

**Weights and Measurements of Organs of Bonin Island Petrels, *Pterodroma leucoptera hypoleuca*.**—In December 1959 an opportunity to collect avian material on Midway Atoll was made possible by grants from the American Philosophical Society, the Bureau of Aeronautics, and Southern Illinois University, and by the cooperation of the United States Navy. Dr. John C. Downey of Southern Illinois University aided in the collection.

The petrels were picked up on the ground or taken in nets in an area where, as a result of construction activities, they would have been killed in their burrows. The birds were quickly killed by tracheal injection of ethyl chloride. Measurements of body weight, wing length, heart weight, and liver weight were made immediately. The heart was slit open and all blood removed before weighing; blood vessels were cut off as near as possible to the heart. Liver weight was measured after the gall bladder had been removed and the liver blotted on paper to remove surface moisture. Wing area was obtained by cutting paper silhouettes and weighing them; various tests and comparisons with areas measured with planimeters indicated less than 5 per cent error. Samples of endo- and ectoparasites and of blood were saved before the skeleton was prepared; these materials are presently being studied.

No significant sexual difference was found in wing length (34 males and 36 females; both means were  $76 \pm 0.3$  mm.), in wing area ( $524 \pm 6.3$  and  $526 \pm 4.7$  mm., respectively), in wing area per gram of body weight ( $2.8 \pm 0.05$  and  $2.9 \pm 0.04$ , respectively), in heart weight (40 males and 39 females, 2.1 grams), or in the ratio of heart weight to body weight (1.2 per cent). Body weight is statistically the same in the two sexes, but males consistently average somewhat heavier.

The most interesting information on weights came from samples taken at different times of the day (Table 1). In discussing these the midpoint of the time period will be used; that is, the period from 2:00 to 6:00 P.M. will be stated as

TABLE 1

DIURNAL CHANGES IN LIVER AND BODY WEIGHT IN BONIN ISLAND PETRELS

	N	Liver weight, grams		Liver as per cent of body weight		Body weight, grams	
		Mean*	Range	Mean*	Range	Mean*	Range
<i>Males</i>							
2-6 p.m.	10	$4.9 \pm 0.24$	3.5-6.1	$2.8 \pm 0.10$	2.3-3.4	$175 \pm 1.0$	153-185
6-10 p.m.	14	$6.4 \pm 0.31$	4.6-7.9	$3.4 \pm 0.13$	2.4-4.0	$188 \pm 4.2$	165-207
10 p.m.-2 a.m.	12	$6.7 \pm 0.36$	5.0-9.0	$3.7 \pm 0.21$	2.6-5.2	$182 \pm 4.1$	162-201
2-6 a.m.	10	$6.5 \pm 0.23$	5.4-7.7	$3.4 \pm 0.15$	2.7-3.9	$195 \pm 6.1$	165-230
6-10 a.m.	12	$5.6 \pm 0.23$	4.1-6.6	$3.1 \pm 0.10$	2.4-3.6	$184 \pm 5.1$	160-216
10 a.m.-2 p.m.	10	$5.4 \pm 0.30$	4.3-7.7	$3.1 \pm 0.13$	2.4-3.7	$177 \pm 6.3$	154-209
<i>Females</i>							
2-6 p.m.	11	$4.5 \pm 0.22$	3.6-5.5	$2.6 \pm 0.11$	2.0-3.1	$170 \pm 3.6$	150-185
6-10 p.m.	14	$6.0 \pm 0.15$	5.2-7.3	$3.3 \pm 0.07$	3.0-3.7	$182 \pm 2.8$	169-206
10 p.m.-2 a.m.	18	$5.9 \pm 0.23$	4.2-7.3	$3.3 \pm 0.12$	2.3-4.2	$178 \pm 3.0$	157-208
2-6 a.m.	12	$6.6 \pm 0.21$	5.6-7.9	$3.5 \pm 0.08$	3.0-3.9	$188 \pm 4.2$	166-212
6-10 a.m.	10	$5.0 \pm 0.19$	4.1-5.9	$2.9 \pm 0.14$	2.8-3.6	$171 \pm 3.4$	151-185
10 a.m.-2 p.m.	11	$4.8 \pm 0.18$	4.1-5.9	$2.7 \pm 0.09$	2.2-3.2	$177 \pm 2.9$	164-197

\* With standard error.

4:00 P.M. Although body weight appeared to be nearly equal in the two sexes for most periods of the day, it is interesting to note in Table 1 that at 8:00 A.M. males were significantly heavier ( $P = 0.05$ ).

In males, body weight was least between noon and 4:00 P.M. By 4:00 A.M. body weight had increased 11 per cent ( $P = 0.01$ ) with the most significant increases occurring between 4:00 and 8:00 P.M. and between midnight and 4:00 A.M. From the high at 4:00 A.M. body weight of males decreased gradually, and without statistically significant differences between successive sampling periods, until 4:00 P.M.

In females, body weight showed much the same pattern of variation except that it reached its low at 8:00 A.M. and maintained this level without statistically significant change until 4:00 P.M. Total increase was 11 per cent ( $P = 0.01$ ). Between 4:00 and 8:00 A.M. body weight in females dropped abruptly; the change ( $P = 0.01$ ) in this time constituted virtually the entire 12-hour loss in body weight. In this same span of time there was also a major decrease in the weight of males, but it accounted for only half of their total loss in body weight.

Liver weight showed variations of much greater relative magnitude. In both sexes this weight was least from noon to 4:00 P.M. The greatest weight was reached between midnight and 4:00 A.M., with some indication that in the female the buildup continued somewhat longer; rather than simply maintaining the increased weight between midnight and 4:00 A.M., as in the male, there was a significant increase ( $P = 0.05$ ) during this time in the female. This may be related to a possible sexual difference in feeding habits. Unfortunately, it was not until the analysis of data was started that a possible difference in feeding time was observed. Hence data bearing directly on this point are neither abundant nor conclusive. Females predominated in collections made early in the evening. At 10:00 P.M., in one collection made, 25 birds were taken—17 (9 males, 8 females) on the ground and 8 (1 male, 7 females) from the air. The next evening (10:00 P.M.) 41 petrels were taken—10 males and 14 females on the ground, and 4 males and 13 females from the air. At midnight, of 17 birds taken on the ground 12 were males and 5 were females; 12 males and 13 females were netted from the air. At 1:30 A.M. twice as many birds were collected on the ground (31 males and 34 females) as in the air (12 males and 13 females), but the sex ratio was the same in both instances. These data may indicate that, in December at least, most females emerge and begin to feed earlier and thus feed for a longer time.

In absolute values the liver weight fluctuated 37 per cent ( $P = 0.01$ ) in males and 47 per cent ( $P = 0.01$ ) in females during the 24 hours. Relative to body weight (Table 1), the fluctuations in liver weight were 32 and 35 per cent, respectively. In both sexes the major increase was between 4:00 and 8:00 P.M.; the period of most rapid decrease was between 4:00 and 8:00 A.M.

Fisher and Bartlett (Diurnal Cycles in Liver Weights in Birds, *Condor*, 59 (6): 364–372, 1957) first found a liver cycle in Red-winged Blackbirds (*Phoeniceus agelaius*) and Starlings (*Sturnus vulgaris*). In the wintering birds of their study, the males showed a greater overnight loss in liver weight (Red-wings: 32 per cent in males, 22 per cent in females, and Starlings: 40 per cent in males, 25 per cent in females). Fisher (MS) has since noted a cycle of comparable magnitude in Cowbirds, Rusty Blackbirds, Common Grackles, and domestic chickens. All these species are diurnal and granivorous and/or insectivorous.

One significance of the present note then lies in making known a daily cycle in

liver weights in the Bonin Island Petrel, which is nocturnal and marine, and which subsists largely on squids. In this petrel the cycle of liver weights follows the pattern of change of the body weights, but percentagewise the liver variations are three times as great. The greater fluctuation in liver weight in the female petrels, as contrasted with greater fluctuation in the male of other species, may be related to the prebreeding condition of the petrels and the wintering status of the Redwings and Starlings.—HARVEY I. FISHER, *Department of Zoology, Southern Illinois University, Carbondale, Illinois.*

**Virginia Rail (*Rallus limicola limicola* Vieillot) Breeding at Vermilion, Alberta.**—On 6 July 1958 an adult male Virginia Rail was collected from a partially flooded *Carex* meadow in Grizzly Bear Coulee, five miles south and three miles east of the town of Vermilion, Alberta. The specimen was deposited in the National Museum of Canada (Catalogue Number 41559), on behalf of the Canadian Wildlife Service, by which the author was temporarily employed to assist in waterfowl studies.

At the time the bird was collected, there was one other adult present. Both birds were exhibiting a distraction behavior as though there was a nest or a brood present. Three days later, an adult was seen feeding two downy young approximately three feet from the site where the specimen had been collected. At this time, two more adult Virginia Rails were observed. One was seen one-half mile west, and the other, one mile west of the collection site. These birds also exhibited distraction behavior.

The A.O.U. *Check-list of North American Birds* (1957, Fifth Edition) defines the northern limit of the breeding range of the Virginia Rail in Alberta as Brooks, 200 miles south of Vermilion. Prior to the collection of the specimen reported herein, the only other specimen collected north of Brooks was an adult male taken near Fort Chipewyan by T. M. Shortt on 30 June 1945 (Specimen Number 72295, Royal Ontario Museum). Although the Virginia Rail has been recorded from this more northerly point, the author believes that the collection of the adult Virginia Rail at Vermilion and the subsequent observation of an adult feeding two downy young at the same site would serve to constitute a new northern record for the breeding range of this species in Alberta.—JAMES K. LOWTHER, *Department of Zoology, University of Toronto, Toronto 5, Ontario, Canada.*

**Plumage Peculiarity in Cedar Waxwing.**—A specimen of Cedar Waxwing (*Bombycilla cedrorum*) was collected from a flock of 18 to 20 birds at Stoneham, 40 kilometers (25 miles) north of Quebec City, on 7 July 1957. Examination of the specimen showed a peculiar coloration of the terminal appendages of the secondaries, the usual bright red being replaced by a bright yellow.

The bird was an adult female whose ovary was well developed. The color of other external parts did not prove different upon comparison with a series of females in the Quebec Provincial Museum. The mean lengths of the wing and culmen of 10 females were: wing 92.6 mm. and culmen 9.5 mm., while for the abnormally colored specimen these measurements were 93.6 mm. and 9.5 mm., respectively. The specimen is preserved in the author's collection as Number 147.—HENRI OUELLET, 341 Fourth St., Quebec City, P.Q. Canada, or The University of New Brunswick, Fredericton, N.B., Canada.

**Behavior of a California Gull Devouring a Juvenile Coot.**—On 3 June 1960, while driving along the west side of Unit 2 of the Bear River Migratory Bird