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THE ACARINE GENUS *SYRINGOPHILUS* IN NORTH AMERICAN BIRDS

BY

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In the acarine suborder Trombidiformes are a number of minor parasitic families of mites whose biological potential for transmitting microbial diseases has not been explored. These include the Myobiidae, Harpirhynchidae and Syringophilidae. My investigations indicate that the last 2 are abundant in North American birds. In particular I have found syringophilids in a relatively high percentage of the avian species which have been handled in any numbers.

Mites of the family Syringophilidae characteristically are found living inside the shafts of the large flight feathers of the wing, particularly in the secondaries. Occasionally they occur in the shafts of the tail feathers and even the body feathers (HIRST, 1922). No conclusive information is available on how and when these mites penetrate or leave the feather shaft. It is probable that some forms of the mites are able to migrate out of the feather shafts in search of new feathers or hosts since syringophilids are occasionally found on birds outside of the feather shafts.

The mouthparts of syringophilids are long, slender, piercing stylets often with harpoon shaped heads. This structure indicates that these mites feed by piercing the soft, highly vascular, living tissue within the feather and ingesting the seeping fluids. This practice places the Syringophilidae on the list of possible disease vectors. In addition the frequent occurrence of these mites on birds, the presumed migration of the mites at the time of molting and nesting, and their protected environment further increases their potential as disease vectors.

Because they are not often recovered by the usual collecting methods and because of a lack of obvious taxonomic characters, relatively few species of syringophilids have been described. The most recent comprehensive paper on the group, (FRITSCH, 1958), describes 6 new species and 1 new subspecies of *Syringophilus*, reviews the pertinent literature, and presents a key and figures for the species now known. Only one of these, *Syringophilus bipectinatus*, has been recorded in the United States

(REBRASSIER and MARTIN, 1932). *Syringophilus columbae* Hirst, 1920 has also been described from domestic pigeons in the U. S. (HIRST, 1920 ; 1922).

Over a 3-year period approximately 300 small birds of the more common eastern species and more than 600 icterids have been searched for syringophilid by the writer. The occurrence of 6 species of these mites in 12 avian species and an observed incidence of as high as 40 per cent of birds infested by syringophilids in certain populations of the common grackle indicate that these mites are common in North American birds and that the family will grow considerably in numbers of species as more birds are examined.

Since an assessment of the taxonomy and distribution of the syringophilids in North American birds is essential to subsequent studies on their biology and vector potential, descriptions of the females of those species found by us is hereby presented. Only one of these species, *S. minor*, was included among those species discussed by FRITSCH (1958) from European birds. All measurements presented here are in millimeters.

Morphology. — Syringophilids are elongate, thin, almost worm-like mites well adapted for their parasitic existence within the feather shaft. They are generally milky white to opaque yellow in color and do not assume the red, reddish brown, or black appearance associated with the larger blood feeding mites. Morphological variation within the group does not seem to be extreme and the discovery of reliable taxonomic characters requires considerable effort. Syringophilids are small mites and generally range in length from 0.5 to 2 mm ; in width from 0.1 to 0.4 mm. The body is divided by indistinct constrictions into 3 main areas ; the proterosoma which includes the gnathosoma and the region of legs 1 and 2 ; the mesosoma, a new term hereby proposed for the area of legs 3 ; and the opisthosoma, used here as including the region of legs 4 posterior to the end of the body. The opisthosoma is occasionally subdivided again by a faint constriction behind the 4th pair of legs. The two main body constrictions are the propodosomal constriction just posterior to the propodosomal shield, and the mesosomal constriction between legs 3 and 4.

Proterosoma. — The gnathosoma is generally elongate and bears a pair of well developed, 4-segmented palpi. The rostrum ends apically in a pair of thin, rounded lips. These rostral lips are important diagnostic characters according to their shape and the presence or absence of decorative teeth on the leading edge and bristle-like setae in the stylet emergence area. The rostrum bears a pair of anterior and a pair of posterior rostral setae ventrally. Dorsally there is a single pair of setae and occasionally a sclerotized rostral shield. The mouthparts are long, narrow, stylets, often harpoon shaped at their apex, which emerge at the distal tip of the rostrum. The tarsi of the gnathosomal palps bear a pair of specialized claw-like setae and a short thumb-like seta in addition to three elongate, simple setae. The length and form of the specialized setae are important diagnostic characters. In addition we have used a character termed the thumb-claw index which is the number obtained when the length of the longer distal claw seta is divided into the length of the shorter

thumb seta. The gnathosoma bears dorsally a pair of diagnostically important peritremes. These consist of a fragile internal section and a more sturdy emergent section. The peritremal sections are subdivided into a number of segments of characteristic form. The segments of the emergent peritreme may be either sharply or bluntly serrate, or quite rounded, appearing like a string of beads.

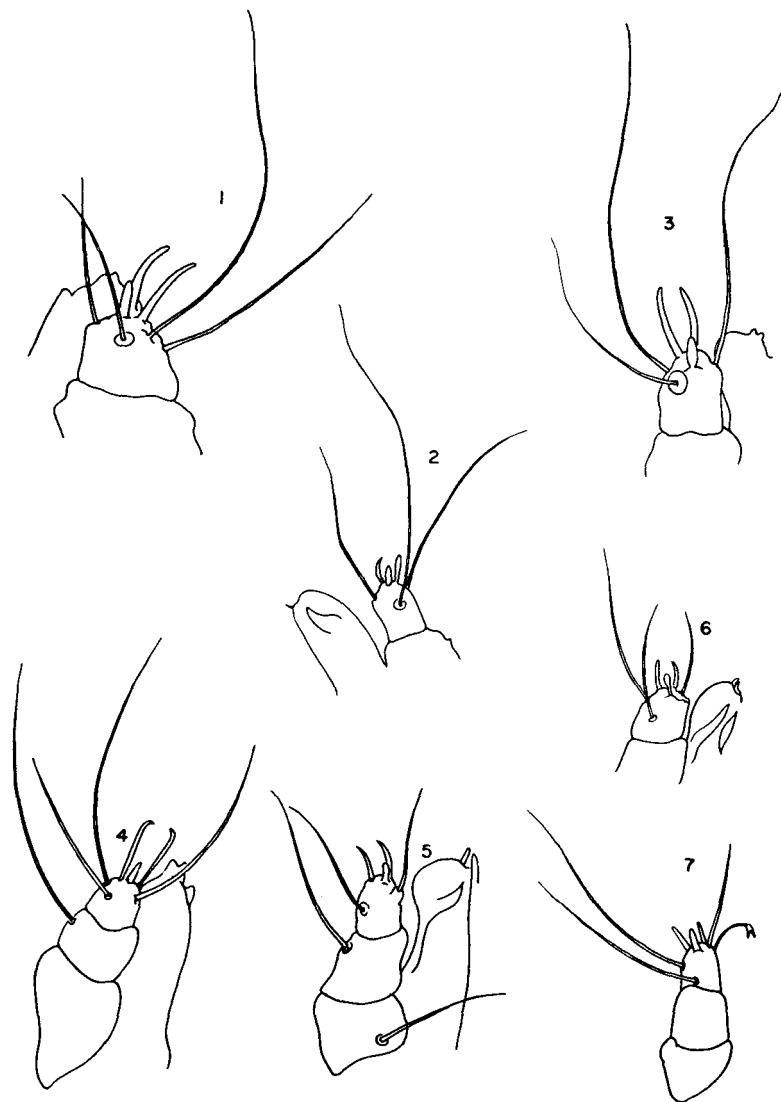


FIG. 1. *Syringophilus icteridae*, gnathosoma. — FIG. 2. *Syringophilus minor*, gnathosoma. — FIG. 3. *Syringophilus passerinae*, gnathosoma. — FIG. 4. *Syringophilus hylocichlae*, gnathosoma. — FIG. 5. *Syringophilus dendroicae*, gnathosoma. — FIG. 6. *Syringophilus zenadourae*, gnathosoma. — FIG. 7. *Syringophilus seiuri*, gnathosoma.

Internally the propodosoma carries a strongly sclerotized, curving, cheliceral apodeme of characteristic shape and size. A measurement from the gnathosomal apex to the curve of this apodeme is one of the most stable figures available for comparison. The sclerotized coxal bases of legs 1 and 2 are seen ventrally on the propodosoma. The configuration of these structures, particularly the point on

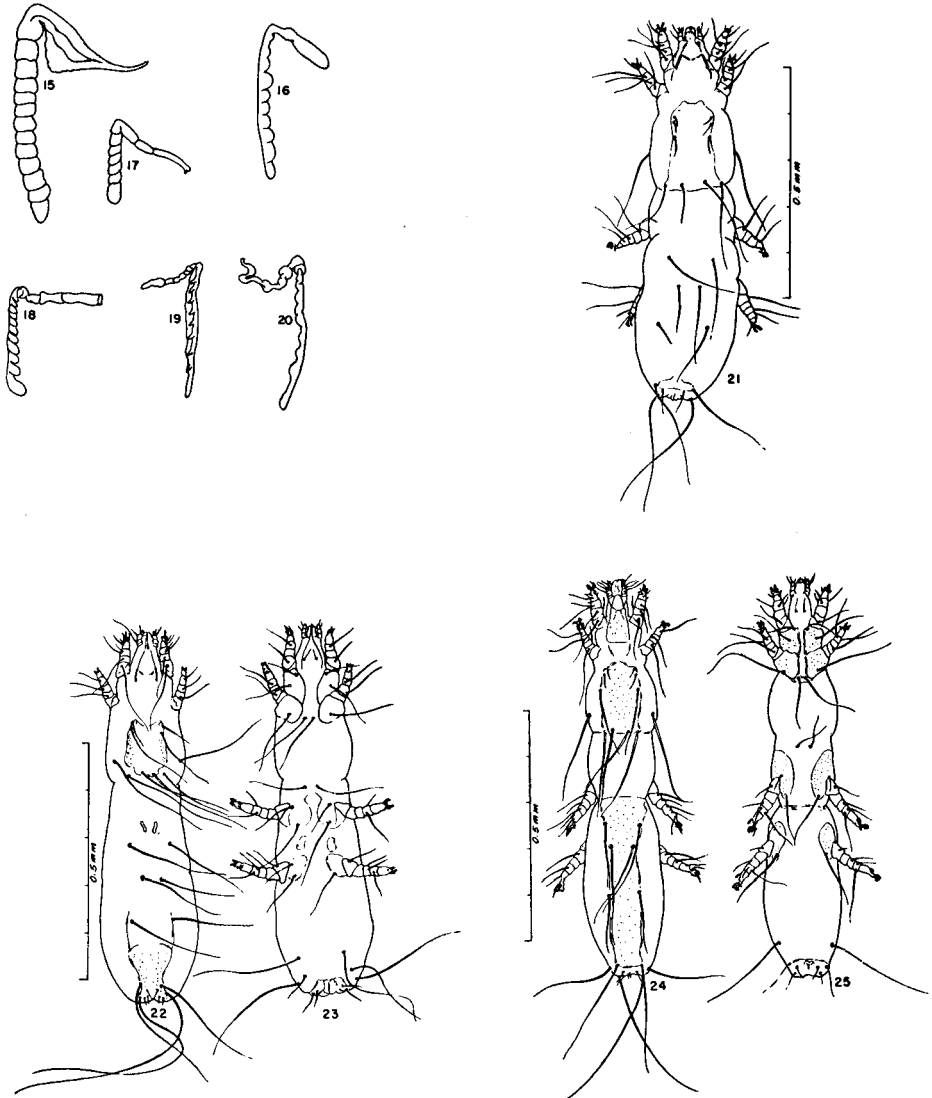


FIG. 15. *Syringophilus icteridae*, peritreme. — FIG. 16. *Syringophilus hylocichlae*, peritreme. — FIG. 17. *Syringophilus zenadourae*, peritreme. — FIG. 18. *Syringophilus dendroicae*, peritreme. — FIG. 19. *Syringophilus minor*, peritreme. — FIG. 20. *Syringophilus seiuri*, peritreme. — FIG. 21. *Syringophilus dendroicae*, dorsal. — FIG. 22, 23. *Syringophilus zenadourae*, dorsal and ventral. — FIG. 24, 25. *Syringophilus seiuri*, dorsal and ventral.

coxal base 2 where coxal base 1 merges, is of diagnostic importance. Dorsally the propodosoma bears a dorsal shield or plate of varying shape, sclerotization, and ornamentation which is of considerable taxonomic importance. In addition, the first 6 pairs of dorsal setae are also seen. These setae are generally on the shield although sometimes certain of these occur off the shield or even are missing. The relative distances between these setae and their length are important. In addition 3 ratios have been used as characters : The distance between dorsal setae 1 and 2 divided into the distance between setae 1 and 3 (ratio 1-3 ÷ 1-2) ; the distance between dorsal setae 1 and 2 divided into the distance between 1 and 6 (ratio 1-6 ÷ 1-2) ; and the length of dorsal seta 1 divided into the length of dorsal seta 6 (ratio 6 ÷ 1).

Mesosoma. — The mesosoma lacks either dorsal or ventral sclerotization and is usually provided with fine cuticular striations. Ventrally there is a single pair of mesosomal setae and 2 pair of coxal setae. The coxa of leg 3 is vestigial and may or may not be indicated by a sclerotized plate.

Opisthosoma. — Dorsally the opisthosoma bears dorsal setae 7, 8, and 9. A sclerotized shield may or may not be present. If present, it is generally pygidial in nature and confined to the posterior region, although in some species the entire dorsal opisthosoma is covered. Posteriorly there are 1 or 2 pairs of pygidial setae, 1 or 2 pairs of terminal setae and variable numbers of anal setae on the dorsal surface. Ventrally the opisthosoma carries the vestigial coxal plates and coxal setae of leg 4. There are also 2 or 3 pairs of ventral opisthosomal setae and a variable number of genital setae.

Legs. — The legs of syringophilid are generally well developed and of equal size. Coxae 1 and 2 are fixed plates ; coxae 3 and 4 are vestigial so that the legs appear superficially to have 5 segments. The tarsi of all legs terminate in a characteristic clawed, setate pulvillus and bear both simple and highly modified fan setae. Other leg segments are sparsely setate, with long simple setae and specialized setae sometimes useful as diagnostic characters.

Key to species of *Syringophilus* now known from wild birds in U. S.

- 1a) Anterior rostral border lacking decorative teeth..... 2
- 1b) Anterior rostral border with 1, usually 2 and sometimes 3 pairs of blunt teeth. Dorsal setae whip-like..... 5
- 2a) Opisthosoma with prominent, punctate dorsal plate extending anteriorly to mesosomal constriction. Dorsal setae weakly spinose at margins..... *S. seiuri* n. sp.
- 2b) Dorsal opisthosomal plate, if present, restricted to posterior region ; pygidial in nature. Dorsal setae smooth at margins..... 3
- 3a) Fan seta on leg 4 with 15-16 fine tines. Thumb seta capitate. Emergent peritreme with 5-7 bead-like segments..... *S. zenadourae* n. sp.
- 3b) Fan seta on leg 4 with 5-6 stout tines..... 4
- 4a) Internal peritreme with 8-9 ball-like segments ; emergent peritreme with 7-8 serrate segments *S. minor*

- 4b) Internal peritreme with 2-3 elongate segments ; emergent peritreme with 11 serrate segments..... *S. dendroicae* n. sp.
- 5a) Anterior border of rostrum bearing two large, blunt teeth ; emergent peritreme with 11 serrate segments rounding at edges ; ratio of distances between dorsal setae 1 — 2-6 = 7 + ; edges of coxal bases 1 merge with edges coxal bases 2 about 1/2 down their length..... *S. hylocichlae* n. sp.
- 5b) Anterior rostral border with 1, 2, or 3 pairs of smaller teeth ; ratio of distances between dorsal setae 1 — 2-6 = 5-6 ; edges of coxal bases 1 merge with edges coxal bases 2 less than 1/2 down their length..... 6
- 6a) Size very large, females generally 1.5 — 2 mm in total length ; emergent peritreme with 13-14 round segments ; dorsal setae 7 and 9 long ; 0.5 mm ; rod seta on tibia 1 short and stout, less than 1/2 the length of tibia..... *S. icteridae* n. sp.
- 6b) Size smaller, less than 1 mm in length ; median band on dorsal plate very heavily sclerotized ; emergent peritreme with 10 serrate segments, rostrum elongate, length rostral apex to curving apodeme about 0.3 mm..... *S. passerinae* n. sp.

Syringophilus seiuri n. sp.

(Figs. 24, 25).

Female. — Elongate, yellowish-white in color ; total length 0.83 ; width of abdomen 0.22 ; body divided into proterosoma, mesosoma, and opisthosoma ; opisthosoma prominent and saclike, separated from mesosoma by a strong constriction, propodosomal constriction weak, making mesosoma and proterosoma appear superficially as a single region. Propodosoma with a well sclerotized dorsal shield having minute punctations generally and bearing setae 1, 2, 3, 5 and 6. Fourth pair setae not on shield ; mesosoma not sclerotized, with transverse striations ; opisthosoma bearing a moderately sclerotized dorsal shield having generalized minute punctations ; this shield weakly sclerotized and inapparent at its middle. Length, tip of gnathosoma to propodosomal constriction 0.33 ; length propodosomal to mesosomal constriction 0.17 ; length mesosomal constriction to posterior opisthosoma 0.33.

Gnathosoma. — Elongate ; anterior rostral border smoothly rounding, extending beyond palpi, and lacking decorative dentition (Fig. 7). With a pair of short 4-segmented palpi 0.034 long ; palpal tarsus bearing claw-like and thumb setae ; length distal claw seta 0.0065 ; length thumb seta 0.004 ; claw-thumb index 6 ; rostrum with bilateral peritremes dorsally, internal section with 4 segments, emergent section 0.041 long having 8 weakly serrate segments (Fig. 20). Rostrum bearing a sclerotized, punctate plate dorsally.

Proterosoma. — Width of shield at level of third setae 0.089 ; distance between setae 1 and 2, 0.005 ; between setae 1 and 3, 0.037 (2-3 ÷ 1-2 ratio = 6) ; between setae 1 and 6, 0.118 (ratio 2-6 ÷ 1-2 = 23). Length 1st dorsal seta 0.032 ; length second dorsal seta 0.046 ; length 6th dorsal seta 0.22 (ratio 6 ÷ 1 = 6.9). Ventrally propodosoma bearing sclerotized coxal bases of legs 1 and 2 which carry sclerotized, punctate plates ; bases of coxa I run posteriad and parallel, to end at pos-

terior bases of coxa II without closing. Length, tip of gnathosoma to base coxa I, 0.097; length gnathosoma to curving cheliceral apodeme 0.16; width apodeme 0.054.

Opisthosoma. — Dorsal plate on opisthosoma well developed and punctate, bearing dorsal setae 7-9; length 7th seta, 0.146; length 9th seta 0.136. Dorsal setae stout, ending in fine points, not whip-like; dorsal setae, particularly 1-6 weakly spinose at margins.

Legs. — Generally well developed and of equal size; all legs bearing tarsal fan setae; fan setae on leg 4 with about 6 times; length leg 1 to coxal base 0.1; length leg 4 including coxa 0.138; rod seta on tibia 1 approximately equals tibia in length.

Diagnosis. — This species may be differentiated from *S. bisetatus*, the only other known species with nonornamented rostrum and similar coxal bases, by the presence of the punctate opisthosomal shield and the peculiar spinose dorsal setae.

Type host. — The ovenbird, *Seiurus aurocapillus*. Specimens morphologically similar to and apparently conspecific with this species have been taken by us from the worm eating warbler, *Helminthos vermivorus*, and the song sparrow, *Melospiza melodia*.

Type locality. — Beltsville, Maryland, A.R.C., Sept. 29, 1960.

Type material. — Holotype filed in the U.S. National Museum, Washington, D. C. (66860). Paratypes at the Rocky Mountain Laboratory (RML).

***Syringophilus zenadourae* n. sp.**

(Figs. 22, 23).

Female. — Elongate, rather stout, yellowish-white; total length 0.75; width abdomen 0.19. Body divided by poorly defined constrictions into proterosoma, mesosoma and opisthosoma; mesosomal constriction inapparent, making mesosoma and opisthosoma appear superficially as a single area. Length, tip of gnathosoma to propodosomal constriction 0.29.

Gnathosoma. — Elongate; anterior rostral border smooth, lacking decorative dentition and bearing a pair (2 per side) of short, bristle-like stylet emergence setae (Fig. 5); with a pair of well developed 4-segmented palpi 0.037 long; palpal tarsus with claw-like and thumb setae; length distal claw seta 0.0055; length thumb seta 0.004, thumb seta capitate, wider at apex than base; (claw-thumb index 7.3); rostrum with bilateral peritremes dorsally, internal section smooth, 2-segmented; emergent section 0.023 long with 5-7 rounding, bead-like segments (Fig. 17).

Proterosoma. — Provided with a weakly sclerotized shield dorsally which has a few minute punctations at the lateral margins and bearing dorsal setae 1, 2, 5,

and 6. The 4th seta is off the shield, the 3rd is apparently missing. Width of shield at level of lateral punctations 0.079. Distance between setae 1 and 2, 0.011; between 1 and 6, 0.15 (ratio 2-6 ÷ 1-2 = 3.6). Length 1st dorsal setae 0.065; length 6th dorsal setae 0.19 (ratio 6 ÷ 1 = 2.9). Ventrally propodosoma bearing sclerotized coxal bases of legs 1 and 2. Base coxa 1 runs posteriad and diverges to merge with base coxae 2, 2/3 down its length. Bases coxae 2 weakly sclerotized posteriorly; coxal plates lightly punctate. Length, tip of rostrum to base coxa I, 0.096; length rostral tip to cheliceral apodeme 0.19; width apodeme 0.05.

Opisthosoma. — Opisthosomal plates restricted to posterior dorsum where a small, well sclerotized punctate shield is seen. Length 7th seta 0.215; length 9th seta 0.19. Dorsal setae whip-like, with smooth sides. Legs well developed, all with prominent tarsal fan setae; fan seta on tarsus 4 with 16 + fine tines; length leg 1 to coxal base 0.095; length leg 4 including coxa 0.11; rod seta on tibia I sword-like, approximately equals the tibia in length.

Diagnosis. — This species is differentiated from other wild bird syringophilids by the loss of dorsal setae 3. It differs from *S. columbae* in having dorsal seta 2 approximately twice as long as dorsal seta 1 and 5-7 rather than 4 segments in the emergent peritreme.

Type host. — The mourning dove, *Zenadoura macroura*.

Type locality. — Laurel, Maryland, 1/22/60.

Type material. — The holotype is filed in the U. S. National Museum, Washington, D. C. (66861). Paratypes at Rocky Mountain Laboratory.

Syringophilus minor Berlese, 1887.

Syn. : *S. bipectinatus forma minor* Berlese, 1887.

S. minor minor Berlese, 1887.

This species is found in the wing feathers (remiges) of the house sparrow, *Passer domesticus*. It is not *S. bipectinatus* Haller, 1880. FRITSCH (1958) split the species into two subspecies; *Syringophilus minor minor* Berlese, 1887 from the house sparrow and *Syringophilus minor glandari* Fritsch, 1958 from the birds *Garrulus glandarius* and *Coccothraustes coccothraustes*. On the basis of FRITSCH's description and figures it is probable that these forms are in fact separate species. Moderate morphological differences between the females are given emphasis by striking differences in the size and shape of the male aedeagus. Therefore no subspeciation in *S. minor* will be recognized in this paper.

This species is hereby redescribed from specimens in our collection with emphasis on those characters useful in separating species from North American birds.

Female. — Elongate, thin, yellowish-white; total length about 0.67 mm; maximum width of abdomen approximately 0.09 mm. Body divided by poorly defined constrictions into three main areas: propodosoma, including the gnathosoma

and leg pairs 1 and 2 ; mesosoma or the region of the third pair of legs ; and opisthosoma which, in the syringophilids, includes the region of the fourth pair of legs posteriorly to the end of the body. The propodosoma and opisthosoma are provided with more or less sclerotized areas or plates dorsally while the mesosoma is unsclerotized with weak transverse striations.

Length, tip of gnathosoma to propodosomal constriction about 0.276 mm ; length, propodosomal to mesosomal constriction, 0.08 mm ; length mesosomal constriction to posterior opisthosoma 0.31 mm.

Gnathosoma. — Elongate ; anterior rostral border smoothly rounding, labium-like, extending anteriorly beyond palpi, lacking decorative dentition and bearing a pair of short, bristle-like setae at the stylet emergence area (Fig. 2) ; with a pair of well developed 4-segmented palpi 0.034 mm long ; palpal tarsus characteristically bearing a pair of claw-like setae and a blunt, thumb-like seta apically ; length, distal claw seta 0.005 mm ; length thumb seta 0.004 mm ; claw-thumb index 0.8 ; rostrum with bilateral peritremes dorsally consisting of a transverse internal section and an emergent longitudinal section. Internal segments 8 or 9, ball-like ; emergent section 0.039 mm long having 7-8 serrate segments (Fig. 19).

Proterosoma. — Provided with a weakly sclerotized unornamented shield covering the propodosoma dorsally and bearing the first 5 pair of dorsal setae. Width of shield at level of third setae 0.11 mm. Distance between setae 1 and 2, 0.006 mm ; between 1 and 3, 0.04 (ratio $2-3 \div 1-2 = 7$) between 1 and 5, 0.116 (ratio $2-5 \div 1-2 = 19$). Length 1st dorsal setae, 0.024 ; length, 5th dorsal seta 0.17 (ratio $5 \div 1 = 7$). Ventrally propodosoma bearing sclerotized coxal bases of legs 1 and 2. Base coxa 1 ends less than halfway down base coxa 2 ; bases coxa 2 weakly sclerotized posteriorly ; length, tip of gnathosoma to base coxa I, 0.096 ; length gnathosoma to curving mandibular apodeme, 0.174 ; width apodeme 0.049.

Opisthosoma. — Dorsal plates on opisthosoma weakly sclerotized and inapparent ; opisthosomal dorsum bearing dorsal setae 7-9 ; length 7th seta 0.13 ; length 9th seta 0.11 mm. Dorsal setae moderately stout, ending in sharp points, not whip-like.

Legs. — Legs generally well developed and of equal size. Legs 2, 3 and 4 bearing tarsal fan setae ; fan setae on tarsus 1 poorly developed ; fan setae on leg 4 bearing 6 tines ; length, leg I to coxal base 0.087 mm ; length leg 4 including coxa 0.1 mm ; rod seta on tibia I short, 0.024 mm, less than the length of the tibia.

Male. — As generally described ; 0.45 mm long by 0.137 mm wide ; aedeagus only slightly curved, about 0.07 mm long.

Diagnosis. — *S. minor* is differentiated from other known species by the characteristic ball-like segments of the internal peritreme, the presence of 5-6 stout tines on the fan seta of tarsus 4, and the unornamented rostral border.

Host. — The house sparrow, *Passer domesticus*.

Locality. — Europe and North America. Specimens here described taken from a house sparrow collected at Blackwater Refuge, Cambridge, Maryland July 27, 1960.



FIG. 26, 27. *Syringophilus passerinae*, dorsal and ventral.

***Syringophilus dendroicae* n. sp.**

(Fig. 21).

Female. — Rather small and stubby ; total length 0.72-0.81 ; width of abdomen 0.20 ; prosoma set off from the rest of the body by a strong prosomal constriction ; mesosomal constriction weak making mesosoma and opisthosoma appear superficially as one region. Propodosoma with a weakly sclerotized dorsal shield having minute punctations confined to the lateral border and bearing dorsal setae 1, 2, 3, 5 and 6 ; opisthosoma lacks dorsal sclerotization except at posterior end where a faint sclerotization suggests itself. Length, tip of gnathosoma to propodosomal constriction 0.325.

Gnathosoma. — Anterior rostral border smoothly rounding, extending beyond palpi and lacking decorative dentition ; and bearing a pair of prominent, stubby setae flanking the emerging stylets (Fig. 5). With a pair of short, 4-segmented palpi 0.039 long ; palpal tarsus bearing claw-like and thumb setae ; length distal claw seta 0.006 ; length thumb seta 0.0035 ; claw-thumb index 5.8 ; rostrum with bilateral peritremes dorsally, internal section with 2-3 segments, emergent section

0.03 long having 11 serrate segments (Fig. 18) ; rostrum humped, lacking a definite dorsal plate.

Proterosoma. — Width of shield at level of third setae 0.096 ; distance between setae 1 and 2, 0.011 ; between setae 1 and 3, 0.049 ($2-3 \div 1-2$ ratio = 4.4) ; between setae 1 and 6, 0.14 (ratio $2-6 \div 1-2$ = 12.6). Length 1st dorsal seta 0.032 ; length second dorsal seta 0.045 ; length 6 th dorsal seta 0.21 (ratio $6 \div 1$ = 6.6). Ventrally propodosoma bears sclerotized coxal bases of legs 1 and 2 which carry sclerotized, sparsely punctate plates ; bases of coxa I run posteriad, diverging to merge with bases coxae II $3/4$ way down their length. Length, tip of gnathosoma to base coxa I 0.098 ; length rostral tip to curving cheliceral apodeme 0.17 ; width apodeme 0.065.

Opisthosoma. — Lacking dorsal plates ; length 7th dorsal setae 0.15 ; length 9th dorsal setae 0.14 ; dorsal setae ending in fine points but not whip-like and smooth at margins. Ventral opisthosoma bearing sclerotized, punctate plates against coxae 3 and 4.

Legs. — Generally well developed and of equal size ; all legs bearing tarsal fan setae ; fan seta on leg 4 with about 5 stout tines ; length leg 1 to coxal base 0.11 ; length leg 4 including coxa 0.12 ; rod seta on tibia 1 approximately equals tibia in length.

Diagnosis. — This species may be differentiated from *S. seiuri* which it closely resembles in size and setation by the lack of definite anterior opisthosomal shield, smooth dorsal setae, configuration of coxal bases 1 and 2 and the prominent stylet emergence setae on the rostrum.

Type host. — The myrtle warbler, *Dendroica coronata*.

Type locality. — Chincoteague, Virginia, Sept., 1961.

Type material. — Holotype filed in the U. S. National Museum, Washington, D. C. (66862).

***Syringophilus hylocichlae* n. sp.**

(Figs. 28, 29).

Female. — Elongate, yellowish-white ; total length 0.98 ; width of abdomen 0.21 ; body divided into propodosoma, mesosoma and opisthosoma. Propodosomal constriction strong, mesosomal constriction less apparent. Propodosoma with a moderately sclerotized dorsal shield having a wide, median band, more heavily sclerotized and having vague, pit-like decorations ; sides of shield with scattered small punctations. Dorsal setae 1, 2, 3, 5 and 6 borne on shield. Mesosoma not sclerotized ; opisthosoma lacking a dorsal shield anteriorly although a suggestion of a small, bilaterally lobed shield is seen posteriorly. Length, tip of gnathosoma to propodosomal constriction 0.44 ; length propodosomal to mesosomal constriction 0.11 ; length mesosomal constriction to posterior opisthosoma 0.39.

Gnathosoma. — Elongate, each anterior rostral border decorated with two large teeth (Fig. 4). With a pair of 4-segmented palpi 0.051 long; length distal claw seta 0.011; length thumb seta 0.005; claw-thumb index = 4.5; rostrum with bilateral peritremes dorsally; internal section with 1-2 wide segments; emergent section 0.051 long having 11 serrate segments each rounding evenly mesally (Fig. 16). Dorsal rostral plate moderately sclerotized and unornamented.

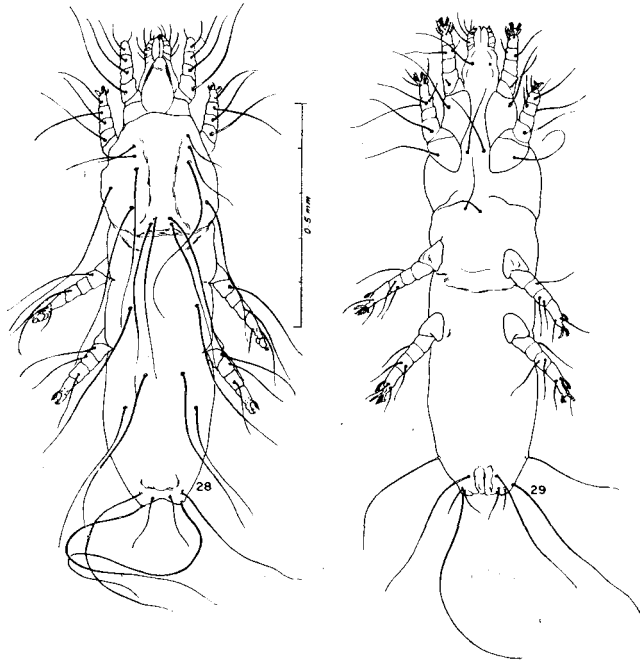


FIG. 28, 29. *Syringophilus hylocichlae*, dorsal and ventral.

Proterosoma. — Width of shield at level of third setae 0.12; distance between setae 1 and 2, 0.021; between setae 1 and 3, 0.045; (ratio 2-3 ÷ 1-2 = 2.1); between setae 1 and 6, 0.16 (ratio 2-6 ÷ 1-2 = 7.6). Length 1st dorsal seta 0.096; length second dorsal seta 0.15; length 6th dorsal seta, 0.36 (ratio 6 ÷ 1 = 3.7). Ventrally propodosoma bearing sclerotized coxal bases of legs 1 and 2 which have sclerotized but not punctate plates; bases of coxa I run posteriad, diverging to merge with bases coxae 2 halfway down their length. Length, tip of rostrum to base coxa I, 0.13; length rostral tip to curving cheliceral apodeme 0.21; width apodeme 0.066.

Opisthosoma. — Lacking dorsal plate anteriorly; posteriorly with a faint bilobed plate. Ventrally without sclerotized plates supporting coxae 3 and 4. Length 7th dorsal seta 0.34; length 9th seta 0.33. Dorsal setae ending in whip-like tips. Smooth at margins.

Legs. — Generally well developed and of equal size ; all legs bearing tarsal fan setae ; fan on leg 4 with many fine tines (14) ; length leg 1 to coxal base 0.15 ; length leg 4 including coxa 0.216 ; rod seta on tibia 1 less than tibia in length.

Diagnosis. — This species may be differentiated from other known species by the large teeth on the rostral tip, the close position of dorsal setae 5 and 6, and the characteristic shape of the peritreme.

Type host. — The veery, *Hylocichla fuscescens*.

Type locality. — Beltsville, Maryland, A.R.C., May 27, 1960.

Type material. — Holotype filed in the U. S. National Museum, Washington, D. C. (66863). Paratypes at Rocky Mountain Laboratory.

***Syringophilus icteridae* n. sp.**

(Figs. 30, 31).

Female. — Large in comparison with other species ; total length 1.09 to 1.43 ; width of abdomen 0.33 ; body divided into propodosoma, mesosoma, and opisthosoma ; opisthosoma again divided by a faint constriction into a region holding the 4th pair of legs and another consisting of the posterior opisthosoma. Propodosoma with a dorsal shield weakly sclerotized laterally and having a median well sclerotized band ornamented laterally with slight depressions. Seta 1, 2, 3, 4 and 5 do not appear to be on shield because of weak sclerotization laterally ; mesosoma not sclerotized, with transverse striations dorsally ; opisthosoma lacking definite dorsal plates, longitudinally striated. Length, tip of gnathosoma to propodosomal constriction, 0.54 ; length propodosomal to mesosomal constriction 0.21 ; length, mesosomal constriction to posterior opisthosoma, 0.52.

Gnathosoma. — Elongate ; anterior rostral border bearing one and occasionally two blunt teeth (Fig. 1). With a pair of short, strong, 4-segmented palpi 0.06 mm long ; palpal tarsus with claw and thumb setae ; length distal claw seta 0.01 ; length thumb seta 0.0065 ; claw-thumb index 6.5 ; rostrum with bilateral peritremes dorsally, internal section thin, 1 or 2 segmented, emergent section 0.065 long, having 13-14 prominent roundish, bead-like segments (Fig. 16) ; dorsal plate of rostrum indistinct, lightly punctate.

Proterosoma. — Distance between 3rd dorsal setae 0.12 ; width of heavily sclerotized shield band at level of 3rd setae 0.07 ; distance between setae 1 and 2, 0.028 ; between setae 1 and 3, 0.087 (ratio 2-3 ÷ 1-2 = 3.1) ; between setae 1 and 6, 0.162 (ratio 2-6 ÷ 1-2 = 5.8). Length 1st dorsal seta 0.2 ; length 2nd dorsal seta, 0.34 ; length 6 th dorsal seta, 0.41 (ratio 1 ÷ 6 = 2). Ventrally propodosoma bearing sclerotized coxal bases of legs 1 and 2 which are covered by moderately sclerotized, unornamented plates ; bases of coxae I diverge posteriorly, and merge with the bases of coxae II at a point less than 1/3 of the length of coxae II. Length, tip of gnatho-

soma to base coxa I, 0.17; length gnathosoma to curving cheliceral apodeme 0.286; width large apodeme 0.095.

Opisthosoma. — *Opisthosoma* lacking well defined dorsal sclerotized areas except posteriorly at the region of dorsal setae 9 where a faint plate suggests itself; length 7th seta 0.5, length 9th seta 0.5. Dorsal setae stout at bases, smooth sided, tapering to fine, whip-like ends.

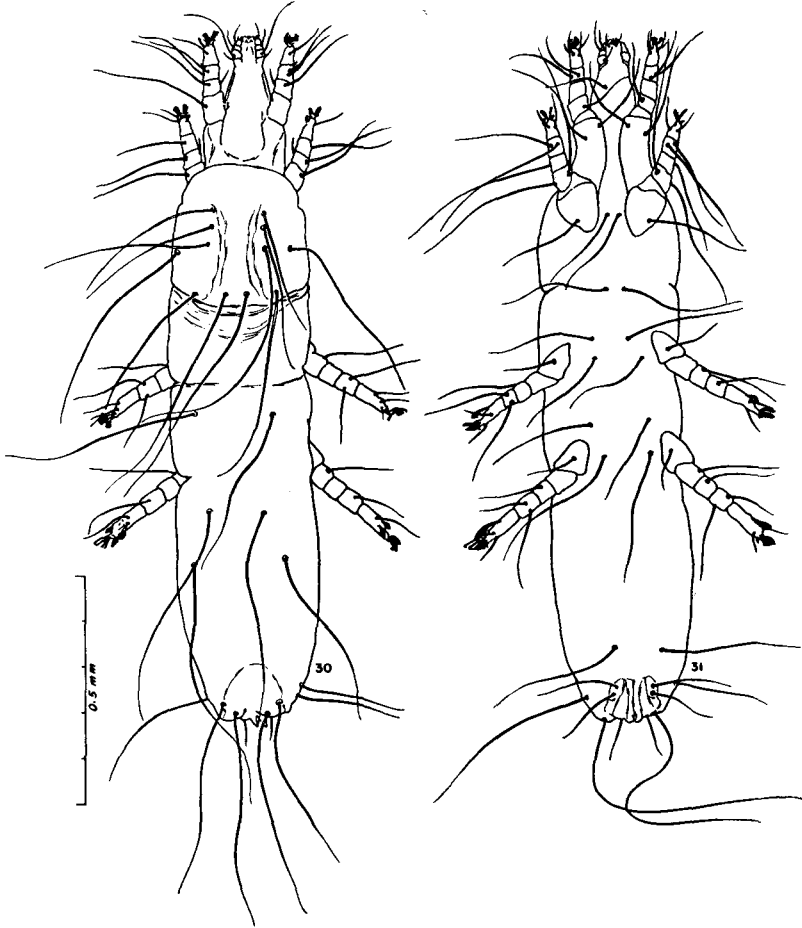


FIG. 30, 31. *Syringophilus icteridae*, dorsal and ventral.

Legs. — Well developed, 3 and 4 appearing longer than 1 and 2; all legs bearing tarsal fan setae; fan setae on leg 4 with many tines (18?); length, leg 1 to coxal base 0.186; length leg 4 including coxa 0.35; rod seta on tibia I short, spine-like, about half the length of the tibia.

Diagnosis. — This species may be differentiated from other known species which lack definite plates on the opisthosoma by the characteristic form of its propodosomal shield, large size, and short tibial rod setae.

Type host. — The red-winged blackbird, *Agelaius phoeniceus*. Specimens morphologically similar to and apparently conspecific with this species have been taken by us from the rusty blackbird, *Euphagus carolinus*; and the common grackle, *Quiscalus quiscula*.

Type locality. — Patuxent Wildlife Research Center, Laurel, Maryland, 2/26/57.

Type material. — The holotype is filed in the U. S. National Museum. (66864). Paratypes at Rocky Mountain Laboratory.

Syringophilus passerinae n. sp.

(Figs. 26, 27).

Female. — Elongate, yellowish-white; total length 0.85 to 0.97 mm; width of abdomen 0.17 to 0.22. Body divided by poorly defined constrictions into three main areas; propodosoma, mesosoma, and opisthosoma. Propodosoma with well sclerotized and decorated dorsal shield; mesosoma and opisthosoma lacking plates or sclerotized areas dorsally. Length, tip of gnathosoma to propodosomal constriction, 0.39 mm; length, propodosomal to mesosomal constriction, 0.14 mm; length mesosomal constriction to posterior opisthosoma 0.35 to 0.43 mm.

Gnathosoma. — Elongate; anterior rostral border smoothly rounding, labium-like extending anteriorly beyond palpi, decorated with two and sometimes three blunt teeth anterio-mesally and bearing a pair of short blunt, bristles in the stylet emergence area (Fig. 3); stylets harpoon-like with three barbs; with a pair of well developed 4-segmented palpi 0.047 mm long; basal segment poorly developed; palpal tarsus characteristically bearing a pair of claw-like setae and a blunt, thumb-like seta apically; length, distal claw seta, 0.012 mm; length thumb seta 0.005 mm; claw-thumb index 0.46; rostrum with bilateral peritremes dorsally; internal section smooth, 2 segmented; emergent section 0.036 mm long, delicate, having about 10 poorly demarcated serrate segments (Fig. 16).

Proterosoma. — Bearing a well sclerotized dorsal shield ornamented by a median, heavily sclerotized portion having lesser sclerotized pit-like areas. Width of shield at level of 3rd setae 0.075, width of heavily sclerotized area 0.050; distance between setae 1 and 2, 0.025; between setae 1 and 3, 0.057; (ratio 2); between setae 1 and 5, 0.13 (ratio 5). Ventrally propodosoma bearing sclerotized coxal bases of legs 1 and 2. Base coxa 1 overlaps base coxa 2 for less than 1/4 of its length, base coxa 2 divergent and fairly well sclerotized posteriorly; length, tip of gnathosoma to base coxa 1, 0.22; length, gnathosomal tip to curving cheliceral apodeme, 0.33; width apodeme 0.08 mm.

Opisthosoma. — *Opisthosoma* with longitudinal striations, lacking dorsal sclerotized areas; dorsum bears setae 6-9; length 6th seta 0.37; length 8th seta 0.39. Dorsal setae greatly attenuated ending in whip-like very fine points.

Legs. — Generally well developed and of equal size. All legs bear tarsal fan setae; fan seta on leg 3 large, having 12 tines; length leg 1 to coxal base 0.14; length leg 4 including coxa 0.17; rod seta on tibia 1 short, less than the length of the tibia.

Diagnosis. — This species may be differentiated from other known species by the peculiar configuration of the propodosomal shield.

Type host. — The indigo bunting, *Passerina cyanea*.

Type locality. — Beltsville, Maryland, A.R.C. June 29, 1960.

Type material. — Holotype filed in U. S. National Museum, Washington, D. C. (66865). Paratypes at Rocky Mountain Laboratory.

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