REPORT

OF THE

CRUISE OF THE REVENUE MARINE STEAMER

CORWIN

IN THE

ARCTIC OCEAN

IN

THE YEAR 1884.

BY

CAPT. M. A. HEALY, U. S. R. M.,
COMMANDER.

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DESCRIPTIONS OF BOGOSLOV ISLAND

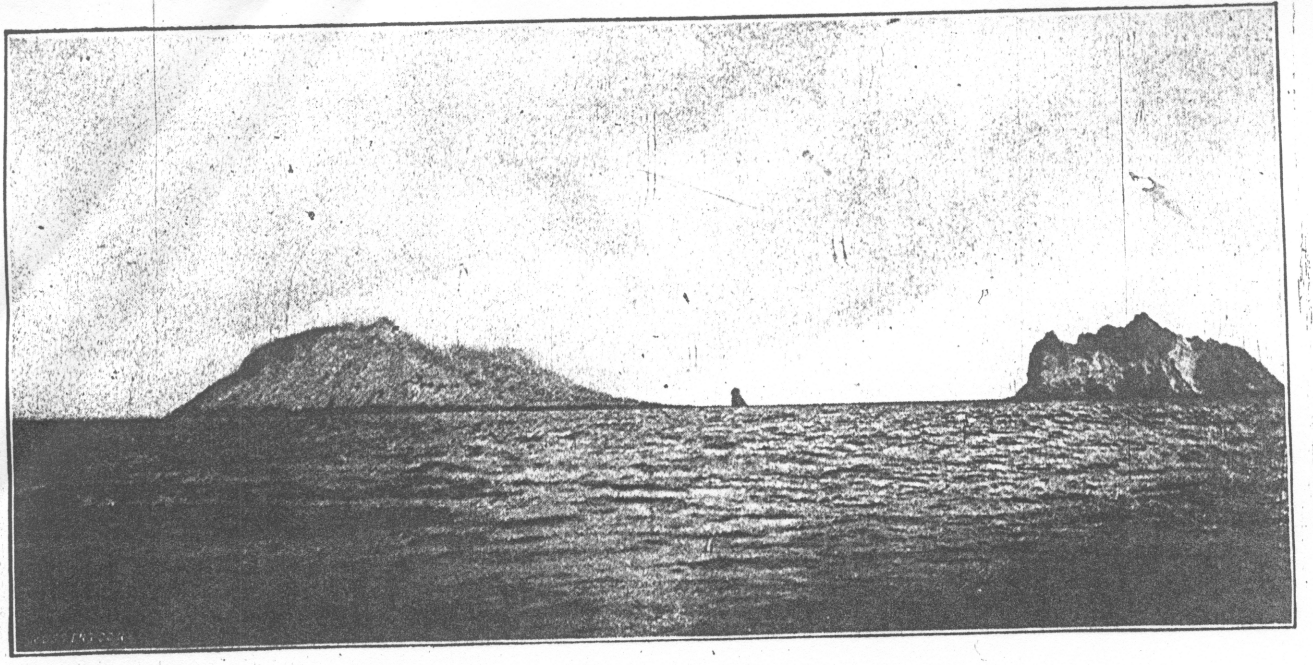
AND THE

NEW VOLCANO IN BERING SEA,

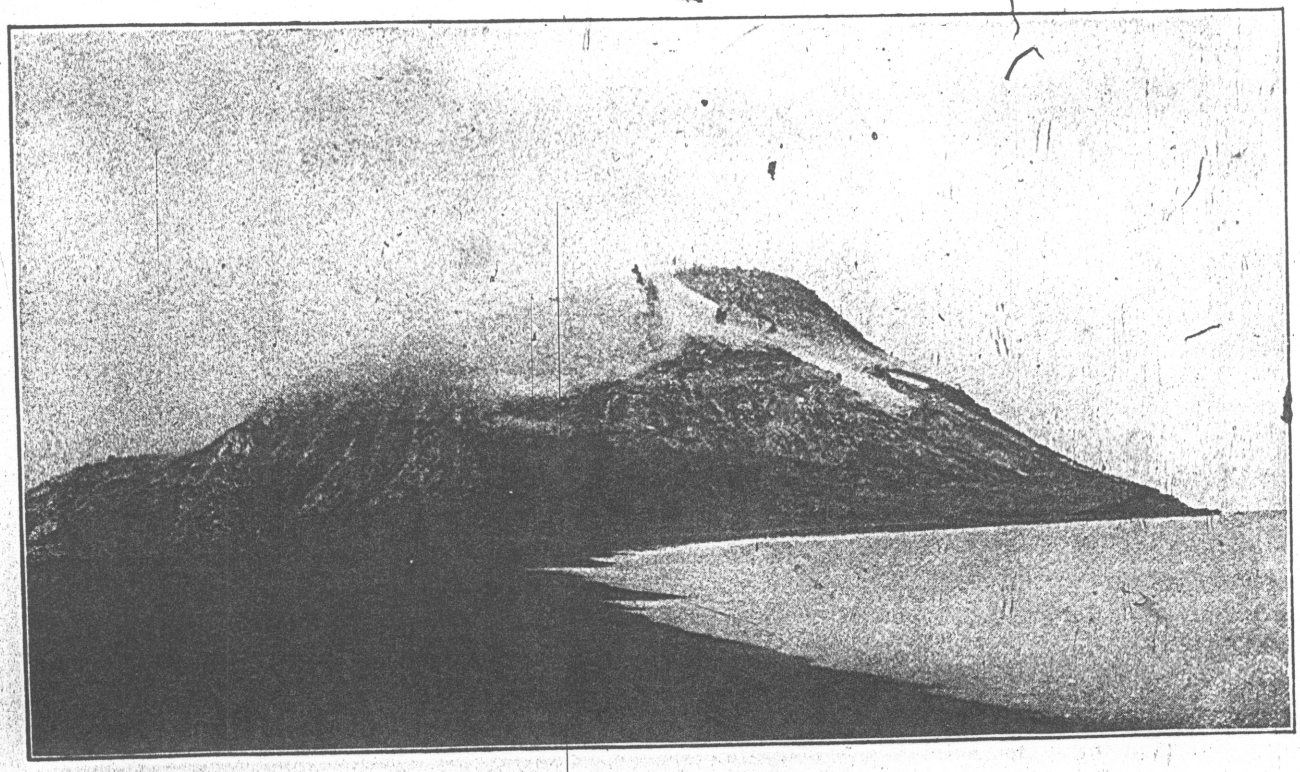
(ILLUSTRATED WITH SIX PHOTOGRAPHS).

BY

LIEUT. J. C. CANTWELL and SURGEON H. W. YEMANS.



BOGASLOFF: SAIL ROCK, BEARING NE. BY E., DISTANT ONE MILE.



SAIL ROCK AND NEW BOGASLOFF.

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DESCRIPTIONS OF

BOGOSLOV ISLAND AND THE NEW VOLCANO IN BERING SEA.

Visited by the U. S. S. Corwin, Capt. M. A. Healy, U. S. Revenue Marine, commanding.

REPORT OF SECOND LIEUT. JOHN C. CANTWELL.

Approaching the island from the northeast it has the appearance of being divided into two parts, the northern portion being in a state of eruption and the southern portion a much serrated rock rising almost perpendicularly from the sea, while between the two and nearer the northern part of the new Bogoslov a tower-like rock rises with a slight inclination towards the north to a height of eighty-six feet. At a distance it might be easily mistaken for a sail upon the horizon; for this reason it is called Ship Rock or Sail Rock. A nearer approach discovers the fact that the two elevations are connected by a low, flat beach free from rocks and affording an excellent landing place for small boats. The *Corwin* steamed around the northern end of the island and close enough to obtain an accurate view of the volcano. The top was hidden by clouds of steam and smoke which issued not only from the crater but also poured forth with great violence from rents or areas in the sides of the cone. On the northeast side these apertures are particularly well defined. I counted fifteen steam jets forming a group situated on a horizontal line about two-thirds the distance from the base to the apex of the cone. This group was the more noticeable on account of the force with which the steam escaped as well as the marked regularity of the spaces separating the vents. The sketch marked A gives a view of the northern end of the island and the position of steam jets mentioned above.

When the center of the island bore northeast and distant three-quarters of a mile the *Corwin* was anchored in thirteen fathoms water and a boat lowered in which we proceeded towards the shore, sounding in from ten to twelve fathoms until within one hundred and fifty feet of the beach, when the water gradually shoaled and we landed without difficulty, the wind being light from northeast and the sea smooth. The landing place is shown in the sketch marked B.

The narrow isthmus connecting the old and new formations is composed of a mixture of fine black sand and small oolitic stone, the greatest quantity of sand being on a line dividing the island longitudinally into two parts. During our stay the water did not rise high enough to cover this beach, but pieces of drift-wood, algæ, etc., found on the highest parts fully show that at the times of highest tides or during severe storms the entire isthmus is submerged.

The sides of the new Bogoslov rise with a gentle slope to the crater, and the ascent at first appearance is easy, but the thin layer of ash formed into a crust by the action of rain and moisture is not strong enough to sustain a man's weight. At every step my feet crushed through the outer covering and I sunk at first ankle-deep and later on knee-deep into a soft, almost impalpable dust which arose in clouds and nearly suffocated me. As the summit was reached the heat of the ashes became almost unbearable, and I was forced to continue the ascent by picking my way over rocks and bowlders whose surfaces being exposed to the air were cooler and afforded a more secure foothold.

The temperature of the air at the base was 44° and at the highest point reached 60°. A thermometer buried in the sand at the foot of the cone registered 44°, half-way to the top, 191°, and in a crevice of the ramparts of the crater the mercury rapidly expanded and filled the tube, when the bulb burst, and shortly afterwards the solder used in attaching the suspension ring to the instrument was fused. We estimated the temperature at this point to be 500° Fahrenheit. The temperature of the water around the island was the same as that of the sea, as observed on board the *Corwin* at the time, was 40°.

On all sides of the cone there are perforations through which the steam escaped with more or less energy. I observed from some vents the steam was emitted at regular intervals, while from others it issued with no perceptible intermission. Around each vent there was formed a thick deposit of sulphur, the vapor arising from which was suffocating and nauseating in the extreme.

An examination of the interior of the crater was not satisfactory on account of the clouds of smoke and steam arising and obscuring the view. On the northwest side the surface of the cone is broken into a thousand irregularities by masses of volcanic and metamorphic rock. On all other sides, however, the accumulation of ash and dust has almost entirely covered the rocks and the sides appear more even and less precipitous.

A curious fact to be noted in regard to this volcano is the entire absence, apparently, of lava and cinder. Nowhere could I find the slightest evidence of either of these characteristics of other volcanoes hitherto examined in the Aleutian Islands. Small quantities of rock-froth consisting of unfused particles in a semi-fused mass were seen, but the heat of discharge has evidently never been sufficient to produce firm fusion. Specimens of dust collected from one of the vents was compared with volcanic dust which fell in the village of Ounalaska October 20, 1883, and found to be identical in character.

Descending to the beach on the east side I found it to be much the same formation as on the west side, with perhaps the exception that the line of sand here approaches nearer the water-line. The pebbles seen on the island are universally of a dark-gray color, with small black spots and worn surface by attrition.

I saw no shells and but little sea-weed. Kelp in considerable quantities, however, was observed close inshore.

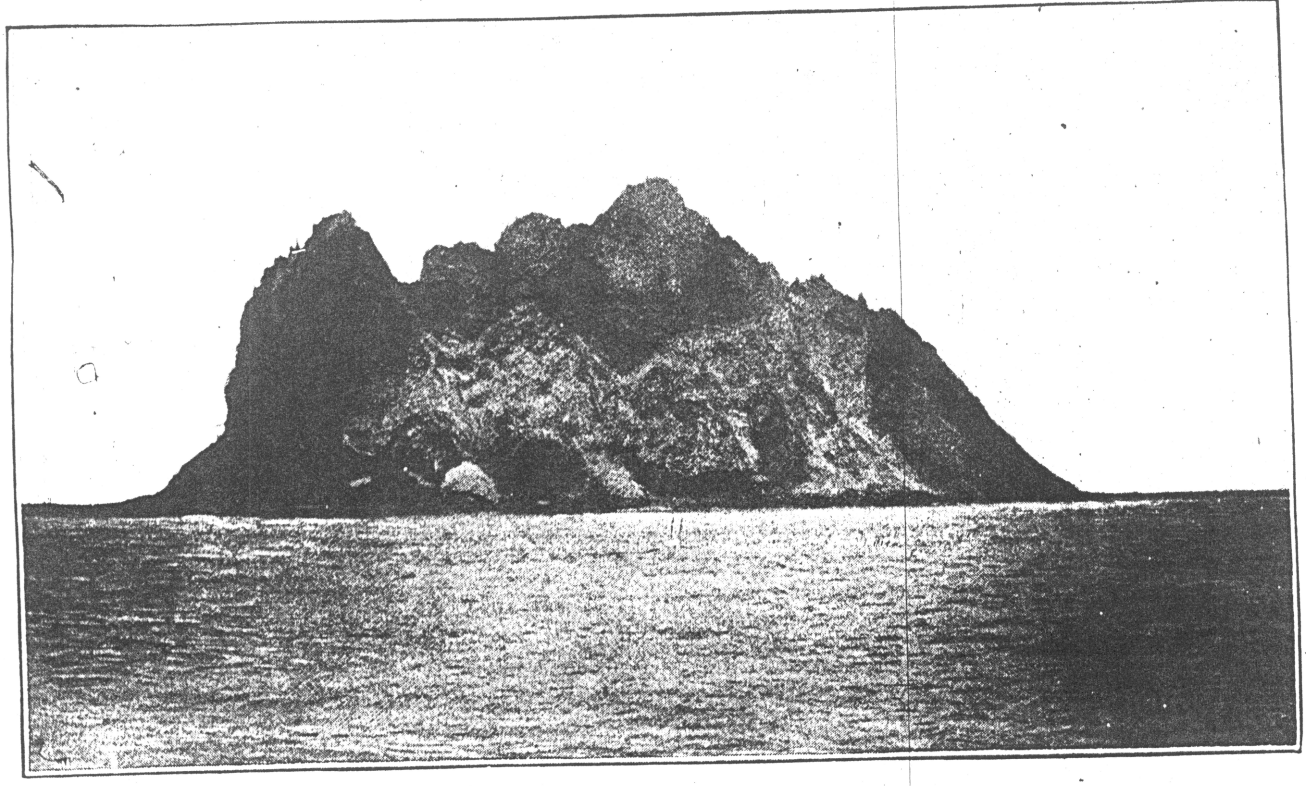
A walk of a third of a mile brought me to old Bogoslov, where the beach abruptly terminates. The northern end of this rock rises almost perpendicularly to a distance of some 325 feet. Its face is deeply indented at the base, forming a cave-like recess which gives the rock the appearance of leaning toward the north.

Probably nowhere can there be found a better example of the disintegration of stone into soil by the action of the atmosphere. The composition of the islet was originally of slate or shale. It is now breaking down on all sides and crumbling to dust. The central portion seemed to be composed of a more enduring substance, but a close examination was impossible on account of the loose, crumbling nature of the rock forming the sides and the precipitous ascent. I fired a rifle-shot into a flock of puffin, myriads of which were perched in the clefts and niches of the rock, and when they rose small pieces of stone were detached and in turn displaced larger pieces of stone until a perfect avalanche of stone came down the declivity, scoring great ruts in the hillside and tearing up great masses of stone, which were dashed to pieces on the shore below.

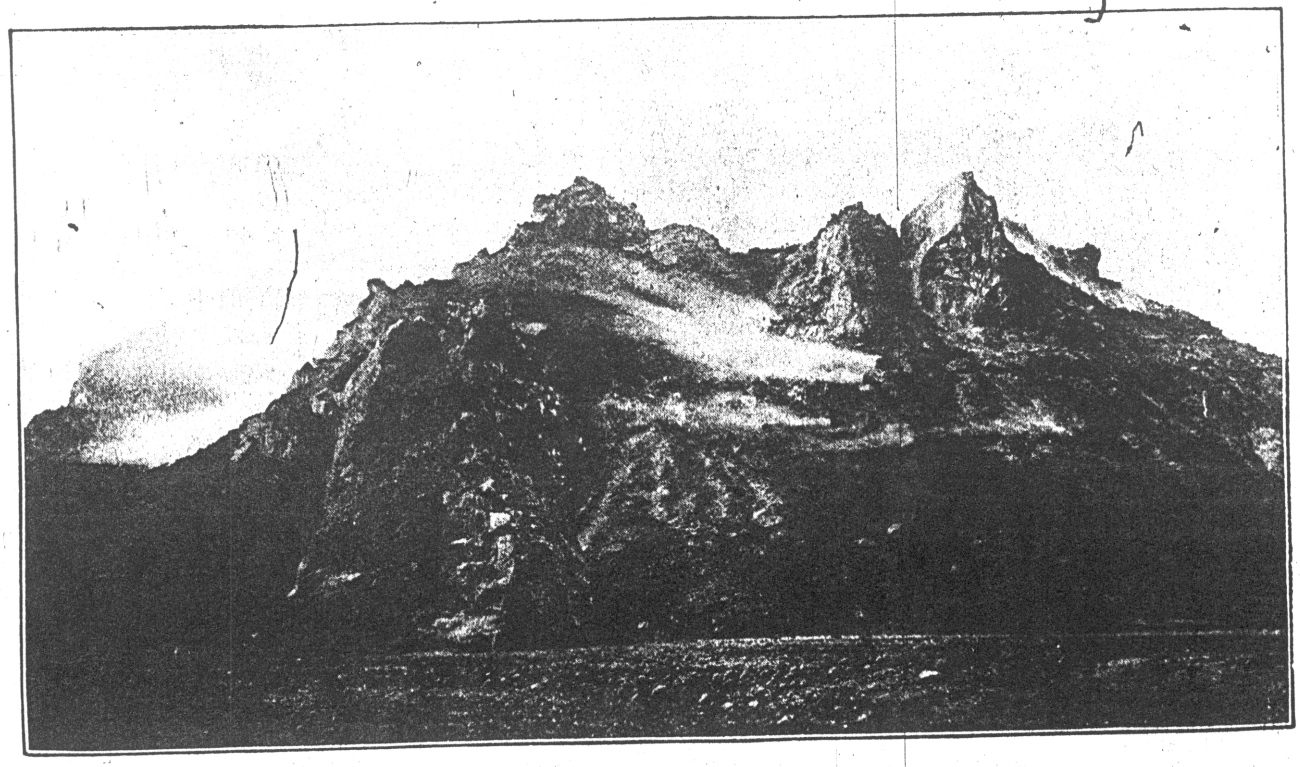
Specimens of outer rock were found at the base of the old Bogoslov, on the southern side, which, being struck with a hammer, crumbled to dust, in some cases deeply tinted with red, showing the presence of iron.

Hard bowlders of some hard, smooth stone fringe the bases of both the old and new Bogosloff, but a careful examination of the surrounding waters, both in small boats and on board the *Corwin*, failed to show any outlying dangers. A spot of sand and pebble formation extends from the southern end of old Bogoslov four-tenths of a mile in a southeasterly direction, and, like the isthmus connecting the two islands, is probably submerged at times of highest tides or during severe storms. The depth of water around the island is shown upon the chart accompanying the report.

Puffin in great numbers were seen on old Bogoslov, and it is probable they make this isolated spot a breeding place. I also saw numbers of harlequin-ducks, gulls, and kittiwakes. A dead albatross was picked up on the beach, but it is probable it was washed ashore, as its presence in



OLD BOGASLOFF, BEARING E. BY N.



EAST FLANK OF CRATER.

these latitudes is not common. Several herds of sea-lions were found on the beaches and on the rocks of the island. They evinced no fear of our party until fired into, when they entered the water and followed us from point to point, evidently viewing our intrusion with the greatest curiosity and astonishment.

Angular measurements were made on shore by Lieut. D. W. Hall to determine the heights of the peaks and the dimensions of the island, with the following results:

	Feet.
Height of east pinnacle old Bogoslov	334
Height of center pinnacle old Bogoslov	289
Height of west pinnacle old Bogoslov	324
Breadth of base old Bogoslov	933
Height of Sail Rock	875
Width of isthmus (narrowest)	326
Length of southern spit	1,824
Extreme length of island	7,904

General trend of island, SE. by E. and NW. by W.

By observations of Lieut. J. W. Howison the position of Sail Rock was reckoned to be latitude 53° 55′ 18″ north and longitude 168° 00′ 21″.7 west.

In conclusion, I have to regret that this subject, so full of interest to science, could not have been more satisfactorily discussed, but the relation which old Bogoslov bears to the new formation, the existence or non-existence of a crater in the latter, and the geological problems arising open up a field of inquiry too vast for me to enter. It is with this knowledge that this report has been confined to statements of facts and description of phenomena which fell under my observation during a reconnaissance of the island, and if any of them should prove a help to any others in their investigations the most sanguine hopes of the writer will have been realized.

Respectfully submitted.

JOHN C. CANTWELL,
Third Lieutenant, U. S. Revenue Marine.

REPORT OF SURGEON H. W. YEMANS, U. S. MARINE-HOSPITAL SERVICE.

The recently formed portion of Bogoslov Island, Bering Sea, lies in latitude 53° 55′ 18″.5 north and longitude 168° 00′ 21″ west, and is of nearly circular shape, about one half mile in diameter and distinctly volcanic in its origin. It has, in previous descriptions, received the name of new Bogosloff in contradistinction to the more ancient portion of the island, the two having been thought by those who first saw them since the recent eruption to be separate islands.

The exact date of the advent of the new portion above the sea-level is not definitely known. Natives who were in that neighborhood claim to have seen smoke issuing from old Bogoslov during and since the summer of 1882, but as they were at a considerable distance and no evidences were to be discovered about old Bogoslov of recent eruptions, it is fair to presume that what was seen arose from the new portion, which possibly had not at that time made its appearance above water. Although known to be in superaqueous existence some ten months at the date of this writing it had received no closer examination than that possible from the deck of a vessel distant half a mile until the visit of the *Corwin*, M. A. Healy, commanding, May 21, 1884.

The credit of the first discovery belongs, I believe, to Captain Anderson, of the schooner *Matthew Turner*, who saw and sailed partly around the island September 27, 1883. He describes it at that time actively erupting large masses of heated rock and great volumes of smoke, steam, and ashes from the apex and numerous fissures on the sides and base; while at night bright reflections of interior fires were distinctly visible. A few days later Captain Hayne, of the schooner *Dora*, also saw it, but did not land. He gives a description similar to that of Captain Anderson of its appearance.

No earthquake shocks or other unusual phenomena were noticed on the neighboring islands at the time of the supposed eruption, though the two volcanoes on Akoutan Island ceased to smoke at about that time and have shown no signs of activity since.

October 20, 1883, a shower of volcanic ashes fell at Ounalaska, sixty miles to the eastward, although it is possible that this pumice dust came from Mount St. Augustine, a volcano then active some seven hundred miles northeast of that place.

May 21, 1884, at 4 a. m., the new formation was seen from the deck of the *Corwin*, as a dull gray, irregularly shaped hill of about five hundred feet in height, from the sides and summit of which great volumes of steam were arising, obscuring the upper third, and becoming detached, floated off on the northwest wind, then blowing, as cumulous clouds. At a height of about two-thirds of the distance from the base there issued, on the north side, a series of large steam jets, which extended in a horizontal direction completely across the northwestern face of the hill, which at that part was considerably flattened laterally and quite steep, giving it a very striking resemblance to a smoking charcoal kiln. This is shown in a photograph, somewhat blurred, unfortunately, owing to a sudden lurch of the ship.

Fortunately, the day was clear, not hazy, although the sky was overcast, a somewhat thick layer of cumulo-stratus clouds obscuring the hill most of the time, rendering the process of picture-taking a difficult undertaking, and our artist, Lieut. George H. Doty, is to be congratulated on his (under the circumstances) brilliant success. Without the accompanying photographs an adequate description of this recent and most interesting addition to the Aleutian group of islands could hardly be given, while with them one can avoid creating false impressions, and can also remove erroneous conceptions.

On nearer approach what at first sight appeared to be patches of vegetation became visible. A closer examination, however, revealed their true nature—collections of condensed sulphur which had accumulated around the orifices of what had once been active steam jets. These condensations were still going on, each vent, in fact, having its encircling collection of condensed sulphur of various hues and tints.

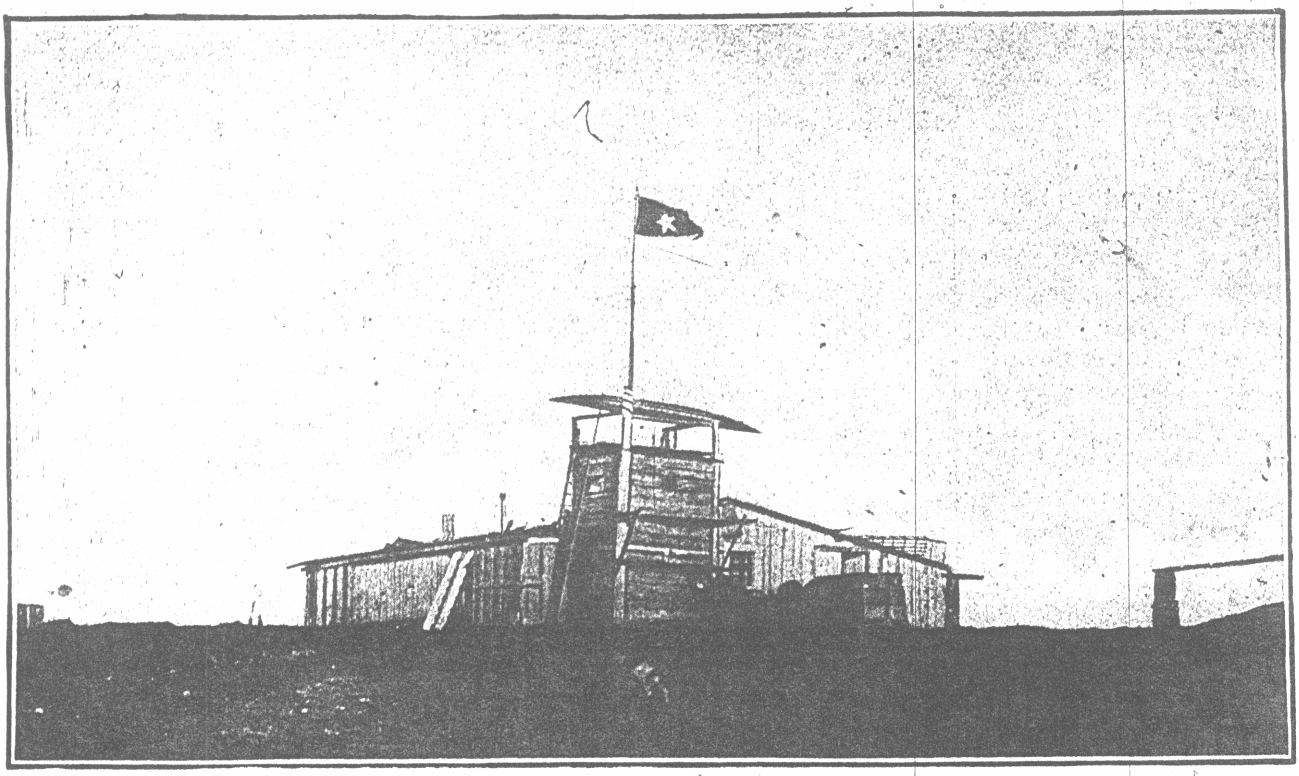
Steaming to within one-fourth of a mile of the south side of the isthmus, which was first discovered to form a connecting link between the old and new portions of Bogoslov, thus making them one, so to speak, the *Corwin* was brought to an anchor in thirteen fathoms of water, and a landing by boats was immediately made. But little surf was breaking on the beach, which at that point was composed of fine gravel and sand, and landing thereon presented no difficulties.

Photograph No. 2 was taken from the ship, at a distance of three miles off Ship Rock, which then bore NE. ¾ N., and shows distinctly the exact relation of the old and new portion of the island, including also the isthmus, near the middle of which stands the rocky pinnacle known as Ship Rock.

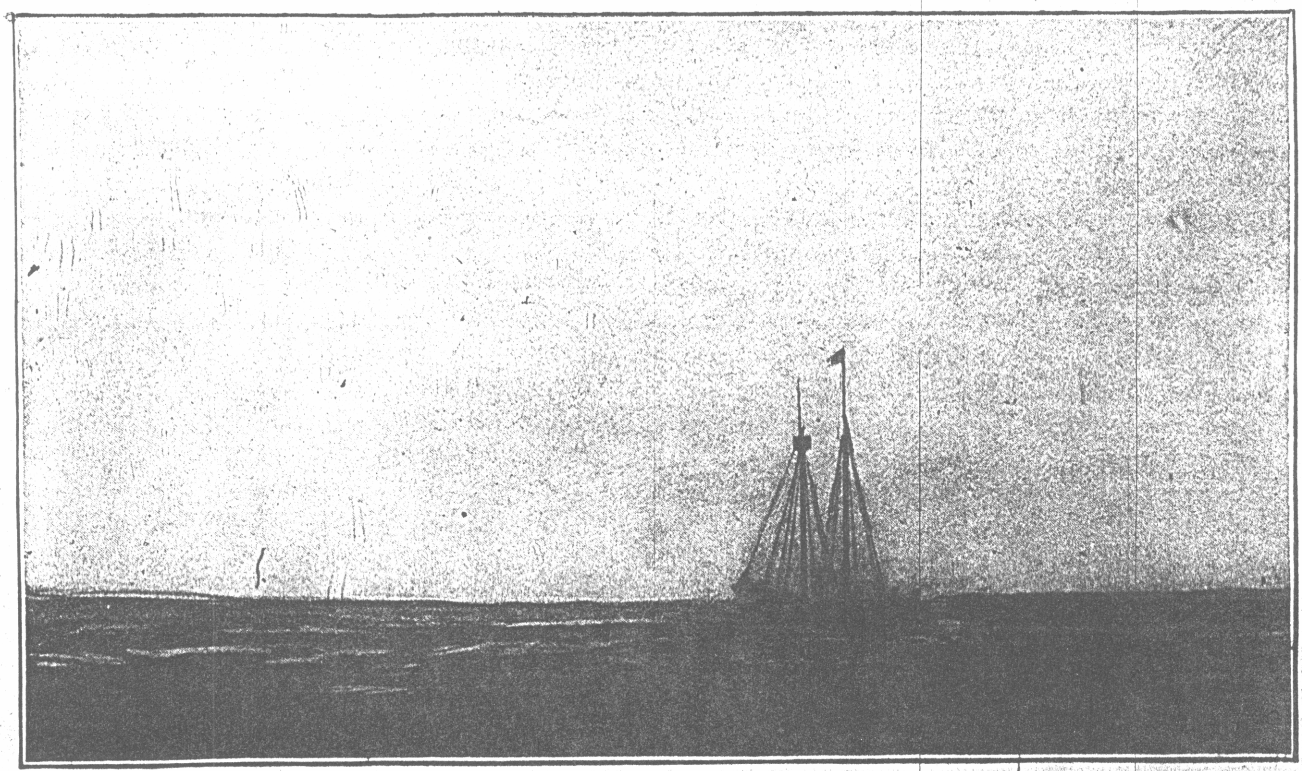
The low, narrow intermediate portion of the island termed in this report the isthmus, lying between and connecting the higher extremes, is readily seen to be of much greater age than the newly formed portion, and had evidently been, previous to the recent eruption, a partially submerged spit, making out in a northwesterly direction from old Bogoslov; but the same force which pushed up the new addition elevated it also, especially that portion, the extremity immediately beneath the northeastern half of the new formation. The extent of this elevation, judging from the barnacles and water-marks on Ship and other rocks, being some twenty or more feet. It is the extremity of this spit which forms a considerable part of the foundation of the new portion.

But few shells were found on the beach, and the only vegetation seen was a few patches of kelp and some specimens of Fucacine thrown upon the beach. Myriads of sea fowls occupied the clefts and crevices of the rocky heights of old Bogoslov and on the beach and rocks surrounding that end of the island. Large numbers of sea-lions, some of immense size, were seen, but took to the water on our approach. Both birds and animals seemed to avoid the newer portion, on which I saw no animal life whatever.

The temperature of the water at the place of landing was the same as that more distant from the island, 42°; of the atmosphere, 44°; and a thermometer buried in the gravel of the beach above high-water mark registered 44°. Already had the odor of sulphurous oxide become distinctly perceptible, which near the summit and in the depressions rendered respiration decidedly difficult.



WHALING STATION NEAR POINT BARROW. FORMERLY SIGNAL STATION, U. S. A.



ARCTIC OCEAN TRADING SCHOONER.

Following the beach to the southward, in order to get as far to windward as possible, until a point opposite the ridge shown in the left of photograph numbered 4 was reached, the ascent was begun. For the first one hundred yards the route lay over a gentle slope composed of fragments of rock thickly covered with loose ashes, into which one sank knee-deep at every step; then, as the sides became steeper, over loosely-piled fragments of rock, following the ridge until about two-thirds of the distance had been accomplished, when we were confronted by an insurmountable wall of rock (aqueo-igneous conglomerate), which stopped further progress in that direction. At this point an attempt to photograph the interior of the great fissure was made, but the immense volume of aqueous vapor issuing from it and the numerous vents in the vicinity so completely obscured the view as to render it a total failure. Photographs Nos. 3, 4, and 5 give a sufficiently clear idea of the appearance of the new formation to make the following brief description intelligible. The great fissure extends in a northeast and southwest direction through the upper third of the hill, dividing it into two unequal portions, the southeastern part being much the smaller and lower one. The smaller portion is about one-fifth of the mass and was 403 feet in height. Owing to its top being obscured the height of the larger summit could not be definitely ascertained, but it was probably about seventy-five feet higher than its neighbor, certainly not over five hundred feet in all, which height it had probably never exceeded by more than fifty feet. No satisfactory examination of the interior of the great fissure could be made, owing to the steam, fumes, and heat rendering entrance into it highly dangerous if not absolutely impossible.

The immediate entrance only was visible, the clouds of vapor which arose from and almost completely filled it hiding the interior from view. Vents more or less active were abundant; the temperature of the interior of one of the smaller ones was 196°; the thermometer, laid on the surface in a sheltered situation, registered 56°, while when held at the height of the head from the surface the mercury fell to 49°. Water thrown upon the rocks at the entrance of the great fissure was immediately vaporized with a hissing noise. It was observed there and elsewhere that the discharge from the vents was perfectly regular, unaccompanied by much, if any, noise, and the ear placed upon the surface and over the larger of the extinct vents could detect nothing more than a faint "purring" or hissing sound.

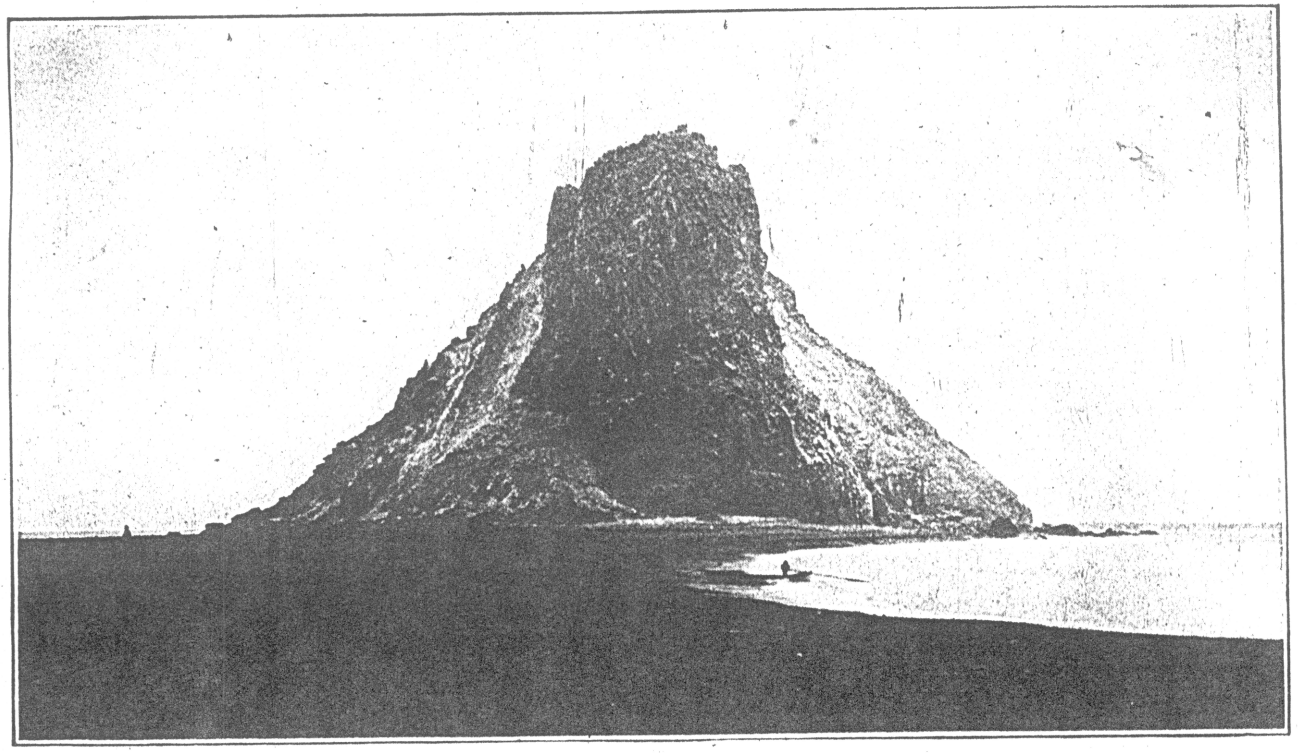
Finding it impossible to make the wished-for examination of the great fissure or to reach the summit, we descended and made a half circuit of the base, where a re-ascent was attempted. Steep and inaccessible walls soon stopped our progress, however, and only about the same elevation as on the opposite side was reached, and similar success attended our efforts to penetrate or even obtain a view of the interior. The heat of this side was much greater than that of the other, both of the surface and the discharges, it being hot enough in one of the crevices through which steam was escaping to quickly melt the solder fastenings of the thermometer and expanding the mercury sufficiently to burst the bulb, although the instrument was made to register 260° F.

It is much to be regretted that a thorough examination of the interior of the great fissure was rendered impossible, as much desirable information could doubtless have been obtained, for at its bottom would, in my opinion, be found the perpendicular stratum forced up at the time of eruption, elevating the softer strata into the two flanking ridges which form the apices of the larger and smaller elevations surmounting the hill. A few fragments of granitoid rock picked from among the débris indicate the probable character of this intermediate stratum, no outcroppings of which were, however, visible. The flanking portions, indeed, almost the entire visible part of the new formation, had evidently once formed the bottom perpendicular stratum, of which latter Ship Rock is possibly an extension or more probably a forerunner. Photographs Nos. 6 and 7 show, respectively, the northwest end and southeast side of old Bogoslov.

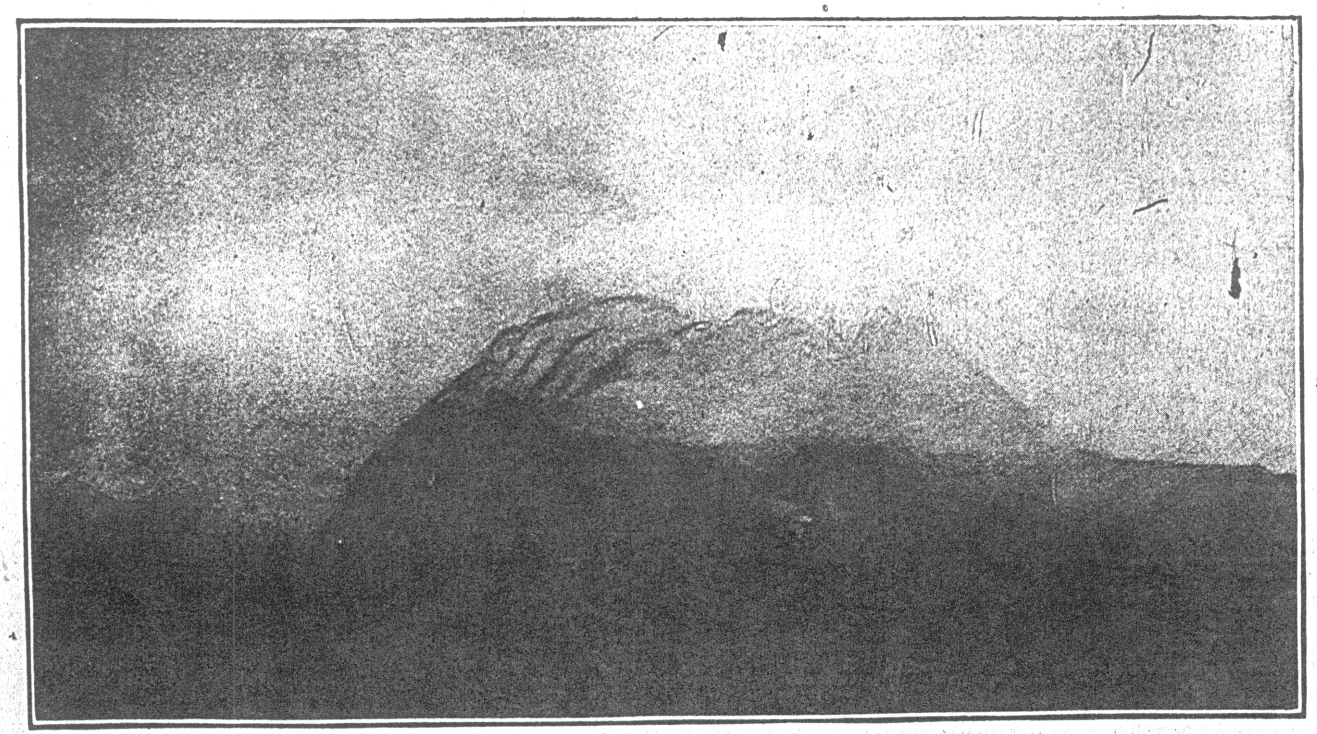
Upon the return of the *Corwin* from the Arctic next fall it is hoped an opportunity to revisit this interesting spot, the scene of one of nature's curious freaks, will be afforded, so that a more thorough examination may be made and changes noted.

Respectfully submitted.

H. W. YEMANS,
Assistant Surgeon, U. S. Marine-Hospital Service.



OLD BOGASLOFF, FROM SAIL ROCK.



NEW BOGASLOFF, BEARING SE.