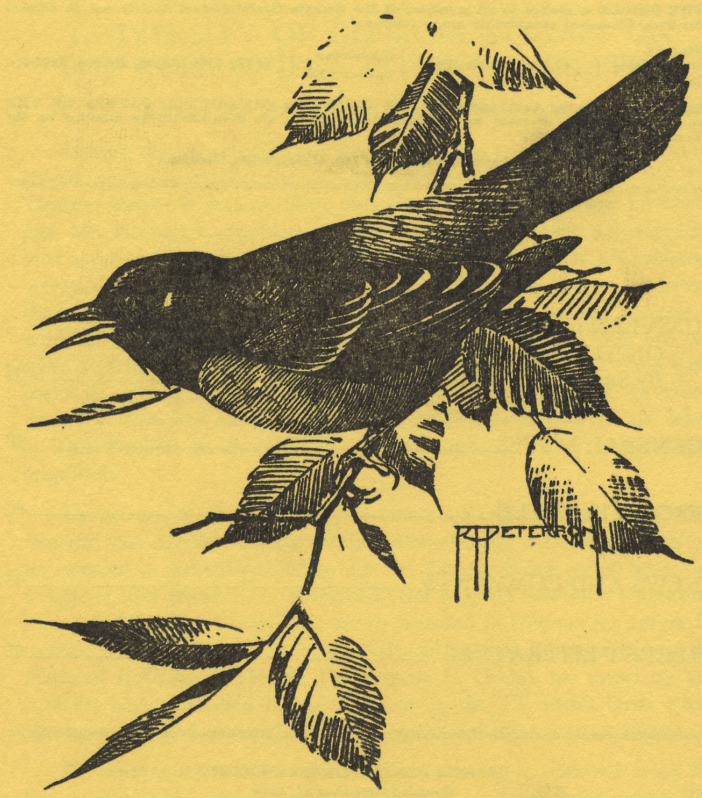
THE ORIOLE

A Quarterly Journal of Georgia Ornithology; Official Organ of the Georgia Ornithological Society



VOL. XXIX SEPTEMBER, 1964 NO. 3

THE ORIOLE

EDITOR
Milton N. Hopkins, Jr., 202 W. Roanoke Drive, Fitzgerald, Georgia

EDITORIAL COMMITTEE
J. Fred Denton, Robert A. Norris, Ivan R. Tomkins

THE ORIOLE is mailed to all members of the Georgia Ornithological Society not in arrears for dues. Classes of membership are as follows:

Student, Out-of-State, Library $2.00; Regular, $3.00; Sustaining, Garden Club $5.00; Life, $50.00; Patron, $100.00.

Inquiries concerning back issues of THE ORIOLE or OCCASIONAL PAPERS OF THE G. O. S. should be directed to the Business Manager. All dues should be remitted to the Treasurer of the Society.

Katherine Weaver, Box 769, Milledgeville, Georgia

CONTENTS

THE ORIOLE

A Quarterly Journal of Georgia Ornithology; Official Organ of the Georgia Ornithological Society

VOL. XXIX SEPTEMBER, 1964 NO. 3

UNIVERSITY OF GEORGIA STUDIES ON THE ROLE OF FAT IN BIRD MIGRATION

SHIRLEY G. MARSHALL[1] *and* VIRGINIA B. BAKER[2]

During the fall of 1955 a television tower was erected in Leon County, Florida on property that the late Mr. Henry L. Beadel gave to the Tall Timbers Research Station. Since this time, Georgia's eminent ornithologist, Mr. Herbert L. Stoddard, Sr., has systematically collected migrating bird specimens which have collided with the tower. After his pre-dawn arrival at the tower, Mr. Stoddard identifies, labels, bags, and freezes these specimens for subsequent research. Due to his intense interest in wildlife, he feels that these birds should not have died in vain but will serve a useful purpose. In addition to his personal studies, he ships specimens to various universities throughout the United States. In recent years Mr. Stoddard has been joined by Dr. Robert A. Norris and others at Tall Timbers in an effort to unravel some of the mysteries of bird migration.

By agreement, the University of Georgia has first choice of available material not needed in local studies. Periodically, the frozen birds are transported to Athens packed in dry ice. The birds are sorted according to species after which each is weighed (wet weight) and wing lengths are recorded. The sorted specimens are then stored in freezers for future fat studies. Aided by grants from the National Science Foundation and the National Institute of Health, Dr. Eugene P. Odum, his associates and students have published 12 papers based on the TV tower birds which also have provided material for two doctoral and three masters theses.

To commence fat extraction, a given species is removed from the freezer after which sex determination is made by gonadal inspection. The age of each bird is determined by removing the skin on the top of the head and examining the degree of skull ossification (bone development). The birds are then placed in aluminum pans in a vacuum oven which is

[1] Research Assistant, Department of Zoology, University of Georgia, Athens.
[2] Research Technician, Department of Zoology, University of Georgia, Athens.

Contribution From Tall Timbers Research Station, Tallahassee, Fla.

held at constant body temperature of 40 C. Drying time varies with species, for example warblers will be sufficiently dried in three to four days whereas tanagers and thrushes require six to seven days. After drying, the specimens are weighed to ascertain the dry weight and amount of water lost. Each bird is separately ground in a Waring blender containing approximately two inches of 95 percent ethyl alcohol. The pulverized bird-alcohol mixture is poured into a beaker which is placed on a water bath and brought to a boil. After boiling, the mixture is strained through a very fine mesh sieve. Petroleum ether is substituted for the alcohol and the boiling process is repeated three additional times to dissolve all the fat. Upon completion of this stage of the fat extraction process, the remaining fat-free material is returned to its aluminum pan and is placed in a drying oven for twelve hours. Each pan and its dried contents are weighed and this figure is subtracted from the original dry weight yielding the exact amount of fat removed by the petroleum ether. For some studies the fat itself is recovered for chemical analysis.

Among the important discoveries made by University of Georgia workers is that water and non-fat portions of the bird's body remain "homeostatic", or stable, despite hugh amounts of fat deposited and used prior to and during migration. In contrast, when people become obese, tissue and water are added as well as fat; subsequent reducing is slow and difficult since body tissues must also be broken down. The migratory bird, on the other hand, merely burns the "high octane" fuel (i. e. fat) that has been stored temporarily in pre-existing cell "tanks" much as an airplane consumes fuel stored in its tanks. Our studies have indicated that an increase in weight is directly proportional to fat deposited; therefore, one may estimate the amount of migratory fat in a living bird from its wet weight.

To illustrate the tremendous range of fat deposition and to demonstrate how total wet weight varies with the fat content, the blackpoll warbler provides a good example. This particular species is known to fly southward in autumn from New England directly over the Atlantic Ocean to the West Indies and on to its destination in South America, sometimes as far south as Chile. This migratory route may involve the longest non-stop overwater flight attempted by any small passerine bird. It should be mentioned that our blackpoll specimens did not come from Tall Timbers Research Station (since, of course, this species would be rare in the Southeast during the fall) but were donated by Dr. W. H. Drury of South Lincoln, Massachusetts and Dr. L. D. Caldwell, Central Michigan University, Mt. Pleasant, Michigan. The wet weights of these

specimens varied from 11 to 20 grams. When processed, the most obese of the 11 to 13 gram birds produced between one and two grams of fat whereas the 18 to 20 gram birds produced between seven and nine grams of fat; the latter were late migrants evidently ready for the long overwater flights. A number of species at Tall Timbers also show this pattern, that is, late migrants in fall averaging fatter than early migrants. The close relationship between fat and total weight is shown in Figure 1. One extremely obese bird weighing 24 grams yielded slightly over 12 grams of fat (that is, over half of its body weight was fat). Although this black-poll specimen is the most obese bird yet extracted many individual thrushes, tanagers, bobolinks and warblers killed at the tower have proved to be almost as fat.

The most common long-range migrant collected at the TV tower is the red-eyed vireo. After having processed over 300 members of this species, we can safely state that it is the most variable in fat content. Differences in fat deposition can perhaps be attributed to different routes this species uses for migration. Some individuals, presumably the fat ones, may fly directly across the Gulf of Mexico to Central and South America while others probably fly along the Florida peninsula and thence into the West Indies. The latter route would require less fat (fuel) than the former. The net weight of this species varies from 14 to 26 grams. The lighter birds have one to two grams of fat while the heavier birds have approximately 10 grams of fat.

Another long-range migrant studied is the yellow-billed cuckoo whose wet weight varies from 77 to 93 grams. Among the eighteen birds processed thus far, the lightest bird had approximately 23 grams of fat while the heaviest bird yielded more than 46 grams. These large fat deposits provided good evidence that cuckoos fly directly across the Gulf of Mexico on their way to Argentina and Uruguay.

The last bird to be considered in this article is the bobolink which has one of the longest migration routes, extending from North American breeding grounds to southern South American wintering areas. Birds with wet weights of approximately 34 grams contained 12 grams of fat while wet weights of approximately 48 grams yielded 22 grams. Laboratory experiments with a colony of bobolinks have shown that decreasing day lengths regulate fat deposition in fall; birds arriving at the Gulf coast have maximum fat deposition, and are prepared for the long flight to South America.

The following are theses and papers published which have resulted from the University of Georgia studies on fat deposition in migratory birds. These titles are arranged in chronological order.

Odum, Eugene P. and Jesse D. Perkinson, Jr. 1951. Relation of lipid metabolism to migration in birds: seasonal variation in body lipids of the migratory White-Throated Sparrow. Physiol. Zool., 24:216-230.

Odum, Eugene P. and Clyde E. Connell. 1956. Lipid levels in migrating birds. Science, 123:892-894.

Odum, Eugene P. and James C. Major. 1956. The effect of diet on photoperiod-induced lipid deposition in the White-Throated Sparrow. Condor, 58:222-228.

Connell, Clyde E., Jr., 1956. Lipid levels in migrating birds. MS Thesis. University of Georgia, Athens.

Norris, Robert A., Clyde E. Connell, and David W. Johnston. 1957. Notes on fall plumages, weights, and fat condition in the Ruby-Throated Hummingbird. Wilson Bull., 69:155-163.

Odum, Eugene P. 1958. The fat deposition picture in the White-Throated Sparrow in comparison with that in long-range migrants. Bird-Banding, 29:105-108.

Connell, Clyde E., Eugene P. Odum, and Herbert Kale. 1960. Fat-free weights of birds. The Auk, 77:1-9.

Odum, Eugene P. 1960. Premigratory Hyperphagia in Birds. Amer. J. Clinical Nutrition, 8:621-629.

Odum, Eugene P. 1960. Lipid deposition in nocturnal migrant birds. Proc. XIIth Inter. Orni. Cong. pp. 563-576.

Odum, Eugene P., Clyde E. Connell, and Herbert L. Stoddard. 1961. Flight energy and estimated flight ranges of some migratory birds. The Auk, 78:515-527.

Rogers, David T., Jr. 1963. The effect of age, sex and level of lipid deposition on major body components in the Parulidae. MS Thesis. University of Georgia, Athens.

Gifford, Cameron E. 1964. Bioenergetics of lipid deposition in the bobolink, **Dolichonyx oryzivorous**, a trans-equatorial migrant. Ph. D. Thesis. University of Georgia, Athens.

Hicks, David L. 1964. Histology of fat deposition in some migrant thrushes. MS Thesis. University of Georgia, Athens.

Walker, Alma T. 1964. Major fatty acids in migratory bird fat. Physiol. Zool., 37:57-64.

Odum, Eugene P., David T. Rogers, and David L. Hicks. 1964. Homeostasis of nonfat components of migrating birds. Science, 143:1037-1039.

Caldwell, Larry D., Eugene P. Odum and Shirley G. Marshall. 1964. Comparison of fat levels in migrating birds killed at a central Michigan and a Florida Gulf Coast television tower. Wilson Bull., 75:428-434.

Rogers, David T., Jr. and Eugene P. Odum. 1964. Effect of age, sex, and level of fat deposition on major body components in some wood warblers. The Auk, 81:505-513.

Odum, Eugene P. 1964. Adipose tissue in migratory birds. Handbook of Physiology. (In press).

Gifford, Cameron E. and Eugene P. Odum. 1964. Bioenergetics of lipid deposition in the bobolink, **Dolichonyx oryzivorus**, a trans-equatorial migrant. Condor (In press).

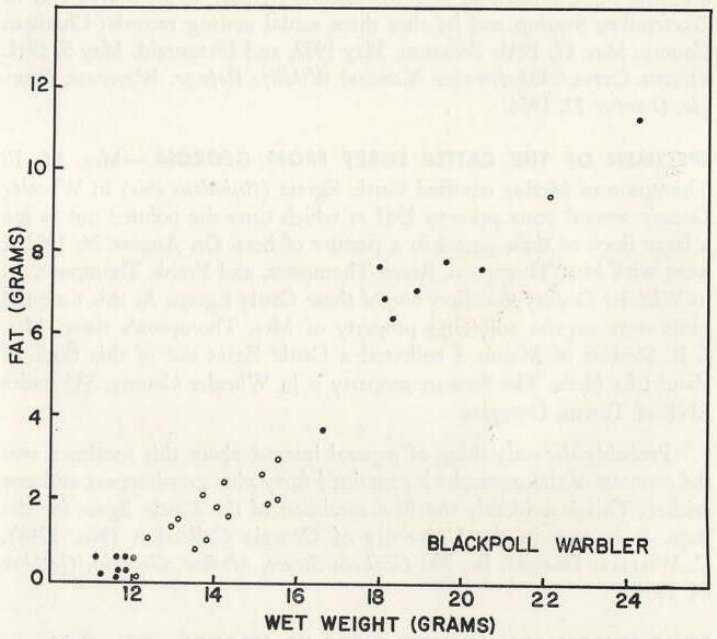


Figure 1. Total specimen (wet) weight ploted against grams of fat extracted for a series of fall migrant Black Poll Warblers. The 16 solid dots in this figure represent birds from Massachusetts; the eight fat ones were taken from the end of September to the beginning of October while the lean ones were collected in mid-September.

The circles represent birds collected in fall at a Michigan television tower; with one expection, these birds were relatively lean.

GENERAL NOTES

SPARROW HAWK NESTING ON OKEFENOKEE REFUGE.—On April 4, 1964, I flushed a Sparrow Hawk from a nesting box near where Suwannee Canal crosses Trail Ridge at Camp Cornelia in Charlton County on Okefenokee National Wildlife Refuge. The box which was about seven feet from the ground on the bole of a pine tree contained the bird's nest with five eggs. The nesting box was one of some 160 such boxes erected on the refuge primarily for wood ducks.

Burleigh (Georgia Birds, 1958) says that the Little Sparrow Hawk (*Falco sparvarius paulus*) is an uncommon resident in south Georgia and rather local in its distribution. He states that it has been reported breeding on Cumberland and Blackbeard Islands, at St. Marys and in Okefenokee Swamp and he cites three actual nesting records: Chatham County, May 14, 1934; Folkston, May 1932, and Fitzgerald, May 5, 1941. Eugene Cypert, *Okefenokee National Wildlife Refuge, Waycross, Georgia, October* 22, 1964

SPECIMEN OF THE CATTLE EGRET FROM GEORGIA.—Mrs. M. F. Thompson of McRae reported Cattle Egrets (*Bubulcus ibis*) in Wheeler County several years prior to 1963 at which time she pointed out to me a large flock of these agrets in a pasture of hers. On August 24, 1963, I went with Mrs. Thompson, Reece Thompson, and Frank Thompson, Jr. to Wheeler County to collect one of these Cattle Egrets. At this time the birds were on the adjoining property of Mrs. Thompson's sister, Mrs. J. B. Stewart of Macon. I collected a Cattle Egret out of this flock of about fifty birds. The Stewart property is in Wheeler County, 5¼ miles ENE of Towns, Georgia.

Probably the only thing of general interest about this specimen was the contents of the stomach; it contained forty plus grasshoppers and one cricket. This is evidently the first specimen of the Cattle Egret for the state. It is now in the University of Georgia Collection (No. 2248). C. William Dopson, Jr., 708 *Graham Street, McRae. Georgia, October* 24, 1964

SOME UNCOMMON SUMMER BIRDS IN ATLANTA.—The Baltimore Oriole (*Icterus galbula*) nested on the dam of the Brookhaven Country Club lake. The nest was located about 20 feet above the ground at the end of a branch in a Yellowpoplar tree. The four young orioles left the nest on June 12, 1964.

Two Song Sparrows (*Melospiza melodia*) were seen at Long Island in the Chattahoochee River on June 11, 1964. The sparrows were again seen on June 15 and 17; each time one of them was singing. There is a possibility that they are nesting, which would be the first time in Atlanta, but a nest has not been found.

A female Hooded merganser (*Lophodytes cucullatus*) was seen on the lake at Chastain Park on June 20, 1964. The bird permitted me to approach to within 30 feet before it took flight across the lake where it landed. John Skene, 305 *West Wieuca Road, Atlanta, Georgia, June* 23, 1964.

FROM THE FIELD

William S. Clark of Georgia Tech noted a Cerulean Warbler and heard the bird singing between June 2 to 13. The bird was apparently on territory. He noted an immature White Ibis at Constitution Lakes on July 1 and 4. Three different Traill's Flycatchers, apparently on territory, were heard during the spring and early summer in the Atlanta area.

Bobby Crawford of Thomasville along with John Wilson noted 350 Cattle Egrets on nesting grounds on August 2 and estimated 150 to 200 individuals in fields and pastures near Thomasville on the same day. They also noted two White Ibis on this date. On August 9 he found a pair of Common Gallinules with two downy young on a lake edge.

Mr. W. E. Freeborn sent in a report of a Flicker nesting on the ground in a cotton patch in northeast Elbert County, Georgia. He received his information from Parker B. Smith who saw the nest and identified the bird. The "nest" contained nine eggs on June 19 when Mr. Smith examined it.

Fr. Martin of the Monastery of The Holy Ghost, Conyers, Georgia noted a Bonaparte's Gull on April 6, the Swainson's Warbler from April 24 to 29, the Barn Owl on July 17 and 25 and 3 Common Terns on September 9, 1964.

William Dopson reports that Pine Siskins were common on South Campus of the Univ. of Georgia in Athens during the first ten days in April. Near McRae he found 19 Black Terns on August 23, 51 on August 24, 12 on August 29, and 4 on September 18. He had an unusually early date for the Mallard when two birds were found on September 18. A Louisiana Heron was also noted on September 18.

NEWS AND COMMENTS

THE 51ST. MEETING OF THE GEORGIA ORNITHOLOGICAL SOCIETY—The 51st meeting of the Georgia Ornithological Society was held at Thomasville, Georgia, on October 9, 10, and 11, 1964.

On Friday evening Mildred Sue McKewen and her committee registered members and welcomed them to Thomasville. Ed Komarek gave a briefing on the Saturday field trips. Coffee and a social hour followed.

Saturday morning field trips were to Tall Timbers. This is a non-profit Research Foundation. Mr. H. L. Stoddard is president, Mr. Roy Komarek is vice-president, and Mr. Ed Komarek is secretary and treasurer. Dr. Robert Norris is ornithologist and Mrs. Betty Komarek works in Science Education. Mr. Lucien Harris will soon join the staff as entomologist.

G.O.S. members were divided into three groups, Roy Komarek took one group to Tall Timbers for bird watching. Leon Neel, forester, and Ed Komarek each took a group through Birdsong plantation and to visit the bird window at the Komarek home. Mrs. Betty Komarek and Miss Komarek met these groups at the house and told them about the bird window.

Then the three groups reconvened at Tall Timbers for bird watching. When all were assembled Ed Komarek explained the ecology of the fire plots.

Then the entire group went to the W.C.T.V. television tower where Mr. Stoddard discussed the research project on birds killed at the tower.

From there we went to Tall Timbers Headquarters for a chicken barbeque lunch prepared by Nick Faller, archeologist, and Thomas Quick, office man of the Tall Timbers staff.

In the afternoon, Bob Wise led one group to Wakulla Springs where boat trips had been arranged. Red Gidden and John Davis of the U. S. Fish and Wildlife Service led one group to visit the St. Marks refuge.

The annual G.O.S. dinner was held at Hotel Scott at 7:30, and after dinner, Mildred Sue McKewen presented bird slides, many of them taken at the bird window at Birdsong.

On Sunday morning the group went to Greenwood Plantation. This comprises 18,000 acres. Experiments have been conducted here on hybrid corn, but the area visited by the G.O.S. group was a magnificent virgin

long-leaf pine forest maintained as an experimental forest and for quail management. Mr. Ed Komarek gave the group a fine talk on the ecology of the forest, and then members had a chance to botanize and bird, and especially to see the red-cockaded woodpeckers.

At 11 o'clock, G.O.S. president Jim Jenkins held the count at the plantation office. Birds seen in Florida were included in the listing, with such rarities as the bald eagle and limpkin at Wakulla Springs and the scissor-tailed flycatcher at St. Marks. A total of 112 birds were listed. After the count a discussion was held on the location of the spring meeting. Suggestions were Waycross, Calloway Gardens, the Macon-Butler area, and Jekyl Island. Members are asked to please send a card to Jim Jenkins stating their preference. The fine talks by Mr. Stoddard and Mr. Komarek took the place of the usual paper session, and because of the educational and interesting demands on time the annual business meeting and reports of regional vice-presidents were omitted. Everyone agreed that this Thomasville meeting was very outstanding.

SPECIAL NOTE—Anyone wishing to receive publications on the field work and experiments being conducted at Tall Timbers and Greenwood, may be placed on the mailing list by writing to Mr. Ed Komarek, Tall Timbers Research Foundation, R. 1, Box 110, Tallahasee, Florida.

Your secretary is indebted to Mr. Ed Komarek for the notes on this meeting.

Respectfully submitted,

Mrs. E. O. Mellinger, Secretary

RECENT LITERATURE

THE GREAT AUK—a novel by Allan W. Eckert, 1963, Little, Brown and Company, Boston and Toronto.

This is a case study—absorbing in its detail—of the manner in which one bird species became extinct. The last two living specimens of the great auk and their single egg were destroyed by three men on June 3, 1844, on Eldey Island off the coast of Iceland.

Using the form of the novel, the author gives a complete life history of this black and white penguin-like bird, which stood 30 inches or more tall. It was without flight powers, but it could and did swim three thousand miles in migration from northern latitudes to North and South Carolina. It liked to feed underwater, and was quite capable of staying submerged as long as ten minutes.

There is no anthropomorphism, happily. The hero of the novel is larger than his fellows, and he leads the flock, but the author does not give him a name, nor endow him with any human qualities such as the ability to talk.

Of greatest interest to ornithologists (although admittedly imaginative in part) is the account of how the extinction of a species takes place. With the great auk it was a series of disasters: skin and flesh hunters clubbed to death as many as two thousand birds a day. Whales ate a few. One fledgling fell into a rock crevice and died. Another was caught on a fish-hook. Arctic storms accounted for more, and a Carolina hurricane became a major tragedy. Scientists collected a few because they had such poor skins in their museum. When the bird became scarce, collectors paid hunters for a few more dead birds. And all the time, auks—which mate for life—laid only one egg a year. The last pair were clubbed to death. Superb swimmers, they could not fly and their progress on land was a travesty of walking. Louis C. Fink

LIFE HISTORIES OF NORTH AMERICAN MARSH BIRDS. 1963 by Arthur Cleveland Bent, Dover Publications, 180 Varick Street, New York 14, New York, 392 pp., 98 plates, $2.75.

The present work is an unabridged republication of National Museum Bulletin No. 135 first published in 1926. It contains detailed life history information on fifty-three species of North American marsh birds and pictures many of these species in its 179 black and white photographs.

Descriptions of the former status of such birds as the American Flamingo, Great White Heron, Roseate Spoonbill, and the Limpkin will provide many hours of pleasant and profitable reading.

LIFE HISTORIES OF NORTH AMERICAN DIVING BIRDS., 1963 by Arthur Cleveland Bent, Dover Publications, 180 Varick Street, New York 14, New York, 239 pp., 80 plates, $2.75.

This volume is an unabridged republication of the National Museum Bulletin No. 107 first published in 1919. It contains life history accounts of thirty six species of diving birds and is illustrated by 92 photographs.

The account of the Auk and its passing is probably one of the most interesting of the diving birds' stories contained in this volume and is another chapter in the sad commentary of the destructiveness of man.

As in previous volumes Dover Publications has done a creditable job in reproducing this work at such a reasonable price. Milton Hopkins, Jr.

A STATEMENT OF POLICY

Application for membership may be made to the Treasurer. *THE ORIOLE* is sent without charge to all classes of members not in arrears for dues. Send changes of address, claims for undelivered or defective copies and requests for information relative to advertising, subscriptions and back numbers to the business manager.

All articles and notes submitted for publication and all books and publications intended for review should be sent to the editor.

Original papers in the field of ornithology are published in *THE ORIOLE*. Papers are judged on their contribution of original data, ideas, or interpretations and on their conciseness, scientific accuracy, and clarity.

COPY—Type manuscripts *double spaced* throughout. Underscore scientific names only. Number pages in the upper right hand corner. Arrange contents in this sequence: title page, text, reference, tables, figure legends, and figures. Type your complete address and date of submitting manuscript.

STYLE—The guide for preparation of copy is the STYLE MANUAL FOR BIOLOGICAL JOURNALS available from American Institute of Biological Sciences, 2000 P Street NW, Washington 6, D.C., $3.00. A copy of this manual is held by the editor for use by contributing authors. A postal card request and return postage by you is required for its use.

TITLE—The title should be concise, descriptive, and not more than 10 words in length. Avoid use of scientific names in titles if possible.

FOOTNOTES—Avoid footnotes by incorporating such material in the text.

NOMENCLATURE—Vernacular names are not to be capitalized in text. They are to be accompanied by appropriate scientific names the first time each species is mentioned. Show reference for long lists of scientific names (i.e., A.O.U. Checklist, 5th ed., 1957).

REFERENCES—When there are fewer than 3 references insert them in parentheses where needed in the text by author, journal, volume, pagination, and year of publication. Three or more references are grouped alphabetically by authors last names under "literature cited".

TABLES—Prepare tables in keeping with size of *THE ORIOLE*. A good table should be understandable without reference to the text.

ILLUSTRATIONS—Illustrations should be suitable for photographic reproduction without retouching. Colored plates will be charged to the author.

REPRINTS—Request for reprints must be sent with original manuscript and are to be paid for by the author.

The *author* is responsible for putting his manuscript in final form for production. Authors should consult colleagues and specialists for review of papers before submission, and check all literature available to him that might have a bearing on his paper.