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# The Occurrence of Chiggers, *Neoshoengastia americana*, among Chaparral Birds of Southern California

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Chiggers, an immature stage of predacious mites, have been reported from many birds (McClure and Ratanaworabhan 1973). Among them have been trombiculids of which the genus *Neoshoengastia* has widespread distribution on both sides of the Pacific (Womersley and Audy 1957). The objective of this study was to determine the hosts and prevalence of *Neoshoengastia americana* (Hirst) among the birds in the coastal chaparral of Ventura County, California.

## Methods

The study was made at the Camarillo Grove County Park, Ventura County, a 25-acre Coastal Oak (*Quercus agrifolia*)-dominated grove surrounded by heavily pastured coastal chaparral (*Opuntia* sp., *Rhus integrifolia*, *Photina arbutifolia*, *Nicotiana glauca*, other shrubs and many annuals). Birds were captured with mist nets extended one day each week from July 1979 to the present (1987) at various locations in the pasture or within the park. Each bird was banded with a standard U. S. Fish and Wildlife Service band and examined for the presence of chiggers. By gently blowing the feathers aside the bright orange chiggers are easily seen attached to the bare skin about the vent or on the belly, flanks or sides. Since the mouth parts are deeply imbedded and may break off if the mites are pried free, I collected them by inducing them to relax by dropping a few drops of 70% alcohol on them. Holding the bird quietly for a moment or two allowed the chiggers to react to the alcohol and I could then lift them free and store them in vials of 70% alcohol and 1% glycerine.

A brief review of the life cycle: chiggers are usually found on the abdomen in clusters around the first individual that made an attachment. They are on a dias of swollen tissue thrown up by the bird. They remain attached, feeding on blood and exudates for only a few days, but the tissue requires several days to heal after the mites have dropped off so that a recent infestation is recognizable. Having dropped from the host the mite hides among soil detritus (Baker and Wharton, 1964). There it molts into a non-feeding eight legged nymphal form which may molt again into a second nymph. The final molt produces a predacious adult that feeds on insect eggs and upon small creatures of the soil and soil detritus. The female deposits

eggs singly among the debris; the eggs hatch into six legged chiggers (also referred to as larvae) that climb upon vegetation to await the passing of a suitable host. Even though there is tissue swelling where the mites attach to the host, the swellings must not cause an irritation for the bird does not appear to attempt to remove them. They seem to be in a vulnerable position on the abdomen and sides, readily available to the bird's bill.

## Results

During the eight year study chiggers were noted on 22 of the 82 species netted in this habitat. The 22 were all species that habitually foraged on the ground. Tables 1 and 2 list the numbers of birds examined and the rate of infestation by these parasites by year and by month. In both tables the data are shown as fractions: the number of infested birds above the number examined. Table 1 reviews the eight years of information by month. It lists seven winter residents (2858 individuals) and 15 permanent and/or summer residents (2625 individuals). The 5483 birds had an overall infestation rate of 3%. Because of the mild climate in this part of California mites were active all year with peak activity from July into November. During periods of heavy mite activity 6.2% of the individuals of the infested species that were examined were positive. Among these birds infestations were most abundant in August and November. Winter residents entering the habitat in September and October when chigger activity was high became infested but lost their parasites during January, February and March when the climate was cool enough to reduce mite activity.

Table 2 lists the infestations by years and includes data from 5520 birds. Mite activity appears to vary from year to year; the most infested host species, 12, were noted in 1982. However the rates of parasitism were greatest in 1981 and 1986, over 9% both years.

## Discussion

During the winters of 1977 through 1979 rainfall was above average, the pasture was not razed and vegetation became tall and dense enough to support much wildlife. A stream from a small spring above the park flowed each

Table 1. Distribution of the chigger *Neoshoengastia americana* by month among ground feeding birds at Camarillo Oak Grove Park, Ventura Co., California. Number infested birds/ number examined, based on all birds examined from 1979-1986.

PERMANENT RESIDENTS													
SPECIES	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Total Percent
Scrub Jay	0/5	0/11	0/8	0/6	0/17	0/15	0/22	2/18	1/21	0/7	0/11	0/18	3/159 1.9
Cactus Wren	0	0	0	0	0/2	1/4	0/4	2/5	0	0	0/1	0	3/16 18.7
Canyon Wren	0	0	0	0	0	0	1/1	0	0	0	0	0	1/1 100
Bewick's Wren	0/3	0/2	0/5	0/5	1/15	0/9	1/15	2/11	4/22	2/10	1/1	0/5	11/103 10.2
No. Mockingbird	0/11	0/9	0/15	0/7	0/9	0/17	1/10	0/13	0/18	0/17	0/15	0/17	1/158 0.6
California Thrasher	0/3	0/3	0	0/3	0/10	1/4	1/11	1/9	1/12	1/6	0/1	0/7	5/69 7.2
Rufous-sided Towhee	0/42	0/15	0/10	0/10	0/15	0/37	2/85	2/70	2/66	0/43	0/47	0/25	6/465 1.3
Brown Towhee	0/23	0/20	0/22	0/23	1/49	2/120	21/211	21/133	8/114	0/29	0/14	0/16	53/774 6.8
Ruf-crowned Sparrow	0/3	0/2	0	0/3	0/7	0/25	1/17	0/18	1/9	1/12	0/8	0/2	3/106 2.8
Lark Sparrow	0	0	0/9	0/4	0/9	1/23	3/31	4/40	0/16	0/4	0	0	8/136 5.9
Sage Sparrow	0	0	0	0	0/2	1/3	0/2	0	0/2	0	0	0	1/9 11.1
Savannah Sparrow	0/2	0	0/1	0/10	0	0	0/2	1/6	0/5	0/1	0/5	0	1/32 3.1
Song Sparrow	0/7	0/10	0/15	0/20	0/42	0/36	0/19	0/42	1/23	0/19	0/2	0/7	1/242 0.4
Lincoln's Sparrow	0/7	0/1	0/8	0/7	0/2	0/3	0/5	0/1	0/3	1/9	0/4	1/5	2/55 3.6
Brewer's Blackbird	0/3	0/10	0/10	1/39	0/60	0/83	0/28	0/23	0/24	0/15	1/4	0/1	2/300 0.6
Total	0/109	0/83	0/103	1/137	2/239	6/379	31/463	35/389	18/335	5/172	2/113	1/103	101/2625
Percent infested	0	0	0	0.7	0.8	1.6	6.7	9.0	5.4	2.9	1.8	1.0	3.8
WINTER RESIDENTS													
SPECIES	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Total Percent
House Wren	0	0/2	0	0	0	0	0/1	1/10	1/20	1/7	0/1	0/2	3/43 7.0
Hermit Thrush	1/48	0/34	0/37	0/15	0/14	0	0	0	0/1	6/58	14/77	0/31	21/315 6.7
Yel-rumped Warbler	0/50	0/66	0/28	0/16	0/1	0	0	0	0	0/156	0/127	1/32	1/476 0.2
Wh-thrld Sparrow	0	0/2	0/1	0	0	0	0	0	0	1/1	0	0	1/4 25.0
Gold-crowned Sparrow	0/112	0/104	0/64	0/24	0	0	0	0	0/1	1/19	1/33	3/57	5/414 1.2
Wh-crowned Sparrow	3/272	2/271	0/125	0/69	0	0	0	0	0/2	3/73	5/74	13/171	26/1057 2.4
Dark-eyed Junco	0/117	0/87	0/51	0/23	0/1	0	0	0	0	0/15	0/72	6/183	6/549 1.1
Total	4/599	2/566	0/306	0/147	0/16	0	0/1	1/10	1/24	12/329	20/384	23/476	63/2858
Percent infested	0.67	0.35	0	0	0	0	0	10.0	4.2	3.6	5.2	4.8	2.2
TOTALS													
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Total Percent
Total birds	4/708	2/649	0/409	1/284	2/255	6/379	31/464	36/399	19/359	17/501	22/497	24/579	164/5483
Percent infested	0.6	0.3	0	0.3	0.8	1.6	6.8	9.0	5.3	3.4	4.4	4.1	3.0
No. Infested Species	2	1	0	1	2	5	8	9	8	9	5	5	22
Ratio Infested Birds	4/320	2/271	0	1/39	2/64	6/154	31/380	36/302	19/287	17/195	22/189	24/448	164/2649
Percent Infested	1.2	0.7	0	2.6	3.1	3.9	8.2	11.9	6.6	8.7	11.6	5.4	6.2
Ratio of Abundance*	19	11	0	42	50	63	132	192	106	140	187	87	100

\*Based upon average as 100.

winter for up to two months, February into April. In October 1980 an intense chaparral fire destroyed all vegetation on 8000 acres including the 1000 acres surrounding the park, but the park itself was only partially damaged. The flames also killed most of the mammals and weak flying birds that could not escape before them. However, soil inhabiting invertebrates such as tube spinning spiders escaped, and by April, 1981, the habitat was slowly recovering. Cattle and goats introduced in 1981 soon reduced the environment to bare ground and over-grazed shrubs, and the stream ceased to flow (McClure

1981). The livestock were not removed until 1984 and intermittent usage followed. Conditions within the park itself did not change radically in the eight years. The park area was so small that it is doubtful if the birds picked up their chigger populations within it. All fed in the chaparral as much or more than they did in the park and were subject to the fluctuations in mite population densities there.

## The Occurrence of Chiggers (cont.)

### Acknowledgments

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(Western Bird Banding Association)

**Table 2. Yearly infestations of the chigger *Neoshoengastia americana* among ground feeding birds in Ventura County, California. Number infested birds/number examined**

SPECIES	1979	1980	1981	1982	1983	1984	1985	1986	TOTAL
Scrub Jay	0/21	0/28	0/10	0/16	0/8	0/8	0/10	3/54	3/155
Cactus Wren	2/4	0/6	0	0	0/1	1/3	0	0/4	3/18
Canyon Wren	0	0	0	0	0	1/1	0	0	1/1
Bewick's Wren	0/8	0/22	3/17	7/21	0/11	1/13	0/17	0/10	11/119
House Wren	0/1	0/1	0/6	1/7	0/14	0/3	2/10	0/1	3/43
Hermit Thrush	0/34	10/84	6/57	1/71	0/2	2/23	2/23	0/19	21/313
Northern Mockingbird	0/16	0/14	1/15	0/17	0/12	0/29	0/23	0/28	1/154
California Thrasher	2/24	0/16	0/2	0/4	0/1	1/3	0/7	2/12	5/69
Yellow-rumped Warbler	0/116	1/64	0/34	0/25	0/17	0/38	0/72	0/130	1/496
Rufous-sided Towhee	0/83	0/140	0/49	1/26	0/9	0/5	2/30	3/124	6/466
Brown Towhee	2/105	1/72	10/74	6/93	1/62	1/49	4/127	28/192	53/774
Rufous-crowned Sparrow	0/2	0/1	0/7	2/56	0/8	0/10	0/11	0/11	2/106
Lark Sparrow	0	0	5/69	2/48	0/6	0/2	0/1	1/10	8/136
Sage Sparrow	0	0	1/7	0	0	0	0/1	0	1/8
Savannah Sparrow	0	0	0/8	0/8	1/7	0	0/8	0/1	1/32
Song Sparrow	0/5	0/10	0/24	0/48	1/46	0/11	0/39	0/60	1/243
Lincoln's Sparrow	0	0/6	0/10	1/6	0/12	0/6	0/6	1/9	2/55
White-throated Sparrow	0/2	0	0	1/1	0	0	0/1	0	1/4
Golden-crowned Sparrow	0/41	2/54	1/37	1/65	0/35	1/32	0/80	0/70	5/414
White-crowned Sparrow	0/51	6/118	11/119	6/181	0/112	0/50	3/120	0/309	26/1060
Dark-eyed Junco	0/29	0/19	6/89	0/108	0/41	0/56	0/64	0/144	6/550
Brewer's Blackbird	0/37	0/26	0/32	1/37	0/27	0/19	1/66	0/56	2/300
Total	6/579	20/681	44/666	30/838	3/431	8/361	14/716	38/1244	163/5516
Percent Infested	1.0	2.9	6.6	3.6	0.7	2.2	2.0	3.0	3.0
Number Species Infested	3	5	9	12	3	7	6	6	22
Ratio Infested Birds	9/133	20/392	44/484	30/612	3/115	8/124	14/376	38/392	163/2628
Percent Infested	4.5	5.1	9.1	4.9	2.6	6.5	3.7	9.4	6.2
Ratio of Abundance*	72	82	147	79	42	105	60	152	100

\*Based upon average as 100.