restrial to an aquatic life, include not only the return to the larval form of retinal pigment but also a change in the mode of nitrogen excretion, in the direction of the larval pattern.

In *Triturus viridescens,* both metamorphoses can be modified experimentally with great ease. The first metamorphosis can be accelerated with thyroxin or suppressed by thryoidectomy in the embryo or by raising the larvae in solutions of thiouracil. The second metamorphosis can be precipitated, and practically fused with the first, by treatment with pituitary or prolactin. The patterns of nitrogen excretion under these experimental conditions will be investigated.

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Mummified Seal Carcasses in the McMurdo Sound Region, Antarctica

Abstract. Information was collected on 90 mummified carcasses of the "crabeater" seal in the ice-free areas of the McMurdo Sound region, Antarctica. The carcasses range from relatively well-preserved bodies to merely old, twisted, wind-dissected fragments of tissue. They are hard and dry and lie on the surface of the ground, mostly in valley bottoms. The arid, cold climate is ideal for retarding organic decay. One carcass was dated by radiocarbon analysis and found to be between 1600 and 2600 years old.

Mummified carcasses of the "crabeater" seal (*Lobodon carcinophagus*) lie scattered over the land surface 1 to 30 miles from the sea and up to 3000 feet above sea level in the ice-free areas of the McMurdo Sound region, Antarctica. A few such carcasses were noted on land many miles from the sea in this area almost 60 years ago by scientists of the early British antarctic expeditions (*1*). We noted 90 mummified seal carcasses during the 1957–58 field season (*2*). No doubt many others exist in the McMurdo Sound region, and probably in other parts of Antarctica. The occurrence of these carcasses on the surface of the ground so far from their natural habitat raises the questions of why they are there, how long they have been there, and how they got there. Two carcasses have been shipped to the United States for anatomical and histological study. This paper represents a preliminary report of our observations (*3*).

All except one of the identifiable carcasses are of the crabeater seal. One is a Leopard seal (*Hydruga leptonyx*) (*4*). A fairly well-preserved carcass of an Adelie penguin was found lying on the ground 15 miles from the sea near seal carcasses on the west side of the sound.

The leathery dry carcasses are in various states of preservation; some are relatively well-preserved, and others are merely old, twisted, wind-dissected fragments of tissue. The well-preserved ones range in length from 3½ to 7 feet and in diameter from 1 to 1½ feet. They are dry and hard, and they have hair only on the side in contact with the ground; this side is generally flat and has a strong smell.

We found seal carcasses in every ice-free area we visited in the McMurdo Sound region except Black Island and Ross Island. Twenty-five percent of the remains were found within a mile of the sea, but scattered groups of 2 to 19 specimens were found as much as 17 miles inland. The carcasses in each group were spaced 10 to 100 feet apart.

Most of the carcasses were found in the valley bottoms, many along courses of ephemeral streams. Most of the streams do not drain into the sea but into small, ice-covered lakes in valleys blocked from the sea by a moraine or a glacier. Several seal carcasses were found along the edges of these lakes. Many were found at the heads of ephemeral streams where the streams issue from glaciers, or at the heads of stream valleys.

All the carcasses noted were on land except one which was found half embedded in the ice cover of Lake Bonney at the upper end of Taylor Dry Valley. All of those on the land lie on top of the ground and most have 2 to 4 inches of coarse, windblown sand banked against their windward sides.

The age of the mummified seal carcasses in the ice-free land of the McMurdo Sound region is intriguing. The remains have been thought to be perhaps 100 years or so old, because the arid and cold climate of the area is ideal for retarding organic decay. Radiocarbon analysis of one carcass showed that it is between 1600 and 2600 years old; another is being analyzed.

The material, which was dated at the Lamont Geological Observatory, Columbia University (sample L-462B), was from a brown, weathered fragment 1 foot wide and 4 feet long. It was found at an elevation of 1640 feet above sea level on glacial drift overlying a bedrock bench on the north side of Mount Nussbaum in Taylor Dry Valley. E. A. Olson and W. S. Broecker of Lamont Geological Observatory report as follows (*5*):

"Since the radiocarbon age of any organic sample requires a knowledge of initial radiocarbon concentration, it is customary to assume this to be the same as in a similar contemporary sample. In the case of antarctic seals, no present-day material was available, so that we have had to assume two extreme values and thus to quote an age interval rather than a discrete age. A lower age limit involves the assumption that the seal's diet consisted entirely of marine organisms deriving their carbon from surface water adjacent to Antarctica. Based on measurements of the dissolved carbonate in antarctic water which show it to be relatively depleted in radiocarbon, an age of 1700 ($\mp$ 100 years is obtained. An upper limit of 2500 ($\mp$ 100) years is obtained if the Lamont contemporary wood standard is used in the age calculation. Hence, the seal age almost certainly lies within the interval 1600–2600 years."

We believe that the antarctic seals, which occasionally wander inland, find no food in the fresh or alkaline lakes and therefore die. The cold, arid climate preserves their carcasses an incredible length of time, and the remains of seals and other animals that have wandered inland during the last 2000 years probably still exist to attest the animals' last journey (*6*).

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2. The work was done under the auspices of the National Academy of Sciences, U.S. National Committee for the International Geophysical Year.
3. An earlier report was made by the senior author at the Symposium on Antarctic Research, Wellington, New Zealand, 18–22 Feb. 1958. See *Polar Times* (June 1958), p. 11, col. 4.
4. Identified by David H. Johnson, curator, Division of Mammals, Smithsonian Institution, Washington, D.C., from a lower jaw of a carcass.
5. Written communication to the senior author, 16 Apr. 1959.
6. Publication of this article was authorized by the director of the U.S. Geological Survey.

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