ADDITIONAL INVERTEBRATE NEST ASSOCIATES OF THE PRAIRIE WARBLER

BY VAL NOLAN JR.

In an earlier report on invertebrates collected from nests of the Prairie Warbler *(Dendroica discolor)* near Bloomington, Indiana, one snail, seven species of mites, and at least 12 species of insects were recorded from nine nests (Nolan, 1955). The present paper summarizes data from 14 additional nests of the same warbler. The study area and method of collection were virtually identical with those described previously, although collection from four of the nests was accomplished by visual inspection and by hand instead of by the Berlese funnel. One snail, at least two species of spiders, four species of mites, and at least 25 species of insects were found. Of the ten nests placed in funnels, only three yielded more than three species; two nests harbored six invertebrates each and one contained ten. This last held a young Brown-headed Cowbird *(Molothrus ater);* it was the only nest, among those subjected to the Berlese process, parasitized by that bird.

Animals common to the earlier and the present lists numbered only about seven, a statement whose vagueness is attributable to the impossibility of precise determination in some cases. No Mallophaga appear on either list.

I am grateful to J. F. Gates Clarke and O. L. Cartwright of the Smithsonian Institution for referring the material to the specialists indicated; my indebtedness to the members of this latter group is manifest.

The nests. Of the following nests, numbers 4, 10, 11, and 14 were not placed in Berlese funnels, and collection was thus limited to larger, conspicuous animals. The proportion of successful nests on the list is very much higher than it would be in a random sample. Plant names follow Deam (1940).

1. Nest 3 feet 8 inches high in 10-foot sugar maple *(Acer saccharum).* Destroyed by predator May 27, 1953, during incubation.

2. Nest 6 feet 10 inches high in 10-foot white elm *(Ulmus americana).* Young left nest May 28, 1954.

3. Nest 4 feet 2 inches high in 18-foot sugar maple. Nestlings removed by predator June 3, 1953.

4. Nest 6 feet 2 inches high in 10-foot white elm covered by Virginia creeper *(Parthenocissus quinquefolia).* Young left nest June 9, 1954.

5. Nest 1 foot 10 inches high in 4-foot blackberry (*Rubus* sp.). Nestlings removed by predator June 11, 1953.

6. Nest 4 feet 10 inches high in 8-foot sugar maple. Warbler nestlings died as result of presence of young Brown-headed Cowbird, which left nest June 12, 1953.

7. Nest 9 feet high in 16-foot white elm. Young left nest June 13, 1954.

8. Nest 11 feet 2 inches high in 16-foot apple *(Malus pumila)* covered with Virginia creeper. Young left nest June 14, 1953.

9. Nest 9 feet high in 13-foot elm covered with Virginia creeper. Young left nest June 17, 1953.

10. Nest 15 inches high in 2½-foot blackberry. Young left nest June 21, 1954.

11. Nest 14 feet high in 19-foot black locust *(Robinia pseudo-acacia)* covered with Japanese honeysuckle *(Lonicera japonica)*. Two eight-day-old Prairie Warblers and one cowbird of same age removed by investigator on June 26, 1958.

12. Nest 8 feet 10 inches high in 15-foot white elm. Young left nest July 9, 1954.

13. Nest 4½ feet high in 10-foot white elm. Young left nest July 17, 1953.

14. Nest 2½ feet high in 5-foot white elm. Two of three eggs hatched July 11, 1958, and one egg hatched July 12. One of older nestlings removed by investigator on July 15. Youngest nestling grew progressively weaker and died on July 17; remaining bird left nest July 21.

The invertebrates. Information concerning classification and food habits of the following animals was taken from Pilsbry (1948), Baker and Wharton (1952), Kaston and Kaston (1953), Imms (1957), Borror and DeLong (1954), and Comstock (1949).

GASTROPODA

PULMONATA (SNAILS)

Pupillidae, determined by J. P. E. Morrison: *Pupoides albilabris* (C. B. Adams). One in nest 10. Probably casual; ordinarily terrestrial, a scavenger on plant and animal material.

Whether this species and *Gastrocopta armifera* (previously reported) were picked up by the warblers or were carried to the nests as they clung to bits of plant fiber, or whether they climbed up under their own power, it is clear that this is another instance in which a bird may become an agent in dispersing small mollusks. Roscoe (1955) tells of the discovery of aquatic snails on birds' plumage, and Ramsden (1914), McAtee (1914), and Paton and Williamson (1943) refer to similar episodes involving terrestrial snails.

ARACHNIDA

ARANEIDA (SPIDERS)

Salticidae, determined by R. A. Crabill: (1) *Paraphidippus* probably *marginatus* (Walck.). One in nest 10. Probably foraging, casual. (2) *Synemosyna lunata* (Walck.) One in nest 6. Probably foraging, casual.

Spider damaged too extensively to permit certain allocation to family. One in nest 7. Probably foraging, casual.

ACARINA (MITES), determined by E. W. Baker

Dermanyssidae: *Ornithonyssus sylviarum* (Canestrini and Fanzago). One in nest 5, at least 1000 in nest 6, about 100 in nest 9, at least 250 in nest 13. Parasitic on the birds.

In view of the fact that Western equine encephalomyelitis virus and St. Louis encephalitis virus have been recovered from northern fowl mites *(Ornithonyssus sylviarum)* collected from bird nests (Reeves et al., 1947; Hammon et al., 1948),

data on this species may assume considerable significance. The most interesting point would seem to be the contrast between 1953 and the other years of the study, i.e., 1952 and 1954-1958. A few northern fowl mites were funneled out in 1952 (reported under the name *Bdellonyssus sylviarum*, Nolan, 1955), and some may be assumed to have been present in later seasons. Numbers of any that may have occurred in the six years other than 1953 were so small, however, that visual inspection, and in many cases handling, of over 200 Prairie Warbler nests and some 200 nests of other species on the study area revealed no mite infestation at all. In 1953, on the other hand, nests 6, 9, and 13 were teeming with numbers greatly exceeding the quantities actually collected, and at least three additional Prairie Warbler nests were so infested that swarms of mites covered my hands as soon as I touched the structures. These latter animals were not collected, but they may have been *Ornithonyssus*. Of the nests in which they were found, two were emptied of their nestlings by predators, on July 23 and July 25, 1953; young left the other nest successfully on July 18.

No mites have been noticed on hundreds of live nestling Prairie Warblers handled since 1952 or on about 80 adults banded since 1955. Russell Mumford and I have removed a number of still undetermined parasites from the bodies of about 100 Prairie Warblers killed in 1957 and 1958 at a television tower in Leon County, Florida, during nocturnal migration; *Ornithonyssus* may be among the animals gathered from these birds, but if so there were no conspicuous numbers.

Anystidae: *Anystis* sp. One in nest 6. Predaceous on other mites and small insects.

Cheyletidae: *Cheyletia* sp. One each in nests 2 and 12. Some cheyletids are parasitic on bird feathers; others are predaceous on mites and insects.

Analgeroidea: More precise determination impossible. One nymph in nest 1. Probably a feather mite.

INSECTA

COLLEMBOLA (SPRINGTAILS)

Not determined. Five in nest 6. Scavengers or feeders on micro-organisms.

CORRODENTIA (PSOCIDS)

Liposcelidae, determined by K. M. Sommerman: (1) *Liposcelis* sp. subgenus A. Three in nest 6, 5 in nest 7, 1 in nest 9, 1 in nest 12. Scavengers on animal and plant material. (2) *Liposcelis* sp. subgenus B. Four in nest 7. Scavengers on animal and plant material.

THYSANOPTERA (THRIPS)

Thripidae, determined by Kellie O'Neill: (1) *Frankliniella tritici* (Fitch). One female in nest 7. Plant feeder. (2) *Limothrips* sp. One female in nest 2. Either a predator on small arthropods, or a plant feeder.

Phlaeothripidae, determined by Kellie O'Neill: (1) *Leptothrips* sp. One adult in nest 7. Predator or spore or plant feeder. (2) Probably *Karnyothrips* sp. One male and 1 female in nest 5. Predator, or sport or plant feeder.

HOMOPTERA

Cicadellidae (leafhoppers), determined by J. P. Kramer: *Empoasca fabae* (Harris). Two males in nest 5. Plant feeder, casual.

Fulgoroidea (planthoppers), determined by J. P. Kramer: *Scolops sulcipes* Say. One female in nest 12. Plant feeder, casual.

Aphididae (plant lice), determined by Louise M. Russell: Aphidinae, genus and species not determinable. One early instar nymph in nest 6. Plant feeder, casual.

Coccoidea, determined by H. Morrison: Coccinae (cochineal insects). One larva in nest 6. Plant feeder, casual.

COLEOPTERA (BEETLES)

Dermestidae, determined by R. S. Beal: *Trogoderma* probably *glabrum* (Herbst). One skin cast in nest 8. Scavenger on animal material.

Lathridiidae, determined by J. G. Rozen: Genus and species not determinable. Four larvae in nest 5. Feeder on fungi and Mycetozoa, in vegetable debris; some found in mammal nests.

LEPIDOPTERA (BUTTERFLIES AND MOTHS)

Gelechioidea, determined by H. W. Capps: Stages too early for further determination. Five in nest 5. Feed as larvae on living and dead plant material.

Tineidae, determined by H. W. Capps: Stages too early for further determination. Ten in nest 1, 14 in nest 6, 30 in nest 9. Scavenger on dead or decayed animal and plant material.

DIPTERA (FLIES)

Psychodidae, determined by A. Stone: *Psychoda alternata* Say. One in nest 3. Scavenger on decaying organic material, possibly a coprophage.

Heleidae, determined by W. W. Wirth: *Culicoides* sp. Fourteen in nest 7. Larvae occur in wet and moist situations, e.g., decaying vegetation; may scavenge. Adults are blood suckers.

Lycoriidae, determined by A. Stone: *Bradysia* sp. One in nest 1. Fungus feeders as larvae.

Itonidae, determined by R. H. Foote: Damaged too extensively for further determination. One in nest 5. Larval food habits vary greatly; perhaps a scavenger.

Calliphoridae, determined by C. W. Sabrosky: (1) *Protocalliphora metallica* (Tns.). Twenty larvae in nest 11, 23 larvae in nest 14. Parasitic; larvae suck blood of nestling birds. (2) *Protocalliphora* new species, presently being described in revision of the genus. Several in nest 4. Parasitic; larvae suck blood of nestling birds.

Five of the 23 nests reported in this and my 1955 paper held *Protocalliphora* larvae and at least 15 or 20 additional nests of the Prairie Warbler have been dismantled in an unsuccessful search for these maggots. On the subjects of the habits of these parasites and their effects on the nestlings I would add to my previous remarks the following observations: On June 24, 1952, four maggots, not collected but probably *Protocalliphora,* were found at mid-day apparently feeding on the exposed viscera of a young bird recently killed by a predator and left in the nest. In 1958, the young Brown-headed Cowbird in nest 11 was distinctly less vigorous than experience with young of that species would have led me to expect, and this may have been true of one of its nest-mate warblers; the cowbird died some four hours after I had removed it from the nest. Further evidence that the maggots

lower the vitality of nestlings is the fact that the last bird to hatch in nest 14 failed to gain weight properly and died on its sixth day. On the other hand, this death left only one young bird in nest 14 as a potential host for the 23 maggots; yet that bird seemed normally vigorous and departed from the nest at the usual age.

HYMENOPTERA

Scelionidae (scelionid wasps), determined by C. F. W. Muesebeck: *Trichasius* sp. One male in nest 6. Parasitic in insect or spider eggs.

Formicidae (ants), determined by M. R. Smith: (1) *Solenopsis molesta* (Say). Several workers in nest 13. Probably scavenging or casual. (2) *Crematogaster lineolata* (Say). At least 1 worker in nest 13. Probably foraging, casual. (3) *Lasius neoniger* Emery. One worker (infected with parasitic fungus *Laboulbenia* sp.) in nest 6, 2 workers in nest 10. Probably foraging, casual.

There is a general discussion of the fauna of birds' nests in chapter 14 of Rothschild and Clay's (1952) work on bird parasites. Boyd (1951) has reviewed the ectoparasites of birds, while Herman (1955) recently surveyed the literature on that subject. Hicks (1959) has published a check-list of insects found in birds' nests.

SUMMARY

The invertebrates found in fourteen nests of Prairie Warblers (*Dendroica discolor*) near Bloomington, Indiana are listed. One species of snail, at least two of spiders, four of mites, and at least 25 of insects were found.

LITERATURE CITED

BAKER, E. W., and G. W. WHARTON. 1952. An introduction to acarology. New York, i-xiii, 1–465.

BORROR, D. J., and D. M. DELONG. 1954. An introduction to the study of insects. New York, i-ix, 1–1030.

BOYD, E. M. 1951. The external parasites of birds: a review. Wilson Bull., **63**: 363–369.

COMSTOCK, J. H. 1949. Rev., 9th ed. An introduction to entomology. Ithaca. i-xix, 1–1064.

DEAM, C. C. 1940. Flora of Indiana. Indianapolis. 1–1236.

HAMMON, W. McD., W. C. REEVES, R. CUNHA, C. ESPANA, and G. SATHER. 1948. Isolation from wild bird mites (*Liponyssus sylviarum*) of a virus or mixture of viruses from which St. Louis and Western equine encephalitis have been obtained. Science, **107**: 92–93.

HERMAN, C. M. 1955. "Diseases of birds" *in* Recent studies in avian biology (ed. Wolfson). Urbana. i-ix, 1–479.

HICKS, E. A. 1959. Check-list and bibliography on the occurrence of insects in birds' nests. 681 pp. Iowa State College Press, Ames, Iowa.

IMMS, A. D. 1957. Rev. ed. by RICHARDS, O. W., and R. G. DAVIES. A general textbook of entomology. London. i-x, 1–886.

KASTON, B. J. and E. 1953. How to know the spiders. Dubuque, Iowa. i-vi, 1–220.

MCATEE, W. L. 1914. Birds transporting food supplies. Auk, **31**: 404–405.

NOLAN, V., JR. 1955. Invertebrate nest associates of the Prairie Warbler. Auk, **72**: 55–61.

PATON, C. I., and K. WILLIAMSON. 1943. Bird and snail associations. Ibis, **85**: 348.

PILSBRY, H. A. 1948. Land mollusca of North America (north of Mexico). Vol. II, Pt. 2, Monog. no. 3, Acad. Nat. Sci. Philadelphia. i-xlvii, 521–1113.

RAMSDEN, C. T. 1914. The Bobolink (*Dolichonyx oryzivorus*) as a conveyer of mollusca. Auk, **31**: 250.

REEVES, W. C., W. MCD. HAMMON, D. P. FURMAN, H. E. MCCLURE, and B. BROOKMAN. 1947. Recovery of Western equine encephalomyelitis virus from wild bird mites (*Liponyssus sylviarum*) in Kern County, California. Science, **105**: 411–412.

ROSCOE, E. R. 1955. Aquatic snails found attached to feathers of White-faced Glossy Ibis. Wilson Bull., **67**: 66.

ROTHSCHILD, M., and T. CLAY. 1952. Fleas, flukes and cuckoos. New York. i-xiv, 1–304.

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ERRATUM

'The Auk,' **79** (2), pp. 133, 138, April, 1959. Dr. K. C. Parkes sends a useful correction. The Piping Plover reported banded at "Penn Yan," New York and recovered at Long Beach, Ontario, "about 150 miles west" of where it was hatched, was actually banded at "Sandy Pond, Oswego County," (a bay of Lake Ontario), "about 250 miles southwest" of the recovery site. The error was in the records of the Fish and Wildlife Service, which, on checking, found that the bander's residence (rather than the banding site) had been listed.

INFORMATION ON COLOR PHASES

D. F. Owen, Dept. of Zoology, University of Michigan, Ann Arbor, Michigan, is investigating the possibility of preferential, non-random mating between animals having distinct color phases. He would like to receive records of the color of known breeding pairs of polymorphic birds, particularly the Screech Owl (*Otus asio*), Ferruginous Hawk (*Buteo regalis*), and the western race of the Red-tailed Hawk (*Buteo jamaicensis calurus*). Data on color is of interest whether the members of the breeding pair were the same or different in coloration.