GENERAL NOTES

Lipase Activity in the Heart Muscle of a Migratory and a Nonmigratory Bird.—It has been shown that the lipase activity of the cardiac muscle is directly related to the heart rate (George and Iype, 1959). This relationship is to be expected since fat is known to be a major fuel in cardiac metabolism (Visscher, 1938; Bing, 1956) and also because neutral fats can be enzymically hydrolyzed into fatty acids that can then be oxidized by the cardiac muscle. When there is an increase in the heart rate, the energy expended should also be increased and hence there should also be an increase in fat utilization. Under these conditions, an increase in lipase activity also could be expected in order to turn out more fatty acids for the increased demands of the heart. The relationship between heart-muscle lipase activity and the rate of heart beat has been shown in the heart of the developing chick (George and Iype, 1959), in the postnatal development of the rat, and also in the pigeon under experimental conditions that alter the heart rate (George and Iype, unpubl.). In the present study the heart-muscle lipase activity of a migratory and that of a nonmigratory bird have been studied.

The Rosy Pastor *(Pastor roseus)* and the Common Myna *(Acridotheres tristis)* were chosen as types for the migratory and nonmigratory bird, respectively. The birds were collected by trapping them in a mist net. Hearts from freshly decapitated birds were taken, and the ventricular portion was cut out and blotted free of blood. After carefully removing the adipose tissue and blood, the tissue was taken for the enzyme assay. In each case a 2.5 per cent homogenate in distilled water was prepared in a chilled mortar, and the lipolytic activity was determined manometrically in a bicarbonate-carbondioxide buffer system of pH 7.4 at 37°C (adapted from Martin and Peers, 1953). Four per cent (v/v) tributyrin in 0.0148 M $NaHCO_3$ emulsified by shaking with a drop of "Tween 80" was used as the substrate. Lipase activity is expressed as the number of μl CO_2/mg protein/hour. Protein was determined according to the micro-Kjeldahl steam distillation method (Hawk *et al.*, 1954).

The lipase activity of the Rosy Pastor cardiac muscle was found to be 28.02 and that of the myna 36.78 μl CO_2/mg protein/hour (average of five experiments). It is known that smaller birds have a higher heart rate (Sturkie, 1954). The Common Myna and Rosy Pastor are more or less of the same size. So it might be expected that the heart rate as well as the heart-lipase values of these two birds also should be similar. But the results obtained show that the lipase activity in the myna's heart is distinctly greater and that a higher heart rate for this bird is also indicated. There are at present no data available on the heart rate of these species. However, it is a well-known fact that marathon runners have a low pulse rate (Schneider and Karpovich, 1948: 179-182). Similarly one might expect a lower heart rate in migrating birds. So the lower lipase value for the Rosy Pastor heart may be indicative of a lower heart rate in this bird that indulges in prolonged and sustained flight. In this context it may be mentioned that it has been observed that of all the parts and organs of the body of a migratory bird the heart alone shows no increase in fat content just before migration (Odum and Perkinson, 1951).

Literature Cited

Bing, R. J. 1956. The metabolism of the heart. *In* Harvey lectures. Academic Press, New York, pp. 27–70.

GEORGE, J. C., and P. T. IYPE. 1959. A study of the lipase activity in the developing chick heart. J. Exp. Zool., **141:** 291–297.

HAWK, P. B., B. L. OSER, and W. H. SUMMERSON. 1954. Practical physiological chemistry. McGraw-Hill Co., Inc., New York. xx + 1350 pp.

MARTIN, H. F., and F. G. PEERS. 1953. Oat lipase. Biochem. J., **55:** 523–529.

ODUM, E. P., and J. D. PERKINSON. 1951. Relation of lipid metabolism to migration in birds. Seasonal variations in body lipids of the migrating White-Throated Sparrow. Physiol. Zool., **24:** 216–230.

SCHNEIDER, E. C., and P. V. KARPOVICH. 1948. Physiology of muscular activity. W. B. Saunders Co., Philadelphia. viii + 346 pp.

STURKIE, P. D. 1954. Avian physiology. Comstock Publishing Associates. Ithaca, New York. xx + 423 pp.

VISSCHER, M. B. 1938. Fat metabolism of the isolated heart. Proc. Soc. Expt. Biol. Med., **38:** 323–325.

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Tail Molt of the Saw-whet Owl.—The sequence of tail molt of birds, especially owls, is not well known. Since Mayr and Mayr in their study of the tail molt of small owls (*Auk,* 71: 172-178, 1954) did not examine a molting specimen of either *Aegolius* or *Micrathene,* the following observations of the molt of a captive Saw-whet Owl *(Aegolius acadicus)* seem relevant.

The bird, an adult female, was caught by hand on 12 November 1960 near Ann Arbor, Washtenaw County, Michigan, and was maintained indoors at The University of Michigan Museum of Zoology until late spring 1961. During this time studies of metabolism and molt were conducted. The Saw-whet Owl is recorded as having one full molt in the fall (Bent, U.S. Nat. Mus. Bull., 170: 233, 1938), but my bird began its molt in late February and finished in early May. This unusual timing is probably a result of captivity and long artificial day lengths. The tail was lost in one week about halfway through the period of molt. The bird appeared tailless for about three weeks, after which time the new tail feathers were as long as the unmolted under tail coverts. Examination of the feathers that were lost and the incoming feathers indicated that the tail molt proceeded inward, with the two innermost rectrices being lost last. The rest of the body molt closely followed the sequence outlined for young Screech Owls *(Otus asio)* by Kelso (Biological Leaflet 50, 1950).

This essentially simultaneous molt of the tail in *Aegolius* was predicted by Mayr and Mayr *(loc. cit.)* because tail molt "tends to be simultaneous in all small [owls]." They suggest that simultaneous tail molt may be the result of "relaxation of selection" for gradual tail molt, which "is presumably based on a more complex physiological mechanism." Presumably the disadvantages of loss of maneuverability caused by taillessness are more than offset by the selective advantages of a decrease in the duration of tail molt.—CHARLES T. COLLINS, *The University of Michigan Museum of Zoology, Ann Arbor, Michigan.*

A Curtailed Postjuvenal Molt in the Steller Jay.—A first-year male of the Steller Jay *(Cyanocitta stelleri)* obtained by Ward C. Russell near Santa Cruz, California, on 26 April 1961, is of interest because it shows retention of juvenal feathers to a degree unlike that of first-year birds of the local population and