

A reef extends for about 1/4 mile from the western side of the bay. There are depths of 12 to 17 fathoms within this bay, but it is fully exposed to the southward and is too narrow to afford a secure anchorage.

From the southern entrance point of Telok Ramboetan the coast trends in a southeasterly direction for about 1 mile to Tandjoeng Baik, which is the western entrance point of Telok Ajer Bini. The eastern entrance point of this bay is Tandjoeng Maloeat, which is situated about 1 3/4 miles eastward of Tandjoeng Baik. Poelau Soei, an islet 300 feet high and about 1/2 mile long, lies in the entrance to Telok Ajer Bini in a position nearly 1/2 mile westward of Tandjoeng Maloeat, and is separated from the eastern side of the bay by a narrow channel. The shores of the bay are fringed by a narrow reef, and there is a detached reef, about 1/4 mile long, lying close offshore about 1/2 mile north-northeastward of Poelau Soei. Several white rocks, about 10 feet high, lie about 3/4 mile west-northwestward of the northern end of Poelau Soei, and a 1 3/4-fathom patch lies in the bay about 3/4 mile northeastward of the white rocks.

Telok Loening is a narrow inlet, about 1/2 mile long, that indents the western side of Telok Ajer Bini. Several houses are located on the shores of this inlet.

Good anchorage is available in Telok Ajer Bini in a position about 1/2 mile northward of Poelau Soei in 16 fathoms, mud bottom.

Between Tandjoeng Maloeat and Tandjoeng Kretang, the southeastern extremity of Poelau Siantan, the coast recedes to a distance of nearly 1 1/4 miles forming another inlet. The shores of this inlet are fronted by a reef that extends as far as 1/4 mile from its head. This inlet does not afford a safe anchorage during the southwest monsoon as it is open to the southwestward.

The southeastern part of Poelau Siantan consists of an irregularly shaped peninsula that terminates at Tandjoeng Kretang. Goenoeng Peta, a sharp conspicuous peak 770 feet high, is the summit of this peninsula, and is situated about 3/4

mile northward of Tandjoeng Kretang. Batoe Tikoes, a rock 12 feet high, lies on the edge of a reef that extends about 1/8 mile southwestward from Tandjoeng Kretang, and Berhala, an islet 140 feet high, with a reef projecting about 200 yards from its northern side, lies about 1/2 mile east-southeastward of Tandjoeng Kretang.

9-38 Eastern coast of Poelau Siantan.—From Tandjoeng Kretang, the coast trends in a northerly direction for about 2 1/2 miles to the northern extremity of the peninsula forming the southeastern part of Poelau Siantan. There are two small inlets westward and southwestward of this point, neither of which has any navigational importance. From this point the coast continues in a general northerly direction for about 3 1/2 miles to the entrance of Telok Baroek, a narrow reef-strewn inlet. On the western side of this inlet are two waterfalls, situated close together. From the northern entrance point of Telok Baroek the coast trends in a northwesterly direction for about 4 1/2 miles to Tandjoeng Momang, which is the northern extremity of Poelau Siantan. Most of the eastern coast of Poelau Siantan is fronted by a reef that extends as much as 1/2 mile offshore northward of the entrance of Telok Baroek. Djangkat, an islet 105 feet high, stands on the reef about 1/2 mile northward of the northern entrance point of Telok Baroek, and another islet, 210 feet high, lies near the edge of the reef in a position about 1 mile south-southeastward of the southern entrance point of Telok Baroek.

9-39 Northern coast of Poelau Siantan.—Between Tandjoeng Momang and Tandjoeng Angkak, about 1/2 mile southwestward, the coast recedes in a southeasterly direction forming a small bay, the shores of which are fronted by reefs and sunken rocks.

Terempa Bay, about 3/4 mile long, is entered between Tandjoeng Angkak and Tandjoeng Baroek, which is situated about 3/4 mile westward of Tandjoeng Angkak and about the same distance east-southeastward of Tandjoeng Pedas, the northwestern extremity of Poelau Siantan. The bay has a sandy beach at its head, but both its sides are

fringed by reefs that extend as far as 300 yards offshore. A white beacon, surmounted by a black cone, marks the edge of the reef extending from the western shore, and a black beacon, surmounted by a red cylinder, marks the edge of the reef extending from the eastern shore.

A light is shown from a white stone structure situated on the slope of the hill about 1/3 mile southward of the head of the bay. Another light is shown from the head of the 312-foot pier which is located at the head of the bay. An unofficial light is shown in front of a house located about 1/4 mile westward of the end of the pier.

Anchorage can be taken near the head of the bay in 15 fathoms, sand and mud bottom, with the white stone light structure, located 1/3 mile southward of the head of the bay, bearing 178° and the unofficial light structure in front of the house bearing 243°. During the Northeast Monsoon vessels should anchor farther out; at this time landing is usually impracticable.

9-40 TEREMPA (3° 13' N., 106° 13' E.), the principal village in the Anambas Eilanden, is situated on the sandy beach at the head of Terempa Bay. It is built on either side of a small creek, the mouth of which dries at low water. The Chinese section is located eastward of this creek and the Malay settlement is located westward of the creek. A government official resides at Terempa, and the government offices are located near the eastern side of the village. The estimated population is between 2,000 and 3,000.

A pier, with a depth of 4 feet alongside, is situated on the eastern side of the village near the government offices. A pier, 312 feet long, is located 100 yards westward of this pier. Vessels drawing up to 13 feet can berth at this pier. There is a wooden pier eastward of the creek.

Provisions.—Fresh bread and pork are available at the Chinese section. Drinking water may be obtained from a pipe situated near the pier.

Communications.—Vessels maintain regular communication with Singapore. There is also a radio station at Terempa.

9-41 Coast.—Between Tandjoeng Baroek and Tandjoeng Pedas, a distance of about 3/4 mile, the coast is indented by a narrow inlet about 1/3 mile long.

A rock, 3 feet high, lies about 1/5 mile offshore in a position about 1/2 mile north-westward of Tandjoeng Baroek and about 1/3 mile east-northeastward of Tandjoeng Pedas.

Selat Peninting is the name given to the channel that separates Poelau Siantan from Poelau Matak. Its western entrance lies between Tandjoeng Pedas, the northwestern extremity of Poelau Siantan, and Tandjoeng Jang, the west extremity of Poelau Matak. At this point the channel is about 2 1/2 miles wide, but it narrows to a width of about 1/3 mile abreast Tandjoeng Kangor, on the north-eastern coast of Poelau Siantan about 2 miles southeastward of Tandjoeng Momang. From its western entrance to Tandjoeng Kangor the channel is deep and free of dangers, but eastward of this point it becomes encumbered by reefs and sunken rocks. The coastal reef near Tandjoeng Kangor extends offshore to a distance of about 600 yards, and foul ground extends southward from the southeastern extremity of Poelau Matak for a distance of about 1 mile, leaving only a narrow channel between the southern limit of the foul ground and the coastal reef that fronts the north-eastern coast of Poelau Siantan.

9-42 THETIS CHANNEL WITH ADJACENT ISLANDS AND DANGERS EASTWARD AND WESTWARD.—The northeastern group of the Anambas Eilanden is divided into two smaller groups by a waterway known as Thetis Channel. For purposes of description the three large islands of the northeastern group, namely Poelau Siantan, Poelau Matak, and Poelau Moeboer, together with their adjacent islands eastward and southeastward, lie on the western side of Thetis Channel, whereas a number of smaller islands and islets lie on its eastern side. Several islets and dangers lie in the fairway, and these will be included in the description of the channel.

9-43 Western side of Thetis Channel.—Batoe Garan, an island 770 feet high, is situated about 1 1/3 miles eastward of the northeastern extremity of Poelau Matak. From Tandjoeng Kepinis, its northern extremity, to Tandjoeng Moening, its southern extremity, it is about 6 miles long. The southern part of the island consists of a narrow peninsula, about 1 mile long, that terminates at Tandjoeng Moening. A ridge of densely wooded hills extends nearly the entire length of the island, and there are several villages (continued on page 181)

along its coasts. Snoel, an islet 300 feet high, lies about $1/5$ mile off the central part of its eastern coast. Poelau Piatjoek, 160 feet high, Poelau Toempik, 280 feet high, Kelang, 140 feet high, and Poelau Seberang, 275 feet high, are small islands lying between Poelau Matak and Batoe Garam. The area in the vicinity of these small islands is shallow and reef-strewn, and there is no navigable passage between Poelau Matak and Batoe Garam.

Pigoes, 175 feet high, Poelau Pidi, 230 feet high, Mantang Besar, 235 feet high, and Mantang Ketjil, 200 feet high, are a chain of islets situated southward of Batoe Garam. Pigoes, the northernmost, lies about $1/4$ mile southward of Tandjoeng Moening, the southern extremity of Batoe Garam, and Mantang Ketjil, the southernmost, is situated about $1\ 3/4$ miles south-southeastward of Tandjoeng Moening. Reefs extend westward from these islets for as much as $1/4$ mile. Foul ground extends eastward from Mantang Besar and south-southwestward from Mantang Ketjil for about $1/4$ mile.

Poelau Beliba, an island 305 feet high and slightly over 1 mile long, lies about $3/4$ mile southwestward of Tandjoeng Moening. It is almost surrounded by a reef that extends as far as $1/3$ mile from its southeastern extremity.

Poelau Lidi, a narrow wooded island 220 feet high and about 1 mile long, is situated about 1 mile southward of Poelau Beliba. The reef that surrounds this island extends as far as $3/5$ mile from its northeastern extremity.

Selat Tebang is a channel between Poelau Beliba and Poelau Lidi on the westward, and the chain of four islets extending southward from Batoe Garam on the eastward. This channel extends into the shallow area between Poelau Matak and Batoe Garam, and terminates in a position close southward of Poelau Seberang. A coral **patch**, with a least depth of 7 fathoms, and possibly less, is situated in the entrance to Selat Tebang in a position between $1/2$ and $3/4$ mile southward of Mantang Ketjil. Vessels can anchor near the middle of Selat Tebang in a position about $3/4$ mile westward of Mantang Besar in depths of 13 fathoms, mud bottom. The north-

eastern extremity of Poelau Matak bearing 350° , and open just westward of the western extremity of Tandjoeng Moening, leads westward of the 7-fathom patch, and also leads to the anchorage in Selat Tebang.

Air Asoek is a narrow wooded island, the northern extremity of which is situated about $1/4$ mile westward of Poelau Lidi. This island, which is 470 feet high and about $2\ 1/2$ miles long, lies parallel to the southern part of the eastern coast of Poelau Matak. The narrow channel between the reefs along the eastern coast of Poelau Matak and the western coast of Air Asoek is a continuation of Selat Peninting, which was described in sec. 9-41. The northern part of the eastern side of Air Asoek is connected to Poelau Lidi by a reef. Poelau Koran, an islet 270 feet high and about $3/4$ mile long, lies on a reef that extends in a southeasterly direction from the eastern side of Air Asoek for a distance of nearly 1 mile.

A **reef**, about $2\ 1/2$ miles long in a northerly and southerly direction, lies close eastward of Air Asoek, Poelau Lidi, and Poelau Koran. Several islets lie on this reef, the largest of which is Tobing, 145 feet high, situated at the southern extremity of the reef.

Poelau Telok Paoe, an island 550 feet high and about $1\ 1/4$ miles long, lies close southward of Air Asoek and about $1/2$ mile eastward of the southeastern extremity of Poelau Matak. Several detached patches of reef lie near the middle of the continuation of Selat Peninting between Poelau Telok Paoe and Poelau Matak. Numerous detached reefs lie within a radius of about $1\ 1/2$ miles northeastward and southeastward of the southern extremity of Poelau Telok Paoe. Temoeang Besar, 100 feet high, and Temoeang Ketjil, 70 feet high, are islets lying on a detached reef about $1\ 1/4$ miles east-southeastward of the southern extremity of Poelau Telok Paoe, and Tingarat, an islet 65 feet high, lies on a detached reef about $1/2$ mile eastward of the eastern extremity of Poelau Telok Paoe. Passage between these reefs is possible only for small craft with local knowledge.

Batoe Belah, 385 feet high, and Poelau Masabang, 435 feet high, are small islands situated respectively about $\frac{2}{3}$ and $\frac{1}{2}$ mile off the middle part of the eastern coast of Poelau Siantan. Both are surrounded by reefs that extend as far as $\frac{3}{4}$ mile northward and eastward from Batoe Belah, and $\frac{1}{2}$ mile northeastward from Poelau Masabang. Paoe, an islet 160 feet high, stands on the reef about $\frac{1}{8}$ mile northward of Batoe Belah, and Rioem, an islet 170 feet high, lies on the reef about $\frac{1}{4}$ mile eastward of Batoe Belah. Two detached reefs lie respectively about $\frac{3}{4}$ mile east-northeastward and east-southeastward of Rioem. Dekit, an islet 140 feet high, lies about $\frac{1}{3}$ mile east-southeastward of Batoe Belah. Foul ground extends a short distance from the eastern side of this islet, and several detached reefs lie within $\frac{1}{3}$ mile eastward and northeastward of it.

Selat Batoe Belah is the channel between Poelau Siantan on the westward and Batoe Belah and Poelau Masabang on the eastward. Its southern entrance lies between the southern extremity of Poelau Masabang and the 210-foot islet off the middle of the eastern coast of Poelau Siantan. (See sec. 9-38.) Its northern entrance is situated at its junction with the eastern part of Selat Peninting. Except for a short distance between Poelau Masabang and Batoe Belah on its eastern side, and off the entrance to Telok Baroek (see sec. 9-38) on its western side, both sides of Selat Batoe Belah are reef-lined, narrowing the channel to about 400 yards. A small detached reef lies in the fairway about $\frac{1}{4}$ mile eastward of Djangkat. (See sec. 9-38.) The tidal current runs somewhat strongly through Selat Batoe Belah, the flood setting southward and the ebb northward.

Poelau Badjau, a large irregular-shaped island about 5 miles long, lies close off the eastern coast of Poelau Siantan, from which it is separated by a narrow channel. There are two conspicuous peaks on this island. Goenoeng Simang, 785 feet high, is situated near the western side of the island, and another peak, 780 feet high, lies about 1 mile northeastward of Goenoeng Simang. The

eastern and western sides of the islands are fairly steep-to, but its northern and southern sides are fringed by reefs and are indented by several bays and inlets. The northern side of the island is comprised of two narrow peninsulas. A reef extends from the eastern peninsula for a distance of about $\frac{3}{4}$ mile. A reef, which uncovers 3 feet, extends for about $\frac{1}{4}$ mile from Tandjoeng Lanting, the northern extremity of the eastern side of Poelau Badjau. The southern extremity of the eastern side of the island is a point situated almost 2 miles southward of Tandjoeng Lanting. A detached reef, which uncovers 3 feet, lies nearly 1 mile southwestward of this point. Another detached reef lies close offshore in a position about $\frac{3}{4}$ mile southwestward of the drying reef. Several rocks, the highest of which is 70 feet, lie close offshore near Tandjoeng Soeka, the southernmost point of Poelau Badjau. Between Tandjoeng Soeka and Tandjoeng Doemang, a point about $1\frac{1}{4}$ miles to the northwestward, there is a bay, the sides of which are fringed by reefs. Several detached reefs and sunken rocks lie near the middle of this bay, the southernmost of which is situated about $\frac{1}{3}$ mile northeastward of Tandjoeng Doemang. Anchorage can be obtained near the entrance to this bay in a position about $\frac{3}{8}$ mile south-southeastward of Tandjoeng Doemang in depths of 15 fathoms, sand bottom.

Selat Berawa is the channel that separates the western side of Poelau Badjau from the southern part of the eastern coast of Poelau Siantan. Its southern entrance lies between Tandjoeng Doemang and a point on the southeastern coast of Poelau Siantan about $\frac{1}{2}$ mile southwestward of Tandjoeng Doemang. The width of this channel is only about $\frac{1}{8}$ mile.

Selat Semanggi is a continuation northward of Selat Berawa, and is about $2\frac{1}{4}$ miles long from its northern end to its junction with Selat Batoe Belah and Selat Taboerik. A $5\frac{1}{2}$ -fathom coral patch lies in the fairway of this channel in a position about $\frac{3}{4}$ mile north-northwestward of the 785-foot summit of Poelau Badjau.

Selat Tamboerik is the name of the channel be-

tween the western peninsula on the northern side of Poelau Badjau and the southeastern side of Poelau Masabang. Its narrowest part, having a width of about 1/4 mile, is at its northeastern end between the reefs that project in a northeasterly direction from Poelau Masabang and the western peninsula on the northern side of Poelau Badjau. Tidal currents set through this channel with a velocity of 1 knot, the flood setting southwestward and the ebb northeastward.

9-44 Pemoetoes group.—Pemoetoes, an island 260 feet high and about 1 1/3 miles long, is situated about 1 1/4 miles eastward of the southern extremity of Poelau Badjau. It is surrounded by a narrow reef, and its coasts are indented by several small bays. Tina, and Tengerran, 135 feet high, are islets lying respectively about 1/4 mile west-southwestward and 2/3 mile southwestward of Tandjoeng Boloe Kara, the southern extremity of Pemoetoes.

Batoe Itam, 250 feet high, and Oeroek Oeroek, 195 feet high, are small islands joined together by a reef, situated respectively about 1/2 mile east-southeastward and 3/4 mile east-northeastward of the northern extremity of Pemoetoes. An islet, 30 feet high, stands on the reef that projects about 1/4 mile southward from the west extremity of Oeroek Oeroek. Pengelat, an island 250 feet high, lies close off the eastern side of Oeroek Oeroek, from which it is separated by a narrow channel. Anchorage can be obtained between Pengelat and the northern extremity of Oeroek Oeroek in a position about 600 yards eastward of the northern extremity of Oeroek Oeroek in depths of about 18 fathoms, sand bottom.

Selat Tandjoeng Soeka is the name of the channel between the islands just described and the southeastern coast of Poelau Badjau. The fairway through this channel has an average width of about 1/2 mile and is free of dangers except for the detached reef drying 3 feet, that lies off the southeastern side of Poelau Badjau. (See sec. 9-43.) The tidal currents, which are diurnal in character, set through the channel with a velocity of 1 1/2 to 2 knots, the flood setting south-

westward and the ebb northeastward. A southerly wind and current often produce tide rips in the southern part of Selat Tandjoeng Soeka.

Walsh Bank, with a least depth of 6 fathoms, coral bottom, lies near the southwestern entrance of Selat Tandjoeng Soeka and in the fairway between the southwestern and northeastern groups of the Anambas Eilanden in a position about 2 1/2 miles south-southeastward of the southern extremity of Poelau Siantan and about 2 2/3 miles south-southwestward of the southern extremity of Pemoetoes. The 20-fathom curve is nowhere more than 1/2 mile distant from this patch. The southeastern extremity of the eastern side of Poelau Badjau bearing 31° and just open westward of the western side of Poelau Getah (see sec. 9-55) leads about 1/3 mile westward of this patch.

9-45 Memperoek group.—Memperoek, an island 760 feet high and about 2 3/4 miles long, lies about 1/2 mile eastward of Pemoetoes. Its northern and southern extremities are fairly steep-to, but the remainder of the island is fringed by a narrow reef. Two rocks above water lie close off Tandjoeng Belantan, the southeastern extremity of the island. Batoe Rakit consists of a number of rocks, the highest of which is 6 feet, extending from the middle of the eastern coast of Memperoek for a distance of about 1/4 mile.

Abang, an islet 345 feet high, lies close westward of the southern part of Memperoek, from which it is separated by a very narrow channel. A reef extends from the eastern and western sides of this islet for a distance of about 1/5 mile. A rock, 15 feet high, stands on the reef that projects from the western side of the islet.

The channel between Memperoek and the islands forming the southeastern side of Selat Tandjoeng Soeka is only about 1/8 mile wide at its narrowest part, and is not recommended.

9-46 Poelau Akar group.—Semoet, an island 240 feet high and about 1/2 mile long, is the westernmost island of the Poelau Akar group. It lies about 1 1/4 miles southeastward of the southeastern extremity of Memperoek.

Telok Bakau, an island 225 feet high and nearly 1 mile long, is situated about 1/3 mile east-southeastward of Semoet. A reef fringes the eastern side of this island, and extends northward from the island for a distance of about 2/3 mile. Baba, an islet 135 feet high, stands on the western side of this reef.

Bate, an island 270 feet high, lies slightly more than 1/4 mile northeastward of Telok Bakau. A narrow reef projects southward from Bate for a distance of about 1/3 mile, leaving a very narrow channel between it and the reef that fringes the eastern side of Telok Bakau.

Poelau Akar, the largest and easternmost of the Poelau Akar group, is 525 feet high and about 1 1/2 miles long. It is situated about 1/2 mile eastward of Telok Bakau. Two narrow inlets, both of which are encumbered by reefs, indent the northern side of the island.

Tjatoe, an islet 190 feet high, lies slightly more than 1/8 mile southwestward of the southwestern side of Poelau Akar.

9-47 Dangers.—There are two detached dangers in the fairway of the channel between Memperoeck and the Poelau Akar group. Batoe Laki, a rock 3 feet high, lies about 4/5 mile east-northeastward of Tandjoeng Belantan, the southeastern extremity of Memperoeck, and about 3/4 mile north-northwestward of Semoet. Batoe Bini, which dries 3 feet, lies about 1 mile northeastward of Tandjoeng Belantan and about the same distance north-northwestward of Semoet. Tide rips are often observed in the vicinity of these dangers.

Noensa, the southernmost island of the northeastern group of the Anambas Eilanden, is situated about 1 1/4 miles south-southeastward of Poelau Akar. This narrow island is about 3/4 mile long and attains an elevation of 196 feet near its northern end. It is fairly steep except its southern end, from which foul ground extends for a distance of about 1/8 mile.

A small hank, with a least depth of 13 fathoms, lies about 1 1/2 miles southward of Noensa.

The tidal currents in this vicinity, which are

diurnal in character, attain a velocity of about 1 knot, the flood setting southwestward and the ebb northeastward.

9-48 Eastern side of Thetis Channel—Poelau Pendjalin group.—Poelau Pendjalin Besar ($3^{\circ}23'N.$, $106^{\circ}26'E.$), the largest and westernmost of the Poelau Pendjalin group, is situated about 5 miles eastward of Batoe Garam and marks the eastern side of the northern end of Thetis Channel. Its rounded summit, 430 feet high, is situated near its center. Its western side recedes to a distance of about 1/3 mile forming a large bight, the depths in which are too great to afford a secure anchorage. **Foul ground** extends a short distance from the southwestern extremity of this island.

Poelau Setoedjoe, a small narrow island 215 feet high, lies at the extremity of a reef that extends in a northeasterly direction from Pendjalin Besar for a distance of about 3/4 mile. An islet, 125 feet high, lies on the same reef about 1/4 mile southward of Poelau Setoedjoe.

Poelau Pendjalin Ketjil, an island 320 feet high, lies close off the southeastern extremity of Poelau Pendjalin Besar, from which it is separated by a narrow channel. Except for the middle of its northern side, this island is fringed by a reef that extends as far as 1/2 mile from its southeastern side. Two **rocks**, the eastern of which is 2 feet high, lie inside the reef close off Tandjoeng Lamoen, the southern extremity of the island.

Poelau Pasoe, an islet 200 feet high, lies about 1/5 mile off the eastern extremity of Poelau Pendjalin Ketjil, to which it is joined by a reef. Two smaller islets, 60 and 70 feet high respectively, lie on either side of this reef.

Vessels can anchor northward of Poelau Pendjalin Ketjil with the eastern extremity of Poelau Pendjalin Besar bearing 233° , distant about 1/2 mile, in depths of 15 fathoms, sand and coral bottom.

Alarm Bank, a coral shoal about 1/2 mile in extent, and having a least known depth of 4 3/4 fathoms, lies about 3/4 mile east-northeastward

of Poelau Pasoe. A 6-fathom patch is situated about 1/2 mile east-northeastward of this shoal, and there is a 15-fathom patch about 1/2 mile eastward of the 6-fathom patch. Alarm Bank and the two patches just described are marked by heavy tide rips, and navigation in this vicinity should be avoided.

9-49 MANDA RIOUW GROUP.—Njemoek, an island 180 feet high and nearly 1/2 mile long, is situated about 3 miles southwestward of Poelau Pendjalin Besar. It is free of reefs, but there are depths of less than 6 fathoms around the island that extend as far as 1/4 mile southwestward of it.

Tokong Goeroeng, an islet 30 feet high, and surrounded by shoal water for a distance of nearly 1/4 mile, lies about 3/4 mile southward of Njemoek.

Menjali, an island 200 feet high and nearly 3/4 mile long, lies about 1/2 mile south-southeastward of Tokong Goeroeng. This island is fringed by a narrow reef at its southeastern side.

Manda Riouw Darat, an irregular-shaped island 465 feet high and about 1 1/3 miles long, is situated about 1/3 mile southeastward of Menjali. A bay, about 1/4 mile wide, indents its northern side to a distance of about 1/2 mile. Two boulders, 30 and 40 feet high respectively, lie close off its western side, most of which is fringed by a narrow reef. Square Rock, 12 feet high, lies close off the southern extremity of the island.

Manda Riouw Laoet is an island 335 feet high and nearly 2 miles long. Its northern extremity is situated about 1/8 mile eastward of the southeastern extremity of Manda Riouw Darat. Its southwestern extremity is connected to the southern extremity of Manda Riouw Darat by a reef that fronts the shallow reef-strewn area between the western side of Manda Riouw Laoet and the southeastern side of Manda Riouw Darat. A rock, 4 feet high, lies close off the southwestern extremity of Manda Riouw Laoet, and Ipil, an islet, lies on the edge of a reef that extends from its southern extremity for a distance of about 1/5 mile.

Mangkian, an island 140 feet high and cultivated with coconut trees, lies about 1 1/8 miles southwestward of Manda Riouw Laoet. A narrow neck of land projects from the southwestern side of the island for a distance

of about 1/4 mile. The entire island is surrounded by a reef to as much as 1/5 mile on its western and southeastern sides. A rock, which dries 3 feet, stands near the edge of the reef close off the northwestern part of the island.

A shoal, with a depth of 2 1/2 fathoms, lies about 3/5 mile southward of the southern extremity of Mangkian. A 4-fathom patch lies close northward of this shoal. Two patches, with depths of 4 1/4 and 5 1/4 fathoms, lie respectively about 1 3/5 miles southward and about 1 1/3 miles south-southeastward of the 2 1/2-fathom shoal.

9-50 POELAU SAGOEDAMPAR GROUP.—Poelau Sagoedampar, an island 500 feet high and about 1 1/2 miles long, is situated about 2 miles southeastward of Manda Riouw Laoet. It is fringed by a narrow reef except its northern side, from which a reef, about 1/2 mile wide, extends for a distance of nearly 1 mile. Sama, an islet 225 feet high, lies on the northeastern side of this reef. A smaller islet, 40 feet high, lies on the northwestern extremity of this reef, and Tjina, another islet, lies near the edge of the reef close westward of the northern extremity of Poelau Sagoedampar. Three detached reefs, the center one drying 4 feet, lie about 1/4 mile off the southwestern side of the island.

A detached 22-foot shoal lies 1 1/2 miles westward of the south end of Poelau Sagoedampar.

9-51 POELAU SELAI GROUP.—Boesoeng, a wooden island 335 feet high and about 1/2 mile long, is situated about 3/4 mile eastward of the southeastern extremity of Poelau Sagoedampar. Its western and southern sides are fringed by a reef, on the eastern extremity of which there is an islet 110 feet high. A remarkable boulder, 50 feet high, lies in the shallow water that extends about 1/3 mile from the eastern side of the island, and several above-water rocks lie close southward of this boulder. A detached patch awash lies about 1/3 mile southward of the island.

A rock with a depth of less than 6 feet over it lies in the channel between Boesoeng and Poelau Sagoedampar in a position about 2/5 mile east-southeastward of the southeastern (continued on page 186)

extremity of Poelau Sagoedampar and about 1/2 mile westward of the southern extremity of Boesoeng. With the exception of this rock, the channel is deep and clear.

Penilan, a narrow island 305 feet high and about 1 mile long, is situated about 2/3 mile southeastward of Boesoeng. With the exception of its northern extremity and a short stretch near the middle of its eastern side, the island is fringed by a narrow reef.

Poelau Selai, the easternmost of the Anambas Eilanden, is situated close southeastward of Penilan, from which it is separated by a narrow boat channel. Its summit, which is 530 feet high, appears as a sharp peak when viewed from northward or southward, but from other directions it has the appearance of a wide ridge. The island is about 1 3/4 miles long, and its coast is indented by several bays, those on the southern and eastern sides being encumbered by reefs and sunken rocks. **Anchorage**, which is sheltered from southerly winds, can be taken near the center of the bay on the northern side of the island in a depth of 13 fathoms.

9-52 Telok Risan group.—Telok Risan, an irregular-shaped island 570 feet high, is situated nearly 2 miles west-southwestward of Poelau Selai. Except for its southwestern extremity and a portion of its eastern side, it is surrounded by a reef that extends as far as 1/3 mile from its southern side. A rock, 40 feet high, stands on the reef close off the eastern side of the northern extremity of the island, and another rock, 60 feet high, stands on a detached reef about 1/8 mile eastward of its southeastern extremity. An islet, 150 feet high, lies near the edge of the reef between the southeastern and southwestern extremities of the island. An area of foul ground, nearly 1/2 mile long and about 1/4 mile wide, lies near the entrance to a bay that indents the western side of the island to a distance of about 1/3 mile.

A **patch**, with a least depth of 2 1/2 fathoms, lies about 1/2 mile westward of the foul ground, and a detached drying reef lies about 1 1/4 miles west-northwestward of the foul ground.

Temeroek, an island 280 feet high, lies about 1/8 mile southward of Telok Risan. A narrow neck of land, terminating in a promontory 80 feet high, projects in a southwesterly direction from Temeroek for a distance of about 1/2 mile, and a reef extends in a north-northeasterly direction from this promontory for a distance of about 3/4 mile.

Niboeng, an islet 135 feet high, lies about 1/6 mile southeastward of Temeroek.

Koedok, an islet 85 feet high, lies about 1 mile northeastward of the northern extremity of Telok Risan.

A detached **reef**, about 1/3 mile in diameter, which uncovers 5 feet, lies about 3/4 mile westward of Koedok. A smaller **reef** lies close northward, and two **patches**, with least depths of 3 3/4 and 5 fathoms, lie respectively about 5/8 mile northwestward and 2/5 mile northward of this drying reef. Four small **reefs**, two of which uncover, lie within 1 1/4 miles southwestward of the large reef.

9-53 Poelau Poendjoeng group.—Poelau Poendjoeng, the largest island of this group, is situated nearly 1/2 mile southward of the 80-foot promontory of Temeroek. This island is about 2 miles long, and has two prominent peaks near its center, the higher of which is 1,140 feet. The eastern side of the island is steep-to, but the remainder of it is fringed by a narrow reef. An islet, 190 feet high, lies about 1/3 mile southwestward of the southeastern extremity of the island, and another islet, 95 feet high, lies close off its southwestern side.

Pempang, a narrow island 460 feet high and about 4/5 mile long, is situated about 1/2 mile eastward of the southeastern extremity of Poelau Poendjoeng. This island is fairly steep-to and densely wooded. It is inhabited.

Mentalak, an island 300 feet high and slightly over 1 mile long, is situated about 2/3 mile southward of the southwestern extremity of Poelau Poendjoeng. Its eastern and western sides are fringed by a reef. This island is partially cultivated with coconut trees.

9-54 Pedjaoel group.—Pedjaoel, an island 760 feet high and about 1 1/4 miles long, lies about 1/3 mile west-northwestward of the southwestern extremity of Poelau Poendjoeng. Two islets, 150 and 180 feet high respectively, stand on the edge of a reef that projects from the northwestern side of the island for a distance of about 1/3 mile. A rock, 3 feet high, lies about 1/5 mile southwestward of the 150-foot islet. Two 6-fathom patches, nearly 1/2 mile apart, lie about 1/3 mile off the southern side of Pedjaoel.

Pengending, an island 815 feet high, lies about 1/3 mile northeastward of the eastern side of Pedjaoel, to which it is connected by a reef. A rock, 6 feet high, stands on a reef that extends in an easterly direction from the northeastern side of Pengending for a distance of about 1/4 mile. An islet, 160 feet high, lies on the edge of a reef close off the northwestern extremity of the island. A rock awash lies about 1/8 mile northward of this islet, and another rock, 4 feet high, lies between them. An islet, 115 feet high, from which a reef projects for a short distance, lies about 1/2 mile northwestward of the 160-foot islet. There is anchorage, which is sheltered from southerly winds, northward of Pedjaoel, with the 160-foot islet off the northern extremity of Pengending bearing 95° and the 115-foot islet just described bearing 34°. The depth in this anchorage is 13 fathoms, sand and coral bottom.

Channels.—Selat Telok Dalam is the name of the channel between the Pedjaoel group on the northwestward and the Poelau Poendjoeng group on the southeastward. This channel, which is about 1/8 mile wide at its narrowest part, is deep and free of detached dangers, although its northern end is somewhat encumbered by the reef that extends from the northeastern side of Pengending.

The channel between the Pedjaoel group and the Poelau Poendjoeng group on the southward, and the promontory of Temeroek on the northward is about 2/5 mile wide, and is deep and clear.

9-55 Poelau Loejong group.—Poelau Loejong, a narrow wooded island about 1 3/4 miles long, is situated about 1 1/2 miles northwestward of the

180-foot islet off the northwestern side of Pedjaoel. It consists of two well-defined peaks, separated by a narrow strip of low land, the northern and higher of which is 375 feet. The western side of the island is indented to a distance of about 1/4 mile by a bay about 1/2 mile wide. A rock, 10 feet high, lies close off the northwestern extremity of the island, and another rock, 8 feet high, lies about 1/5 mile south-southwestward of the 10-foot rock.

A patch, with a least depth of 2 1/4 fathoms, and depths of 3 1/2 to 10 fathoms close around, lies about 1/2 mile westward of the head of the bay on the western side of the island.

Poelau Getah, a wooded island 290 feet high, lies about 1/8 mile south-southeastward of Poelau Loejong. Its northwestern side is connected to the southeastern part of Poelau Loejong by a reef. A rock, 12 feet high, lies close off the northern extremity of Poelau Getah.

Esperance Reef, nearly 1/2 mile in extent, and having a sandbank that dries 6 feet on its south end, lies about 1 mile northeastward of the northern extremity of Poelau Loejong. A tangent on the eastern side of Poelau Getah in range 209 1/2° with the northern extremity of Oeroek Oeroek (see sec. 9-44) leads eastward of Esperance Reef and the 4 1/4 and 5 1/4-fathom patches southward of Mangkian, and westward of the reef lying about 1 1/2 miles westward of Telok Risan.

9-56 Islands and dangers in Thetis Channel.—

Hooper Bank are two detached shoals lying southeastward of the southern part of Batoe Garam. (See sec. 9-43.) The northern patch, with a sand and coral bottom, has a least depth of 5 fathoms, and lies about 1 1/4 miles eastward of Tandjoeng Moening, the southern extremity of Batoe Garam. The southern patch, with a depth of 6 fathoms, lies about 1 mile southward of the northern patch.

Hale Bank, a coral shoal having a least depth of 3 1/2 fathoms, lies nearly in the middle of Thetis Channel in a position about 1 1/2 miles southwestward of the southern extremity of Manda Riouw Darat.

Thetis Reef, lying near the middle of Thetis

Channel, is a coral reef about 1/2 mile long. It is situated about 2 miles west-southwestward of the southwestern extremity of Mangkian, in the Manda Riouw group. A 4 1/2-fathom patch lies about 1/3 mile south-southwestward of the reef, and a 4-fathom patch lies about 2/3 mile west-northwestward of it. Patches with depths of 3 to 5 fathoms lie within 1 mile northward of Thetis Reef.

A narrow reef, about 1 mile long, is situated about 1 mile southwestward of Thetis Reef. There is a sand cay on this reef, which dries 5 feet.

Mangkian Pandak, an island 160 feet high, is situated about 1 1/4 miles northwestward of the northern extremity of Poelau Loejoeng. A reef extends from the western side of this island for a distance of about 1/5 mile, and a sandy spit projects from its southern end. Two wooded islets, 80 and 160 feet high, lie respectively about 1/5 mile east-southeastward and 1/2 mile south-southeastward of the island. A coral head, with a depth of 3 1/2 fathoms, lies about 1 mile north-northeastward of Mangkian Pandak, and a coral shoal, with a least depth of 3 fathoms, lies about 3/5 mile northeastward of it. A detached 6-fathom patch lies about 1/3 mile east-northeastward of the 3-fathom coral shoal.

Chabrol Bankan, two in number, lie about midway between the eastern side of Poelau Badjau and the western extremity of Pedjael. The southeastern patch, having a least depth of 3 1/2 fathoms, lies about 4/5 mile westward of the western extremity of Pedjael, and the northwestern patch, with a least depth of 4 1/2 fathoms, is situated about 1 1/3 miles westward of the same point and about 2/5 mile northwestward of the southeastern patch.

Howard Rock, with a depth of 2 1/4 fathoms over it, lies about 3/4 mile east-southeastward of the northern extremity of Memperook. (See sec. 9-45.)

The southwestern extremity of Mangkian Pandak in range 342° with the southwestern extremity of Poelau Getah leads about 3/4 mile eastward of Howard Rock and close eastward of the southeastern patch of Chabrol Bankan.

Egeria Rock (3°02'N., 106°27'E.), a coral head with a depth of 2 fathoms, lies in the southern approach to Thetis Channel in a position about 2 1/2 miles east-northeastward of the southern extremity of Poelau Akar. (See sec. 9-46.) A 3 1/2-fathom coral patch lies about 1/2 mile westward of Egeria Rock.

9-57 ZUID NATOENA EILANDEN.—This group, consisting of several islands and numerous reefs and shoals, is situated about 15 to 75 miles northwestward of the northwestern coast of Borneo, from which it is separated by Api Passage. (See sec. 8-93.) The islands and dangers of the Zuid Natoena Eilanden consist mainly of two groups. The islands of the southern, or Poelau Serasan group, are high and rocky, and those of the northern, or Poelau Soebi group, are low and flat. All of the islands are cultivated with coconut trees to a certain extent, but there are few villages of any size in the Zuid Natoena Eilanden.

Tides.—The character of the tides in the Zuid Natoena Eilanden is mixed. A semi-diurnal tide predominates in the Poelau Serasan group, but that in the northern part of the Poelau Soebi group is almost balanced. The mean spring range at Poelau Serasan is about 6 feet, and the mean diurnal range at Poelau Soebi Ketjil, the northernmost island of the Poelau Soebi group, is about 4 3/4 feet.

9-58 POELAU SERASAN GROUP—Outlying islands and dangers.—**Sint Petrus-eiland** (1°54'N., 108°39'E.), the southernmost of the Zuid Natoena Eilanden, consists of two densely wooded islets connected by a drying reef. The western and larger islet is 334 feet high, and lies about 41 miles westward of Tandjoeng Moenggoeresak, on the northwestern coast of Borneo. A narrow reef fringes both islets. The two islets have been reported (1958) to be good radar targets at a distance of 20 miles. Anchorage can be taken, in depths of about 16 fathoms, northward of the reef that joins the two islets, or close off the southern side of the western islet, according to the prevailing wind. There is a light-keeper's relief house near both anchorages,

and these houses can be reached by way of a beacons channel through the coastal reef.

A **light** is shown from a white iron framework, 66 feet high, situated near the center of the western islet.

Sint Petrus Rock, 8 feet high and steep-to, lies about 2 miles southward of Sint Petrus-eiland. The channel between them is deep and clear.

Poelau Meroendoeng, an island about $1\frac{1}{4}$ miles long, is situated about 28 miles east-northeastward of Sint Petrus-eiland and about $15\frac{1}{2}$ miles northeastward of Tandjoeng Moenggoeresak. It consists mainly of mangrove swamp, but there are two hills, covered with trees, near its center. The elevation of the tree tops is about 118 feet. A drying reef lies about $\frac{1}{2}$ mile off the western side of the island, and there is a 1-fathom patch close westward of it. In 1939 breakers were reported close off the northwestern end of the reef. A $2\frac{3}{4}$ -fathom patch lies about $1\frac{1}{4}$ miles north-northeastward of the northern extremity of Poelau Meroendoeng, with a 5-fathom patch close southward of it.

A **light** is shown from a white iron framework tower, 98 feet high, on the summit of Poelau Meroendoeng.

A **coral patch**, with a least depth of 26 feet, lies about 10 miles northeastward of Poelau Meroendoeng. Banks, with depths of 8 to 10 fathoms, lie between this patch and the island.

Semboeni Reefs consist of a number of rocky heads with depths of 10 to 19 feet. The westernmost, which is awash, lies about $9\frac{1}{2}$ miles northward of Poelau Meroendoeng, and from this position the reefs extend in an east-northeasterly direction for a distance of about 8 miles, with a 10-foot patch at the east extremity.

Maloe Reefs, composed of coral, lie west-northwestward of Semboeni Reefs. The southwesternmost shoal, with a least depth of $11\frac{1}{2}$ fathoms, lies about $7\frac{1}{2}$ miles west-northwestward of the westernmost of the Semboeni Reefs and about $13\frac{1}{2}$ miles north-northwestward of Poelau Meroendoeng. The northeasternmost of these reefs, with a least depth of $2\frac{1}{4}$ fathoms,

lies about 11 miles east-northeastward of the southwesternmost shoal. Between them are several detached reefs, three of which have sandy cays that dry about 7 feet. The channel between Maloe Reefs and Semboeni Reefs is deep and clear.

Zuid Hooiberg, a small island 469 feet high, is situated about 17 miles northwestward of Poelau Meroendoeng. This island is fringed by a narrow reef, and an above-water rock lies close south-westward of it.

Serasan Passage, which is free of dangers, lies between Zuid Hooiberg and Maloe Reefs on its southern side and Poelau Serasan, with its adjacent islands, on its northern side. The least width of the passage, which is near its eastern end between the southeastern extremity of Poelau Serasan and the northeasternmost of the Maloe Reefs, is about 7 miles.

Poelau Perhantoean, a steep-to densely wooded island 479 feet high and about $\frac{2}{3}$ mile long, lies near the eastern end of Serasan Passage in a position about $2\frac{1}{2}$ miles southward of the southeastern extremity of Poelau Serasan. The channels on both sides of this island are deep and clear.

Poelau Serasan, the second largest of the Zuid Natoena Eilanden, is situated about $24\frac{1}{2}$ miles northward of Poelau Meroendoeng and about $40\frac{1}{2}$ miles northwestward of Tanjong Datu, on the northwestern coast of Borneo. The island is about 9 miles long, and has a summit of 1,447 feet near its southwestern extremity. The southern and eastern sides of the island are fringed by a reef that extends nearly one mile from the center of a bight near the middle of the southern side. A sandy bay, about 6 miles wide, indents the eastern part of the northern coast of the island for a distance of about 1 mile. Several shoal patches, with depths of $\frac{1}{2}$ fathom to $4\frac{1}{4}$ fathoms, lie as much as 1 mile off this section of the coast. From the western extremity of this bay the coast trends in an easterly direction for about 2 miles to Tandjoeng Koti, the northwesternmost point of Poelau Serasan. Koti, a hill 761 feet high, lies close inside this point. This conspicuous hill is nearly perpendicular on its

western side and is marked with bare red patches. From Tandjoeng Koti the coast trends southward for about 2 miles to a point known as Klapperhoek. This part of the coast is rather hilly. Eastward of Klapperhoek the coast is indented to a distance of about 3 miles by a bay, most of which is encumbered by drying reefs. From Macdowal Point, the southern entrance point of this bay, which is situated about 2 miles southeastward of Klapperhoek, the coast trends southward for about 1/2 mile to Tandjoeng Bilin, and thence southeastward for about 1 mile to Park Point, the southwestern extremity of Poelau Serasan. This section of the coast is fringed by a narrow reef.

9-59 Islands and dangers westward of Poelau Serasan.—Close westward of Poelau Serasan is an extensive reef, about 4 miles in diameter, on which there are several islands and islets. The Gordon Eilanden, situated on the northeastern part of the reef, consist of an island 359 feet high and about 3/4 mile long, and four islets. Two of these islets lie close northwestward of this island, and the other two lie close off its eastern side. Perajoen, an islet 359 feet high, lies near the southeastern side of the reef. Four smaller islets lie northeastward and northwestward of Perajoen. Hadji, another islet, lies on a detached reef about 1/2 mile southwestward of Perajoen. Poelau Teberian, the largest of the islands on the reef, lies on the western side of the reef in a position nearly 2 miles west-northwestward of Hadji. It is 744 feet high and about 2/3 mile long. Two detached shoals, which dry, lie between 1/2 mile and 1 1/4 miles southward of the south side of Poelau Teberian. Teberian Ketjil, an islet 260 feet high, lies close off the northeastern extremity of Poelau Teberian.

A reef about 600 yards in extent and with a least depth of 19 feet lies about 1 mile northwestward of Poelau Teberian.

A shoal, with a least depth of 33 feet, lies about 1/2 mile west-southwestward of the northwest extremity of Poelau Teberian. A 16-foot and a 19-foot patch lie about 600 yards and 1,600 yards, respectively, south-southwestward of the same point. A 6-fathom patch lies about 1/2 mile northward of the northwest extremity of Poelau Teberian.

There is a narrow channel through the reef between Hadji and the Gordon Eilanden on the

eastward, and Poelau Teberian and Teberian Ketjil on the westward, but it is navigable only by small boats.

9-60 Royalist Haven.—Royalist Haven is the name given to the passage between Poelau Serasan and the extensive reef that lies westward of it, which is described above. Its narrowest part is abreast Macdowal Point, where its width is about 1/3 mile. It is entered between Batoe Hol on the eastward and Batoe Patjil on the westward. The former is a coral shoal, awash near its west end, that lies about 1/4 mile south-westward of Park Point. The west edge of this shoal is marked by a **beacon** with two black cones. The latter is a coral shoal, with a least depth of 8 feet, lying about 2/3 mile west-southwestward of Park Point and about 1/6 mile eastward of the southeast extremity of the reef. Its east side is marked by a **beacon** with a red cylindrical topmark.

There are numerous shoals and sunken rocks in the south part of the channel of Royalist Haven, most of which are marked by privately maintained **beacons**. Those marking the shoals on the east side of the fairway are surmounted by white balls, and those on the west side by black truncated cones. When approaching Royalist Haven from the westward, care should be taken that one of these privately maintained beacons is not mistaken for the official beacon marking Batoe Patjil. Abreast Macdowal Point the channel is divided, the east branch extending into the reef-encumbered bay between Macdowal Point and Klapperhoek for a distance of about 1 mile, and the west branch trending in a west-northwesterly direction for a distance of about 1 1/2 miles to the edge of the reef projecting southward from Klapperhoek.

Depths.—The general depths in Royalist Haven from its entrance to Macdowal Point are 7 to 12 fathoms. Beyond this point the eastern branch of the channel shoals rather quickly. In the western branch the depths decrease gradually to 3 1/4 fathoms until abreast of Klapperhoek, where they increase regularly out to the 10-fathom curve. This branch of the channel is unnavigable, however, because of the numerous coral reefs.

9-61 Anchorage.—There is good anchorage, in depths of 8 to 10 fathoms, in a position about 1/4 mile southwestward of Tandjoeng Bilin. There is also anchorage farther northward, in a position about 1/2 mile northwestward of Macdowal Point. During the southwest monsoon there is well sheltered anchorage, in depths of about 5 1/2 fathoms, off the western entrance to Royalist Haven in a position about 1 3/4 miles southwestward of Klapperhoek. A tangent on the southwestern side of Teberian Ketjil in range 130° with the summit of Parajoen leads to this anchorage. Care must be taken to avoid the 2 3/4-fathom and 1 1/2-fathom patches lying respectively about 2/3 and 5/6 mile northwestward of Teberian Ketjil.

Vessels should not attempt to enter Royalist Haven from westward between Klapperhoek and Poelau Teberian. This passage is unmarked and there are many patches, with depths of 16 feet or less over them, within 1 mile northwestward of a line joining this point and islet. Within this entrance there are several unmarked rocks, both sunken and awash.

9-62 Directions.—Vessels approaching Royalist Haven should steer with Koti Hill in range about 336° with Tandjoeng Bilin, which leads through the entrance. When the outermost detached rock off Klapperhoek is in range 319° with the northeastern extremity of the largest of the Gordon Eilanden, this range will lead to the anchorage southwestward of Tandjoeng Bilin. If proceeding to the anchorage northwestward of Macdowal Point, the vessel must be coned by eye between the reefs westward of Macdowal Point until the easternmost of the Gordon Eilanden is in range 206° with the eastern side of Hadji. Anchorage may then be taken as convenient on this range.

9-63 PALEMPA, a village situated near the southeastern end of the bay between Macdowal Point and Klapperhoek, is the residence of the Administrator of the Zuid Natoena Eilanden. It is not visible from the northern anchorage in Royalist Haven, but can be reached by boats through a narrow beacons channel.

A pier, about 1,300 feet long, extends over the reef from the southeastern end of the bay. A stone pier, about 200 feet long, is situated nearly 1/2 mile westward of the 1,300-foot pier.

9-64 Islands and dangers northeastward of Poelau Serasan.—A group of islands and shoals extends in a north-northeasterly direction from

the northeastern extremity of Poelau Serasan for a distance of about 7 1/2 miles.

Poelau Genting, an island 380 feet high and about 1 mile long, is the southernmost of these islands, and is situated nearly 1 mile northeastward of the northeastern extremity of Poelau Serasan.

Peanjamoeck, an islet 242 feet high, is situated about 1 1/3 miles northwestward of Poelau Genting. Two shoals, each with depths of 26 feet, lie, respectively, about 1/2 mile westward and 2 1/2 miles west-northwestward of Peanjamoeck.

Poelau Sempadi, an island 544 feet high and about 1 mile long, is situated about 2 1/4 miles north-northeastward Poelau Genting. A 1 1/4-fathom patch lies about 3/4 mile westward of Poelau Sempadi, and two 6-fathom patches lie respectively about 1 1/2 miles west-southwestward and the same distance east-northeastward of it.

Sedoea, a hilly islet, is situated about 1 3/4 miles north-northwestward of Poelau Sempadi. A reef extends from the southeastern side of this islet for a distance of about 1/3 mile.

A reef, about 3/4 mile long, lies close southwestward of Sedoea, from which it is separated by a deep but narrow channel. Rikel, an islet, stands on the northern extremity of this reef, and Banjo, a smaller islet, lies near the center of it.

Kepala, a low rock, lies about 1 1/2 miles northeastward of Sedoea. Its eastern side is fringed by a reef.

Koti Passage is the name of the channel that separates the Poelau Serasan group from the Poelau Seobi group. It is about 10 miles wide between the northwestern extremity of Poelau Serasan and Kerdau, the southeasternmost island of the Poelau Seobi group.

Haynes Shoal, with a least depth of 19 feet, lies in the fairway of Koti Passage in a position about 8 miles westward of the northwestern extremity of Poelau Serasan. A tangent on the northern extremity of Poelau Serasan in range 98° with the northern peak of Poelau Genting leads close northward of Haynes Shoal. With the exception of this shoal, Koti Passage is deep and free of detached dangers.

Current.—During the southwest monsoon a current has been observed to set in a northerly

direction in Koti Passage with a velocity of about 2 1/2 knots.

It was reported, in 1961, that a vessel experienced an easterly set, of 1 1/2 to 2 1/2 knots, in the northern approach to this passage.

9-65 POELAU SOEBI GROUP.—Poelau Seraja ($2^{\circ}41'N.$, $108^{\circ}34'E.$), the southwesternmost island of this group, is situated about 25 miles west-northwestward of Poelau Serasan. It is a hilly island about 3 miles long with two peaks near its center, the southern and higher of which is 833 feet. The 1-fathom curve lies about 3/4 mile off the western side of the island. The western side of the island rises steeply from the sea, but its eastern side, which is fringed by a reef, is low and sandy. Foul ground extends about 1/3 mile from the northwestern side of the island, and a 10-foot patch lies about 1/2 mile northeastward of its northern extremity.

Doea, a rock 65 feet high, lies about 1 1/2 miles northeastward of the northern extremity of Poelau Seraja. This rock is surrounded by a reef and should not be approached within a distance of 1/2 mile. A 7-fathom patch lies about 2 miles southeastward of Doea.

Djaring, a reef with a least depth of 10 feet, lies about 3 1/2 miles northward of Doea. A 5-fathom patch lies about 3 1/4 miles north-northeastward of this reef.

The light shown on Poelau Soebi Ketjil is obscured over the southeast part of this reef.

A shoal, the position of which has not been accurately ascertained, was reported (1918) to lie about 7 miles northward of Djaring.

Swanley Rock, a coral head, over which there is a least depth of 2 1/4 fathoms, lies about 4 1/4 miles eastward of Doea.

Poemoebaboeng, a reef awash about 1 mile in diameter, lies about 4 miles eastward of Swanley Rock and about 8 1/2 miles eastward of Doea. Foul ground extends about 3/4 mile southward from Poemoebaboeng.

Djabak, a reef awash, lies about 3 miles northward of the western end of Poemoebaboeng reef and about 9 miles northeastward of Doea. A coral shoal, with a least depth of 2 fathoms, lies about 2 miles westward of Djabak and depths of less than 6 fathoms extend about 1,600 yards westward from this shoal. A 3/4-fathom

patch, with a 4 3/4-fathom patch about 1 mile east-northeastward of it, lies about 1 1/2 miles northwestward of Djabak. Another coral shoal, with a least depth of 1 1/2 fathoms, lies about 2 1/2 miles eastward of Djabak.

Latoe, consisting of a black boulder on a dry sandbank, is situated about 4 3/4 miles east-southeastward of Djabok. Shoal water, with a least depth of 16 feet, extends about 1 1/4 miles southward from Latoe.

Sebiang and Djapoe are two low islets, covered with coconut trees, that stand on a coral reef lying about 3/4 mile eastward of Latoe. These islets are about 1 mile apart, and the reef, on which they stand, is about 4 1/4 miles long. A clump of coconut trees stands on the reef between these islets. A rock, with less than 1 fathom over it, lies close off the west part of the north side of the reef in a position about 1 mile northwestward of Sebiang and about 2 1/2 miles east-northeastward of Latoe.

Poelau Pandjang is a low island, about 3 1/4 miles long, and is completely surrounded by a reef that extends as far as 2 1/4 miles from its southwestern extremity. Kerdau is a low circular-shaped islet standing near the southwestern extremity of this reef. There are several detached rocks and shoals within a distance of about 2 miles southward and southwestward of Kerdau, and a rock, over which there is a least depth of 13 3/4 fathoms, lies about 4 miles west-southwestward of Kerdau. A 7-fathom depth exists about 2 3/4 miles south-southwestward of Kerdau. There are several villages on the west side of Poelau Pandjang, and vessels call regularly.

Mambat, a low islet covered with coconut trees, stands near the center of a narrow reef, about 2 miles long, that is situated about 2 1/2 miles north-northwestward of Poelau Pandjang. Shoal water, with a least depth of 13 feet, extends about 3/4 mile from the northeastern side of Mambat, and a 29-foot patch lies about 2 miles east-northeastward of the islet.

Karang Laoet, a drying reef, is situated about 4 1/2 miles eastward of Mambat. A spit, with a least depth of 2 fathoms, extends about 1/5 mile westward from the reef. The northern extremity of Sebiang in range about 251° with the southern peak of Poelau Seraja leads close southward of Karang Laoet.

The channel between Kerdau, Poelau Pandjang,

(1940) **INDONESIA—South Natuna Islands—Subi Besar—Hydrographic Information.**—The symbol for a reef will be substituted for the 2¼-fathom depth in 2°42.6' N., 108°40.9' E. (approx.).

Note.—The legend "Swanley Rock" close eastward will be amended to "*Swanley Reef.*"

(N.M. 13/66.)

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H.O. Cbarts **3040, 5501, 5502.**

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and Karang Laoet on the southeastward, and Djapoe, Sebiang, and Mambat on the northwestward is deep and free of detached dangers, excepting the 29-foot patch east-northeastward of Mambat, and the rock, with a least depth of $1\frac{3}{4}$ fathoms, that lies about 4 miles west-southwestward of Kerdau.

Poelau Soebi Besar, the largest of the Zuid Natoena Eilanden, is located about 7 miles northwestward of Poelau Pandjang. It is about $10\frac{1}{2}$ miles long, and is mostly low. Depths of less than 5 fathoms extend as far as $3\frac{1}{2}$ miles from the south, southeast and southwest sides of the island, and its northeast and northwest sides are fringed by reefs that extend as far as 4 miles from the middle of its east and west sides. The island has been reported (1958) to be a good radar target at a distance of 24 miles.

Tambelai, an islet, stands on a drying reef, about $2\frac{1}{2}$ miles long, that lies about $1\frac{3}{4}$ miles south-eastward of the southeastern extremity of Poelau Soebi Besar. The channel between them is foul.

Several shoals, with depths of 1 fathom to 6 fathoms, extend about $5\frac{1}{2}$ miles southwestward from Tambelai.

Laoet is a reef nearly 2 miles long, on which there are some drying rocks. It is located about $4\frac{1}{4}$ miles northeastward of Tambelai and about $1\frac{1}{2}$ miles eastward of the coastal reef that fringes the eastern side of Poelau Soebi Besar. A $1\frac{1}{2}$ -fathom patch lies close northward of Laoet.

Serdang, a steep-to coral reef, with a least depth of 19 feet is located about 6 miles northward of Laoet and about 7 miles east-northeastward of the northeastern extremity of Poelau Soebi Besar.

Poelau Soebi Ketjil, an island about $2\frac{1}{2}$ miles long and 262 feet high, lies on the coastal reef close northward of Poelau Soebi Besar. The island has been reported (1958) to be a good radar target at a distance of 20 miles.

A light is shown on the summit near the north end of Poelau Soebi Ketjil.

There is good anchorage northward of the light structure on Poelau Soebi Ketjil. A sandy beach is located at this part of the island, and landing by boats is always practicable. A narrow passage, marked by privately maintained beacons, leads to this beach, but boats using

the passage must guard against the strong current that sets across it.

9-66 Batoe Priok, the principal village of the Poelau Soebi group of the Zuid Natoena Eilanden, is located on the southern side of Poelau Soebi Ketjil. There is a basin in the reef, which is reached through a narrow passage through the coastal reef on the eastern side of the island. This basin affords good anchorage for small craft having local knowledge. There is also good anchorage off the entrance of the passage leading to the basin.

Ria Rock, which is white in color and conspicuous, lies near the northeastern edge of the coastal reef in a position about 1 mile northeastward of the northeastern extremity of Poelau Soebi Ketjil.

A spit, with a depth of $4\frac{1}{2}$ fathoms at its outer end, extends $\frac{3}{4}$ mile northeastward from the rock.

Two conspicuous densely-wooded islets lie between Ria Rock and Poelau Soebi Ketjil. A stranded wreck is located about 1 mile southeastward of Ria Rock.

Dengajak, a low islet covered with coconut trees, lies on the coastal reef in a position about $2\frac{1}{4}$ miles westward of the middle of the western side of Poelau Soebi Besar. Two shoals, with least depths of $2\frac{1}{2}$ and $3\frac{1}{2}$ fathoms, lie respectively about $1\frac{1}{2}$ miles westward and southwestward of Dengajak. A 4-fathom patch lies about 3 miles north-northeastward of the islet.

Toedang, an islet situated about 3 miles south-southwestward of Dengajak, is low and covered with coconut trees. The islet is fringed by a reef, and a spit, with a depth of $4\frac{1}{2}$ fathoms near its outer end, extends for a distance of about 1 mile from its northern end. The channel between Toedang and the coastal reef of Poelau Soebi Besar eastward of it is foul.

Bakau, an island about $1\frac{1}{4}$ miles long, is situated about 3 miles westward of the western extremity of Poelau Soebi Besar. It is fringed by a reef, and a rock awash lies about $1\frac{1}{2}$ mile northwestward of its northern extremity. A spit, with depths of $4\frac{3}{4}$ fathoms, extends in a northeasterly direction from its eastern side for a distance of about $1\frac{1}{3}$ mile. A 5-fathom patch lies about $1\frac{1}{2}$ miles south-southeastward of Bakau.

9-67 NATOENA EILANDEN.—This group of islands is situated approximately 50 miles north-northwestward of the Zuid Natoena Eilanden and approximately 90 miles northeastward of the Anambas Eilanden.

The principal island of the group, Groot Natoena, which is about 36 miles in length and attains an elevation of 3,396 feet, is by far the largest and highest of any in the groups described in this chapter.

There are several outlying islands and dangers southwestward of Groot Natoena, the most distant of which is Poelau Midai, situated about 45 miles south-southwestward of it.

The islands in this group are mainly under coconut cultivation, but are sparsely populated. With the exception of Poelau Sedanau, an island situated about 3 miles off the southwestern coast of Groot Natoena, none of the islands in the group is of any importance to shipping.

Tides.—The character of the tides in the Natoena Eilanden is mixed, but predominately diurnal. The mean diurnal range is about 3 1/2 feet.

9-68 OUTLYING ISLANDS AND DANGERS.—Poelau Midai ($3^{\circ} 00' N.$, $107^{\circ} 47' E.$), an island about 4 miles long, $2\frac{1}{2}$ miles wide, and 589 feet high, is situated about 62 miles westward of Poelau Soebi Ketjil, in the Zuid Natoena Eilanden. It is low near the coast, and rises gradually to its summit, which is situated near its center, and consists of three peaks of almost equal height. The principal villages are Sabang Barat, situated near the northwestern extremity of the island, and Seblat, near the center of its southern side. There is regular steamer communication with other ports in the East Indies. The population of Poelau Midai is about 500. The island has been reported (1958) to be a good radar target at a distance of 35 miles.

Dangers.—Poelau Midai is surrounded by a narrow, drying reef. An islet, on which there are a few bushes, stands on the reef near the middle of the western side of the island. Outside the reef are numerous detached shoals, with depths of less than 5 fathoms, that lie within the 10-fathom curve, which is as much as $2\frac{3}{4}$ miles off the northeastern and southwestern extremities of the island. Two rocks with depths of $1\frac{3}{4}$ and $1\frac{1}{4}$ fathoms over them, lie respectively about $\frac{1}{2}$ and $\frac{3}{5}$ mile southwestward of the northwestern extremity of the island.

9-69 Anchotages.—During the Southwest Monsoon, vessels with local knowledge can

anchor off the village of Sabang Barat in 7 fathoms with the Chinese store bearing 145° and about $\frac{1}{2}$ mile from the stone pier. This store is located on the northeastern side of a break in the reef, and near it is a stone pier where small boats can land. There is a flagstaff at the root of this pier. During the Northeast Monsoon, vessels with local knowledge can anchor off Seblat village in about 10 fathoms with the southeast extremity of the island bearing about 055° and the village bearing about 316° . There is an opening in the reef near the village that leads to a good landing for boats. A coconut tree, which was reported to be conspicuous, stands on the beach westward of the village, and is a useful landmark.

Jackson Reefs, with depths of 16 to 29 feet, lie about $2\frac{3}{4}$ miles eastward of Poelau Midai. A detached coral shoal with a least depth of 19 feet lies about $1\frac{1}{2}$ miles northeastward of Jackson Reefs. The channel between these reefs and the dangers off the eastern side of Poelau Midai is deep and clear.

A 6-fathom patch was reported (1950) about $2\frac{1}{2}$ miles north-northeastward of the northeastern extremity of Poelau Midai.

Diana Reefs consist of a number of coral patches that are divided into two main groups. The southern group, with a least depth of 16 feet, lies about $2\frac{1}{2}$ miles north-northwestward of Poelau Midai, and there is a clear channel between this group and the dangers off the northern side of Poelau Midai. The northern group of Diana Reefs is situated nearly 2 miles north-westward of the southern group and extends in a northeasterly direction for about 7 miles. In this group, patches with depths of 16 feet, 10 feet, and 10 feet, lie, respectively, about 6 miles north-northwestward, 7 miles north-by-westward, and $9\frac{1}{2}$ miles north-by-eastward of the northwestern extremity of Poelau Midai. An isolated coral patch, with a least depth of 10 feet, lies about 14 miles north-northeastward of the northwestern extremity of Poelau Midai, and there is no surface indication of its presence.

The northwesternmost danger, a 6-fathom patch, lies about $9\frac{1}{2}$ miles north-northwestward of the island.

Noord Hooiberg, a conical-shaped islet 212 feet high, is situated about 21 miles north-northwestward of the northwestern extremity of Poelau Midai. This islet lies near the center of a bank within the 10-fathom curve, which is about 2 1/2 miles distant from the islet in a northeasterly, southeasterly, and southwesterly direction, and about 1 1/2 miles distant in a northerly direction. There are a number of shoals situated on this bank, the depths of which are 15 to 46 feet. Two detached shoals with least depths of 19 and 26 feet, lie, respectively, about 2 1/2 miles south-southwestward and about the same distance south-southeastward of the islet. The channel between Noord Hooiberg and Diana Reefs is wide, deep, and clear.

Postiljon Rocks, situated about 18 miles east-northeastward of Noord Hooiberg, consist of two conspicuous rocks standing close together. The southern and larger of the two is 54 feet high. These rocks lie near the center of a bank within the 10-fathom curve, on which there are irregular depths. A rock awash lies about 1/6 mile south-southwestward of Postiljon Rocks, and two 23-foot patches lie, respectively, about 1 mile south-southeastward and the same distance north-northwestward of them. A 5 1/2-fathom patch is situated near the eastern edge of the bank in a position about 2 1/4 miles eastward of the rocks. The channel between Diana Reefs and Noord Hooiberg on the southwestward, and Postiljon Rocks on the northeastward is deep and free of detached dangers, except for the 10-foot patch lying north-northeastward of Diana Reefs.

Tokong Boro, a group of four rocks, the highest of which is 18 feet, lies on a reef that is situated about 47 miles north-northwestward of Postiljon Rocks and about 32 miles westward of the western extremity of Groot Natoena. These rocks lie on a steep-to reef about 1/2 mile in diameter.

9-70 GROOT NATOENA (NATUNA BE-SAR) WITH ADJACENT ISLANDS AND DAN-

TERS—Duperré Eilanden.—This group of moderately high wooded islands lies close off the southwest extremity of Groot Natoena.

Sededap, the southwesternmost island of the group, lies about 15 1/2 miles northeastward of Postiljon Rocks, and consists principally of a wooded ridge, which rises steeply on its western side to an elevation of 920 feet. The village of Telok Labu is situated at the head of a small cove at the northeastern extremity of the island.

Antu, an islet covered with coconut trees, lies about 1/3 mile northeastward of the northeastern extremity of Sededap.

Selentang, a narrow island about 1 mile long and 320 feet high, is situated about 2/5 mile northward of the northern extremity of Sededap.

Boeloe, an islet 197 feet high, lies close northward of Selentang. A detached, 6-fathom patch lies about 800 yards westward of the islet.

Lagong, the largest island of the group, is situated about 1 mile eastward of the northeastern extremity of Sededap. This island is about 4 miles long and has two conspicuous peaks, the northern and higher of which rises from an elevated ridge near the northeastern side of the island, and attains an elevation of 1,624 feet. The other, situated about 1 mile southwestward, is an isolated sharp-pointed peak 1,471 feet high. The southwestern part of Lagong consists of a promontory with a ridge of three rounded summits. There is a village near the southwestern extremity of this promontory.

Genting, an islet consisting of two hills connected by a neck of low land, lies about 1/5 mile off the southwestern extremity of the promontory of Lagong, to which it is joined by a sandy spit.

All of the islands described above are situated on an extensive reef that is about 6 1/4 miles long between the northeastern side of Lagong and the southwestern side of Sededap, and only the western sides of Sededap and Selentang are free of reefs. Two detached shoals, with depths of 5 feet and 6 feet, lie respectively about 2/3 mile southwestward and 1/2 mile northwestward of the summit of Selentang.

Batang, an island about 3 miles long and 1,624 feet high, is situated about $3/4$ mile northwestward of Lagong and about the same distance north-northeastward of Boeloe. An isolated peak, 871 feet high, rises near its northwestern extremity. The island was reported (1958) to give a good radar return at a distance of 25 miles. A $2\frac{3}{4}$ fathom patch, with a 3-fathom patch close southwestward of it, lies about $2/3$ mile westward of the northwest extremity of the island. The south and west sides of Batang are fringed by reefs and foul ground that extends as far as $1\frac{1}{4}$ miles from its south side.

There is a deep channel, with depths of 6 to 12 fathoms, between the reefs extending southward from Batang and those fringing the southern islands of the Duperré Eilanden. Vessels should pass southward of the large detached drying reef lying with its southwest edge about $3/4$ mile eastward of Boeloe, but passage should not be made unless the reefs are uncovered. During the southwest monsoon, good anchorage is available in the western entrance to this channel in a position about midway between Boeloe and the southwestern extremity of Batang in depths of 6 to $6\frac{1}{2}$ fathoms.

9-71 Straat Laplace is the name of the channel that separates the Duperré Eilanden from the southwest side of Groot Natoena. It is about $3/4$ mile wide at its southeast end and about 1 mile at its northwest end.

Boeroeng, a rock 86 feet high, stands near the center of a coral reef, about $3/4$ mile long, near the northwestern entrance to Straat Laplace in a position about $2\frac{2}{3}$ miles north-northwestward of the northwest extremity of Batang. Three above-water rocks stand on this reef southward of Boeroeng.

Komang, an island about 1 mile long and 610 feet high, lies close off the southwestern side of Groot Natoena, and on the eastern side of the northwestern entrance to Straat Laplace in a position about 1 mile northeastward of Batang. There is anchorage southward of this island. A steep-to rock, with a least depth of 16 feet, lies about 1 mile northward of the west extremity of Komang.

Verdier Reef, with a least depth of $1/4$ fathom, lies near the middle of the fairway of Straat La-

place in a position about 1 mile from the eastern side of Batang.

Serantas, a wooded islet 381 feet high, lies near the western side of the southeastern entrance to Straat Laplace in a position about $1/2$ mile off the eastern side of Lagong. Semasin, a smaller islet, lies between. Both islets are surrounded by narrow, drying reefs.

Batoe Nènèh, a small reef with a depth of less than 6 feet, over which the sea breaks heavily, lies about $6\frac{1}{2}$ miles westward of Boeroeng. Boeroeng in range 088° with the summit of Sientoe leads close southward of Batoe Nènèh.

9-72 Southern coast of Groot Natoena.—The southern part of Groot Natoena is almost separated from the rest of the island by the Koeala Bindjai and the Soengai Penarik, which together extend from its southwestern side to within $1/2$ mile of its southeastern side, forming an estuary about 1 mile wide. Tandjoeng Lampa, the southern extremity of Groot Natoena, is a bare rugged point situated about 1 mile eastward of Serantas. From Tandjoeng Lampa the coast trends in an easterly direction for a distance of about $8\frac{1}{2}$ miles to Tandjoeng Pian Padang, the southeastern extremity of the island. This section of the coast is fringed by a reef that extends as far as 1 mile offshore in places. A $3\frac{1}{4}$ -fathom shoal was reported to lie about $2\frac{1}{2}$ miles southeastward of Tandjoeng Lampa.

Telok Toekak is a small bay that indents the southern coast of the island to a distance of about $2/3$ mile. It is entered between Tandjoeng Lampa and a point about 2 miles east-northeastward, which rises from the coast to three conspicuous low hills. When seen from a distance these hills appear as an island. The inner part of Telok Toekak is encumbered by reefs.

The village of Tengah is situated at the mouth of the Soengai Tengah in a position about $3\frac{3}{4}$ miles east-northeastward of Tandjoeng Lampa. Sekoekoer, a barren islet, lies on the coastal reef near Tengah, and a smaller islet, which is covered with coconut trees, lies about $1/4$ mile westward of Sekoekoer.

A spit, with a depth of 10 feet over its outer end, extends southward from the coastal reef to a position about one mile southwestward of Sekoekoer.

Tandjoeng Pian Padang is a low, sandy point. A spit, with a depth of 19 feet, extends

in an east-southeasterly direction from the point for a distance of about 1 1/2 miles, and depths of less than 36 feet extend about 1 1/4 miles east-northeastward from this shoal.

A detached, stony shoal, with a least depth of 29 feet, lies about 2 3/4 miles southeastward of the point.

Small vessels with local knowledge can anchor in the bay formed by Tandjoeng Pian Padang and a tongue or the coastal reef about 1 mile westward of the point in a position about 1/3 mile offshore in depths of 4 fathoms.

Several conspicuous mountains back the section of the coast between Tandjoeng Lampa and Tandjoeng Pian Padang, the highest of which are Sientoe, 1,717 feet high, and Loetjoek, 1,969 feet high, situated respectively about 4 1/2 miles north-northwestward and 2 3/4 miles northeastward of Tandjoeng Lampa.

9-73 SOUTHEASTERN COAST OF GROOT NATOENA.—Between Tandjoeng Pian Padang and Tandjoeng Sebintang, a point situated about 9 1/2 miles northeastward, the coast recedes to a distance of about 1 1/2 miles forming a bight, which is divided into two parts by Tandjoeng Medang, a point situated about midway between Tandjoeng Pian Padang and Tandjoeng Sebintang. From Tandjoeng Sebintang the coast trends in a north-northeasterly direction for a distance of about 4 1/4 miles to Tandjoeng Koekoep, the eastern extremity of Groot Natoena, and thence in a northerly direction for about 1 3/4 miles to Tandjoeng Karang, the southern entrance point of the Soengai Oeloe. This part of the coast is low and sandy, and for the most part is covered with coconut trees. It is fringed by a reef, with the exception of a stretch about 2 miles long close southwestward of Tandjoeng Medang. Foul ground extends in a northeasterly direction from Tandjoeng Pian Padang for a distance of about 5 miles.

The villages of Padang and Penarik are situated respectively about 1 3/4 and 4 miles northward of Tandjoeng Pian Padang.

White Rock, which is fairly conspicuous, is situated near the outer edge of the coastal reef in a position about 1 3/4 miles southward of Tandjoeng Koekoep.

A Chinese store, which has a conspicuous roof, is situated on the shore westward of White Rock near the head of a cove in the reef. There is good landing for boats here.

Between Tandjoeng Koekoep and Tandjoeng Karang the coastal reef extends offshore for a distance of about 1 1/2 miles. A low islet is situated on the reef in a position about 1/5 mile east-northeastward of Tandjoeng Koekoep.

9-74 OFF-LYING ISLETS AND DANGERS.—Lamina Reef, with a least depth of 1/4 fathom, lies about 4 1/4 miles eastward of Tandjoeng Pian Padang.

A reef, parts of which are above water, lies about 3 miles eastward of Tandjoeng Medang. A small above-water reef lies about 1 3/4 miles eastward of this reef, and two patches, with depths of 1 1/4 fathoms and 1/4 fathom, lie respectively about 1/2 mile southwestward and 1 mile south-southwestward of the small above-water reef. A patch of discolored water lies about 3 3/4 miles southeastward of Tandjoeng Medang.

Djantai and Kemoedi, situated respectively about 1 1/2 miles south-southeastward and the same distance eastward of Tandjoeng Sebintang, are low islets covered with coconut trees. Soengot, a smaller islet, lies about 1/3 mile southeastward of Kemoedi. Both Djantai and Kemoedi are surrounded by reefs, and foul ground extends in a northeasterly direction from Kemoedi for a distance of about 2 miles. The channel between these islets and the coastal reef westward of them is foul.

Penoengoel Reefs are the easternmost of the known dangers lying off Groot Natoena. Devonport Rock, with a least depth of 2 1/4 fathoms, is the southernmost of these reefs. It lies about 5 miles eastward of Tandjoeng Koekoep. The northernmost of these reefs, with a least depth of 1 fathom, lies about 2 3/4 miles northward of DEVONPORT ROCK and about 5 1/4 miles east-northeastward of Tandjoeng Koekoep. There are numerous detached shoals between Penoengoel Reefs and the coastal reef about 3 1/2 miles westward.

9-75 ANCHORAGES.—Vessels with local knowledge can anchor in depths of 4 fathoms in a position about 3/4 mile south-southeastward of the Chinese store situated westward of White Rock. Vessels approaching this anchorage should steer for the store, bearing 282°, until Kemoedi is in range 222° with the southeasternmost peak behind Tandjoeng Pian Padang. A course of 259° should then be

steered and anchorage should be taken when the store bears about 332°. A ROCK with a depth of less than 1 fathom over it, lies about 1/4 mile northward of this anchorage.

Vessels with local knowledge can also anchor off the village of Penarik. The dangers in the approach to this anchorage are marked by discolored water.

9-76 SOENGAI OELOE (ULU).—The Soengai Oeloe discharges into the sea between Tandjung Karang and Tandjung Pasir. Tandjung Pasir is located about 1 mile west-northwestward of Tandjung Karang. The entrance of this river, which is located about 3 miles eastward of Tandjung Pasir, lies between the coastal reefs that extend about 1 3/4 miles eastward of Tandjung Karang and about 2 1/2 miles eastward of Tandjung Pasir. It is marked on its north and south sides by beacons. The beacon on the north side is surmounted by a black cone, point up, and the beacon on the south side has a red cylindrical topmark. A rock awash lies about 1/2 mile eastward of the northern entrance beacon; a depth of 13 feet lies about 1/4 mile northeastward of the rock awash. Local knowledge is necessary for vessels entering this channel.

From its entrance the channel trends in a westerly direction between several drying reefs to a position about 3/5 mile northward of Tandjung Karang, and thence in a west-southwesterly direction to a position close southward of Tandjung Pasir. A bar, with one foot of water over it, is formed about 1/2 mile east-southeast of Tandjung Pasir.

A group of Chinese stores stand on the reef on the north side of the channel about 400 yards south-southwestward of Tandjung Pasir. These stores are connected to the land by a bridge which has a wharf, 262 feet long, at its head where small vessels can berth.

Above the wharf, the river is unnavigable, even for boats.

There is good anchorage off the entrance channel to the Soengai Oeloe in depths of 11 fathoms.

9-77 NORTHEASTERN COAST OF GROOT NATOENA.—From Tandjung Pasir the coast

trends in a northerly direction for a distance of about 4 miles to Tandjung Senoebing. It is generally low, and rises gradually towards the mountains inland. Gebergte Ranai (Pegunungan Ranai), a conspicuous range of high mountains, is situated about 4 miles westward of Tandjung Senoebing. This range consists of three peaks, the southernmost of which is a square mass of rock 3,163 feet high. The northernmost peak, situated about 1 mile north-northwestward of the southernmost peak, attains an elevation of 3,393 feet. Bedoeng, a mountain 1,432 feet high, is situated about 7 1/2 miles west-northwestward of the highest peak of Gebergte Ranai. It slopes gradually on its southwestern side, but is steep on its northeastern side.

9-78 TELOK RANAI, a bay situated close southward of Tandjung Senoebing, is entered between that point and the northern side of the coastal reef that extends about 2 miles from the coast northward of Tandjung Pasir. It is open to the northeastward and is suitable only as a temporary anchorage. The shores of Telok Ranai are covered with coconut trees. There are a number of scattered houses among the trees, two of which, situated near the head of the bay, are conspicuous. At high water, landing is possible at the village of Ranai, which is situated about 2 1/4 miles south-southwestward of Tandjung Senoebing, by boats that can cross the reef. At low water, the only landing place is an indentation in the reef near the head of the bay. Two patches, with depths of 3 1/4 and 4 1/4 fathoms, lie respectively about 2/3 mile east-southeastward and about the same distance south-southeastward of the southern extremity of Tandjung Senoebing. A rock, with a depth of less than 1 fathom over it, lies near the outer edge of the coastal reef in a position about 1 mile south-southeastward of Tandjung Senoebing, and two other rocks, with depths of less than 1 fathom, lie near the head of the bay about 1/2 mile eastward and 2/3 mile east-southeastward of Ranai village.

There is temporary anchorage, in depths of from 5 to 6 fathoms, in Telok Ranai in a position about 3/4 mile eastward of the village

of Ranai with the 320-foot summit of Tandjoeng Senoebing bearing north. Vessels approaching the anchorage from the southward should steer for the summit of Tandjoeng Senoebing bearing not more than 301° until the two conspicuous houses near the head of the bay bear 256° . The course should then be altered and these houses steered for on this bearing until the summit of Tandjoeng Senoebing is abeam bearing 346° . Thence a southwesterly course should be steered until the summit of Tandjoeng Senoebing bears north, when anchorage may be taken in depths of about 4 fathoms. Vessels desiring to anchor in the more shallow water closer to the shore should proceed on a southwesterly course for about $1\frac{1}{2}$ mile farther, but Tandjoeng Senoebing must be kept open westward of the western side of Senoea in order to avoid the rocks near the head of the bay. Vessels approaching Telok Ranai from the northward should steer for Tandjoeng Pasir bearing not less than 211° until the two conspicuous houses bear 256° . From this position they should proceed as directed above.

From Tandjoeng Senoebing the coast trends in a northwesterly direction to Tandjoeng Tandjoeng, a low point situated about $4\frac{1}{2}$ miles northwestward of Tandjoeng Senoebing. Between these points the coastal reef extends as much as $1\frac{1}{2}$ mile offshore.

Senoea, an island about $\frac{3}{4}$ mile long, lies about $4\frac{1}{4}$ miles eastward of Tandjoeng Tandjoeng. It has three summits, the highest of which is 379 feet. The eastern side of the island is steep-to, but its southern and western sides are low and sandy with reefs extending as much as $1\frac{1}{3}$ mile offshore.

Penganak Senoea, a rock 19 feet high, lies close off the southeastern extremity of Senoea.

A shoal, with a least depth of 4 feet lies almost 1 mile south-southwestward of Senoea. A $2\frac{1}{2}$ -fathom shoal lies about $\frac{3}{4}$ mile west-southwestward of the island's southern extremity.

Straat Senoea, which separates Senoea from the coast of Groot Natoena, is about 2 miles wide, but is so obstructed by shoals that it is navigable only by small vessels having local knowledge.

9-79 Telok Selahang is an inlet in the coastal reef southeastward of Tandjoeng Tandjoeng. Small vessels having local knowledge

can anchor in a position about $\frac{2}{3}$ mile south-eastward of Tandjoeng Tandjoeng in depths 4 to 5 fathoms. Vessels proceeding to this anchorage by way of Straat Senoea should steer 345° with Tandjoeng Senoebing astern bearing 165° . When the northern extremity of Senoea bears 88° , a course of 268° should be steered until Tandjoeng Senoebing bears 142° . A course of 248° should then be steered for the foot of the northern spur of Gebergte Ranai, which will lead to the anchorage.

From Tandjoeng Tandjoeng the coast trends in a northwesterly direction for a distance of about 5 miles to Tandjoeng Penedak, which is a low sandy point. This part of the coast is fringed by a drying reef, and the area within the 10-fathom curve is generally foul.

Sahi, a conspicuous rock, lies on the coastal reef in a position about $1\frac{1}{4}$ miles southward of Tandjoeng Penedak.

Between Tandjoeng Penedak and Tandjoeng Datoe, a point situated about $8\frac{1}{2}$ miles north-northwestward, the coast recedes to a distance of about $2\frac{1}{2}$ miles forming a bight. From a position about 3 miles northwestward of Tandjoeng Penedak the coastal reef projects for a distance of about 1 mile, dividing the bight into two parts.

Telok Sengiapi, the southern part of the bight, is free from fringing reef, and affords safe anchorage. There is a sandy beach at the head of Telok Sengiapi. A $3\frac{1}{2}$ -fathom patch lies near its southeastern side in a position about 1 mile northward of Tandjoeng Penedak.

Telok Moeara, the northern part of the bight, is fringed by a reef, and there are numerous shoals lying within the 10-fathom curve, which is nowhere more than 2 miles offshore along this part of the coast. There are several reddish-colored rocks along the shore of Telok Moeara in a position about $2\frac{1}{2}$ miles southward of Tandjoeng Datoe.

Tandjoeng Datoe is a sheer, barren, steep-to cliff, with a wooded summit 364 feet high.

The wreck of an LST lies stranded on the northeastern coast of Groot Natoena in a position on the coastal reef about $4\frac{2}{3}$ miles southward of the summit of Tandjoeng Datoe.

Tandjoeng Semoet, the northern extremity of Groot Natoena, is a low point situated about

1 1/2 miles northwestward of Tandjoeng Datoe. The coastal reef extends for a distance of about 3/4 mile from this point. Panda, an islet 43 feet high, lies near the edge of the reef in a position about 1/2 mile northward of Tandjoeng Semoet.

Telok Ayer Litjin is a small bay situated between Tandjoeng Datoe and Tandjoeng Semoet. A small stream flows out through the reefs that encumber this bay.

9-80 Off-lying danger.—De Mieuille Reef, which dries near its center, is situated about 10 miles east-southeastward of Tandjoeng Penge-dak and about 3 3/4 miles northeastward of Senoea. The channel between Senoea and De Mieuille Reef is deep and clear.

9-81 Northwestern coast of Groot Natoena.—Poelau Pandjang is a narrow island about 2 1/2 miles long, the southern extremity of which is situated about 1 3/4 miles westward of Tandjoeng Semoet. The northern part of the island is hilly, and Tandjoeng Kapala Pandjang, its northern extremity, rises to a summit of 167 feet. The island has sandy beaches and is fringed by a drying reef that extends as much as 2/3 mile from its eastern side.

Straat Pandjang is a narrow channel, with depths of from 6 to 8 fathoms, between the reef that fringes the eastern side of Poelau Pandjang and the coastal reef that extends from the northern extremity of Groot Natoena. It is free of detached dangers, and the reefs on either side can be distinguished by the discoloration of the water. There are several shoals, with depths from 1 1/4 to 5 fathoms, lying near the southwestern approach to the channel in an area within about 2 1/3 miles southwestward and south-southwestward of Tandjoeng Joe, the southern extremity of Poelau Pandjang.

The **wreck** of a small freighter lies stranded on the northwestern coast of Groot Natoena in a position on the coastal reef about 4 1/3 miles south-southwestward of Tandjoeng Joe.

Vessels approaching Straat Pandjang from Favorite Passage (see sec. 9-83) should steer for the wooded summit of Tandjoeng Datoe bearing

90° until the southeastern extremity of Tandjoeng Joe bears 31°. A course of 40° should then be steered until the southeastern extremity of Tandjoeng Joe is abeam bearing 310°, and thence a course of about 55° should be steered through the center of the channel.

Vessels approaching from the northward or eastward should steer for the southeastern extremity of Tandjoeng Joe bearing 245° until the southern extremity of Panda is in range about 132° with the summit of Tandjoeng Datoe. A course of 237° should then be steered until the southeastern extremity of Tandjoeng Joe is abeam bearing 327°, when the course should be changed to 220° and this course steered until the summit of Tandjoeng Datoe bears 90°. The course should then be changed to 270°, and this course must be kept, with the summit of Tandjoeng Datoe bearing 90° astern, while passing between the **shoals** near the southwestern entrance of the channel.

9-82 Coast.—From Tandjoeng Semoet the coast of Groot Natoena trends in a southwesterly direction for a distance of about 20 miles to Tandjoeng Pajoeng, which is the extremity of a promontory consisting of three hills, the highest of which is 630 feet. Tandjoeng Pajoeng is also the western extremity of Groot Natoena. Between these points the coast is low and covered with vegetation. It is fringed by a **reef** that extends as far as 1 1/4 miles offshore in places.

Boenga, a low islet covered with coconut trees and surrounded by a **reef**, lies about 1 1/2 miles offshore in a position about 6 1/2 miles southwestward of Poelau Pandjang. An area of **foul ground**, about 1 3/4 miles long and about 3/4 mile wide, lies nearly 2 miles northeastward of Boenga, and two patches, with depths of 2 1/2 and 3 1/4 fathoms, lie respectively about 2/3 mile northwestward and 2 miles northward of the islet.

A detached drying **reef**, with shoal water extending nearly 1 mile southwestward of it, lies about 1 mile southwestward of Boenga. Two **patches**, with depths of 2 3/4 and 2 fathoms, lie respectively about 1 1/2 and 2 1/4 miles southwestward of this reef.

Boeton, an islet about $2/3$ mile long, lies about $1\frac{1}{4}$ miles offshore in a position about $5\frac{1}{2}$ miles northeastward of Tandjoeng Pajoeng. It is surrounded by a **reef** that extends as far as 1 mile from its northeastern extremity. A narrow detached **reef** lies about $1/2$ mile northwestward of this islet.

Samarago, a low islet covered with coconut trees, lies about 2 miles northwestward of Boeton. It is nearly circular in shape and is surrounded by a reef. A rock, with a depth of less than 1 fathom, lies near the edge of the reef in a position about $1/3$ mile southwestward of Samarago, and a small drying reef lies about 2 miles northwestward of the islet.

Sabai is a hilly wooded islet, situated about $1/2$ mile northwestward of Tandjoeng Pajoeng, from which it is separated by a narrow channel, with a least depth of 24 feet in the fairway.

Kapala Nanggal, a smaller islet, lies on the edge of the reef close northwestward of Sabai. A patch, with a least depth of $3\frac{1}{4}$ fathoms, lies about $3/4$ mile northward of Kapala Nanggal.

An above-water reef lies near the northern end of a shoal, with depths of less than 5 fathoms, which is situated about 2 miles offshore in a position about $3\frac{1}{2}$ miles north-northeastward of Kapala Nanggal. A smaller drying reef lies about $1\frac{1}{2}$ miles southwestward, and a patch, with a depth of less than 6 feet over it, lies close westward of this reef.

9-83 Off-lying islands and dangers.—Karang Boenta, consisting of two coral reefs separated by a deep narrow channel, situated about $15\frac{1}{2}$ miles west-northwestward of Poelau Pandjang. The southern reef has a least depth of 1 fathom, and the northern reef dries in places.

Semapi Reef, which dries in places, lies about 11 miles westward of the northern extremity of Groot Natoena and about 4 miles northward of the islet of Samarago. This reef is about $3\frac{1}{2}$ miles long in a northeasterly and southwesterly direction and is about $1\frac{1}{4}$ miles wide. A shoal, with a least depth of $1\frac{1}{2}$ fathoms, lies about $3\frac{1}{2}$ miles northwestward of the northeastern extremity of Semapi Reef, and another patch,

with a least depth of $3\frac{1}{2}$ fathoms, lies about $1/2$ mile southward of its southwestern extremity.

Poelau Seloean, a hilly wooded island 984 feet high, is situated about $9\frac{1}{2}$ miles northwestward of Tandjoeng Pajoeng. The southwestern part of the island consists of a small peninsula that is connected to the island by a narrow neck of land. When viewed from the northwestward this peninsula appears as an islet. A drying rock, which generally breaks, lies nearly $1/2$ mile off the southern part of the eastern side of the island, and a **sunken rock**, with a depth of less than 6 feet over it, lies about $1/4$ mile off the center of its eastern side.

A coral reef with a least depth of 11 feet lies about 2 miles westward of Poelau Seloean, from which it is separated by a deep clear channel. The southern extremity of Poelau Seloean in range 104° with the summit of Bedoeng (see sec. 9-77) leads about $1/2$ mile southward of this reef.

Sedoea, an islet 276 feet high, is situated about 4 miles west-northwestward of Tandjoeng Pajoeng. Its southern end is low and sandy, and there are some coconut trees on this part of the islet. Selimoc, an islet 369 feet high, lies about $1/2$ mile eastward of Sedoea. Both islets are fringed by reefs, and are separated by a narrow channel.

A 10-foot patch lies about $1\frac{1}{2}$ miles southward of Sedoea, and a coral shoal, with a least depth of 1 fathom, lies about 4 miles westward of the islet. There is no surface indication of the presence of this shoal.

Favorite Passage, in which there is a least depth of 9 fathoms in the fairway, leads between Semapi Reef on its northwestern side and the dangers fronting the northwestern side of Groot Natoena on its southeastern side. The only detached dangers in Favorite Passage are the drying reef, which shows discoloration, situated about 2 miles northeastward of Samarago, and the $3\frac{1}{4}$ -fathom patch lying about 2 miles northward of Boenga.

9-84 Southwestern coast of Groot Natoena with off-lying islands and dangers.—From Tandjoeng Pajoeng the coast trends in a general south-southeasterly direction for a distance of about 8 miles to Tandjoeng Belitoeng. This part of the

coast is fronted by a reef that extends as far as 1 mile from Tandjoeng Belitoeng, and there are numerous islets and dangers within the 10-fathom curve, which is about 1 1/2 miles offshore near Tandjoeng Pajoeng and about 4 miles offshore near Tandjoeng Belitoeng.

Semama, a wooded sandy cay, is situated on a reef that lies about 1 2/3 miles southwestward of Tandjoeng Pajoeng.

Penganak, a low islet, and Batoe Bilis, an islet with two peaks, the higher of which is 461 feet, lie on a drying reef about 1 2/3 miles offshore in a position about 3/4 miles southward of Tandjoeng Pajoeng. A drying rock lies about 1/5 mile southward of the southwestern extremity of Batoe Bilis. The channel eastward and southeastward of these islets are obstructed by numerous shoals and a small drying reef.

Pisang and Melangi are islets situated on the coastal reef eastward of Batoe Bilis and Penganak. The former is hilly and wooded, and the latter is low and covered with coconut trees.

Poelau Salor, a densely wooded island about 2 miles long, is situated about 6 miles westward of Tandjoeng Belitoeng. It rises steeply from the sea to a prominent peak 1,604 feet high. It is steep-to on its western side, but the remainder is fringed by a drying reef that extends as far as 1 1/2 miles from its southeastern side. Kokop, an islet covered with coconut trees, lies on the reef in a position about 1 mile southeastward of the island. Poelau Salor can be identified east of Groot Natoena.

Two coral shoals, each with a least depth of 11 feet, lie, respectively, about 6 3/4 and 8 miles west-northwestward of the northern extremity of Poelau Salor, and another shoal, with a least depth of 2 1/2 fathoms, lies about 3 miles northwestward of the northern extremity of Poelau Salor. None of these shoals has any surface indication of its presence.

Sabangar Reef, which dries, lies about 3/4 mile north-northeastward of the northeastern extremity of Poelau Salor.

Djali, an islet covered with coconut trees, lies on a coral reef that is situated about 1 1/2 miles southwestward of Tandjoeng Belitoeng. A narrow shallow channel separates this reef from the coastal

reef that fronts Tandjoeng Belitoeng. There are numerous shoals and sunken rocks within the 10-fathom curve northwestward, westward, and southwestward of Djali. A drying reef lies about 3 miles southwestward of Djali and a rock, awash, lies about 1/2 mile southward of the drying reef.

Poelau Sedanau, a conspicuous hilly island nearly 4 miles long, lies about 6 1/4 miles southeastward of Poelau Salor and about 4 miles southward of Tandjoeng Belitoeng. Its summit of 732 feet is situated near its southwestern end. This island is divided into two parts by Selat Pemoetoes, a narrow creek, and is surrounded by an extensive reef that extends as far as 1 1/4 miles from its western side. Semalah, an islet, lies on the reef in a position about 3/4 mile north-northwestward of Tandjoeng Semoeloet, the southern extremity of Poelau Sedanau.

Serval Reef, with a least depth of 6 feet, lies about 1 2/3 miles southwestward of Tandjoeng Semoeloet. Several other shoals, with depths of 3 to 16 feet, lie within a distance of 2 miles east-southeastward of Serval Reef. A rock, with a depth of less than 6 feet over it, lies about 800 yards eastward of the reef.

A beacon, surmounted by two black cones, points up, marks the northern end of a reef that is situated about 2/3 mile southeastward of Tandjoeng Semoeloet, and a beacon, surmounted by a black cone, point up, marks the western edge of a reef that is situated about 1 1/3 miles east-northeastward of the same point. A beacon, with a red cylinder topmark, marks the southeast side of a small coral reef, with less than 6 feet over it, about 4/5 mile eastward of Tandjoeng Semoeloet. A rock, awash, lies close northward of the latter beacon. Northward of the beacons described above, there is a channel, marked by unofficial beacons, that leads to the village of Genting, but local knowledge is necessary for the safe navigation of this channel. The channel between Poelau Sedanau and the coastal reef north-eastward of it is obstructed by numerous reefs and shoals.

9-85 GENTING (3°48' N., 108°02' E.), the principal village of the Natoena Eilanden, is situated at the head of an inlet in the reef on the eastern side of Poelau Sedanau. The inhabitants are mainly Chi-

nese. The settlement consists of a group of structures, built on piles over the reef, and connected to the village of Sedanau on the mainland westward of it by a bridge. A government official resides at the village of Ajer Boeloch, which is situated on the southern side of the inlet close to the village of Sedanau.

Pier.—There is a small government pier at Genting, which is suitable for small vessels. It can be identified by a small wooden cupola surmounted by a flagstaff.

Communications.—There is regular steamer communication with Singapore, and with other ports in Indonesia.

9-86 Kembang, a narrow double-peaked islet 389 feet high, lies on the southwest end of an extensive detached reef, the southwestern end of which is situated about 2 miles south-eastward of Tandjoeng Semoeloet. Two patches, with depths of 23 and 26 feet, lie respectively about $\frac{1}{2}$ mile south-southwestward and the same distance southeastward of the southern extremity of Kembang. A 6-foot patch lies about 1 mile east-southeastward of the southeast extremity of Kembang. A rock, awash, lies about 400 yards northeastward of the 6-foot patch. Two sunken rocks, each with less than 6 feet of water over them, lie respectively about $1\frac{1}{4}$ miles eastward and $1\frac{1}{2}$ miles east-northeastward of the southeastern extremity of Kembang.

Kocala Bindjai.—Between Tandjoeng Belitoeng and the western end of Komang (see sec. 9-71), situated about 12 miles south-southeastward, the southwestern coast of Groot Natoena recedes forming a bay, into the head of which flows the Kocala Bindjai, which is an estuary formed by the confluence of the narrow Soengai Bindjai and the broader Soengai Penarik. The entrance to this estuary is encumbered by islets and shoals, through which a channel leads to the anchorage off Tandjoeng Blitoeng, the northern point of a peninsula that forms the southern side of the bay. This point is situated about $9\frac{1}{2}$ miles eastward of the village of Genting.

Semeroeng is an islet lying near the outer edge of the coastal reef in a position about $4\frac{1}{4}$ miles west-southwestward of Tandjoeng Blitoeng. This islet has a low hillock near its northern extremity.

Seroengoes, an islet having two peaks, the higher of which is 488 feet, lies about $\frac{1}{4}$ mile north-

northwestward of Semeroeng. A reef projects from the western side of this islet for a distance of about 1 mile.

Pasir is an islet lying at the east end of a reef about 3 miles long, the west extremity of which is situated about $\frac{3}{4}$ mile east-northeastward of Seroengoes.

A beacon, surmounted by two black cones, points up, marks a small reef that lies about $1\frac{1}{2}$ miles southwestward of the north extremity of Semeroeng. A beacon, with a red cylindrical topmark, marks the southern side of a detached reef situated about $1\frac{1}{5}$ miles west-southwestward of the northern extremity of Semeroeng.

These **beacons** mark the entrance of the channel leading to the anchorage off Tandjoeng Blitoeng, but local knowledge is necessary for vessels proceeding to this anchorage.

The Soengai Bindjai joins the Soengai Penarik at a position about 2 miles eastward of Tandjoeng Blitoeng. Sengoea, an islet, lies at the mouth of the Soengai Bindjai.

The village of Bindjai is situated about 2 miles upstream from the mouth of the Soengai Bindjai. Lumber is carried downstream by lighters and is loaded aboard vessels anchored off Tandjoeng Blitoeng. Three lighters are available at the village.

9-87 NOORD NATOENA EILANDEN.—This group, comprising one large island, two small islands, and several off-lying islets and dangers, lies north-northwestward of the Natoena Eilanden. These islands serve as good landmarks, but are of little importance to shipping. They are governed by a native chief, who resides on Laoet, the largest island of the group.

9-88 Tides.—The character of the tides in the Noord Natoena Eilanden is almost entirely diurnal, the mean diurnal range being about $2\frac{1}{4}$ feet.

9-89 Outlying islands and dangers.—Tokong Boeroeng ($4^{\circ}25'N., 107^{\circ}41'E.$), a group of 4 rocks, the two highest being 15 feet high, stands on a small reef about 19 miles north-north-northwestward of Poelau Seloean in the Natoena Eilanden.

Semioen, a circular-shaped island about $3/4$ mile in diameter, is situated about $5\frac{3}{4}$ miles north-northeastward of Tokong Boeroeng. This wooded island has three hills, the westernmost and highest of which rises to an elevation of 497 feet. Except for its eastern side, which has a sandy beach, the entire island is precipitous and rocky. It is surrounded by a steep-to drying reef that extends about $1/4$ mile from its northeastern and southeastern extremities. Two coral patches, with least depths of $2\frac{1}{4}$ and 5 fathoms, lie respectively about 1 mile south-southwestward and $1\frac{1}{2}$ miles northward of the island.

9-90 Laoet, the largest of the Noord Natoena Eilanden, is situated about 15 miles northeastward of Semioen and about 30 miles north-northwestward of the northern extremity of Groot Natoena. It has a length of about 7 miles, and a greatest width, near its southern end, of about 3 miles. It is generally hilly, rising near its northern end to a summit of 896 feet. The coast at this point is rather steep, but elsewhere it is low and sandy. The entire island is surrounded by an extensive drying reef that projects from Tandjoeng Majam, the southwestern extremity of the island, for a distance of about 3 miles, and extends as much as $2\frac{3}{4}$ miles from the eastern side of the island. The villages of Parit and Tongkok are situated respectively about 1 mile northeastward and $1\frac{1}{2}$ miles east-southeastward of Tandjoeng Majam.

Sengat and Sebetoei, above-water rocks, lie on the southern part of the reef that surrounds Laoet. The former is situated about $2\frac{3}{4}$ miles east-southeastward of Tandjoeng Majam, and the latter lies about $3/4$ mile north-northwestward of the same point. A group of above-water rocks lie about $2/3$ mile northeastward of Sebetoei.

Sekatoeng, a precipitous hilly island about $1\frac{1}{4}$ miles long and 728 feet high, is situated at the northern extremity of the reef that surrounds Laoet. The southern extremity of this island lies about $1/3$ mile northeastward of the northern extremity of Laoet. A bare detached rock, 222 feet high, lies close off the northeastern extremity of the island.

Glamis Castle Rock, with a least depth of $1\frac{1}{2}$ fathoms over it, lies close off the eastern edge of the reef that surrounds Laoet in a position about 3 miles southeastward of the northern extremity of the island.

Doris Reef, with a least depth of $1\frac{1}{2}$ fathoms, lies close off the southeastern edge of the reef that surrounds Laoet in a position about 3 miles east-southeastward of the southeastern extremity of the island.

Batoe Imoeng, a detached rock 58 feet high, lies about $3/4$ mile off the southern edge of the reef that surrounds Laoet in a position about $4\frac{1}{4}$ miles southeastward of Tandjoeng Majam.

In addition to the dangers described above there are numerous detached shoals, reefs, and sunken rocks outside the coastal reef within the 10-fathom curve, and the island of Laoet should not be approached on its eastern, southern, or southwestern sides without a detailed chart.

9-91 Off-lying dangers.—Laurel Reef, with a least depth of 7 fathoms, coral bottom, lies about 8 miles east-southeastward of the northern extremity of Laoet. A 6-fathom patch lies about $2\frac{1}{4}$ miles west-southwestward of Laurel Reef.

A coral reef, with a least depth of $4\frac{1}{2}$ fathoms, lies about 6 miles southeastward of the northern extremity of Laoet.

Batoe Penoe, a rock with a least depth of $2\frac{3}{4}$ fathoms over it, lies about $5\frac{1}{2}$ miles east-southeastward of Batoe Imoeng.

Karang Toeman, a coral reef with a least depth of $3\frac{1}{2}$ fathoms, lies about $5\frac{1}{2}$ miles southeastward of Batoe Imoeng.

Karang Kia, a coral reef with a least depth of $3\frac{1}{2}$ fathoms, lies about $4\frac{1}{4}$ miles south-southeastward of Batoe Imoeng, and another coral reef, with a least depth of $3\frac{1}{2}$ fathoms, lies about $2\frac{1}{4}$ miles south-southwestward of Karang Kia.

Gloria Reef, about $1\frac{1}{2}$ miles long in an easterly and westerly direction, and with a least depth of $1\frac{1}{2}$ fathoms, lies about $2\frac{1}{2}$ miles southward of Batoe Imoeng. A $3\frac{1}{2}$ -fathom patch lies about $1/2$ mile westward of Gloria Reef.

A 5-fathom patch lies about 1 1/3 miles off the northern part of the western coast of Laoet in a position about 3 1/2 miles southwestward of the island's north extremity. A 3 1/2 fathom patch lies nearly 2 miles west-southwestward of the same point.

9-92 Anchorages.—During the northeast monsoon vessels can anchor off the bight in the coastal reef southward of Laoet in 12 to 14 fathoms with the southeast extremity of Laoet bearing 043° and Batoe Imoeng bearing 108°. There is also anchorage, in a depth of about 6 1/2 fathoms, inshore of the detached reefs and close south-southeastward of Tandjoeng Majam. Vessels proceeding to this anchorage should steer for the southeast extremity of the island bearing 044°, which leads between the reefs in the entrance, until Batoe Imoeng bears 125°. The course should then be

changed gradually to the northwestward, keeping Batoe Imoeng astern bearing 134°, and anchorage should be taken when the southeastern extremity of Laoet bears 074°. A vessel may also approach this anchorage by steering for Sengat, bearing 027° and just open eastward of the eastern side of Laoet, until Batoe Imoeng bears 125°, and then proceeding as directed above.

During the southwest monsoon, there is good anchorage, in depths of 10 to 12 fathoms, with the northeast side of Sekatoeng bearing 064° and the northern extremity of Laoet bearing 133°. There is also anchorage, in depths of 9 to 10 fathoms, in a position 2/3 mile to 1 1/2 miles off the eastern side of Sekatoeng.

CHAPTER 10

NORTHWEST COAST OF BORNEO — TANJONG DATU TO MARUDU BAY

10-1 GENERAL REMARKS.—The northwestern coast of Borneo from Tanjong Datu to Tanjong Sampanmangio, the northern extremity of Borneo, which is situated about 520 miles north-eastward of Tanjong Datu, consists of the native state of Sarawak and a part of British North Borneo.

The coastline is fairly regular, but is indented by two large bays. The larger of these bays is situated between Tanjong Datu and Tanjong Sirik, a point about 110 miles east-northeastward of Tanjong Datu, and the other is Brunei Bay, situated about 145 miles southwestward of Tanjong Sampanmangio.

Much of the coast is fronted by tidal mud or sand flats, but is reasonably free of fringing reef. Approaches to the coast are obstructed in some places by detached shoals and coral reefs.

A number of rivers flow into the sea along this section of the coast, many of which are navigable for some distance by small craft.

Much of the country bordering the coast is low, but about 25 miles inland a mountain range extends in a northeasterly direction, and terminates at Mount Kinabalu, which rises to an elevation of 13,450 feet.

Labuan, which is situated near the entrance of Brunei Bay, is the only island of any importance or size along the northwestern coast of Borneo.

The principal towns on or near the coast are Kuching, Miri, Brunei, Jesselton, Kudat, and Victoria.

Current.—A current with a rate of 4 knots setting 060° was reported (October 1956) between position 6°43' N., 115°29' E. and the west entrance of Balabac Strait.

Off the northwest coast of Borneo and in Palawan Passage, between the parallels of 2° N. and 11° N., currents may set in any direction throughout the year with rates of up to 1 knot or more, and have caused stranding of vessels on either side of the passage.

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10-2 COAST FROM TANJONG DATU TO SUNGEI SARAWAK.—From Tanjong Datu the coast of Sarawak trends south-southeastward for about 6 miles to Tanjong Serabang, and thence southward and southeastward for about 20 miles to the entrance of the Batang Kayan.

Two shoals, with depths of 3 1/4 and 3 1/2 fathoms, lie respectively about 3/4 mile and 2 miles eastward of Tanjong Datu. The latter shoal lies near the end of a shoal area, with depths of less than 6 fathoms, that extends in a south-southeasterly direction for about 6 miles and joins the shoal waters that extend from this section of the coast for a distance of 4 to 7 miles.

A rock, which dries 1 foot, lies about 1/2 mile offshore in a position about 1 3/4 miles south-southeastward of Tanjong Datu. This rock lies at the outer end of a foul spit that extends from the shore in a north-northeasterly direction for about 1 mile. Between the extremity of this spit and Tanjong Serabang the coast is fringed by rocks that extend as much as 1/2 mile offshore.

Pulau Datu, an islet 122 feet high, is situated close offshore in a position about 1 1/2 miles south-southwestward of Tanjong Serabang.

Telok Serabang, a small bay lying between Pulau Datu and Tanjong Serabang, is shallow and rock-strewn.

Pulau Serabang, an islet 51 feet high, lies in the entrance of Telok Serabang in a position about 4/5 mile south-southeastward of Tanjong Serabang.

Between Pulau Datu and Tanjong Blinsah, a point situated about 5 1/2 miles southeastward, the shoal waters fronting the coast, with depths of less than 3 fathoms, extend offshore for as much as 2 miles. The northern half of this shoal area is foul, and there are two rocks, 6 and 2 feet high, about 1 mile south-southeastward and 2 1/4 miles southward, respectively, of Pulau Datu.

(138) EAST INDIES—Borneo—Northwest coast—Kuala Sematan—Buoy
Kuala Sematan Lighted Buoy ($1^{\circ}49.7'$ N., $109^{\circ}47.7'$ E. approx.) will

(N.M. 39/66.)

(N.M. 14, Kuching, 1966.)

H.O. Chart 3040.

H.O. Pub. 71, 1951, page 207.

Two detached shoals, with depths of 2 1/4 and 1 1/2 fathoms, lie respectively about 2 1/2 and 4 1/4 miles south-southeastward of Tanjong Serabang, and a rocky patch, which dries 4 feet, lies about 3/4 mile east-northeastward of Tanjong Blinsah. A 7-foot patch lies about 2 miles northward of the same point.

From Tanjong Blinsah to Tanjong Batu, a point situated about 11 1/2 miles east-southeastward, the coast is fronted by shoal water, with depths of less than 3 fathoms, that extends 1/2 mile to 1 3/4 miles offshore.

A rock, which dries 7 feet, lies near the edge of the shoal water in a position about 1/2 mile northward of Tanjong Batu.

The mouths of the Sungei Siru Besar and the Sungei Sematan lie between Tanjong Blinsah and Tanjong Batu, the former lying about 4 miles southeastward of Tanjong Blinsah, and the latter about 4 1/4 miles west-northwestward of Tanjong Batu. Neither is of much importance to shipping.

Sungei Sematan is entered between Tanjong Slepoh, about 7 miles southeastward of Tanjong Blinsah, and Tanjong Pugu, about 1/2 mile further southeastward.

A drying sand spit extends about 3/4 mile northeastward and 400 yards eastward from Tanjong Slepoh and a similar sand spit extends about 3/4 mile north-northeastward and about 250 yards westward from Tanjong Pugu. The entrance channel lies between these two spits.

There is a least depth of 4 feet (1961) on the range lines over the bar, but the channel is liable to change, particularly during the northeast monsoon, and entry should not be attempted without local knowledge. The average rise of the tide is about 13 feet.

Within the bar there is anchorage for vessels up to 100 feet in length in depths of 18 feet, but it is exposed to the northeast monsoon.

SEMATAN, a government station, located on the west side of the entrance of Sungei Sematan, is the most westerly port in Sarawak. Sematan, a lighterage port, is used almost exclusively for exporting bauxite. Lighterage operations cease during the northeast monsoon.

There is a launch jetty on the left bank about 600 yards southward of Tanjong Pugu, and a loading jetty on the same side of the

river about 200 yards further up-stream. There are depths of about 4 feet at the heads of these jetties.

NAVIGATIONAL AIDS.—A pair of range beacons painted white, the front beacon with a triangular topmark, point up, the rear beacon, triangular topmark, point down, stand about 100 yards westward of Tanjong Slepoh. In line 238°, they lead across the outer part of the bar to a position about 1/2 mile from the front beacon. Another pair of similar range beacons stand about 1/2 mile southward of Tanjong Slepoh; in line, about 205°, they lead from the range on the outer part of the bar over the inner part of the bar to the entrance of the river. All these beacons are privately maintained.

A radio mast stands about 600 yards southward of Tanjong Slepoh.

A LIGHT BUOY, painted in black and white vertical stripes, is moored about 1 1/4 miles northward of Tanjong Pugu. The buoy is shifted to meet channel changes. It marks the seaward end of the entrance channel over the shallow bar, and is removed during the northerly monsoon.

Vessels loading bauxite from Sematan should anchor in an area about 5 miles north-northeastward of the entrance of the Sungei Sematan. This area, which is about 2 miles in extent, lies with its center about 3 1/4 miles east-southeastward of Pulau Talang Kechil. Anchorage should not be taken westward of 109° 48.6' E., the west limit of the area. There are no restrictions on light-draft vessels anchoring to the southward of the area if they wish to do so.

A MOORING BUOY lies anchored about 350 yards southwestward of Tanjong Pugu; there are also several small moorings for lighters.

Vessels proceeding to Sematan may obtain pratique through Kuching Radio. Messages should be addressed "Dirmid, Kuching" and should advise E.T.A., last port of call and whether any case of notifiable disease on board. Customs and immigration formalities will be dealt with at Sematan.

10-3 BATANG KAYAN.—The entrance to this river lies between Tanjong Pelandek and Tanjong Sirek, situated respectively about 3 and 6 1/2 miles southeastward of Tanjong Batu. A drying sand bank, through which

there is a shallow channel, extends from the mouth of this river for a distance of about 1 1/2 miles.

Batu Lundu, a rock which dries 13 feet, lies about 1 3/4 miles northward of Tanjong Sirek. A LIGHT is shown from Batu Lundu.

The town of Lundu is situated on the western bank of the Batang Kayan in a position about 12 miles from its entrance. There is a least depth of 3 feet over the bar but passage should only be attempted by boats with local knowledge. There are two wharves at Lundu. The Commercial wharf has a length of 22 feet with a depth of 11 feet alongside; Government wharf has a length of 8 feet with a depth of 7 feet alongside.

A group of fairly high mountains lies north-westward of Lundu in a position about 4 miles southwestward of Tanjong Pelandek, Gunong Perigi, with an elevation of 2,984 feet, is the highest.

10-4 ISLANDS AND DANGERS BETWEEN TANJONG DATU AND BATANG KAYAN.—Pulau Talang Talang Besar, an inhabited island 371 feet high, lies about 6 miles east-northeastward of Tanjong Blinsah. There is a sandy beach on the eastern side of this island, from which shoal water, with a depth of less than 6 feet, extends a short distance southward.

Pulau Talang Talang Kechil an islet 255 feet high, lies about 1 mile south-southwestward of Pulau Talang Talang Besar.

Both of the above-mentioned islands are turtle sanctuaries and have caretakers living on them.

Turtle Rock, which dries 12 feet lies about 1 mile south-southwestward of Pulau Talang Talang Kechil.

10-5 SUNGEI SARAWAK AND APPROACHES.—Tanjong Sipang, the termination of a mountainous peninsula that projects in a northerly direction from the mainland for a distance of about 5 miles, is situated about 25 miles east-northeastward of Tanjong Sirek. It may be identified from the eastward or westward by two conspicuous sugar-loaf peaks, Gunong Santubong, a mountain 2,770 feet high, is situated near the southern end of this peninsula in a position about 4 1/2 miles southward of Tanjong Sipang.

Gunong Serapi, which rises to a very sharp peak 2,998 feet high, is situated about 12 miles southwestward of Gunong Santubong.

A lump-shaped mountain resembling a castle is situated close westward of Gunong Serapi. Its elevation is slightly less than that of Gunong Serapi, and it is not visible eastward of Gunong Santubong.

Pulau Sempadi, an island 400 feet high, is situated about 1 3/4 miles offshore in a position about 8 3/4 miles north-northeastward of Tanjong Sirek. Foul ground extends northward, westward, and southward from the western side of this island for a distance of nearly 3/4 mile. The northwesternmost danger is an above-water rock, 9 feet high.

Pulau Satang, a densely wooded island 678 feet high, is situated about 10 miles westward of Tanjong Sipang. This island is steep-to and free of dangers, except on its southeastern side, from which a coral reef extends for a distance of about 1/8 mile. There is a small plantation on the southeastern side of the island.

Pulau Satang Kechil, a densely wooded islet, lies about 1 1/4 miles southward of Pulau Satang. This islet is surrounded by a fringing reef that extends about 1/2 mile offshore from its western side.

Pulau Tukong Ara and Pulau Tukong Banun, 47 and 55 feet high, lie respectively about 1 1/2 miles eastward and 2 miles southeastward of Pulau Satang Kechil.

The islands described above lie near the outer end of the shoal water, with depths of less than 4 fathoms, that extends about 4 1/2 miles northward from the low sandy coast.

Cruizer Rock, which is awash, lies about 3 1/2 miles northward of Tanjong Sipang. During bad weather, or with a heavy swell, the sea breaks on this rock, but in fine weather there is no surface indication of its presence, and it should be given a wide berth. Tanjong Buloh and Tanjong Embang, which are points situated on the eastern side of the Tanjong Sipang peninsula, in range 171° leads about 2/3 mile westward of Cruizer Rock, and a tangent on the western side of Tanjong Sipang in range about 209° with Gunong Serapi leads about 3/4 mile eastward of it. At night Tanjong Po light, bearing not less than 132°, will lead northward of Cruizer Rock.

10-6 WRECKS.—A wreck, with a least depth of 2 feet over it, lies about 1 1/2 miles west-northwestward of Tanjong Sipang. Two

sunken wrecks lie about $10\frac{1}{2}$ miles north-northwestward of Tanjong Sipang. The masts of the northernmost wreck are visible. There are several dangerous wrecks in Sungei Sarawak.

Another peninsula, which projects in a north-northeasterly direction from the mainland for a distance of about 6 miles, is situated about $10\frac{1}{2}$ miles east-southeastward of the Tanjong Sipang peninsula. Pulau Lakei, an islet, lies close off the north extremity of this peninsula. A rock, 8 feet high, on which there is a tide gage hut, lies close southward of the islet. The bay between these two peninsulas has depths of less than 3 fathoms and dries in patches near its head. The greater part of the shoreline of this bay has not been fully surveyed.

Tanjong Po, the eastern extremity of the Pulau Lakei peninsula, is situated about 2 miles southeastward of the peninsula's northern extremity. There is a conspicuous white streak near its east extremity. Shoal water, with depths of less than 4 fathoms, extends nearly $\frac{1}{2}$ mile offshore between Tanjong Po and the northern extremity of the peninsula. White Rock, 4 feet high, lies near the southeastern end of the shoal water in a position about $\frac{1}{2}$ mile northward of Tanjong Po.

A light is shown, at an elevation of 430 feet, from a white pyramidal tower, 60 feet high, on Tanjong Po.

The Sungei Sarawak has two navigable entrances, the Santubong, which is entered close westward of Tanjong Sipang, and the Muara Tebas, which has its entrance close eastward of Tanjong Po. Vessels of 300 feet in length and a draft of 15 feet or 280 feet in length and a draft of $16\frac{1}{2}$ feet can proceed to Kuching, the capital of Sarawak, which is situated about 20 miles upstream from either entrance.

The Muara Tebas entrance, which has a depth of 17 feet, is the one generally used, inasmuch as the depth of the Santubong entrance is only 7 feet. The Santubong entrance should not be attempted without local knowledge. During the northeast monsoon this entrance is not practicable because of the heavy swell on the bar. Dense early morning fogs occur over the river, especially after heavy night rains.

The fogs normally disperse about 2 or $2\frac{1}{2}$ hours after sunrise.

10-7 Santubong entrance.—Between Pulau Satang Kechil and the western entrance point of the Sungei Santubong there is shoal water, with depths of less than 4 fathoms, that extends $3\frac{1}{2}$ to 5 miles offshore.

From Tanjong Sipang the coast trends south-southwestward for a distance of about $4\frac{1}{2}$ miles to Tanjong Tambak. Foul ground extends from this section of the coast to a distance of about $\frac{1}{2}$ mile. Shoal water, with depths of less than 1 fathom, extends in a west-northwesterly direction for a distance of about $1\frac{1}{2}$ miles from Telok Penyok, which is a small bay situated about 3 miles south-southwestward of Tanjong Sipang. Two detached 1-fathom patches lie respectively about $\frac{1}{2}$ mile and $1\frac{1}{8}$ miles west-northwestward of the western extremity of this shoal water. These patches lie on either side of the fairway across the bar.

Between Tanjong Tambak and Cross Point, which is situated about $1\frac{1}{2}$ miles south-southeastward of it, the coast recedes forming a bay that dries for a distance of nearly $\frac{3}{4}$ mile from its head.

Nap Rocks, which dry about 10 feet, lie about $\frac{1}{2}$ mile southward of Tanjong Tambak.

A rock, awash, lies about 900 yards westward of Cross Point.

Royalist Rock, which is awash, is situated about $\frac{3}{4}$ mile southwestward of Cross Point.

Pulau Kra, an islet, lies on the southern side of the entrance channel in a position about 1 mile south-southwestward of Cross Point. It is connected to the land about $\frac{1}{3}$ mile southeastward of it by a reef of sunken rocks. This reef also extends northwestward of the islet for a distance of about $\frac{1}{6}$ mile. This islet is rather difficult to distinguish from seaward.

Rainbow Reef, with a depth of less than 1 fathom, lies about $\frac{1}{3}$ mile northwestward of Pulau Kra.

The bar of the Sungei Santubong has a depth of about 7 feet. Its outer 3-fathom edge lies about 6 miles north-northwestward of Pulau Kra. This bar is possibly subject to change because of its sandy nature, and because of the freshets that occur. Inside the bar the river has depths of 10 to 54 feet, but there are several dangers

between its entrance and its junction with the Sungei Sarawak, and local knowledge is essential for vessels proceeding beyond Cross Point.

10-8 Tidal currents.—The flood current sets eastward across the bar, and the ebb current westward. In the entrance to the river the flood current sets toward Royalist Rock. The strength of both the flood and ebb currents is increased immediately inside the river entrance.

At the entrance to the Muara Tebas the spring tides rise about 14 feet and the neaps about 11.4 feet.

10-9 Directions.—Vessels approaching the Santubong entrance from the westward should steer for Gunong Santubong bearing 131° until the extremity of Tanjong Sipang bears 65° . From this position Bukit Siol, a 345-foot hill situated about 9 miles southward of Gunong Santubong, will be visible bearing about 163° . This hill will be seen between North and South Haycocks, which are two conical-shaped hills situated southward of Pulau Kra. Bukit Siol should be steered for, bearing 163° , which course will lead over the bar between the two 1-fathom patches west-northwestward of Telok Penyok and up the fairway to Cross Point in a least depth of 7 feet. When Cross Point bears about 103° the course should gradually be changed to the eastward in order to pass between Cross Point and Royalist Rock. Vessels entering this channel with the flood stream should make this turn in plenty of time in order to avoid being set on Royalist Rock and the shoals southwestward of it. Local knowledge is necessary for vessels proceeding upstream from Cross Point.

10-10 Muara Tebas entrance.—The coast between Tanjong Po and Tanjong Selabat, situated about $3\frac{1}{2}$ miles southwestward, recedes westward forming a bay. A sand and mud flat extends from the head of the bay for a distance of about $1\frac{1}{2}$ miles. This flat dries 1 to 9 feet. Between Tanjong Selabat and Tanjong Muara Tebas, a point situated about $1\frac{1}{2}$ miles southward, another bay, Telok Awar, is formed, which dries 2 to 12 feet. A pyramidal beacon, the upper part of which is painted white, is situated on Gunong Ayer, 381 feet high, which is the northernmost hill on Tanjong Muara Tebas. This beacon is difficult to distinguish from seaward.

Batu Pisang Sikat, an islet 110 feet high,
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lies close off Tanjong Selabat. Batu Jambar, 15 feet high and another islet 10 feet high, are both 50 feet high to the tops of the trees, and lie close together in a position about $\frac{1}{5}$ mile southward of Tanjong Selabat. Rocky Islet, 9 feet high, lies about $\frac{1}{4}$ mile south-southeastward of the same point. Another islet, 5 feet high, lies close offshore in a position about $\frac{1}{4}$ mile northeastward of the beacon on Gunong Ayer.

There is a jetty, the head of which dries at low water, located at the village about 1,400 yards southwestward of Tanjong Muara Tebas.

Beting Matong, a sandy spit with depths of 13 to 18 feet, lies eastward of Tanjong Po. The northern extremity of this spit is situated about $1\frac{1}{2}$ miles northeastward of this point.

The outer bar, composed of hard sand and situated about 2 miles southeastward of Tanjong Po, lies between two areas of shoal water, with depths of less than 3 fathoms, that extend in a northeasterly direction from both sides of the river entrance. The northern part of the eastern shoal area is formed by Beting Matong. In 1959 the least depth over Beting Matong on the outer range line was 15 feet.

Several detached 3-fathom patches lie in or near the fairway in a position about $1\frac{1}{4}$ miles eastward of Tanjong Po and in a position about 2 miles southeastward of the same point. A smaller shoal with a least depth of $1\frac{3}{4}$ fathoms, lies in the western shoal area near the western side of the outer bar in a position $1\frac{3}{4}$ miles southeastward of Tanjong Po. In 1959 there was a least charted depth of 18 feet on the outer bar about $\frac{1}{2}$ mile northwestward of the outer range line.

Tanjong Embang comprises the coastal area on the southern side of the entrance to the Sungei Sarawak, and is situated between a position about $\frac{3}{4}$ mile southward and a position about $1\frac{1}{2}$ miles southeastward of Tanjong Muara Tebas. A shoal, which dries 2 to 10 feet, extends in a northerly and northeasterly direction from Tanjong Embang for a distance of nearly 1 mile.

About 1 mile eastward of Tanjong Muara Tebas the inner bar is formed. In 1960 there was a least depth of about 17 feet in the fairway of the inner bar. A shoal sounding of 13 feet was reported (1964) to lie about $\frac{1}{2}$ mile east-southeast of Tanjong Muara Tebas.

From the inner bar the river trends in a west-

southwesterly direction for a distance of about 3 miles to McDougall Point, which is situated on the eastern bank. From McDougall Point the river follows a winding course for a distance of about 8 1/2 miles to North Junction Point where it joins the Sungei Santubong.

Tanjong Batu is a point situated on the western side of the river in a position about 2 1/4 miles west-southwestward of Tanjong Muara Tebas. There is a pier at this point. A rock, which dries 3 feet, is situated about 100 yards westward of the pier.

Belcher Rocks, with a depth of less than 1 fathom over them, lie about 175 yards off the western bank of the river in a position about 1/2 mile west-southwestward of Tanjong Batu.

A notice board stands on the north shore about 400 yards northwestward of the east edge of the rocks.

A depth of 18 feet lies about 350 yards off McDougall Point, in a position 800 yards southeastward of the front range light of the Senari Range. A 7-foot patch lies close southeastward of the 18-foot depth.

A bar, with depths of 3 fathoms or less over it, extends southward across the river, about 1/2 mile southward of McDougall Point.

Renard Point, about 1 3/4 miles southward of McDougall Point, lies on the west bank of the river. A 16-foot rocky patch lies about 800 yards northward of Renard Point. A light is shown from Renard Point.

Bukit Sejinkat, 280 feet high, stands about 1 1/4 miles westward of Renard Point. Kampong Sejinkat, a small village, where there is a small pier, lies at the foot of this hill.

Beting Tanju, a shoal with a least depth of 11 feet over it, lies in the middle of the river southward of Renard Point, and extends about 3/4 mile westward.

The entrance of Loba Batu Blat lies between Tanjong Sadap, on the south bank about 1 1/2 miles west-southwestward of Renard Point, and Tanjong Buaya, about 500 yards further southwestward.

In Batu Blat Reach, between Tanjong Buaya and Tanjong Bakau about 1 mile westward, a bank with depths of less than 6 feet, extends about 400 yards from the south side of the river. Depths of less than 3 fathoms exist about 200 yards farther offshore.

A bank, with depths of less than 3 fathoms, extends for 1 1/4 miles in a southwest direction from a point about 1/2 mile west of Tanjong Bakau.

At Pending Point, about 1 1/4 miles southwestward of Tanjong Bakau, the Sungei Sarawak trends northward. The oil wharf at Biawak stands on the west side of the river about 700 yards northward of Pending Point. Bukit Biawak, a small hill, lies close westward of the wharf.

Lights—beacons.—A lighted beacon, painted black and white, stands on the east bank at the entrance of Sungei Kuap, about a 1/4 mile east-southeastward of Pending Point. A red and white beacon, with a ball topmark, stands on the west side of the Sungei Kuap, about 400 yards west-southwestward of Pending Point. A similar beacon stands on the east side of the same river about 600 yards south-southwestward of the same point.

An anchorage beacon, with a yellow triangle, point up, with a black stripe, stands about 1/2 mile eastward of Pending Point.

Above Pending Point the river is marked by lighted beacons, painted black and white, and by a pair of range lights at the west end of Prima Donna Reach.

10-11 Range lights.—Range lights, known as the Embang Range, are shown from a position near Tanjong Embang. The front light is shown at an elevation of 70 feet from a steel tower with a diamond topmark; and the rear light, which is situated about 3/8 mile south-southwestward of the front light, is shown at an elevation of 100 feet from a similar structure with a diamond topmark. These lights, are in range 209 1/2°.

Range lights, known as the Senari Range, are also shown from steel towers, each with a diamond topmark, on the western side of the river opposite McDougall Point. The front light is shown at an elevation of 70 feet; and the rear light, which is situated about 2/5 mile west-southwestward of the front light, in range about 247°, is shown at an elevation of 100 feet.

10-12 Anchorages.—The best anchorage is near the entrance to the Sungei Kuap, which is situated about 7 miles upstream from McDougall

Point. Vessels up to 400 feet in length with a draft of 18 feet can be accommodated.

Off Kampong Sejinkat, about 3 miles down-river from Pending Point, three vessels of up to 11,000 tons deadweight and 25 feet draft have been anchored at the same time. There are three white tripod beacons in this vicinity, to assist in selecting a berth.

The explosives anchorage extends about a half mile up-river from Tanjong Bakau and its limits are marked by four red and white beacons, each surmounted by a disc.

Vessels not more than 300 feet in length with a draft of 15 feet, or up to 280 feet in length with a draft of $16\frac{1}{2}$ feet, can moor off the town of Kuching, in a position about 200 yards southward of Henderson Point, which is situated near the west side of the town. Vessels can also moor in midstream off the entrance to the drydock. There is anchorage for small vessels between the sago factory, on the south side of the river near the eastern end of the town, and Samarang Rocks, which are situated about $2\frac{1}{5}$ mile eastward. Vessels using the anchorages off the town of Kuching must moor bow and stern.

Anchorage was taken (1959) in 11 fathoms, blue clay, off the mouth of the Loba Batu Blat, about $3\frac{1}{2}$ miles upriver of McDougall Point. Tanjong Buaya bore 216° , Tanjong Sadap bore 168° , and the south summit of Bukit Sejinkat bore 024° . Logs were loaded at this anchorage.

Prohibited anchorages.—Anchorage is prohibited in the Sungei Sarawak for about $1\frac{1}{4}$ miles northward of Pending Point.

No vessel may anchor in the channel between Brooke Dock in Kuching and the channel mark opposite Warren Point, about 2 miles downstream, except in an emergency. In such cases a report shall be made immediately to the Director of Marine.

Submarine cables—pipeline.—A submarine cable crosses the river between Fort Margherita and the opposite shore, about 2 miles westward of Warren Point. Each end is marked by a notice board. A pipeline crosses the river eastward of this cable. Another submarine cable similarly marked as the one above, crosses the river about 1 mile westward of Warren Point.

10-13 Signal station.—There is a signal station on Bukit Biawak, a hill about 700 yards westward of Pending Point. Numerous silver-painted oil tanks stand on the summit of the hill.

A black ball hoisted indicates that a power vessel exceeding 80 tons net register is proceeding down river from Kuching and no vessel exceeding 40 tons net register may proceed up river from Pending Point until the signal is hauled down.

10-14 Regulations.—The following are extracts from the shipping regulations:

(a) No vessel exceeding 80 tons net register shall be underway in the Sungei Sarawak above Pending Point between the hours of 1930 and 0500 without the permission of the Director of Marine.

(b) When approaching a bend, steam vessels shall sound one prolonged blast on their whistle or siren.

(c) Steam vessels exceeding 80 tons net register may not overtake or pass another vessel in the Sungei Sarawak upstream of a point $1\frac{1}{4}$ miles westward of North Junction Point.

10-15 Tides.—The tides are semi-diurnal. The spring tides rise 15.9 feet and neaps rise 13.3 feet at Kuching.

10-16 Tidal currents.—The ebb current sets out of the Sungei Kuap with a velocity of 2 to 3 knots, and the flood current sets in with a velocity of $1\frac{1}{2}$ to 2 knots. Off Kuching the ebb current runs at up to 3 knots at spring tides, but in the narrows and after a heavy rain, it may nearly double this velocity. The flood current off Kuching may attain a velocity of up to $1\frac{1}{2}$ knots. There is only a short period of slack water in the river.

When the height of high water at Pulau Lakei exceeds $13\frac{1}{2}$ feet, the flood current continues to run at Kuching for one hour after high water. In the entrances to Sungei Sarawak, the velocities of the tidal currents are about one half of those off Kuching. The tidal currents meet and separate near North Junction Point.

10-17 Pilots.—Pilots are stationed at Kuching and can be embarked either about 1 mile north eastward of Tanjong Po or off Pending Point. Pilotage is not compulsory.

Vessels requiring a pilot should give at least 24 hours notice by radio, to their agents or "Shipping Kuching", of their expected time of arrival at the pilot station. They should also communicate their draft, last port of call, and state of health.

10-18 DIRECTIONS.—Vessels arriving at the Muara Tebas entrance of the Sungei Sarawak at low water or at night should anchor, in a depth of about 5 fathoms, in a position about 1 1/2 miles northward of Tanjong Po lighthouse and wait for daylight or until there is sufficient depth on the bar. To reach Kuching on one flood tide it is necessary to leave this anchorage at least 3 hours before high water.

As vessels should not attempt to enter the river without local knowledge, directions are given only as far as McDougall Point.

Vessels approaching from the westward may pass either about 1 mile northward of Cruizer Rock, or midway between the rock and Tanjong Sipang. The latter approach has depths of about 4 3/4 fathoms. Vessels should pass about one mile eastward of Tanjong Po lighthouse steering to make good a course of about 155°. When the lighthouse bears 304° and is distant about 2 miles, the course should be changed to bring Embang Range in line bearing 209 1/2°. A course of 209 1/2° should then be steered until Senari Range is in line bearing about 247° when the course should be changed to about 247° and this course steered to a position northward of McDougall Point. There is a least depth of 17 feet on the latter range.

10-19 KUCHING (1° 34' N., 110° 21' E.), the main commercial port and capital of the State of Sarawak, is situated on the south bank of the Sungei Sarawak about 22 miles from the sea. The principal exports are rubber, pepper, timber, sago and rattan. Agriculture is the principal industry. Fort Margherita and the Astana, or Rajah's house, are situated on the northern bank. The Main Bazaar extends along the river front, behind the wharves and warehouses, for a distance of about 3/4 mile. The government and municipal offices are situated near the center of the Main Bazaar. The European residential area and educational institutions are located southward of the government offices. The population was estimated to be about 65,000 in 1961.

WHARVES.—The harbor has six wharves two of which are suitable for sea-going vessels, having depths of from 11 to 19 feet and 8 to 12 feet alongside them respectively.

The remaining wharves at Kuching have depths of from 4 feet to drying 4 feet alongside.

Biawak Oil Wharf, a T-head wharf 176 feet long with a depth of 19 feet (1960) alongside its face, projects from the west side of the river at Pending, about 400 yards northeastward of the signal station on Bukit Biawak. Tankers of 400 feet in length drawing 21 feet have berthed at this wharf.

A reinforced concrete wharf, 800 feet long, with a least depth of 17 1/2 feet alongside, is located at Tanah Puteh, about 2 1/2 miles downriver from Kuching. Facilities include two transit sheds, providing 60,000 square feet of covered storage, several other storage sheds, and workshop. Vessels of 403 feet in length drawing 17 feet will be able to berth alongside.

REPAIRS.—The government workshop is capable of undertaking small hull and machinery repairs. Simple brass castings, up to 150 pounds in weight, can be made. A portable electric welding plant is available.

Drydock.—Brooke Dock, a government-owned graving dock, is capable of accommodating vessels of 1,500 tons. The length on the bottom of this dock is 241 1/2 feet, the entrance width is 44 1/4 feet, and the depth on the sill is 12 feet MHWS. A 1962 dockyard report states the drydock is capable of accommodating vessels up to a length of 215 feet, a beam of 34 feet, and a maximum draft of 12 feet. There is also a slipway, located at the government workshop, that is capable of hauling up 30-foot launches if floated in at high tide.

CRANES.—A 15-ton crane at the entrance of the graving drydock, is available for lifting boilers, etc. for removal to the Government workshop. Lighters can berth under this crane only at high water. There is also a 1-ton steam derrick located on the wall abreast the Government store. Lighters can berth under this crane. A 1964 report lists 2 electric cranes of 1/2-ton capacity, a 5-ton mobile crane, and a 10-ton steam slewing-type crane. A 1964 report lists 2 electric cranes of 1/2-ton capacity, a 5-ton mobile crane, and a 10-ton steam slewing-type crane.

Mobile cranes are available on the wharf at Tanah Puteh.

SUPPLIES.—Fresh and tinned provisions can be obtained. Bonded stores are available.

COAL.—About 200 tons of coal are usually kept in stock. Vessels are supplied by lighters at the rate of about 60 tons per hour. There was a coal bunker on Lorna Doone Wharf, which is situated about 300 yards upstream from Steamship Wharf, with a capacity of about 220 tons. The bunker was fitted with an electric hoist capable of lifting 1/2 ton. The rate of delivery here is about 10 tons per hour. It was reported (1963) that stock sufficient only for local requirements were kept on hand.

FUEL OIL.—In 1952 fuel oil in drums could be obtained in limited quantities, but only by previous arrangement. Two oil depots are located at Biawak. Diesel oil for bunkers is available at a loading rate of about 60 tons per hour.

WATER.—Water is supplied through 3-inch pipes on Main Bazaar Wharf and Steamship Wharf. Water can also be supplied from lighters.

COMMUNICATIONS.—There is regular steamer communication with Hong Kong, Singapore, eastern Australia ports and the coastal ports of Sarawak, Brunei and British North Borneo. There is a local telephone system that connects Kuching with places in upper Sarawak. There is also a government-owned radio station.

There is daily air service to Singapore and British North Borneo. A road connects Kuching with Pending.

HEALTH AND SANITATION.—A well equipped general hospital, located in the south part of the town, has 369 beds, X-ray equipment, and a dispensary.

A water-borne sewage system serves part of the town.

All vessels calling at Kuching must have a bill of health from the last port of call.

10-20 COAST FROM SUNGEI SARAWAK TO TANJONG SIRIK.—From the eastern extremity of Tanjong Embang the coast trends in a southerly direction for a distance of about 3 miles to the mouth of the Batang Semarahan, and thence in an easterly direction for a distance of about 11 miles to the entrance of the Batang Sadong. Shoal water, with depths of less than 4 fathoms, extends in a northerly direction from this section of

the coast for a distance of 7 to 10 miles. Drying flats of mud and sand extend from 1 mile to 2 miles offshore.

BATANG SADONG.—The entrance to this river, which is about 2 1/2 miles wide, lies between Tanjong Piling, on its western side, and Tanjong Melaban, on its eastern side. There are no known dangers in this river from its mouth to its junction with the Simunjan branch about 20 miles upstream, but a tidal bore occurs in the river at spring tides.

10-21 SIMUNJAN, a small river port, is located about 20 miles upriver of Sadong. A small wharf, which dries at low water, is located at the port. Coal can be obtained at Simunjan.

10-22 BATANG LUPAR.—From Tanjong Melaban the coast trends in an east-southeasterly direction for about 9 1/2 miles to the mouth of the Sungei Sebuyau which discharges at the west side of the mouth of the Batang Lupar. Gunong Silabu, 1,286 feet high, and Bukit Berdiri, 1,350 feet high, situated respectively about 5 3/4 and 8 miles south-southeastward of Tanjong Melaban, are useful landmarks.

The village of Sebuyau is situated near the coast in a position about 9 miles east-southeastward of Tanjong Melaban and at the mouth of the Sungei Sebuyau. A light is shown from a concrete pillar which stands on the east entrance point of this river. Close southward of the village is a 555-foot high hill, with trees on it which increase the overall height to about 614 feet. Tree-top heights of hills about 1 mile and 2 3/4 miles west-southwestward of the village are 410 feet and 1230 feet, respectively.

SEBUYAU is fronted by an extensive bar of mud and sand, with a least depth of 7 feet. Large granite quarries are located nearby. There are two small wharves, with least depths of 4 to 9 feet (1960) alongside, which are used by light-draft vessels to load stone and granite. Conveyor belts are located on these wharves.

Pulau Burong, an islet about 345 feet high to the tops of the trees, lies about 3 1/4 miles north-northeastward of Tanjong Melaban. The shoal waters, with depths of less than 4 fathoms, that front this section of

the coast extend for a distance of about 6 1/2 miles northward from this islet.

The eastern entrance point of Batang Lupar is situated about 5 1/2 miles northeastward of the 410-foot hill near the village of Sebuyau.

Triso Hill, 390 feet high to the tops of the trees, is situated on the eastern bank of the river in a position about 3 miles southward of its eastern entrance point.

Pulau Triso, an islet 303 feet high to the tops of the trees, lies about 1/2 mile west-southwestward of Triso Hill. A rock, with a depth of less than 6 feet over it, lies about 200 yards east-northeastward of the islet, and there is a 10-foot patch about 250 yards northwestward of Pulau Triso.

The bar, which consists of very soft mud, and which has a least depth of 6 feet, lies with its outer end about 18 miles northwestward of Pulau Triso. An obstruction lies on the bar in a position about 3 3/4 miles northeastward of Pulau Burong. The depths are reported to be slightly greater, and the bottom softer, on the southwestern part of the bar than on its northeastern part.

From Pulau Triso to its junction with the Sungei Lingga, about 14 miles upstream, the Batang Lupar has depths in the fairway of 2 to 4 1/2 fathoms. It flows through dense jungle consisting mostly of mangroves and palm trees.

At high tide, vessels with a draft of up to 16 feet can enter or leave the Batang Lupar.

Lingga, a small village, stands at the entrance of the Sungei Lingga. There is a small wharf, with a least depth of 6 feet (1960) alongside, at the village. A flagstaff stands near the wharf. Vessels loading timber anchor in 15 feet in the main stream, abreast the village.

Navigation is hampered by tidal bores in the Batang Lupar and Sungei Lingga. The largest bores occur three days after full and new moon, those occurring after the new moon being greater. The large bores are usually first observed just below Pulau Seduku, and islet situated in mid-stream about 25 miles upstream from the mouth of the river, and travel about 40 miles farther upstream. At times of very low river, these bores have reached as far as 50 miles up-



stream from Pulau Seduku. In the large bores, it is reported that the advancing wave attains a height of 6 feet when about 3 miles upstream from Pulau Seduku, and the speed of advance, which is dependent on the configuration of the river bed, is estimated to be about 10 knots at Simanggang, which is situated about 19 miles upstream from Pulau Seduku.

A WHARF, a JETTY, and a CONCRETE RAMP for use of bow door landing craft are located at Simanggang. Vessels up to 117 feet long and drawing 6 1/2 feet have entered the port, but it was necessary to utilize the flood tide in proceeding upriver.

10-23 TIDAL CURRENTS.—At the entrance to the river the in-going and out-going tidal currents begin respectively about 1 hour 50 minutes after low water and high water at Pulau Satang. (See sec. 10-5.) The mean velocity of the in-going current is about 2 1/2 knots at spring tides, and that of the out-going current is about 3 1/2 knots.

10-24 DIRECTIONS.—To enter the river, vessels with local knowledge should steer for Pulau Burong bearing 160°, and pass a safe distance northeastward of this islet. A course should then be steered for the southwestern side of the river entrance in order to pass westward of Pulau Triso, the channel on the eastern side of this islet being subject to strong eddies during both tidal currents. Local knowledge is essential for vessels proceeding upstream from Pulau Triso.

Pilots for Batang Lupar and Batang Saribas can be arranged through Kuching. The pilot for Batang Lupar will meet the vessel about one mile northeastward of the Tanjong Po lighthouse.

CAUTION.—A large number of fishing stakes lie in the approach to Batang Lupar.

10-25 COAST.—From the eastern entrance point of the Batang Lupar the coast trends in a north-northeasterly direction for a distance of about 6 miles to Tanjong Riong, the western entrance point of the Batang Saribas. The village of Maludam is situated near this point. Tanjong Batang Marau, the eastern entrance point of the Batang Saribas, is situated about 6 1/2 miles north-northeastward of Tanjong Riong.

A LIGHT is shown from Tanjong Batang Marau.

A 1960 survey found the bar had a least depth of 12 feet and a tidal range of up to 19 feet. Once over the bar, the river had no rocks or shoals, being deep from bank to bank with a least depth of 32 feet in the fairway. The tidal currents in the river are strong. There is a minimum depth of 20 feet in the fairway from Pusa to Manggut.

Maludam spit, a drying mudbank extends about 3 miles northwestward from the south entrance point of the Batang Saribas.

Depths of less than 5 fathoms extend in a northwesterly direction from the mouth of the Batang Saribas for a distance of about 15 miles. The least depth at the river entrance is about 10 feet. Shoal water, with depths of 3 fathoms or less, extends in a northerly and northwesterly direction from Tanjong Batang Marau for a distance of about 11 miles. A drying sandbank extends for nearly 2 3/4 miles in a northerly direction from this point.

A shoal, with a least depth of 4 feet, and marked by a stake (1958), lies about 3 1/2 miles north-northwestward of Tanjong Kabong and about 1 3/4 miles offshore. A spit, with depths of less than 6 feet over it, extends from Tanjong Kabong to a position about 1/2 mile eastward of the south end of the above-mentioned shoal.

Pasir Dua Blas, a sandbank which dries one foot at its southern end, lies on the above bank, about 7 miles northwestward of Tanjong Batang Marau. Beting Marau, a sandbank with depths of less than 6 feet and with two drying patches, the southern of which dries 7 feet and the northern 2 feet, extends northward about 7 1/2 miles from a position about 2 miles northwestward of Tanjong Batang Marau. A bank which dries 8 feet lies about 5 3/4 miles north-northwestward of the same point. In 1958 shoal water appeared to extend several miles northwestward of the above bank; breakers were also observed at low water.

LIGHTED RANGE BEACONS are located about 2 miles northeastward and about 4 miles north-northeastward, respectively, of Tanjong Batang Marau. These ranges, which should be used only eastward of Beting Marau, lead into Sungei Krian. These beacons are moved as necessary to conform to the

channel. In 1960 a depth of 5 feet could be carried into the river on the ranges mentioned above.

Kabong, a fishing village and government station, is just inside the river entrance on the northern side of the river. A radio mast stands on the north bank of the river close southward of the village.

Sungei Seblak, about 2 1/4 miles above Tanjong Kabong, has depths of 6 to 39 feet in the fairway for about 11 1/2 miles above its mouth.

TIDAL CURRENTS.—In the entrance of Sungei Krian the ebb current attains a velocity of about 4 1/2 knots at springs and the flood current about 4 knots. In the deep channels on either side of Beting Marau the ebb current sets northward and attains a velocity of about 3 1/2 knots at springs while the flood current sets southward at about 3 knots.

From Tanjong Batang Marau, the coast trends in a north-northeasterly direction for a distance of about 21 miles to Tanjong Selalang, the southern entrance point of the Kuala Rajang. The land near this point is very low and densely wooded. In 1962 it was reported when approaching the Kuala Rajang entrance the coastline begins taking form at 18 miles offshore. Shoal water, with depths of less than 4 fathoms, extends from this section of the coast for a distance 5 to 11 miles.

10-26 BATANG RAJANG.—Tanjong Jerijeh, the northern entrance point of the Kuala Rajang, is situated about 4 1/2 miles north-northwestward of Tanjong Selalang, and the Batang Rajang is entered between these two points. This river is navigable by vessels having local knowledge, and drawing not more than 12 feet, as far as the town of Sibu 70 miles upstream.

An improved channel to Sibu, entering at Kuala Paloh, was established in 1962 (see sec. 10-33).

There was a least depth of 19 feet (1965) in the main entrance channel of Batang Rajang. There is a lively freighter traffic between Sibu and Singapore. It was reported (1960) that single-crew vessels of up to 280 feet in length and drawing 16 feet, and twin-screw vessels of up to 300 feet in length drawing 14 1/2 feet, could reach Sibu.

The town of Rajang stands on the north bank of the river and has a small jetty and a sawmill close westward.

Tanjong Mani, a timber port, is located about 16 miles upriver. The size of vessels is limited only by the depth on the bar. A vessel with a length of 507 feet and drawing 29 1/2 feet has anchored at this port. Water can be obtained from a water barge.

The entrance of the river is obstructed by Bohari Bank, a large shoal, with a least depth of 9 feet, the center of which lies about 3 1/2 miles westward of Tanjong Jerijeh. A narrow spit, as defined by the 3-fathom curve, with a least depth of 7 feet, extends east-southeastward from a position about 1/4 mile southeastward of the northeast end of this shoal and nearly joins the shoal bank fronting the coast to the southwestward of Tanjong Jerijeh.

Tanjong Sebulal, on the north bank of the river, lies about 5 miles east-southeastward of Rajang.

Middle Bank extends about one mile west-southwestward and the same distance west-northwestward from Tanjong Sebulal. A small part of the bank dries near the center, and the remaining part has depths of less than 6 feet over it.

Tanjong Mani lies on the south bank of the river about 2 1/2 miles north-northeastward of Tanjong Sebulal.

Mani Bank, which dries 4 feet, lies with its southwest end about 1 mile southwestward of Tanjong Mani. It stands on a spit, with depths of less than 18 feet over it, which extends about 3/4 mile off the bank of the river between Tanjong Mani and the small stream close southward.

10-27 NAVIGATIONAL AIDS.—A light is shown from a framework structure about 800 yards south-southeastward of Tanjong Jerijeh. The northwest and southwest sides of the structure are each faced with a red and yellow checkered rectangular daymark. This structure is difficult to identify during the morning hours but shows up well in the afternoon. A house with an aluminum roof close to the light structure shows up well during the morning hours.

(5736) **EAST INDIES—Borneo—Northwest coast—Kuala Rajang—Chart amendment.**—1. The recommended track charted between $2^{\circ}08' \text{ N.}$, $111^{\circ}09' \text{ E.}$ (approx.) and $2^{\circ}18' \text{ N.}$, $111^{\circ}02' \text{ E.}$ (approx.) will be expunged.

2. The following note will be charted in $2^{\circ}05' \text{ N.}$, $111^{\circ}25' \text{ E.}$ (approx.):

CAUTION

Depths on the bar are subject to considerable change and great care should be exercised when navigating in this area.

3. The note "See Caution" will be substituted for the note "Less water reported (1964)" in $2^{\circ}08.4' \text{ N.}$, $111^{\circ}07.7' \text{ E.}$ (approx.).

(Supersedes N.M. 7 (905) 1965.)

4. The lighted buoy (Fl. G.) ($2^{\circ}08.5' \text{ N.}$, $111^{\circ}06.8' \text{ E.}$ approx.) is painted black and white.

5. The light (Fl. R.) ($2^{\circ}08.5' \text{ N.}$, $111^{\circ}10.8' \text{ E.}$ approx.) will be amended to *Qk. Fl. R.*

6. The visibility of Tg. Selalang Light ($2^{\circ}05.8' \text{ N.}$, $111^{\circ}12.2' \text{ E.}$ approx.) will be amended to 6 *M.*

(N.M. 36/66.)

(B.A. Chart 1948.)

H.O. Charts **3040**, **5502** (6).

H.O. Pub. 112, Nos. 28482, **28490**.

H.O. Pub. 71, 1951, pages **214**, **215**.

A lighted beacon is located about 1 1/2 miles southeastward of the light on Tanjong Jerijeh.

A conical light buoy, painted in red and white vertical stripes and equipped with a radar reflector, is moored about 5 1/3 miles westward of Tanjong Jerijeh light structure.

A light buoy, painted black, and equipped with a radar reflector, is moored about 3 1/4 miles west-southwestward of the same structure.

A light is shown from a white diamond beacon located on the coast in a position about 1 1/4 miles southward of Tanjong Selalang.

A light is shown from a wooden tower on Tanjong Selalang.

Two white beacons, with diamond topmarks, stand about 1 1/2 miles southwestward and 1 mile south-southeastward of Tanjong Sebubal. A notice board lies about 2 miles westward of the same point.

A lighted beacon stands about 1 1/4 miles west-southwestward of Tanjong Mani. Another lighted beacon lies about 1,400 yards north-northwestward of the same point. A light shown from the top of a notice board lies about 1,300 yards northward of the same point.

10-28 ANCHORAGE.—The best anchorage for small vessels, in 5 to 7 fathoms, mud bottom, is in mid-channel in a position southward of the village of Rajang, which is situated on the northern bank of the river about 5 miles eastward of Tanjong Jerijeh. Although the holding ground is good, there are strong tidal currents and frequent heavy squalls. For these reasons it is recommended that vessels veer plenty of chain.

A deep-water anchorage lies off Tanjong Mani, about 16 miles above the river entrance. The holding ground is good and vessels are recommended to anchor either 700 or 500 yards south of the LIGHTED notice board about 1,300 yards northward of Tanjong Mani. This anchorage is mainly used by vessels loading timber, and the size of the vessels using it is limited only to those which can cross the bar. Sago and cutch (a tanning extract) are also loaded at this anchorage. Fresh water is brought in by water barge from Sibu. A limited amount of fresh fruits and vegetables are available.

10-29 TIDES.—The tides at the village of Rajang are semi-diurnal, the average spring range being about 11 1/2 feet.

10-30 TIDAL CURRENTS.—The flood current at Rajang commences about 5 hours before high water, and has a velocity of about 3 knots. The ebb current commences about 1 hour after high water, and has a velocity of about 3 1/4 knots.

10-31 PILOTS.—Government pilots are available 5 miles west of Tanjong Jerijeh. A 1964 report states that during good weather, the pilots board at a position about 3 1/2 miles west-southwestward of Tanjong Jerijeh light structure. In bad weather they board in the fairway in a position about 2 miles south-southeastward of the light structure. Requests for their services should be made to "Shipping Sibu" and repeated to "Shipping Sarikei" about 48 hours prior to arrival. A full time pilot is stationed at Sarikei and the services of the Marine Officer at Sibu are also available.

10-32 DIRECTIONS.—The main entrance lies between Bohari Bank and a spit which extends about 7 1/2 miles west-northwestward from Tanjong Selalang. Vessels entering the river should steer about 125° for the light beacon southward of Tanjong Selalang. When Tanjong Selalang light structure bears about 114° steer for it. When the conspicuous sawmill northwestward of Rajang is just open clear of the light beacon located about 2 miles southwestward of Tanjong Jerijeh, and bears about 078°, course may be set up river. In 1959, there was a least depth of 23 feet through this channel.

The northern entrance channel begins in a position about 3 1/2 miles northwestward of Tanjong Jerijeh light and extends in a southeasterly direction to a position about 1 1/2 miles south-southwestward of the light, passing northeastward of Bohari Bank. Vessels entering the river should steer for the beacon southward of Tanjong Selalang bearing about 143°. This course will lead across the bar in a least depth of 20 feet (1959). It was reported (1960) that this entrance is no longer used.

When Tanjong Jerijeh Light bears 010° course should be changed to 090° for about

1 1/2 miles, or until the beacon on the north shore bears north. The vessel should then alter course to 071° heading for the sawmill at Rajang, and anchor as convenient southward of Rajang. Between Rajang and the anchorage at Tanjong Mani, about 10 miles farther upstream, salient features of the river banks are marked by beacons and notice-boards, but as local knowledge is necessary above Rajang, no further directions will be given.

Caution.—A scend of about 2 feet has been observed, on a calm day at low water, on the bar of the northern entrance of Kuala Rajang.

10-33 BATANG PALOH.—Kuala Paloh lies about midway between Tanjong Jerijeh and Tanjong Sirik. It is entered between Tanjong Pasir, about 17 1/2 miles north-northeastward of Tanjong Jerijeh, and Tanjong Sedi. A bar with a least depth of 14 feet fronts the entrance between 3 and 5 3/4 miles northwestward of Tanjong Pasir. The bar is shallower than that fronting Kuala Rajang (see sec. 10-26), but once crossed, the river to Sibu via Muara Seredeng, Loba Semah, and Leba-an is easier to navigate and has fewer dangers. It is reported that since 1962 larger vessels have been able to reach Sibu than heretofore, and the limits imposed at the end of that year were a draft of 18 feet and a length of 450 feet. These limits are subject to revision.

Osman bank, which dries 3 feet, is located between 1 mile and 1 3/4 miles northwestward of Tanjong Pasir. Depths of less than 6 feet extend westward from it for 1 1/2 miles. On the north side of Kuala Paloh there are several drying sandbanks, including Pasir Timon, which dries 10 feet at its south end. These banks lie up to 5 miles northwestward of Tanjong Sedi, and depths of less than 6 feet extend about 1 mile further in this direction.

Kampung Paloh is located about 1 mile southward of Tanjong Pasir. There are many huts between this village and Tanjong Kedang, about 3 miles southeastward.

Navigation aids.—A pillar light buoy named "FAIRWAY" is moored off the seaward side of the bar about 7 1/2 miles west-northwestward of Tanjong Pasir. It is painted in black and white vertical stripes and is fitted with a radar reflector. A pillar light buoy named "INNER" marking the east end of the fairway over the bar, is moored about 3 miles

northwestward of Tanjong Pasir. It is painted in black and white vertical stripes and is fitted with a radar reflector.

Two pairs of beacons are located at the junction of Batang Paloh with Muara Seredeng about 12 miles upriver from Tanjong Sedi. The beacons, in line, bear about 082°-262° and indicate a fairway over a bar in a least depth of 14 feet.

A light is shown from a metal framework tower located on Tanjong Sedi.

Anchorage.—Vessels may anchor near the "Fairway" light buoy, in about 5 fathoms, stiff mud and sand, or cross the bar (see directions below) and anchor off Tanjong Sedi.

Tidal Currents.—At springs, near the "Fairway" light buoy, the north-going current attains a velocity of about 2 knots, and the south-going current a velocity of about 1 1/2 knots. Near the "Inner" light buoy, the ebb current attains a velocity of about 3 1/2 knots, and the flood current a velocity of about 1 3/4 knots.

Pilots.—Government pilots are available off Tanjong Sedi. They will board a vessel at the "Fairway" light buoy if the weather is suitable. Request for a pilot should be made to "Shipping Sibu" and the message should mention "Paloh channel", 48 hours notice are generally necessary.

Directions.—Vessels entering Kuala Paloh should make good a course of about 100° from the "Fairway" light buoy to the "Inner" light buoy and thence make good a course of about 117° to pass 500 yards off Tanjong Sedi where good anchorage can be obtained. As local knowledge is necessary to navigate the river no further directions will be given.

Sarikei.—Sarikei, about 27 miles above the mouth of the Batang Rajang, had a population of about 1,900 in 1947. Pepper, rubber and timber are exported. About 60,000 tons of shipping visited the port in 1955.

The main wharf at Sarikei consists of two pontoons with a total length of 120 feet and a least depth of 22 feet alongside; the wharf is suitable for vessels up to 2,000 tons. In addition, there are two other pontoons, 40 and 110 feet in length, with least depths of 12 and 8 feet alongside, respectively, and a small jetty with a least depth of 6 feet alongside.

Binatang.—Binatang, 11 miles upriver of Sarikei, had a population of 1,840 in 1947. In 1955, 53,000 tons of shipping visited the port; exports were rubber and pepper.

The main concrete wharf at Binatang, on the left bank of the river, is 179 feet long with a depth of 16 feet alongside. The wharf is suitable for vessels of up to 2,000 tons. In addition, there are two jetties with depths of 21 and 12 feet alongside, respectively, and two wharves, 57 and 24 feet long, with least depths alongside of 7 feet and 5 feet, respectively.

Sibu (2° 17' N., 111° 49' E.), situated about 70 miles upstream from the mouth of the Batang Rajang, is one of the principal ports of Sarawak and the residence of a government official. The town is situated on a small island, about 3/4 mile long, that lies near the confluence of the Batang Rajang and the Batang Igan. It is separated from the northern bank of the Batang Rajang by the Loba Lem-bangan, a muddy creek. The main bazaar extends along the southeastern end of the town, and most of the government offices and quarters are situated here. The Malayan section of the town is along the Loba Lem-bangan. The principal exports are timber, pepper, rubber, and sago. Over 110,000 net tons of coastal and foreign shipping visited the port in 1955. In 1960 the population was about 20,000.

Wharves.—There are several wharves at Sibu, the principal one having a length of 486 feet and a least depth alongside of 19 feet; another wharf, located about 1 1/2 miles

southeastward of Sibu, has a length of 74 feet with depths of 13 to 15 feet alongside. The oil wharf has a length of 290 feet with depths alongside of 16 feet. There is another wharf and several floating wharves for small craft. A 200-foot jetty extends from the south bank of the river across from Sibu. Most cargo is handled by ship's gear.

Repairs.—There is a workshop that makes minor repairs to river craft. An overhead crane near the workshop lifts engines from small craft.

Supplies.—Provisions, fresh water and limited quantities of high speed diesel fuel are obtainable.

Communication.—There is regular steamer and air service to Kuching and Singapore. There is a telephone exchange and a radio station.

Medical.—Sarikei and Sibu each have a hospital.

10-34 Coast.—From Tanjong Jerijeh the coast trends in a north-northeasterly direction for a distance of about 38 miles to Tanjong Sirik. This section of the coast is uniformly low, and is covered with casuarinas, low jungle and mangroves. It is fronted by shoal water, with depths of less than 4 fathoms, that extends 2 to 4 miles offshore. The land to the northeastward of Tanjong Jerijeh was reported as receding (1956).

Kuala Belawai, which can be entered only by small vessels with local knowledge, is situated between Tanjong Jerijeh and Tanjong Manat, about $4\frac{1}{2}$ miles north-northeastward.

Approaching from westward Tanjong Manat appears first as a line of trees with its south end considerably darker and denser than its north end; it forms a good landmark.

North Jerijeh Sands, an extensive sandbank, which dries in patches, extends in a westerly direction from the entrance of Kuala Belawai for a distance of about 4 miles. Manat Spit, which dries from 1 foot to 4 feet, extends in a westerly direction from Tanjong Manat for a distance of about $2\frac{1}{2}$ miles.

The bar of the Kuala Belawai, which has a least depth of 8 feet, lies about 3 miles westward of Tanjong Manat.

10-35 Tanjong Sirik is the east extremity of the large bay, of which Tanjong Datu is the west extremity. Shoal water, with depths of less than 3 fathoms, extends about 7 miles northward, about $5\frac{1}{2}$ miles westward and about $9\frac{1}{2}$ miles northeastward from this point. The point was reported (1959) to be extending northward and northwestward. Tanjong Sirik has been reported (1958) to be a good radar target at a distance of 19 miles.

A light is shown from a steel framework tower on the extreme northern tip of Tanjong Sirik. The light structure was reported (1959) to be difficult to see by day because of the trees.

10-36 Tidal currents.—Some distance from the shore the tidal currents set northeastward and southwestward, but closer inshore they follow more closely the trend of the coast. Westward of Tanjong Sirik the tidal currents set northward and southward with a velocity of 2 to 3 knots; eastward of the cape they set eastward and westward. Tide rips occur near the shoal water off Tanjong Sirik, especially during the northerly and easterly currents. The tide sets strongly through the channels leading to Muara Lassa attaining a velocity of 4 knots, close eastward of Pulau Patu, on the ebb current after rains.

10-37 COAST FROM TANJONG SIRIK TO TANJONG KIDURONG.—From Tan-

jong Sirik the coast trends in an east-northeasterly direction for a distance of about 110 miles to Tanjong Kidurong. Between Tanjong Sirik and the entrance to Batang Balingian, which lies about 32 miles west-southwestward of Tanjong Kidurong, the coast is low and partly wooded. A mud bank, with depths of less than 3 fathoms, extends from this section of the coast for a distance of about $2\frac{1}{2}$ miles. This mud bank has not been closely examined. About 8 miles south-eastward of the mouth of the Batang Balingian there is a range of hills that trends in a southeasterly direction. Table Hill is the most prominent peak in this range of hills.

Kuala Bruit and Kuala Matu are situated close eastward of Tanjong Sirik. These are the two mouths of Muara Lassa, a large river that trends in a southerly direction and joins the Batang Paloh in a position about 24 miles south-southeastward of Tanjong Sirik. Kuala Bruit and Kuala Matu are separated by Pulau Patu (Patok), a pear-shaped island about 2 miles long. Pasir Jungau, a shoal that dries about 4 feet, extends about $2\frac{1}{4}$ miles northward from the northern extremity of Pulau Patu. Kuala Bruit has a least depth of 5 feet (1959) over the bar which lies from $4\frac{1}{2}$ to $5\frac{1}{2}$ miles north-northwestward of Pulau Patu. The channel is liable to change, especially after the northeast monsoon, and should not be attempted without local knowledge.

Muara Lassa can be entered by small vessels eastward of Pulau Patu and Pasir Jungau. There is a least depth of 12 feet (1959) over the bar of the main entrance of Muara Lassa, which lies about $6\frac{1}{2}$ miles north-northeastward of Pulau Patu.

Fishing stakes are located about $5\frac{1}{2}$ miles north-northeastward of Pulau Patu. The village of Bruit lies on the western side of Kuala Bruit in a position about 5 miles southeastward of Tanjong Sirik Light.

The mouth of the Batang Igan is entered eastward of Igan Point about 20 miles east-northeastward of Tanjong Sirik. Igan Point, low and wooded, was reported (1959) to be extending west-northwestward. A drying spit extends about 1 mile west-northwestward from Igan Point, and a similar spit extends about $1\frac{1}{2}$ miles north-northwestward from the east entrance point.

A bar with a least depth of 4 feet lies about 2 miles northward of Igan Point. An unexamined 10-foot shoal lies about $3\frac{1}{4}$ miles northward of Igan Point.

A light is shown from a steel framework tower with a white diamond topmark, which faces the northeast, about $\frac{3}{4}$ mile east-southeastward of Igan Point. The light structure is difficult to see from the northward by day.

Shoal water, with depths of less than 3 fathoms, extends from its narrow entrance for a distance of about $2\frac{1}{2}$ miles. The channel over the bar changes frequently, but, in 1959, vessels approaching the river with Igan Point light bearing 164° , could maintain a depth of 4 feet. Close eastward of the lighthouse, there are reported depths of 12 to 72 feet for 50 miles upstream to the junction of this river with Batang Rajang at Sibul. This channel is not fully surveyed, however, vessels with a 9-foot draft use the river regularly. The village of Igan stands on the east bank of the river about 3 miles from its entrance.

The Batang Oya enters the sea about 13 miles eastward of Batang Igan. Two lights, disposed vertically, are shown from a mast, painted in black and white bands, about $\frac{1}{2}$ mile westward of the entrance of the river.

Drying sandbanks extend about $\frac{3}{4}$ mile northeastward from the light and the same distance north-northwestward from the east entrance point of the river. A bar, with a least depth of 1 foot (1959) over it, lies between the north edges of these banks. The channel across the bar and into the river is marked by stakes. It is reported that small craft drawing 6 feet can navigate the river for a distance of about 17 miles. The village of Oya stands on the east bank of the river about 1 mile upstream from its entrance.

10-38 The mouths of the Sungei Penat and the Sungei Judan are situated respectively about $4\frac{1}{2}$ and $6\frac{1}{2}$ miles eastward of Batang Oya. Neither river has been examined, and they can be entered only by boats.

The Batang Mukah is situated about $13\frac{1}{2}$ miles eastward of Batang Oya. The least

depth on the bar about $\frac{1}{2}$ mile northward of the entrance to this river, is 2 feet (1960), with an average tide range of 5 feet. The channel over the bar is marked by stakes which are moved as necessary to conform with the changes in the channel.

Drying sandbanks extend about $\frac{3}{4}$ mile northward from the west entrance point, and $\frac{1}{2}$ mile northward from the east entrance point, of Batang Mukah. There are several submerged rocks near the entrance to the river, the positions of which have not been accurately ascertained. The tidal influence is felt as far as 8 to 9 miles upstream from the mouth of this river, and the river itself is often congested with driftwood. A government station is situated at the village of Mukah, which is situated on the western bank of the river about 1 mile within the entrance. Two small wharves, with depths alongside of 6 to 18 feet, are located at Mukah. A radio tower, from which a light is shown, is located at Mukah. There is an airfield close westward of the entrance of Batang Mukah; regular air services connect Mukah with Sarawak, Brunei and North Borneo. In 1947 the population of Mukah was about 4,700.

Signals.—Tidal signals are shown from the eastern yardarm of the flagstaff at Mukah.

One white ball-----Flood tide.
One red ball-----Ebb tide.

Depth signals are shown from the western yardarm of the above flagstaff.

Three white balls-----7 feet or more on the bar.
Two white balls-----6 feet on the bar.
One white ball-----5 feet on the bar.
No signal-----less than 5 feet on the bar.

Range lights.—A light is shown from a flagstaff on the west entrance point of the Batang Mukah, this light is obscured by trees except over the approach to the river. A rear light is shown close south of the above light. These lights in range about 182° leads in the approach to the river.

10-39 Batang Bintulu.—The entrance to this river is situated about $58\frac{3}{4}$ miles east-northeastward of the mouth of the Batang Mukah. Several other rivers, including the Batang Balingian and the Batang Tatau, flow into the sea between these two rivers, but none is of any importance to shipping. Mount Tatau, a conical-shaped peak