Key to Aquatic Mites Known from Alberta
(created by H. Proctor, July 2008 version)

Most illustrations have been redrawn by Heather Proctor from these two sources:

Cook, D.R. 1974. Water mite genera and subgenera. Memoirs of the American Entomological Institute 21: i – 860.

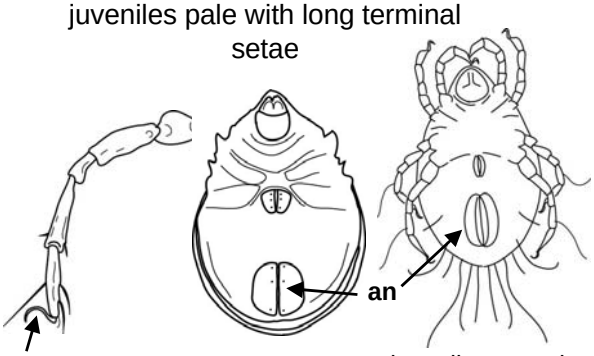
Smith, I.M., D.R. Cook & B.P. Smith. 2001. Water mites (Hydrachnida) and other arachnids. pp. 551 – 659 in J.H. Thorp & A.P. Covich (eds.) Ecology and Classification of North American Freshwater Invertebrates, 2nd edition. Academic Press, San Diego.

For a diagram of water mite anatomy and examples of male and female genitalia, see Appendix I.

For a list of taxa see Appendix II (**including taxa that are not keyed** but can be identified using sources cited above).

ACARI

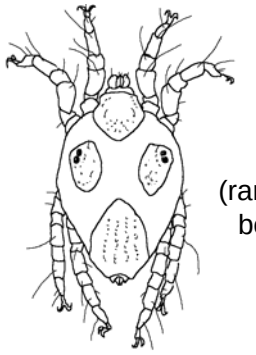
- 4 pairs of legs
  - 1 claw at tip (tarsus) of each leg; large anal opening (**an**); adults shiny, brownish, hemispherical; juveniles pale with long terminal setae



Oribatida: Hydrozetidae: *Hydrozetes*

(there are a few other genera of aquatic oribatids that have 3 claws/tarsus; these also have large anal openings)

  - >1 claw per leg tarsus
    - 2 claws per tarsus (at least on first two pairs of legs)
      - very small (< 1mm long), dorsoventrally flattened, diamond-shaped mites; bases of legs I and II widely separated from bases of legs III and IV



Halacaridae

(rarely recorded, but this may be due to small body size)

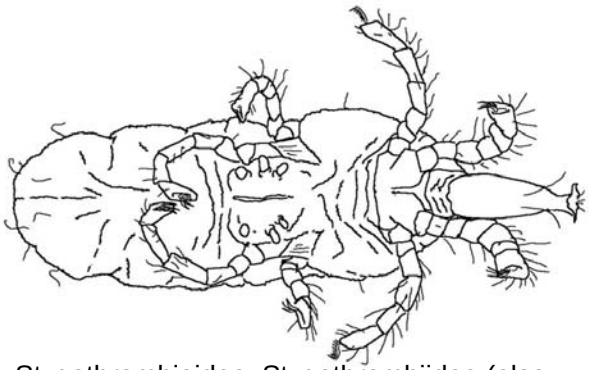
      - not this combination of features

Hydrachnidia (a.k.a. Hydrachnida, Hydracarina)

water mites in the strict sense

see Hydrachnidia key

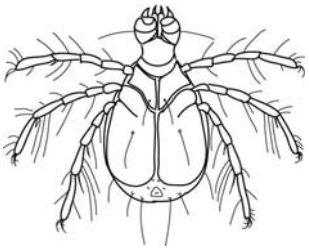
    - 3 claws per tarsus; palp with one long blunt terminal seta; soft, elongate mites from lotic substrates



Stygothrombioidea: Stygothrombiidae (also 'Stygothrombidiidae'): *Stygothrombium*

(this superfamily is sometimes included in, and sometimes excluded from, the Hydrachnidia)

- 3 pairs of legs

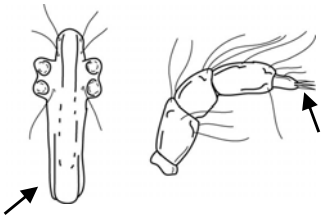


larval mite – not identifiable further

HYDRACHNIDIA

eyes very close together (~ 1 eye-width apart) on same sclerotized plate in middle of 'forehead'; soft-bodied; large red or orange mites

eye-plate with long posterior projection; palps with terminal setae almost as long as palp tarsus; body clearly longer than wide



eye-plate palp

Limnocharidae: *Limnochares*

eye-plate without posterior projection, shaped like a pair of eye-glasses; palps with terminal setae shorter than tarsus; body usually egg-shaped

eye-plate palp

Eylaidae: *Eylais* (very common)

eyes at least 2 eye-widths apart; wide array of colours and degrees of sclerotization

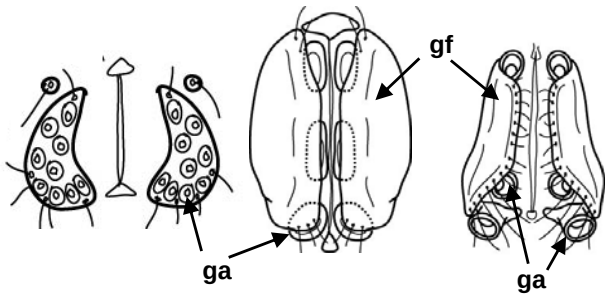
mites with gonopores (arrows in A^1-C^1 at bottom of page)

adults

mites without gonopores (A-C at bottom of page); often only 2 pairs of genital acetabula

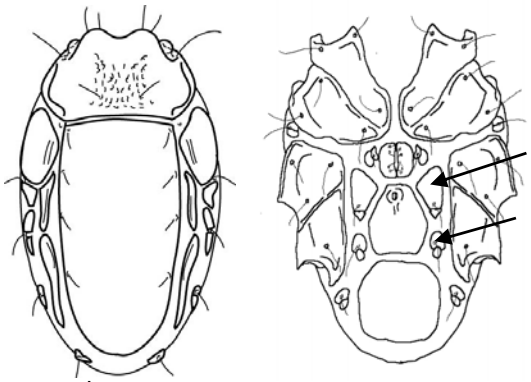
deutonymphs, may not be identifiable using this key

genital acetabula (**ga**) clearly present around gonopore, though may be obscured behind genital flaps (**gf**); typically without sclerotized plates between hind coxae



see Hydrachnidia A

no apparent genital acetabula around gonopore; dorsum with 2 large median plates and several smaller peripheral platelets; venter with sclerotized plates between hind coxae



dorsum venter

Hydrovolziidae: *Hydrovolzia* (rare)

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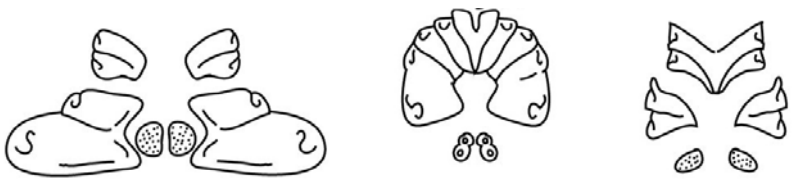
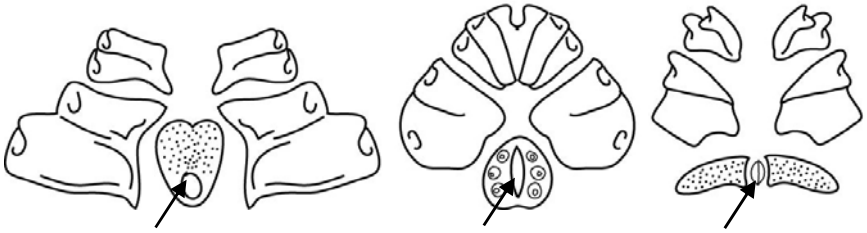
examples of deutonymphal water mites (ventral)



A B C

examples of adult water mites (ventral)

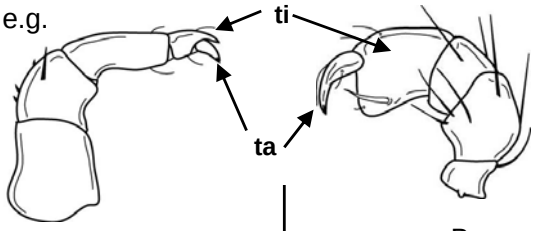


A^1 B^1 C^1

HYDRACHNIDIA A

last two segments of palp (tibia [**ti**] and tarsus [**ta**]) forming grasping pincer

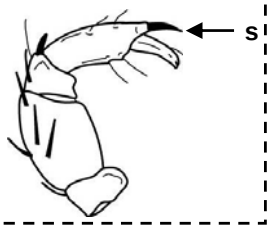
e.g.



A

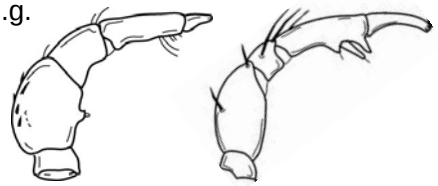
B

but not when it is just an enlarged seta (**s**)



tibia and tarsus of palp not forming grasping pincer

e.g.

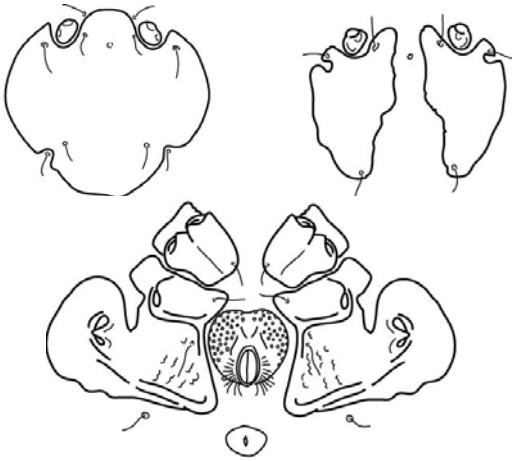


see Hydrachnidia B

palp tibia projects dorsally and palp tarsus moves against it from below = “chelate palp” (see A above)

palp tibia projects ventrally, and palp tarsus moves against it from above = “uncate palp” (see B above left); well-sclerotized mites

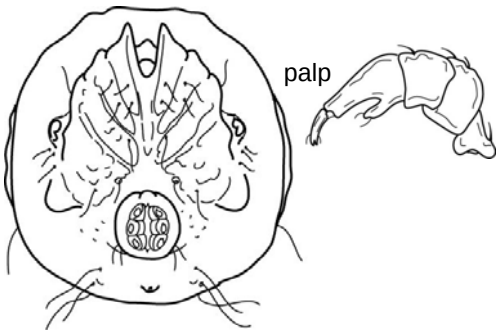
3rd segment of palp (genu) clearly longer than palp tibia (see A above); usually with 1 or 2 large plates between eyes; 4th coxae much wider than other coxae; usually large, red, spherical mites



Hydrachnidae: *Hydrachna* (very common)

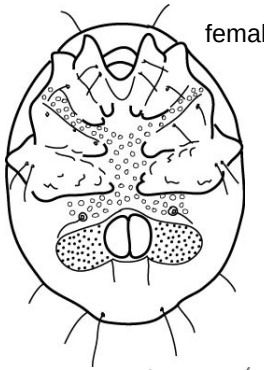
not this combination of features

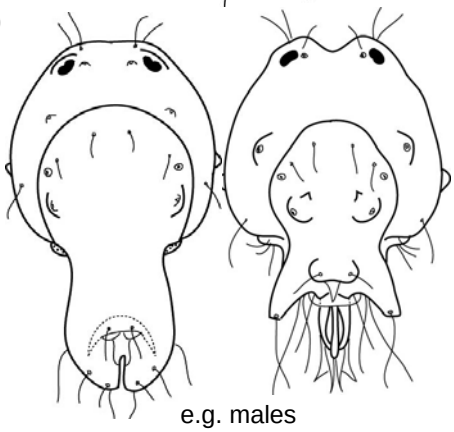
3-4 pairs of genital acetabula in single row on either side of genital opening; male without elaborate posterior extensions of body



Mideopsidae: *Mideopsis* (in part; not all species have clearly uncate palp)

many pairs of acetabula on wing-like fields on either side of genital opening; male usually with elaborate posterior extension of body

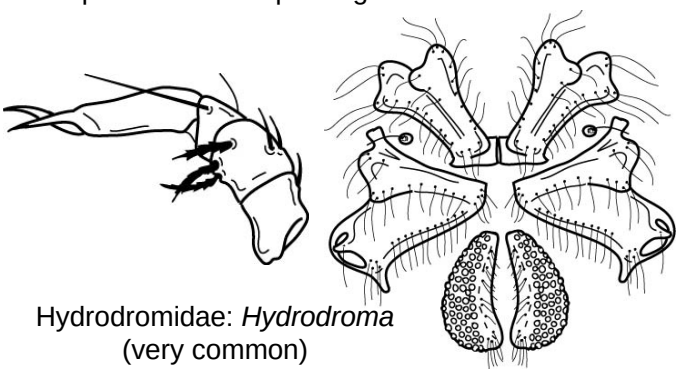




e.g. males

Arrenuridae: *Arrenurus* (very common)

tips of palp tibia and tarsus long, slender and scissors-like; no dorsal plates; genital plates with >10 prs of genital acetabula



Hydrodromidae: *Hydrodroma* (very common)

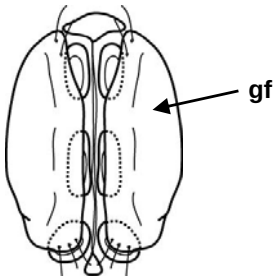
palp not scissors-like; often with dorsal plates; usually only 3-4 pairs of acetabula

Hydryphantidae (see family key)

HYDRACHNIDIA B

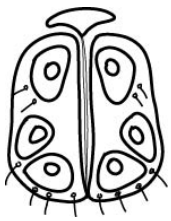
genital acetabula close together in 2 median rows, flanked or covered by movable genital flaps (**gf**); usually only 3-6 prs of genital acetabula

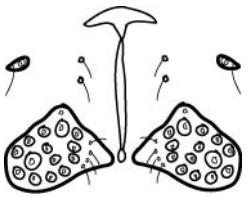
e.g.



genital flaps usually absent, but if they appear to be present the flaps are not movable but are fused to the body or the acetabula are on surface of flaps; often >>6 prs of acetabula

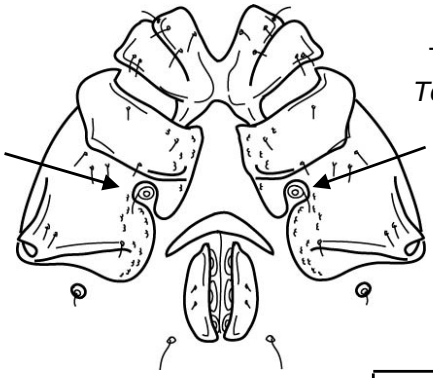
e.g.





see Hydrachnidia C

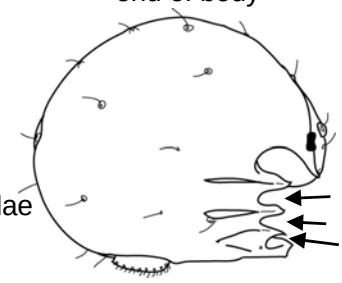
4th coxal plates encircling a pair of glandularia (gland openings)



Teutoniidae: *Teutonia* (rare)

4th coxal plates not encircling glandularia

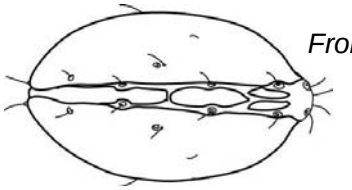
when viewed laterally, all leg bases crowded at anterior end of body



Oxidae

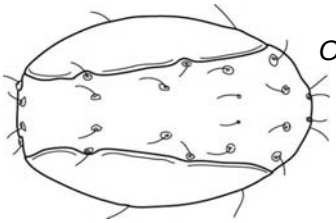
leg bases not crowded at anterior end of body

when viewed dorsally only thin strip of unsclerotized cuticle present, usually bearing narrow platelets



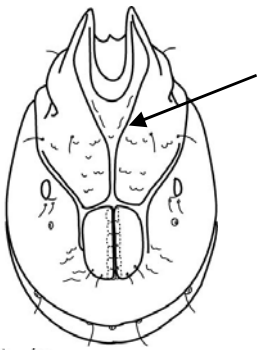
Frontipoda

broad unsclerotized dorsal area without narrow platelets

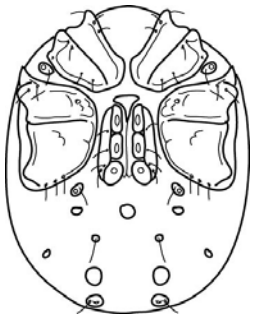


Oxus

coxae fused medially to form Y- or V-shaped line from anterior margin of genital field to 1st coxal plates

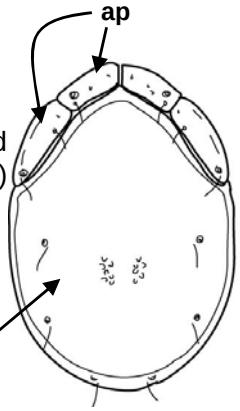


coxae not fused medially to form Y or V



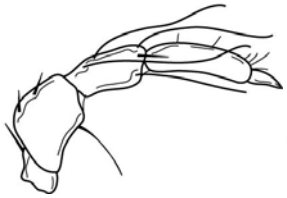
Sperchontidae (see family key)

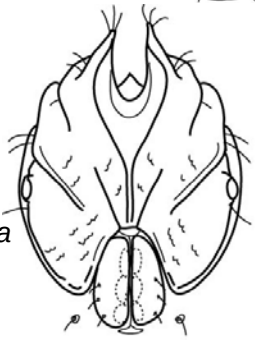
strongly dorso-ventrally compressed and completely sclerotized; dorsally 1-2 prs of small anterior platelets (**ap**) and 1 large median plate (**mp**)



Torrenticolidae (see family key)

not strongly compressed and with little dorsal sclerotization; palp usually with several long setae

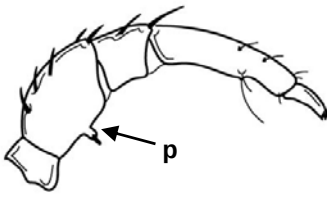


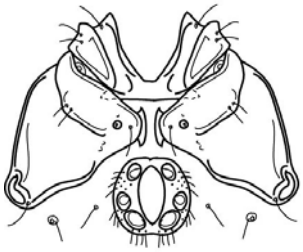


Lebertiidae: *Lebertia* (very common)

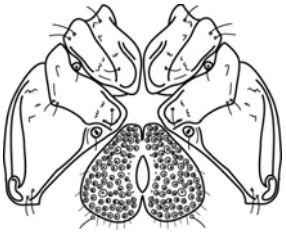
HYDRACHNIDIA C

tarsus of leg IV without claws, but may have a long subterminal seta (**s**); usually only 3 prs of genital acetabula (*Limnesia anomala* an exception); palp usually with seta on projection (**p**) on ventral side of palp femur





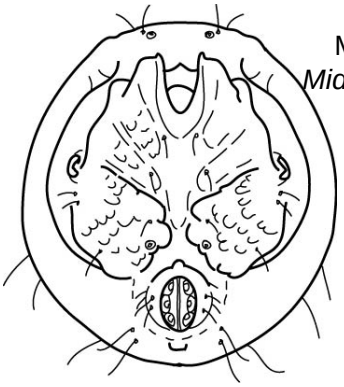
Limnesiidae: *Limnesia* (very common)



L. anomala

tarsi of legs IV with claws

3-4 prs of genital acetabula arranged vertically in a single column on either side of gonopore; completely sclerotized mites

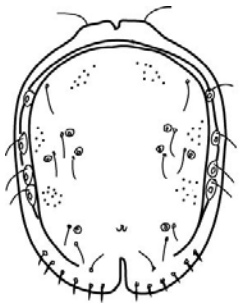


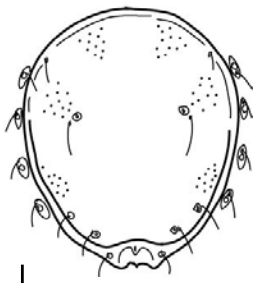
Mideopsidae: *Mideopsis* (in part)

acetabula not arranged this way; mites with various degrees of sclerotization

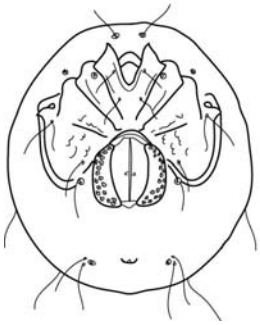
dorsum completely or almost completely covered by a single large plate (= shield)

e.g.





genital area extends anteriorly between 4th coxae; > 4 prs of acetabula; male with highly modified genital flaps



male genital area

Mideidae: *Midea* (uncommon)

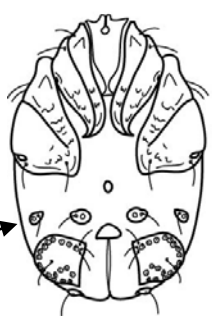
genital area not between 4th coxae, instead usually very close to end of body; 3-many prs of acetabula

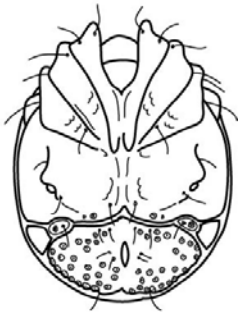
Aturidae (see family key)

dorsum not completely covered by single large plate, though may have numerous platelets (a few species of *Feltria* with full dorsal shield in which case have glandularia arranged as described below)

dorsum with 1 median plate and many smaller pairs of platelets; 2 prs of glandularia (**gl**) in a row between 4th coxae and genital area

dorsum





ventral views: female (left) male (right)

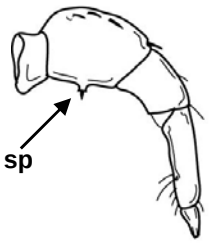
Feltriidae: *Feltria* (common & diverse)

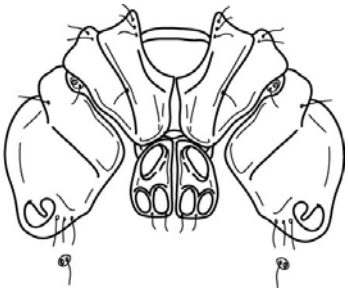
not this combination of features

see Hydrachnidia D

HYDRACHNIDIA D

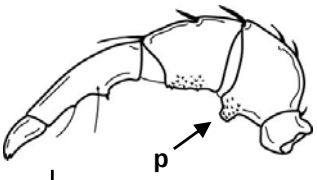
ventral side of palp femur with a seta borne on a small projection (**sp**); 3 prs of genital acetabula; genital area between 3rd and 4th coxae





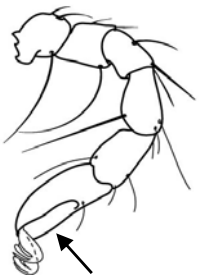
Limnesiidae: *Tyrellia* (uncommon except in submerged moss in standing water)

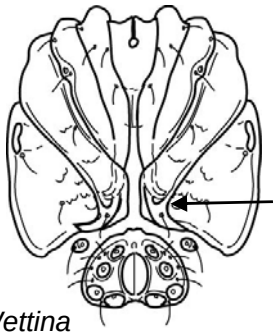
not this combination of features - do not mistake simple projection on palp femur (**p**) for seta on projection (see e.g. below)



claws and socket of leg I tarsus not obviously larger than those of other legs

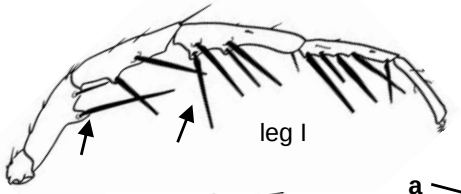
claws and socket of tarsus of leg I very large; acute medial angle of fusion of coxae III and IV

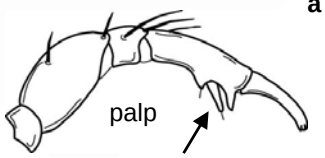


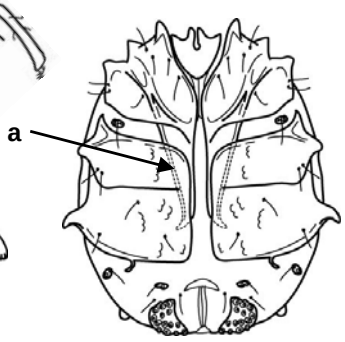


Wettinidae: *Wettina* (uncommon)

legs I and palps with thick, rigid setae borne on long tubercles and/or first coxae with long internal apodemes (**a**) that reach into 4th coxae or parasitic inside freshwater mussels; palp with at least one ventral projection on tibia



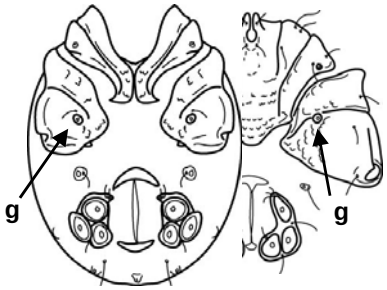




Unionicolidae

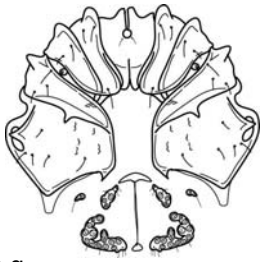
not this combination of features

a pair of glandularia (**g**) set in the 4th coxal plates (sometimes close to border with 3rd coxae); males never with modified 3rd or 4th legs

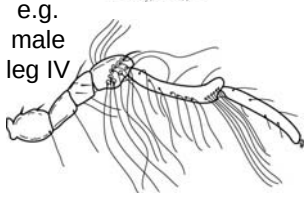


Hygrobatidae (see family key)

no glandularia in 4th coxae; leg III and/or IV of male usually with strong modifications

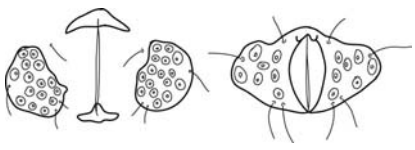


e.g. male leg IV



Pionidae (see family key)

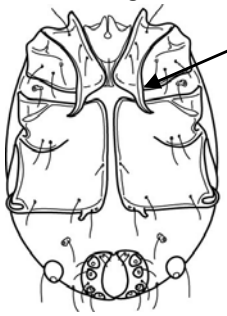
1st coxal apodemes project into 4th coxae (see **a** above); usually > 6 prs of genital acetabula



female male

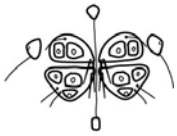
Neumania

1st coxal apodemes short; usually 5 prs of genital acetabula; female genital plates broken into 4 platelets; legs I often very long



Unionicola

male

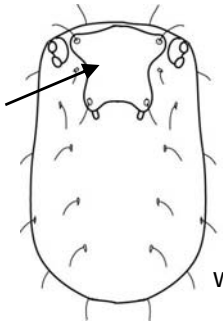


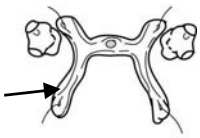
female

FAMILY KEYS

HYDRYPHANTIDAE

legs with swimming setae on distal segments (see Anatomy figure in Appendix); large oblong or H-shaped plate between eyes



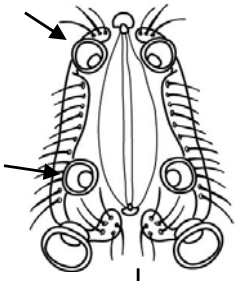


Hydryphantes

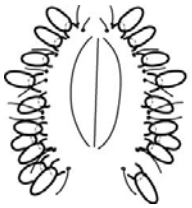
(the rare *Pseudohydryphantes* would also key here; it lacks the large plate between the eyes)

legs without swimming setae

3 prs of genital acetabula

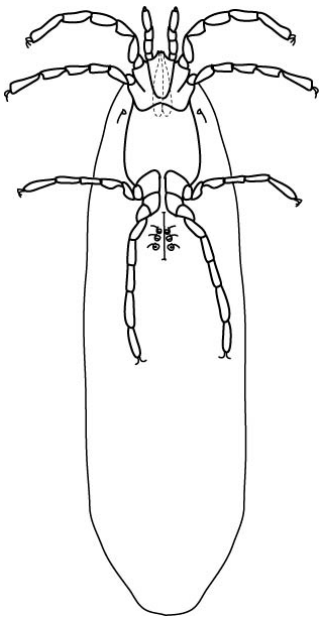


> 3 prs of elongate genital acetabula; tarsal claws with comb-like serrations (**s**)



Protzia

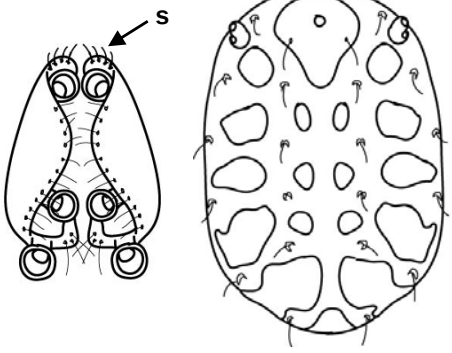
body greatly elongated and worm-like; genital flaps poorly developed or absent; no obvious dorsal plates or platelets



Wandesia

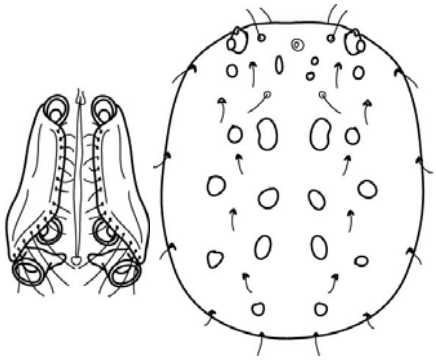
not worm-like, often has dorsal plates or platelets

genital field with well-sclerotized projections of genital flaps extending anterior to 1st pr of acetabula, bearing thick setae (**s**); usually with large median plate between eyes



Panisopsis

no anterior projection of genital flaps bearing setae; with at most very small platelets between eyes



Thyas

NOTE: if you find a hydryphantid in Alberta that does not fit the key or match the illustrations, it may be one of the following rare genera:

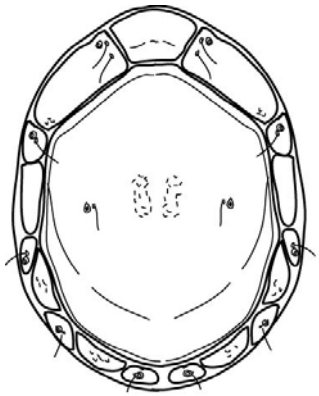
(a) without dorsal plates or platelets: *Notopanisus* (has anterior extensions to genital flaps as illustrated for *Panisopsis* above), *Albertathyas* (no anterior extensions)

(b) dorsal platelets separated centrally but last pair fused to form single terminal plate: *Panisus*

(c) dorsal platelets fused to form large central plate or 'doily-like' network that may cover entire dorsum: *Thyopsis* (2nd pr of acetabula located distally at same level as 3rd pr), *Thyopsella* (2nd pr well anterior to 3rd, as illustrated above)

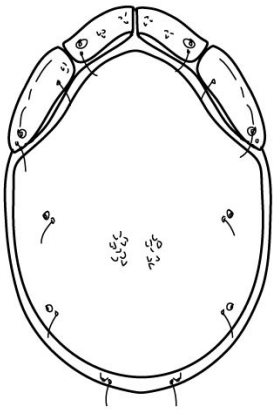
TORRENTICOLIDAE

one unpaired anterior-median platelet and more than 5 prs of lateral platelets

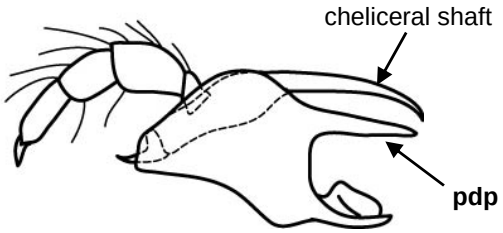


Testudacarus (rare)

1-2 prs of anterior-median platelets

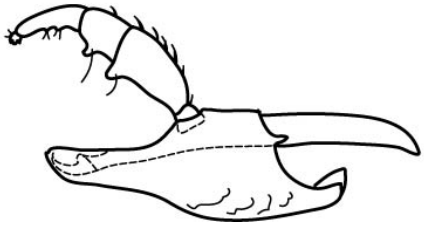


base of mouthparts (capitulum) with long postero-dorsal projection (**pdp**) when viewed laterally (you must dissect off mouthparts in order to see this)



Monatractides

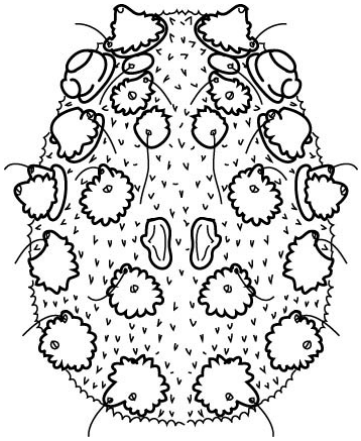
capitulum without long postero-dorsal projection

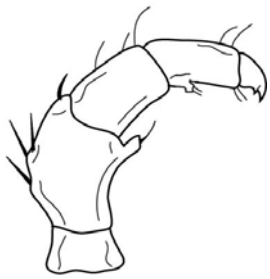


Torrenticola (very common)

SPERCHONTIDAE

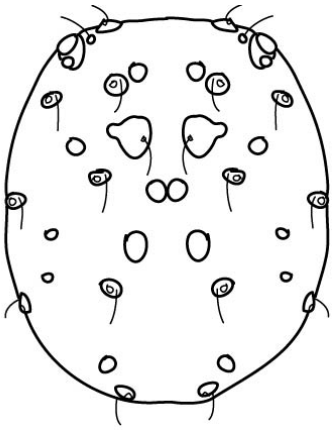
glands and associated setae (glandularia) raised as large bumps covered with numerous smaller ‘warty’ projections; ventral sides of palp tibia without peg-like setae

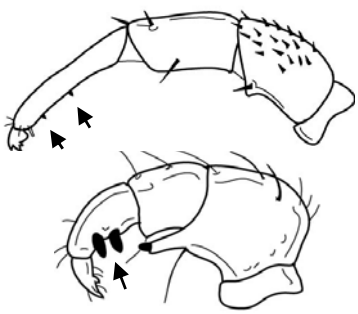




Sperchonopsis

glandularia usually not raised, but if raised then on smooth bumps; palp tibia usually with 2 peg-like setae

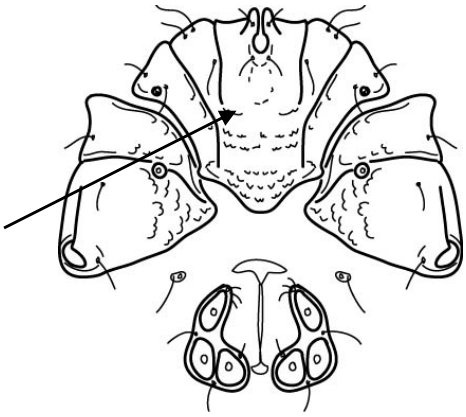




Sperchon (common)

HYGROBATIDAE

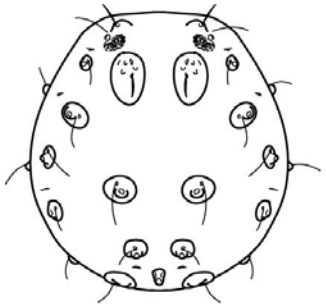
base of capitulum broadly fused to first coxae (arrow); little dorsal sclerotization; 3 or more prs of genital acetabula

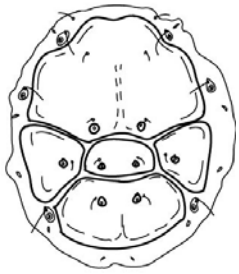


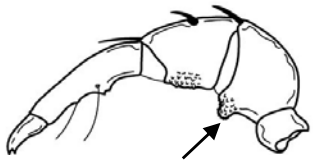
Hygrobates

capitulum not fused to first coxae (for e.g.'s see Pionidae illustrations next page); 3 prs of genital acetabula

numerous dorsal platelets; tibia and tarsus of leg I not modified; usually with ventral projection from palp femur

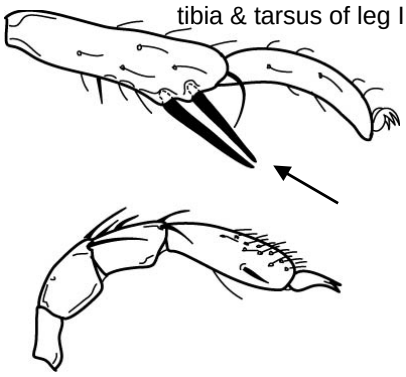






Corticacarus (uncommon)

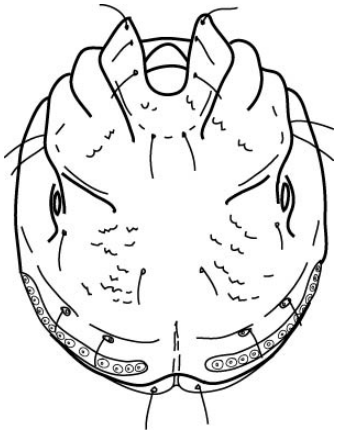
rarely with dorsal platelets; tibia of legs I with modified dorsal setae, and tarsus usually slightly bowed; palp femur without ventral projection



Atractides

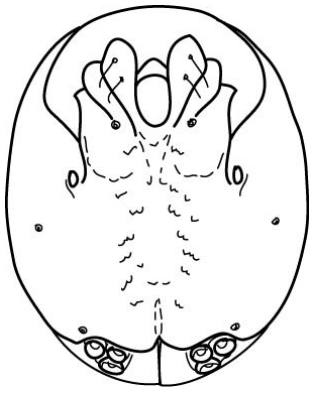
ATURIDAE

>4 prs of small genital acetabula spread out along hind margin of body



Aturus (common and diverse)

3-4 prs of genital acetabula

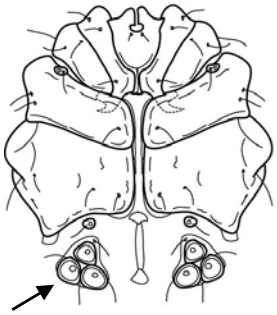


Brachypoda (rare)

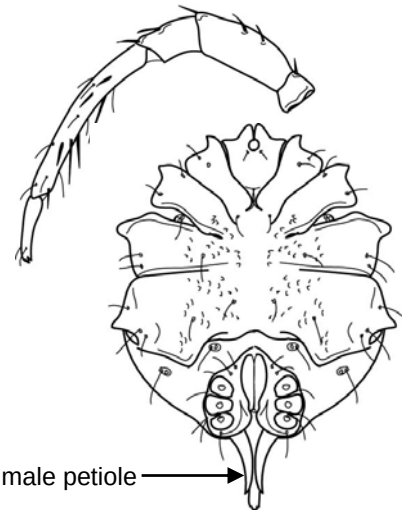
NOTE: other rare genera of aturids with 3 prs of acetabula known from Alberta are *Estellacarus* (differentiated from *Brachypoda* in having ridges extending posteriorly from insertions of hind legs), *Woolastookia* (differentiated from *Estellacarus* and *Brachypoda* in lacking a spinelike projection from palp femur), and *Ljania* (differentiated from others in having the posterior suture line of the 4th coxae curved in and around glandularia. These are keyed in Smith et al. [2001])

PIONIDAE

3 prs of genital acetabula



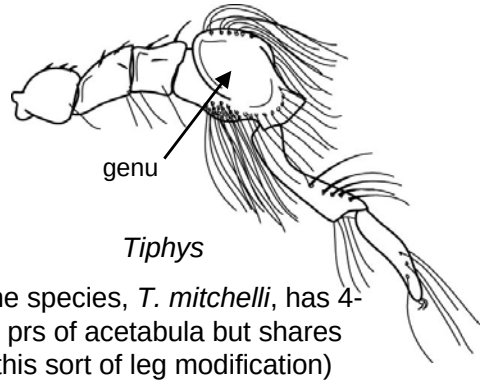
both sexes with extremely long and narrow palps; male with terminal posterior projection from genital field (= petiole)



Hydrochoreutes

not this combination of features (**males only** can be keyed from here on)

male legs IV with genu greatly expanded and bearing many long setae with enlarged bases



Tiphys

(one species, *T. mitchelli*, has 4-6 prs of acetabula but shares this sort of leg modification)

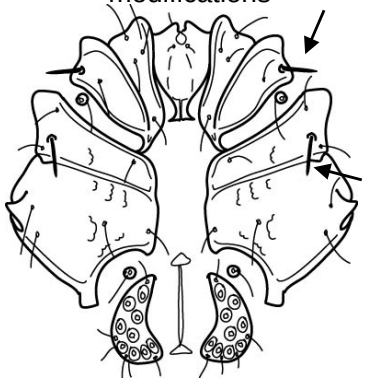
male legs IV with genu at most only slightly expanded and bearing short unmodified setae

(see Pionidae A)

4 to many prs of acetabula

swimming hairs present on at least some leg segments (see Appendix I: anatomy) ; male leg III usually modified for sperm transfer

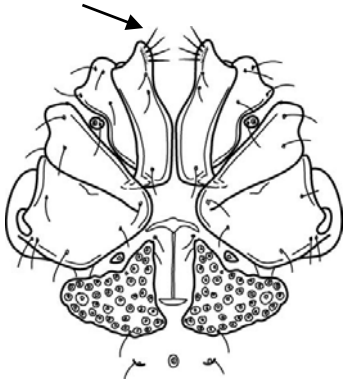
outer margins of coxae II and III each with a stout seta; male without leg modifications



Huitfeldtia (not yet recorded from Alberta)

not this combination of features

anterior inner margins of first coxae with array of stout setae

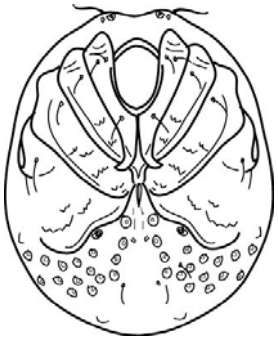


Nautarachna (rare)

no such setae

(see Pionidae B)

no swimming hairs on legs; no sexual dimorphism of male leg III



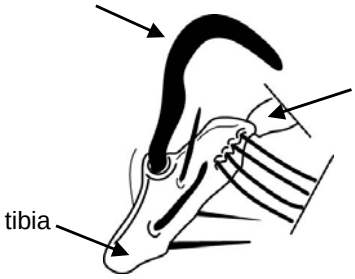
male venter

Pseudofeltria (rare)

PIONIDAE A

(males only)

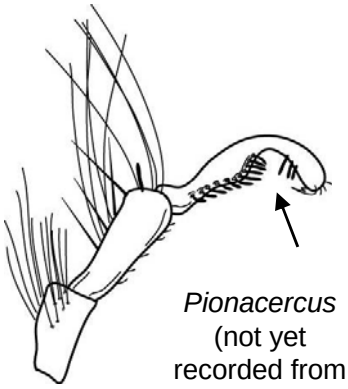
end of leg IV tibia with large hooked seta



Neotiphys (rare)

leg IV tibia without such a seta

tarsus of leg IV curved with a row of thick peg-like setae on concave side



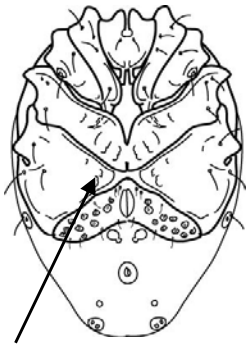
Pionacercus (not yet recorded from Alberta)

tarsus of leg IV not modified in this way ; has some flattened setae at end of tibia of leg IV

Pionopsis (rare)

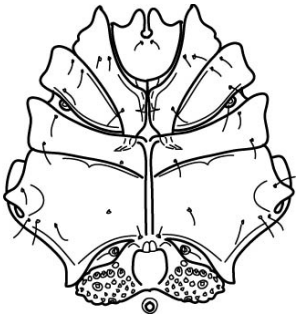
PIONIDAE B

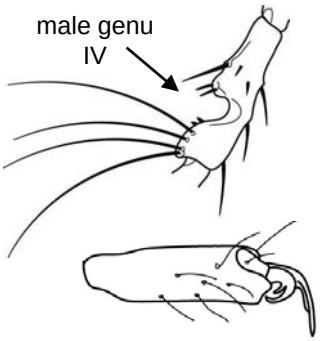
4th coxae approximately triangular in shape with pointed inner margin

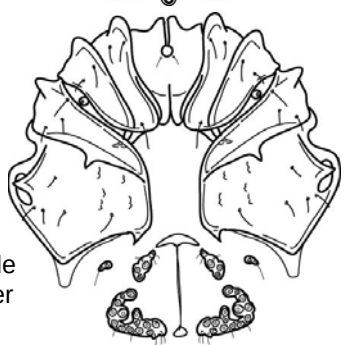


Forelia

4th coxae with well-developed, long inner margins; **genu** of leg IV and claw of leg III highly modified in male



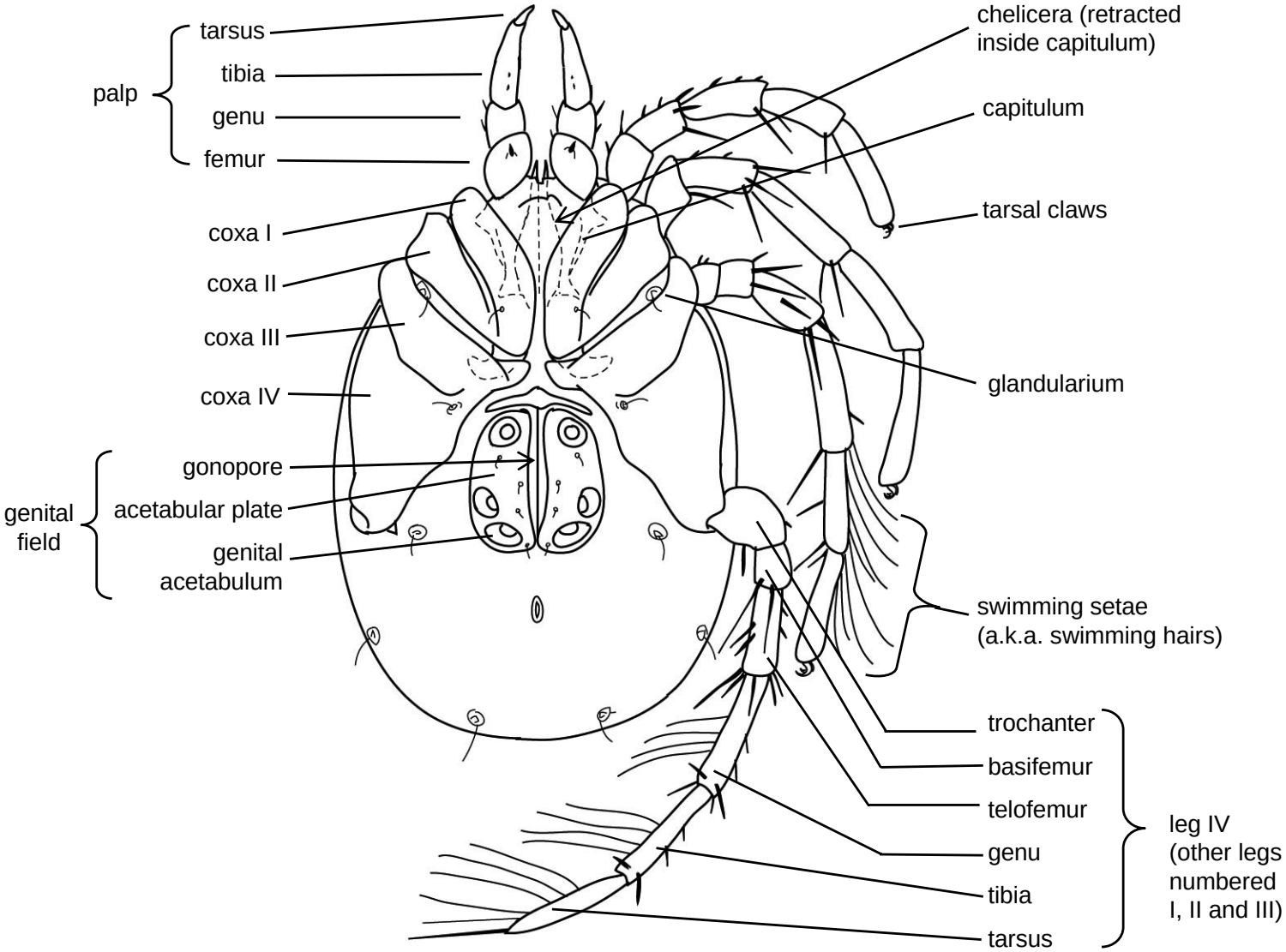


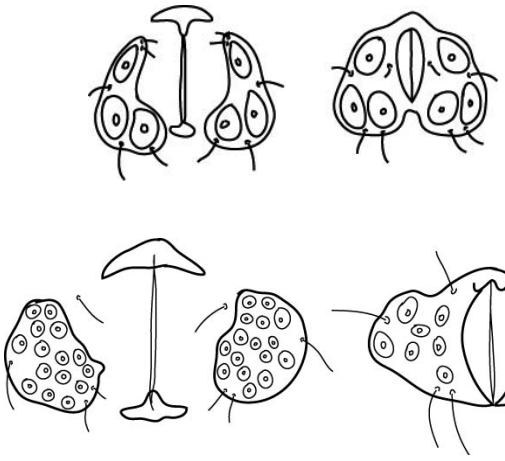


Piona (very common and diverse)

Appendix I: water mite anatomy

ventral view of a female *Limnesia*





examples of female (left) and male (right) water mite genitalia:

top = *Hygrobates*, bottom = *Neumania*

Appendix II: List of water mite taxa known or suspected to occur in Alberta

with advice from Dr. Ian Smith (Agriculture Canada, Ottawa)

created 11 October 2002; modified 2 Aug 2006

This is a list of genera known or strongly suspected to be in Alberta. The numbers in brackets are Ian's conservative estimate how many species are likely to be present - they are very provisional. "*" means that the genus is very common. "?" means that the genus has been collected within a few miles of the Alberta border and probably will turn up eventually. "NK" means not included in the Proctor (2006) flowchart key. Note that some genera are not in Clifford (1991). This is because (a) they were first collected from Alberta after 1991, or (b) the genus was described after 1991 (e.g. *Albertathyas* was discovered by Ian in 1998). Note that the family Stygothrombidiidae is sometimes not considered to belong to the Hydrachnidia.

Stygothrombidiidae	*Stygothrombium* (1)
Hydrovolziidae	*Hydrovolzia* (1)
Limnocharidae	*Limnochares* (2)
Eylaidae	**Eylais* (5)
Hydrachnidae	**Hydrachna* (5)
Hydryphantidae	*Hydryphantes* (3)
	Albertathyas (1)
	Notopanisus (1)
	Panisopsis (2)
	Panisus (1)
	Protzia (1)
	Thyas (2)
	Thyopsella (1)
	Thyopsis (1)
	Wandesia (1+)
	Pseudohydryphantes (1)
Hydrodromidae	**Hydrodroma* (1)
Sperchontidae	**Sperchon* (15+)
	Sperchonopsis (5)
Teutoniidae	*Teutonia* (1)
Anisitsiellidae	*Bandakia* (1+) NK
	Utaxatax (1) NK
Lebertiidae	*Estelloxus* (?) NK
	**Lebertia* (20+)
Oxidae	*Frontipoda* (1)
	Oxus (2+)
Torrenticolidae	*Monoatractides* (5)
	Testudacarus (1)
	**Torrenticola* (15+)
Limnesiidae	**Limnesia* (5+)
	Tyrrellia (1)
Hygrobatidae	**Atractides* (10+)
	Corticacarus (1)
	**Hygrobates* (5)
	Mesobates (?) NK
Feltriidae	**Feltria* (15+)
Unionicolidae	**Neumania* (5)
	**Unionicola* (2)
Wettinidae	*Wettina* (1)
Pionidae	*Hydrochoreutes* (1)
	Pionacercus (?)
	Pseudofeltria (1)
	Forelia (1+)
	Huitfeldtia (?)
	Neotiphys (1)
	Pionopsis (1)
	Tiphys (1+)
	Nautarachna (1)
	**Piona* (10+)
Aturidae	*Brachypoda* (1)
	Estellacarus (1)
	Woolastookia (1)
	Ljania (1)
	**Aturus* (10+)
Momoniidae	*Stygomomonia* (1) NK
Mideidae	*Midea* (1)
Nudomideopsidae	*Paramideopsis* (1) NK
Mideopsidae	*Mideopsis* (5)
Chappuisididae	*Morimotacarus* (1) NK
Athienemanniidae	*Platyhydracarus* (1) NK
Acalyptonotidae	*Acalyptonotus* (1) NK
Laversiidae	*Laversia* (1) NK
Arrenuridae	**Arrenurus* (20+)