

RONNE ANTARCTIC RESEARCH EXPEDITION, 1946-1948*

Comdr. Finn Ronne, USNR

BEFORE our departure from Beaumont, Texas, about 15 months ago, I was asked by a newspaper reporter what we planned to do in the Antarctic. I told him then, I would prefer to answer that question upon our return, when I would be better able to tell him what we *DID* do in the Antarctic. Now I can answer that question and the success of the Expedition can be judged by its accomplishments.

Since the discovery of the Antarctic Continent, a little more than one hundred years ago, adventurers and explorers have, from time to time slowly, lifted part of the veil which surrounds that great mysterious southland. It is still in the grip of an ice age, and is the most isolated and desolated spot on this earth. It is the coldest, the highest, the most recently discovered, and so far, the least valuable economically of all the continents. The seals and penguins found there could not live from the land alone, where there are no reptiles and no insects. Except for low forms of mosses and lichens, it is completely devoid of vegetation. Terrestrially, it is a botanic and zoological desert. An area of the continent larger than the United States is still marked as unknown, and this will continue to offer a fertile field for explorers for many years to come.

Although I had done a considerable amount of planning, I was not definitely certain that the Expedition would depart until December 8th, 1946, at which time I was finally assured of the minimum amount of financial backing. You can realize the enormous amount of work, day and night, which was necessary to get an Expedition off to the Antarctic in about a month and a-half.

With support from various government agencies, scientific institutions, and many private individuals, and after many toils and tribulations, our expedition sailed from Beaumont, Texas, on the 25th of January, 1947. The twenty three expedition members, only 8 of them having been to sea before, manned and operated our 183 ft. sturdy wooden vessel.

In addition to some other valuable equipment, the United States Air Forces furnished three airplanes to the Expedition. They were interested in receiving the results from any trimetrogon pictures which we would be able to take. One of the planes, a twin-engine Beechcraft, was conditioned for cold weather flying at Kelly Field. There the plane also had the trimetrogon cameras installed. A total of two thousand man hours was spent in fixing up the plane according to specifications. When the Beechcraft was being hoisted aboard our ship in Beaumont, Texas, the day before our departure, one of its standard lifting lugs suddenly snapped, just as the crane swung the plane over the dock. Seconds later, I numbly realized that the demolished plane before me would never take aerial pictures over the Antarctic. Our two other planes were safely hoisted aboard and lashed into position on the boat deck. The Norseman, made by the Noorduyn Company of Canada, is especially designed for cargo carrying in cold weather regions. It operates better on skis than on wheels and proved ideal for our cargo-hauling work to advanced field bases. Our smaller plane, a Stinson L-5, was found to be ideally suited for local reconnaissance work and for making initial landings on unknown terrain, to pick out suitable landing areas for the larger planes.

With the hope that we would be able to obtain another Beechcraft in time,

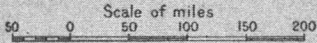
* An Address delivered at Society's local meeting at Washington, D. C. on April 28, 1948.

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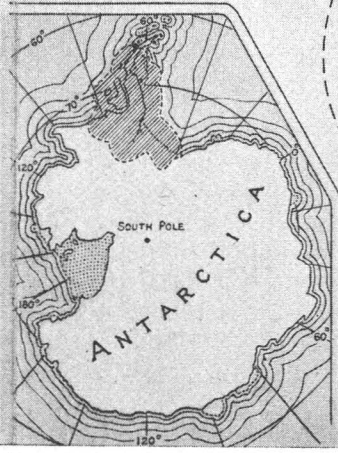
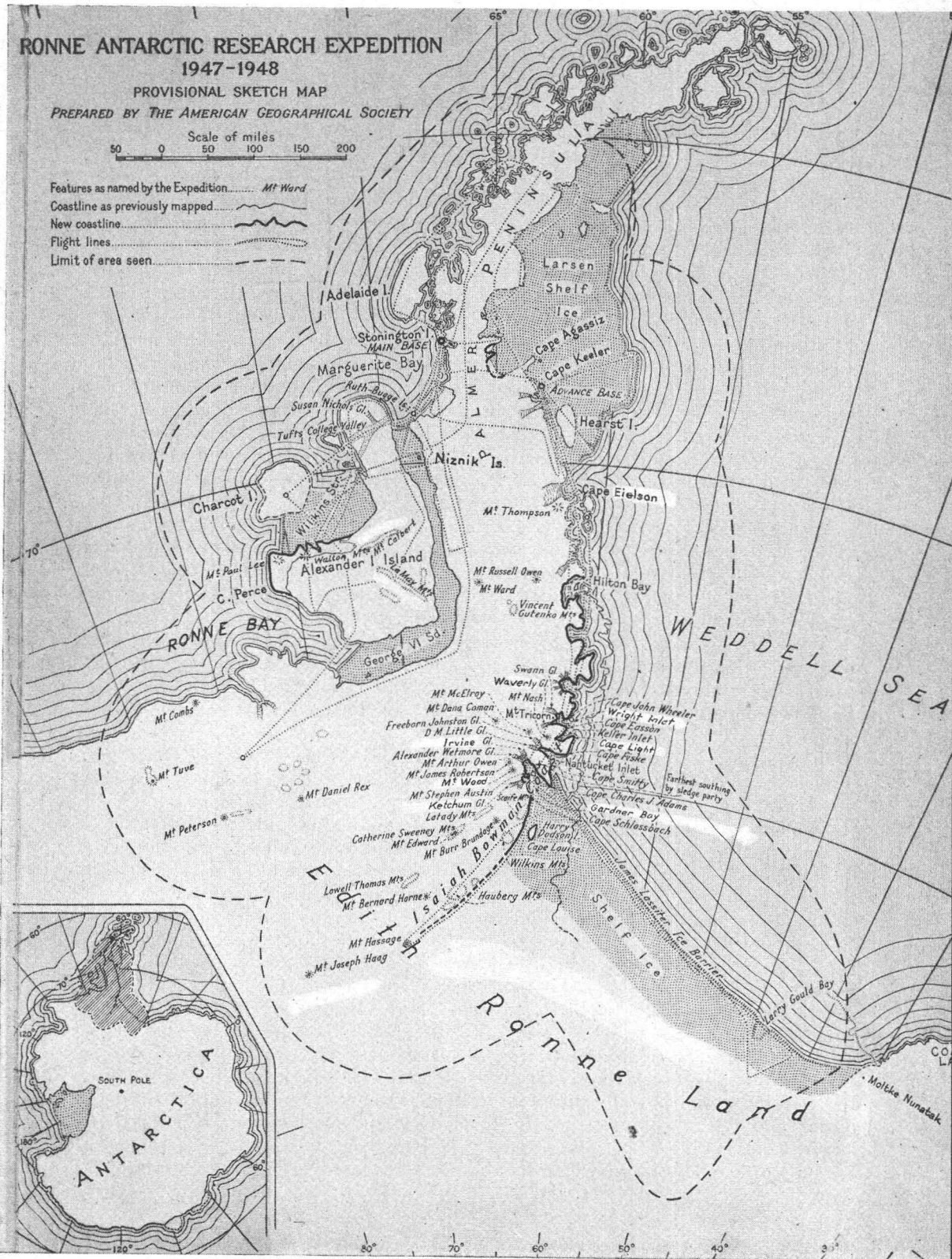
1947-1948

PROVISIONAL SKETCH MAP

PREPARED BY THE AMERICAN GEOGRAPHICAL SOCIETY



- Features as named by the Expedition..... Mt Ward
- Coastline as previously mapped.....
- New coastline.....
- Flight lines.....
- Limit of area seen.....



I had the Aviation Group salvage all of the valuable trimetrogon installation from the wreckage in Beaumont. Fortunately, the officers in charge of the U. S. Air Forces were both progressive and interested. We were informed that we could pick up another plane upon our arrival at the Canal Zone. While we were docked at the Naval Submarine Base at Panama, a practically brand new plane of the same type was carefully hoisted aboard. To insure that lightning would not strike twice in the same place, double lifting slings were used.

Upon our departure from Panama, aerial photographer Latady and aviation mechanic Robertson began work on their long and complicated job of making the complete installation of the trimetrogon cameras. The beautiful upholstery on the interior of the plane was completely stripped, in order to keep the weight as low as possible. Holes were cut in the floor and on the sides of the fuselage, to accommodate the vertical and oblique cameras. Frames for the cameras were then mounted and lined up in their appropriate positions. In addition, the electrical controls for the cameras, a radio altimeter and extra gas tanks were installed. All the material which we had fortunately salvaged from the wrecked plane was installed in the new Beechcraft. Both Latady and Robertson deserve a great deal of credit for their tireless hours of hard work, in order to get this important phase of the installation completed before we reached the Antarctic.

Upon leaving Panama we made brief stops at Valparaiso and Punta Arenas, Chile, before heading for the vast white continent south of Cape Horn. On the 12th of March 1947, the vessel arrived off Stonington Island in Marguerite Bay, Palmer Land. Some men were sent ashore immediately to establish living quarters. Within a few weeks the camp buildings were made ready for occupancy and, by the end of April, all hands had moved into permanent winter quarters.

Shortly after arrival, the vessel made an exploratory trip through uncharted waters south to the beginning of King George VI Sound. The voyage revealed some previously undiscovered islands and we set a new southing for ships' navigation in this sector. At latitude $69^{\circ} 20'$ South huge tabular icebergs blocked further penetration. The ship returned to the base and was anchored in a cove a third of a mile from the camp site. The temperatures were falling steadily and within a few weeks the winter ice had securely frozen the vessel in the Antarctic's grip.

The scientists, who only a few weeks before had faithfully stood engine-room and deck watches, set up their instruments in the Science Building or in specially constructed shacks. The scientific investigations started immediately and continued for almost a year. Physicist Peterson soon had a first class Meteorological Station in full operation, with daily balloon runs, one of which reached a record height of 88,500 feet. These observations were transmitted on daily radio schedules to the U. S. Weather Bureau here in Washington for inclusion on South American weather forecasting networks. To investigate the unusual phenomena common to the Polar Regions, Mr. Peterson maintained a continuous record of Solar Radiation at the Base. He also conducted several parties in the field in the general vicinity of the Base. With sextants, they measured the refraction of the sun at low altitude. Two cosmic ray flights were made at altitudes up to 12,000 ft. for Mr. Peterson to investigate the strange rays originating outside the earth's atmosphere. Readings of cosmic rays' intensity were also taken aboard ship on our return voyage. Geophysicist Andrew Thompson maintained continuous tidal, magnetic and seismological observations at the Base. His magnetic readings at the Base were supplemented by numerous sets of measurements obtained from outlying field bases. Mr. Thompson's main interest, how-

ever, was his seismological station. His two highly sensitive seismographs recorded earthquakes all over the world. These results were analyzed and radioed to several interested stations in the United States, including the Coast and Geodetic Survey, where they helped to establish the exact location of the quake.

Heavy snowfalls during May and June soon had the buildings fairly well covered, and with the rapidly disappearing sun, most of the expedition's activities were conducted indoors. Winternight in a Polar Camp, with its long monotonous period of bad weather and darkness, is the time when a group of men living closely together in isolation is under abnormal strain and tension. Nerves become frayed, dispositions change and minor incidents take on major proportions. This is the most difficult period for the Leader, who must see to it that all hands are well occupied. Fortunately, however, this is also the time when the major preparations must be made for field programs which begin upon the return of the sun. All hands were kept busy.

Latady and Robertson made the final checks on the trimetrogon installation in the winter period. The two K-17 oblique cameras were mounted in the frame in the after compartment of the Beechcraft. There was space available to mount the vertical camera in the same frame; but it would have been an endless task to reroute the control cables leading aft along the center floor of the aircraft. The vertical camera was therefore mounted eighteen inches off the centerline and a slight correction in its alignment therefore had to be made. When the cameras were placed in the planes, Latady found there were a few parts missing. These and a few devices to enable greater efficiency, he turned out on the lathe in the machine shop. Latady, who excels in a number of things which he calls hobbies, is actually an excellent machinist by profession.

Upon the gradual return of the sun, the field preparations were completed and the out-of-doors program began. During the month of September 1947, all facilities of my Expedition were temporarily placed at the disposal of the British Leader of the Falkland Island Dependencies Survey to search for three missing British flyers. Fortunately, after conducting a nine-day search by air in overcast weather, Lassiter and Adams, our two pilots, found and rescued the three British explorers from the sea ice of Marguerite Bay, where their plane had crash-landed over a week before.

At the end of September, the geologist, Dr. Nichols, head of the Geology Department at Tufts College, and Robert Dodson of Harvard left the Main Base and headed for Alexander Island. They were in the field for 154 days, and obtained much valuable data and a large collection of geological specimens.

During the organization period of my Expedition in Washington, those photogrammetrists with whom I conferred, including Mr. Landen of the Geological Survey, impressed upon me the necessity of obtaining ground control points for correlation with the aerial pictures taken. They informed me that no matter how few or how scattered, these ground points were of the utmost importance for making accurate maps from the photographs. Since I have always had a great personal interest in seeing accurate maps made over the Antarctic Regions, I wanted to make sure that we obtained as many accurate control points of the ground territory over which we intended to fly, as was humanly possible. I therefore planned to have two different dogteam surveying parties cover as much of the area and penetrate as far into the unknown as the field season would permit. With this in mind, I ordered sufficient sledge dogs to maintain in the field two completely independent surface parties. Unfortunately, an epidemic of distemper among the dogs on our way south took its heavy toll. When the trail season arrived, only twenty-two dogs were left on the tethering lines. In order to make the best of our opportunity, I discussed plans of a joint party with the

Leader of the nearby British Base. A sledge journey south, as I was contemplating, could only be made possible by laying advanced food caches with our airplanes. Together, Major Butler and I made plans for the first of what I hope will be many examples of international exploration of the Antarctic.

During the early part of October, the four man Joint British-American Weddell Coast Party began their 1,200 mile round trip south along the Weddell Coast, in order to obtain ground control points for correlation with my Expedition's aerial photographic program. Our Expedition's participants were Ship's Mate and Navigator Walter Smith and Boy Scout Owen from Beaumont, Texas, as Dog Driver. They made the trip with three nine-dog teams, and were in the field for a total of 105 days. The dogteam party used an English made transit Tavistock, which was very accurate and of light weight for such a journey when the weight pulled per dog is of major importance. Wherever the party camped, a daily fix was obtained and all the features of at least fair prominence were plotted. The average distance travelled per day was about fifteen miles. If the weather was clear when they made a stop for lunch during the middle of the day, or rather the middle of the night, since they travelled during the night hours when the surfaces were better, triangulation points were cut in to fix the location of these features definitely. The sun, of course, was up twenty-four hours a day. Angular sights with the transit then enabled the party to get accurate heights of mountains and peaks along their route.

During this same period, two advanced field weather stations were maintained, one on top of the 6,000 foot plateau seventeen miles east of our Base, and one at Cape Keeler, one hundred and twenty-five miles south on the Weddell Coast. These stations gave daily reports of the highly variable weather which was seldom good on both sides of the peninsula at the same time. With the trail party in the field still further to the south, and with the reports from these weather stations, the stage was now set for the long range flying program. All three planes participated. Periodic breaks in the weather were utilized to fly gasoline, equipment and personnel over the mile high plateau to the Keeler Advanced Base. Very often the pilots would not be able to complete a round trip because of the sudden weather changes and it was not unusual for them to have to remain at the Cape Keeler Advanced Base for a number of days before returning to the Main Base for another load of gasoline and other supplies. In addition to the gasoline, supplies and personnel that we were depositing for our southern flight operation, our Norseman cargo carrying plane also hauled not less than 5,500 pounds of man-food, dog-food and kerosene and deposited it for the surface party along the Weddell Coast, thus enabling them to stay in the field for 105 days. Since we had daily radio schedules with the Weddell Coast Party, they would inform us of their needs in travelling further south, and with the first break of good weather, it was just a matter of hours before the plane would land alongside them in the field. What a contrast this was to the methods used by such historic explorers as Shackleton, Scott, and Amundsen. A total of approximately twenty-five tons was hauled by air to Keeler and beyond for our operations.

Each time a plane went into the air, I insisted upon complete emergency equipment being carried for each person in the plane. This emergency equipment was the individual's only possible chance for survival in case a plane was forced down and rescue operations from the air would prove impossible. I should like to state here, that in order to accomplish our full program with the amount of gasoline available and in consideration of our limited flying weather, all of the planes were loaded beyond the prescribed Army or CAA weights. On occasions, the Norseman flew as much as 1,250 pounds overloaded, the Beechcraft 1,300

pounds overloaded. This additional weight was entirely at the discretion of the pilots and the mechanic. I made a definite point of insisting that each pilot decide at what time he considered it safe to fly and the amount of weight which could safely be flown.

The objective of the geographical program was to discover and explore the world's last major coast line which lay between Palmer Peninsula and Coats Land four hundred and fifty miles away, and to cover this area in trimetrogon pictures. Knowledge concerning this coast line would answer the old question whether the Antarctic Continent was one unit or divided by a connection between the Weddell Sea and the Ross Sea. By flying the Norseman cargo plane and the Beechcraft exploratory plane south together, by landing them together in the unknown, in a new Bay, which I named Gardner Bay, by filling the Beechcraft with the gasoline cargo from the Norseman, two long southern exploratory flights were made. These two flights solved the major geographical objectives.

In the Beechcraft, Captain James W. Lassiter was the pilot, Latady the aerial photographer, and I handled the navigation. At Mount Stephen Austin located in Gardner Bay, I was fortunate enough to obtain a celestial fix. From there, we took off and followed the extension of the Palmer Land Mountain Chain to the southwest. As we flew above this mountain chain, the height of the mountains beneath gradually decreased while the land gradually increased in elevation and seemed to be coming up to meet us. The dying mountain chain finally terminated in a gradually rising snow covered plateau. The elevation of this plateau was found to be approximately 5,000 feet and it stretched to the limit of our visibility, which at our 10,000 foot altitude, I estimated to be at least two hundred miles. This meant that we actually saw the terrain as far south as 81 degrees. While in the air, at our furthest westing a bubble sextant sight of the sun gave me a good line of position. We were at that time within sight of Mt. Mary Ulmer, which mountain was discovered by Lincoln Ellsworth in 1937 on what I consider the most outstanding flight ever made over the Antarctic. On our return flight to Mt. Stephen Austin, we flew a parallel track about twenty miles north of the outward track, in order to get as much coverage as possible in the photographs. On this leg of the flight, our right oblique camera went out of commission for an hour because the electrically operated mechanism became sluggish; this we attributed to the temperature of 16 degrees below zero Fahrenheit.

On our second long southern flight, our standby base was established at Mt. Tricorn about sixty miles north of Gardner Bay. We unfortunately made a false start on this flight and were forced back because of bad weather. It had been my intention to fly due south but the bad weather cost us two precious hours of gasoline. After an enforced wait of three days at Mt. Tricorn, the weather cleared and I decided to complete the southeastern flight to Coats Land. On this southeastern flight, we followed the 100 foot high shelf ice barrier for 450 miles to where it joins Coats Land. Crevasses running parallel to the ice cliff were found three miles inland. At one place, they continued for a distance of approximately thirty miles. Similar crevassed areas, but smaller in size, could be seen further inland while we continued to fly southeasterly. Larry Gould Bay was discovered in approximately Latitude 78 deg. 25 min. South, Longitude 45 deg. West. At the head of Gould Bay, crevasses leading down to small embayments were seen with numerous icebergs frozen into the one or two year old bay ice.

These observations coupled with radio altimeter readings taken on the due south leg of the journey which recorded an elevation of 700 feet approximately forty miles in from the ice edge, established the fact that the land beneath was

gradually rising to the south toward the pole itself. After having covered the whole area where a possible strait may have existed and found high elevations both to the southwest and the southeast, I can definitely state that no tie exists between the Weddell Sea and the Ross Sea on the opposite side of the Continent. Our flights were made at altitudes of ten, twelve and fourteen thousand feet. A running time record of our altitudes was religiously kept for correlation with the photographs.

On a third long mapping and exploratory flight to the southwest from the Main Base along the Robert English Coast south of Alexander Island, landings to obtain accurate lines of position were made on the Continent, five hundred miles from the Main Base. The elevation by radio altimeter readings was found to be 3,100 feet. The altimeter reading on the plane's altimeter recorded the same figure. The aerial photographs taken on this leg of the flight can readily be correlated with the ground survey which Carl Eklund and I conducted on our sledge trip to this area in 1940-1941. At that time a total of 34 astronomical fixes were established with 12 principal control stations. At these stations, complete photographic circles were taken with 30 degree change in azimuths and the positions of 320 major mountain peaks and nunataks were determined. This surface control from the previous expedition I believe will be a great help also for the future map makers, when correlated with the trimetrogon pictures we took this time.

We made another landing on the highly elusive Charcot Island, which, from my observations, I believe is a part of Alexander Island itself. Of course, the trimetrogon pictures which we took over this area will, when developed, give definite information concerning my belief. On the few good flying days for the long flights, every minute was utilized in order to obtain trimetrogon aerial photographs. On all of these flights, Lassiter was the pilot and he also maintained the radio communication with our auxiliary bases on the Weddell Coast and the Main Base on Stonington Island. Every minute of Lataday's time was occupied while in the air, with the operation of the trimetrogon and K-20 cameras and the changing of film from time to time. He also worked the radio altimeter and drift meter and passed this information on to me. His notes taken during the flights will be essential in the making of the maps from our pictures. I took care of the navigation end of the flights, and my vantage point in the co-pilot's seat gave a me splendid view of the terrain beneath and ahead.

Whenever we landed with the Beechcraft in the field, I always did my utmost to obtain a fix in relation to the nearest recognizable feature. I had the exact time on the chronometer as we always received radio time ticks from the Main Base while we were in the air. I used the bubble sextant to obtain my lines of position. At some of the landings in the field, when we were on our return journey, I was able to take another sight and thus obtain a fix.

A conservative total of 250,000 square miles of heretofore unexplored terrain and 450,000 square miles of territory was accurately photographed for the first time. Many discrepancies in existing maps were found. All results were recorded by 14,000 aerial photographs. A total of three hundred and forty-six hours was flown by the three planes and thirty-nine thousand air miles were covered. Not less than eighty-six landings in the field, about half of which were unsupported, were made in order to accomplish this program.

Provided one uses extreme caution at all times, we discovered that it is possible to make a landing in the field in the Antarctic just about anywhere one so desires, within reason. My excellent pilots, Captain Lassiter and Lieutenant Adams, both officers on active duty with the Expedition from the U. S. Air Forces, had had no previous experience in polar flying, but they can now be

classified as veterans. Any more competent airmen than those two will be hard to find.

By the time the last of the high octane gasoline had been consumed, the geographical program had accomplished more than original planning had contemplated. The three planes had been used extensively on reconnaissance work, cache-laying missions for aviation and dog team parties, searching for the lost British flyers, transporting personnel and equipment to advanced field bases, geographical exploration over the unknown, and trimetrogon photographic work. Coupled with a year's investigations made in ten branches of science, I feel that the expedition has fortunately been unusually successful.

The three planes and other equipment on loan from the United States Air Forces were returned aboard our vessel to the United States. Under the guidance of Skipper Comdr. Schlossbach, Mate and Navigator Walter Smith and Chief Engineer Charles Hassage, our ship with its mostly untrained crew safely made the 15,000 mile round trip to and from the Antarctic.

As I look back upon our adventures in the Antarctic, I feel exceedingly grateful that we all returned safely to civilization. I am thinking now with particular regard to our aviation program. There is no doubt in my mind that flying in the Antarctic is a dangerous and hazardous occupation. It is only within one's power to proceed slowly, use the utmost safety precautions, have pilots and a mechanic in whom you have complete trust, and prepare for any unforeseen emergencies. The rest is in hands more guiding than those of mere man. During our flying operations, we only had one accident which could have been most serious and that occurred on the ground. Lieutenant Charles Adams landed our L-5 plane on top of the 6,000 foot plateau and deposited a load of supplies at the weather station. When he tried to take off again at that altitude, he found that the powdered snowy surface and lack of a wind prevented him from gaining the necessary speed to lift the plane in the air. After two attempts, he stopped to take count of the situation. He got out of the plane and tried to kick the accumulation of snow from under the ski. In doing so, he accidentally slipped and fell into the revolving propeller. Two astounded onlookers pulled him back and gave him immediate first aid and he insisted he was capable of returning the plane to the Base. When he arrived at the Base, the doctor took several stitches in his scalp and marvelled at the fact that Chuck would be one of the few men able to relate such an event first-hand. Dangers and hardships are lurking behind every corner in the Antarctic, but, by the Grace of God, we all returned safely to New York a few days ago.

It has always been my belief and it will remain so in the future, that a small group of well-selected, highly competent men can most effectively accomplish a well-rounded program. On a small expedition, there is considerable scope for individual initiative. To work effectively, it is also necessary for an expedition to winter for at least one year in the Antarctic because otherwise the duration of the stay is so restricted by the period of open water that it is difficult to complete a planned and coordinated program.

The 14,000 trimetrogon pictures which we brought back with us have been turned over to the Air Forces and are now being developed at MacDill Field, Florida. It is my fervent hope that they will be of value for making corrections to previously explored territory and for making new maps of the newly explored terrain in West Antarctica.

At the Base we had a complete photographic laboratory. Electrically operated developing and fixing tanks for processing K-17 films were furnished, as well as an electrically operated dryer. Latady's problems were many in developing

three of the film rolls. Each roll contained 250 exposures. The temperatures outside were around zero degrees Fahrenheit and with a coal stove heating the Science Building, it was difficult to keep an even temperature of the chemicals and the rinsing water. Snow and ice blocks were melted in our galley snowmelter, and by carrying numerous buckets of water from the galley, through the tunnel to the Machine Shop and from there through another tunnel to the Science Building, he and his helpers were able to build up a couple of drums of water reservoir which was pumped up into a tank located in the overhead. It was a continuous job, of twelve hours' duration, to develop one roll of film. After developing one of these rolls, Latady usually turned into his bunk some time in the wee hours of the morning. Because of our lack of proper facilities, only three test rolls of the trimetrogon films were developed by him while we were still in the Antarctic. The results were excellent and I see no reason why the other 59 rolls which are now in Florida should not turn out equally well. While I have brought back the pictures and ground control points, I am fully appreciative of the great complexity and magnitude of the work that remains to be done.

I am truly glad to have had this opportunity to appear before the Photogrammetry Society, because ultimately it will be through the understanding and capabilities of some of your members that the pictures which we have taken will be transformed into maps. There is, of course, no need for making a detailed contour map over the Antarctic at this time. It is my hope that a map will be made so that the features and their naming can be easily recognized by future explorers who will endeavor to carry on further, beyond the limits of our discoveries. It is also my hope that the whole of Antarctica some day, perhaps within our lifetime, will have been seen by man, and from my experience on this Expedition, I am convinced that with good planes and determined personnel, the trimetrogon cameras will make this possible.

It is my belief that the pictures and the ground control resulting from the Expedition will be sufficient to enable you to produce satisfactory maps. I wish to thank you in advance for the contributions which you will necessarily make during the course of this work.

REPORT ON THE AERIAL PHOTOGRAPHY OF THE RONNE ANTARCTIC RESEARCH EXPEDITION*

William Robertson Latady

PREPARATION

ARRANGEMENTS were made to obtain a C-45 at Panama as a replacement for the plane abandoned at the Pennsylvania Shipyard in Beaumont, Texas. The modification work, including the trimetrogon installation, was to be accomplished by personnel on board ship while traveling south. Air Force officers, Captain Lassiter and Lt. Adams were assigned to the Expedition.

The C-45 was loaded on board the ship in Panama, along with all the equipment taken out of the first C-45, which Lassiter and Adams had brought down in a C-47. Albrook Field had been able to put in a 43 gallon nose tank and give the plane an important coat of paint, two toned red and yellow, so that it would stand out against the snow.

* Submitted June, 1948.