

the National Museum of Canada, who identified all three birds as the race *v. nigra*. These are the first specimens of the Common Eider taken in Minnesota. An earlier sight record of Common Eider by William Pieper at Grand Marais, Cook County, 7 November 1955 is considered valid.—ROBERT W. DICKERMAN, *University of Minnesota, Museum of Natural History, Minneapolis, Minnesota*, and FORREST B. LEE, *Minnesota Division of Game and Fish, St. Paul, Minnesota*.

Aggressiveness of Migrant Myrtle Warblers toward Woodpeckers and Other Birds.—In making observations on woodpeckers over the course of eight years in the vicinity of Seneca, Maryland, I have noted repeated instances of attacks made on them, as well as on other birds, by migrant Myrtle Warblers (*Dendroica coronata*). These attacks have taken place in October and November. On 9 November 1957, for example, a Red-bellied Woodpecker (*Centurus carolinus*) with something yellow in its bill, possibly a piece of acorn, was swooped at and closely pursued by a Myrtle Warbler as it flew across a canal. I have witnessed similar attacks on Red-headed (*Melanerpes erythrocephalus*), Hairy (*Dendrocopos villosus*), and Downy (*D. pubescens*) woodpeckers, as well as on Bluebirds (*Siala sialis*), all occurring in mid-air. The frequency of such episodes may be indicated by observations made in 1960. Thus, on 20 November I saw a Myrtle Warbler attack a Downy Woodpecker that was feeding on poison ivy berries (*Rhus radicans*). The Downy flew across the canal with the warbler in pursuit, both rested in a tree within a short distance of each other, and the warbler resumed the attacks when the woodpecker took wing again. This sequence happened three times. While standing at the same spot a few minutes later, I observed a similar series of attacks on a Chickadee (*Parus carolinensis*), which had a poison ivy berry in its bill; on a Blue Jay (*Cyanocitta cristata*), which was driven from an oak; and on a Cardinal (*Richmondia cardinalis*). On 27 November I observed Myrtle Warbler attacks on a Downy and a Hairy Woodpecker and finally on a Robin (*Turdus migratorius*). This last episode was unusual. The Robin refused to leave the limb on which it was perching except to fly at the Myrtle Warbler three times.

Factors common to many episodes, such as those described above, were that the birds either had food in their bills or were close to a poison ivy vine covered with berries. The warblers develop a territorial possessiveness about these vines, for they feed on the berries regularly. This type of behavior is not unique. I have (1958, *Wilson Bull.*, 70: 347–358), for example, observed a Mockingbird (*Mimus polyglottus*) that drove several species of woodpeckers away from a group of persimmon trees, where they were feeding on persimmons. Another aspect of the warblers' behavior is that they appear to be quick to take advantage of what other birds may be feeding upon. As described elsewhere (Kilham, 1953, *Wilson Bull.*, 65: 41), I observed an example of this behavior on 6 January 1953, when a Myrtle Warbler stayed close to and followed a Yellow-bellied Sapsucker (*Sphyrapicus varius*) that was feeding on hackberries. Such habits may have survival value for a warbler that may migrate late or even winter in the north.—LAWRENCE KILHAM, 7815 Aberdeen Road, Bethesda, Maryland.

A Note on the Pectoral Muscles of Birds.—It is well known that the fundamental force of wing movements is produced by pectoral muscles. The *M. pectoralis major*, attaching ventrally on the head of humerus, pulls the wing bones down, and *M. supracoracoideus* (*M. pect. minor*), with its tendon passing through

the *Foramen triosseum* made by the clavicle, scapula, and coracoid, and attaching to the dorsal base of the humerus, acts as wing raiser. The author has already shown (*Miscell. Rep. Yamashina's Inst.*, No. 14: 50–59, 1960) in various species of birds that the *M. pect. major* always consists of main (*M. pect. major proprius* [of Kuroda]) and lateral (*M. pect. major lateralis* [of Kuroda]) parts, of which there appears to be no definite reference in literature. This lateral part is important functionally as the source of supinating force pulling the wing backward after downstroke (by *M. pect. major proprius*). Since this lateral part is essential in bird flight in producing the propelling effect to the wing, it is, I believe, found in all species of flying birds.

It had already been known that sailing birds have another layer, *M. pect. major profundus* (of Kuroda), as shown by Forbes (*Challenger Rep., Anat.*, 1882) and Gadow (Bronn's *Thierreich, Anat.*, 243, 1891), but no attention seems to have been given to it until my recent report (*Zool. Mag.* 69: 85–89, 1960). It is to be noted that this layer is developed in systematically quite different birds—some Accipitres, all Tubinares, Steganopodes—which indicates that it is the result of parallel adaptation to a particular (sailing) way of flight. It is rather an important point that this adaptational second layer was found, by careful dissection, in *Nannopterum harrisi*, a flightless cormorant of the Galapagos Islands (obtained by Japanese Galapagos Islands Expedition, 1959), although in extremely thin layer as were also the other parts. In flight, cormorants flap rather than sail, but there is the probability of sailing origin, since this layer is retained even in flightless condition. This suggests that this adaptational character (of *profundus*) has been fixed and retained genetically among Steganopodes.

I suggest that the function of this layer may be to cope with the wind force acting to the wing from below while sailing, so as to keep the wing motionless. The action of this layer therefore should be frequent, short, and strong. In the Tubinares, which need this function far more than do land soars and which utilize changing air flows produced by sea waves in their pelagic sailing, this layer consists of white muscle fibers adapted for this purpose (George and Naik, *Auk*, 77: 224, 1960).

Recently, I examined the pectoral muscles of the Frigate Bird, *Fregata magnificens* of Galapagos Is., and found the third, or middle, separate layer, which I would name here, *M. pectoralis major medius*, since I could not find reference for this layer in literature. This layer is not found even in species with such marked ability to sail as *Diomedea* and should be peculiar to *Fregata*. The smallness of the body relative to the wing area is more remarkable in *Fregata* than in *Diomedea*, since the wings of *Fregata* are much wider and primaries much longer than in *Diomedea*. The forked tail is also very long, and the feet are extremely degenerated. As is known, it is the most aerial in habit among sea birds and in flight combines the soaring and high maneuverability (for which its forked tail is adapted) in aerial attack to rob other sea birds of food. Therefore, it seems to me a natural conclusion, though direct proof is lacking, that the third layer has developed for such need of flight technic with very large wing areas relative to body size. In short, the splitting of *pectoralis major* would have occurred first as an adaptation to soaring and sailing flight, but in *Fregata* this further layer presumably has been added in correlation with its maneuverability in flight.

The *pectoralis minor* (*M. supracoracoideus*) also splits into three portions in *Fregata* and *Sula* and some other large-winged, large birds, such as flamingos

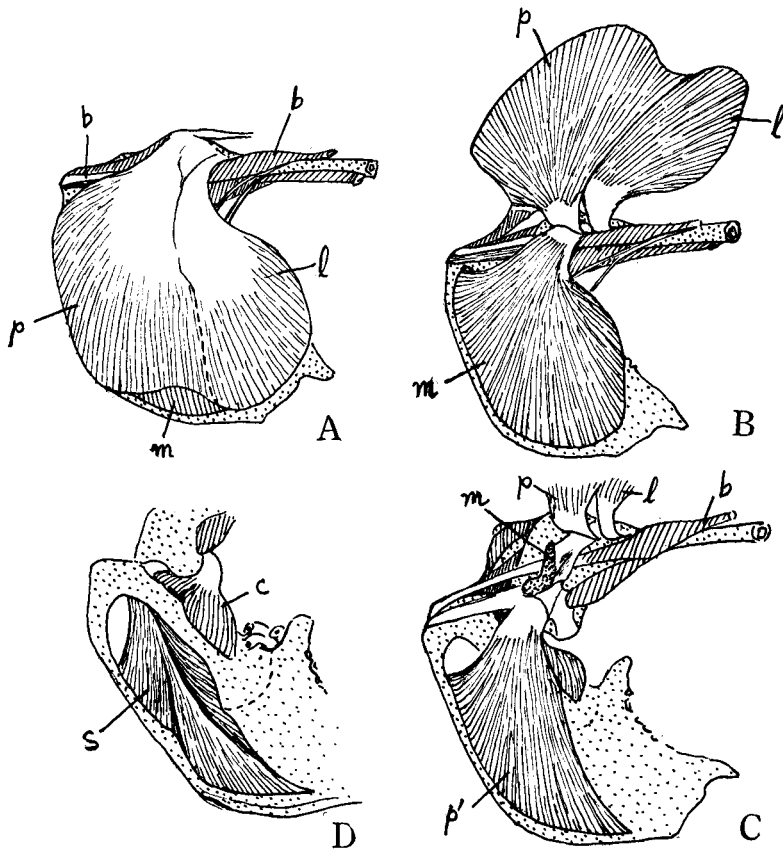


Figure 1. Pectoral muscles of Frigate Bird (*Fregata magnificens*). Left side view: (A) external layer, showing *proprius* and *lateralis*; (B) showing the second layer, *medius*, by turning the external layer inside out; (C) the deepest third layer *profundus*; (D) *M. supracoracoideus* consisting of three parts.

b: *biceps*, c: *coraco-brachialis longus*, l: *pectoralis major lateralis*, m: *pect. major medius*, p: *pect. major proprius*, p': *pect. major profundus*, s: *supracoracoideus*.

(though single in the crane), and even into four portions in *Diomedea* (Forbes, l.c.; Kuroda, *Zool. Mag. l.c.*). Each part should have peculiar significance functionally, but this is not clear as yet to the writer.—NAGAHISA KURODA, *Yamashina Museum of Birds*, 49 Nanpcidai, Shibuya, Tokyo, Japan.

Wintering Tennessee Warblers.—The A.O.U. *Check-list* (Fifth Edition, p. 482, 1957) defines the winter range of the Tennessee Warbler (*Vermivora peregrina*) as from Guerrero, Oaxaca, and Guatemala south to Colombia and northern Venezuela, but does not mention any United States winter records.