

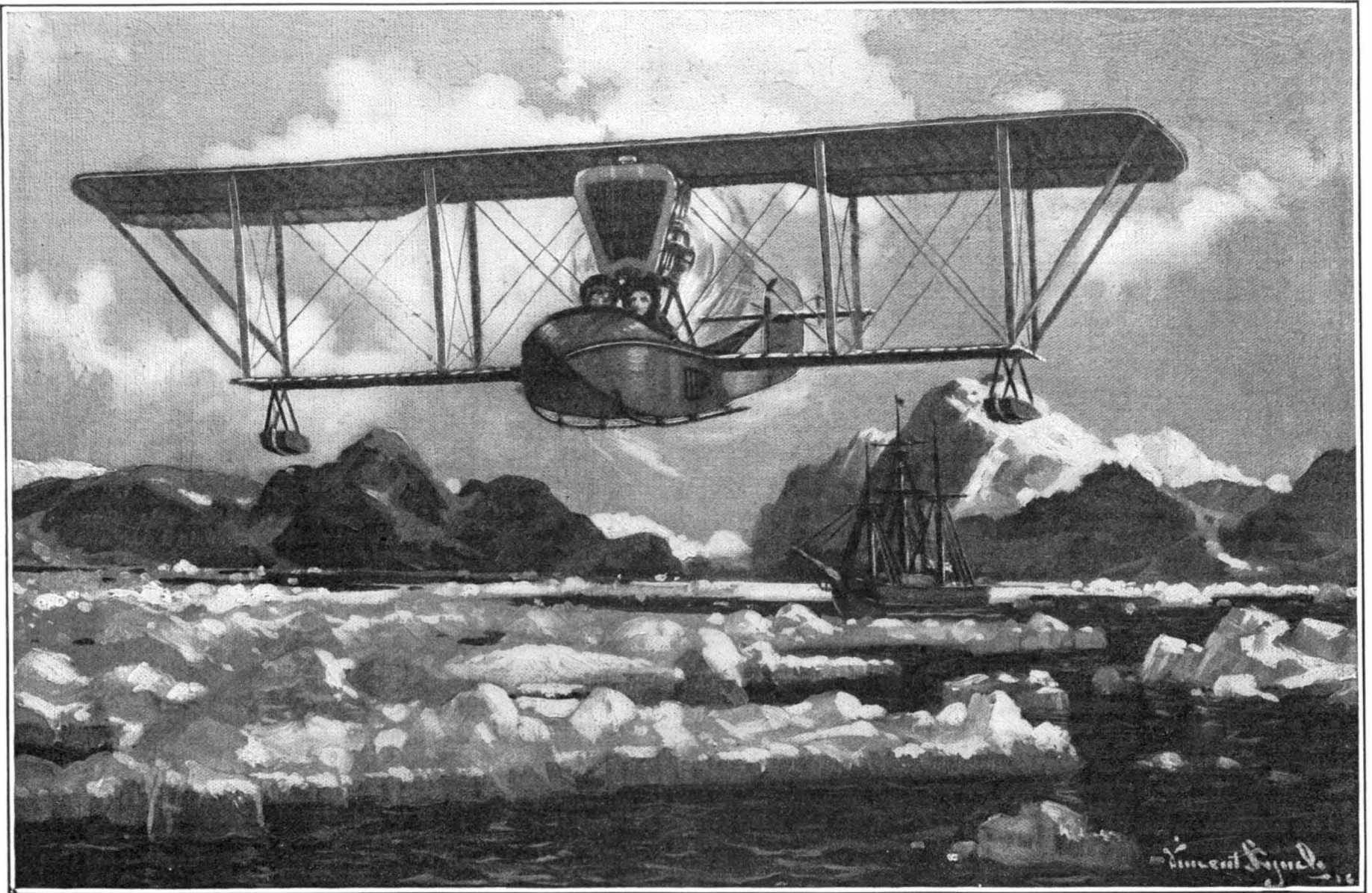
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The aeroplane vs. the steamer in polar exploration.

The Aeroplane in Arctic Exploration

By Burt M. McConnell, Canadian Arctic Expedition, 1913-14

IN September, 1915, Vilhjalmur Stefansson, Commander of the Canadian Antarctic Expedition, after having been "missing" for 18 months and almost universally given up for dead, surprised the world with a telegraphic announcement, from far within the Arctic Circle, that he had discovered land in the western Arctic Ocean northwest of Prince Patrick Land, and that he was going back to look for more. Those who know Stefansson realize that at any moment word may come that he has succeeded in this quest, and found a great Arctic continent.

It was the writer's good fortune, during the early stages of the work leading to last year's results, to be one of the supporting party that accompanied Stefansson and his two companions as far out on the sea ice as possible, carrying extra provisions and dog rations. Of the 65 miles thus covered, we were carried 40 by a southwest blizzard. The remaining 25 miles were achieved at the expense of 16 days of continuous and racking effort on the part of both men and dogs; and on our return over the rough, treacherous, drifting ice we encountered even greater difficulties. Ice fields half a mile wide consisting of solid masses as large as a house, tumbled about in confusion, could be crossed only by laboriously hacking trails up and down the steep slopes and hoisting and lowering the sleds with ropes. In one day of ten hours steady back-breaking labor we progressed but 500 yards.

Such conditions were enough to make the least imaginative wonder whether there were not a better way to explore the million square miles of unknown

area of the western Arctic. And it was then that the potential value of the aeroplane for this work was borne in upon me. Here we were, struggling along at the mercy of an adverse gale, and covering about as much area in a month of ceaseless effort as would an aeroplane in an hour!

The possibilities of the hydroaeroplane in Arctic exploration are indeed almost unbounded. During the winter of negligible daylight it would of course not be available. But in one long summer day of from 16 to 20 hours of brilliant atmospheric transparency, a single machine could cover as much territory as the most courageous and fortunate sledge driver could hope to cover in two months!

The development in the field of aerial navigation has been tremendous within the past three years. In 1913 there was no slightest possibility of Stefansson using the aeroplane to advantage; now all authorities are agreed that every objection to its employment has been removed. At the rate of exploration thus made possible, how long would it be before the one remaining unexplored area of great extent would be completely investigated—that lying north of Alaska and eastern Siberia, extending over 90 deg. of longitude from Prince Patrick Land to the New Siberian Islands, and bounded on the north by the Pole itself? Here it is that Stefansson is working; here it is that the old mode of exploration encounters the greatest hardships; here it is that the field of the aeroplane should be recognized to lie.

This field is a broad one. The western Arctic affords almost virgin territory for ethnologist and archaeologist, and at the same time presents a geographic problem of greatest interest. For geographers and students of

tidal phenomena long have contended that within the unknown area between Alaska and the Pole there lies a land mass of large proportions—either a continent of some 500,000 square miles, or an archipelago similar to the one lying north of western Canada. Upon the hypothesis of a deep and uninterrupted polar basin it is difficult to account for the fact that the range of the semi-daily tide along the north coast of Alaska is only about a quarter as great as that at Bennett Island, near the New Siberian group. Dr. R. A. Harris, of the U. S. Coast and Geodetic Survey, who for years has studied the problems connected with the tides of the Arctic, has even sketched a hypothetical continent within the unknown area. He has also shown that the diurnal tides along the north coast of Alaska have less than one half the rise and fall which the tidal forces acting over an uninterrupted basin would produce, and that the daily ebb and flow actually occurs earlier at Point Barrow than at Flaxman Island, 275 miles to the eastward, whereas with an open polar sea the reverse would be the case. On the other hand, Dr. Nansen, the Norwegian explorer, basing his belief upon soundings obtained during the drift of the "Fram," insists that the area in question is a deep open basin. This ship, however, in its remarkable drift, barely skirted the region under discussion. At any rate, the aeroplane stands preëminent as a means for testing the validity of these theories, for it is absolutely impossible for ships or dog teams to penetrate far into the interior of the Arctic ice pack.

In 1879 the "Jeanette," under Lieut. De Long, in an attempt to reach the Pole by way of Bering Strait was forced into the ice pack near Herald Island and

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The Aeroplane in Arctic Exploration

(Concluded from page 295)

allowed to drift. For two years she held a northwest course, and was then crushed in the ice and sunk near Bennett Island. The drift of the "Fram," in command of Nansen, began approximately 15 deg. west of Bennett Island and ended in the vicinity of Spitsbergen. If the courses of these two vessels are laid down upon a chart, an abrupt angle is at once noticeable. This would indicate the proximity of a corner of a large land mass to the northeast, around which the "Jeanette" possibly would have drifted had she not been crushed. Stefansson's discoveries of 1915 have confirmed this to a certain degree, although he was able to cover only a limited area with dog teams, and that area lay far to the eastward.

Further, migration of birds directly northward from the Arctic coast of Alaska has been reported by whaling captains; and there is no good ground for rejecting these statements, and others that the birds return from the north a few months later with their young. This would hardly be susceptible of any explanation other than that afforded by the existence of a considerable land mass in the direction taken. Again, it is asserted by the whalers that the bowhead whales, entering the Arctic from the Pacific through Bering Strait each Spring, proceed past Wrangel Island and disappear into the north, to be next seen in the vicinity of Banks Land, going southeast along the coast. Twelve hundred miles is a long deep-water cruise, even for a bowhead whale; and the alternative naturally occurs, that the whales may follow the shore line of an unknown continent, feeding in the shallows en route.

Assuming, then, from the various indications, that an extensive land mass does exist between Alaska and the Pole, is it worth finding? The question can be answered in the affirmative, even by the utilitarian. The Arctic regions of Canada, and even Spitsbergen, were worth finding, though the latter lies in approximately the same latitude as Dr. Harris's hypothetical continent—about 77° north. Valuable coal deposits have been found there within the past few years, although it had been freely characterized as a "region fit only for polar bears." Just what would be found on any land that might be discovered between Alaska and the Pole cannot of course be forecasted. But some material advantage would surely accrue; and to know whether or not land *does* exist in this area would be of considerable benefit to science.

For the work of exploring this vast unknown area the aeroplane would seem to offer the best, if not the only, means. Little difficulty would be experienced in summer flights over the Arctic Ocean. As in land flights, it would be necessary for the pilot to know the engine speed of his machine, its actual speed relative to the earth, his altitude, and his geographical position at stated intervals. The speed and course could be found by astronomical means familiar to the marine navigator, who can with watch and sextant determine his position to within two minutes of arc—i. e., to within 2 miles. With the recently invented Sperry drift indicator, it is not to be anticipated that wind velocity would complicate the issue to any great extent in flights of less than 400 miles. In this connection it should be borne in mind that the prevailing northeasterly winds, having blown over the sea for hundreds of miles, would be constant, and no more dangerous to the aviator than dead calm; whereas strong air currents over land, broken up by hills, rivers, buildings and trees, are most erratic and troublesome.

In view of the hazardous nature of exploration in the Arctic, even in the summer, it would be well to have each aeroplane equipped with a gyroscopic stabilizer, which automatically controls the machine and keeps it on an even keel in the highest winds. Also, because of the proximity to the magnetic pole and

the consequent difficulty in using the ordinary compass, some better guide to directions would be of value. Were it not for their almost prohibitive weight, two gyroscopic compasses might well be employed, one set parallel to the earth's axis, indicating true north, the other perpendicular thereto, indicating the longitude.

A wide range of speed would be necessary for accurate observations coupled with ability to cover the ground; and the hull would have to be covered with walrus hide, as the Eskimos cover their kayaks and umiaks, to prevent puncture by floating bits of ice. Only in exceptional seasons would it be possible to alight upon the water without contact with these. The equipment should also include sled runners, although there might never be occasion to use them, as the proportion of floating ice to water is about one to nine in the summer time. Still, a situation might arise where the runners would save the aeroplane from destruction.

A scientific expedition, using a ship as a base for five aeroplanes, could, in the course of a favorable summer, explore the entire area between the Asia-America boundary, near Wrangel Island, and the Alaska-Canada line at 141 deg. west longitude. With one machine the continental shelf, from the longitude of Point Barrow to Banks Land, could be located, sounded and charted. An aeroplane could obtain a series of soundings in an ice-infested sea by rising above the ice in moving from place to place, where a ship would be in constant danger.

One of the most valuable of the things definitely known about the geography of the western Arctic is that there is a current through the Polar sea from America to Europe. The existence of this current has been established by a long, laborious, and fragmentary process of launching and recovering drift-casks. The placing of such casks at points well off-shore, where the drift will catch them readily, could best be accomplished by aeroplanes, which could drop them with absolute certainty at any desired point; and if this were done on an extended scale it could only result in the discovery of much valuable oceanographic data. Then, too, the entire region in question is a virgin field for the motion picture camera. Altogether it appears that the possibilities for doing useful scientific work by aeroplane in the hitherto neglected western Arctic are almost unbounded, and it is to be expected that Stefansson, who has blocked out work for another dozen years, will avail himself of this resource.

Lipo-Vaccines

THE bacterial vaccines employed for prophylactic or therapeutic purposes are commonly prepared by placing in suspension in aqueous solutions of suitable salts bodies of microbes modified by appropriate treatment. A new method of preparation is advocated by two French savants, Mm. Moignic and Pinoy. They obtain the desired bacterial emulsion by a mixture of lanoline and vasoline, instead of the usual aqueous solution of a salt. They have established the fact that living microbes, placed in such a medium, to which one per cent of camphor has been added, lose their powers of reproduction at the end of a variable period, and can then be injected into healthy animals without fear of infection. The vaccines thus obtained they term lipo-vaccines.

In a report to the Biological Society made last March they stated that they had proved by careful experiment:

1. That autolysis is, if not entirely avoided, at least negligible.
2. That re-absorption takes place more slowly.
3. That consequently reactions in sensitive individuals tend to be reduced to the minimum.

Since in vaccinotherapy the auto-vaccines are those which give most success, especially since they are used as soon as prepared and hence contain few microbes entolysed by water, the authors believe this method presents definite advantages over that now generally employed.

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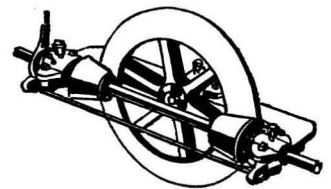
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