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## Imprinting of a Ring-billed Gull

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Most studies of imprinting or fixation behavior are, of necessity, conducted with hand-reared or captive birds (Hess 1959, Lorenz 1952, Thorpe 1956), and I have found few references to abnormal attachments in wild birds. During the fall and winter of 1973-1974, I made daily observations of winter populations of diving ducks on Flathead Lake, in western Montana. During this study I observed an immature-plumage Ring-billed Gull (*Larus delawarensis*) in the constant company of a flock of four female and two male Common Mergansers (*Mergus merganser*). The males were in almost complete winter plumage, with some vestiges of molt.

Gulls frequently feed in proximity to other fish-eating birds in this area, probably because of a common food source. There is also some parasitic feeding advantage for the gulls. I have observed gulls taking fish from mergansers surfacing from depths lower than the gulls could reach. However, it was readily apparent that this particular gull was not such a casual feeder. When first observed on 11 November 1973, the gull was engaged in a curious attempt to submerge. It put its head into the water and flapped its wings and splashed its feet. It flew up about 1 m and dove into the water with only momentary success. This behavior occurred repeatedly and only when the mergansers were under the water. When they surfaced the gull swam to join them. Even when this required covering some distance, the gull did not fly to the new location as gulls usually do, but swam in a labored fashion, with much pumping of the head in the sagittal plane. When the mergansers dove again the gull resumed the attempts to follow. This occurred on more than 15 successive dives during the first observation period of about an hour. After this the birds were seen almost daily. During this period the gull fed very little. It spent most of its time just keeping up with its adopted "family." The mergansers seemed neither to accept nor reject the gull. They swam to join each other but all maintenance of contact between them and the gull was strictly up to the gull. This the gull did with difficulty because of its reluctance to fly and the mergansers' superior swimming ability.

Over a period of a month the attempts to dive after the mergansers diminished and by mid-December the gull only swam erratically about until the mergansers surfaced, with its neck arched so that the bill was pointed straight down. This was possibly an attempt to observe the mergansers' progress under water. The gull was capable of flight, with gull-like maneuvers in landing and taking off, but flew only when the mergansers did and only with direct flapping flight, low over the water, as they did. In feeding it dabbled phalarope fashion. It appeared to have considerably less bulk and presented a much slimmer profile than the gulls that landed nearby, so its feeding habits up to this point may not have been totally effective.

I was able to observe these birds almost daily and this behavior continued until 1 January 1974 when the lake froze over and the birds were forced to move downriver to open water. With the return of open water

to the lake on 17 February 1974 I again sighted the mergansers, two males and four females, and the imprinted gull. The gull paid no attention to other gulls that fed nearby. On one occasion the gull swam following his "family" through a large heterospecific collection of ducks, mergansers, and gulls, apparently ignoring other gulls and birds, to remain with the mergansers. The gull now flew to keep up a great deal, rather than swimming. It did not swim about in a confused manner when they dove, but calmly allowed them to drift some distance ahead and then flew to join them. On one occasion it flew on ahead and landed in front of their line of travel and remained feeding in that location until after they had passed some distance before again flying to join them, landing in the middle of the flock. Occasionally the gull would circle about the flock before landing, in a brief hint of soaring flight. On these flights it was never observed higher than about 6 to 10 m above the water and the only departure from direct-line flapping flight was restricted to the brief spiral on landing.

This heterospecific "family" fed in the area daily in this manner until on 29 March 1974 they flew south toward the river, with the mergansers in a tight low formation about 2 m above the water. The gull flapped along at the same level about 3 m behind. This was the last sighting of these birds. The causes and outcome of this relationship can, of course, only be conjectured. Ring-billed Gull and Common Merganser nesting requirements are quite different, with the gulls nesting in colonies on the ground, usually on somewhat barren islands (Bent 1921), and the mergansers nesting in cavities in trees or other well-protected sites (Bent 1923, Palmer 1975). In this area, however, they do nest adjacent to the same bodies of water.

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### Regulation of Metabolism During Torpor in "Temperate" Zone Hummingbirds

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The ability of hummingbirds to control their body temperatures and metabolic rates precisely while torpid has been noted for several species from tropical latitudes (*Eulampis jugularis*, Hainsworth and Wolf 1970; *Eugenes fulgens* and *Panterpe insignis*, Wolf and Hainsworth 1972; *Oreotrochilus estella*, Carpenter 1974), and regulation in torpor has been indirectly inferred from measurements of nest temperatures for one species from temperate latitudes (*Selasphorus platycercus*, Calder and Booser 1973). Lasiewski (1963, 1964; Lasiewski and Lasiewski 1967) did not report this phenomenon in his classic studies of the metabolism of hummingbirds from the United States.

Because of the lack of observation of the phenomenon there has been some question about the occurrence of regulation during torpor for hummingbirds from temperate areas (Dawson and Hudson 1970, Calder and King 1974). We present evidence that regulation of metabolic rate during torpor occurs for two species from temperate areas (*Archilochus alexandri* and the *Eugenes fulgens* race from Arizona), and we offer a possible explanation for the lack of observation of this in the earlier work of Lasiewski.

The methods were identical to those described previously (Hainsworth and Wolf 1970) with the exception that all measurements were made during the dark phase of the photoperiod on which the birds were maintained (either 14L:10D or 9L:15D). Data were collected from four female *Archilochus alexandri* and four male *Eugenes fulgens*.

Oxygen consumption for homeothermic birds (Fig. 1, closed circles) was similar to measurements previously reported for these species (Lasiewski 1963, Lasiewski and Lasiewski 1967) as well as for the more tropical race of *Eugenes fulgens* (Fig. 1; Wolf and Hainsworth 1972). When these hummingbirds