adaptation for flight and this would suggest that the reduction and eventual loss of teeth also somehow favored this adaptation. Little has been ventured in the past by way of a possible explanation for this loss of teeth. The most prevalent idea at present seems to be that it was in response to the detrimental effects of the weight involved in possessing teeth and their attendant rather heavy supporting jaws, especially so far from the center of gravity.

Many present day forms have bills as heavy as, or heavier than, tooth-bearing jaws would necessarily be. This is probably a secondary condition that can exist because of the relative perfectness of other flight-adapted features. It may be that the ancestral types, not so perfectly adapted for flight as present forms, lost their teeth because any advantage making for better flight would be at a greater premium than at present. Once lost, it would be impossible for teeth to reoccur since they have been derived by a long process of evolution from placoid scales. Some modern forms have secondarily evolved "teeth" which are hooks or serrations of the horny coverings of the maxillae and mandibles. This demonstrates that teeth or tooth-like structures are still an advantage, particularly to some groups. The tooth-like structures present in modern forms are useful as meat-tearing structures or for holding active and or slippery prey. They are not, however, used for chewing.

I believe that another possible explanation for this loss of true teeth (admitting that weight reduction may be a partial explanation) involves the necessarily very high rate of metabolism of birds which is in turn a response to the flying habit. Such a high rate of metabolism necessitates the rapid ingestion of great quantities of food, usually of high caloric value. This in turn calls for rapid digestion and assimilation of this food. The more finely divided the food is the quicker it can be utilized. Teeth, of course, can process food into fine enough particles for rapid digestion if chewing is long enough, but rapid ingestion would then be impossible. Birds have evolved, instead, a muscular gizzard within which food is ground rapidly and finely with the aid of ingested grit. This permits the rapid and frequent ingestion of food which can be temporarily stored in the esophagus or crop while a relatively constant process of ingestion and digestion takes place.

Forms which are adapted to take foods which are easily digested such as flesh and nectar do not require this rather elaborate digestive system although many flesh eaters need "teeth" to aid in tearing their prey into small enough pieces to be swallowed. I think that it is likely that modern birds which do not need a muscular, grinding type of stomach have evolved from ancestral types which did because of increased demands for more rapid ingestion and digestion.

I suggest that the greater feeding efficiency of a grinding, muscular gizzard (developing along with the increasing necessity for a progressively higher rate of metabolism coincidental to greater flight efficiency) made teeth less necessary and led, consequently, to their reduction and final loss.—WILLIAM C. DILGER, *Laboratory of Ornithology, Cornell University, Ithaca, New York.*

Absence of Syrinx in the Turkey Vulture (*Cathartes aura*).—Dissection of the trachea of the Turkey Vulture shows no syrinx. The trachea branches into two bronchi much as in mammals, with no syringeal drum, no pessulus, and no wide expanses of membrane between cartilages or at the apex of the bronchi. The cartilages are very narrow, considering the size of the bird, none over 1 mm. in width. The bronchi consist not of half-rings of cartilage but of complete rings, the inner portion of each ring extremely fine, almost hair-like. Although very thin, these cartilages appear to give enough support to the internal bronchial membranes to

prevent sound-producing vibrations. There is no trace of internal or external muscles in the region of the bifurcation of the trachea, nor of the sterno-trachealis and tracheo-lateralis muscles. Evidently, therefore, the voiceless condition of the Turkey Vulture is due to structure and is not merely a matter of behavior.—MILDRED MISKIMEN, *Miami University, Oxford, Ohio.*

Land Bird Migrants over the Florida Straits.—Recent interest in observations of land birds migrating over water prompts me to record the following events.

On May 6, 1955, at 7:30 A.M., I sailed from Havana, Cuba, for New York. The course that day was generally northeast, the noon position being 23° 58′ N. by 81° 20′ W. and at sunset we were about twenty miles off Miami. At first, there was a northeast wind; then we ran through a calm, following which, the wind sprang up from the west and it became slightly hazy. About sunset, it clouded over for thirty minutes but there was no rain. No unusual weather conditions had been evident on weather maps of the preceding five days.

During the morning, a few landbirds were seen, both on board and passing by to the northward. About 1:00 P.M., when we were well into the area of west wind, landbirds began to pass in increasing numbers. They were in groups of 5 to 15 and were headed between north and north-northwest. The majority flew about fifty feet above the water, but some flocks were just above the waves and some at an estimated two hundred feet. The flight continued unbroken until dark when there appeared to be a lull, though some birds were heard overhead and were seen passing through the lights about 9:30 P.M., at which time the flight direction was more northwesterly. It was estimated that 1800 warblers and 200 larger birds were seen. The great majority of birds paid no attention to the ship. A few landed briefly and then went on, while a very few were obviously exhausted and settled down. These gradually accumulated on board and about sunset the following count was made: 1 Barn Swallow; 1 flycatcher, probably a Wood Pewee; 1 Parula Warbler; 2 Cape May Warblers; 4 Black-throated Blue Warblers; 12 Prairie Warblers; 4 Blackpoll Warblers; 35 Palm Warblers, both Yellow and Western subspecies identified, Western much predominant; 40 Northern Waterthrushes; 35 Yellow-throats; 200 Redstarts; and 25 Bobolinks. These birds were absurdly tame, resting on chairs, hats, and even shoulders and hands of the passengers, exciting a great deal of interest.

As regards non-passerine birds, a single Ringnecked Plover appeared and rested briefly. About 6:00 P.M. a group of hawks, including 2 Sharp-shinned Hawks, 1 small buteo not satisfactorily identified, 2 Marsh Hawks, 1 Osprey, and 4 Sparrow Hawks, arrived. These remained around the ship about ten minutes but did not perch, except for one Sparrow Hawk which settled on the rigging momentarily. This same bird was observed to make a single unsuccessful attempt to capture a Redstart.

A similar group of birds but in much smaller numbers had been seen from ship on May 4 in the southeastern part of the Florida Straits, between the Bahamas and Cuba. On this day, Bobolinks made up a much higher percentage of the total; they were singing vigorously as they passed, the other birds calling occasionally but never singing. This singing of the Bobolinks while in flight was heard but less marked in the larger flight on May 6.

In view of the mild and essentially normal weather conditions, it is believed that this flight was not a case of storm-blown or "lost" birds but a part of the normal spring migration passing from the Bahamas and the eastern half of Cuba to Florida. —NORMAN P. HILL, M.D., *2308 Highland Avenue, Fall River, Massachusetts.*