PENGUIN TRACKS FAR INLAND IN THE ANTARCTIC

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THE breeding places of Antarctic penguins are along the coast. These truly aquatic birds are known to travel great distances at sea, but there are very few records of wanderings inland. Wilson (1907: 57) mentions that Adelie Penguins, *Pygoscelis adeliae,* have been seen on the Ross Ice Shelf, about 110 kilometers inland from the sea. Recently, a fairly well-preserved carcass of an Adelie Penguin was found lying on bare ground 24 kilometers from the sea near mummified Crabeater Seals, *Lobodon carcinophages,* in the McMurdo Sound area (Péwé, Rivard, and Llano, 1959).

The present paper reports on two penguin tracks that were found, within a day of each other, by two U.S. traverse teams during the International Geophysical Year, 1957–1958. One track was about 300 kilometers (186 miles) and the other about 400 kilometers (250 miles) from the nearest known sea.

The first was seen on 31 December 1957 by N. B. Augenbaugh, who was a member of the Ellsworth Station traverse party traveling on the Filchner Ice Shelf. At approximately 67°00′W, 78°50′S, and at an elevation of about 61 meters (200 feet), the party came across an indistinct track in the snow. Photographs convinced us that it was made by a walking penguin (Figure 1). Although positive identification was not possible, the track was most likely made by an Emperor Penguin, *Aptenodytes forsteri.* The track was running east-west; however, the direction of the bird could not be ascertained. This bird was over 400 kilometers from the known edge of the Filchner Ice Shelf and about 500 kilometers from the nearest (and recently discovered) Emperor rookery in Gould Bay farther southeast (Figure 3).

The second observation was made on 1 January 1958 during the Byrd Station traverse. When traveling on the Ellsworth Highland, between Kohler Range and the Sentinel Mountains, at 77°30′S, 98°54′W, and at an elevation of 1,440 meters (4,720 feet), the party crossed a recently made penguin track in the snow (Figure 3). The bird was heading South 20° East *true* in a remarkably straight line. The track was followed for about 2 kilometers, and over this distance it showed less than a 2° deviation in direction. The bird had walked for only two meters; for the rest of the way, it had tobogganed on its belly. The size of the footprints was 8 x 5 cm. and the standing stride 30 cm. The width of the groove caused by the breast of the tobogganing bird was 6 to 9 cm. When tobogganing, a penguin propells itself with its feet. The distance

Figure 1. Tracks made by a walking penguin on the Filchner Ice Shelf. An ice axe is alongside for scale. (Photo by N. B. Augenbaugh.)

Figure 2. Tracks made by a tobogganing penguin on the polar plateau, Ellsworth Highland. The trough in the snow is made by the bird's belly. The sinusoidal parallel lines are made by the feet, which are alternately used to push the body forward. Faint marks made by the flippers are occasionally seen farther out to the side. An exposure meter is alongside for scale. (Photo by N. A. Ostenso.)

between pushes with the same foot was from 41 to 51 cm. Two deposits of excreta were seen about 800 meters apart (Hale and Murray, 1958).

These careful notes with photographs (Figure 2) were brought back by the traverse party. Samples of the excreta were collected in a sterile container and kept frozen until received at The Johns Hopkins University in October 1959. No microorganisms could be grown from the excreta in spite of careful culturing on a variety of enriched and selective media. The excreta were bright green, which demonstrated the penguin had been fasting for at least three days.

The track was too small to have been made by an Emperor Penguin, so it must have been one of the Pygoscelid penguins. The Adelie Penguin is by far the most likely, because of its circumpolar distribution on the Antarctic continent, although the possibility of a Chinstrap Penguin, *Pygoscelis antarctica,* cannot be excluded. These species are about half the standing height and roughly one-sixth the weight of the Emperor Penguin.

The penguin was traveling over 300 kilometers (186 miles) from the nearest known coastline of Pine Island Bay, and on an extraordinarily straight course that was taking it farther inland, roughly towards the South Pole. No species of penguin have yet been reported breeding along some 100° of longitude east between Ross Island in the Ross Sea and Alexander I Island in west Palmer Peninsula (Graham Land), except on Peter I Island. Here, less than 50 pairs of Adelie Penguins and one pair of Chinstrap Penguins were found nesting in 1948 (Holgersen, 1957). Since Peter I Island has such a small population of penguins and is about 1,000 kilometers (620 miles) away, it seems very likely that there are Adelie rookeries along the Walgreen and/or Eights Coast. It would not have been possible for such a small, flightless bird to have gained access to the polar plateau, and to have climbed to an elevation of 1,440 meters (4,720 feet), without an easy approach from the sea to the hinterland. This encourages us to believe that there is a suitable place where an exploration party could reach the plateau from this unknown coast. Also it seems reasonable to expect that the coastline is farther south than mapped and that the penguin had indeed walked less than 300 kilometers (186 miles).

Such a conclusion is substantiated in part by geophysical studies conducted in Marie Byrd Land (Ostenso, *et al.,* 1960; and Bentley, *et al.,* 1960), which show that a deep, subglacial trough extends between the Ross and Bellingshausen seas. Seismic soundings showed the ice to be 3,330 ± 20 meters (10,900 feet) thick beneath the point at which the penguin track was observed. Thus, the rock surface is 1,890 meters (6,200 feet) below sea level. The existence of this trough plus the

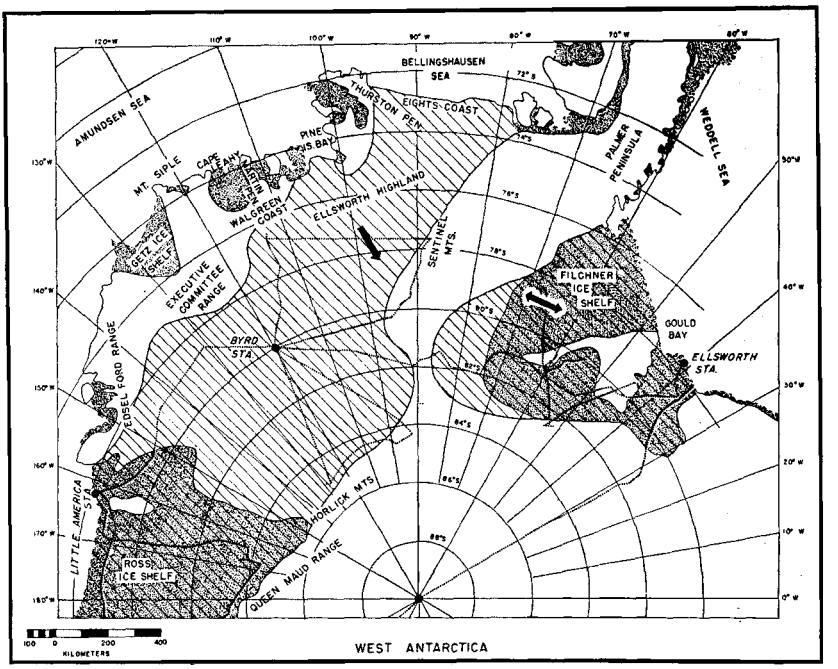

Figure 3. Map showing where the Byrd Station Traverse, 1957–1958, and the Ellsworth Station Traverse, 1957–1958, crossed penguin tracks whose location and direction are shown by the arrows. The Walgreen and Eights coasts are known only from aerial reconnaissance. The front of the Filchner Ice Shelf has been plotted by ship. Hachured area represents land surface below sea level. Dotted lines represent oversnow traverses 1957–1959.

extrapolation of the observed ice-surface slope northward suggests that the Eights Coast is considerably farther south than indicated on current maps. In addition, a reconnaissance flight in 1958 over the Walgreen Coast, on which one of the authors (N.A.O.) participated, showed this coastline to be considerably farther south than mapped. However, there was no marked East-West displacement of the coastal features. Thus, an extrapolation of the bird's course would indicate that it originated in Pine Island Bay. Radar altimeter soundings and surface features indicate that the Getz Ice Shelf is much larger than shown, particularly in eastern extent, being continuous with adjacent, unnamed bays. Therefore, Mt. Siple, Cape Leahy, and Martin Peninsula are probably islands. Another reconnaissance flight in January 1960 to the western edge of the Eights Coast indicated that the Thurston Peninsula is actually an island (Thiel, 1960).

Why this bird and others reported by Wilson and Péwé were so far away from known coast is a mystery. Adelie Penguins may travel as many as 100 kilometers over fast sea ice to reach their breeding ground in early spring, and the males are then capable of going without food for at least six weeks during October and November (Sladen, 1958: 48, 52). But in January, all successful breeders are feeding their young and spend most of their time at sea collecting food. There is, however, a shifting population of unsuccessful breeders and nonbreeders that return from sea at the end of the season either to occupy vacant nest sites or wander far away from the rookeries. These wanderers are probably mostly young nonbreeders. It has been suggested (Sladen, 1953) that under favorable conditions they will establish themselves in new areas, and thus extend the range of the species. This bird might have been one such nonbreeding wanderer that had lost its way.

The Byrd Station traverse party had the following members: V. H. Anderson, C. R. Bentley (Leader), D. P. Hale, J. B. Long, W. E. Long and N. A. Ostenso. All shared in collecting this record.

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