

can be traced to an extremely mobile shoulder joint which enables the bird to twist its wings in such a way as to generate lift on both the forward and backward strokes. Ehrlich and coauthors described the mechanics as follows:

The front edge of the wing leads on both strokes, and on the backstroke it is the underside of the feathers that face upward, the shoulder rotation having, in effect, turned the wing upside down . . . The direction of thrust changes between the forward and backward strokes, so that they cancel each other out . . . the hovering flight is quite expensive: about 30 percent of the total body weight of hummingbirds is invested in the breast muscles (which power the wings), whereas other strong-flying birds have about 20 percent, and weak fliers may have only about 15 percent [Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. *The Birder's Handbook: A Field Guide to the Natural History of North American Birds*, New York: Simon & Schuster Inc., p. 323].

Ruby-throated Hummingbirds feed on insects and occasionally tree sap from woodpecker drillings. The latter feeding behavior is an example of commensal feeding, where members of one species (such as a woodpecker species) assist the foraging of another (such as a hummingbird species) but incur no significant costs and receive no benefits.

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MEET OUR COVER ARTIST

This issue of *Bird Observer* is the second consecutive issue with cover art provided by Gordon Morrison. The cover shows a detail of a limited edition print of the Ruby-throated Hummingbird. In addition to his works described in our April 1991 issue, two coloring books of the Peterson series, *A Field Guide to Tropical Rainforests Coloring Book* and *A Field Guide to Endangered Animals of North America Coloring Book* are due for release in the fall of 1991. Gordon had previously provided the art for two other coloring books, *A Field Guide to Dinosaurs Coloring Book* and *A Field Guide to Seashores Coloring Book*. For readers interested in a limited edition print of this month's cover or in other artwork, Gordon can be reached at 52 Bulfinch Street, North Attleboro, MA 02760.

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