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FOOD OF THE LONG-BILLED MARSH WREN, *TELMATODYTES PALUSTRIS GRISEUS*, IN THE SALT MARSHES OF SAPELO ISLAND, GEORGIA.¹

By

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During a study of the ecology and bioenergetics of the Long-billed Marsh Wren, *Telmatodytes palustris griseus* (Kale, 1965) in the salt marshes of Sapelo Island, Georgia, stomachs of 195 adult, immature, and nestling wrens were analysed for food items. Percent frequency of occurrence (F) and percent total volume (V) of the major groups of food items found in wrens collected throughout the year are presented in Figure 1 (from Kale, *op. cit.*). A comparison of these major groups of food items eaten during the breeding season, April through August (113 stomachs), with those eaten in the winter season, September through March (82 stomachs), is discussed fully in the work cited above.

A relatively low number of species of insects and spiders live in the salt marsh, with a few species comprising the majority of the individuals present. Thus, it was possible to identify food items in many cases from legs, heads, wings, elytra, or other fragments still relatively intact in the gizzard (stomach). The majority of the insects, spiders, and molluscs appearing in this annotated list have been identified by comparison with a reference collection of specimens determined by various specialists at the Smithsonian Institution and the American Museum of Natural History. Several of the reference specimens were identified only to family

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or genus for various reasons (lack of specialist, insufficient or poor specimens, or new, undescribed material).

It is a pleasure to acknowledge the assistance of Willis J. Gertsch and W. Ivie of the American Museum of Natural History for determination of spiders; W. H. Anderson, Chief of the Insect Identification and Parasite Introduction Research Branch, USDA, who arranged for determination of insects; Horace O. Lund, Department of Entomology, and Grace J. Thomas, Department of Zoology, both of the University of Georgia, for insect larvae and mollusc determinations, respectively. I am deeply indebted to Eugene P. Odum for his direction and advice during the course of this study, and many thanks go to my teachers, colleagues, and friends at the University of Georgia and throughout the state. Finally, I am grateful to Andrew J. Meyerriecks for a critical reading of the manuscript, and to my wife Charlotte, who assisted me in innumerable ways and provided much patience and encouragement throughout the study.

Following is an annotated list of the food found in the 195 stomachs. After each item listed will appear in parentheses the number of stomachs in which the item occurred in the breeding or summer (S) period, April through August, and in the winter (W) period, September through March. Mean percent frequency of occurrence will be listed after the stomach number and will be separated from this figure by a colon (:) for each order, important family and, in some cases, individual species.

Hymenoptera (S-86:76%; W-71:87%)

Hymenoptera were found in the majority of stomachs both in winter and summer and constitute the most frequently taken insects, except in the winter months when fulgorids exceeded the hymenoptera in frequency and volume.

Formicidae (S-50:44%; W-39:48%)

Crematogaster clara Mayr (S-38, W-38)

The common marsh ant (size 3-4-mm) was an important food item throughout the year. It lives in small colonies inside the standing stalks of dead *Spartina*. They have been observed eating wren eggs that were broken by rice rats, and feeding on carcasses of adult wrens killed by rats. One ant colony was found living inside a narrow cane pole which had been placed in the marsh several months previously to mark a wren territory.

Camponotus (Collobopsis) sp. prob. *pylartes fraxinicola* M. R. Sm. (S-15, W-1)

This ant (size 3-5 mm) is slightly larger and darker in color than *Crematogaster clara* and is relatively uncommon in the marsh.

Ichneumonidae (S-7:6%; W-3:4%)

Several species of ichneumonids have been observed in wren stomachs, but most of these are unidentifiable from the fragments.

Schizopyga pulchra Wly. (S-3, W-2). A small parasitic wasp (6-8 mm) with head, thorax and tip of abdomen colored black with rest of abdomen and legs a bright orange. Rare.

Pimplinae (possibly an undescribed genus) (S-2, W-0)

A small, (6-7 mm) extremely rare wasp with head and last two apical segments black, rest of body reddish.

Braconidae (S-29:26%; W-13:16%)

Two species comprised most of the determinable specimens of this family occurring in wren stomachs.

Chelonus sp. (undescribed) (S-15, W-4). A black wasp (size 7-8 mm) with a strongly chitinous abdomen that resembles beetle elytra. Fairly common in marsh.

Heterospilus sp. (S-14, W-12). A light orange wasp that appears to vary considerably in size (4-8 mm). Identified in stomachs chiefly by numerous orange heads with grey eyes.

Chalcidae (S-23:20%; W-6:7%)

Two species, which are very similar in appearance, made up the majority of chalcids eaten.

Eurytoma sp. (S-11, W-3)

Tenuipetiolus sp. (S-7, W-1)

Both of the above are small (5 mm) black wasps which appear to lack the distinct enlargement of the hind femora typical of most chalcids.

Other Hymenoptera (S-46:41%; W-49:60%)

Numerous wasp fragments were undetermined as to species and the majority of this category is comprised of these. Several identified wasps appeared in stomachs and are listed below.

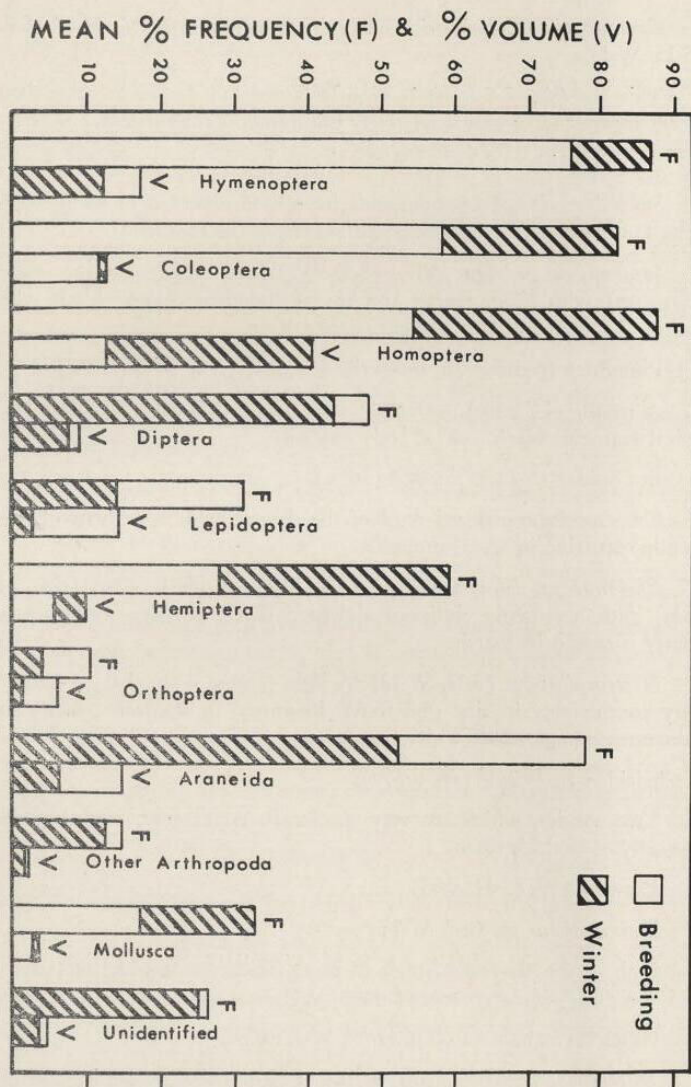


Fig. 1. Mean percent frequency of occurrence and percent of the total volume of food items in 113 marsh wren stomachs during the breeding season (April through August) and 82 stomachs during the winter season (September through March), Sapelo Island, Georgia. (From Kale, 1965).

Eupelmidae (S-2, W-1). A small (2-3 mm) undetermined species with black and white banded wings, yellow tibiae, and two dorsal yellow patches on anterior portion of thorax.

Scelionidae. Numerous undetermined heads were thought to be scelionids. This group represents the smallest items eaten by wrens (1 mm).

Telenomus poisi Ashm. (S-0, W-2). A tiny (1-2 mm) black wasp with clear wings and bright yellow legs which is very common in the salt marsh, and probably comprised the majority of the microhymenoptera found in wren stomachs.

Pompilidae (Spider wasps). Represented by one specimen taken in summer.

Siricidae (Horntails). One specimen found in a summer stomach.

Coleoptera (S-66:58% ; W-67:82%)

Insects in this order occur more frequently in winter stomachs (82%) than in summer (58%) although in terms of volume they are of similar importance (12%-13%).

Anthribidae—probably *Ormiscus* sp. (S-7:6% ; W-1:1%).

This primitive brown weevil (size 3 mm) is relatively uncommon.

Curculionidae (S-27:24% ; W-42:51%)

Two species of weevils have been found in wren stomachs, one single specimen represented only by fragments could not be specifically identified. The other was tentatively identified as *Lissorhopturus* sp., a gray-black weevil 3-4 mm in length. It is relatively common in the marsh and appeared frequently in wren stomachs.

Cleridae (S-34:30% ; W-8:10%)

The clerids are represented in the salt marsh by a single species—*Isohydnocera tabida* Lec.—a long-necked black beetle with yellow legs (size 5-6 mm), and fairly widely distributed in the marsh and often found in wren stomachs.

Melyridae (S-9:8% ; W-3:4%)

This family is represented by a single species, the bright metallic blue (green when viewed under water) *Collops* sp., probably *subtropicus*, Fall. It was not often found in wren stomachs, perhaps because it is a

bit stouter (2.5 x 6 mm) than most insects eaten by wrens; however, several larvae of this family were found in stomachs.

Mordellidae (S-17:15%; W-11:13%)

This family is represented by two species which together constitute the most common beetles in the salt marsh.

Mordellistena nigricans (Melsheimer) (S-15, W-9). This small (4 mm) shiny mordellid appeared much more frequently in stomachs than did the following species.

Mordellistena splendens Smith (S-2, W-5). This light to dark brown mordellid is twice the size of *nigricans* (6-8 mm), and in some parts of the marsh may be found in greater numbers.

Miscellaneous Coleoptera (S-6:5%; W-16:20%)

The salt marsh coleoptera are characterized by relatively few species, and only rarely was it impossible to identify their remains in wren stomachs.

Orthoperidae

Orthoperis spp. (S-0; W-16). Very small (up to 1 mm) round, brown or black beetles that live in the leaf crevices of *Spartina*. There are probably several species (possibly undescribed) of this group present in the marsh throughout the year.

Languridae (Erotylidae-Langurinae) (S-2, W-0)

This distinctive group is represented by two species in the genus *Languria*, probably the largest beetles (8-12 mm) inhabiting the salt marsh. This group was first encountered in wren stomachs before any specimens were taken in the marsh with the use of sweep nets.

Coleoptera larvae (S-14:12%; W-4:5%)

Most of the beetle larvae were unidentifiable; however, the most common beetle larvae eaten by wrens appeared to be the Melyridae. Larvae of the Staphylinidae were encountered twice. One intact larva of the family Murmidae was found in a stomach taken in June, 1959, and identified by Dr. Horace Lund as *Murmidi* sp., which, as far as we can tell, is the first specimen collected in the state.

Diptera (S-54:48%; W-36:44%)

The diptera are second to the hymenoptera in numbers of species present in the salt marsh, but far surpass the wasps in numbers of in-

dividuals. However, being strong, rapid fliers, they are not captured by wrens in the same numbers as are the hymenoptera, thus in terms of frequency and percent volume, the flies are of lesser importance as food items.

Otitidae (S-18:16%; W-8:10%)

The two species of this family present in the marsh are often the most conspicuous, if not the most numerous. Adults of both species vary considerably in size, presumably the result of variation in nutrition during the larval stage.

Chaetopsis aenea (Weld.) (S-8, W-1). The banded otitid (black and white bands on wings) is generally the larger (4-10 mm) of the two species and usually is present in fewer numbers.

Chaetopsis apicalis (Johns) (S-11, W-6). This otitid is characterized by plain wings with a dark spot or stripe at the distal ends and a metallic steel-blue thorax. Considerably more size variation (2-6 mm) occurs in this species than occurs in *aenea*. It is by far the most numerous of the two species.

Ephydriidae (S-9:8%; W-18:22%)

This family is the largest family of the marsh diptera and is represented by at least six or more species. Larvae of this family are the most frequently eaten of the diptera larvae.

Parydra imitans (Lw) (S-3, W-8). This small (4 mm) black fly is relatively common, but only occasionally appeared in wren stomachs.

Dimecoenia spinosa (Lw) (S-3, W-0). A dull green, or gray fly with brownish wings, about twice the size (7 mm) of *Parydra*, and rarely eaten by wrens.

Notiphila bispinosa Cresson. (S-2, W-1). A small (5 mm) grey fly with brown and gray striped abdomen, fairly abundant in the marsh, but seldom appeared in stomachs.

Psilopa compta (Mq) and *Plagiopsis aeneo-nigra* (Lw) (S-2, W-2). These two species are so similar that it was not possible to specifically identify the fragments in stomachs. Both species are about 2-3 mm long with shiny metallic purple thorax and very clear white wings.

Dolichopodidae (S-11:10%; W-3:4%)

Several undescribed species of these small (3 mm) fragile flies with very long yellow legs are present in the marsh in relatively high numbers,

nevertheless, they seldom occur, in identifiable form at least, in wren stomachs. One of the less common forms has a shiny metallic green thorax, fragments of which have been noted in stomachs.

Other Diptera (S-25:22%; W-13:16%)

Since the diptera are softer bodied, very few fragments remain in the gizzard in an identifiable condition for long; as a result more diptera were undetermined than any other group.

Anthomyiidae. *Hylemya* sp.

Chamaemyiidae. *Leucopis* sp.

These two families are grouped because of the similarities between the two relatively uncommon species which represent them. They have been found in three stomachs, one of which contained a larval anthomyid.

Chloropidae

Oscinella sp. The tiny flies (1.0 mm) of this genus are the most common diptera in the marsh during the warm months, yet they have not been seen in stomachs, either because they fly too rapidly to be caught by wrens, or are so fragile that they are quickly crushed in the gizzard. One of the species, *Oscinella insularis* (Mall), probably comprises the majority of those present in the marsh.

Elachiptera sp. (S-0, W-1). This very distinctive, small (3 mm) brown, narrow-winged fly appears quite commonly in marsh sweeps, but was found in only one wren stomach.

Sarcophagidae (S-2, W-0)

Sarcophaga sp. The size (7-10 x 3-4 mm) of this group is a bit larger than the size of items usually eaten by adults, but within the size range fed to nestlings.

Tabanidae

Tabanus nigrovittatus Macq. (S-6, W-0). This large (10-15 mm) green-headed fly is one of the largest items found in adult stomachs. It was more often found in stomachs of nestlings, however.

Mycetophyllidae (S-4, W-0)

The fungus gnats were found in only 4 stomachs, all during the breeding season, and three of these were collected at the same time and place. Thus, this dipteran appears to be a relatively rare food item.

Homoptera (S-61:54%; W-72:88%)

The homoptera were represented in wren stomachs almost solely by the fulgorids (Fulgoridae): *Prokelisia marginata* Van Duzee (S-53:47%; W-71:87%), the most numerous insect in the marsh, especially during the cooler months, and *Liburnia detecta* Van Duzee, a less common fulgorid with vestigial wings. Both are about 3-4 mm in size. One other homopteran, an undetermined Cicadellidae was found in a summer stomach.

Hemiptera (S-32:28%; W-49:60%)

The hemiptera are represented in the marsh by the six species listed below; only one of these, *Ischnodemus badius*, is utilized by the wren to any extent.

Pentatomidae

Rhytidolomia senilis (Say). The marsh stink bug, which reaches sizes of 20 x 8 mm has not been found in wren stomachs.

Miridae

Lygus apicalis Fieber. (Size 5 mm.) Possibly eaten by wrens, although not positively identified in stomachs. Relatively uncommon in the marsh.

Tytthus sp. (Size 2-3 mm.) More common in the marsh than the preceding species, found in one wren stomach.

Nabidae

Nabis capsiformis Cem. (Size 10 mm). Found in only two winter stomachs. This predaceous bug is rather uncommon in the marsh.

Lygaeidae

Trigonotylus sp. (Probably two species) (S-1, W-0). This is a succulent-looking green, or greenish-yellow plant bug (size 8 mm) which is rarely eaten by marsh wrens, even though it is quite common during the warmer months and is a relatively slow flier. It may possibly emit a chemical distasteful to the wren.

Ischnodemus badius Van Dyke. Although this lygaeid does emit a strong odor when handled it appears in 60% of the winter stomachs and 28% of the summer wrens. It is a black, narrow, flat-bodied bug with short or vestigial wings and a beetle-like appearance (size 8-10 mm), and lives in the folds and bases of leaves of *Spartina*. It appears to be relatively long-lived since nymphs of all sizes and the adults are seen

throughout the spring and summer, while only adults and penultimate nymphs are noticed in winter. The nymphs are a bright strawberry red or pink color and apparently are not eaten by wrens since none were found in stomachs.

Orthoptera (S-11:10%; W-3:4%)

Tettigoniidae. *Orchelimum fidicinum* R&H. (S-11, W-2). Nymphs and adults (5-20 mm) are rarely eaten by adult wrens, but are a common part of the diet of nestlings and fledglings. Adults do commonly eat the eggs, which have been found in winter stomachs.

Gryllidae

One stomach in January contained fragments of six undetermined crickets.

Lepidoptera (S-35:31%; W-12:15%)

The lepidoptera occur primarily in wren stomachs as eggs or larvae, especially in winter, while a few unidentified adult moths appeared in stomachs of adults and nestlings in summer. Larvae were of the families: Cranbidae (*Chilo* sp.)—one stomach; Phalaenidae—2 stomachs; Phymatidae—2 stomachs; Noctuidae—1 stomach; Geometridae—2 stomachs; and Pyralidae—2 stomachs. The only adults and eggs identified were Phalaenids. Nestlings are commonly fed lepidoptera larvae which ranged in size from 10-30 mm.

Araneida (S-88:78%; W-43:52%)

Spiders occurred in 78% of the summer stomachs and 52% of the winter stomachs. They were the most frequently occurring food items in the summer stomachs.

Dictynidae

Dictyna altamira Gertsch & Davis (= *savanna* Chamberlain & Ivie). (S-15:13%; W-2:2%). This spider and the Linyphiid *Grammonota georgiana*, which together comprised over 50% of the spiders eaten, are the smallest spiders in the marsh, ranging from 1-3 mm in size. They are very abundant in the folds, crevices and bases of leaves and in hollows of broken stems of dead *Spartina*. *Dictyna* may easily be distinguished from the more abundant *Grammonota* by the thick black claw tufts on the tarsi, denser covering of spines on legs, a distinct cribellum in front of the spinnerets, a calamistrum on metatarsus IV, and all eyes white, except the two anterior medians which are dark.

Clubionidae

Clubiona littoralis Banks (S-16:14%; W-3:4%). This medium-sized (5-9 mm) light tan spider is easily identified in wren stomachs by the enlarged light-colored boss on the side of each red-brown chelicera and by the two parallel rows of the anterior and posterior eyes.

Salticidae

Marpissa sp. (S-26:23%; W-5:6%)

Marpissa pikei (Peckham), A small (5-10 mm) salticid with a long, narrow cephalo-thorax, and striped abdomen.

Marpissa bina (Hentz). A somewhat larger (8-12 mm) jumping spider with short stout cephalo-thorax and spotted abdomen. The above two species are commonly found in streamside and levee marsh and comprise the majority of the salticids eaten.

Hyctia bina (Hentz). A spider very similar to *Marpissa bina*, but somewhat larger and stouter (12-15 mm) with a white striped abdomen. This species commonly fed to young wrens.

Hentzia palmarum (Hentz). Not positively identified from wren stomachs, but fairly common in the marsh in summer.

Linyphiidae

Grammonota georgiana Chamberlain & Ivie (= *trivittata* of Barnes', 1960, list) (S-35:31%; W-28:34%). This is the most abundant of the salt marsh spiders, and appears most frequently in wren stomachs. The legs are long and thin, covered with fine spines, but not as densely as *Dictyna*, lack claw tufts on tarsi, and all eight eyes are dark.

Other spiders (S-33:29%; W-19:23%)

Gnaphosidae

Poecilochroa (Sergiolus) sp. nearest *unimaculata* Emerton, probably undescribed (according to Gertsch, in *litt.*, 1963). (Size 5-10 mm). Only one specimen of this species was found in a wren stomach (in August), although it is not uncommon in the salt marsh.

Lycosidae (S-3, W-2)

Many adult spiders of this group are larger (10-15 mm) than food items usually eaten by adult wrens, but they are commonly fed to nestlings and occasionally found in adult stomachs. The following have been identified from stomachs:

Lycosa sp. (2 stomachs)

Pardosa sp. (1 stomach)

Schizocosa sp. (2 stomachs)

Araneidae

Singa keyserlingi McCook. (Size 5-8 mm). This is a rather common marsh araneid, with a conspicuously white-striped abdomen, that was identified in only one wren stomach. It usually remains concealed in curled leaves, or hollow stalks, and "plays dead" when disturbed.

Eustala triflex Walckenaer (= *anastera* of Barnes' 1960 list). (Size 7-10 x 4-5 mm). This spider has not been found in wren stomachs; however, it is probably the most conspicuous spider in the marsh, building orb webs up to a foot in diameter between the stems of *Spartina*. The fact that most of the webs appear in the shorter grass areas behind levees and in the high marsh where wrens do not generally feed is probably why it has not been found in wren stomachs.

Tetragnathidae (S-2, W-2)

Tetragnatha caudata Emerton

Tetragnatha vermiformis Emerton

Fragments of immature specimens of the above genus (Size 10-15 mm) have occasionally been found in stomachs, although it is possible that they were fragments from immatures of another genus (*Thanatidius* sp) in the family Pisauridae (Size 5-8 mm).

Thomisidae

Tmarus angulatus (Walckenaer) (Size 5mm). One intact immature specimen of this species was found in a winter (22 March) stomach, and to date, is the only record of this species from the marsh. Another Thomisid, *Philodromus peninsulanus* (Gertsch), is occasionally collected in sweep nets, but none has been found in wren stomachs.

Other Arthropods (S-17:15%; W-10:12%)

Crabs (S-10:9%; W-7:8%). Crab fragments found in wren stomachs were from *Uca* sp. (most likely *U. pugnax*, the mud fiddler) or *Sesarma cinereum*, one of the square-backed crabs seen crawling in the leaves of *Spartina*. The size of crabs eaten rarely exceeded 5-7 mm.

Amphipods (S-6:5%; W-2:2%). No attempt was made to determine the amphipod species since only fragments were found in stomachs. There

are several species that live in damp grass and decaying vegetation in the marsh.

Barnacles (S-4:4%; W-1:1%). Fragments of barnacle tergites were found in only five stomachs and probably belonged to the species *Chthamalus fragilis* Darwin which settles on *Spartina* and other structures located near the high tide level during the summer months.

Pseudoscorpions (S-4:4%; W-0). This arachnid is a relatively common inhabitant of *Spartina*, but was found in few stomachs.

Molluscs (S-20:18%; W-27:33%)

More molluscs were eaten in winter than in summer. Several of these were in a condition indicating that the shell may have been empty prior to ingestion. Salt-marsh wrens probably use molluscs as a source of grit in addition to the hard chitinous parts of insect remains (heads, elytra, legs, etc.). Molluscs eaten were of three species of gastropods found in the marsh.

Littorina irrorata (Say). (S-10:9%; W-13:16%). The Marsh Periwinkle is the most prominent invertebrate of the higher portions of the intertidal *Spartina* marsh. However, it is rarely found in the tall grass which grows in wren habitats along the creek edges. Only very young snails may be found here and these small-sized (1-3 mm) individuals appear in wren stomachs.

Melampus bidentatus Say (S-10:9%; W-17:21%). This small cone-shaped, brown and tan striped pulmonate is much less common than *Littorina*, however, it may be found locally abundant throughout the marsh. Snails 1-3 mm in length have been observed in stomachs.

Littoridinops sp. (S-3:3%; W-12:15%). This tiny pearl-white snail rarely grows larger than 3 mm and is relatively rare. More specimens have been taken from wren stomachs than have been collected directly from marsh grass or mud.

Undetermined insect material (S-30:27%; W-20:24%)

This category includes fragments of adults, larvae, and eggs that could not be classified.

Total insect eggs (S-11:10%; W-7:8%)

The majority of the insect eggs were Lepidopteran or Orthopteran (*Orchelimum fidicinum*).

DISCUSSION

Even though the trophic level of some salt-marsh insects is presently unknown it may be concluded from the foregoing list that *T. p. griseus* feeds upon animals at three different trophic levels—herbivores (21 species), predators (30 species), and detritus feeders (16 species). Detritus feeders are animals that feed on particulate organic material, but I am also including in this category those animals that feed on dead, decaying marsh grass. Five orders—Hymenoptera, Coleoptera, Homoptera, Diptera, and Araneida (spiders)—occur in 50% or more of the breeding season stomachs (Fig. 1), while in the winter season these same groups, plus the Hemiptera, dominate. Fewer spiders and flies occur in winter than in summer stomachs.

Beal (1907) analyzed 53 stomachs of several races of Long-billed Marsh Wrens in California and found that Hemiptera (29%), Lepidoptera (17%), and Coleoptera (16%) comprised the major food items. The majority of these were herbivorous feeders. Ants and wasps (8%), Diptera, Orthoptera, and Odonata (12%), and spiders (5%) were also recorded.

Since there are no aquatic insects or aquatic insect larvae in the salt-water marshes, *T. p. griseus* feeds only upon terrestrial insects. In contrast to this, Welter (1935) found that insects which are aquatic for a part or all of their existence constituted a large portion of the diet of *T. p. dissaeptus* in fresh water marshes of New York. He reported that Coleoptera, chiefly Carabidae and Dytiscidae, and Diptera, chiefly Tipulidae, were most frequently found in stomachs.

In terms of percent of the total volume of food estimated in the analyzed stomachs of *T. p. griseus* (Kale, 1965), herbivores constituted approximately 52% of the diet during the breeding season, and 62% in winter. Predators comprised 33% and 23%, respectively, and detritus feeders approximately 12% during both seasons. Since the majority of the primary production of the salt marshes becomes organic detritus (Odum, 1961) the marsh wren actually plays a very minor role in the detritus food chain of the salt marsh ecosystem. It is primarily a secondary and tertiary consumer within the grazing food chain and thus may be a major factor in the control of the secondary consumers among the arthropods.

SUMMARY

1. An annotated list of food items found in 195 stomachs of the Long-billed Marsh Wren, *Telmatodytes palustris griseus*, in the salt marshes of Sapelo Island, Georgia, is presented with mean percent frequency of occurrence during the breeding and winter seasons.

2. Araneida (spiders), Hymenoptera, Coleoptera, and Diptera occurred most frequently in stomachs during the summer (breeding) season, Homoptera, Hymenoptera (chiefly ants), Coleoptera, and Hemiptera were most frequently eaten during the winter season.

3. *T. p. griseus* is primarily a secondary and tertiary consumer within the grazing food chain of the salt marsh ecosystem.

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GENERAL NOTES

THE RING-BILLED GULL "SKIMMING" ON FOOT.—The skimming method of feeding of *Ryncops nigra* is well known; a specialized performance, unique, and limited to the one family of birds. While seeking food in that fashion, in flight, there is a particular use made of the kinetic function of the skull, changing the gape through the elastic hinge of the frontal bones. This has been briefly mentioned (Tomkins, 1951, Auk, 58:236-239) and a much better account given by Zusi (Structural Adaptations of the Head and Neck in the Black Skimmer, 1962, Publ. Nutt. Club, No. 3, pp. 101).

After long acquaintance with the Ring-billed Gull (*Larus delawarensis*) it came as a surprise to see a few of them utilizing the same skimmer-like method of obtaining food, but on foot instead of in flight, while pursuing small fish at the edge of the surf. This happened on Tybe Island, Ga., on several days in July, 1964, at a time when the shallow water teemed with small fishes. One or more of the gulls would stretch the neck and open the mandibles much as the skimmer does, then run rapidly in the shallow water. The head and neck positions were clearly visible to me, although sometimes a small swell would submerge the head. Small fish were sometimes caught, and it was clearly an attempt to obtain food. The head was not swung from side to side, and from the position of the eyes, it seems unlikely that vision had any part in closing the mandibular trap on the fish.

Finding hints of such specialized behavior in species of birds from two different families (Laridae and Rynchopidae) brings thoughts of ancient relationships that cannot now be proved. IVAN R. TOMPKINS, 1231 East 50th St., Savannah, Ga., July 21, 1964

DOUBLE-CRESTED CORMORANTS IN TELFAIR COUNTY.—On April 19, 1964, I observed twenty-three Double-crested Cormorants (*Phalacrocorax auritus*) in Telfair County about 4 miles ENE of Jacksonville, Georgia. The cormorants, flying in V-formation, came from the south, circled low over a small marsh area, and then continued flying in a northerly direction. The only other record I have of the Double-crested Cormorant in Telfair County is a single bird seen at Little Ocmulgee State Park on April 7, 1962. C. WILLIAM DOPSON, JR., 708 Graham Street, McRae, Georgia, October 24, 1964

POMARINE JAEGER AT SAPELO ISLAND.—A Pomarine Jaeger (*Stercorarius pomarinus*) was observed by Herman W. Coolidge and the writer

on South End Beach, Sapelo Island, McIntosh County, Georgia on January 2, 1965. The Jaeger came into view from adjoining Doboy Sound and was pursuing a Caspian Tern which flew inland directly over our heads. The two birds returned over the approximate same flight path in a few seconds and again afforded a close view. The Jaeger appeared to be in only half-hearted pursuit although the tern was flying fast. On this same day other observers on the island noted two Jaegers that did not afford a view that would definitely identify them as to species. MILTON HOPKINS, JR., Fitzgerald, Georgia, February 6, 1965

FROM THE FIELD

L. A. Wells of Columbus reported two Black-throated Green Warblers on August 8, 1964, two Bay-breasted Warblers on October 17, 1964, one immature White-crowned Sparrow on October 18, 1964. He had a Yellow-breasted Chat to remain until October 23 and says that Florence Lynn noted a Red-breasted Nuthatch on October 17, 1964.

William Dopson and Charles Durant were up the Altamaha River from Darien, Georgia on Cowpens Creek on April 25-26, 1964. They found a large rookery of Yellow-crowned Night Herons and Little Blue Herons at this location.

Mr. R. A. Everett of The Cloister, Sea Island, Georgia had a guest, Mr. Alfred H. Barr, Jr. from November 24 to 29, 1964. He wrote as follows: "I saw no birds of particular interest on Saturday, but Sunday morning (Nov. 29) I walked up the beach at fairly low tide and saw two Long-billed Curlews, the first I had ever seen. I got quite close to them, studied them at length and then flushed them so that I could see the red-brown primaries. Peterson calls them rare but quite aside from their scarcity their fantastic bills make them a really exciting bird."

W. E. Freeborn noted a Ruby-throated Hummingbird in his backyard in Decatur, Georgia on October 24, 1964. George Hunter of College Park, Georgia saw hummingbirds on October 25, 1964 and F. M. McCullough of Atlanta saw two hummingbirds on the 25, one on the 26, one on the 27, and a last one on October 28, 1964. All of these are very late for this species around Atlanta.

ERRATUM: In The Oriole 29:31 it was reported that Wm. Dopson saw an estimated 200 Kingbirds near McRae on Oct. 12, 1963. The date should have been September 3, 1963.

NEWS AND COMMENTS

ALABAMA BIRDLIFE—Business manager Louis C. Fink has completed a publication exchange with Auburn University and the G. O. S. Library housed at the University of Georgia now has a complete file of Alabama Birdlife for those interested in this periodical.

TRANSFER—Mr. and Mrs. Eugene Cypert are leaving the Okefinokee Wildlife Refuge shortly and will be transferred to National Wildlife Refuge at Reelfoot Lake, Tennessee. Their contributions to the G. O. S. have been manifold.

RECENT LITERATURE

THOREAU ON BIRDS. 1964, by Helen Cruickshank, McGraw-Hill Book Company, 330 West 42nd Street, New York, New York, 331 pages, \$7.95.

Birds first became an important part of the life of Thoreau during his two years at Walden Pond. As pointed out by Roger Tory Peterson in the foreword of this volume Thoreau was no systematic ornithologist but his greatest contribution to ornithology was the significance of his early observations on the birds of the Concord River Valley in Massachusetts that have given us, after an interval of one hundred and thirty years, a history of bird observations that has been almost continuous and is unmatched anywhere in the New World.

Helen Cruickshank has compiled a notable contribution to naturalists and ornithologists especially by this gathering together of Thoreau's birds. Beginning with the Red-throated Loon and continuing in approximate A.O.U. Checklist order the enumeration of birds that Thoreau observed runs the list to the Snow Bunting.

Following the list of birds is a chapter devoted to Thoreau's ornithological reference books with reproductions of 16 of the plates contained in them. Present day students can look at these illustrations and be somewhat benevolent with Thoreau on his misplaced identifications in some cases and wonder that he did as well as he did.

Other chapters deal with general bird notes and travels of Thoreau, a bibliography, and index.

Helen Cruickshank has shown great insight into the apparent ecological and ornithological findings of Thoreau as well as the not so apparent to the average naturalist. Thoreau's greatest contribution to science was his painstaking recording of diligent and careful observations.

Anyone who has read and enjoyed Thoreau's writings will also enjoy these excerpts concerning birdlife and the absorbing commentary by Helen Cruickshank. Milton Hopkins, Jr.

LIFE HISTORIES OF NORTH AMERICAN CUCKOOS, GOAT-SUCKERS, HUMMINGBIRDS AND THEIR ALLIES. 1964, by Arthur Cleveland Bent, Dover Publications, 180 Varick Street, New York 14, New York, 506 pp., 73 plates, \$5.00 per set of two volumes.

This unabridged edition by Dover is a republication of U. S. National Museum Bulletin 176 first published in 1940.

The two volumes contain life history information on 59 species and subspecies of this group of birds. The first treated bird in Vol. I is the Carolina Parakeet and its subspecies. This opening account is exceptionally well documented and presents practically all references to this interesting bird that Mr. Bent thought reliable. The history of its abundance, habits, and decline as with the extinct Passenger Pigeon, are difficult to conjecture.

Twenty-one species and subspecies of hummingbirds occurring in North America are treated, including the Calliope Hummingbird which is the smallest member of the group containing the smallest North American birds. This hummer weighs approximately three grams yet summers in Northern British Columbia and winters in the southern Mexican States.

As in past numbers of these bulletins very nearly complete life histories are recorded for each species and subspecies if known and contain sections on habits, eggs, young, plumages, food, behavior, voice, field marks, ranges, and migration dates.

LIFE HISTORIES OF NORTH AMERICAN PETRELS AND PELICANS AND THEIR ALLIES, 1964, By Arthur Cleveland Bent, Dover Publications, 180 Varick Street, New York 14, New York, 335 pp, \$2.75.

This volume is an unabridged republication of U. S. National Museum Bulletin 121 first published in 1922. It contains accounts of 69 species and subspecies in this group of off-shore birds and is illustrated by 128 black and white photographs. The water turkey, cormorant, and white pelican, while not always considered off-shore birds, are also treated completely in species accounts.

LIFE HISTORIES OF NORTH AMERICAN JAYS, CROWS, AND TITMICE, 1964, by Arthur Cleveland Bent, Dover Publications, 180 Varick Street, New York 14, New York, 495 pp., \$5.00 per set of two volumes.

This work was originally published in one volume in 1946 as U. S. National Museum Bulletin No. 191. The Dover republication in two volumes is a complete unabridged edition of the original.

Ninety-eight species and subspecies in this Order are covered in these volumes and they contained 112 black and white photographs.

As in past volumes Dover has maintained a high standard of excellence in selection of papers, covers, type of print, and a cost per volume well within the ordinary birder's budget. Milton Hopkins, Jr.

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