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Ball, E. D. 1919. The potato leafhopper and the hopperburn it causes. Bull. Wis. Dept. Agr. 23: 76-102.
Eyer, J. R. 1922. Preliminary note on the etiology of potato tipburn. Science 55: 180-181.
Fenton, F. A. 1921. Progress report on the season's work on the production of potato tipburn. J. Econ. Entomol. 14: 71-83.
Fenton, F. A. and Ressler, I. L. 1922. Artificial production of tipburn. Science 55:54.
Gilmour, D. 1961. The biochemistry of insects. Acadamic Press, New York. p. 7-8.
Granovsky, A. A. 1926. Studies on leafhopper injury to apple leaves. Phytoathology 16: 413-422.
Mittler, T. E. and Dadd, R. H. 1962. Artificial feeding and rearing of the aphid, *Myzus persicae* (Sulzer), on a completely defined synthetic diet. Nature 195: 404.
Scheel, C. A., Beck, S. D. and Medler, J. T. 1956. Feeding and nutrition of certain Hemiptera, Proc. Intern. Congr. Entomol., 10th, Montreal, 2: 303-308.
Trager, W. 1953. Nutrition, p. 350-386. *In* K. D. Roeder, (ed.), Insect physiology. John Wiley & Sons, Inc., New York.

Acarine Fauna of Bird Nests[1]

ELLIS A. HICKS and ROBERT T. BROWN[2]

Abstract. In summer, 1961, 10 nests, representing seven species of passeriform birds, were collected and processed in Berlese funnels to obtain the mites present. Representatives of 20 different families or superfamilies were identified in addition to five groups of larvae and nymphs which could not be identified to family. The families Eremaeidae and Dermanyssidae were most widely represented, and dermanyssids were most numerous.

Mite populations are believed to become established in nests by (1) mites being brought into the nest by way of nest materials, (2) mites being brought into the nest on the bird itself, and (3) mites in their wanderings accidentally encountering the nests.

Investigation and analysis of mite populations in bird nests have received but scant attention, and most of this has resulted incidentally from studies conducted for other purposes. Cameron (1938) presented information on the occurrence of the northern fowl mite in nests of several species of passerine birds. The attention of additional workers has been directed to this species as well as to other mites concerning their possible role in the epidemiology of encephalomyelitic pathogens. A different approach, involving nests as sources or reservoirs for contamination of foodstuffs and other stored products by mites, has been used by Kemper (1938) as well as by others. Of the few investigations directed toward understanding the commensal and parasitic relationships in a nest, the more outstanding contributions are

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those of Stadler (1948) with *Riparia riparia,* Zumpt (1952) with sea birds, Büttiker (1946) with *Micropus melba,* Nolan (1955) with *Dendroica discolor,* and Blair and Parsons (1954) with *Motacilla flava flava.*

In this study, conducted during the summer of 1961, a total of 10 nests were examined. All nests were located in Ames, on or near the Iowa State University campus. They were collected as soon as possible after the fledglings had flown, with the exception of one nest which never harbored young because it was abandoned before egg-laying had been completed.

Berlese funnels, each equipped with a light bulb as a heat source, were used to obtain mites from the nests. Each nest was placed within the funnel for a period varying from 8-24 hours, depending upon the composition of the nest. Bulky or heavily insulated nests were broken apart to speed the process of driving the mites out of the nest materials.

A 70% alcohol solution was used to kill the specimens. Since not enough time was available to clear, mount, and identify all specimens obtained from each nest, one-fiftieth of each sample was examined. The mites were removed into chloral hydrate for clearing, which required from 4-7 days. The longer clearing time was essential for heavily sclerotized specimens. Two mounting media, methyl cellulose and the Crossley modification of Hoyer's, were used for the lightly and heavily sclerotized specimens respectively.

The 10 nests used in this study represented seven species of birds. Following is a listing of the mites taken from each nest sample together with pertinent information concerning the nest. Mites were identified by means of Baker and Wharton (1952), Baker et al. (1958), Strandtmann and Wharton (1958), Cameron (1938), and Da Fonseca (1936).

I. Cardinal. *Richmondena cardinalis cardinalis* (Linnaeus)

Site: On top of a six-foot roll of wire fence inside a garage.
Collection: The last fledgling left the nest May 26, 1961, and the nest was collected June 1 .
Composition: Rather loosely constructed of slender twigs, grapevine stems, grass, and leaves.

Mites: Tormbidiform nymphs	2	Dermanyssidae	5
Tydeidae	3	*Ornithonyssus sylviarum* (Canestrini and Fanzago)	
Stigmaeidae	1	adults	3
		nymphs	2

II. *Richmondena cardinalis cardinalis* (L.)

Site: In a rosebush and 4 feet above ground.
Collection: The last fledgling vacated the nest on May 29, 1961, and the nest was taken the following day.
Composition: Approximately the same as in Number I, except more grapevine was present.

Mites: Eremaeidae	1
Raphignathidae	1
Dermanyssidae	165
O. sylviarum (C. and F)	
adults	36
nymphs	128
larvae	1

III. Robin. *Turdus migratorius migratorius* Linnaeus

Site: In a bittersweet vine 12 feet above ground.

Collection: This nest was gathered May 30, 1961, three days after it was vacated.

Composition: Twigs, roots, stems, grasses, string, leaves, and with a mud cup.

Mites: Cheyletidae	1
Eutogenes foxi (Baker)	1
Bdellidae	1
Dermanyssid nymphs	4

IV. *Turdus migratorius migratorius* L.

Site: Limestone window ledge, north side of Science Building, University campus, and about 5 feet above ground.

Collection: May 24, 1961, the day after the last fledgling was seen in the nest.

Composition: Same as number III.

Mites: Acaridae	1	Trombidiform nymphs	34
Bdellidae	2	Trombidiform larvae	11
Tydeidae	4	Dermanyssidae	5
Galumidae	1	*O. sylviarum* (C. and F.)	
Oribatid nymphs	1	adults	1
Eremaeidae	1	nymphs	4

V. *Turdus migratorius migratorius* L.

Site: Limestone window ledge, east side of Science Building, University campus, and about 20 feet above ground.

Collection: July 19, 1961, the day after the nest was last seen to be occupied.

Composition: Same as number III.

Mites: Oribatid larvae	1	Dermanyssidae	61
Eremaeidae	7	*Dermanyssus gallinae* (DeGeer) nymphs	15
Tydeidae	6	*O. sylviarum* (C. and F.) nymphs	29
		Pellonyssus passeri Clark and Yunker, nymphs	11
		Undetermined nymphs	6

VI. Blue jay. *Cyanocitta cristata bromia* Oberholser.

Site: At height of about 30 feet in a pine tree just east of the first green of the University golf course.

Collection: June 9, 1961, the day following evacuation of the nest.

Composition: Paper, pine needles, twigs, leaves, string.

Mites: Tetranychidae	1	Eremaeidae	1
Bdellidae	1	Dermanyssidae	5
Rhagidiidae	1	*O. sylviarum* (C. and F.)	
Cymberemaeidae	2	nymphs	5
Erythraeidae	1		

VII. Chipping sparrow. *Spizella passerina passerina* (Bechstein).

Site: Eight feet up in an Austrian pine south of MacKay Hall, University campus.

Collection: June 16, 1961, the day after young had left.

Composition: Pine needles, twigs, stems, leaves, comprising a small, compact nest.

Mites: Cymberemaeidae	2
Eremaeidae	11
Dermanyssidae	909
O. sylviarum (C. and F.)	
adults	169
nymphs	737
larvae	3

VIII. Mourning dove. *Zenaidura macroura carolinensis* (Linnaeus).

Site: At height of 10 feet in the crotch of a tree south of Pammel Drive near the University golf course.

Collection: June 17, 1961, two days after the young had left.

Composition: Loose, shabby, consisting of only a few twigs and some pine needles.

Mites: Bdellidae	2
Parasitoidea	1
Ceratozetidae	1
Belbidoidea	
(?Ameronothridae)	5
Haplozetidae	2
Oribatid nymphs	6
Oribatid larvae	1
Oripodidae	2
Eremaeidae	24
Digamasellidae	1
Dermanyssidae	67
O. sylvarium (C. and F.)	
adults	19
nymphs	48

IX. Dickcissel. *Spiza americana* (Gmelin).

Site: On the ground in tall grass in athletic field east of the University. The nest had been abandoned when the grass was cut.

Collection: June 23, 1961, three days after it was abandoned.

Composition: Grass, leaves, weed stems, small twigs.

Mites: Eremaeidae	2
Mesostigmatid nymphs	5

X. House sparrow. *Passer domesticus domesticus* (Linnaeus).

Site: About 10 feet above ground in an ivy vine on the University campus.

Collection: July 2, 1961, the day after fledglings vacated the nest.

Composition: Straw, grass, leaves, feathers, twine, twigs.

Mites: Sarcoptiform nymphs	1
Freyanidae	1
Trombidiform nymphs	5
Tydeidae	4
Dermanyssidae	39
Pellonyssus passeri C. and Y.	
adults	13
Dermanyssus gallinae	
(DeGeer) adults	2
O. sylvarium (C. and F.)	
adults	3
nymphs	21

A qualitative distribution by type of nest is listed below. Numbers in parentheses indicate the quantity of nests, if more than one.

Acaridae: Robin.

Bdellidae: Robin (2), blue jay, mourning dove.

Belbidoidea: Mourning dove.
Ceratozetidae: Mourning dove.
Cheyletidae: Robin.
Eutogenes foxi (Baker): Robin.
Cymberemaeidae: Blue jay, chipping sparrow.
Dermanyssidae: Chipping sparrow, mourning dove, cardinal, house sparrow, robin, blue jay, dickcissel.
Ornithonyssus sylviarum (Canestrim and Fanzago)
adult: Chipping sparrow, mourning dove, cardinal, robin, house sparrow.
larva: Chipping sparrow.
nymph: Blue jay, chipping sparrow, mourning dove, dickcissel, cardinal, robin (3).
Pellonyssus passeri Clark and Yunker
adult: House sparrow.
nymph: Robin.
Dermanyssus gallinae (DeGeer).
adult: House sparrow.
nymph: Robin.
Digamasellidae: Mourning dove.
Eremaeidae: Robin (2), blue jay, chipping sparrow, mourning dove, dickcissel, cardinal.
Erythraeidae: Blue jay.
Freyanidae: House sparrow.
Galumnidae: Robin.
Haplozetidae: Mourning dove.
Oribatid larvae: Robin, mourning dove.
Oribatid nymphs: Mourning dove, robin.
Oripodidae: Mourning dove.
Parasitoidea: Mourning dove.
Raphignathidae: Cardinal.
Rhagidiidae: Blue jay.
Sarcoptiform nymphs: House sparrow.
Stigmaeidae: Cardinal.
Tetranychidae: Blue jay.
Trombidiform larvae: Robin.
Trombidiform nymphs: Robin.
Tydeidae: Cardinal, robin (2), house sparrow.

It is quite evident from the foregoing list that dermanyssids (parasites) and eremaeids (scavengers) occur in a greater variety of the nests studied than do any of the other groups of mites.

A comparison of the contents from nests I and II indicates the necessity for processing nests immediately after they are vacated if a true representation of their acarine contents (especially parasitic forms) is to be obtained. Even though the composition of nest I was similar to that of nest II and the species of bird was the same, the difference between numbers of dermanyssids is striking. A comparison of nest III, taken three days after it was vacated, with IV and V, each of which was taken the day after it was vacated, shows disparity both in quality and in quantity. It is unfortunate that nest IX, located on the ground, was not taken immediately after grass-mowing. The elapse of three days probably resulted in a dissipation of some of the mite fauna from the nest. Height of a nest above ground is probably no barrier to invasion by predators, coprophages, and other types of free-living mites. Nest VI, for example, harbored a variety of these forms. Effect, if any, of the elevation of the nest upon its prospective mite fauna may be expressed as "late to arrive and late to depart." Considering, in addition to nest VI, nests IV and V, each of which was taken from a limestone window ledge about five and 20 feet respectively above ground, one is impressed by the apparent wanderlust of the free-living forms. Brick walls and limestone ledges offer little in the way of food or other benefit to mites, so their presence in nests in such circumstances can be attributed partly to their fortuitous discovery of the nests. Undoubtedly mites are brought in with materials at the time of nest construction; however, this method of dispersal cannot account for the presence of many of the soil mites. Even though several species of birds use soil in the form of mud for nest construction, the water content of the mud, when collected by the bird, may be beyond the tolerance level of the mite. Nor can the presence of phytophagous, predaceous, and scavenging types of mites in the nest be adequately explained solely on the basis of their being on the stick, stem, horsehair, paper, feather, rootlet, twine, etc. at the precise time the bird happens to pick up any of these construction materials.

The greater the variety of organic material in the nest, the greater the variety and quantity of the mite population within it. An accumulation of fecal material will usually have a pronounced influence upon the nest fauna. And, of course, broken eggs or decaying fledglings constitute an additional source of food.

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Literature Cited

Baker, Edward W. and G. W. Wharton. 1952. Introduction to acarology. Macmillan, New York. 465 p.

Baker, Edward W., J. H. Camin, F. Cunliffe, T. A. Woolley, and C. E. Yunker. 1958. Guide to the families of mites. Institute of Acarology, Department of Zoology, University of Maryland, College Park. 242 p.

Blair, R. H. and A. G. Parsons. 1954. The blue-headed wagtail (*Motacilla flava flava*) in Cornwall, with a note on the nest parasities by F. A. Turk. Cornwall Bird Watching and Preservation Soc. Ann. Rep. 1954: 4 p.

Büttiker, W. 1946. Die Parisiten und Nestbewohner des Alpenseglers (*Micropus melba* L.). Die Vögel der Heimat (Aarau, Switzerland) 16 (9) : 3-16.

Cameron, Donald. 1938. The northern fowl mite (*Liponyssus sylvarium* C. and F., 1877). Canad. J. Res. Vol. 16, Sec. D, No. 8, pp. 230-254, 1 fig.

Da Fonseca, Flavio. 936. A monograph of the genera and species of Macronyssidae Oudemans. Proc. Zool. Soc. London Vol. 118, Part II: 249-333.

Kemper, Heinrich. 1938. Hausschädlinge als Bewohner von Vogelnestern. Z. für Hyg. Zool. und Schädlingsbekämpfung 30 (9): 269-274.

Nolan, Val Jr. 1955. Invertebrate nest associates of the prairie warbler. Auk 72 (1) : 55-61.

Stadler, Hans. 1948. Les inquilins et parasites des nids de l'hirondelle de rivage, *Riparia riparia* (L.) Alauda, Rev. Intern. Ornith. 16: 40-54.

Strandtmann, R. W. and G. W. Wharton. 1958. Manual of mesostigmatid mites. The Institute of Acarology, Department of Zoology, University of Maryland, College Park. 330 p.
Zumpt, F. 1952. The ticks of sea birds. Reports, Australian National Antarctic Research Expedition, Series B, ol. 1, Zoology, 12-20 p.

A Comparison of the Abilities of Secondary Teachers and Students of Biology to Understand Science

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Abstract. A comparison of the level of understanding science between secondary teachers and students has been conducted. The biology teachers were made up of two groups. The newly certificated group had just completed their college training; and the other group was made up of experienced, on the job, teachers. The biology teachers were compared with groups of secondary biology students in grades 7-12 inclusive. Significant differences were found between the 7th grade group and all other groups, except the 8th grade group.

The implications of teachers with less understanding of science than a sizable group of their students is discussed. There is a call for increased professional standards and improved college curricula designed to train teachers better in the ways of science and the scientist.

It has been stated often and influentially that our greatest resource in the headlong race for national supremacy lies in the minds of the educated. Therefore, of utmost importance is the question of the proficiency and qualifications of our science educators.

In a study made by the University of Wisconsin (1), six characteristics of good educators were discovered. The first characteristic was intelligence. The second characteristic of a good teacher was a "thorough understanding and basic knowledge of and about the subject matter taught."

PURPOSE

In this study, restricted to the subject matter of biology, the major items considered were how well teachers and students understand the scientific enterprise, scientists, and the aims and methods of science. Specifically, this is a study of the comparison of the abilities of secondary biology teachers and students to understand science.

METHOD

Present and prospective students of biology, as well as secondary students who had just completed a course in general