GENERAL NOTES

A case of Turkey Vulture piracy on Great Blue Herons.—One of the parent Turkey Vultures (*Cathartes aura*) in a nest that I studied near Huntington, Ohio had an unusual method of obtaining food for its two, two-week-old young. In the swampy, Elm-Maple woods where the vultures nested, there was also a small heronry containing about 20 nests of the Great Blue Heron (*Ardea herodias*). On 9 June 1964, the adult vulture twice flew into the heronry for a short time and then returned to its own nest where it fed its young. On 10 June I watched this activity from a vantage point with a view of the heronry, and the reason for the vulture's visits became clear. After landing on a heron's nest which contained two, three-week-old young, the vulture beat the young herons with its wings and jabbed at them with its beak. This caused the young herons to regurgitate their last meal. The vulture then stopped beating them, ate the mass of semi-digested food, and returned to its own nest to feed its young. This behavior was repeated once more during the day but at a different heron nest. This was not the only method used to obtain food for the young since the adult also made longer foraging trips and returned with food which was obviously carrion. The adult herons were never at their nests while the vulture was present.

Mehner (Wilson Bull., 64:242, 1952) has speculated about the possible effect Turkey Vultures might have in causing the abandonment of heron nests. In the heronry under observation, the landowner noticed a steady decline in the number of herons nesting during the previous two years. Perhaps repeated attacks by the vulture caused the death of many young herons by starvation or injury. Turkey Vultures are also known to kill and eat young herons on the nest (Pearson, Bird Lore, 21:321, 1919). It is possible that the vulture could seriously affect the heron's nesting success by such activities and thereby cause the abandonment of nests.

The vulture could have acquired its piratic behavior from experiences it had while attempting to kill a young heron on the nest. If the heron was too large for the vulture to kill easily and regurgitated during the struggle, the vulture may have been satisfied to take the regurgitated food. After several incidents like this, the vulture may have learned that it could get an easy meal by merely beating the young herons.—STANLEY A. TEMPLE, *Laboratory of Ornithology, Cornell University, Ithaca, New York 14850, 22 December 1967.*

Unusual cases of re-nesting Mallards.—The importance of re-nesting in waterfowl as compensation for losses caused by nest destruction has been much discussed. One question dealt with is in what way the stage of incubation at the time of destruction affects the interval to the new attempt. Hochbaum (The Canvasback on a prairie marsh. Amer. Wildl. Inst., 1944) doubted that re-nesting would be possible if the destruction occurred after the incubation had started. Sowls (A preliminary report on re-nesting in waterfowl. Trans. N. Amer. Wildl. Conf., 14, 1949) investigated this by removal of eggs at various stages of egg laying and incubation and found that the re-nesting interval (the time from the destruction of the first nest to the laying of the first egg in the second), as observed in 6 species of Anatinae, mainly Pintail (*Anas acuta*), Gadwall (*A. strepera*), and Blue-winged Teal (*A. discors*), was directly proportional to the time spent on the first nest. Every female waited at least 4 days and for each additional day of incubation on the first nest before destruction, an average of 0.57 day was added to the re-nesting interval. Later these figures were modified to 3 and 0.62 day respectively (Sowls, Prairie ducks. Harrisburg, Pa., 1955). Based upon observations

on Ring-necked Duck (*Aythya collaris*), Lesser Scaup (*A. affinis*), and Cinnamon Teal (*Anas cyanoptera*) Hunt and Anderson (California Fish and Game, 52:1, 1966) concluded that only for the teal did their figures correspond to this rule. For Gadwall, Gates (Wilson Bull., 74:43–67, 1962) found that the re-nesting interval lengthened with a later nest destruction only during the first 10 days of incubation and that the interval was highly variable thereafter. As very few figures seem to be available for the Mallard (*Anas platyrhynchos*) and as most of the information comes from nests destroyed during the first 15 days of incubation, the following observations of female Mallards laying a second clutch after having successfully hatched the first one, might be of interest. The observations were made during 1967 and 1968 at Öster-Malma, a field station of the University of Stockholm.

In the first case in 1967 a marked female and 10 ducklings left the nest, an artificial nest-box, on 5 May with one unhatched egg remaining. The nest was situated on an island in a small pond within a fenced area. The brood was immediately attacked by a male Canada Goose (*Branta canadensis*) which had his female incubating about 10 m away from the duck nest. In order to protect the ducklings the whole family was evacuated to a larger pond situated about 40 m away. The ducklings could walk through the fence and the female fly over it. On one of the three following days the family was seen together in the new pond. On 18 May there was still only one egg in the old nest, but on the following day two eggs were found there. From now on, and until 3 June, at least 5 of the ducklings were regularly seen on the larger pond, while the female stayed within the fenced area. As a matter of fact they were never seen together during this period. On 4 June the female was caught on the nest, which now contained 11 new eggs and 8 days later she was still incubating. Shortly afterwards, however, the nest was robbed, probably by a Jackdaw (*Corvus monedula*) and 5 eggs left in the nest were all infertile. The ducklings were not seen after 3 June and probably did not survive.

In 1968 this female nested in the same nest-box. On 12 May she left the nest followed by 13 ducklings. As in the previous year the family was seen together on the following day, but later on several occasions the ducklings were found alone. Within the first month 2 of them died but the remaining 11 fledged and were seen together in the middle of August. On 10 June the same female was incubating a complete second clutch of 11 eggs in the box. Ten of these eggs hatched on 26 June which means that the incubation started on 30 May and thus the egg-laying not later than 20 May. This time the family kept together in a perfectly normal manner. Despite this the brood was seriously reduced and on 16 August contained only 3 ducklings all of which however fledged.

In the second case in 1967 two females incubating in the same nest, hatched in all 13 ducklings on 14 May and left the nest on the following day. A new clutch with 6 eggs, incubated by one of these females, was found in the same nest on 17 June. These eggs hatched on 4 July which means that the incubation probably started on 7 June.

Thus Mallard females have been found to be able to lay a second clutch after having successfully hatched a first one. This has previously been reported for Mallard in cases where the entire brood has been lost within 48 hours or so after hatching (Burger, Northeast Fish and Wildl. Conf., 1964) and for Wood Duck (*Aix sponsa*) when however the fate of the ducklings has been unknown (McGilvrey, Auk, 83:303, 1966). At least in two of the three cases described here, part of the brood was still alive when the female started her second clutch and the reason for this abandonment of the brood is unknown. The re-nesting interval in these cases was 13, 8, and 17 days respectively, thus

below the 20 days that could be expected from figures calculated by Sowls.—ANDERS BJÄRVALL, *Dept. Zoology, University of Stockholm, Rådmansgatan 70 A., Stockholm Va, Sweden.* *29 September 1967 (additions 22 October 1968).*

Build-up of grit in three pochard species in Manitoba.—Grit from the esophagus, proventriculus, and gizzard of 305 of 345 Canvasbacks (*Aythya valisineria*), Redheads (*A. americana*), and Lesser Scaup (*A. affinis*) examined for food contents was measured as part of an investigation of the summer foods and feeding habits of diving ducks in Manitoba (Bartonek, unpubl. Ph.D. thesis, Univ. Wisconsin, Madison, 1968).

The average volume of grit, as measured by water displacement, in the esophagi of the 305 birds, juveniles and adults combined, was only 0.007 ± 0.004 ml (95 per cent C.L.). Some trichoptera larvae, Molannidae in particular, incorporate particles of sand and gravel into their cases, and when consumed by the ducks indirectly contributed to the amount of grit ingested. Among juveniles, the quantity of grit in the gizzards increases with the age of the birds (Table 1). Juvenile ducks were classified to age according to the method of Gollop and Marshall (Mississippi Flyway Council Tech. Sect. Rept., 1954). The gizzards of juvenile Lesser Scaup contained more (but not always significantly more) grit than those of Redheads and Canvasbacks. Among adults, the gizzards of Redheads contained significantly more (95 per cent C.L.) grit than those of either Canvasbacks or Lesser Scaup.

Grit and other mineral matter varied in size from gravel (> 2 mm) to clay (colloidal). Four juveniles, three of which were 2–3 days old and the other 2 weeks old, did not have grit in their gizzards.

That gizzards retain grit longer than food is evident by the grit to food ratios for these three segments of the digestive tract: 1:122 in the esophagus, 1:7 in the proventriculus, and 1:1 in the gizzard.

Of the 345 waterfowl examined, only 6 contained lead shot in their gizzards. Two juvenile Canvasbacks, one juvenile Redhead, and two adult Canvasbacks had one lead shot each in their gizzards; another juvenile Canvasback contained three lead shot. The incidence of shot among these birds collected on the breeding ground is lower than that summarized by Bellrose (Illinois Nat. Hist. Surv. Bull., 27:261–262, 1959) for

TABLE 1
AVERAGE VOLUMES (ML) OF GRIT IN THE GIZZARDS OF CANVASBACKS, REDHEADS, AND LESSER SCAUP (With 95 Per Cent Confidence Limits and with Sample Sizes in Parentheses)

Species	Average volume of grit in gizzards				
	Juveniles			Adults	
	Class I	Class II	Class III and flying	Female	Male
Canvasback	0.32 ± 0.17 (22)	1.19 ± 0.25 (47)	1.52 ± 0.33 (37)	1.45 ± 0.43 (23)	1.60 ± 0.37 (18)
Redhead	0.46 ± 0.20 (27)	1.25 ± 0.34 (15)	1.86 ± 0.54 (10)	2.71 ± 0.53 (19)	3.06 ± 0.56 (22)
Lesser Scaup	0.83 ± 0.26 (21)	1.72 ± 0.30 (11)	2.05 ± 0.39 (11)	1.62 ± 0.51 (11)	1.33 ± 0.42 (11)