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A New Species of *Fahrenholzia* (Anoplura: Hoplopleuridae) from Texas, with a Key to the Species of the Genus and a List of Their Known Hosts[1]

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ABSTRACT

Including the new species *F. boleni* (type-host, *Perognathus merriami merriami*), the genus now includes 12 species. All of these are ectoparasites on sciuromorph rodents of the family Heteromyidae, and only very rarely have stragglers been found on other rodents, such as Cricetidae.

Lice of the genus *Fahrenholzia* Kellogg and Ferris are common on sciuromorph rodents of the family Heteromyidae. Ferris (1922, 1951) referred to this genus as occurring only on members of that family. So also did Johnson (1962), in her review of the 7 species of *Fahrenholzia* which occur on spiny pocket mice of the subfamily Heteromyinae. Meanwhile Menzies et al. (1951) had recorded *F. pinnata* Kellogg and Ferris from *Onychomys leucogaster*, a member of the myomorph family Cricetidae, where perhaps it was a straggler.

Stojanovich and Pratt (1961), when describing *F. texana* as a new species, gave a key to the 6 species of *Fahrenholzia* then known from the United States. The present paper includes the description of another new species from Texas, a key to the 12 species now known in this genus, and a list of their respective hosts.

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Fahrenholzia boleni, new species

(Fig. 1–5)

MALE.—Length of holotype male 0.837 mm. Head about as long as broad, with very little constriction between it and thorax; antennae with 5 distinct segments, segment 4 with projecting lobe. Thorax longer than wide; thoracic sternal plate (Fig. 3, 4) notched to accomodate first and third pairs of legs, anterior margin concave, posterior projection with blunt apex. Legs characteristic of genus, without toothlike projection at outer basal angle of tarsus. Claws of fore legs long and narrow, not bifurcate at apex; those of middle legs thicker, with small notches at basal region of plantar surface; claws of hind legs largest, also with small notches on plantar surface; tibiae of hind legs with a large spine on dorsal surface. Dorsal longitudinal plate on second abdominal segment narrowing posteriorly, with a single, large seta on outer margin at approximately middle of plate. Paratergal plates present on segments 2–4. Plate III bilobed, outer lobe much larger that inner lobe, each

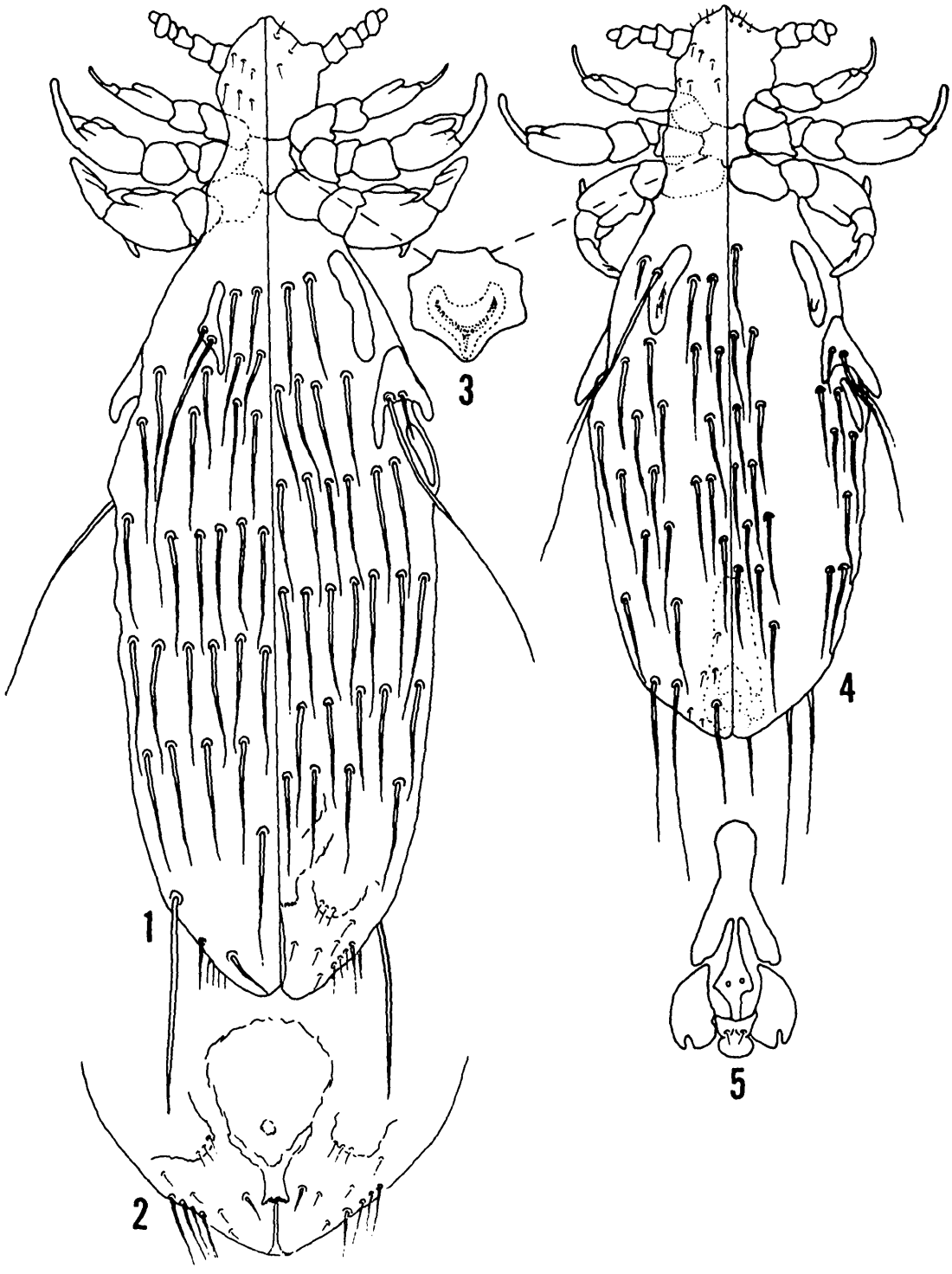

FIG. 1–5.—*Fahrenholzia boleni*. 1, Female allotype. 2, Same, genital plate. 3, Same, thoracic sternal plate. 4, Male holotype. 5, Same, aedeagus.

with rounded apex, outer plate extending from body region and bearing 2 setae of similar structure, the inner seta shorter, the outer one longer than plate. Plate IV simple, without setae, narrowing to apex which usually is rounded but sometimes is concave. Setation of abdomen as in Fig. 4. Aedeagus as in Fig. 5.

FEMALE.—Similar to male, but larger. Length of allotype female 1.13 mm. Thoracic sternal plate like that of male. Genital region as in Fig. 2. Genital plate quadrate, its posterior angle extended into a narrow, apically fringed process. Genital setae 8, arranged as in Fig. 2. Lateral setigerous lobes of segment 8 rounded at apex and bearing 3 small setae. Setation of abdomen as in Fig. 1.

TYPES.—Holotype male, allotype female, and 2 paratypes of each sex from *Perognathus merriami merriami,* 10 miles south of Rivera, Kenedy Co., Texas, March 11, 1966. Holotype and allotype, each mounted on a single slide, deposited in U.S. National Museum (type no. 69803). Paratypes (1 of each sex) in South Dakota State University insect collections and in the author's personal collection. An additional female and several nymphs were collected at the same time and place as were the types.

Fahrenholzia boleni is separable from its closest relative, *F. pinnata* Kellogg and Ferris by the characters given in the following key. The species is named in honor of Professor Eric Bolen, of Texas Technological College, Lubbock, Texas, for his contributions to wildlife science.

KEY TO THE SPECIES OF *FAHRENHOLZIA*

1. Paratergal plates present on abdominal segments 2–4 only 2
   Paratergal plates present on abdominal segments 2–6 at least 11
2. First antennal segment with sharply defined, pointed tooth on dorsal surface; thorax dorsolaterally with rounded, semimembranous, wrinkled expansions set off by convex, sclerotized ribs 3
   Not as above 4
3. Paratergal plate II with both apical setae longer than apical lobe of the plate. Male with posteromedian extension of basal plate of aedeagus not attached to basal plate, broadest apically. Female with anterolateral margins of genital plate not more than twice as long as lateral, oblique margins of gonopods ..... *ehrlichi*
   Paratergal plate II with 1 of the apical setae shorter than apical lobe of the plate. Male with posteromedian extension of basal plate attached to the plate, narrowest apically. Female with anterior, oblique margins of genital plate more than twice as long as anterolateral margins of gonopods ..... *microcephala*
4. Antennal segments 3–5 completely coalesced, not longer than head; thorax not broader than head; sternal plate divided into anterior and posterior sections (male unknown) ..... *hertigi*
   Antennal segments 3–5 not fused; sternal plate a single structure 5
5. Second and third tarsi with a toothlike projection at outer basal angle; paratergal plate III (that of third abdominal segment) with ventral apical angle truncate 6
   Second and third tarsi without a toothlike projection at outer basal angle; ventral apical angle of paratergal plate III not truncate 7
6. Postantennal head margins with heavily sclerotized area and horizontal band extending to ventral surface of head. Basal plate of aedeagus with posterior median process as broad apically as basally; posterolateral arms of basal plate extending almost entire length of parameres. Female with lateral margins of genital plate evenly convex ..... *ferrisi*
   Postantennal head margins without heavily sclerotized area or horizontal band. Basal plate with lateral posterior arms shorter than parameres and with median process narrowing apically. Female with lateral margins of genital plate angulate ..... *schwartzi*
7. Thoracic sternal plate longer than wide 8
   Thoracic sternal plate about as long as wide 9
8. Claws of fore legs bifurcate, those of other legs not longer than width of head; paratergal plate II longer than plate III. Male with toothlike projections on parameres; posteromedian extension of basal plate detached. Female with lateral setigerous lobes of segment 8 horizontally elongate; genital plate without circular sclerotization near posterior apex ..... *texana*
   Claws of fore legs not bifurcate, those of hind legs almost as long as width of head; paratergal plate III as long as plate II. Male with posteromedian process attached to basal plate; parameres without toothlike posterior projections; pseudopenis acutely rounded apically. Female with lateral setigerous lobes of segment 8 oval ..... *fairchildi*
9. Thoracic sternal plate with circular posterior margin, posterolateral margins not concave; paratergal plates of second abdominal segment with 6–8 long, inflated setae between dorsal and ventral lobes. Male with parameres not expanded. Female with genital plate absent ..... *reducta*
   Thoracic sternal plate with pointed posterior margin and concave posterolateral margins 10
10. Thoracic sternal plate with concave anterolateral margins. Male with inner lobes of parameres rounded. Female with genital plate quadrate, its posterior angle produced as a narrow, apically fringed process ..... *boleni*
    Thoracic sternal plate with evenly rounded anterolateral margins. Male with inner lobes of parameres pointed. Female without apically fringed process on genital plate ..... *pinnata*
11. Paratergal plates present on abdominal segments 2–6, that on segment 3 bilobed ..... *zacatecae*
    Paratergal plates present on abdominal segments 2–7, that on segment 3 not bilobed ..... *tribulosa*

LIST OF *FAHRENHOLZIA* SPECIES AND THEIR HOSTS

F. boleni McDaniel	*Perognathus merriami merriami*
F. ehrlichi Johnson	*Liomys irroratus canus*
	L. i. jaliscensis
	L. i. texensis
	L. i. alleni
F. fairchildi Johnson	*Heteromys desmarestianus*
	Liomys adspersus
	L. salvini salvini
F. ferrisi Werneck	*Heteromys goldmani*
	H. sp.
F. hertigi Johnson	*Heteromys desmarestianus*
	Zygodontomys cherriei[2]
F. microcephala Ferris	*Liomys irroratus*
	L. pictus obscurus

[2] Probably a straggler, according to Johnson.

F. pinnata Kellogg and Ferris	*Dipodomys californicus*
	D. deserti
	D. merriami cimiolus
	D. m. nevadensis
	D. ordii
	D. ornatus
	D. phillipsii
	Onychomys leucogaster
	Perodipus richardsoni
	Perodipus sp.
	Perognathus parvus olivaceus
	Microdipodops polionotus
F. reducta Ferris	*Perognathus formosus*
F. schwartzi Werneck	*Heteromysanomalus anomalus*
	H. anomalus [ssp.?]
F. texana Stojanovich and Pratt	*Liomys irroratus texensis*
F. tribulosa Ferris	*Perognathus californicus*
F. zacatecae Ferris	*Perognathus hispidus zacatecae*
	P. h. hispidus

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Seasonal Distribution, Sex Ratios, and Mating of Female Noctuid[1] Moths in Blacklight Trapping Studies[2,3]

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ABSTRACT

Moths of the cabbage looper, *Trichoplusia ni* (Hübner); the corn earworm, *Heliothis zea* (Boddie); the armyworm, *Pseudaletia unipuncta* (Haworth); the yellow-striped armyworm, *Prodenia ornithogalli* Guenée, and the alfalfa looper, *Autographa californica* (Speyer), were collected from traps equipped with blacklight lamps in Home Gardens, and Riverside, California, in 1964–65 and studied to determine possible correlations between seasonal abundance, mating of females, sex ratios of the collections, and seasonal temperature. The abundance of the species varied between the 2 areas, both in total yearly catch and in the size of catches within a given trapping period. Mating appeared to be related more to the total density than to sex ratios during a trapping period. The yearly mating of each species was quite similar in the 2 areas, and the time of night at which the moths were trapped appeared to have little effect on the number of matings per female. Populations were generally higher during the summer months.

Traps equipped with blacklight lamps have been used extensively for surveys and as research tools to determine seasonal abundance, distribution, time of activity, and seasonal population trends of many insect species. After Callahan and Chapin (1960) stressed the importance of mating and other factors in determining the reproductive potential of a lepidopterous population, Graham et al. (1965), by collecting moths of the pink bollworm, *Pectinophora gossypiella* (Saunders), in traps and counting the spermatophores per female, obtained a positive correlation of mated females to the logarithm of the number of moths collected; also they found that females mated less often early in the season than in midseason. Thus these authors suggested that during periods of low population, the percentage of unmated females was high. Callahan (1965) stressed the importance of recording mating of moths collected in light traps and noted and gave possible reasons for the increased mating of corn earworm, *Heliothis zea* (Boddie), in traps equipped with blacklight lamps in the Southern United States, particularly at low population levels.

This paper summarizes results of studies conducted with traps equipped with blacklight lamps at Riverside and Home Gardens, Calif., on 5 species of noctuid moths: the cabbage looper, *Trichoplusia ni* (Hübner); the corn earworm; the armyworm, *Pseudaletia unipuncta* (Haworth); the yellow-striped armyworm, *Prodenia ornithogalli* Guenée; and the alfalfa looper, *Autographa californica* (Speyer).

PROCEDURES AND RESULTS

Two study areas, one at Home Gardens and the other on the campus of the University of California, Riverside, were selected. Home Gardens has cruciferous crops grown throughout the year; Riverside has little or no cruciferous planting in the general area. Both areas are surrounded by foothills having an abundance of annual plants and grasses which would tend to support the insects under consideration only during the spring and summer months. During the rest of the year few annual native plants are in a condition to support the subject insects. At both locations, light traps equipped with 15-w fluorescent blacklight lamps were used.

At Home Gardens, 4 of the traps were distributed 1 mile apart within about 690 acres and operated from

[1] Lepidoptera: Noctuidae.

[2] Accepted for publication April 17, 1967.

[3] In cooperative arrangement with the University of California, Riverside.