A beginner-friendly key to the spider families (Arachnida: Araneae) known from the Canadian Prairie Provinces (Alberta, Saskatchewan, and Manitoba)

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Abstract

The Canadian Prairie Provinces (Alberta, Saskatchewan and Manitoba) are home to species from 29 of the 45 spider families currently found in Canada. Here we provide a beginner-friendly dichotomous key to the spider families of the Canadian Prairies. The key includes numerous photos, line drawings, and simplified definitions of anatomical characters necessary for family-level identification. For each family we include an illustrated summary of important character states, a whole-body photo of an exemplar of the family, and number of species of the family currently reported from the Prairie Provinces.

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Introduction

Dichotomous taxonomic keys are used to aid identification of specimens to predefined levels of taxonomic specificity and predate the Linnaean naming system by 60 years (Griffing 2011). However, despite over 300 years of use, keys still have design and implementation issues. For example, they are often challenging for individuals unfamiliar with taxon-specific technical jargon (Walter and Winterton 2007) or morphological characters. Conversely, keys are not always useful to specialists on the focal group. Experts often proceed through keys in a non-linear fashion or can identify species by sight without using a key at all. This can result in experts not recognizing when keys include errors. Keys often also use ambiguous wording or refer to relative and dependent character states. For example, "very feebly sinuate" in the Lindroth (1961-1969) key to Carabidae (Coleoptera; pg. 65) is dependent on an *a priori* understanding of the "strongly sinuate" state of this trait.

For spider identification in North America, keys to families and genera are available for taxa found north of Mexico (Ubick et al. 2017). For Canada, Dondale & Redner (1978) produced a national key to families, and national keys to genera and species for several families are also available (Dondale & Redner, 1978, 1982, 1990, Platnick & Dondale, 1992, Dondale et al., 2003). Although such geographically broad keys are more comprehensive than regional keys, they normally contain more couplets, and the complexity of such keys can be daunting to new users. In Canada, regional (provincial or territorial) spider identification keys are lacking with the exception of *Guide d'identification des araignées (Araneae) du Québec* (Paquin & Dupérré 2003), which provides a comprehensive guide for Quebec. Provided that the user is aware of changes to family-level taxonomy that have occurred since 2003 (e.g., splitting of the Corinnidae into three families), this key is currently also useful for most other provinces in Eastern Canada. Paquin & Dupérré (2003) includes a family-level key, genus-level keys for some families, and detailed illustrations that allow users to make species-level determinations of spiders in Quebec.

Currently, no family-level key specific to the spiders of the Prairie Provinces of Canada (Alberta, Saskatchewan and Manitoba) is available. As stated above, the use of regionally specific keys can increase efficiency and reduce error. The key in Paquin & Dupérré (2003) includes five more families than the 29 currently recorded across the Prairie Provinces (Cárcamo et al. 2014): Atypidae, Dysderidae, Nesticidae, Oecobiidae and Theridiosomatidae. Although this is not a large number relative to the number of spider families globally (131 families: World Spider Catalog 2022) or reported for Canada (45 families: Canadian Endangered Species Conservation Council 2016; Bennett et al. 2019), having

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to navigate and interpret additional couplets leads to more processing time per spider and an increased potential for identification errors.

Most published spider keys for Canadian fauna use text and line illustrations (e.g., Dondale and Redner 1990; Paquin & Dupérré 2003). Although line illustrations can effectively convey the size, shape and position of structures, they may leave out potentially useful details and are subject to the illustrator's biases and interpretations. We aimed to produce a key that uses photographic images as well as line illustrations to provide as much relevant visual information as possible to aid in family-level identification of spiders of the Prairie Provinces without being overwhelming. Also, keys for the identification of spiders and many other taxa include morphological terminology that is often novel to users not already familiar with the taxon. Separate glossaries for such terms are sometimes associated with keys but using them typically requires moving from the couplet to another page to find the definition (which may or may not provide clarity). We aimed to reduce the need to look up terminology by providing clear, often illustrated, descriptions of potentially unfamiliar morphological terms within the couplets.

Because of their ubiquity and diversity, spiders are frequently used in ecological studies as indicators of disturbance or for general estimation of local biodiversity (Bowden and Buddle 2010; Lowe et al. 2018; Pinzon et al. 2016; Wayland and Crosley 2006). Spider families generally align with ecological guild divisions, meaning family-level identification can offer insight into the ecological structure of a site of interest, such as plant composition or ground surface cover (Cardoso et al. 2011), and can provide information of general natural history (Bradley 2012). Although less informative than species-level data, family-level data are more achievable for those who are new to spider identification and desire to include spiders as part of their research data. The intended audience of this key includes amateur naturalists and other "citizen scientists" as well as professional ecologists who require only family-level identification or need to sort samples to family-level prior to using more specialized literature such as Dondale & Redner (1990) to identify to genus or species.

Methods

Taxa Included

We followed the family concepts of the World Spider Catalog (2022). The 29 families included in this key (Table 1) have representatives in one or more of the Prairie Provinces (Alberta, Saskatchewan and Manitoba) in the current checklists for Canada (Canadian Endangered Species Conservation Council 2016; Bennett et al. 2019). Users who are identifying spiders collected in Alberta near the border with British Columbia, or within BC, should be aware that 13 additional families occur in BC that have not yet been recorded from the Prairie Provinces: Antrodiaetidae, Dipluridae, Mecicobothriidae (all from the Mygalomorphae), Anapidae, Dysderidae, Miturgidae, Nesticidae, Oecobiidae, Oonopidae, Pimoidae, Segestriidae, Trachelidae and Zodariidae (Canadian Endangered Species Conservation Council 2016; Bennett et al. 2019). Likewise, users in eastern Manitoba should be aware that there are seven families that occur in Ontario that have not yet been recorded from the Prairie Provinces: Atypidae (Mygalomorphae), Dysderidae, Nesticidae, Oonopidae, Scytodidae, Theridiosomatidae and Trachelidae (Canadian Endangered Species Conservation Council 2016). Conversely, all families reported in Northwest Territories and Nunavut also occur in the Prairie Provinces.

Character Selection

The majority of characters and terminology used in this key were sourced from Ubick et al. (2017). For some couplets, several species (from multiple genera when possible) were examined by the authors to confirm trait consistency before using them to distinguish families. Some families include taxa that are exceptions to the typical family-level array of character states and were handled through additional couplets for those specific taxa. For Cheiracanthiidae and Desidae, characters were selected based on the single species in each family that has been recorded from the Prairie Provinces.

Photography & Line Illustrations

The majority of the photographed specimens are from the Arthropod Collection at the Northern Forestry Centre (Natural Resources Canada-Canadian Forest Service; NFRC). A few specimens were sourced from the E.H. Strickland Entomological Museum at the University of Alberta (UASM), the Royal British Columbia Museum, Victoria, BC (RBCM), and the Canadian National Collection in Ottawa, Ontario (CNC). All illustrations (photographs and line drawings) were made by the first author. All specimens were stored in ethanol and photographed in a dish filled with 75% ethanol. Spiders were photographed using a Dino-Eye AM7025X eyepiece digital camera (Dunwell Tech, Inc, United States of America, California) mounted onto the trinocular scope attachment of a Leica M205 C dissecting microscope. Spider specimens were positioned using a combination of glass beads and rolled up pieces of paper towel. In some cases, appendages were removed for ease of photography, but removal should not be necessary for the user to observe the majority of the illustrated features. Line illustrations were created using Affinity Designer (https://affinity.serif.com/en-gb/designer/) with the vector pen tool.

Table 1. Checklist of the 29 spider families reported from the Canadian Prairie Provinces (AB; Alberta, SK: Saskatchewan, MB: Manitoba). Users identifying spiders collected near the border of Alberta and British Columbia or the border of Manitoba and Ontario should be aware that there are 16 additional families found in these two provinces that have not yet been recorded in the Prairie Provinces (see Methods for a list of these families).

Family	Province			Guild*	Classical capture methods
	AB	SK	MB		
Agelenidae	x	x	x	Sheet web	Pitfall
Amaurobiidae	x	x	x	Sheet web	Pitfall
Anyphaenidae	x	x	x	Other hunters	Uncommon with classical methods
Araneidae	x	x	x	Orb web	Beating/Sweeping
Cheiracanthiidae	x	-	-	Other hunters	Pitfall/Sweeping
Clubionidae	x	x	x	Other hunters	Beating/Pitfall/Sweeping
Corinnidae	x	x	x	Ground hunters	Pitfall
Cybaeidae	x	x	x	Sheet web	Pitfall
Desidae	x**	-	-	Ground hunters/Sheet web	Uncommon with classical methods
Dictynidae	x	x	x	Ground hunters/Sheet web	Beating/Pitfall
Gnaphosidae	x	x	x	Ground hunters	Pitfall
Hahniidae	x	x	x	Ground hunters/Sheet web	Pitfall
Linyphiidae	x	x	x	Other hunters/Sheet web	Beating/Pitfall/Sweeping
Liocranidae	x	x	x	Ground hunters	Pitfall
Lycosidae	x	x	x	Ground hunters	Pitfall
Mimetidae	x	-	x	Specialists	Beating/Pitfall/Sweeping
Mysmenidae	x	-	-	Space web	Uncommon with classical methods
Oxyopidae	-	x	x	Other hunters	Beating/Sweeping
Philodromidae	x	x	x	Other hunters	Pitfall
Pholcidae	x	x	x	Space web	Uncommon with classical methods
Phrurolithidae	x	x	x	Ground hunters	Pitfall
Pisauridae	x	x	x	Sheet web	Pitfall
Salticidae	x	x	x	Other hunters	Beating/Sweeping
Telemidae	x	x	-	Sheet web	Uncommon with classical methods
Tetragnathidae	x	x	x	Orb web	Beating/Sweeping
Theridiidae	x	x	x	Space web	Beating/Pitfall/Sweeping
Thomisidae	x	x	x	Ambush hunters	Ambush hunter
Titanoecidae	x	x	x	Space web	Pitfall
Uloboridae	x	x	x	Orb web	Beating/Pitfall/Sweeping

* Guilds following Cardoso et al. (2011)

** Recorded only from one greenhouse (Leech, 1991)

Post-Processing of Photographs

Images were stacked in Helicon Focus (http://www.heliconsoft.com/heliconsoft-products/helicon-focus/), using the depth map method. Photo stacks ranged from 15 to 300 individual images. Stacked images were then cropped and contrast-adjusted using Affinity Photo (https://affinity.serif.com/en-gb/photo/). In some cases, photos were edited using the 'in-painting' tool to remove glare from ethanol or floating material.

Anatomical Features and 'Endpoint' Pages

In addition to the key, illustrations of all anatomical features referenced within the key are provided (Plates 1-2). Whenever a new term is introduced in the key, a definition is provided again on the same slide, along with a corresponding illustration. The endpoint for any series of couplets terminating in a family identification is a 'collage' of photos for that family that includes a whole body photo of an exemplar from the family, a summary of important anatomical features, a list of internally hyperlinked characters (online version only) that allow one to return to important couplets used in the determination, and numbers of species of that family

Plate 1. Key anatomical features (drawings)

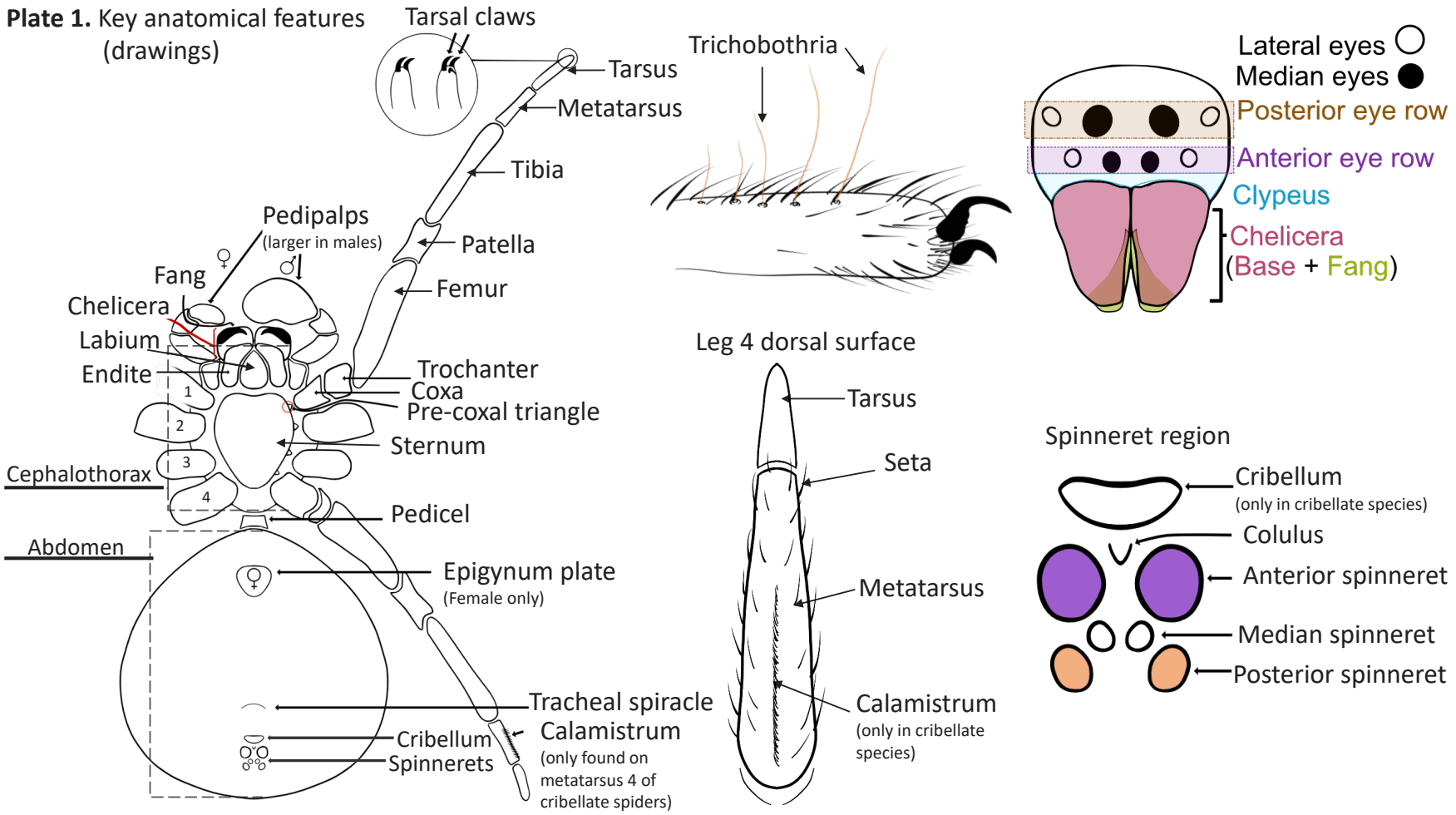
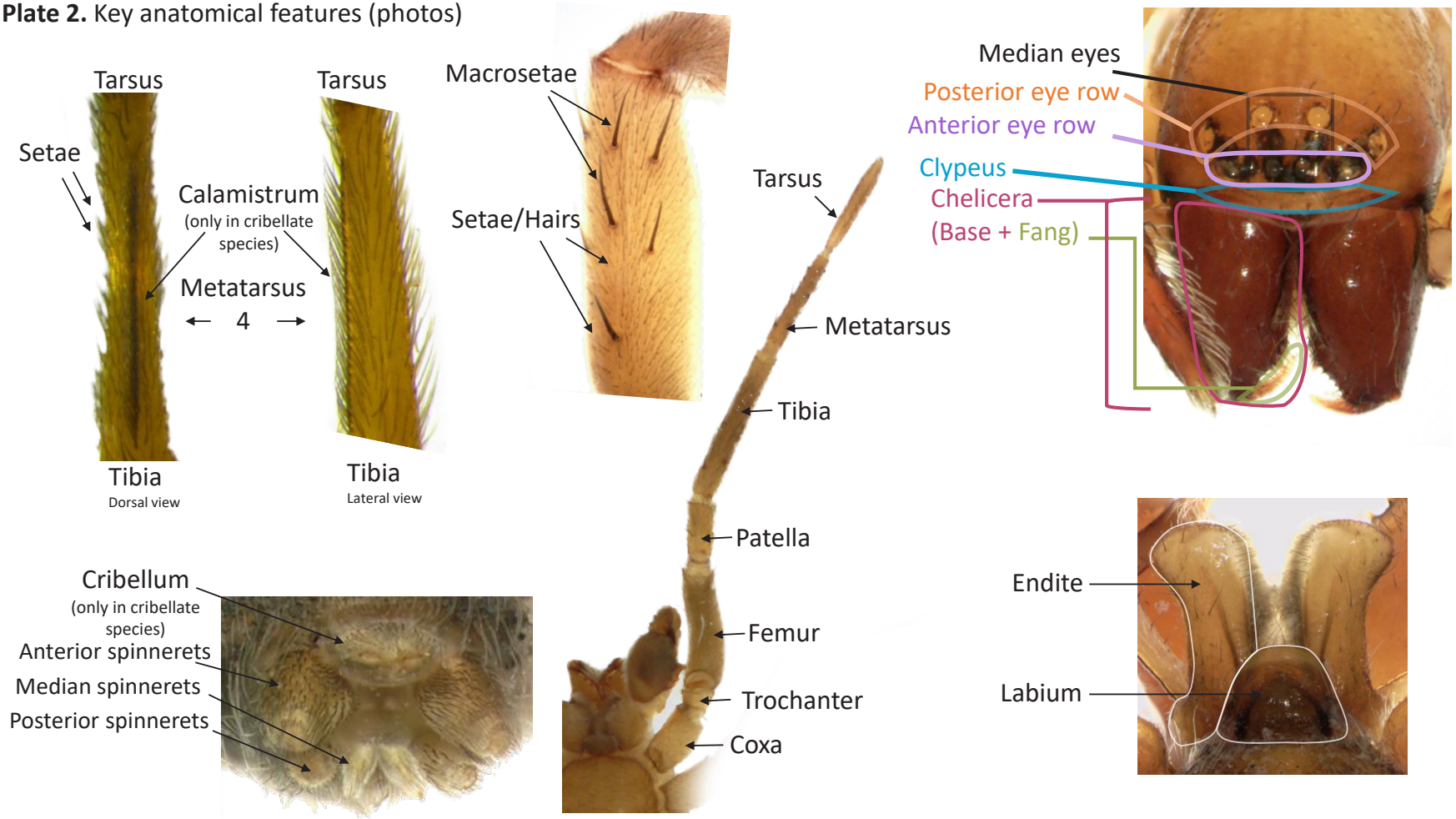


Plate 2. Key anatomical features (photos)



recorded from each of the three Prairie Provinces as reported in Canadian Endangered Species Conservation Council (2016).

Beta-testing

Beta versions of the key were tested by eleven individuals with varying levels of expertise. Three were trained in spider identification, two had some entomological training but little spider-specific knowledge, four were specialists of other invertebrate taxa, and three had no background in invertebrate taxonomy. Feedback from the testers was used to revise the key to improve clarity and ease of use.

Results

Outcomes of Beta-testing

The final key presented here was revised after multiple rounds of tester feedback. Individuals with no arachnological or entomological knowledge initially struggled with the key but were able to make correct determinations after reviewing the diagrams and restarting the key. Beta-testers had access to dissecting microscopes of variable quality. Only one tester experienced difficulties discerning character states on extremely small spiders, such as trichobothria (long, fine specialized setae) on members of Linyphiidae, a family of generally small spiders. Although insufficient magnification or poor resolution caused by inferior lenses can make identifications challenging, we expect that adults and juveniles in later stages of development from most families can be identified using the key in conjunction with the family-level collage pages.

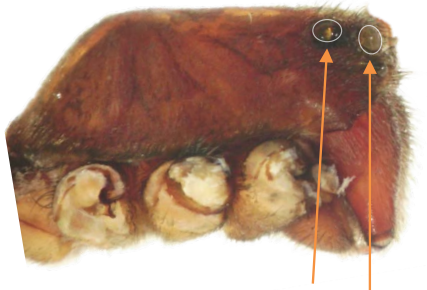
Characters such as the number of tarsal claws (two vs. three) or the presence of specialized setae (e.g., the serrated comb on tarsus 4 in Theridiidae) are commonly used in traditional spider keys; to the novice, however, these are often challenging to see. In fact, one of the testers expressed difficulties in counting the number of tarsal claws, particularly when the specimen had very setose tarsi. In such cases, a leg can be removed from the spider, mounted on a slide using a temporary mounting medium such as clear corn-syrup or disinfectant gel, and examined with a compound microscope. If voucher specimens are needed, the appendage can be returned to an appropriately labeled vial with the rest of the spider afterwards. It is also helpful to know that in the Prairie Provinces, spiders with dense tufts of tarsal setae/scopulae are two-clawed (though not all two-clawed spiders have tufts/scopulae), while three-clawed spiders lack the tuft/scopula. The third claw is normally used for silk manipulation in weavers, while those that are two-clawed normally do not spin webs. There are 10 families of two-clawed spiders in the Prairie Provinces: Anyphaenidae, Cheiracanthiidae, Clubionidae, Corinnidae, Gnaphosidae, Liocranidae, Philodromidae, Phrurolithidae, Salticidae and Thomisidae.

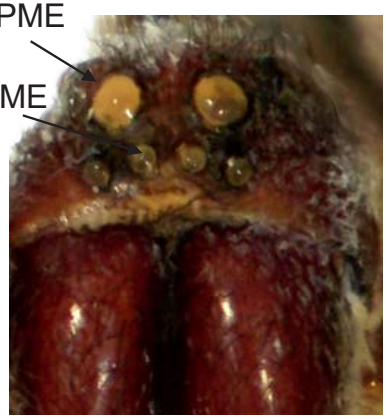
Structure of the Current Key

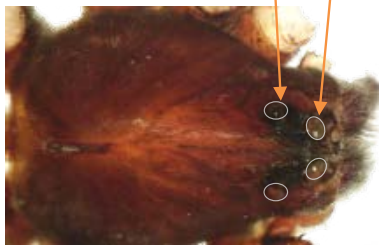
To improve likelihood of a successful identification, some families key out in more than one couplet. For example, the family Tetragnathidae can be reached either by the exceptional length of their chelicerae (a state shown by most tetragnathid genera) or by endite characters in the case of *Pachygnatha*, which have shorter chelicerae than other Prairie Province tetragnathids (Álvarez-Padilla and Hormiga 2011). Early-instar juvenile tetragnathids can also have short cheliceral bases but will still key out as tetragnathids via the *Pachygnatha* couplet.

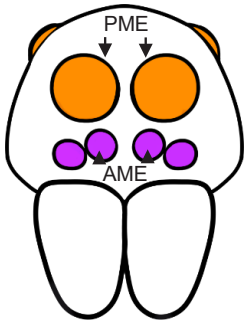
Whenever a new technical term is introduced in the key, a definition is provided on the same page. This should reduce the need to flip to the anatomical plates during the identification process. Another design choice was the avoidance of ambiguous wording (e.g., "relatively small"). When a feature is described in a relative context, it is described relative to another feature on the specimen itself using measurable parameters, such as "two times longer". Characters were selected with the robustness of anatomical structures in mind. Delicate structures are not used early in the key. For example, the character "presence of trichobothria (fragile sensory hairs)" only appears towards the end of a series of couplets, and in most cases is the last character in the series. Like all CJAI keys, ours has the advantage of having an internally hyperlinked online version in addition to a printable version, which increases efficiency through link-clicking instead of page-flipping. Finally, the typical end-of-path pages containing a written diagnosis were replaced with pages containing habitus photos and 'collages' of the couplet photos that were required to reach the family-level endpoints, with couplet wording condensed to fit available space. These collages include links (online version only) to source pages of the couplets in the key where the full wording can be checked. These family collage pages will allow users to confirm their identifications, or in the case of mistakes, significantly streamline backtracking. Characters considered vital to the characterization of the family are in bold font on the collage pages. The combination of the character-selection process employed and presence of the collage pages in this key should allow identification of juvenile specimens in later stages of development to family, with the exception of the family Mysmenidae and spiders in the genus *Cicurina* (Hahniidae), which require adult specimens. Identification of extremely young juveniles may not always be possible due to lack of sclerotization of relevant tissues, or very small size.

We hope our simple-to-use key will encourage more naturalists and ecologists based in the Canadian Prairie Provinces to use spiders in their studies.



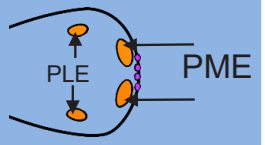






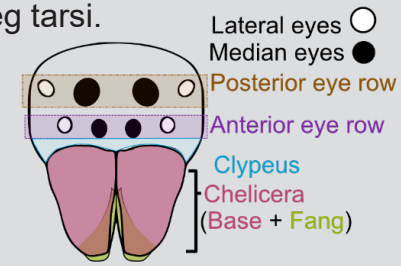
1) Posterior lateral eyes (PLE) further back than posterior median eyes (PME) and face sideways, PME larger than other eyes, anterior eyes small and in a single row; 3 claws on leg tarsi.

Note: 3rd claw may be hidden by hairs, check thoroughly.

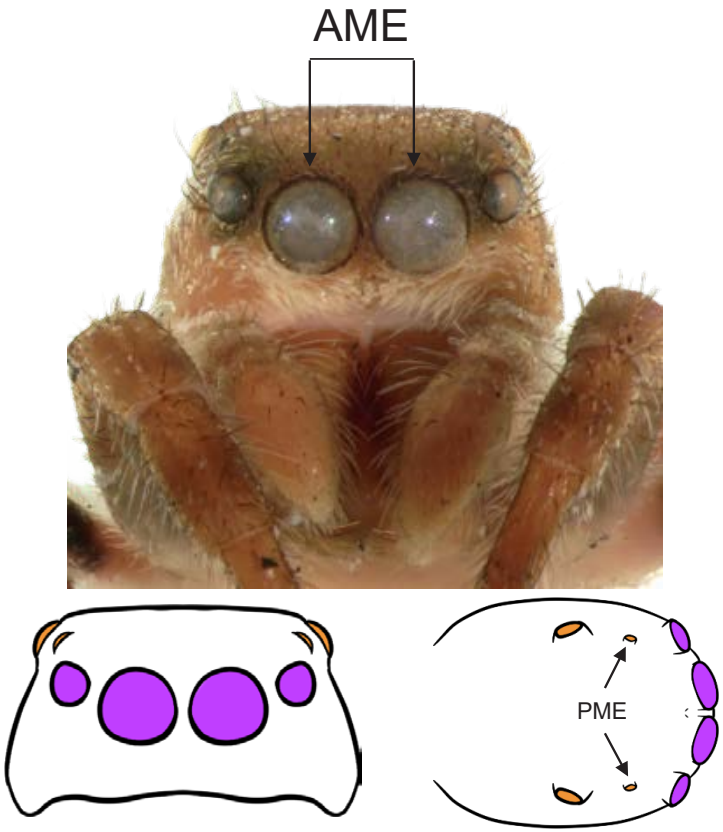


Lycosidae: wolf spiders

1') Eyes not arranged as in 1) (example shown above); 2 or 3 claws on leg tarsi.

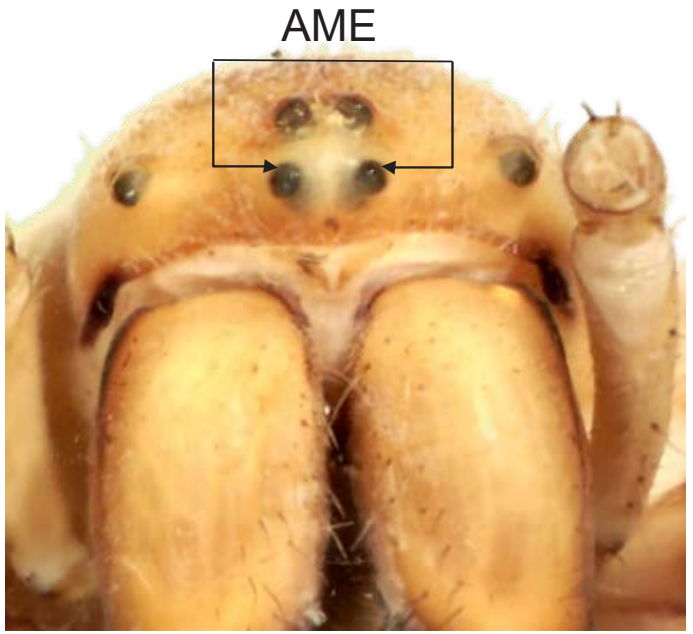


Couplet 2

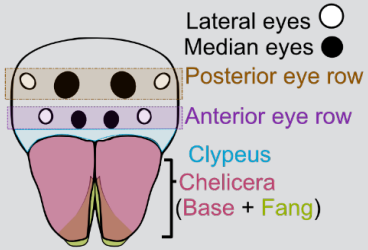


2) Anterior median eyes (AME) much larger than other eyes; 4 eyes prominently visible in frontal view; PME very small; cephalothorax angular in frontal view.

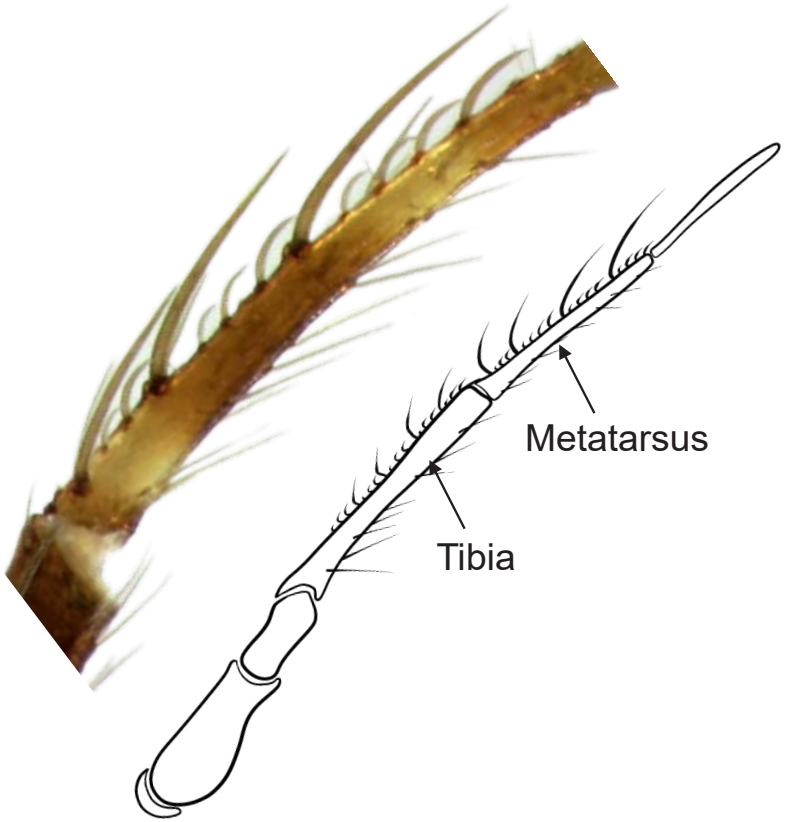
Salticidae: jumping spiders



2') Eyes not arranged as in 2) (example shown above).



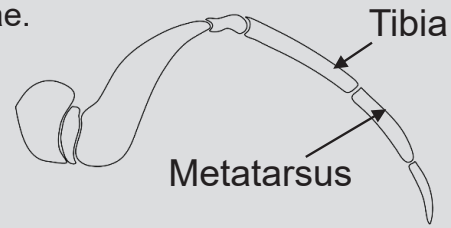
Couplet 3



3) Tibiae and metatarsi of Legs 1 and 2 with a series of long, curved macrosetae with shorter curved macrosetae in between. Setae increase in length distally from one macroseta to the next.

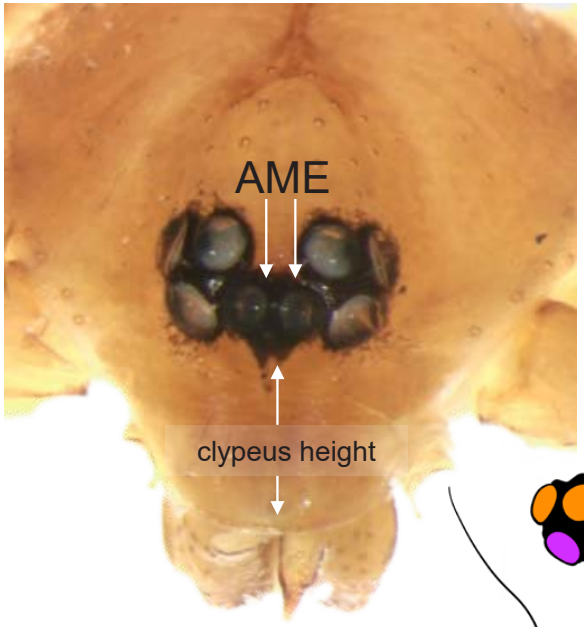
Mimetidae: pirate spiders

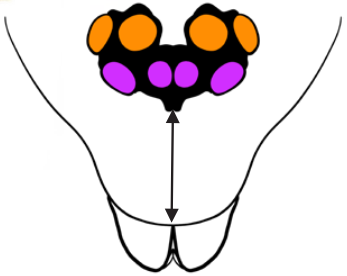
3') Tibiae and metatarsi of Legs 1 and 2 without this pattern, although they may still possess 2 size classes of macrosetae.



Couplet 4

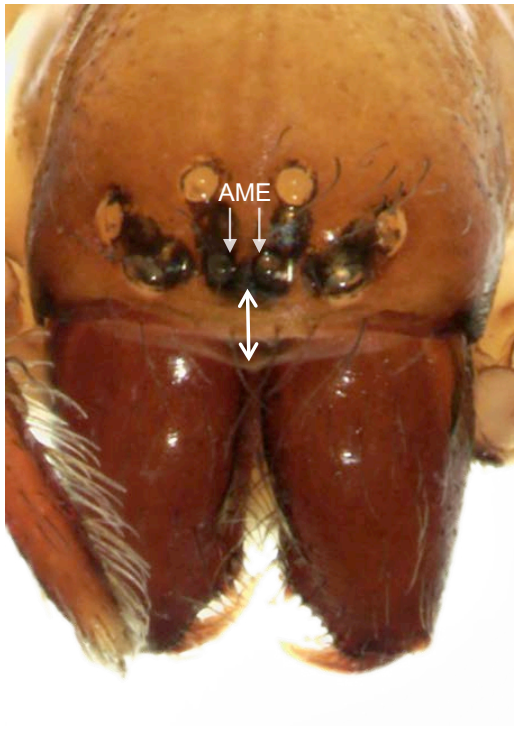
doi:10.3752/cjai.2023.47

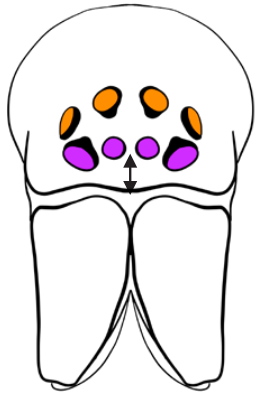




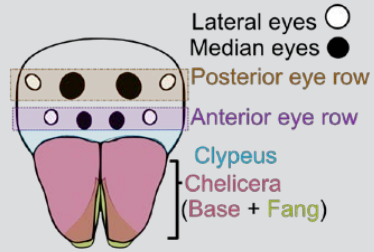
4) Anterior median eyes (AME) clustered very closely together, other eyes of each side tightly clustered in triangular formation, or 6 eyes in 2 groups of 3; clypeus high.

Pholcidae: cellar spiders





4') Eyes not arranged as in 4)(example shown above).



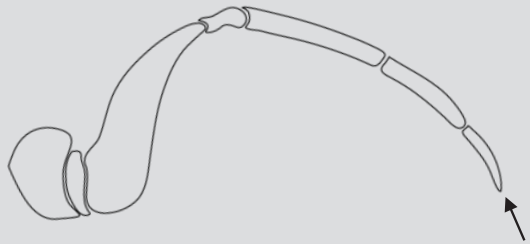
Couplet 5

5) Legs with 2 tarsal claws.

Note: the 3rd (middle) tarsal claw is often smaller than the other two claws and can be hard to see as it may be hidden by or look like the surrounding setae; however, it is hooked and more sclerotized. Check thoroughly, examining each leg, and if in doubt, remove a tarsus and check with a compound microscope - if you find even a single 3rd claw, assume all legs have them.

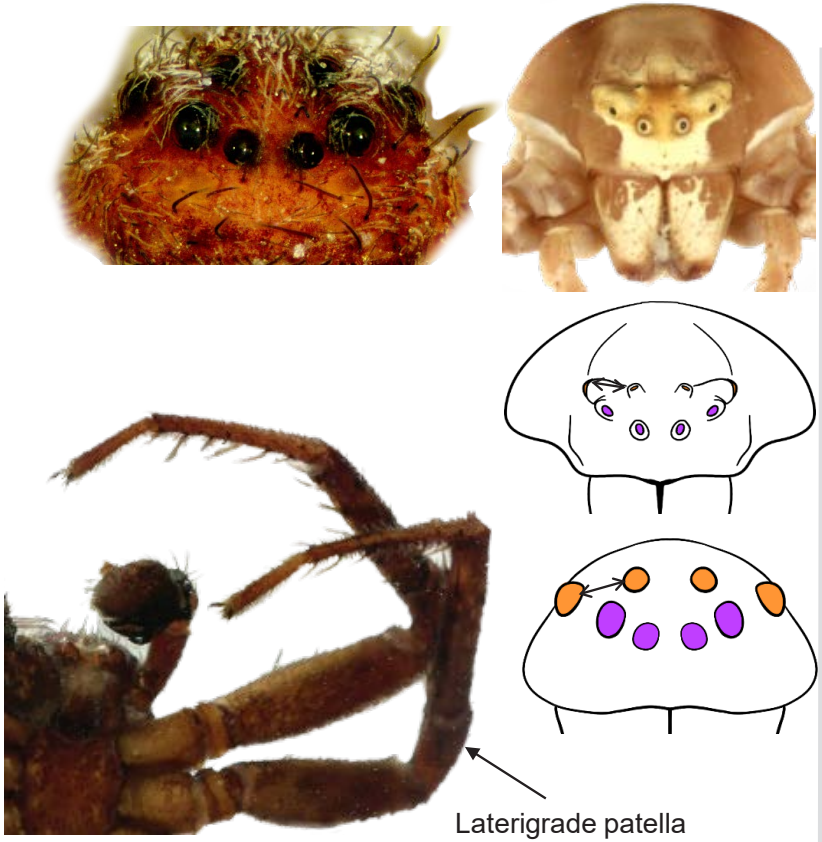
Couplet 6

5') Legs with 3 tarsal claws.



Couplet 15

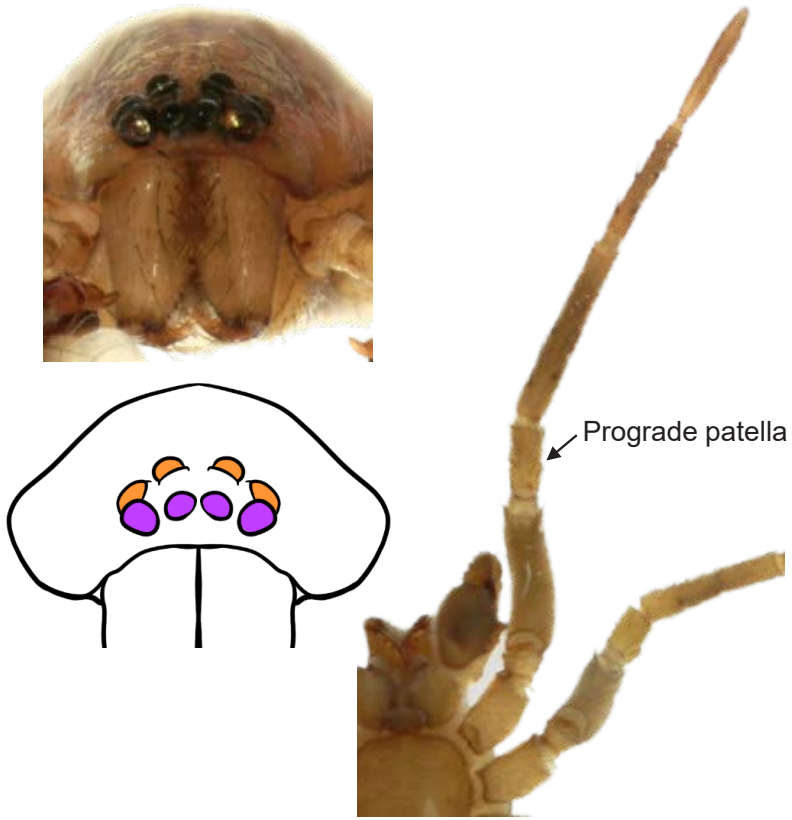
doi:10.3752/cjai.2023.47



6) On each eye row, distance between median eyes, and between median and lateral eyes, at least twice the average eye diameter or close to twice average eye diameter; eyes may be raised on tubercles;

Or: Legs 1 and 2 may be laterigrade: i.e., ventral surfaces of femur and patella rotated such that the leg is directed prolaterally.

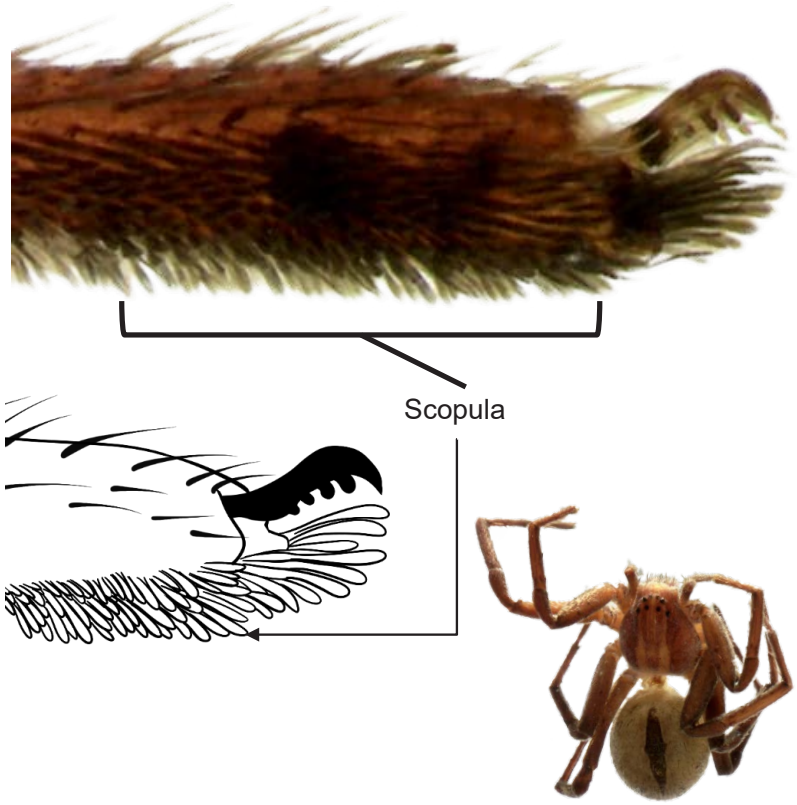
Crab-spider families: Couplet 7



6') On each eye row, distance between median eyes, and between median and lateral eyes, is less than twice the average eye diameter; eyes never raised on tubercles;

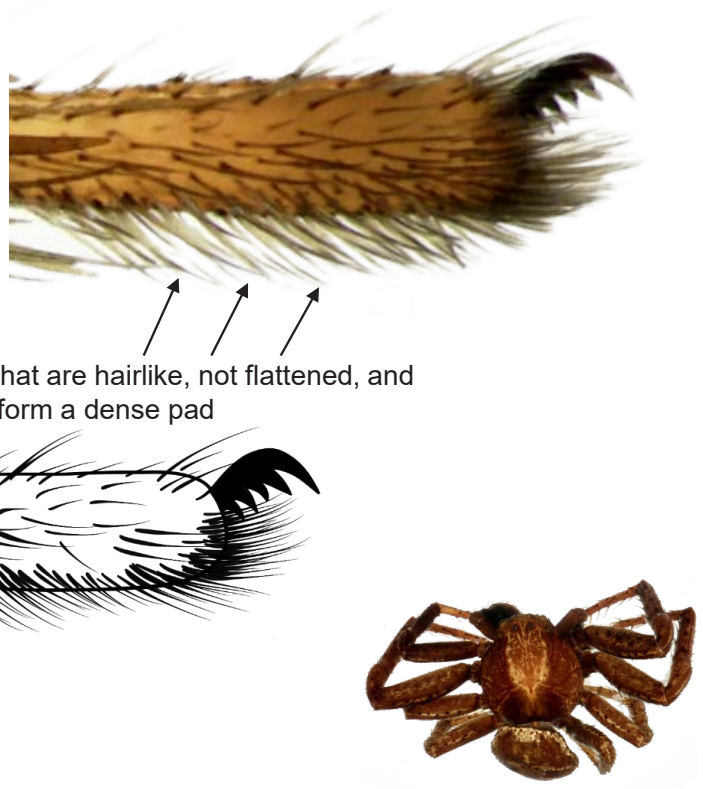
Or: Legs 1 and 2 prograde, i.e., directed more or less anteriorly, ventral surfaces of femur and patella facing down.

Couplet 8

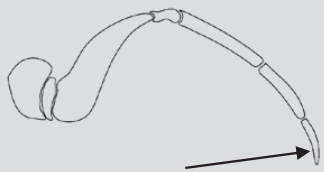


7) Tarsus with a scopula (a broad pad of slightly flattened setae) on the **ventral** surface; all legs may be of similar length or Leg 2 maybe noticeably longer than Leg 1.

Philodromidae: running crab-spiders

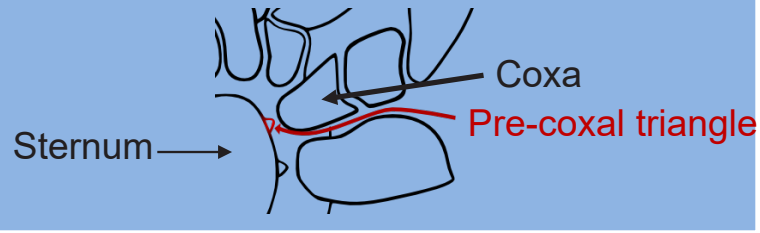


7') Tarsus without scopula on the **ventral** surface; Leg 2 is about the same length or shorter than Leg 1. Legs 3 and 4 much shorter, may be half the length of Legs 1 and 2.



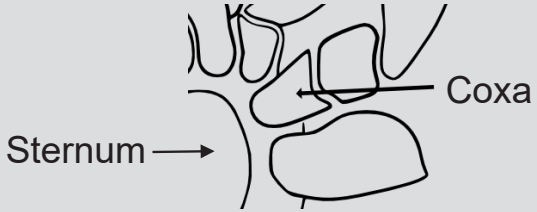
Thomisidae: crab spiders

8) In **ventral** view, small, dark, pre-coxal triangles present between the sternum and the coxal bases.



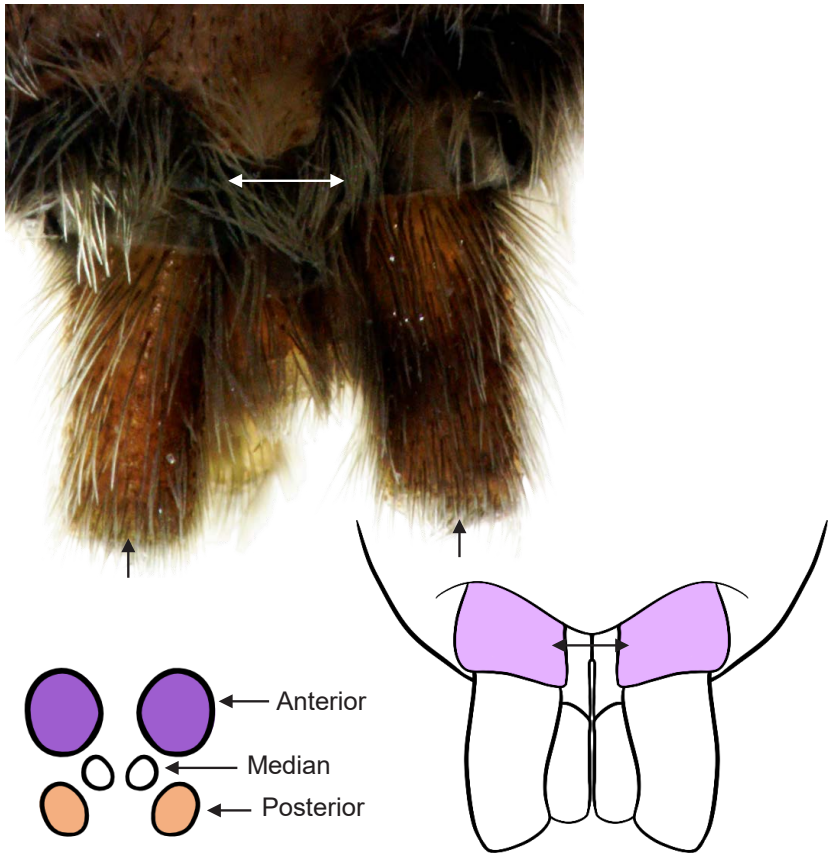
Couplet 9

8') In **ventral** view, no pre-coxal triangles between the sternum and the coxal bases.



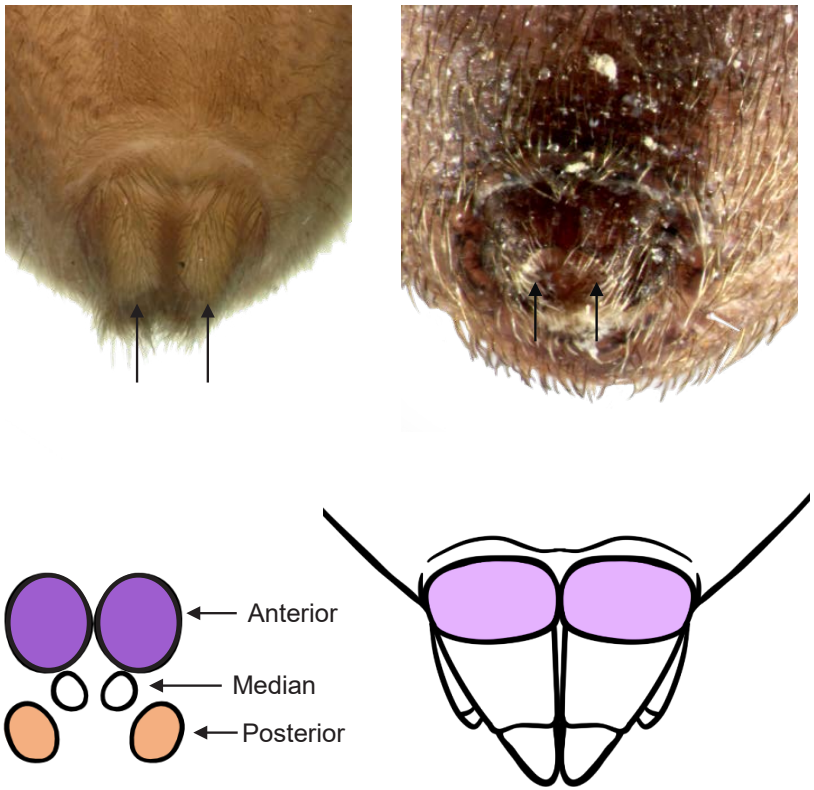
Liocranidae: liocranid spiders

doi:10.3752/cjai.2023.47



9) Anterior spinnerets have a gap between the spinneret bases and are cylindrical.

Gnaphosidae (in part): ground spiders



9') Anterior spinnerets do not have a gap between the spinneret bases and are not cylindrical.

Couplet 10

10) Abdomen is covered in broad, flattened iridescent setae. Iridescence is often green or purple in colour when submerged in ethanol.

Note: Iridescence is sometimes more obvious with black background under the specimen dish.

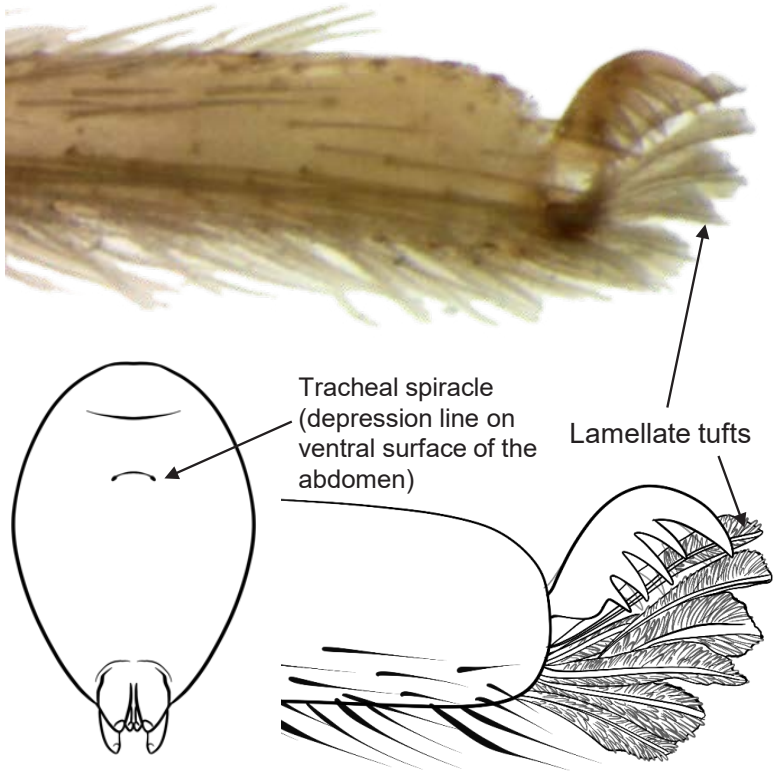
Gnaphosidae (in part: *Micaria* spp.): ground spiders

10') Abdomen is not covered in flattened iridescent setae. Setae may be hair-like or feather-like. Abdomen may have scute on dorsal surface.

Scute: Dorsal sclerotized disk located anteriorly on the abdomen of some members of Corinnidae.

Couplet 11

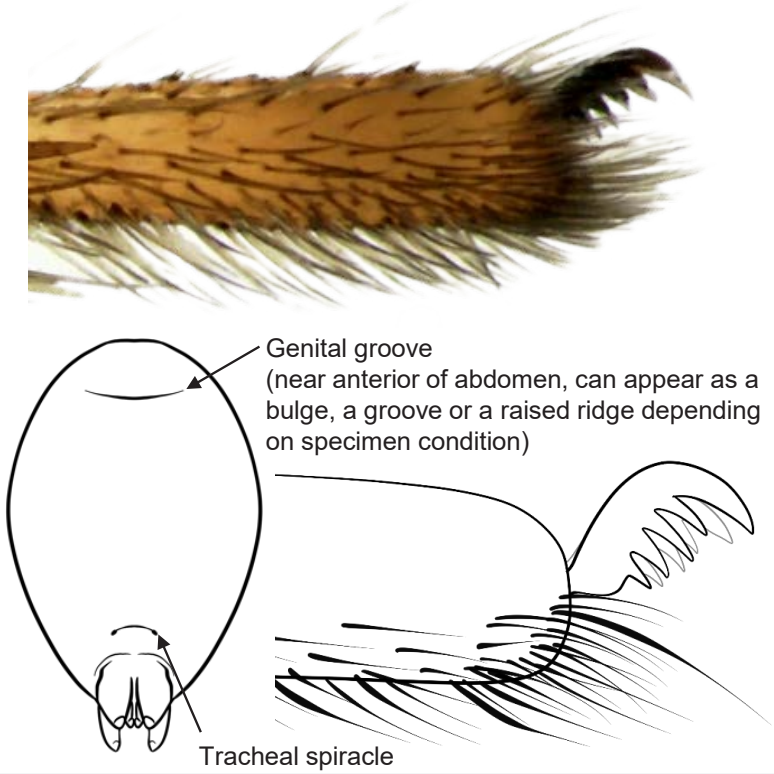
doi:10.3752/cjai.2023.47



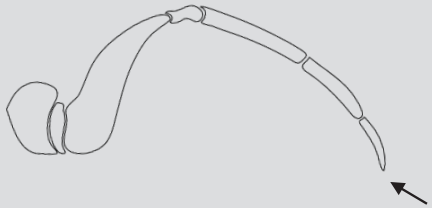
11) Lamellate (leaf-like) setal tufts present between tarsal claws; abdomen in ventral view with tracheal spiracle close to genital groove.

Note: Tracheal spiracle can be difficult to see, check for lamellate tufts first.

Anyphaenidae: ghost spiders



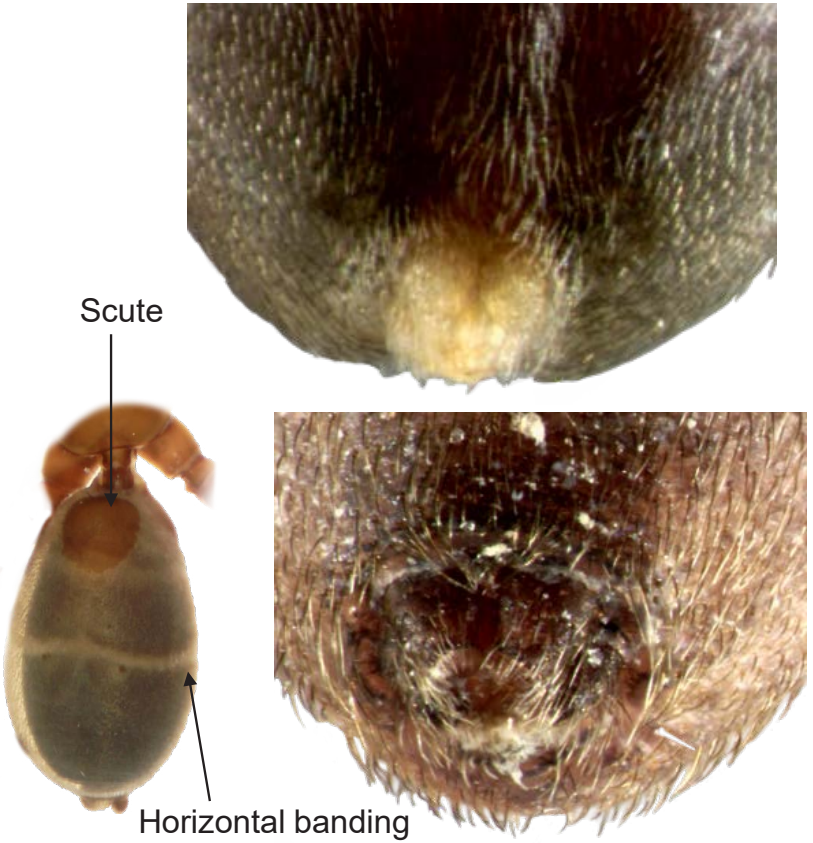
11') Lamellate tufts not present between tarsal claws; tracheal spiracle close to the spinnerets.



Couplet 12

12) Anterior spinnerets larger than all other spinnerets, conical. Abdomen tapers towards spinnerets, ending in a point. Abdomen never has conspicuous horizontal banding or scute on dorsal surface.

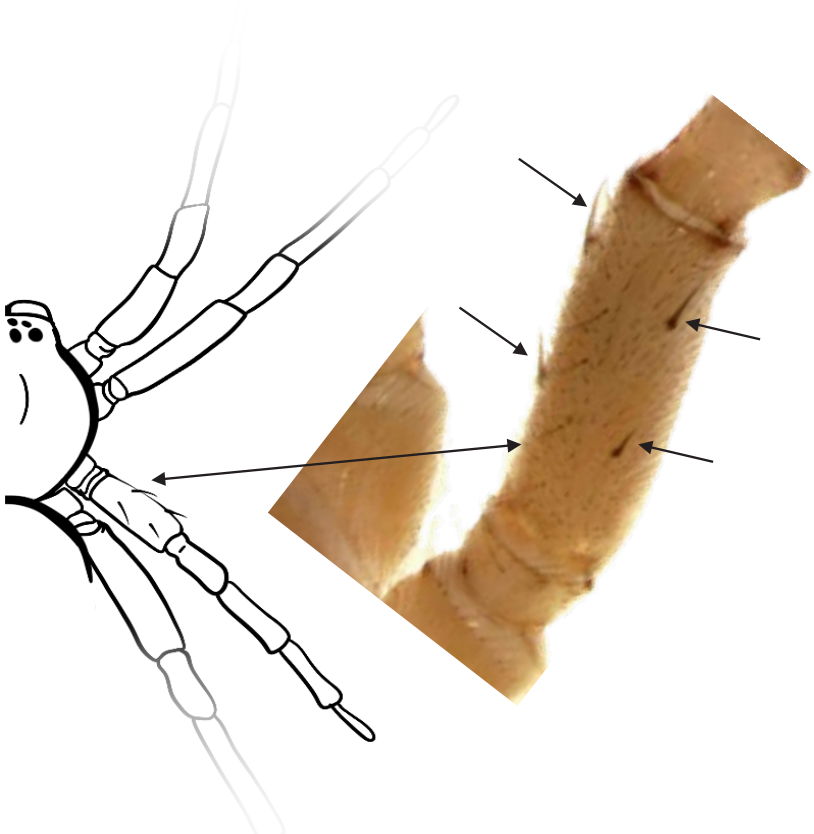
Couplet 13



12') Anterior spinnerets not larger than all other spinnerets, may or may not be conical. Abdomen usually ovoid, may end in point if specimen is gravid. Abdomen may have conspicuous horizontal banding or scute on dorsal surface.

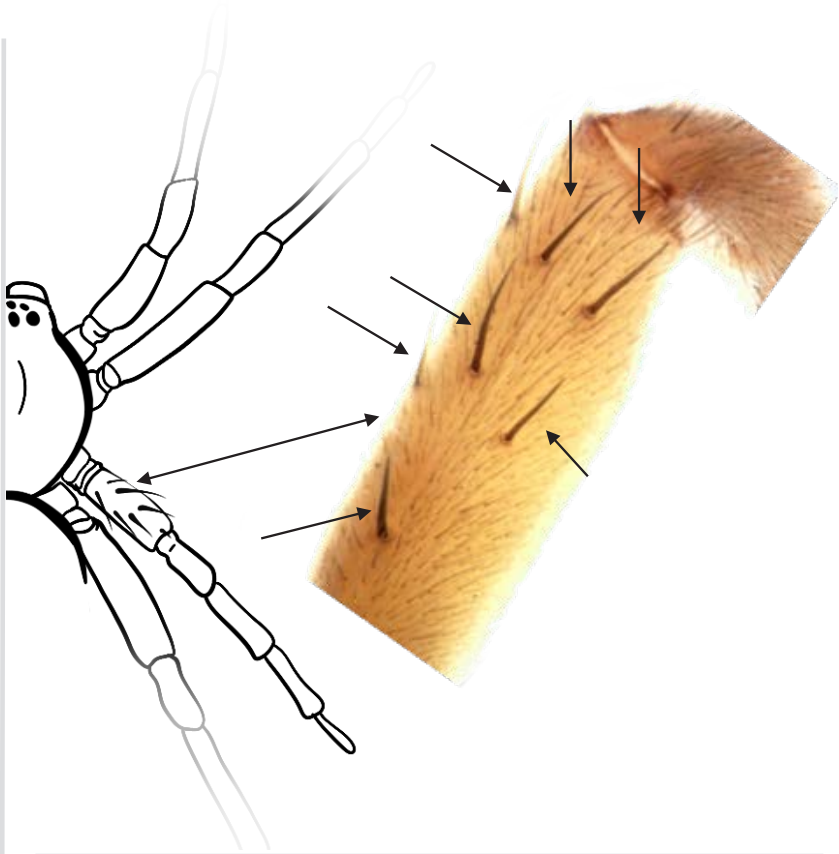
Couplet 14

doi:10.3752/cjai.2023.47

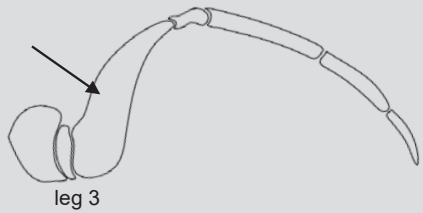


13) Femur of Leg 3 with 2 to 4 paired macrosetae **dorsally**. Note that if macrosetae are broken off, their sockets may still be visible.

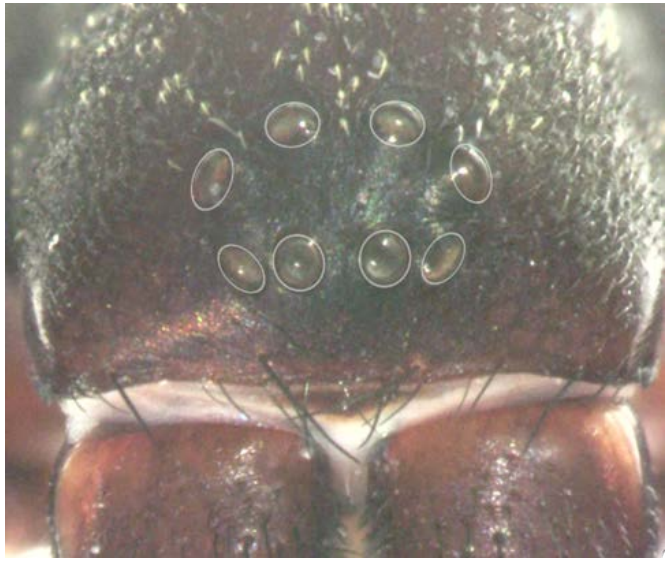
Cheiracanthiidae: long-legged sac spiders



13') Femur of Leg 3 with more than 4 macrosetae **dorsally**, macrosetae may be unpaired.

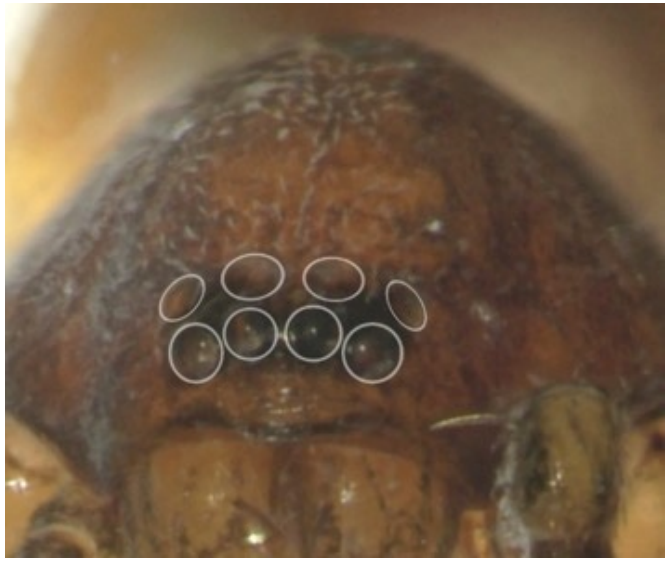


Clubionidae: sac spiders

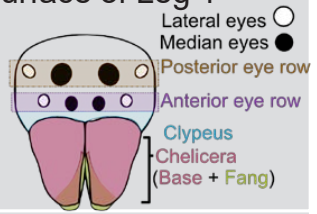


14) Anterior eye row straight or recurved (curved backwards), posterior eye row procurved (curved forward); paired elongate macrosetae absent from ventral surface of Leg 1 tibia.

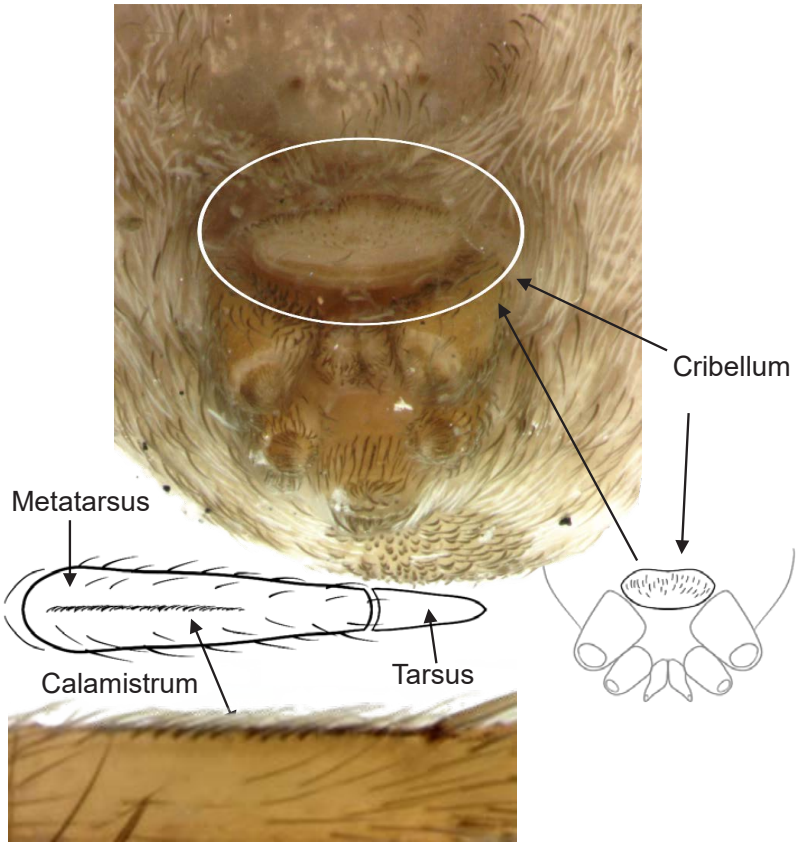
Corinnidae: ant-mimic sac spiders



14') Anterior and posterior eye rows generally straight to slight recurved; paired elongate macrosetae present on ventral surface of Leg 1 tibia.



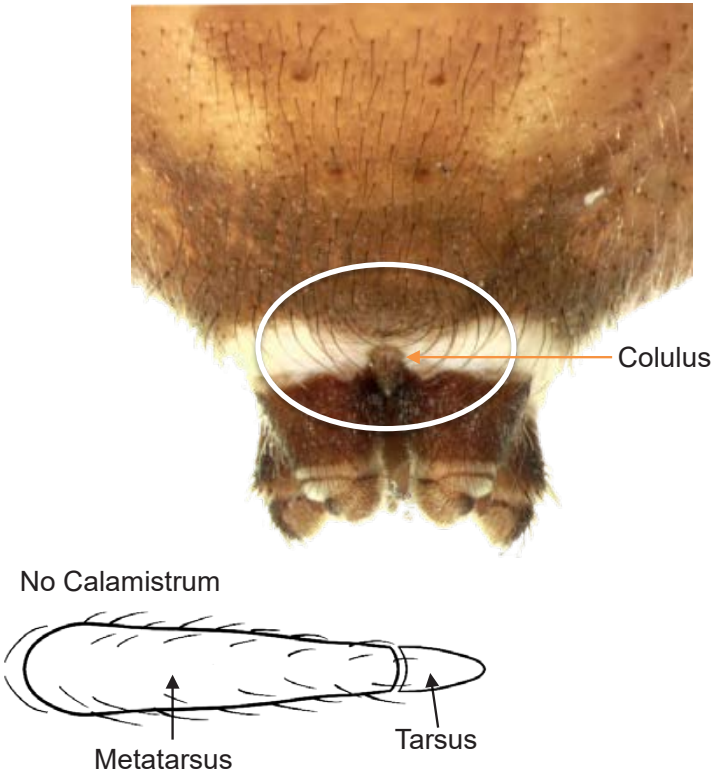
Phrurolithidae: guard-stone spiders



15) Cribellum (a specialized spinning organ located anteriorly to the spinnerets on **ventral** side of abdomen) present, or metatarsus of Leg 4 with a **dorsal** calamistrum (a single or double row of short, curved setae).

Note: In some cases (especially in males), the cribellum or the calamistrum may be absent; if either is present, assume cribellate.

Cribellate families: Couplet 16

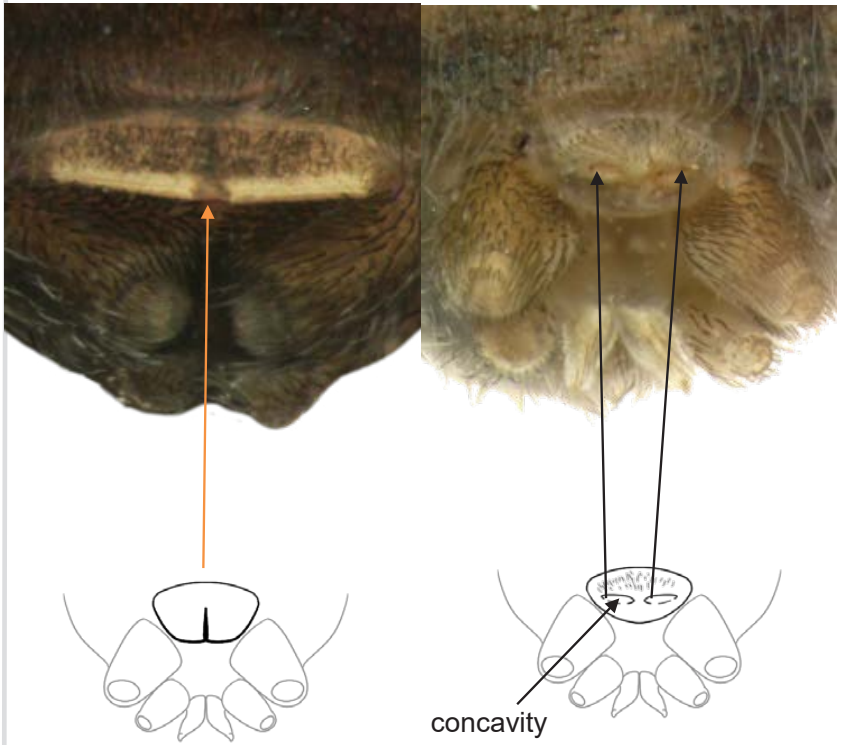


15') Cribellum and calamistrum absent, although a colulus (fleshy lobe at base of spinnerets, within spinneret margin) may be present anterior to spinnerets.

Couplet 21

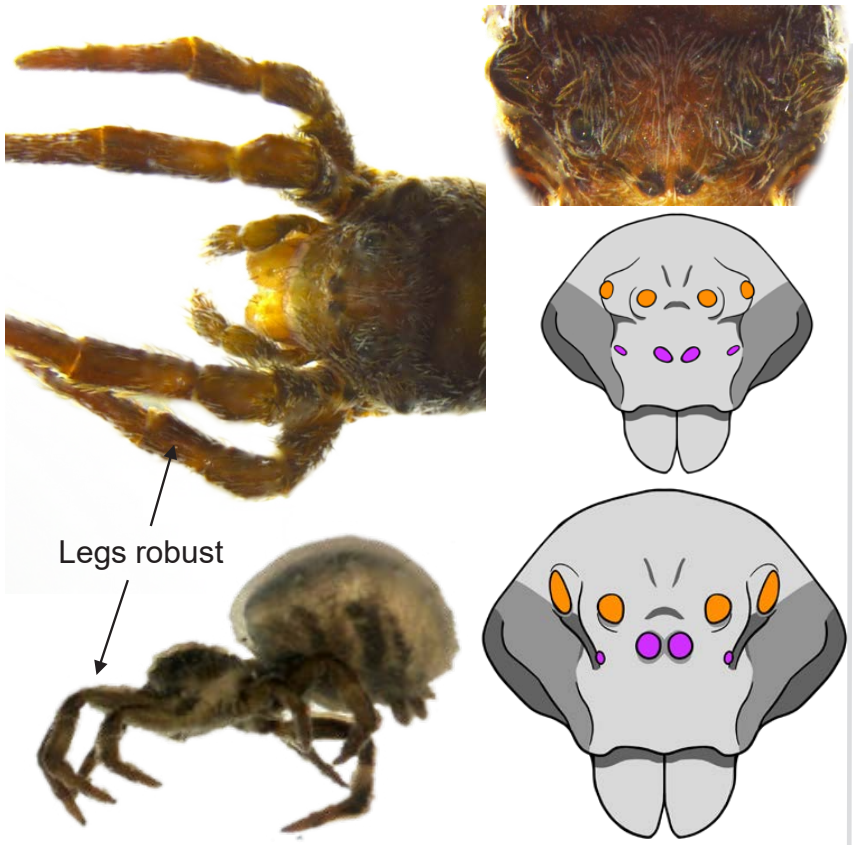
16) Cribellum undivided, lacking dark central line or 2 distinct concavities.

Couplet 17



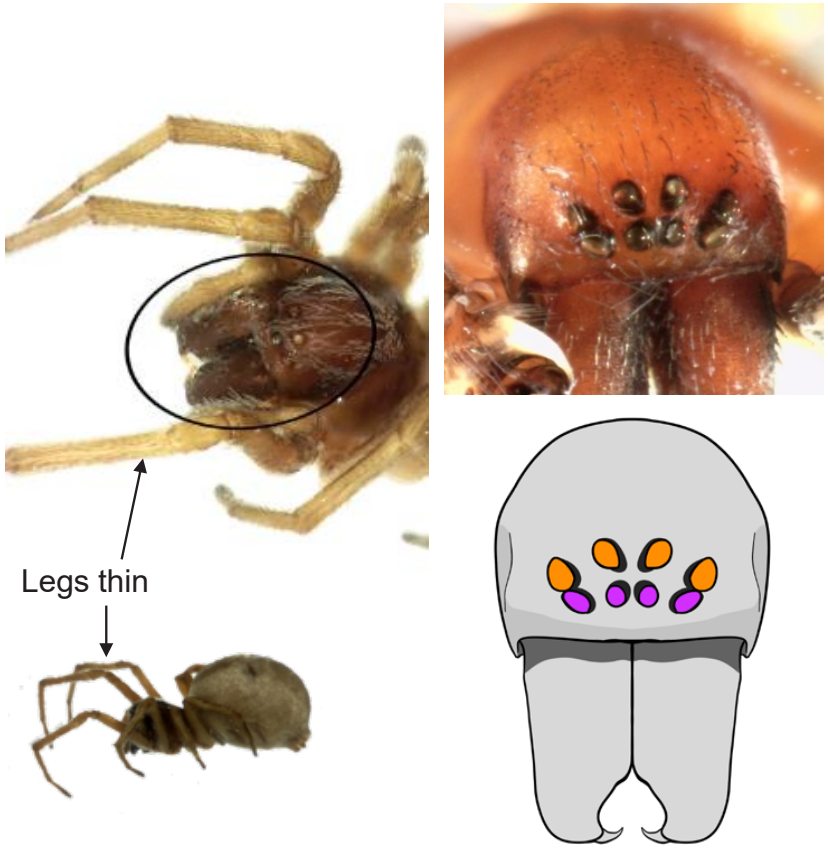
16') Cribellum divided by dark central line or with 2 distinct concavities.

Couplet 19

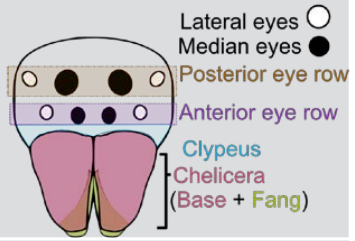


17) Eyes widely-spaced (note that anterior lateral eyes may be reduced and difficult to see); legs robust and stout, Leg 1 femur at most double the length of the patella.

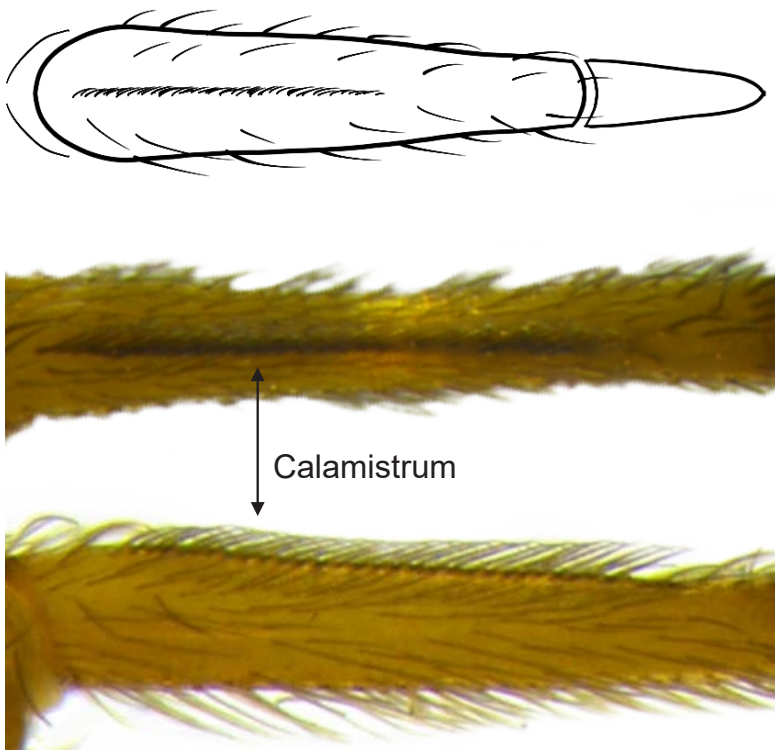
Uloboridae: hackled orb-weaving spiders

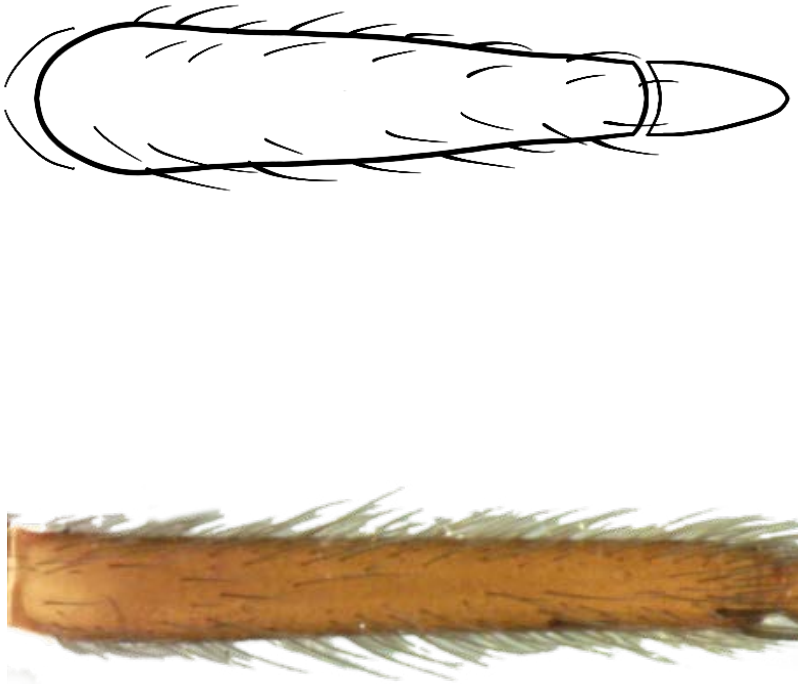


17') Eyes not as in 17); legs thin, Leg 1 femur always longer than 2 patella lengths.



Couplet 18



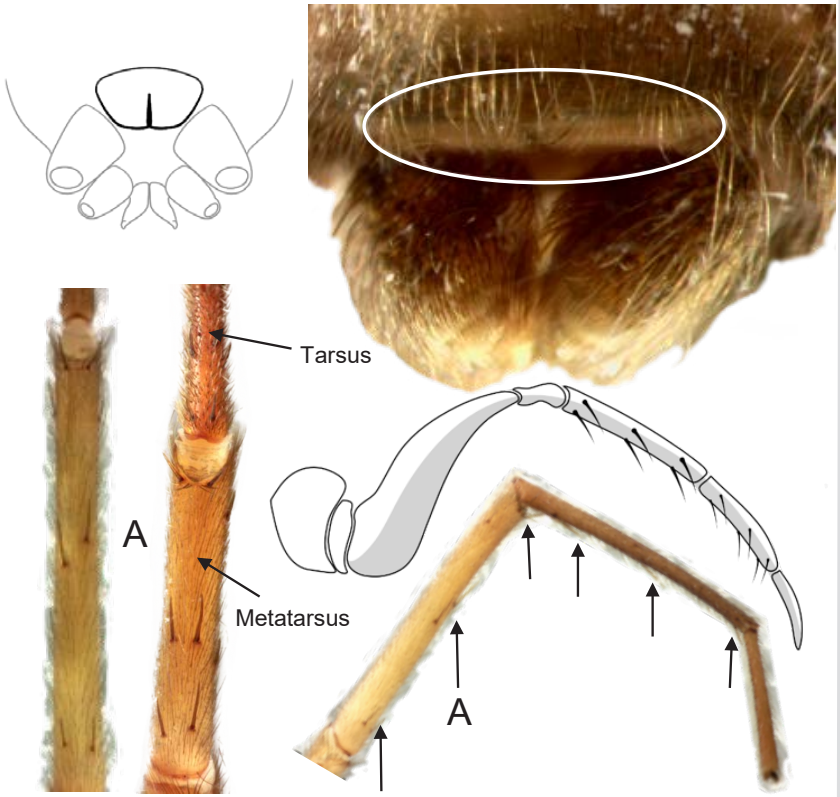


18) Calamistrum (a single or double row of short, curved setae) present on **dorsal** surface of Leg 4 metatarsus; at least 40% the length of metatarsus.

Dictynidae: mesh-weaving spiders

18') Calamistrum absent.

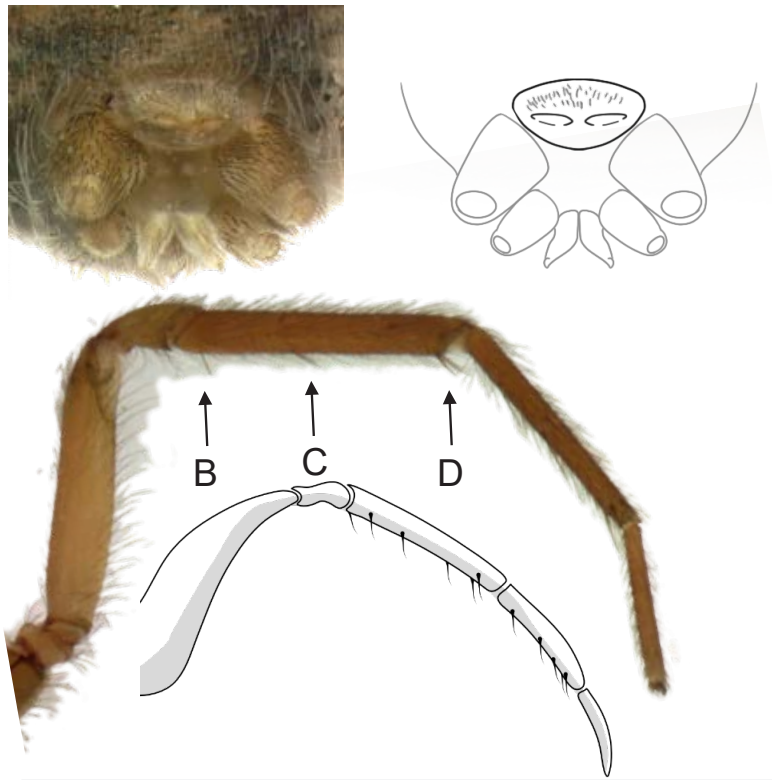
Titanoecidae (in part; males): rock-weaving spiders



19) **Ventral** surface of tibia **and** metatarsus with 3 pairs of macrosetae (members of some pairs may be slightly off-set [A], but majority will line up closely); cribellum divided by a prominent groove.

Note: This is an introduced family represented by a single species (*Metaltella simoni*) which has been found only once in Alberta.

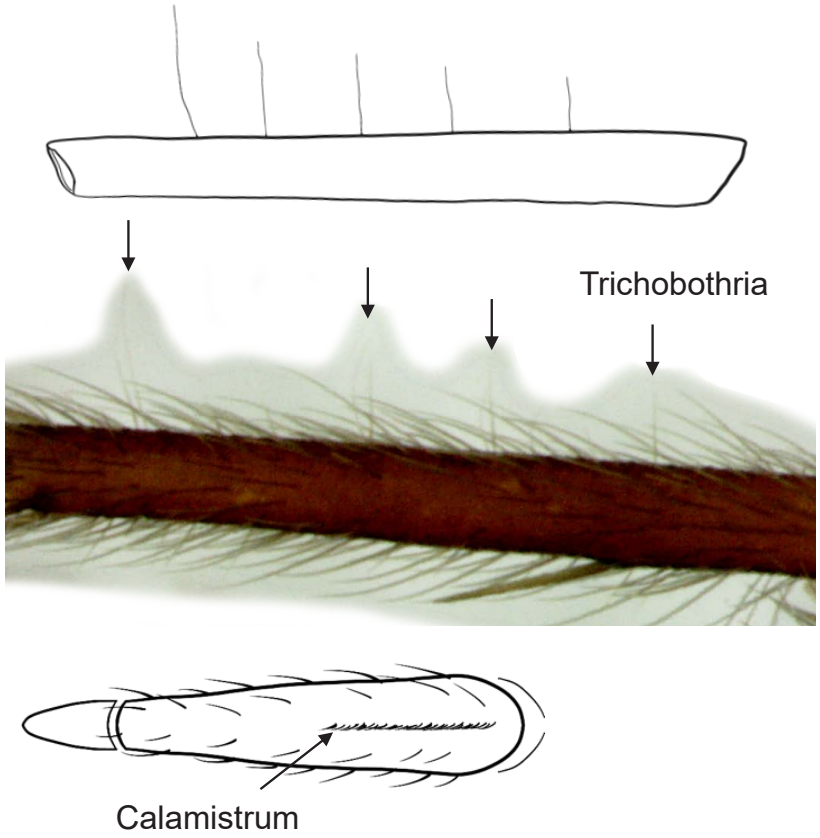
Desidae: intertidal spiders



19') **Ventral** surface of tibia **or** metatarsus lacking 3 pairs of macrosetae; cribellum division is represented either by concavities or by a faint central groove.

Macrosetae: (B: Single, C: Single, D: Pair)

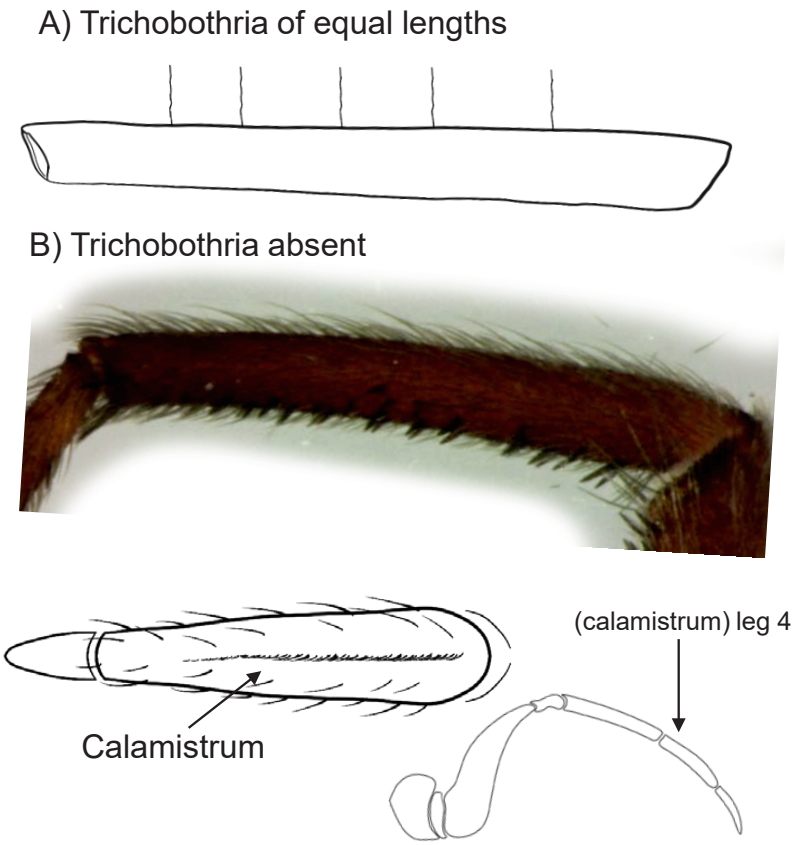
Couplet 20



20) Calamistrum is at most 50% the length of the metatarsus of Leg 4; metatarsi of all legs with a single row of trichobothria (thin sensory setae) that increase in length distally.

Tip: Back-lighting the leg makes trichobothria easier to distinguish. Sometimes are quite short and hidden in the surrounding setae. Use highest magnification possible.

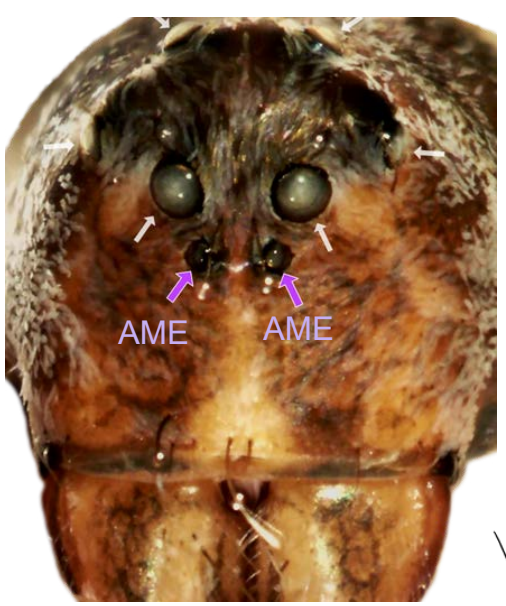
Amaurobiidae: hacklemesh-weaving spiders

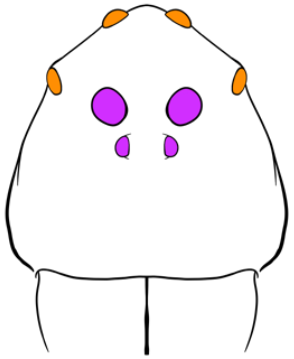


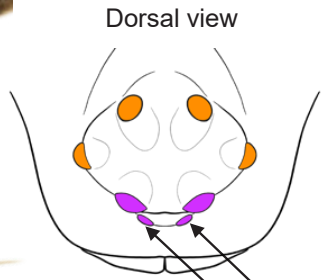
20') Calamistrum is at least 70% the length of the metatarsus of Leg 4; metatarsal trichobothria do not increase in length distally (A) or are absent (B).

Titanoecidae (in part; females): rock-weaving spiders

doi:10.3752/cjai.2023.47

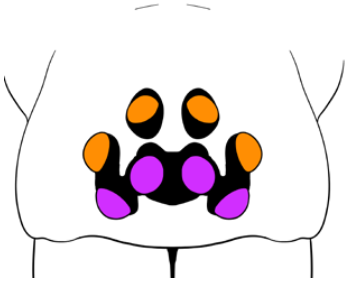




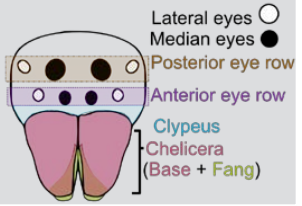


21) Anterior median eyes (AME) smaller than other eyes, and situated well anterior to the anterior lateral eyes, eyes form a hexagon when viewed dorsally; very high clypeus; legs with numerous elongate paired macrosetae.

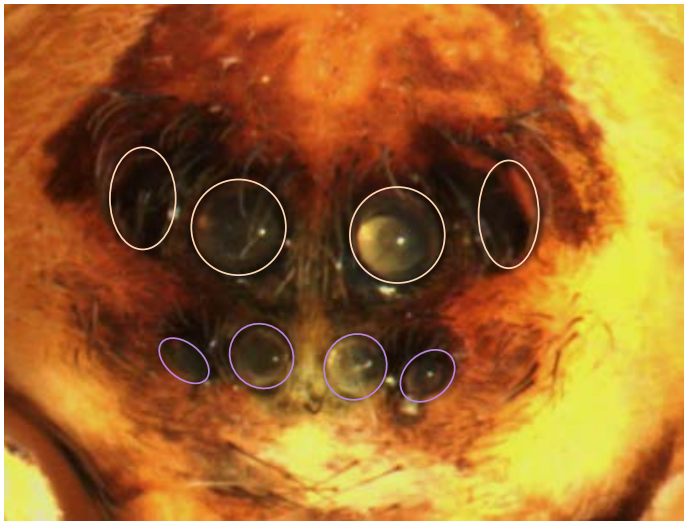
Oxyopidae: lynx spiders

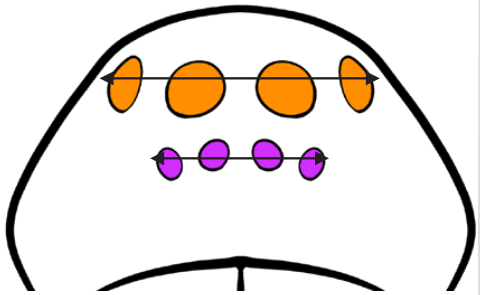


21') Eyes not arranged as in 21) (example shown above); clypeus may or may not be high; legs do not have numerous elongate paired macrosetae.



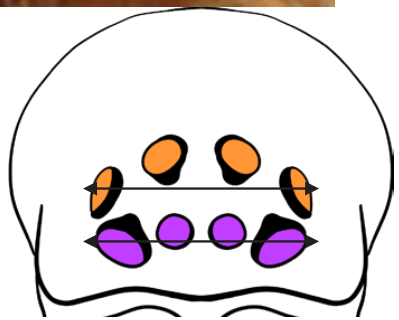
Couplet 22



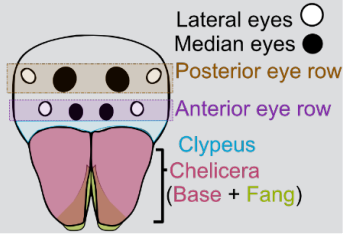


22) Posterior eye row wider than anterior eye row; posterior eye row always has larger eyes.

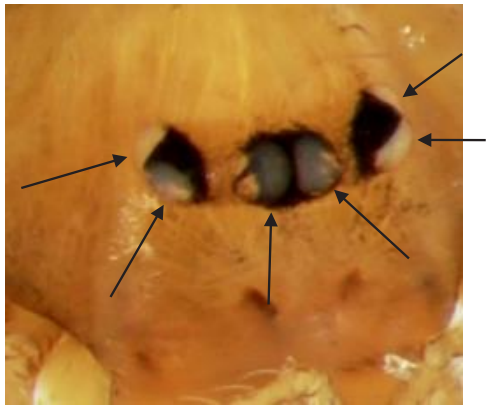
Pisauridae: fishing spiders

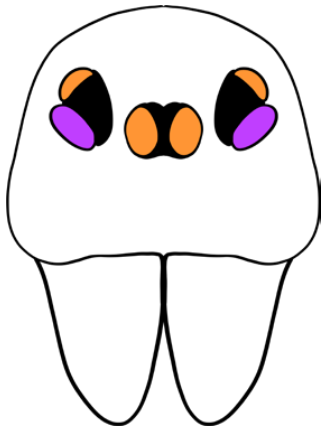


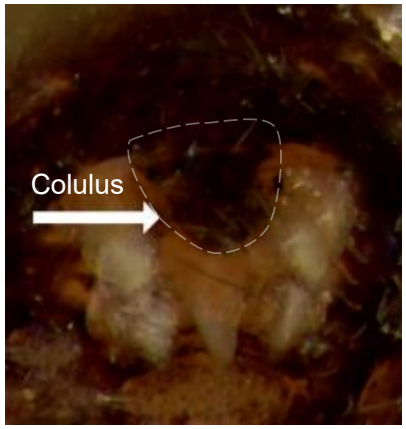
22') Eyes not arranged as in 22) (example shown above).

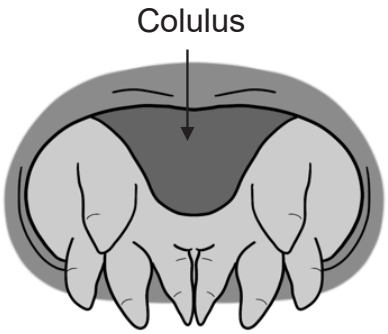


Couplet 23





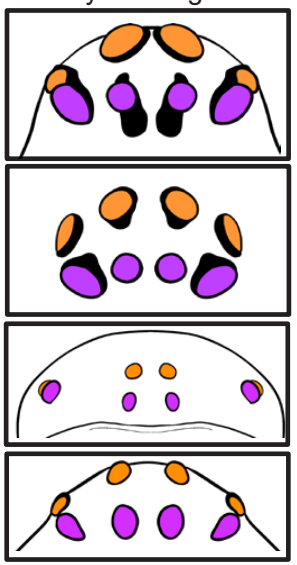


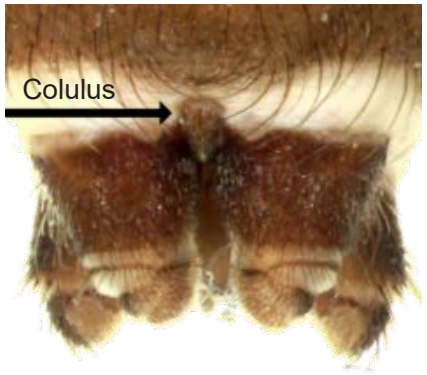


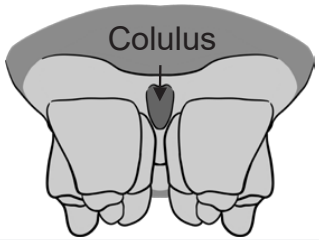
23) Six eyes; width of colulus (fleshy lobe at base of spinnerets, within spinneret margin) similar to that of spinnerets; all spinnerets of roughly equal length.

Telemidae: long-legged cave spiders

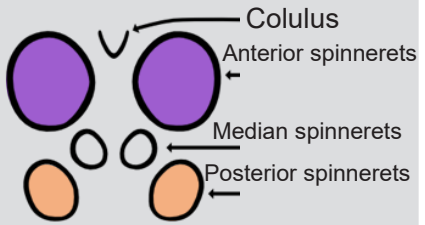
Other eye arrangements







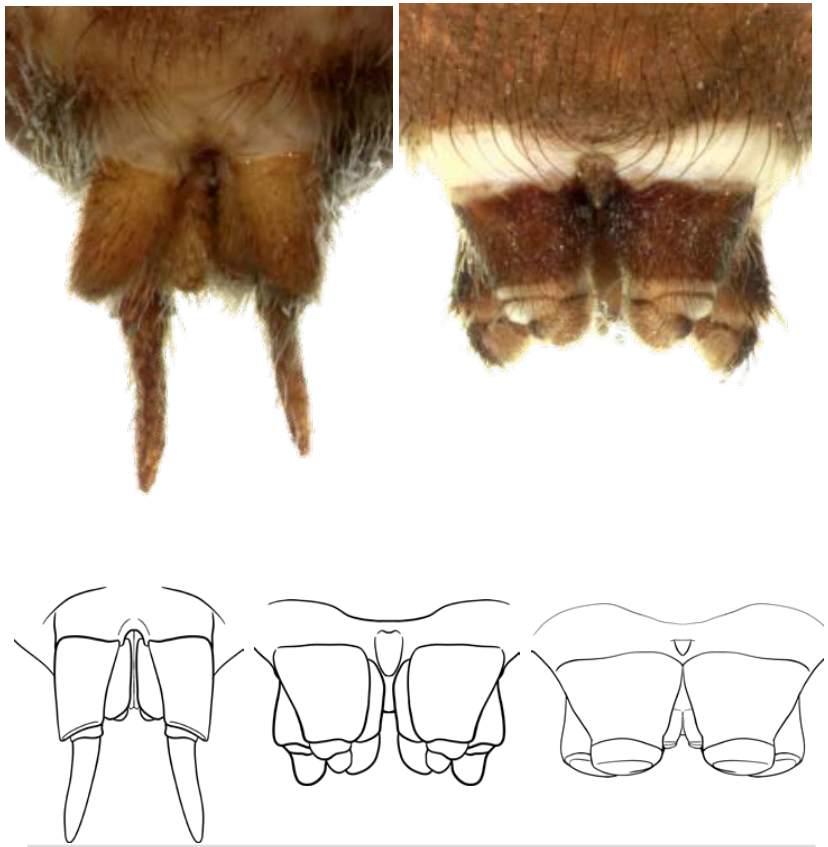
23') Six or eight eyes; colulus narrower than spinnerets, or absent; spinnerets equal in length or some clearly longer than others.



Couplet 24

24) Six spinnerets in a transverse row.

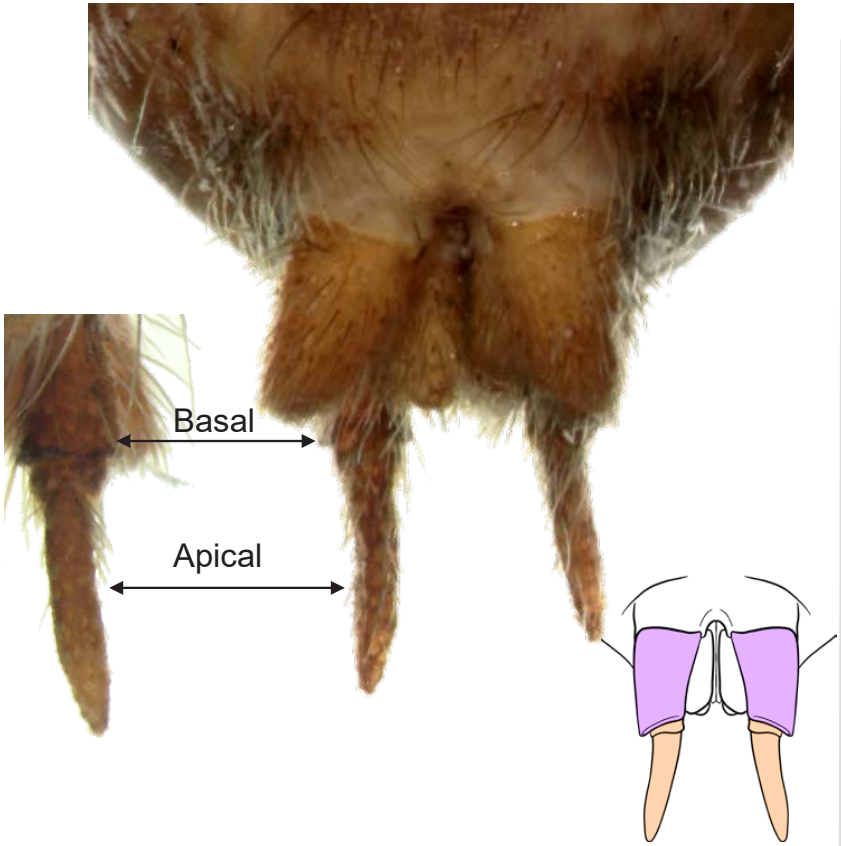
Hahniidae (in part): dwarf sheet-weaving spiders



24') Spinnerets not as in 24) (examples shown above).

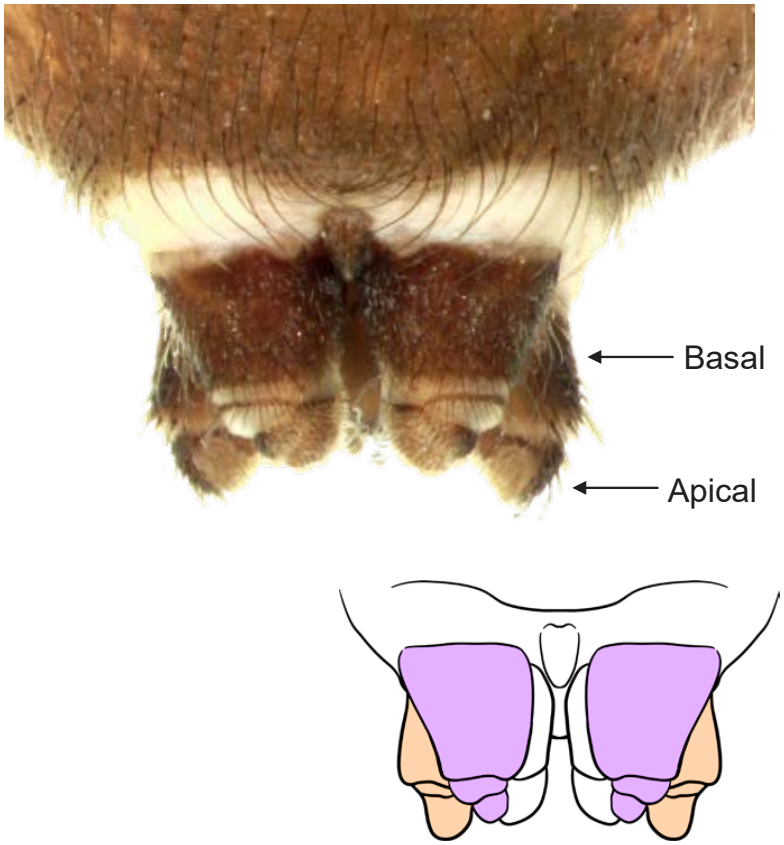
Couplet 25

doi:10.3752/cjai.2023.47

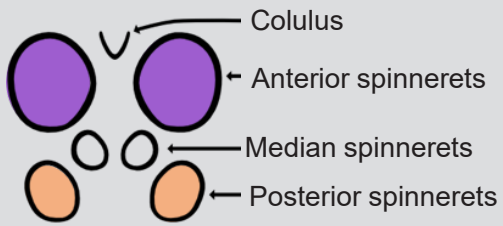


25) Posterior spinnerets twice the length of the other spinnerets, with apical segment as long as or longer than basal segment.

Agelenidae: funnel-weaving spiders

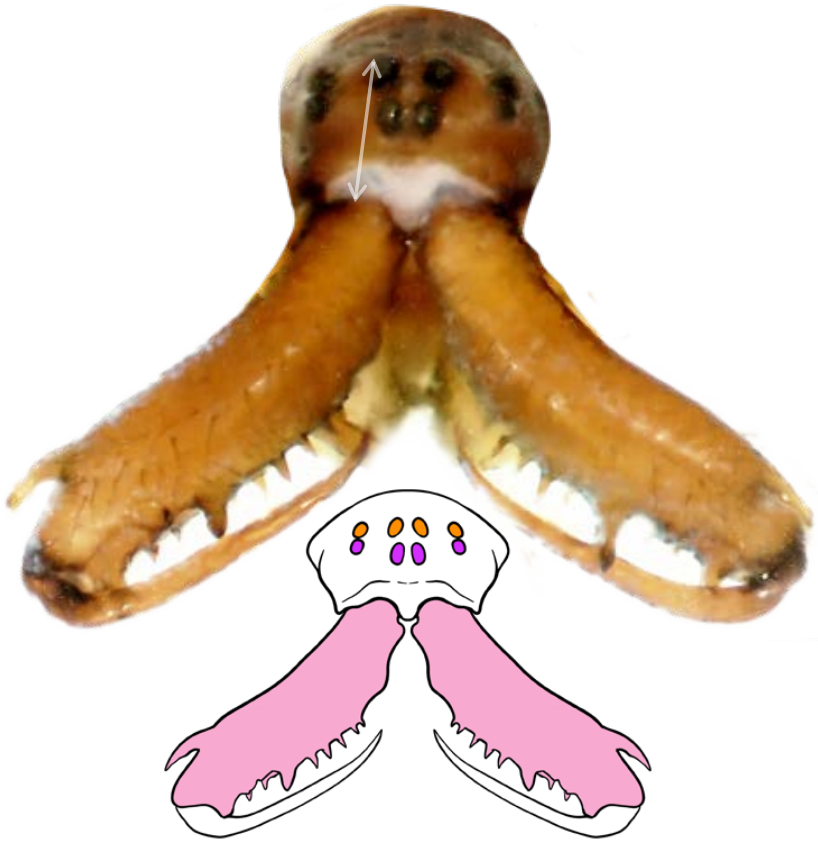


25') Posterior spinnerets not longer than other pairs.



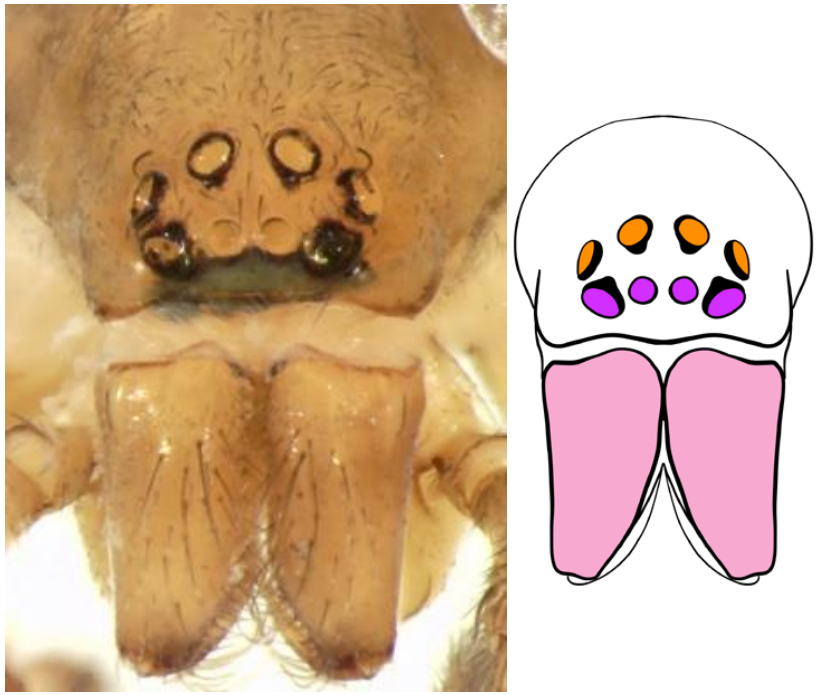
Couplet 26

doi:10.3752/cjai.2023.47

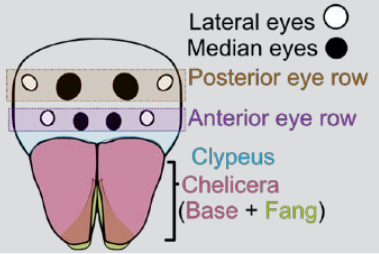


26) Basal segment of chelicera ≥ 2.5x the length of the spider's face and directed anteroventrally or ventrally (length of face is measured from top of chelicera to top of posterior eye row, see double-headed arrow above).

Couplet 27



26') Basal segment of chelicera < 2.5x the length of spider's face.



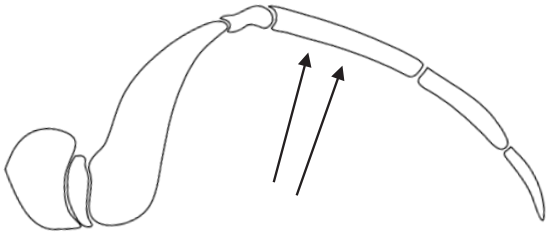
Couplet 28

27) Cephalothorax not elevated anteriorly, chelicerae directed forward.

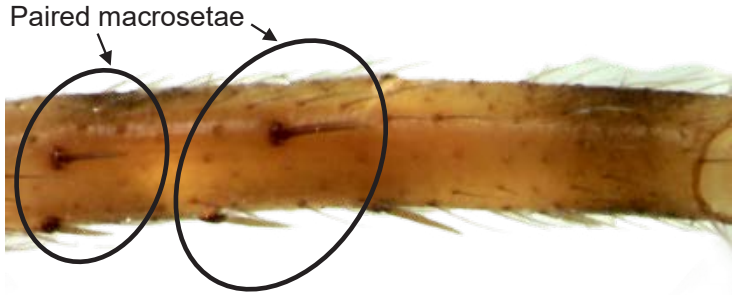
Tetragnathidae (in part): long-jawed orb-weaving spiders

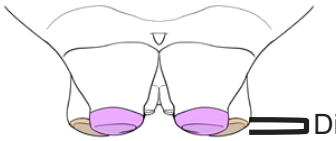
27') Cephalothorax elevated anteriorly, chelicerae directed downward.

Linyphiidae (in part, *Microlinyphia* spp.): sheet-web spiders



Paired macrosetae





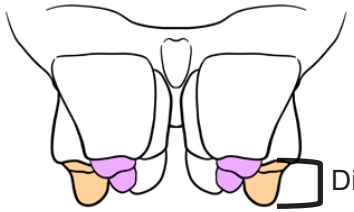
Distal/Posterior

28) **Ventral** surface of Leg 1 tibia with 2-5 pairs of macrosetae in a row, and no macrosetae on the dorsal surface; distal segment of posterior spinneret very short, wider than long, disk-like.

Cybaeidae: soft spiders

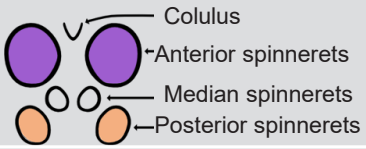
Paired and unpaired macrosetae, macrosetae on dorsal surface

No macrosetae

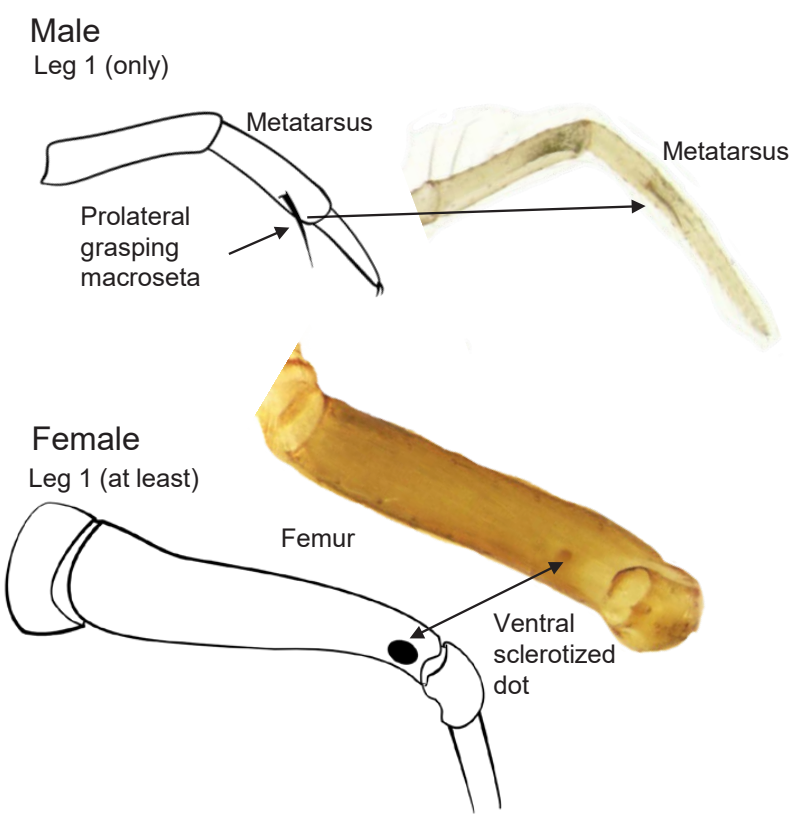


Distal/Posterior

28') **Ventral** surface of Leg 1 tibia with more than 5 pairs of macrosetae, or with unpaired macrosetae, or no macrosetae; distal segment of posterior spinneret not wider than long.



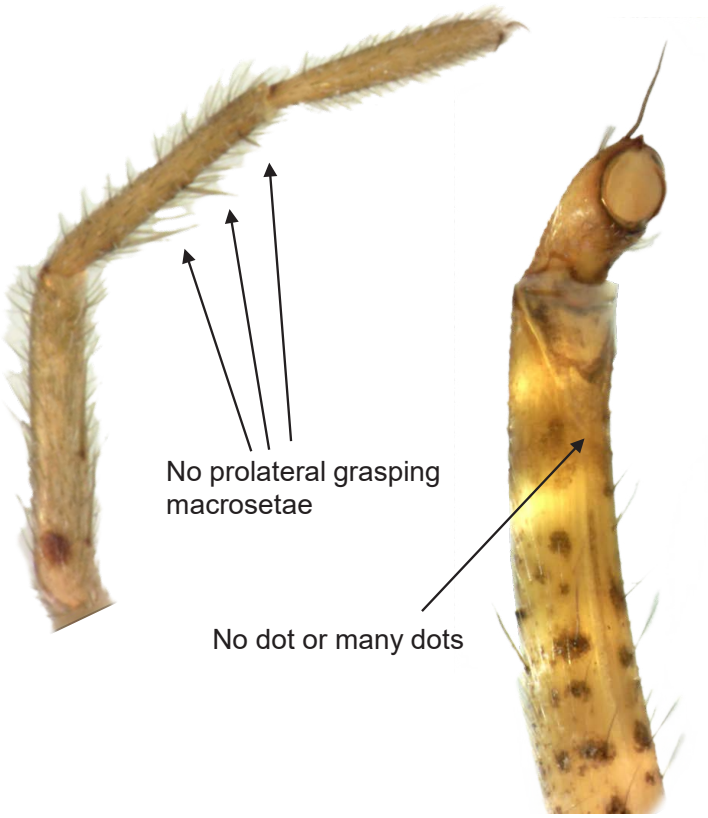
Couplet 29



29) Adult males with a prolateral grasping macroseta on metatarsus of Leg 1; adult female with a sclerotized dot on ventral surface femur of Leg 1 (dot may be present on other legs as well).

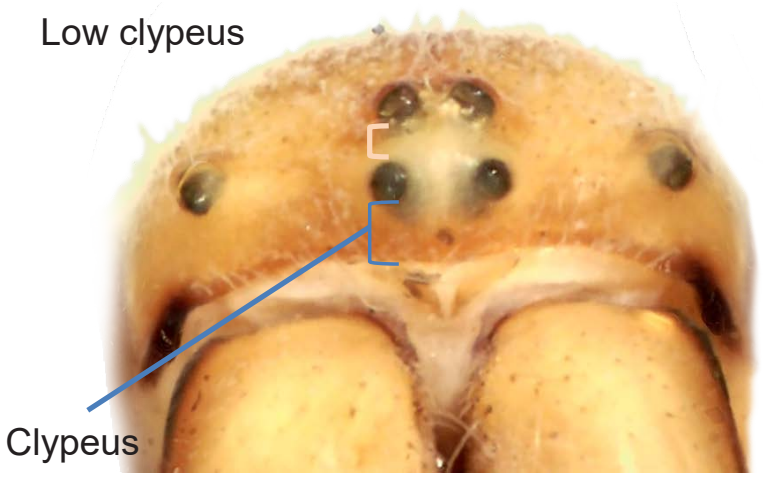
Note: Very small spiders (2-3 mm in length).

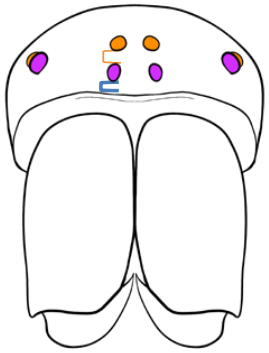
Mysmenidae: spurred orb weavers



29') Lacking these leg characters.

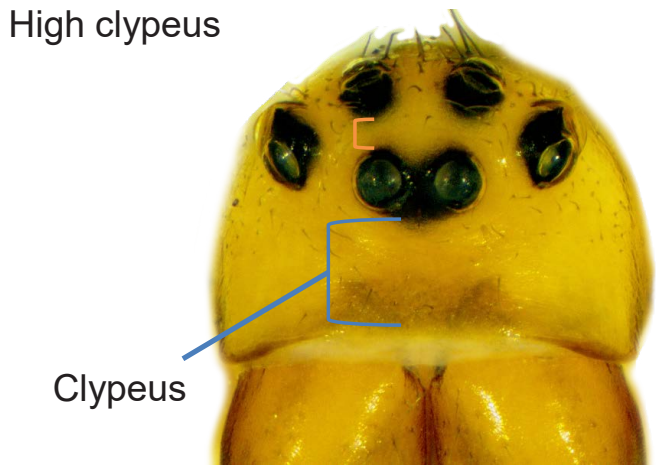
Couplet 30

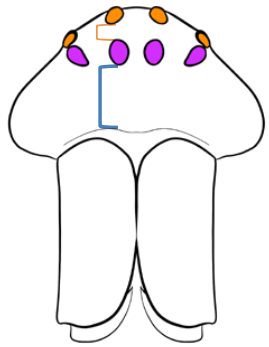




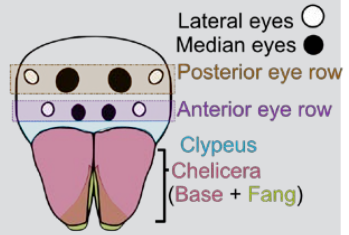
30) Clypeus low (height less than 2x distance between AM and PM eyes).

Couplet 31



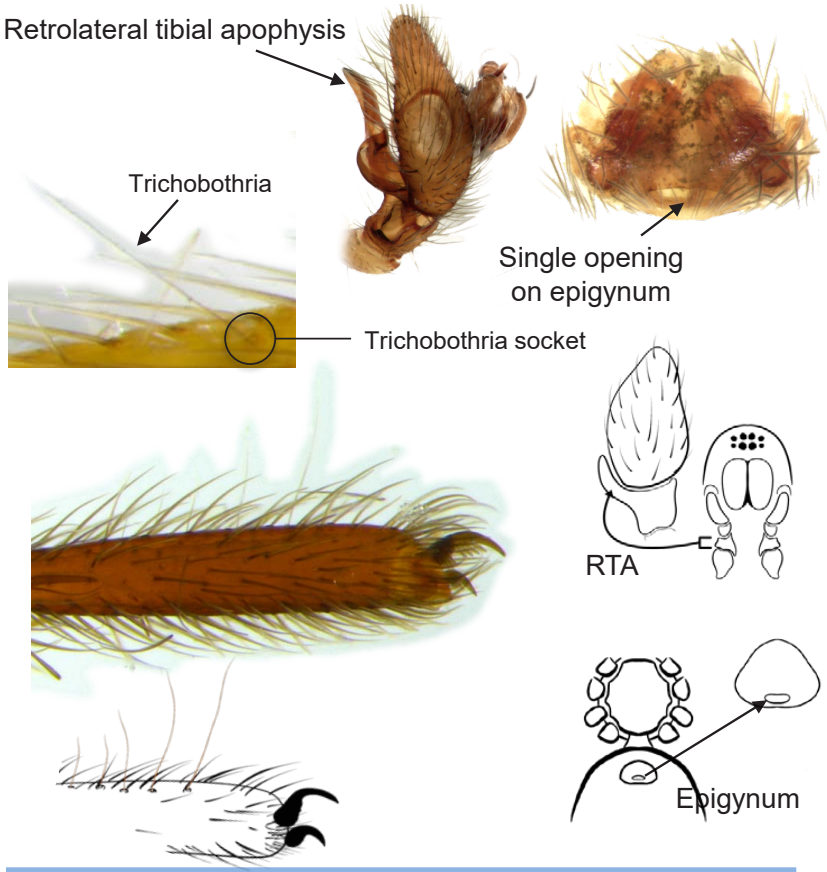


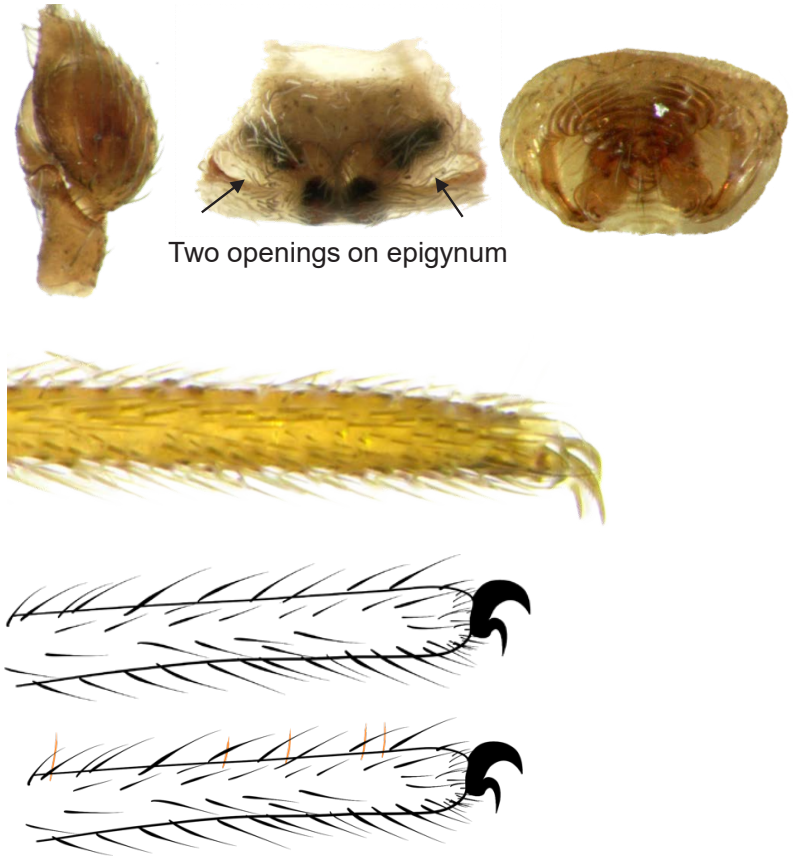
30') Clypeus high (height clearly >2x distance between AM and PM eyes).



Couplet 33

doi:10.3752/cjai.2023.47





31) Tarsus and metatarsus with a single row of six or fewer dorsal trichobothria that increase in length distally, **and** genital structure as follows:

Adult males: Retrolateral tibial apophysis (RTA) elongate (at least half the length of the palp bulb)'.

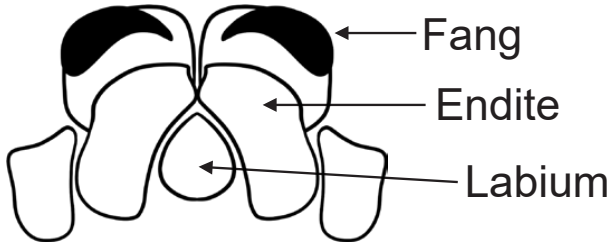
Adult females: Epigynum plate (anteroventral cuticular plate on abdomen) with a single opening, lateral paired round shapes and faint tubes visible on both sides of the opening.

Hahniidae (in part, *Cicurina* spp): dwarf sheet-weaving spiders

31') Tarsus and metatarsus trichobothria absent or in a different arrangement as in 31). Genital structure does not generally resemble photos in 31) (may have multiple, single, or no visible openings, no visible tubes, paired round shapes are not located laterally to the opening).

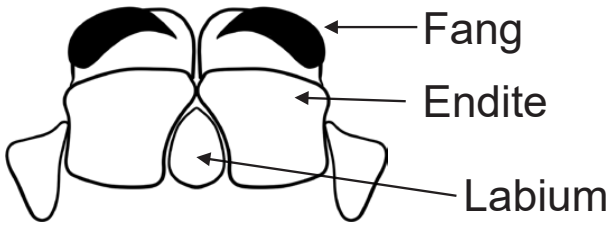
Couplet 32

doi:10.3752/cjai.2023.47



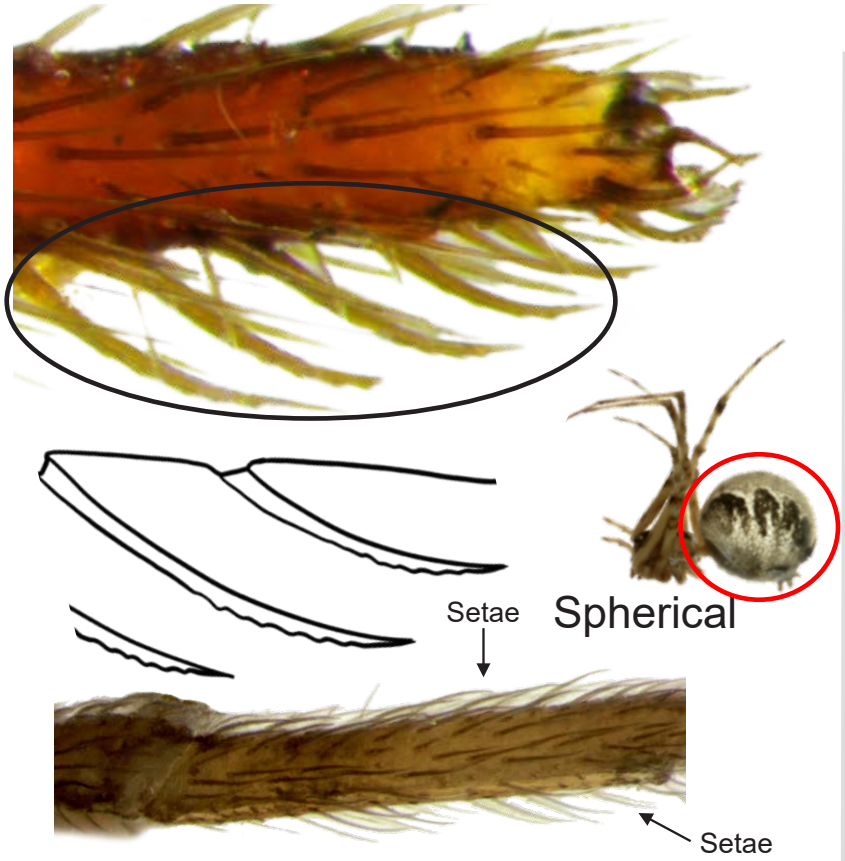
32) Endites longer than wide.

Tetragnathidae (in part): long-jawed orb-weaving spiders



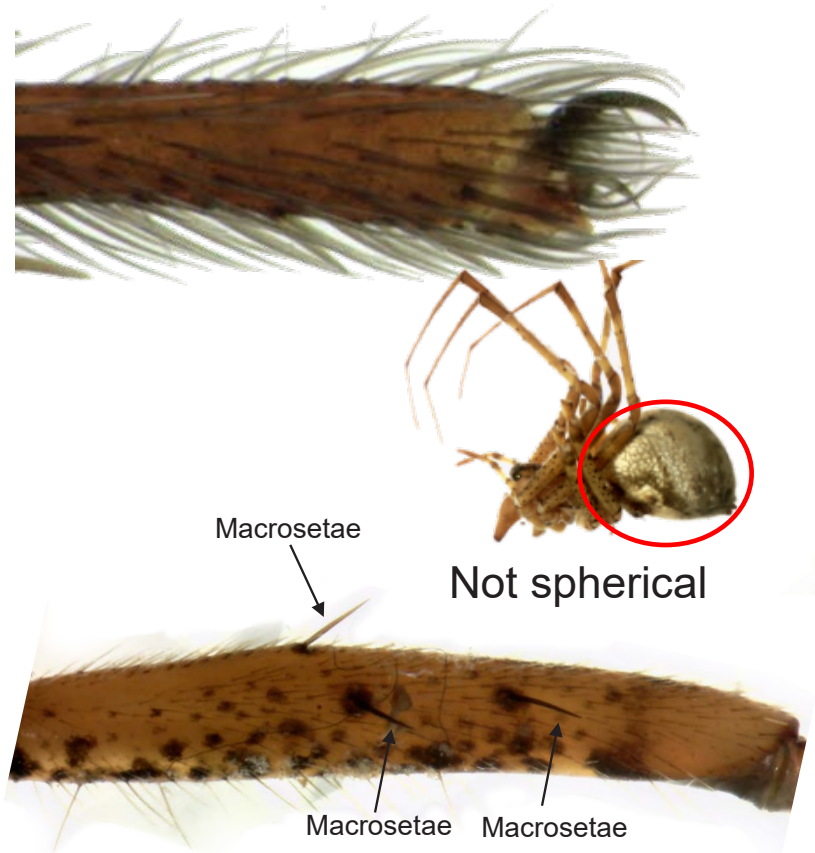
32') Endites approximately as long as wide.

Araneidae: orb-weaving spiders



33) Legs usually lack macrosetae; tarsus of Leg 4 with weakly serrated or wavy-edged setae on ventral surface, setae are curved and arranged as a comb; abdomen may be more or less spherical.

Theridiidae: comb-footed spiders



33') Legs have conspicuous macrosetae; tarsus of Leg 4 lacking serrated or wavy-edged setae on ventral surface; abdomen usually not sphere-shaped, with few exceptions.

Linyphiidae (in part): sheet-web spiders

doi:10.3752/cjai.2023.47

Agelenidae: funnel-weaving spiders

Agelenopsis potteri (Blackwall, 1846)

Important couplets used to reach this family (bold = most diagnostic features)

5) 3-clawed

21) Eyes do not form a hexagon

22) Eyes in the posterior row not larger than eyes in the anterior row; eye rows similar in width

15) No cribellum

23) Colulus not wider than spinnerets

24) Spinnerets not in a transverse straight row

25) Posterior spinnerets elongated, apical segment as long or longer than basal segment

Species recorded: AB(6) SK(6) MB(5)

doi:10.3752/cjai.2023.47

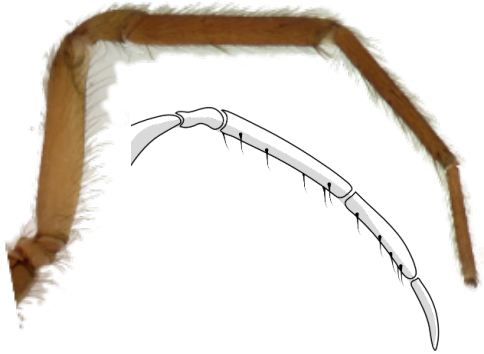
Amaurobiidae: hacklemesh-weaving spiders

Amaurobius borealis Emerton, 1909

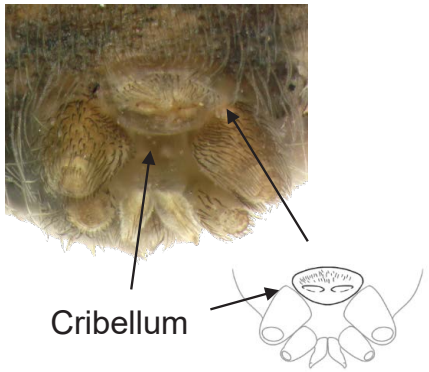
Important couplets used to reach this family (bold = most diagnostic features)

5) 3-clawed

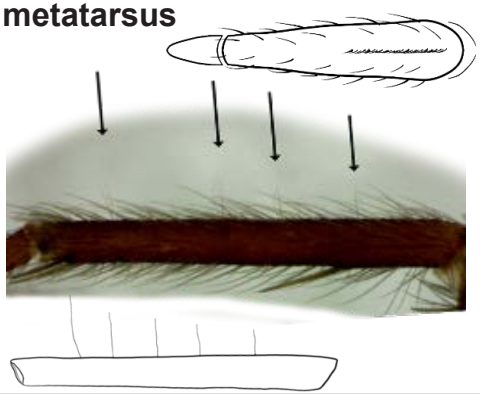
19) Absence of 3 pairs of macrosetae on ventral surface of tibia or metatarsus



16) Divided cribellum



20) Single row of trichobothria increase distally in length, calamistrum ≤ 50% length of metatarsus



Species recorded: AB(7) SK(4) MB(6)

doi:10.3752/cjai.2023.47

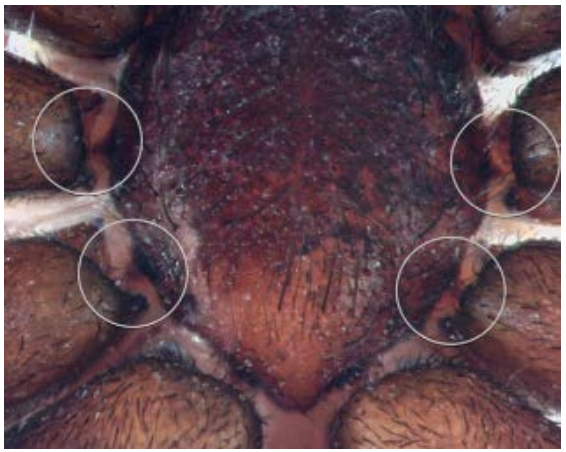
Anyphaenidae: ghost spiders

Anyphaena pacifica (Banks, 1896)

Important couplets used to reach this family (bold = most diagnostic features)

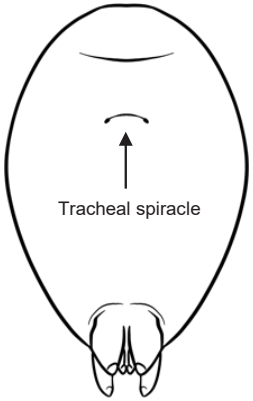
5) 2-clawed

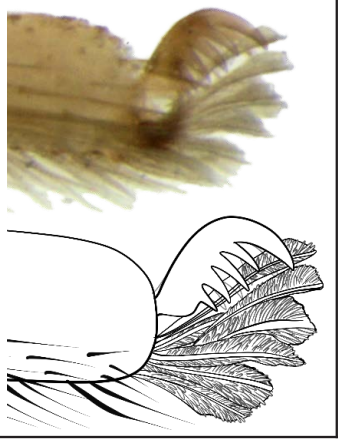
8) Pre-coxal triangles present



9) Spinnerets not cylindrical

11) Lamellate claw tufts and tracheal spiracle close to genital groove





Species recorded: AB(1) SK(1) MB(0)

doi:10.3752/cjai.2023.47

Araneidae: orb-weaving spiders

Larinioides cornutus (Clerck, 1757)

Important couplets used to reach this family (bold = most diagnostic features)

5) 3-clawed

21) Eyes do not form hexagon

26) Chelicerae not rotated forward, with basal segment < 2.5x the length of the face

30) Low clypeus

15) No cribellum

24) Spinnerets not in a single row

25) No elongate pair of spinnerets

32) Endites as long as they are wide

Species recorded: AB(31) SK(25) MB(32)

doi:10.3752/cjai.2023.47

Cheiracanthiidae: long-legged sac spiders

Cheiracanthium inclusum (Hentz, 1847)

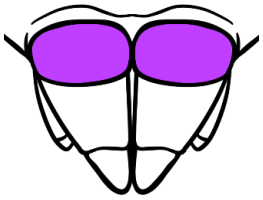
Important couplets used to reach this family (bold = most diagnostic features)

5) 2-clawed

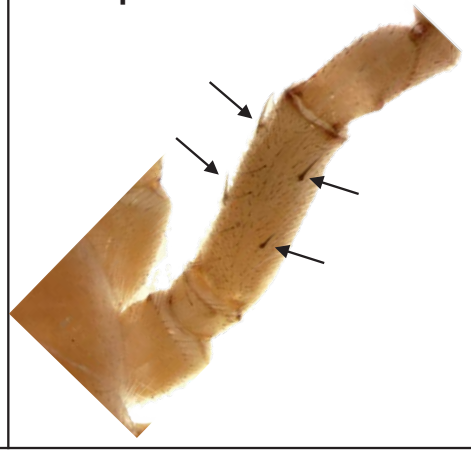
8) Pre-coxal triangles present

9) Spinnerets base without gap, spinnerets not cylindrical

12) Anterior spinnerets longer than rest, abdomen tapers towards spinnerets, no conspicuous horizontal banding or scute



13) Dorsal side of Leg 3 femur with 4 paired macrosetae



Species recorded: AB(1) SK(0) MB(0)

doi:10.3752/cjai.2023.47

Clubionidae: sac spiders

Clubiona canadensis Emerton, 1890

(character not used in key)
often have dark chelicerae

Important couplets used to reach this family (bold = most diagnostic features)

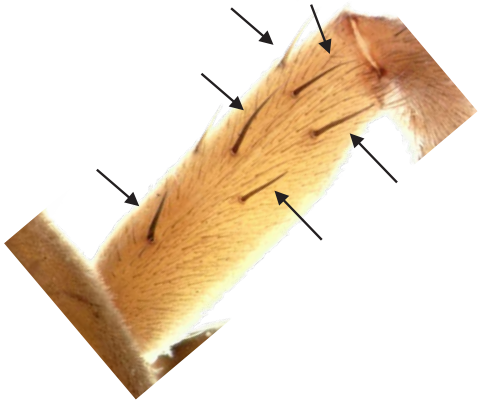
5) 2-clawed

8) Pre-coxal triangles present

9) Spinneret bases are close together

12) Anterior spinneret longest, body tapers toward spinnerets, body never has scute or conspicuous horizontal banding.

13) Dorsal side of Leg 3 femur with more than 4 macrosetae



Species recorded: AB(16) SK(14) MB(18)

doi:10.3752/cjai.2023.47

Corinnidae: ant-mimic sac spiders

Castianeira longipalpa (Hentz, 1847)

(character not used in key) Some corinnids have an elongated pedicel. Tissue damage may mimic this character in other sac spider families.

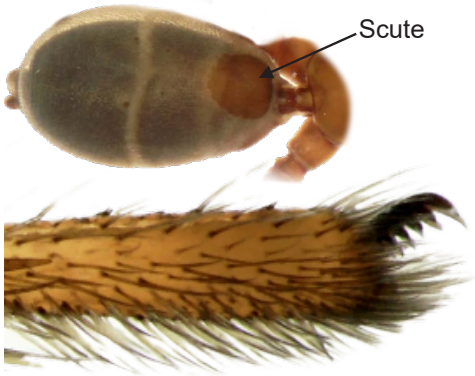
Important couplets used to reach this family (bold = most diagnostic features)

5) 2-clawed

8) Pre-coxal triangles present

11) No lamellate tufts

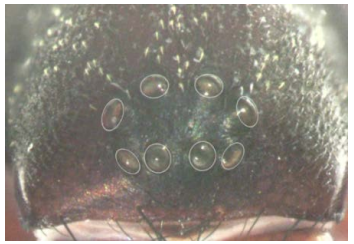
12) Anterior spinnerets not larger than all other spinnerets, **body may have scute**, may have horizontal banding, body oval



14) Anterior eye row recurved, posterior eye row slightly procurved

Dorsal view

Front view



Species recorded: AB(6) SK(6) MB(8)

doi:10.3752/cjai.2023.47

Cybaeidae: soft spiders

Cryphoeca exlineae Roth, 1988

Important couplets used to reach this family (bold = most diagnostic features)

5) 3-clawed

21) Eyes not arranged on a turret

22) Posterior eyerow not wider then anterior eyerow

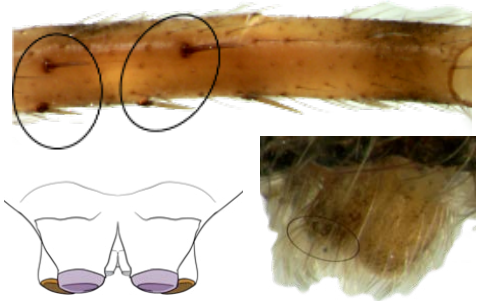
26) Chelicerae are < 2.5x length of spiders face, not rotated anteriorly

15) No cribellum

24) Spinnerets not arranged in a row

25) No elongate spinnerets

28) Tibia of Leg 1 with 2-5 paired ventral macrosetae; distal segment of posterior spinneret very short



Species recorded: AB(1) SK(0) MB(1)

doi:10.3752/cjai.2023.47

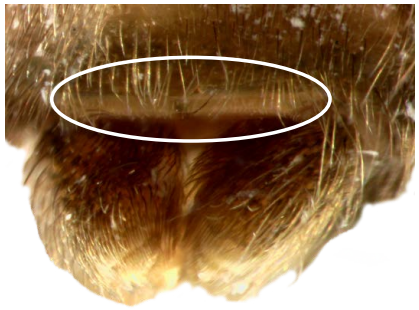
Desidae: intertidal spiders

Metaltella simoni (Keyserling, 1878)
Note: the only Prairie record is from a greenhouse in Calgary, AB, in 1991

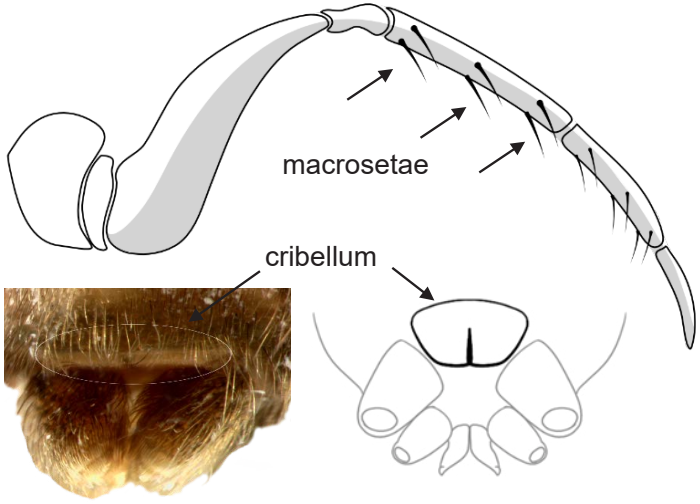
Important couplets used to reach this family (bold = most diagnostic features)

5) 3-clawed

14) Cribellate
16) Divided cribellum



19) Strongly grooved cribellum; tibia and metatarsus have 3 ventral pairs of macrosetae



Species recorded: AB(1) SK(0) MB(0)

doi:10.3752/cjai.2023.47

Dictynidae: mesh-weaving spiders

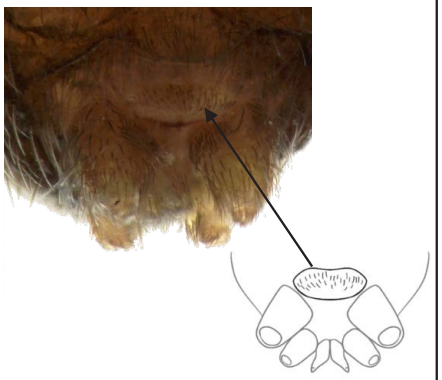
Dictyna brevitarsa Emerton, 1915

(character not used in key) Some dictynids have stripes of pale setae on the top of the cephalothorax

Important couplets used to reach this family (bold = most diagnostic features)

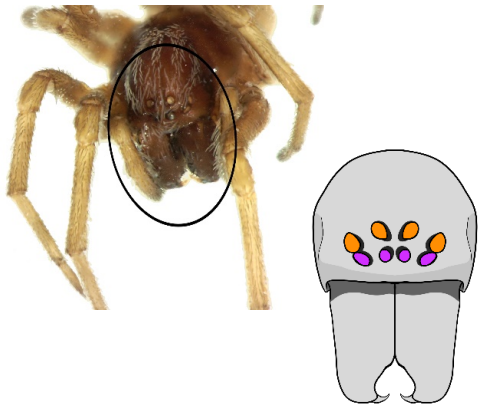
5) 3-clawed

16) Undivided cribellum



Note: outside of prairie provinces cribellum may be divided or absent in this family.

17) Thin legs; unmodified eye arrangement

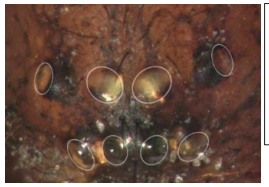


18) Calamistrum covering at least 40% of Leg 4 metatarsus

Species recorded: AB(38) SK(29) MB(31)

Gnaphosidae: ground spiders

Gnaphosa parvula Banks, 1896



(character not used in key)
Gnaphosidae eye pattern: posterior median eyes often oval rather than circular

Important couplets used to reach this family (bold = most diagnostic features)

5) 2-clawed

8) Pre-coxal triangles present

9) Spinnerets with gap between the base & conical structure

***10) Micaria* spp. have iridescent abdomen, but no cylindrical spinnerets**

Species recorded: AB(51) SK(45) MB(42)

doi:10.3752/cjai.2023.47

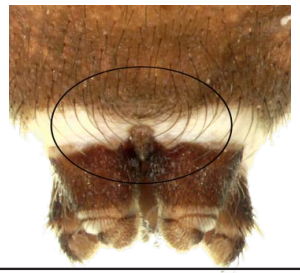
Hahniidae: dwarf sheet-weaving spiders (in part) (1/2)

Neoantistea magna (Keyserling, 1887)

Important couplets used to reach this family (bold = most diagnostic features)

5) 3-clawed

15) No cribellum

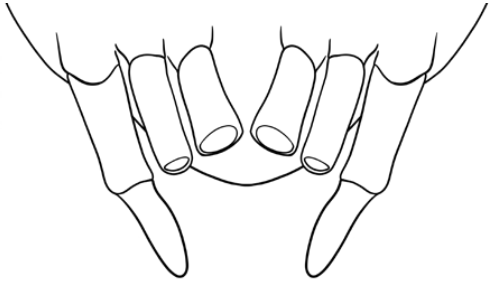


4) Anterior median eyes not touching, remaining eyes not in two tight clusters

23) Eight eyes

26) Chelicerae < 2.5x length of face and not oriented forward

24) Six spinnerets in a row



Species recorded: AB(8) SK(7) MB(6)

doi:10.3752/cjai.2023.47

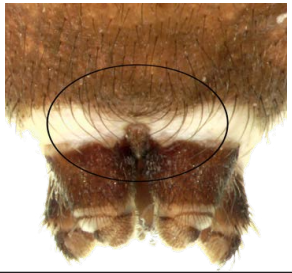
Hahniidae: dwarf sheet-weaving spiders (in part) (2/2)

Cicurina arcuata Keyserling, 1887

Important couplets used to reach this family (bold = most diagnostic features)

5) 3-clawed

15) No cribellum

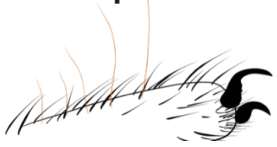


4) Anterior median eyes not touching

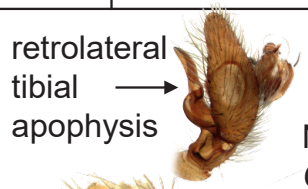
23) Eight eyes

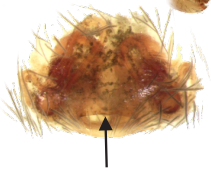
26) Chelicerae < 2.5x length of face and not oriented forward

31) Tarsi dorsally with trichobothria in a single row (of six or fewer) and increasing in length distally & genital structure resembles pictures



retrolateral tibial apophysis





Single opening on epigynum

Note: hahniid genus *Cicurina* does not have the distinct spinneret organization of this family, use genital reference images to confirm if the spider is *Cicurina*.

Species recorded: AB(8) SK(7) MB(6)

doi:10.3752/cjai.2023.47

Linyphiidae: sheet-web spiders

Pityohyphantes subarcticus Chamberlin & Ivie, 1943

(character not used in key) The cephalothorax of many males is highly modified.

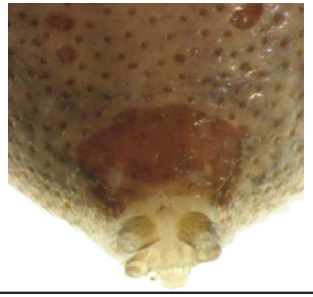
Dismodicus decemoculatus (Emerton 1882)

Important couplets used to reach this family (bold = most diagnostic features)

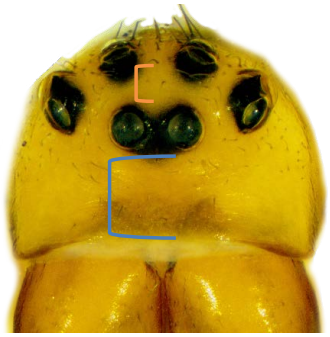
5) 3-clawed

14) No cribellum

25) No elongate paired spinnerets

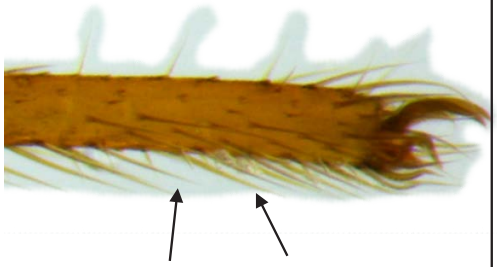


30) High clypeus



31) Tarsus without trichobothria

33) Legs with macrosetae



33) Ventral setae on Leg 4 tarsus not serrated.

Species recorded: AB(251) SK(164) MB(227)

doi:10.3752/cjai.2023.47

Liocranidae: liocranid spiders

Agroeca ornata Banks, 1892

Important couplets used to reach this family (bold = most diagnostic features)

5) 2-clawed

8) No precoxal triangles

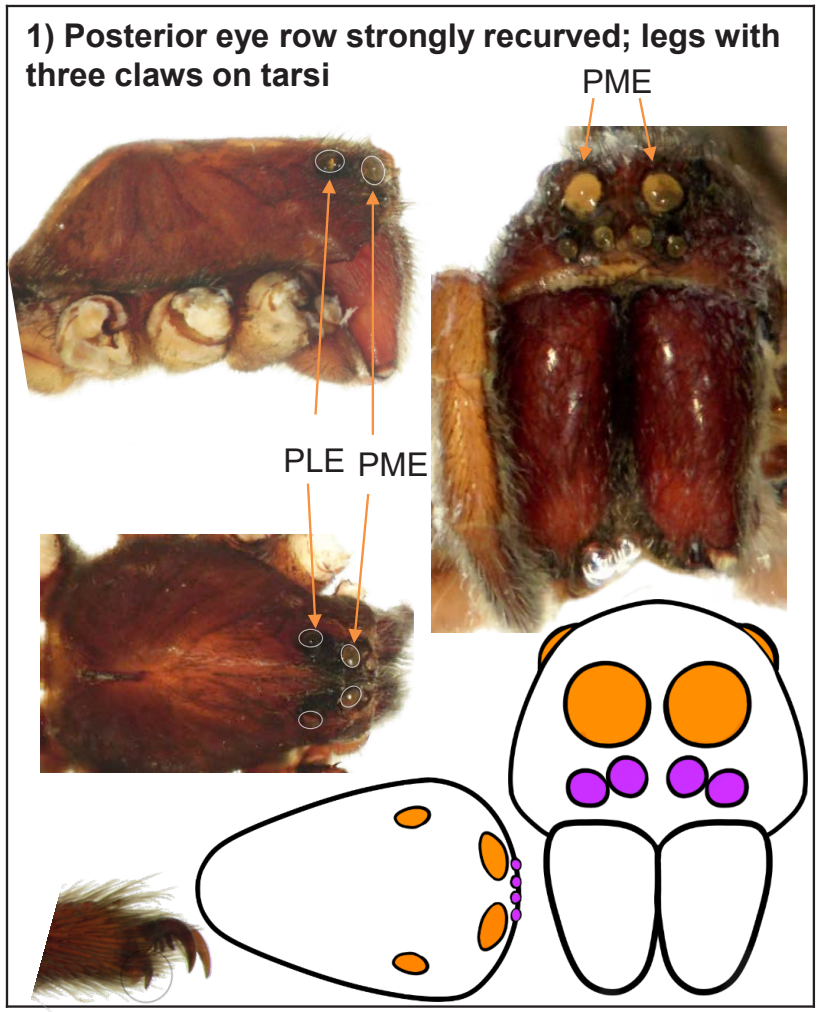
6) Prograde legs; spaces between median and lateral eyes in each row smaller than diameter of eyes

Species recorded: AB(3) SK(2) MB(2)

doi:10.3752/cjai.2023.47

Lycosidae: wolf spiders

Pardosa hyperborea (Thorell, 1872)



Species recorded: AB(46) SK(37) MB(48)

doi:10.3752/cjai.2023.47

Mimetidae: pirate spiders

Ero canionis Chamberlin & Ivie, 1935

3) Tibiae and metatarsi of Legs 1 and 2 with a series of long, curved macrosetae with shorter curved macrosetae in between. Setae increase in length distally from 1 macrosetae to the next.

Species recorded: AB(2) SK(2) MB(2)

doi:10.3752/cjai.2023.47

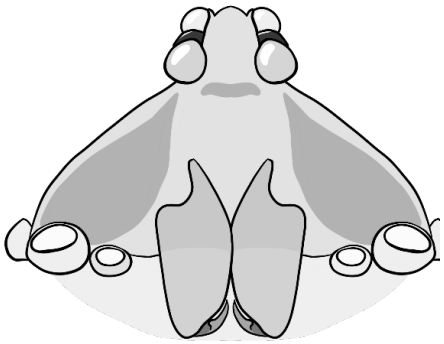
Mysmenidae: spurred orb weavers

Trogloneta paradoxa Gertsch, 1960

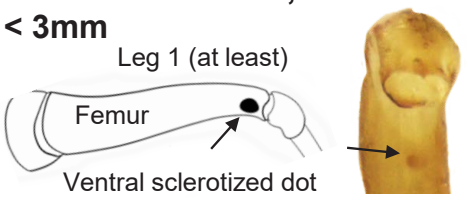
Important couplets used to reach this family (bold = most diagnostic features)

5) 3-clawed

26) Chelicerae < 2.5x the length of the face



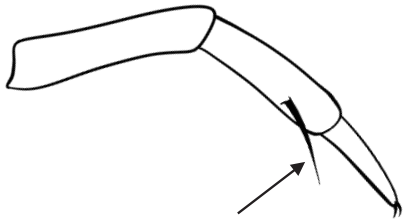
29) (Females) Dot on ventral surface of femur 1; small size < 3mm



15) No cribellum

24) Unmodified spinnerets

29) (Male) Prolateral grasping spine on metatarsus 1; small size < 3mm



Species recorded: AB(1) SK(0) MB(0)

doi:10.3752/cjai.2023.47

Oxyopidae: lynx spiders

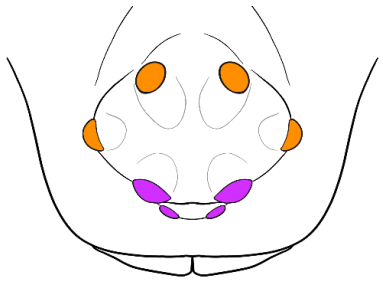
Oxyopes scalaris Hentz*, 1845*

Important couplets used to reach this family (bold = most diagnostic features)

5) 3-clawed

15) No cribellum

21) Eyes form hexagon when viewed dorsally; large leg macrosetae



Species recorded: AB(0) SK(1) MB(1)

doi:10.3752/cjai.2023.47

Philodromidae: running crab-spiders

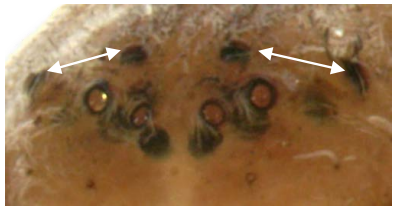
Thanatus formicinus (Clerck, 1757)

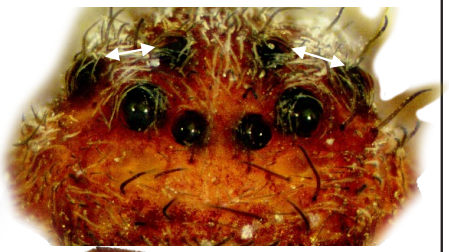
Important couplets used to reach this family (bold = most diagnostic features)

5) 2-clawed

7) Scopula present

6) Space between some eyes can be >2x the diameter of the eyes; eyes may be on tubercules; legs laterigrade



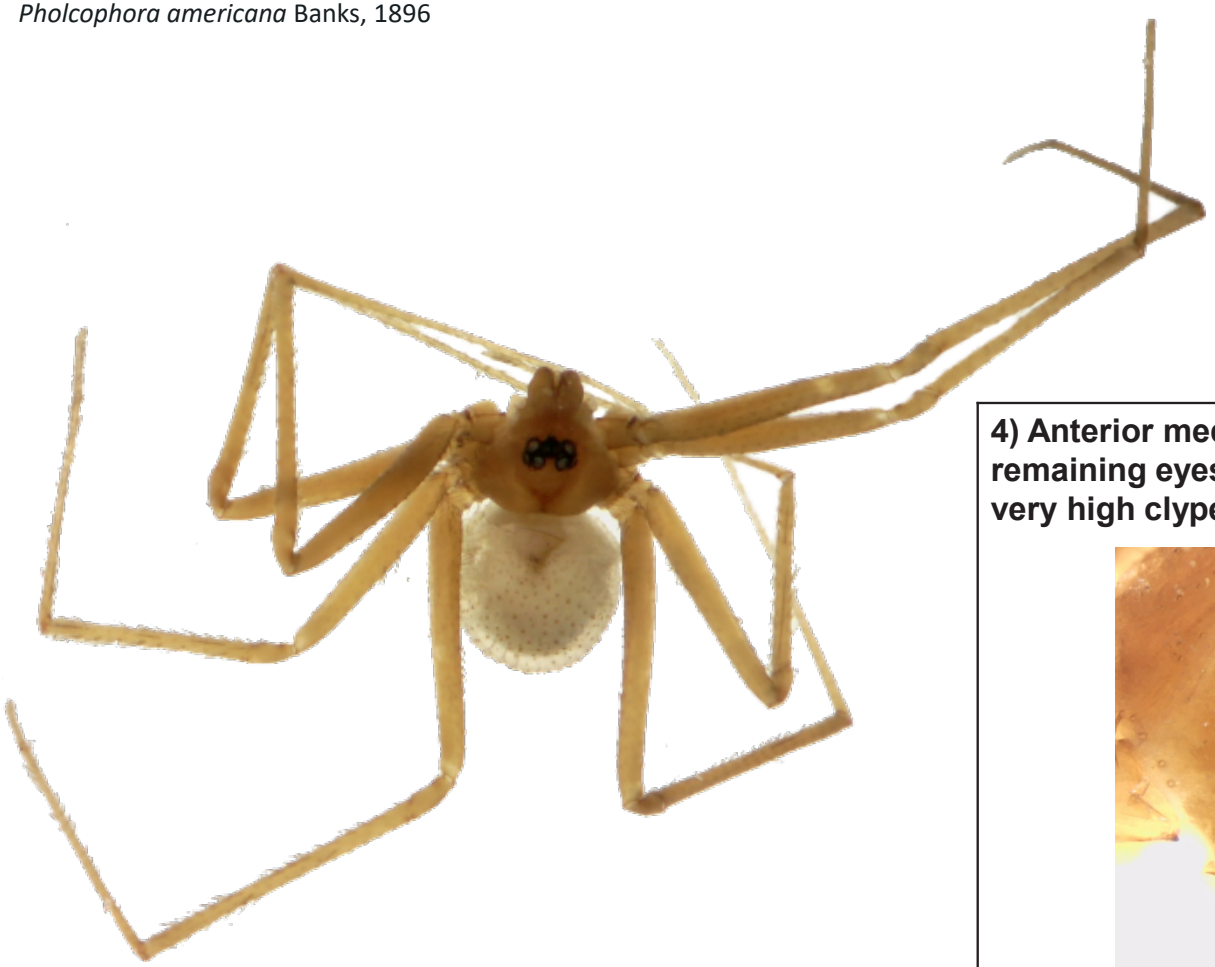


Species recorded: AB(26) SK(23) MB(25)

doi:10.3752/cjai.2023.47

Pholcidae: cellar spiders

Pholcophora americana Banks, 1896



4) Anterior median eyes touching, remaining eyes in 2 tight clusters; a very high clypeus

Species recorded: AB(3) SK(1) MB(1)

doi:10.3752/cjai.2023.47

Phrurolithidae: guard-stone spiders

Scotinella pugnata (Emerton, 1890)

Important couplets used to reach this family (bold = most diagnostic features)

5) 2-clawed

8) Pre-coxal triangles present

11) No lamellate claw tufts

13) Anterior spinnerets not longer than rest, abdomen oval, may have horizontal band, will not have scute

14) Straight eye rows, **spines on tibia 1 are elongate**

Species recorded: AB(38) SK(29) MB(31)

doi:10.3752/cjai.2023.47

Pisauridae: fishing spiders

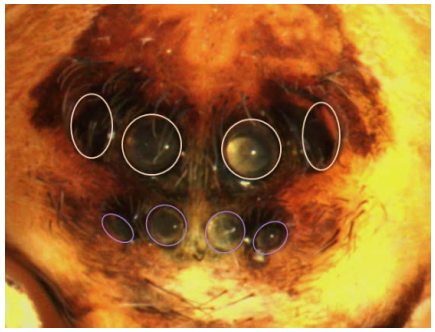
Dolomedes striatus Giebel, 1869

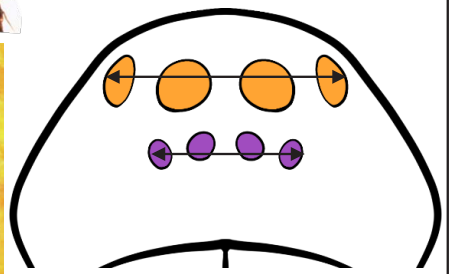
Important couplets used to reach this family (bold = most diagnostic features)

5) 3-clawed

21) Head is not turret shaped; legs do not have numerous pairs of large macrosetae

22) Posterior eye-row has larger eyes, and is wider than the anterior eye-row





Species recorded: AB(2) SK(2) MB(4)

doi:10.3752/cjai.2023.47

Salticidae: jumping spiders

Paraphidippus sp.

2) Large anterior median eyes; angular in frontal view

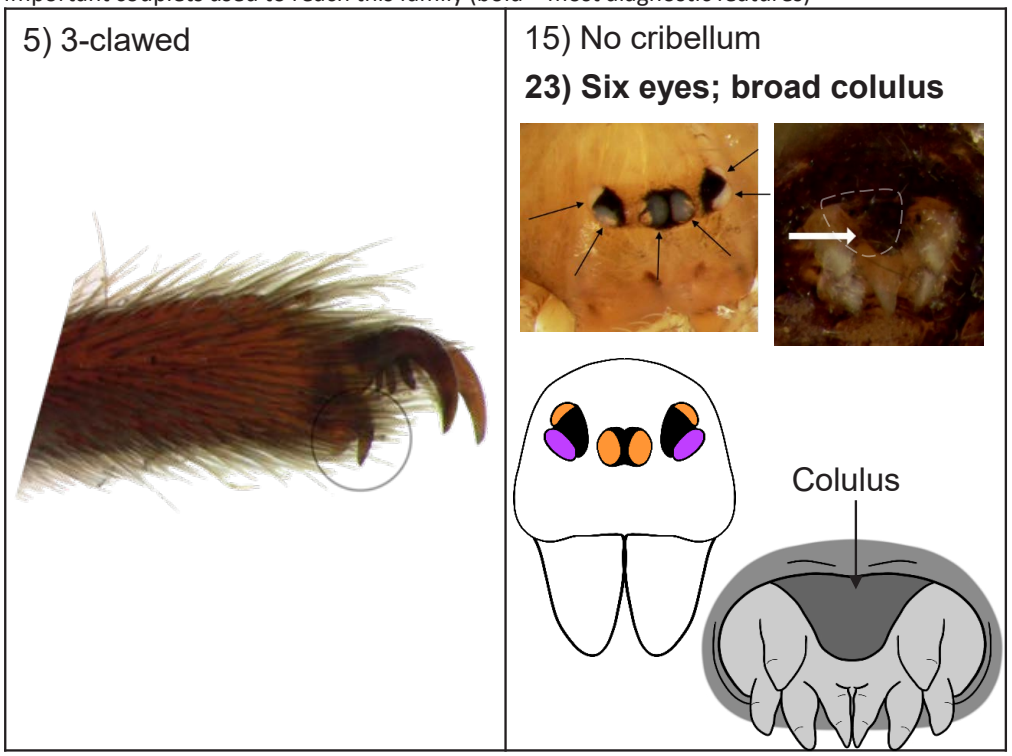
Species recorded: AB(40) SK(38) MB(44)

doi:10.3752/cjai.2023.47

Telemidae: long-legged cave spiders

Usofila pacifica (Banks, 1894)

Important couplets used to reach this family (bold = most diagnostic features)



Species recorded: AB(1) SK(0) MB(0)

doi:10.3752/cjai.2023.47

Tetragnathidae: long-jawed orb-weaving spiders

Tetragnatha versicolor Walckenaer, 1841

Note: Juveniles and females, and all stages and sexes of the tetragnathid genus *Pachygnatha*, may lack elongated chelicerae; however, they always have rectangular endites.

Important couplets used to reach this family (bold = most diagnostic features)

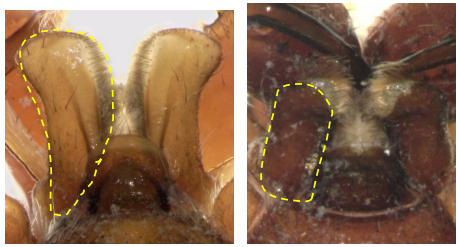
5) 3-clawed

15) No cribellum

26) Chelicerae may be ≥ 2.5x the length of the face, may be rotated forward

30) Low clypeus

32) Endites longer than wide



28) Leg 1 tibia without 2-5 paired ventral macrosetae (MS), may have MS on dorsal surface, may have unpaired MS

Species recorded: AB(13) SK(11) MB(13)

doi:10.3752/cjai.2023.47

Theridiidae: comb-footed spiders

Euryopis argentea Emerton, 1882

Important couplets used to reach this family (bold = most diagnostic features)

5) 3-clawed

15) No cribellum

21) Median anterior eyes similar in size to others; legs do not have large paired macrosetae

24) Spinnerets unmodified

26) Chelicerae < 2.5X the length of the spider's face

30) High clypeus

33) Serrate setae on tarsi 4, spherical shaped abdomen

28) No paired leg macrosetae

33) No macrosetae on leg

Species recorded: AB(34) SK(37) MB(45)

doi:10.3752/cjai.2023.47

Thomisidae: crab spiders

Xysticus emertoni Keyserling, 1880

Important couplets used to reach this family (bold = most diagnostic features)

5) 2-clawed

6) Legs laterigrade; eyes with spaces larger than 2x diameter of eye between eyes, eyes may be on tubercles

7) No scopula

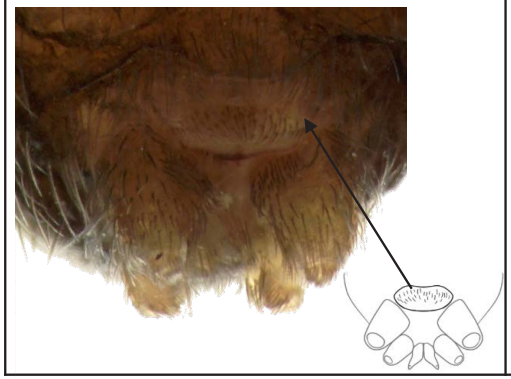
Species recorded: AB(37) SK(32) MB(41)

doi:10.3752/cjai.2023.47

Titanoecidae: rock weaving-spiders (Males)

Titanoeca nigrella (Chamberlin, 1919)

Important couplets used to reach this family (bold = most diagnostic features)

5) 3-clawed 	17) Legs not robust or stocky; eye arrangement unmodified 
15) Cribellum present **16) Undivided cribellum** 	**18) Calamistrum absent** 

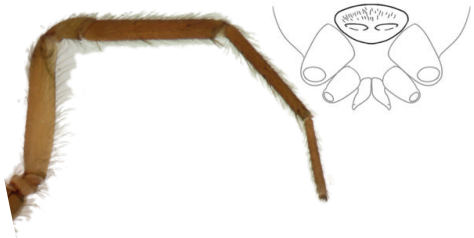
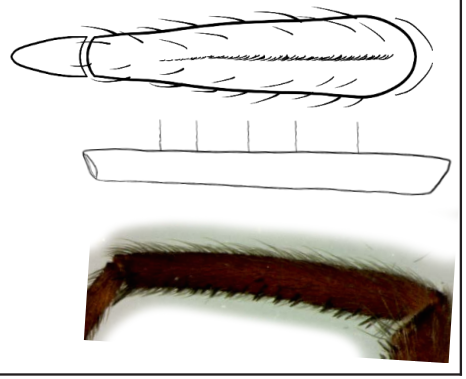
Species recorded: AB(2) SK(2) MB(2)

doi:10.3752/cjai.2023.47

Titanoecidae: rock weaving-spiders (Females)

Titanoeca nigrella (Chamberlin, 1919)

Important couplets used to reach this family (bold = most diagnostic features)

5) 3-clawed 	19) Ventral surface of tibia lacks 3 paired macrosetae; cribellum is divided with concavities or shallow midline 
15) Cribellum present **16) Divided cribellum** 	**20) Trichobothria on metatarsi do not increase in length or are absent; calamistrum 70% of metatarus 4** 

Species recorded: AB(2) SK(2) MB(2)

doi:10.3752/cjai.2023.47

Uloboridae: hackled orb-weaving spiders

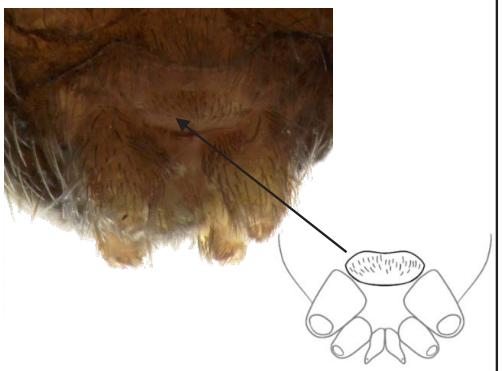
Hyptiotes gertschi Chamberlin & Ivie, 1935

(character not used in key)
On femora 2-4 there may be rows of long trichobothria; these are delicate and may be broken off your specimen

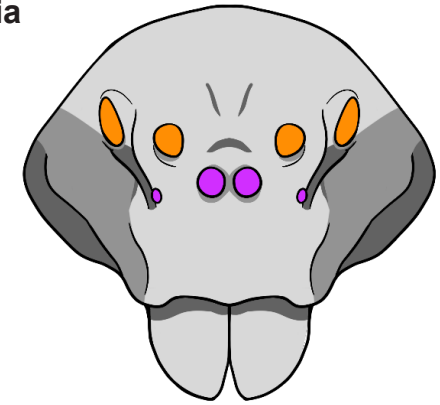
Important couplets used to reach this family (bold = most diagnostic features)

5) 3-clawed

15) Cribellum present
16) Undivided cribellum



17) Lateral eyes distant from median eyes; robust femur and tibia



Species recorded: AB(1) SK(1) MB(1)

doi:10.3752/cjai.2023.47

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