

NUTRITIONAL CONDITION OF WATER PIPITS ON  
ARCTIC NESTING GROUNDS

By LAURENCE IRVING

It is important to determine how late in the breeding cycle migratory birds preserve the fatness that they acquire just before departure from their wintering grounds. I have presented records showing that male birds of a number of species were fat when they reached their arctic nesting places at Anaktuvuk Pass, Alaska (Irving, U.S. Nat. Mus. Bull. 217, 1960). The evidence also indicated that after arrival the males lost fat. The records that I presented did not show the rapidity of the change in fatness, and I have now compiled a clearer series of records of the condition of arctic Water Pipits (*Anthus spinoletta*) from the dates of their arrival from migration until their eggs were laid.

The data are prepared from examinations of 45 pipits at Anaktuvuk Pass (lat. 68° 21' N; long. 151° 50' W) in the central part of the Brooks Range, Alaska, and 13 pipits at Old Crow, Yukon Territory (lat. 67° 24' N; long. 139° 50' W) at the junction of the Old Crow and Porcupine rivers. Fifty of the examples were prepared as specimens which I identified as *Anthus spinoletta rubescens*. The linear distance from their nearest known wintering place in Texas is about 3000 miles (A.O.U. Check-list, 1957).

The average date of arrival of pipits at Anaktuvuk Pass has been May 10 for six recent years. At this early date the mean temperature is below freezing and drops much lower at times in the next two weeks (U.S. Weather Bureau). In some years the snow may have already blown from exposed parts of the tundra, but there is little melting and the rivers do not break up for two or three weeks. At Old Crow the phenomena of spring were only a few days earlier than at Anaktuvuk, and in 1957 ice began to run in the Porcupine River on May 22.

Anaktuvuk is the nesting place of many pipits. For ten days after their first arrival in swift-flying flocks, many flights pass daily. At the peak of migration in 1949, on May 19, Thomas Brower estimated for me that he identified 500 pipits. By the end of the week following the peak of migration, the number of flocks usually diminishes to only a few a day. Among the early flocks some are already scattering as if to nest nearby. Since most pipits nest inland from the arctic coast, the northernmost nesting area is only a hundred miles north of Anaktuvuk, which is therefore practically at the terminus of migration. The arctic coast is only 130 miles distant from Old Crow, and there, pipits were also practically at the terminus of their migration. In 1947, only a few small flocks alighted in the meadow near the village on May 6, 7, and 8 and the last were seen there on May 14. The nearest nesting pipits were found on Old Crow Mountain five miles distant.

At Anaktuvuk (fig. 1) and Old Crow (fig. 2) the earliest male pipits were on the average heavy and the majority were fat. A decline in weight and fatness occurred at Anaktuvuk between May 15 and 21, and for the next month their weight and fatness did not change. Pipits were not collected on Old Crow Mountain until June 9, when three males were found to be light and lean.

A male pipit collected from a flock on the Alaskan Highway at Takhini River about sixty miles west of Whitehorse on May 3, 1958, was very fat. Its longest testis measured 2 mm. The testes of the other male pipits were less than maximum size upon arrival at Anaktuvuk and Old Crow and only attained full size a week later at Anaktuvuk on May 14. The males at Anaktuvuk were then fat.

During the next week, and until the latest measurement on June 13, the testes remained unchanged in size. Attainment of maximum size of testes signaled the decline

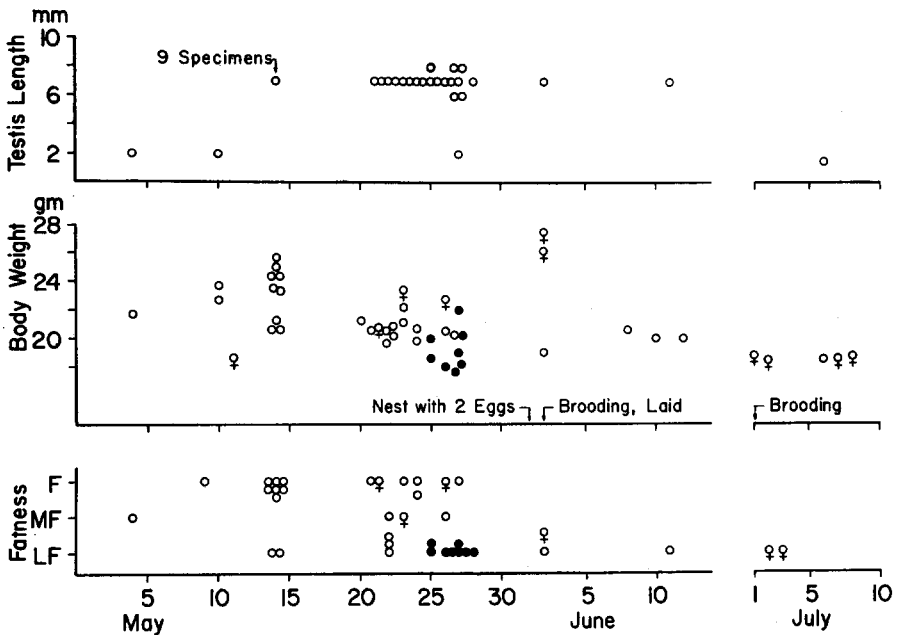


Fig. 1. Greatest length of testes, weight and fatness of Water Pipits (*Anthus spinoletta*) at Anaktuvuk Pass, Alaska. Open circle, males 1949, 1951; ♀, females 1949, 1951; solid circle, males 1954.

of the fatness of male pipits. Behavior associated with great testicular influence is a reasonable cause for the loss of weight and fat. The males were then singing and their song in flight is a strenuous performance. But singing is only a signal for the cares of the breeding male. On their breeding grounds, pipits change from sociable birds in flocks to strongly antisocial defenders of a territory and mate. Since the first eggs were found on June 1 and all six females examined thereafter had laid, the social reorganization and progress of mating occurred in a period of about 20 days after the first arrival of the males.

It can be suggested from observations during the breeding season that male pipits are so occupied with domestic affairs that they do not spend much time feeding. At any rate the fat, some 10 per cent of their weight, that they had transported during migration was utilized during mating. Not only male birds, but males of large herbivores and fur seals utilize their stores of fat and become lean in rutting season.

Early records of female pipits are too few to show their condition at the end of migration, but during the time that males are growing lean, females gain until they are sometimes 30 per cent overweight even without large eggs. The production of eggs is a remarkably efficient transformation but laying an egg daily adds some 20 per cent to the hen's intake of calories (Brodie, Bioenergetics and Growth, 1945:882). Female pipits lay five or six rather large eggs in the arctic, probably at the rate of one a day. In addition they are concerned with the preliminary labor of building a nest. While incubating they can satisfy their food requirements only in the periods when they leave the nest. At that time there can be no want of food on the arctic nesting grounds if the nesting cycle is to proceed.

The fatness of male pipits arriving in the arctic shows that in their recent migratory experience they have not suffered nutritional stress. The schedule of their annual

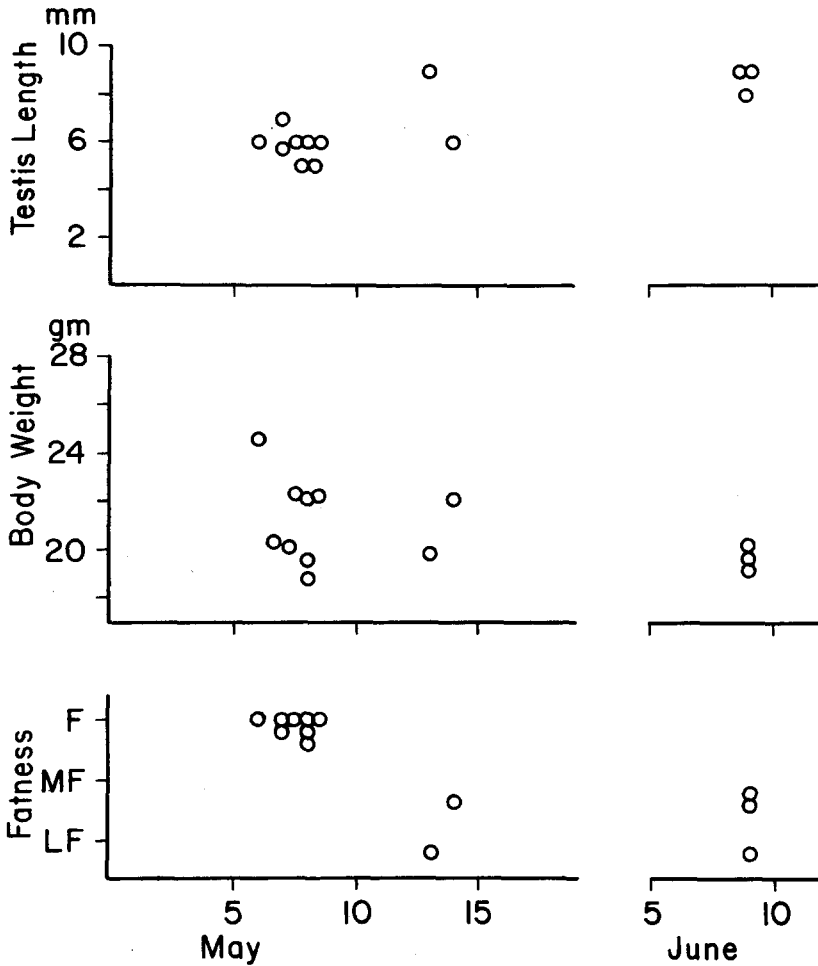


Fig. 2. Greatest length of testes, weight and fatness of male Water Pipits at Old Crow, Yukon Territory, Alaska, 1947.

arrivals and the distance covered does not allow for irregular wandering in search of food during migration. Birds must find food abundant even in the early and cold periods before and after they reach their arctic nesting places. Although the males utilize their fat, the amount lost is not more than three grams which would provide 27 kilo-calories of energy in metabolism. This is about the quantity of metabolic energy that Jon Steen (Ecology, 39, 1958:625-629) found expended in three days by a 22-gram European Tree Sparrow (*Passer montanus*) in Norway. It is evident that enough food is obtainable by arctic birds without long interruption of their intense concern for breeding. Although the males grow lean on the nesting grounds, they are not poor and are actually in good plumage and full of vigor after a long migration to a land where, to all but its residents, existence seems possible only with suffering and under stress.

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Williamson assisted in obtaining the records at Old Crow. Jo Kay, a former chief of the village of Old Crow, knew when and where to look for the arrival of pipits and obtained our first specimens.

#### SUMMARY

On arrival at arctic nesting grounds at Anaktuvuk Pass, Alaska, and Old Crow, Yukon Territory, male Water Pipits identified from 50 specimens as *Anthus spinoletta rubescens* were three grams heavier and fatter than just before nesting. At the time of arrival on May 10, testes were less than half maximum length; maximum size was attained by May 14. Thereafter the size of testes did not change during June, but by May 21 weights had declined and most males were lean. The first egg was laid on June 1. While the males lost weight during mating, females held or gained weight until after laying.

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