

A key to *Arrenurus spp.* (Males) in the Florida Department of Environmental Protection reference collection

[Based on keys or descriptions in Rutter (1999)]

Todd Risk

11/2022



Arrenurus species 1 Pluchino



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Project Description

Arrenurus is common and the most speciose genus of aquatic mite in Florida. Previous keys have not utilized photographs, which are often easier to visually interpret than drawings. This updated key should improve the ability to identify this genus of mite in Florida. However, there are approximately 30 described species of *Arrenurus* from Florida that are not contained in the DEP Laboratory, Tallahassee reference collection; so this key is not yet comprehensive. If you collect an *Arrenurus* that doesn't key out, it is likely one of those. If you would like to donate or lend any mites for inclusion in future updates of this key, please contact DEP using the information on page 2 of this publication.

All pictures taken by Todd Risk, DEP, using a Jenoptik camera and ProgRes SpeedXT Core 5 software.

Photo editing using Corel PhotoPaint software.

All photographed specimens were from the DEP reference collection and from Bob Rutter's collection, which was donated to DEP

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Glossary

Anterior: Situated at the front of the body

Anterolateral: Situated at the front and side of the body

Capitulum: The structure to which mouthparts are attached

Cauda: A structure resembling a tail; area behind the anus

Caudal Lobe: A roundish or flattish appendage, typically 2 parts divided by a fissure

Concave: Curves inward (ie: a bowl)

Conical: Having the shape of a cone

Convex: Curves outward (ie: a sphere)

Coxae: Base of the legs

Dorsal/Dorsum: Situated at the top of the body

Dorsal Shield: A plate/shield on the top of the body

Hyaline appendage: A glass-like shelf attached above the petiole of some male mites

Idiosoma: The body proper/main body from which a cauda, legs, capitulum are attached

Lateral: Situated at the side of the body

Longitudinal Ridge: A raised promontory that runs along the dorsal shield from anterior to posterior

Median/Medial: Situated at the middle or midpoint of the body

Midlateral: Situated at the middle and side of the body

Petiole: A small, projecting structure/stalk located at the posterior end of some male mites

Posterior: Situated at the back of the body

Posterolateral: Situated at the back and side of the body

Projection: A structure that extends outward from the body

Scalloped: A series of small curves along the edge of the body

Tapered: Gradually lessened or diminished

Truncate(d): With a flattened edge

Tubercle(s): A small, rounded projection on the surface of an animal

Ventral: Situated at the bottom/underside of the body

Ventral Shield: The heavily sclerotized shield in which the coxae and genital field fuse

A key to *Arrenurus* spp. (Males) in the Florida Department of Environmental Protection reference collection

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10/2022

- 1 Cauda projecting well beyond posterior margin, at least as long as wide (Figs. 1 and 2) 2



Figure 1: *A. apetirolatus*

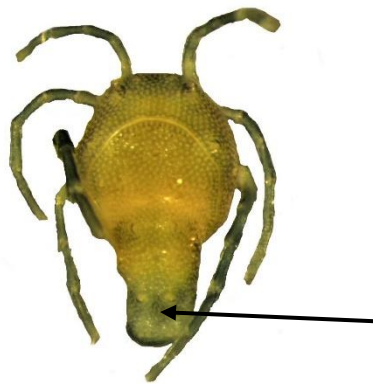


Figure 2: *A. species 9* Rutter

- 1' Body variously elaborated posteriorly as tubercles, paired lobes or projections. If a projecting cauda then projection not as long as wide (Figs. 3 and 4) 9



Figure 3: *A. parasuperior*



Figure 4: *A. bicaudatus*

- 2(1) Distinct conical tubercle above each eye (Figs. 5 and 6) [**Note:** tubercles may be on the dorsum, but not over the eye. Fig. 8] 3



Figure 5: *A. problecornis*

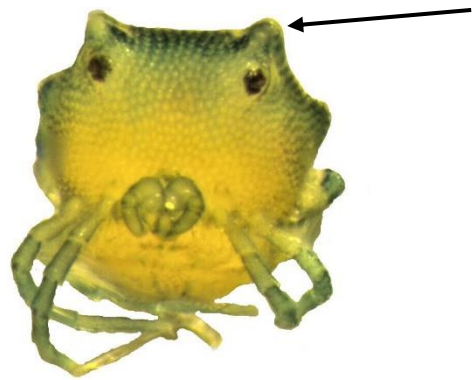


Figure 6: *A. problecornis*

- 2' No conical tubercle above each eye, at most a slight swelling (Figs. 7 and 8) 4



Figure 7: *A. odatus*



Figure 8: *A. species 1* Rutter

- 3(2) Cauda with a scalloped posterior margin and relatively deep median notch (Fig 10). Tubercle above the eye nearly twice as high as wide (Figs. 9 and 11) **A. species 6 Rutter**

[NOTE: It's possible that Figs 9 and 10 represent *A. species 6* Rutter and Fig. 11 represents *A. species 11* Rutter (not in this key). Until more specimens are examined, I chose to consider them a single species]

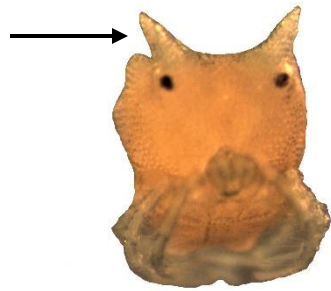


Figure 9: *A. species 6* Rutter

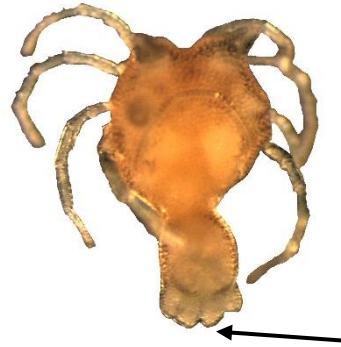
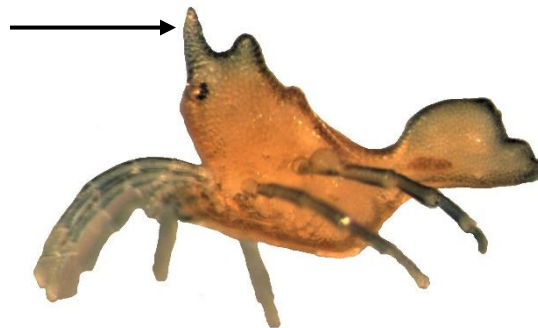


Figure 10: *A. species 6* Rutter



Figures 11: *A. species 6* Rutter

- 3' Cauda posterior margin mostly smooth except for a shallow median notch (Fig. 13). Tubercle above the eye about as high as wide (Figs. 12 and 14) ***A. problecornis*** (Cook, 1976)

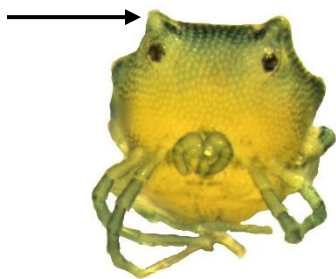


Figure 12: *A. problecornis*



Figure 13: *A. problecornis*



Figure 14: *A. problecornis*

4(2') Cauda with a pointed dorsal projection (Fig. 15) ***A. apetirolatus*** (Piersig, 1904)



Figure 15: *A. apetirolatus*



Figure 16: *A. apetirolatus*

4' Cauda without a pointed dorsal projection; at most a blunt swelling (Figs. 17 and 18) 5

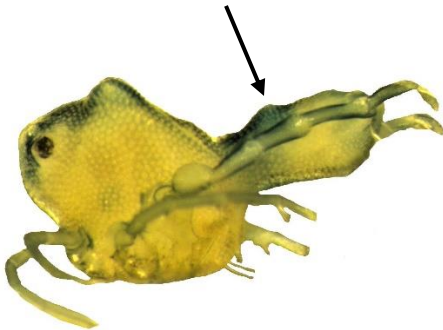


Figure 17: *A. species 1* Rutter



Figure 18: *A. species 9* Rutter

5(4') Idiosoma (body proper) vertically exaggerated; the dorsal shield from the attachment point of the cauda to the top of the idiosoma is directed vertically (Fig. 21) **A. odatus** (Cook, 1976)



Figure 19: *A. odatus*



Figure 20: *A. odatus*

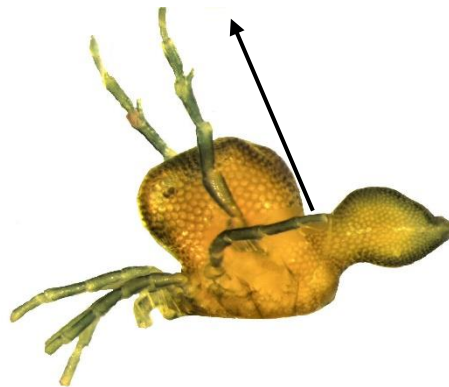


Figure 21: *A. odatus*

5' Idiosoma (body proper) not vertically exaggerated; the dorsal shield from the attachment point of the cauda to the top of the idiosoma is directed forward (Figs. 22 and 23) 6

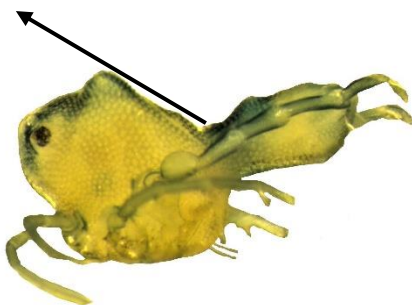


Figure 22: *A. species 1* Rutter



Figure 23: *A. species 9* Rutter

6(5') Dorsum with midlateral tubercles (Figs. 24 and 26). Cauda with posterolateral projections (Figs. 25 and 27) **A. species 1 Rutter**

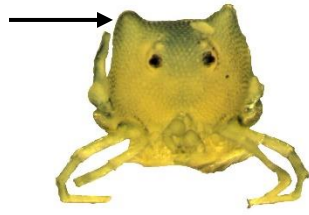


Figure 24: A. species 1 Rutter



Figure 25: A. species 1 Rutter

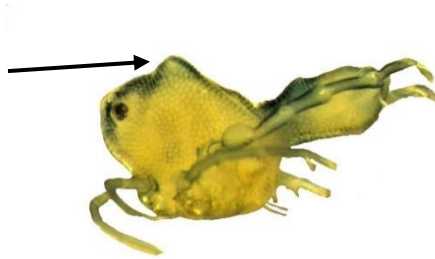


Figure 26: A. species 1 Rutter

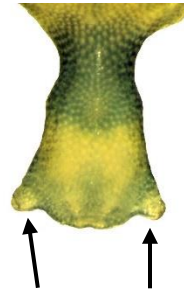


Figure 27: A. species 1 Rutter

6' Dorsum without midlateral tubercles (Figs. 28 and 29). Cauda without posterolateral projections (Figs. 30 and 31) 7



Figure 28: A. species 4 Rutter



Figure 29: A. species 9 Rutter



Figure 30: A. species 4 Rutter



Figure 31: A. species 9 Rutter

7(6') Cauda gradually narrows laterally from base to posterior (Fig. 33) **A. species 9 Rutter**



Figure 32: A. species 9 Rutter



Figure 33: A. species 9 Rutter



Figure 34: A. species 9 Rutter

7' Cauda widens laterally from base to posterior (Fig. 35) OR caudal sides are parallel (Fig. 36) 8

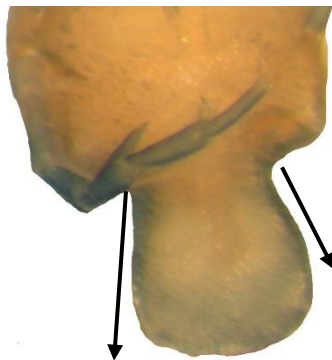


Figure 35: A. zorus



Figure 36: A. species 4 Rutter

8(7'). Cauda short, no longer than wide (Fig. 38). Lateral sides of the cauda parallel (Fig. 38). When viewed from the side, the ventral edge of the cauda gradually rises above the ventral plane from its attachment at the idiosoma (body proper) (Fig. 39). Apex of the 4th segment of the hind leg with a small blunt spur (Fig. 40). Dorsal plate generally convex (Fig. 37) **A. species 4 Rutter**

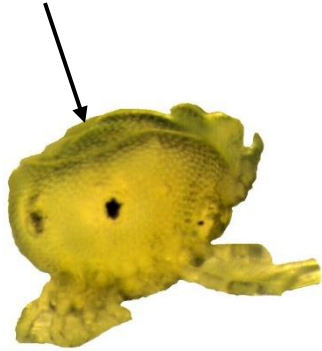


Figure 37: A. species 4 Rutter

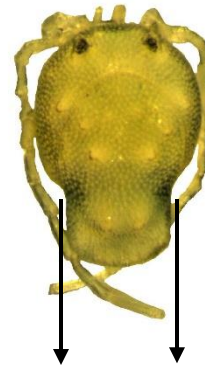


Figure 38: A. species 4 Rutter

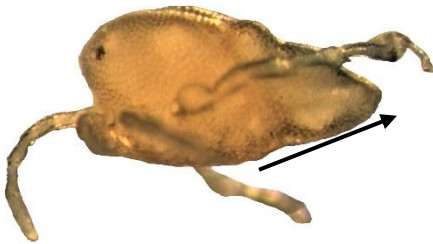


Figure 39: A. species 4 Rutter

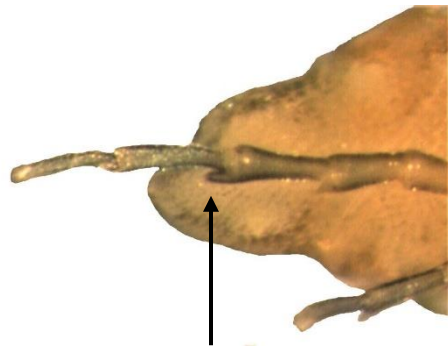


Figure 40: A. species 4 Rutter

- 8' Cauda longer, approximately 1.5 times longer than wide (Figs. 42 and 44). Lateral sides of the cauda widen from base to apex (Figs 42 and 44). When viewed from the side, the cauda sharply rises above the ventral plane from its attachment at the idiosoma (body proper) (Fig. 43). Apex of the 4th segment of the hind leg with a large sharp spur (Fig. 44). Dorsal plate generally concave (Fig. 41) **A. zorus** (Cook, 1976)

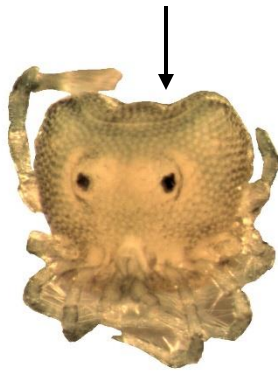


Figure 41: *A. zorus*



Figure 42: *A. zorus*

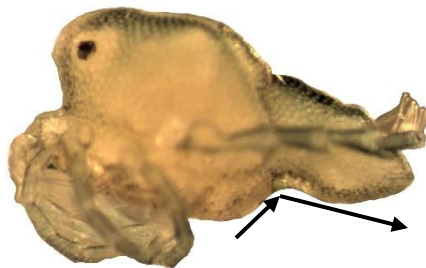


Figure 43: *A. zorus*

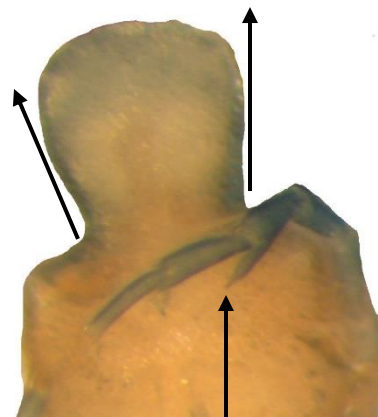


Figure 44: *A. zorus*

- 9(1') Dorsal plate small, nearly completely surrounded by the ventral plate except for a narrow gap posteriorly (Fig. 46) ***A. hovus*** (Cook, 1976)

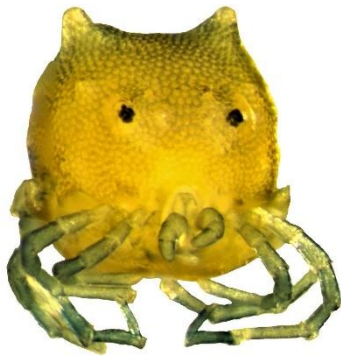


Figure 45: *A. hovus*

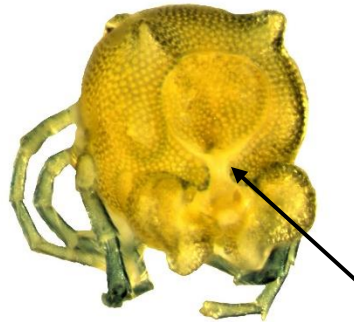


Figure 46: *A. hovus*



Figure 47: *A. hovus*

- 9' Dorsal plate of normal configuration, not enclosed posteriorly by ventral plate (Fig. 48) [**NOTE:** Do not confuse caudal projections with ventral plate encirclement. See Fig. 49] 10



Figure 48: *A. apopkensus*

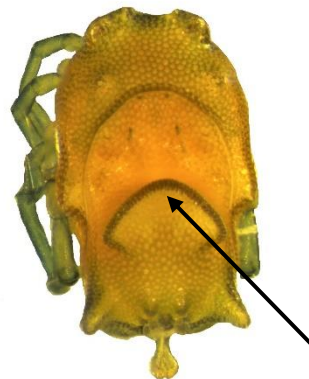


Figure 49: *A. species 1* Pluchino

10(9')	Cauda with a posterior petiole (Figs. 50 and 51)	11
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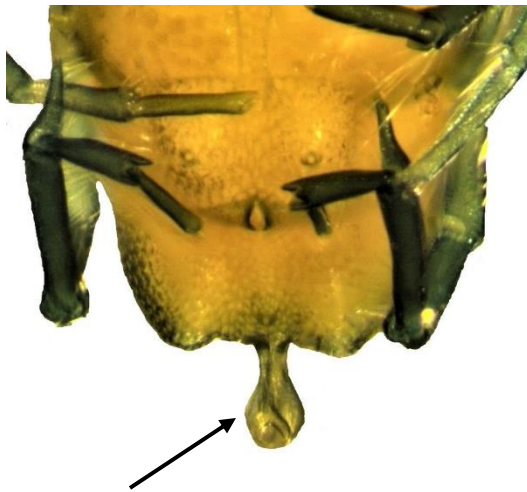


Figure 50: *A. species 1* Pluchino (Ventral view)

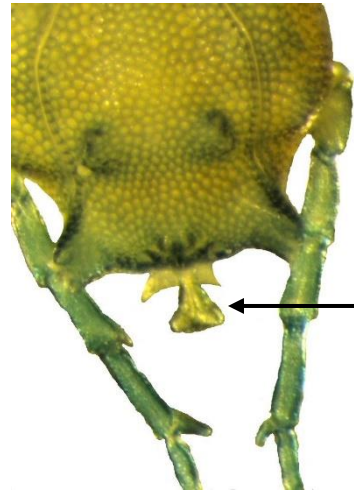


Figure 51: *A. apokensus*

10'	Cauda without a posterior petiole (Figs. 52, and 53)	15
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Figure 52: *A. species 12* Rutter

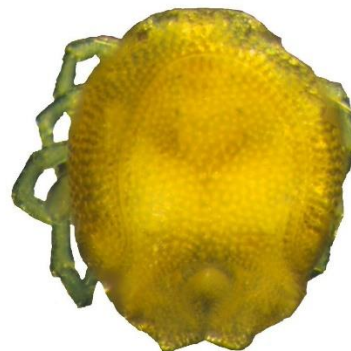


Figure 53: *A. species 7* Rutter

- 11(10) Dorsal plate mostly smooth anterior of dorsolateral caudal projections; at most slight swellings (Fig. 55) ***A. parasuperior*** (Cook, 1976)



Figure 54: *A. parasuperior*

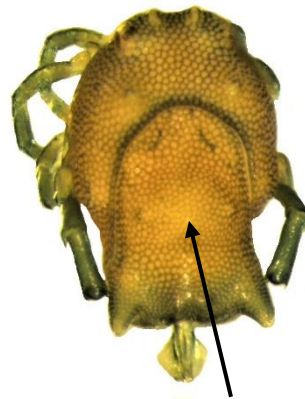


Figure 55: *A. parasuperior*



Figure 56: *A. parasuperior*

- 11' Dorsal plate with an elevated wedge-shaped projection, or paired tubercles variously fused, anterior of dorsolateral caudal projections (Figs. 57 and 58)12

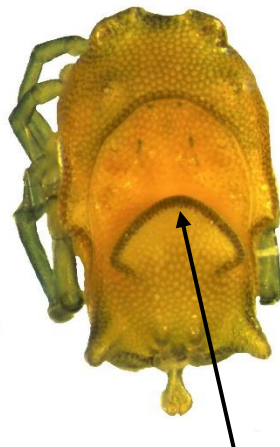


Figure 57: *A. species 1 Pluchino*



Figure 58: *A. apokensus*

12(11') Dorsal plate with an elevated wedge-shaped projection anterior to dorsolateral caudal projections (Figs. 60 and 61) **A. species 1 Pluchino**



Figure 59: *A. species 1 Pluchino*

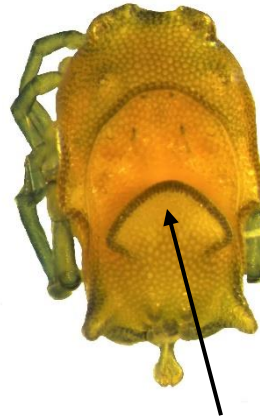


Figure 60: *A. species 1 Pluchino*

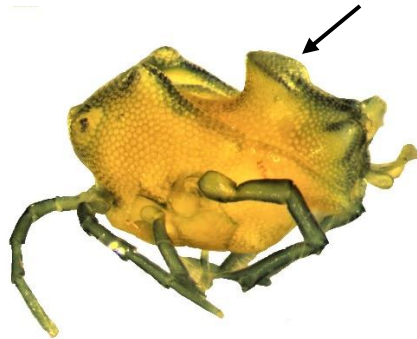


Figure 61: *A. species 1 Pluchino*

12' Dorsal plate with paired tubercles variously fused, anterior of dorsolateral caudal projections (Figs. 62 and 63) 13



Figure 62: *A. apopkensus*

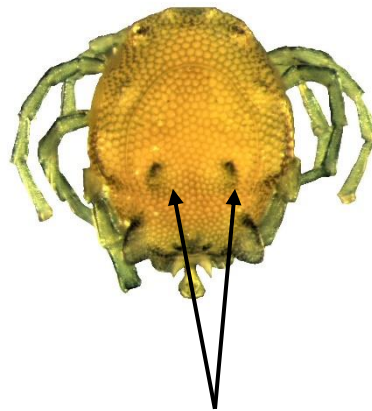


Figure 63: *A. nr. zapus*

13(12') Dorsolateral projections of cauda appear bluntly pointed when viewed from the side. Paired tubercles on dorsal plate largely fused (specimen unavailable) **A. species 5 Rutter**

13' Dorsolateral projections of cauda appear broadly truncate when viewed from the side (Fig. 64). Paired tubercles on dorsal plate distinctly separated (Fig. 65) 14



Figure 64: *A. apopkensus*

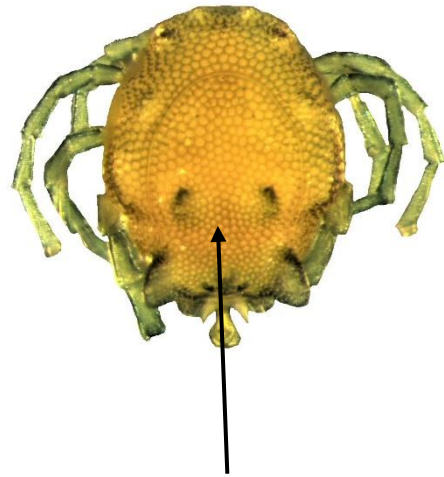


Figure 65: *A. nr zapus*

14(13') Petiole tapered posteriorly (Fig. 66) Hyaline appendage concave (Fig.66) *A. nr. zapus*
(Cook, 1976)

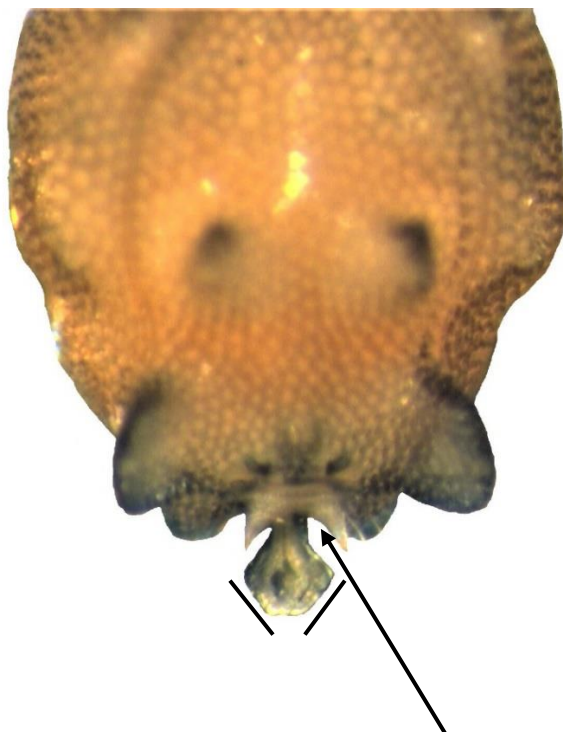


Figure 66: *A. nr. zapus*



Figure 67: *A. nr. zapus*



Figure 68: *A. nr. zapus*



Figure 69: *A. nr. zapus*

- 14' Petiole truncate (Fig. 70). Hyaline appendage straight or nearly so (Fig. 70) ***A. apopkensus*** (Cook 1976)

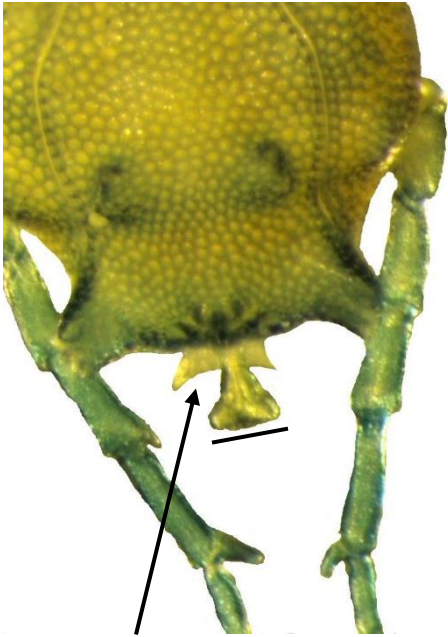


Figure 70: *A. apopkensus*



Figure 71: *A. apopkensus*



Figure 72: *A. apopkensus*



Figure 73: *A. apopkensus*

15(10') Posterior of body with central caudal lobes (Figs. 74 and 75) **A. (*Micruracarus*) group** 16

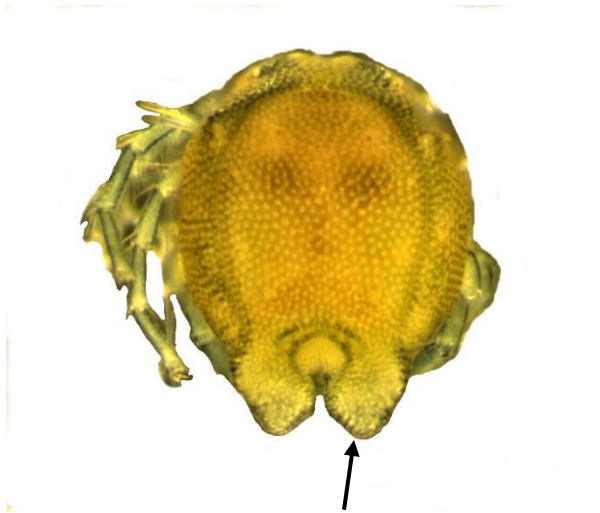


Figure 74: *A. bicaudatus*

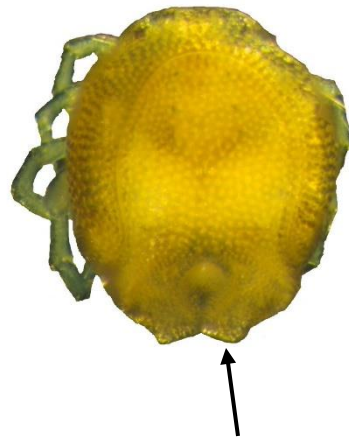


Figure 75: *A. species 7* Rutter

15' Posterior of body without central caudal lobes; at most with tubercles (Figs. 76 and 77) 19



Figure 76: *A. species 12* Rutter



Figure 77: *A. species 1* Risk

- 16(15) Disc of dorsal plate with a concave central depression (Figs 78 and 80). Dorsal plate without a convex central longitudinal ridge (Figs. 78 and 80) **A. species 7 Rutter**

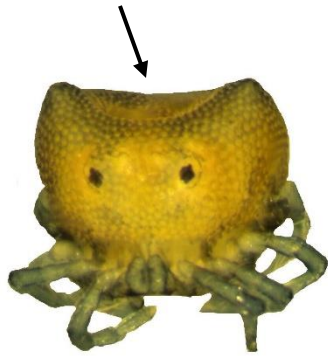


Figure 78: *A. species 7* Rutter

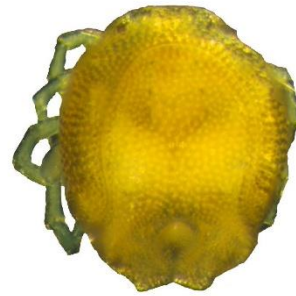


Figure 79: *A. species 7* Rutter

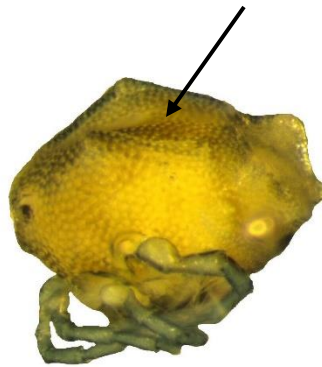


Figure 80: *A. species 7* Rutter

- 16' Disc of dorsal plate with a convex longitudinal ridge (Figs. 80 and 81) 17

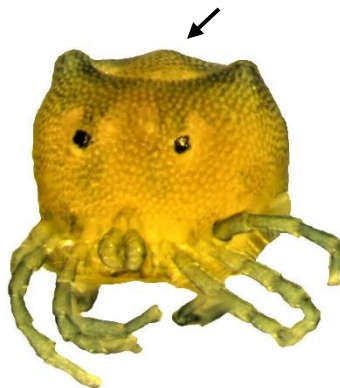


Figure 81: *A. bicaudatus*

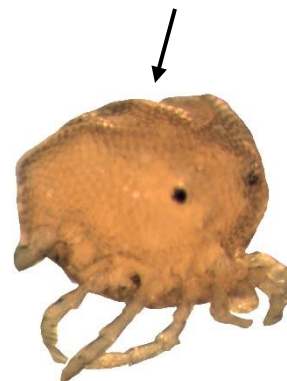


Figure 82: *A. species 2* Rutter

17(16') Caudal lobes rounded along posterior edge (Fig 84). Axis of caudal lobes oriented in a posterior direction (Fig. 84) **A. species 2 Rutter**



Figure 83: A. species 2 Rutter

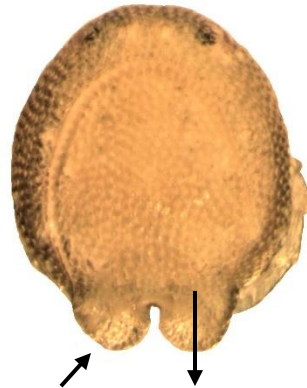


Figure 84: A. species 2 Rutter

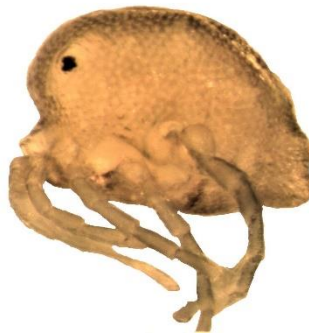


Figure 85: A. species 2 Rutter

17' Caudal lobes truncate along posterior edge (Fig. 86). Axis of caudal lobes oriented in a posterior direction (specimen unavailable) or oriented inward (Fig. 86) 18

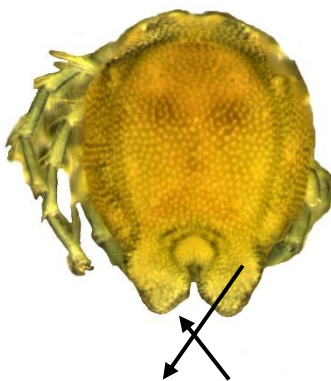


Figure 86: A. bicaudatus

18(17') Caudal lobes appressed along the midline. Axis of caudal lobes oriented in a posterior direction (specimen unavailable) **A. species 10 Rutter**

18' Caudal lobes do not meet along the midline (Fig. 88). Axis of caudal lobes oriented inward (Fig. 88) **A. bicaudatus** (Marshall, 1908)

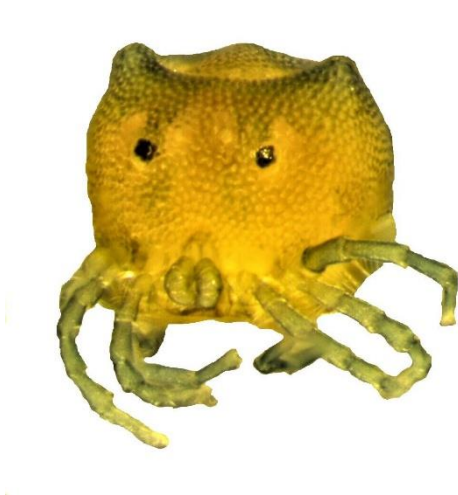


Figure 87: *A. bicaudatus*

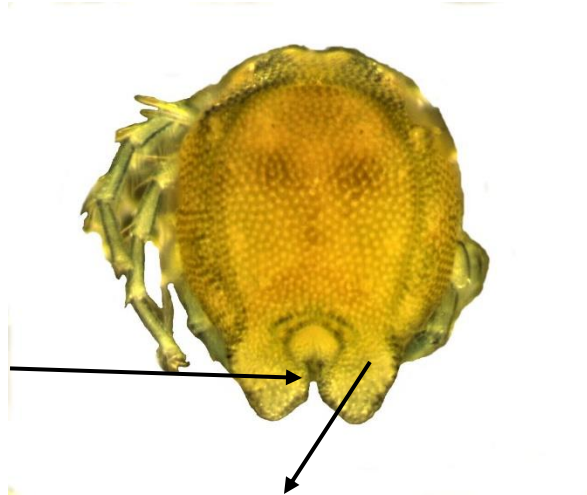


Figure 88: *A. bicaudatus*

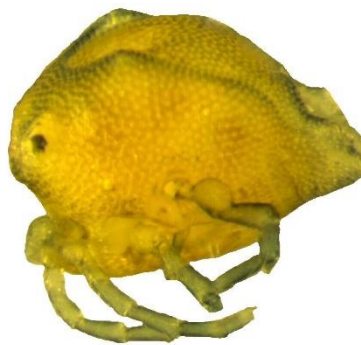


Figure 89: *A. bicaudatus*

19(15') Posterolateral margin with projections longer than wide (Fig. 91) [NOTE: It is possible that this is a female of *A. problecornis* or a similar species (see Cook 1976). Until more specimens are collected, I chose to leave it as it was named in Bob Rutter's collection].....**A. species 12 Rutter**



Figure 90: A. species 12 Rutter

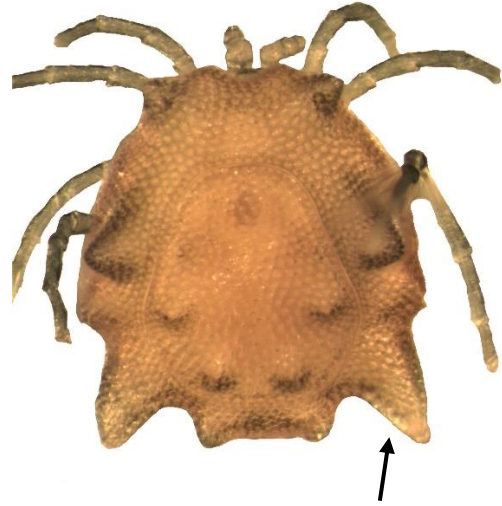


Figure 91: A. species 12 Rutter



Figure 92: A. species 12 Rutter

- 19' Posterolateral margin with projections much shorter (Fig. 94) in comparison to the projections shown in Figure 91 **A. species 1 Risk**

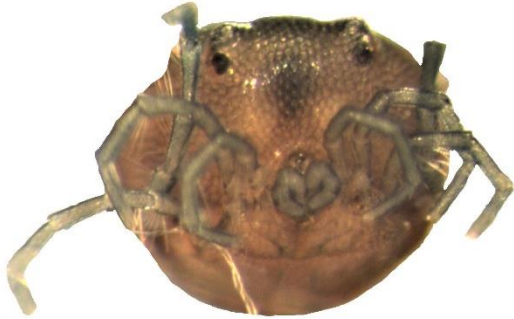


Figure 93: A. species 1 Risk

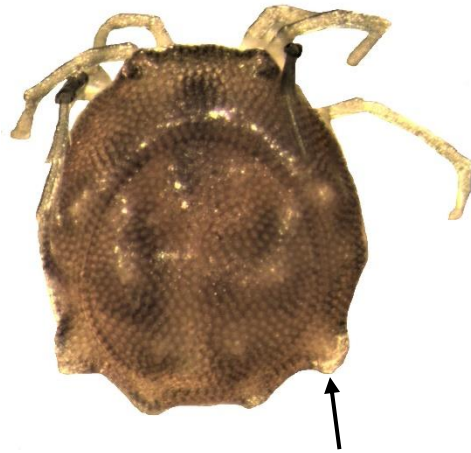


Figure 94: A. species 1 Risk



Figure 95: A. species 1 Risk

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