NEW TARSONEMID MITES ASSOCIATED WITH CITRUS IN FLORIDA (ACARINA: TARSONEMIDAE) ¹

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ABSTRACT

Two new genera (Metatarsonemus and Floridotarsonemus) and 20 new species are described from Florida citrus.

Beer and Nucifora (1965) revised the family Tarsonemidae creating 7 new genera; the family now comprises 18 genera.

The posterior apodemes of male tarsonemid mites are of importance in generic classification. These apodemes form 4 “chambers.” The 2 outer chambers surround the inner ones in species of the genus Polyphagotarsonemus Beer and Nucifora, whereas the 4 “chambers” are in a transverse line in species of other genera. In all species of the genus Lupotarsonemus Beer and Nucifora examined, the anterior borders of the chambers form 4 lobes, whereas, they form an almost straight line in species of the genus Tarsonemus sensu strictu as designated by Beer and Nucifora, and form a V-shape in species of the genus Daidalotarsonemus DeLeon. Metatarsonemus is a new genus created in this study comprising species of mites with the anterior borders of the “chambers” forming a U-shape. Species of the genus Fungitearsonemus Cruanoy have the anterior borders of inner chambers narrow giving the whole a triangular shape. Another new genus Floridotarsonemus which may be related to Fungitearsonemus is described here.

This paper describes and illustrates 20 new species associated with citrus in Florida. Types of these species are deposited in the United States National Museum, Washington, D.C.

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Genus Lupotarsonemus Beer and Nucifora

Lupotarsonemus Beer and Nucifora 1965:40.

Lupotarsonemus is an offshoot of the genus Tarsonemus Canestrini & Fanzago, created to comprise species which have the tibia fused with the tarsus on leg IV but otherwise have characteristics of the type genus. Seven species (all new) have been collected from Florida citrus trees.

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KEY TO Lupotarsonemus associated with citrus in Florida (males)

1. Femur IV angulate at base ......................................................... 2
1'. Femur IV not angulate at base ............................................... 3
2. Tibiotarsal tactile setae of leg IV shorter than femur IV, dorsal femoral seta of leg IV longer than apical ventral seta .............................................................. L. inornatus new species

2'. Tibiotarsal tactile setae of leg IV longer than femur IV, dorsal femoral seta of leg IV about same length as apical ventral seta ............

3. Femur IV with a dorsal process ................................................. 4
3'. Femur IV without a dorsal process .......................................... 6
4. Dorsal process spine-shaped .................................................... 5
4'. Dorsal process cone-shaped, dorsal femoral seta much longer than either ventral apical seta or tibiotarsal tactile seta ...................... L. spicatus new species

5. Leg IV about same length as leg III, tibiotarsal tactile seta conspicuously shorter than femur IV ...................... L. spinosus new species
5'. Leg IV shorter than leg III, tibiotarsal tactile seta almost as long as femur IV ............................................................... L. mumaec new species

6. Femur IV with an inner tubercle ............. L. parawangus new species
6'. Femur IV without an inner tubercle .......... L. floridanus new species

Lupotarsonemus inornatus new species

Fig. 1-3

MALE HOLOTYPE: Length 150\(\mu\), breadth 125\(\mu\), body oval, broadest at posterior of metapodosoma. Dorsal and propodosomal setae with third pair longest, second pair shortest, fourth longer than first. Hysterosoma with first 3 dorsal pairs of setae about equal (\textit{circa} 24\(\mu\)), fourth pair shortest. Leg IV short with femur curved angulated at base; tibia and tarsus IV fused; tactile seta of tibiotarsus shorter than femur and longer than dorsal femoral seta; apical ventral femoral seta shorter than dorsal femoral, both arising at about the same level; claw strong.

REMARKS: In general appearance this mite is close to \textit{L. confusus} (Ewing) but differs in the following respects: 1) Dorsal femoral seta of \textit{L. confusus} as illustrated by Ewing is shorter or about the same length as the ventral apical seta; in \textit{L. inornatus} the dorsal seta is longer. 2) Tibiotarsal tactile seta in \textit{L. confusus} is about the same length as femur IV; it is shorter in \textit{L. inornatus}.

It should be mentioned that Boor (1954) illustrated \textit{confusus} with the tarsus separated from the tibia in disagreement with Ewing, the author of the species.

TYPE LOCALITY: ♂ holotype circled with China ink, collected by H. H. Attiah, 2 January 1963 from Melbourne, Florida. Mounted on same slide with undetermined ♀ tarsonemids.

DISTRIBUTION: Melbourne, Florida.

Lupotarsonemus minitus new species

Fig. 4

MALE HOLOTYPE: Length 114\(\mu\), breadth 68\(\mu\), body parallel-sided, broadest at main body suture. Dorsal propodosomal setae with third pair longest,
Fig. 1-3. *Lupotarsonemus inornatus* new species, 1. ♂ dorsal view, 2. ♂ ventral view, 3. ♂ leg IV ventral view. Fig. 4. *Lupotarsonemus minutus* new species, ♂ leg IV ventral view. Fig. 5-7. *Lupotarsonemus spicatus* new species, 5. ♂ dorsal view, 6. ♂ ventral view, 7. ♂ leg IV ventral view.
second shortest, and first longer than fourth. Hysterosoma with first and second pairs of setae about same length, 10.5 μ, third shorter, about 15 μ, and fourth about half length of third pair. Leg IV short with femur angulate at base, tibia and tarsus fused; tactile setae of tibiotarsus longer than femur; apical ventral femoral seta as long as dorsal femoral seta, both arising at about same level; claw somewhat slender.

Remarks: In life the mite is pale brown with a white spot. It is close to L. scarius (Ewing) but differs as follows: 1) The dorsal femoral seta of leg IV is conspicuously longer than the apical ventral femoral seta in L. scarius as illustrated by Ewing 1939; they are about equal in length in L. minutus. 2) Both setae arise in a transverse line in L. minutus; the dorsal setae arise basal to the apical ventral setae in L. scarius.

Type Locality:  ♂ holotype circled with China ink, collected by M. H. Muma, 13 February 1963 in Highlands Hammock State Park, Highlands County, Florida. Mounted on same slide with an undetermined ♂ and ♀ tarsonemid. 

Distribution: Highlands County, Florida.

Lapotarsonemus spinosus new species

Fig. 5-7

Male Holotype: Length 190 μ, breadth 110 μ, body oval, broadest at posterior of metapodosoma. Dorsal propodosomal setae simple, third pair longest, second shortest, first longer than fourth. Hysterosoma with first pair of dorsal setae longest, second little longer than third, fourth shortest, about half length of second; lengths 36, 27, 25.5, 13.5 μ of setae I, II, III, IV, respectively. Leg IV with femur not angulate, long, stout, with tibia and tarsus fused; tactile setae of tibiotarsus 31.5 μ, shorter than femur IV and longer than ventral apical, latter 25.5 μ; dorsal femoral long, about the length of femur; a dorsal cone-shaped process lies anterior to dorsal femoral seta and a ventral inner tubercle lies anterior to ventral proximal seta; coxa IV rectangular.

Type Locality:  ♂ holotype circled with China ink, collected by H. H. Attiah, 18 December 1962 at Yalaha, Florida. Mounted on same slide with undetermined ♀, ♂, and larval tarsonemids. 

Distribution: Yalaha and Dundee, Florida.

Lapotarsonemus spinosus new species

Fig. 8-10

Male Holotype: Length 152 μ, breadth 91 μ, shape parallel-sided, widest at posterior of metapodosoma.

L. spinosus resembles L. spicatus, differing in the dorsal process on femur IV being spine-shaped instead of cone-shaped. Dorsal hysterosomal setae shorter, lengths 31.5, 22.5, 21, 12 μ of setae I, II, III, IV, respectively. Leg IV about the length of leg III; coxae IV triangular or rectangular; claw stout.

Type Locality:  ♂ holotype circled with China ink, collected by H. H. Attiah, 26 December 1962 at Sebring, Florida. Mounted on same slide with an undetermined ♂ and ♀ tarsonemid.

Distribution: Sebring and Dundee, Florida.
Fig. 8-10. *Lupotarsonemus spinosus* new species, 8. ♀ leg IV ventral view, 9. ♀ dorsal view, 10. ♀ ventral view. Fig. 11-13. *Lupotarsonemus mumae* new species, 11. ♀ dorsal view, 12. ♀ ventral view, 13. ♀ leg IV ventral view.
Lupotarsonemus muniae new species
Fig. 11-13

**Male holotype:** Length 163 μ, breadth 80 μ, body oval, broadest at posterior of metapodosoma. Dorsal propodosomal setae with third pair longest, second shortest, first longer than fourth. Hysterosoma with first pair longest, second little longer than third, fourth around half length of third, lengths 24, 20.5, 16.5, 9 μ of setae I, II, III, IV, respectively. Leg IV short, shorter than leg III; femur IV not angulate at base with dorsal process anterior to dorsal seta spine-shaped; dorsal femoral seta longer than ventral apical and tibiotarsal tactile, latter longer than apical ventral and almost equal to femur, coxae rectangular.

**Type locality:** holotype circled with China ink, collected by L. B. Anderson, 23 July 1959 at Dundee, Florida. Mounted on same slide with 1 ♀ L. spinosus, 1 ♀ L. spicatus, and undetermined ♀ and larval tarsonemids.

**Distribution:** Dundee and Sebring, Florida.

Lupotarsonemus floridanus new species
Fig. 14-16

**Male holotype:** Length 148 μ, breadth 87 μ, body parallel-sided, widest at main body suture. Dorsal propodosomal setae simple, third pair longest, second shortest, first longer than fourth. Hysterosoma with first pair of dorsal setae longest, second longer than third, fourth half length of second, lengths 24, 22.5, 19.5, 11 μ of setae I, II, III, IV, respectively. Leg IV with femur not angulate, with a ventral constricting line at basal inner portion giving an aspect of a trochanter, tibia and tarsus IV fused, tactile seta of tibiotarsus shorter than femur IV and than dorsal femoral seta, apical ventral femoral seta shorter than tactile in tibiotarsus; claw stout.

**Type locality:** Male holotype circled with China ink, collected by J. Brogdon at Homestead, Florida, 10 October 1962. Mounted on same slide with ♀ of Polyphagotarsonemus latus (Banks) and one undetermined larval tarsonemid.

**Distribution:** Homestead, Florida.

Lupotarsonemus paraunguis new species
Fig. 17

**Male holotype:** Length 152 μ, breadth 76 μ, body oval, broadest at posterior of metapodosoma. Dorsal propodosomal setae with third pair longest, second shortest, first longer than fourth. Hysterosoma with first dorsal pair longest, second and third around equal, fourth shortest, lengths 22, 18, 12, 8 μ of setae I, II, III, IV, respectively. Leg IV short, conspicuously shorter than leg III; femur IV not angulate at base; tibia and tarsus IV fused; tibiotarsal tactile seta subequal to femur IV, shorter than dorsal femoral and little longer than apical ventral; an obscure ventral tubercle lies a short distance anterior to basal ventral seta; claw acuminated.

**Remarks:** In general appearance this mite is long and slender with short dorsal hysterosomal setae and short hind legs. Relative lengths of femur IV setae resemble those of L. unguis (Ewing), but the femur of the latter species lacks a ventral tubercle.
Fig. 14-16. *Lupotarsonemus floridanus* new species, 14. ♂ dorsal view, 15. ♂ ventral view, 16. ♂ leg IV ventral view. Fig. 17. *Lupotarsonemus paraunguis* new species, ♂ leg IV ventral view. Fig. 18-19. *Tarsonemus ingens* new species, 18. ♂ dorsal view, 19. ♂ ventral view.
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Type Locality: Delta holotype circled with China ink, collected by H. H. Attiah, 26 December 1962, 3 miles south of Frostproof. Mounted on same slide with the type specimen of *Tarsonemus undulatus* new species and undetermined ♀, ♂, and larval tarsonemids.

Distribution: Sebring, Frostproof, and Fort Pierce, Florida.

Genus *Tarsonemus* Canestrini and Fanzago

*Tarsonemus* Canestrini and Fanzago 1876:142.

Beer and Nuicifora (1965) restricted the genus *Tarsonemus* to species with male leg IV tarsus separated from tibia and the combined length of the 2 segments less than half the length of femur IV.

Three new species were collected on citrus from Florida.

Key to *Tarsonemus* associated with citrus in Florida (males)

1. Femur IV angulate at base .................................................. 2
1' Femur IV not angulate at base, inner margin of femur IV smooth, dorsal femoral and tibial tactile setae of leg IV longer than femur ....

............................................................... *T. ingens* new species

2. Femur IV with base much wider than apex, tibia IV not much longer than basal width ........................................... *T. undulatus* new species
2' Femur IV with base little wider than apex, tibia IV rectangular, nearly twice the length of basal width ................................... *T. citri* new species

*Tarsonemus ingens* new species

Fig. 18-20

Male Holotype: Length 190 μ, breadth 114 μ, body oval, broadest at posterior of metapodosoma. Dorsal propodosomal setae with third pair longest, second shortest, fourth longer than first. Hysterosoma with dorsal hairs conspicuously long, third pair longest, second little longer than first, fourth almost half the length of third, lengths 33, 31.5, 37.5, 18 μ of setae I, II, III, IV, respectively. Leg IV long; femur not angulate at base, inner margin almost smooth; tibial tactile seta and dorsal femoral seta both longer than femur and than apical ventral seta; tibia longer than wide, 1-1/2 times as long as width at base; claw stout.

Type Locality: Delta holotype circled with China ink, collected by H. H. Attiah, 18 December 1962 at Fruitland Park, Florida. Mounted on same slide with undetermined ♀ tarsonemids.

Distribution: Fruitland Park, Florida.

*Tarsonemus undulatus* new species

Fig. 21-23

Male Holotype: Length 175 μ, breadth 95 μ, capitulum longer than wide. Propodosoma with first, second and fourth dorsal seta about same length, third longest. Hysterosoma with third pair of setae longest, first and second about same length, fourth about half length of first, lengths 33, 34, 40, 16.5 μ of setae I, II, III, IV, respectively. Leg IV with femur angulate at base and undulate on inner margin; tactile seta of tibia longer...
Fig. 20. *Tarsonemus ingens* new species, ♂ leg IV ventral view. Fig. 21-23. *Tarsonemus undulatus* new species, 21. ♂ dorsal view, 22. ♂ ventral view, 23. ♂ leg IV ventral view. Fig. 24. *Tarsonemus citri* new species, ♂ leg IV ventral view.
than femur; dorsal femoral much longer than apical ventral; tibia not much longer than width at base.

**Remarks:** This mite has long dorsal hairs in comparison with other species resembling *T. ingens*. It differs from *T. ingens* by having femur IV undulate on the inner margin and basally angulate.

**Type Locality:** δ holotype and 2 ♀ paratypes circled with China ink, collected by H. H. Attiah, 26 December 1962, 3 miles south of Frostproof, Florida. Mounted on same slide with type specimen of *Lepotarsocerinus parasanguis* n. sp. and undetermined ♀, δ and larval tarsonomids.

**Distribution:** Frostproof, Indian River, Fruitland Park, Lake Alfred, Clearwater, and Weirsdale, Florida.

*Tarsonomus citri* new species

**Fig. 24**

**Male Holotype:** Length 156 μ, breadth 78 μ, capitulum longer than wide. Propodosoma with fourth dorsal pair of setae posterior and not lateral to third, fourth pair shortest, third longest, second and first around same length. Hysterosoma with third pair longest, first shorter than second, fourth shortest, lengths 20.5, 24, 27, 13.5 μ of setae I, II, III, IV, respectively. Leg IV with femur angulate at base, length of femur about three times width at base, femur almost parallel-sided with base not much wider than apex; dorsal femoral seta longer than ventral apical seta, both shorter than tibial tactile seta; latter longer than femur; tibia with basal width almost half length of segment.

**Remarks:** In general appearance the mite is long and slender with hind legs not much larger than others.

**Type Locality:** δ holotype circled with China ink, collected 15 February 1955 at Winter Haven on Florida red scale by H. L. Greene.

**Distribution:** Winter Haven, Florida.

*Metatarsonemus* new genus

Males of *Metatarsonemus* have the anterior borders of the 4 "chambers" of the hysterosomal apodemes forming U-shaped line; triangular plate lateral of outer "chambers" sclerotized; transverse sclerotization anterior to main body suture between propodosoma and hysterosoma on venter of body; tarsus and tibia IV distinct.

**Type Species:** *Metatarsonemus simplicissimus* new species.

**Remarks:** The anterior borders of hysterosomal "chambers" as well as ventral sclerotization between propodosoma and hysterosoma might reveal an affinity between this genus and *Daidalotarsocerinus* DeLeun. *Metatarsonemus* is presently represented by 2 new species from Florida and an undescribed species from Egypt.

*Metatarsonemus simplicissimus* new species

**Fig. 25-27**

**Male Holotype:** Length 175 μ, breadth 95 μ, body oval, broadest at posterior of metapodosoma, capitulum nearly as long as broad. Propodosoma with third pair of dorsal setae longest, second shortest, first little
Fig. 25-27. *Metatarsonemus simplicissimus* new species, 25. ♂ dorsal view, 26. ♂ ventral view, 27. ♂ leg IV ventral view. Fig. 28. *Metatarsonemus longitibiae* new species, ♂ leg IV ventral view. Fig. 29-31. *Floridotarsonemus scaber* new species, 29. ♂ dorsal view, 30. ♂ ventral view, 31. ♂ leg IV ventral view.
longer than fourth. Hysterosoma with first pair of dorsal setae longest, second and third equal, and fourth shortest, lengths 25.5, 22.5, 22.5, 13.5 µm of setae I, II, III, IV, respectively. Leg IV with femur not angulate at base and about 2.5 times as long as tibia; tactile seta of tibia much shorter than femur, about same length as ventral apical seta of femur; dorsal femoral seta shorter than both previously cited seta and distal to apical ventral seta; tibia two times as long as width at base.

Remarks: This mite is yellow with a dorsal black or green “H” on the back when alive.

Type Locality: ♀ holotype circled with China ink, collected by M. H. Muma in Highlands Hammock State Park, Highlands County, Florida, on 13 February 1963. Mounted on same slide with one ♀ paratype and undetermined ♀ tarsonomids.

Distribution: Highlands Hammock State Park, Highlands County, Florida.

Metatarsonemus longitibialis new species

Fig. 28

Male Holotype: Length 190 µm, breadth 95 µm, body oval, broadest at posterior of metapodisoma, capitulum nearly as long as broad. Propodosoma with third pair of dorsal setae longest, second shortest, first and fourth about equal. Hysterosoma with third pair of dorsal setae longest, second longer than first, fourth shortest. Leg IV with femur not angulate at base and with tibia elongate and slender 2.5-3.0 times as long as width at base; tactile seta of tibia longer than femur, dorsal femoral seta about as long as apical ventral seta and arising at about the same level.

Type Locality: ♀ holotype circled with China ink, collected 24 September 1957 at Weirsdale, Florida from citrus leaves by H. L. Greene. Mounted on same slide with undetermined ♀ tarsonomids.

Distribution: Weirsdale, Florida.

Floridotarsonemus new genus

Males of Floridotarsonemus have the anterior borders of the inner “chambers” of hysterosomal apodemes narrow giving these “chambers” a triangular shape; leg IV with tibia and tarsus distinct; combined length of tarsus and tibia IV about half length of femur IV; tibia IV with length more than twice segment width at base; femur IV angulate at base with a hyaline inner projection and with dorsal seta distal to and much shorter than apical ventral seta; claw sword-shaped.

Type Species: Floridotarsonemus scaber new species.

Remarks: Hysterosomal apodemes as well as the shape of leg IV reveal the affinity of this genus to Fungitarsonemus Cromroy; shape of the claw differentiates the genera.

Floridotarsonemus scaber new species

Fig. 29-31

Male Holotype: Length 148 µm, breadth 76 µm, body oval, broadest at posterior metapodisoma, capitulum around as long as broad. Propodosoma with third pair of dorsal setae longest, second shortest, first longer than fourth.
Hysterosoma with first pair of dorsal setae longest, second and third about equal, fourth shortest, lengths 28.5, 26, 26, 7.5μ of setae I, II, III, IV respectively. Leg IV with femur angulate at base, possessing a hyaline inner flange; combined length of tibia and tarsus about half length of femur; dorsal femoral seta shorter than apical ventral seta and arising distal to latter; claw long, sword-shaped.

**Type Locality:** Holotype ♀ circled with China ink, collected by M. H. Muma and K. E. Muma from “whitefly fungus” on citrus leaves in Highlands Hammock State Park at Sebring, Florida, 13 March 1963.

**Distribution:** Highlands Hammock State Park, Highlands Co. Florida.

**Genus Daidalotarsonomus** DeLeon

**Daidalotarsonomus** DeLeon 1956:163.

Females of the genus *Daidalotarsonomus* may be recognized by plates or ornamentations on dorsum and by some of the dorsal setae enlarged apically. Males with some dorsal setae spiculate. The V-shape of anterior borders of hysterosomal “chambers” of males, the sclerotization between propodosoma and hysterosoma and the lateral sclerotization on venter of body of males (Fig. 20) might show relationship between this genus and *Metatarsonomus*. Smiley (1967) described *Hemitarsonomus leonardi* Smiley and *H. deleonti* Smiley; they belong in *Daidalotarsonomus*.

Three new species were found associated with citrus in Florida; only females are described; it was not possible to relate males with females.

**Daidalotarsonomus seitus** new species

Fig. 32

**Female holotype:** Length 182μ, breadth 114μ, shape oval. Propodosoma produced anteriorly to form a hood over capitulum and laterally over a great part of the legs, hood with a broad notch anterior of middle; dorsum with irregular striations, first dorsal propodosomal seta serrate 28.5μ, second coarse 27μ. Hysterosoma with first and second segments formed laterally forming a “gown” around body; dorsum of first segment with longitudinal striations; humeral seta fine, 21μ long; first dorsal hysterosomal seta lanceolate, serrate with distinct midrib, 42μ long and arising anterior to third seta; latter seta resembling second in shape, 37.5μ long; fourth seta broad elliptical with two midribs, 22.5μ long and 15μ wide, and arising at same level as third pair.

**Type Locality:** Holotype and paratype ♀ circled with China ink, collected by M. H. Muma, 26 September 1962 from citrus leaves at Fort Pierce. Mounted on same slide with one ♀ *D. venustus* new species and an undetermined ♀ tarsonemid.

**Distribution:** Fort Pierce, Florida.

**Daidalotarsonomus venustus** new species

Fig. 33, 34

**Female holotype:** Length 190μ, breadth 114μ, shape oval. Propodosoma produced anteriorly to form a hood over capitulum and laterally over coxae, hood with a notch anterior to middle; dorsum marked off into ir-
32. *Daidalotarsonemus seitus* new species, ♀ dorsal view. Fig. 33-34. *Daidalotarsonemus venustus* new species, 33. ♀ dorsal view, 34. ♀ ventral view.
Attiah: New tarsonemid mites

regularly shaped plates; first dorsal propodosomal seta 19.5 μ long; second coarse 27 μ long. Hysterosoma with anterior segment dorsally marked off into more or less rectangularly to hexagonally shaped plates arranged in four ranks with first rank partly covered by base of propodosoma, caudal part of hysterosoma marked off into less uniformly shaped plates; humeral seta 16.5 μ long; first dorsal hysterosomal seta same length as humeral seta; second lanceolate, serrate with distinct midrib, 33 μ long; third resembling second in shape and length; fourth pair broad, elliptical, 16.5 μ long; all 3 latter pairs arising at same level. 

Remarks: D. venetus is very close to D. tessellatus DeLeon but differs in arrangement of caudal hysterosomals 2, 3, and 4. In the latter species, the second hysterosomal pair arises anterior to the third and fourth pairs.

Type Locality: 2 holotype circled with China ink, collected by M. H. Muma on 4 February 1959 at Melbourne, Florida. Mounted on same slide with two paratype ♀.

Distribution: Melbourne, Florida.

Daidalotarsonemus somalatus new species

Female Holotype: Length 201 μ, breadth 44 μ, body diamond shaped, widest at middle. Propodosoma produced anteriorly forming a hood over capitulum and laterally over coxae; lateral margin of hood with a broad notch slightly anterior of middle; dorsum marked off into irregularly shaped plates; first dorsal seta 25 μ long, second 33 μ long, both coarse. Hysterosoma with anterior part of dorsum marked off into more or less rectangularly to hexagonally shaped plates arranged in four ranks, first rank partly covered by base of propodosoma; caudal part of hysterosoma marked off into less uniformly shaped plates, some pecan shaped; humeral seta 16 μ long; first dorsal hysterosomal 21 μ long; second lanceolate, serrate with prominent midrib, 39 μ long, and arising anterior to third pair; latter resembling second pair in shape and length and arising anterior to fourth pair; fourth pair elliptical and 27 μ long.

Type Locality: 9 holotype and 3 ♀ paratypes collected 4 October 1959 at Vero Beach, Florida. Mounted on same slide with ♀ of Daidalotarsonemus sp. (see Fig. 49) and one larval tarsonemid.

Distribution: Vero Beach, Florida.

Genus Fungitarsonemus Cromroy


The anterior borders of the inner "chambers" of Fungitarsonemus species are narrow in comparison with those of the outer "chambers" giving the former a triangular shape. Two new species were found associated with citrus in Florida.

Fungitarsonemus pulvrosus new species

Male Holotype: Length 160 μ, breadth 106 μ, body diamond shape, broadest about middle, capitulum nearly as long as broad. Propodosoma with
Fig. 35-36. *Daidalotarsonemus somalatus* new species, 35. ♀ dorsal view, 36. ♀ ventral view. Fig. 37-38. *Fungitarsonemus pulvirostris* new species, 37. ♀ dorsal view, 38. ♀ ventral view.
third pair of dorsal setae longest and fourth shortest, third about two times length of first, second longer than fourth and almost one-third length of first. Hysterosoma with first pair of dorsal setae longest about same length as third propodosomal pair; second and third pairs about equal; fourth pair shortest; first, second, and third hysterosomals arising almost equidistant, and in a longitudinal line. Legs I and II, with tarsi, each carrying a long annulate spur-like seta (Fig. 50, 51). Leg IV with femur angulate at base, 3 times as long as tibia; apical ventral seta of femur 3.5 times as long as dorsal seta and little longer than tibia; dorsal femoral seta arising near base of segment; tibia with length 3 times basal width; tibial tactile seta longer than femur, about same length as combined femur, tibia, tarsus and claw.

**Female paratype**: Length 182-209 μ, breadth 137-171 μ, shape oval. Propodosoma produced anteriorly to form a hood completely covering capitulum and laterally over basal segments of legs I and II. Propodosoma with 2 pairs of dorsal and ventral setae; first dorsal pair about one-third length of second; first ventral pair arising behind apodemes I, second pair behind apodemes II; pseudostigmatic organ elliptical. Hysterosoma with 6 pairs of dorsal setae, 3 median and 3 marginal; medians all long, first pair arising far from margin with distance between its members shorter than their length; marginal seta I shorter than any dorsal setae; marginals II, III very short; former arising in a transverse line with median III, whereas marginal III arises posterior to median III.

**Remarks**: Females of this species carry trash on their back, thus the name pulvirons. It resembles *F. lodiei* (DeLeon) in this habit, but the 2 species differ in the following respects: 1) Dorsal hysterosomal seta I is much shorter than dorsal propodosomal III in the males of *F. lodiei*, whereas these setae are about equal in length in males of *F. pulvirons.*

2) Second and third dorsal hysterosomals of *F. pulvirons* males about equal in length; the latter pair less than half the length of second pair in *F. lodiei* males.

**Type locality**: Holotype ♂ circled with China ink, collected by H. H. Attia, 2 January 1963 on citrus leaf 6 miles southwest of Fort Pierce, Florida. Mounted on same slide with paratype ♂ and ♀ of *F. peregrinos* n. sp. Paratypes: 1 ♂ and 1 ♀ with same data. Ten ♀ of *F. pulvirons* and many ♂ of *F. peregrinos* collected by M. H. Muma and H. H. Attia on 11 January 1963 from the same locality.

**Distribution**: 6 miles southwest of Fort Pierce, Florida.

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**Fungitarsonemus peregrinos** new species

*Fig. 40-42, 52, 53*

**Male holotype**: Length 201 μ, breadth 125 μ, capitulum nearly as long as broad. Propodosoma with third pair of dorsal setae about 2 times as long as first, second longer than fourth. Hysterosoma with first pair of dorsal setae longest, about the same length as third propodosomals; second pair about 2 times length of third; fourth pair about equal to third; second pair arising lateral to first and third and closer to latter. Legs I and II with tarsi, each carrying a lanceolate annulate seta, that of tarsus II shorter and nearer to base (Figs. 52, 53). Leg IV with femur angulate at base, 3 times as long as tibia; tibia 3 times as long as basal width; apical
Fig. 39. *Fungitarsonemus pulvirosus* new species, ♂ leg IV ventral view. Fig. 40-42. *Fungitarsonemus peregrinosus* new species, 40. ♂ dorsal view, 41. ♂ ventral view, 42. ♂ leg IV ventral view.
ventral femoral seta 3.5 times as long as dorsal femoral and little longer than tibia; dorsal femoral arising near base of segment; tibial tactile seta longer than femur.

**Female paratype:** Length 247μ, breadth 209μ, shape oval. Propodosoma produced anteriorly forming a hood over capitulum and laterally over coxae, provided with 2 dorsal and 2 ventral pairs of setae; first dorsal pair about one half length of second; first ventral pair arising behind apodemes I, second pair behind apodemes II; pseudostigmatic organ almost round. Hysterosoma with 6 pairs of dorsal setae, 3 median and 3 marginal; first marginal pair longest of all setae; first dorsal pair arising closer to margin, distance between its members 5-6 times their length; second and third dorsals about same length, both little shorter than first pair; second and third marginals very short arising from caudal margin of body; former almost in transverse line with third dorsals, latter posterior to them; venter of hysterosoma provided with 3 pairs of setae, first arising anterior to extremities of apodemes III, second close to apodemes IV, third on caudal margin.

**Remarks:** *F. peregrinus* is close to *F. peregrinus* (Beer) but differs in the following points: 1) Dorsal marginal seta I of *F. peregrinosus* ♂ much longer than marginals II and III; only slightly longer in *F. peregrinus* ♀ ♀ as described by Beer (1954). 2) Dorsal hysterosomal seta I about same length as dorsal propodosomal seta III of *F. peregrinosus* ♂ ♂; slightly more than twice the latter's length in *F. peregrinus* ♀ as described by Beer. *F. peregrinosus* may be a synonym of *F. peregrinus* since Beer's illustrations of the ♂ do not coincide with his description.

**Type locality:** ♂ holotype and ♂ paratypes mounted with holotype of *F. pulvisorus* collected by H. H. Attiah on 2 January 1963, 6 miles southwest of Fort Pierce, Florida. Paratype ♀ mounted on another slide with same data.

**Distribution:** 6 miles southwest of Fort Pierce, Florida.

**Genus Rhynchotarsonemus** Beer 1954:1221

Species of *Rhynchotarsonemus* may be recognized by the gnathosoma of both sexes having prolonged palpi which form a long beak. Two new species were collected on Florida citrus.

**Rhynchotarsonemus floridanus** new species

**Fig. 43-45**

**Male holotype:** Length 163μ, breadth 84μ, body oval, broadest at posterior of metapodosoma, capitulum longer than broad. Propodosoma with first and second pairs of dorsal setae about equal in length, both shorter than fourth; third pair longest, almost 3 times as long as first. Hysterosoma with second and third pairs of dorsal setae about equal in length, first pair shorter; fourth pair shortest, about one-third length of third pair. Leg II with tibia carrying a long annulate solenidion. Leg IV with femur angulate at base and with tibia and tarsus fused; femur almost 2.5 times as long as width at base and little longer than tibiotarsal tactile; dorsal femoral seta very long, arising a short distance proximal to middle of segment; apical ventral femoral setae shorter than tibiotarsal tactile.
Fig. 43-45. *Rhynchothorsonemus floridanus* new species. 43. ♀ dorsal view, 44. ♂ ventral view, 45. ♂ leg IV ventral view.
Fig. 46-48. *Rhynchotarsonemus citri* new species, 46. ♂ dorsal view, 47. ♂ ventral view, 48. ♂ leg IV ventral view.
Fig. 49. *Daidalotarsonemus* sp. ♀ dorsal view. Fig. 50-51. *Fungitarsonemus pulvirostris* new species, 50. ♀ leg I dorsal view, 51. ♀ leg II dorsal view. Fig. 52-53. *Fungitarsonemus peregrinosus* new species, 52. ♀ leg I dorsal view, 53. ♀ leg II dorsal view.
Attiah: New tarsonemid mites

REMARKS: *R. florianus* resembles *R. filifer* DeLeon in the shortness of leg IV of the ♀; however, femur IV is clearly angulate in *R. florianus*. Moreover, dorsal hyst erosomal seta IV is only one-third the length of hyst erosomal seta III in *R. florianus*; it is one-half the latter's length in *R. filifer*.

TYPE LOCALITY: ♀ holotype circled with China ink, collected by H. H. Attiah and M. H. Muma 14 January 1963 at Highlands Hammock State Park, Highlands County, Florida. Mounted on same slide with undetermined ♀ tarsonomids.

DISTRIBUTION: Highlands Hammock State Park, Highlands County, Florida.

*Rhyncho tarsonemus citri* new species

Fig. 46-48

MALE HOLOTYPE: Length 182 µ, breadth 99 µ, body oval, broadest at posterior of metapodosoma, capitulum longer than broad. Propodosoma with first and second pairs of dorsal setae about equal, fourth pair little longer arising lateral and little anterior to third pair, latter 2.5 times as long as first pair. Hyst erosoma with dorsal setae I, II, III about equal in length, setae IV about half length of third pair. Leg II carrying a long annulate solenidion on tibia, longer than combined lengths of tarsus II and claw. Leg IV with femur angulate at base, femur length almost 3 times width of segment at base and much longer than tibiotarsal tactile; dorsal fem oral seta very long arising from middle of segment; apical ventral seta shorter than tibiotarsal tactile.

REMARKS: ♀ of *R. citri* differ from *R. filifer* DeLeon by the length of femur IV and the location of dorsal femoral seta.

TYPE LOCALITY: ♀ holotype circled with China ink, collected 23 May 1958 at Fort Pierce, Florida from citrus leaf by H. L. Greene.

DISTRIBUTION: Fort Pierce, Florida.

LITERATURE CITED


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