

Construction of Identification Key

Key /Taxonomic aids

- Key is a list of statements
- Used for identification
- Similarities and dissimilarities
- Used pair of contrasting characters “couplet”
- Each statement in couplet is “Lead”

Construction of Identification Key

- Taxonomist have different opinions about the design and format of the key
- Some use numbers to separate the couplets
- Other use letters
- Some taxonomist place each couplets together
- Others may seprate couplets

Construction of Identification Key

Types of Keys

- Indented Key
- Bracket Key
- Pictoral Key
- Polyclave Key

Construction of Identification Key

Principles of Systematics

Module# 89

Principles of Systematics

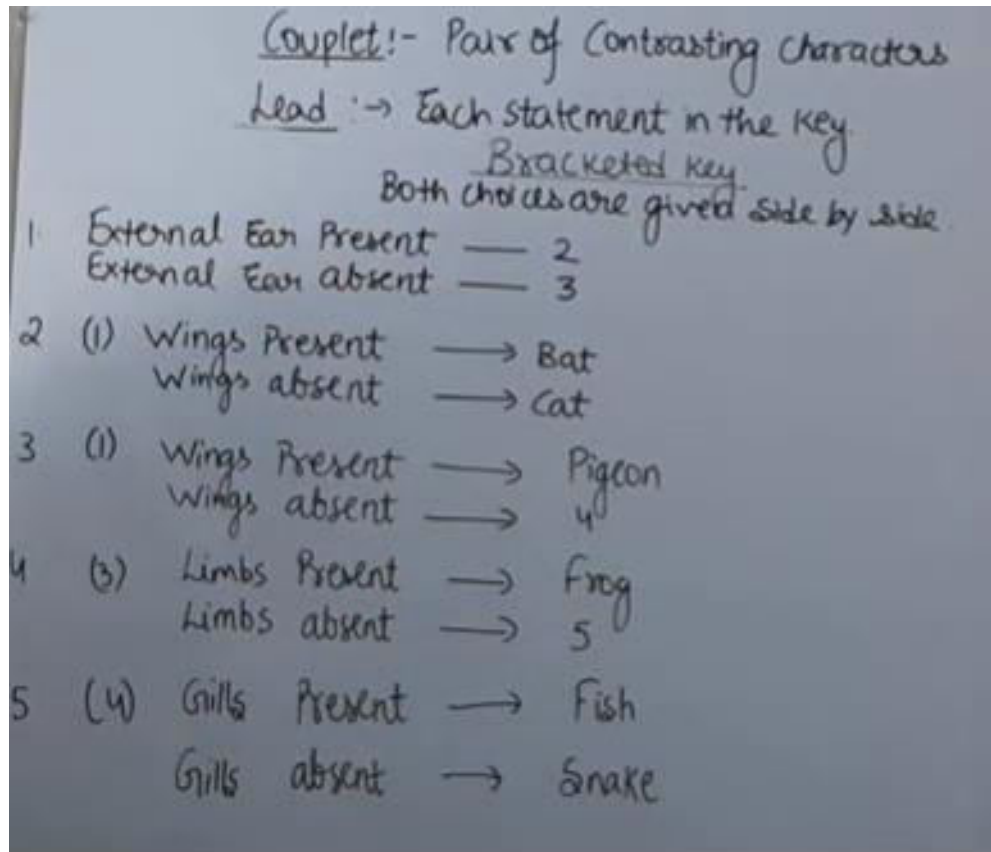
Construction of Identification Key

Identification Keys and Catalogues

Bracketed Key

- Pair of contrasting characters are taken in brackets
- Simple to use
- It is most commonly used in the field of taxonomic study.

Identification Keys and Catalogues



Bracketed Key

- Pair of contrasting characters are taken in brackets
- Simple to use
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<https://www.youtube.com/watch?v=Uqbm-8Zlqwo>

Identification Keys and Catalogues

Pectoral Keys

- For non-scientists
- Simple to use
- Key with pictures
- Jungle or desert/easy for identification of plants and animals

Identification Keys and Catalogues

Polyclave Key

- Based on computer program
- Simple to use
- Plant identification
- Take photos/Google/identification

END

Principles of Systematics

Module# 90

Principles of Systematics

**Morphological
Identifications of
Model Arthropod**

Morphological Identifications of Model Arthropods

- Spiders (Arthropoda: Arachnida) Most
- Most abundant natural predators
- Present in all types of habitat
- Highly diverse groups of Arthropod
- More than 46000 species
- Ranked 7th in animal Kingdom

Morphological Identifications of Model Arthropods

- Present on every continent
- Excellent predators
- Types of spiders
- Can survive without food for several months
- Low metabolic rate
- Prey switching ability

Morphological Identifications of Model Arthropods

- Prey switching
- Four pairs of legs
- Two body parts
- No antennae

END

Principles of Systematics

Module# 91

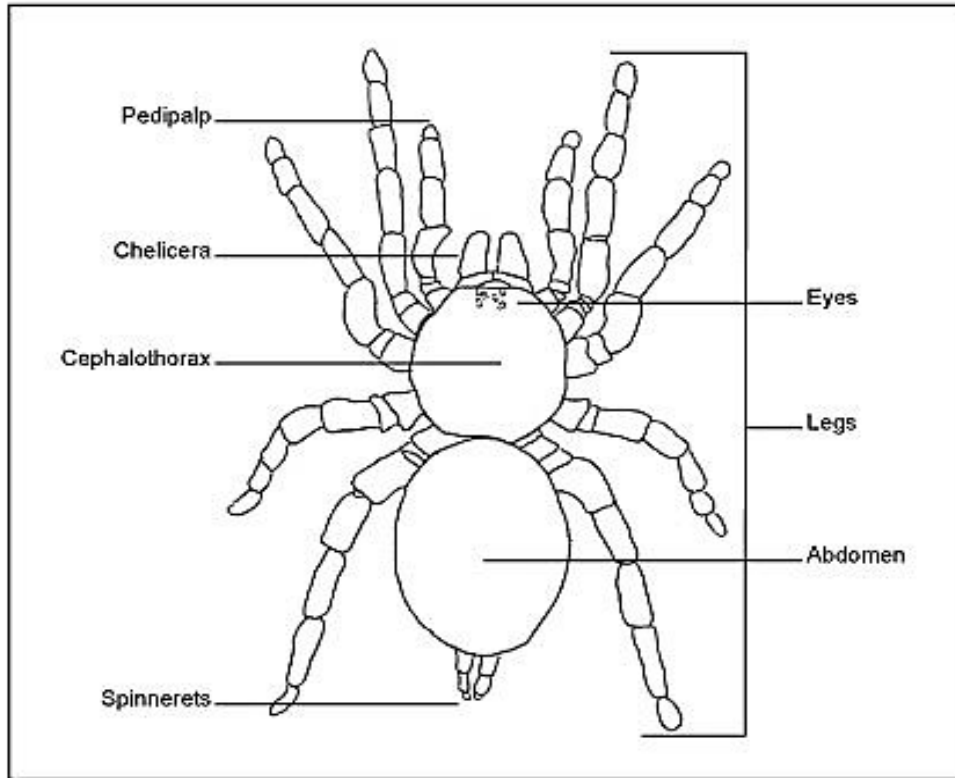
Principles of Systematics

**Morphological
Identifications of
Model Arthropod**

Morphological Identifications of Model Arthropods

- Spiders have two body segments
- Front segment is called **Cephalothorax**
- It contain eyes, mouth parts, fangs, brain, venom gland etc.
- Legs are also connected to this parts
- Four pairs of legs/Chelicera/padipalp

Morphological Identifications of Model Arthropods



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- 2nd part is abdomen
- Spinneret are attached at the end of this part
- Silk glands
- Legs are covered with many hairs
- Hairs pick up vibrations and smell from air
- Claws 2-3 at the end of legs

Morphological Identifications of Model Arthropods

- 2nd part is abdomen
- No skeleton inside their bodies
- Hard outer shell called exoskeleton
- Molting
- Males are smaller than females

Morphological Identifications of Model Arthropods

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Principles of Systematics

Module# 92

Principles of Systematics

**Morphological
Identifications of
Model Arthropod**

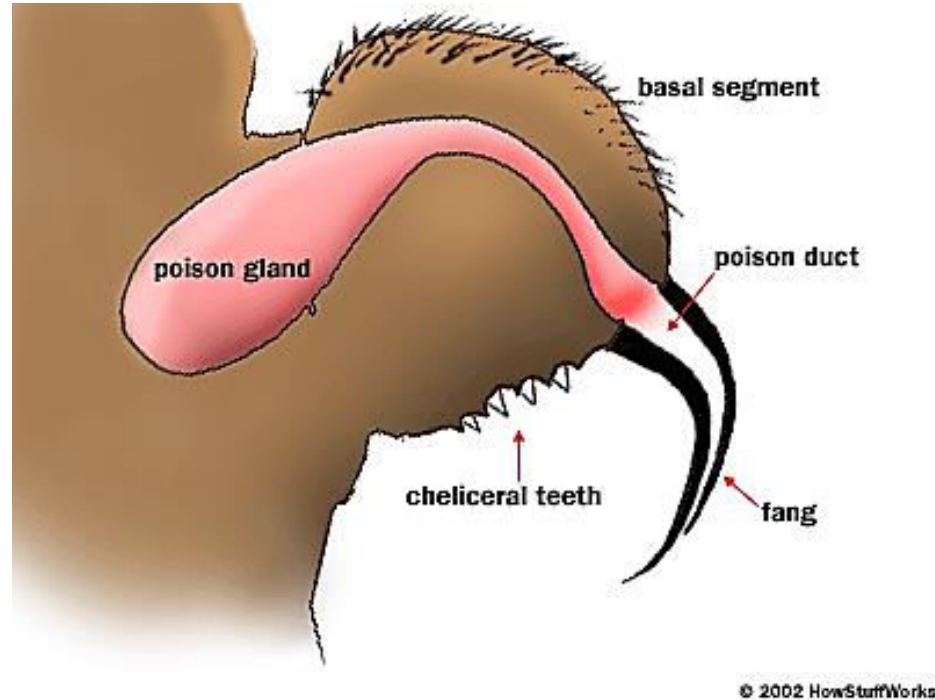
Morphological Identifications of Model Arthropods

Parts of Legs

- Coxa
- Trochanter
- Femur
- Patella
- Tibia
- Metatarsus
- Tarsus
- Claws

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Morphological Identifications of Model Arthropods

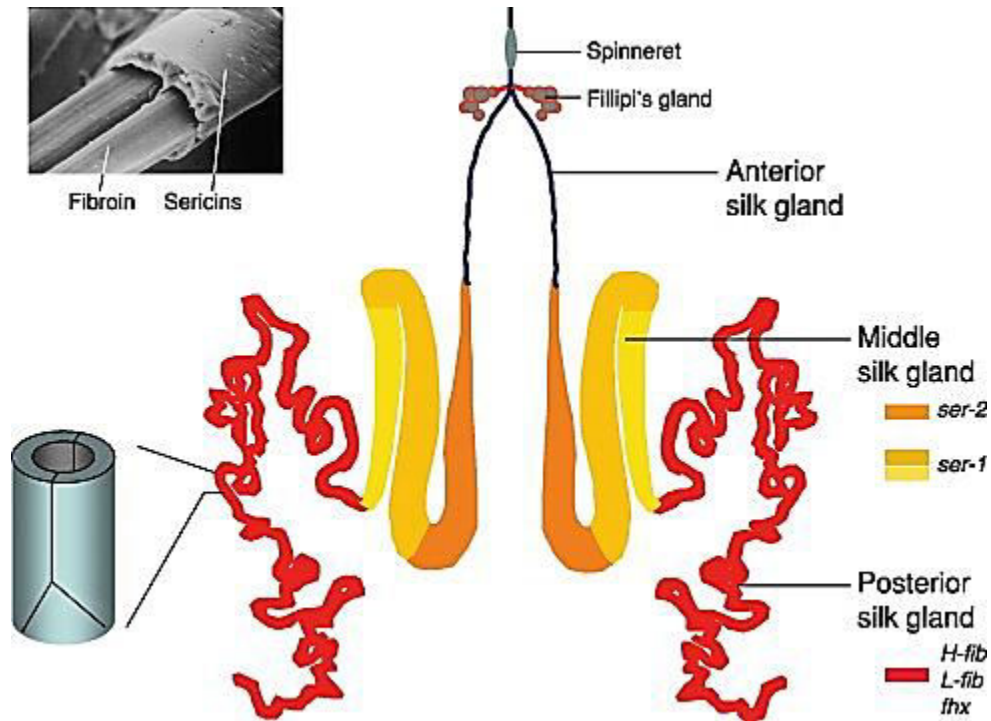


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Parts of Venom gland and use

- Poison gland
- Poison Duct
- Fang
- Absent in the family Uloboridae.
The **glands** are located either in the chelicerae or under the carapace.

Morphological Identifications of Model Arthropods



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Parts of Silk gland and use

- For capturing prey
- For food storage
- Travelling
- Ballooning

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Module# 93

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**Morphological
Identifications of
Model Arthropod**

Morphological Identifications of Model Arthropods

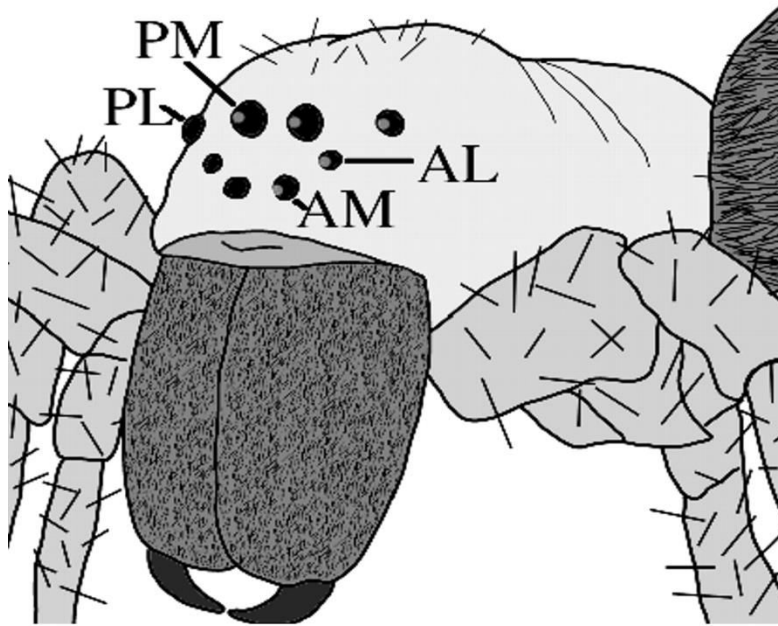


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Eyes in spiders

- Most spiders have **eight eyes**. Some species have **six or fewer eyes**, but they always come in an **even number**.
- Some species of spiders, such as those that live in **caves or under the soil**, have no eyes at all. Even those species with eight eyes don't usually see very well.

Morphological Identifications of Model Arthropods

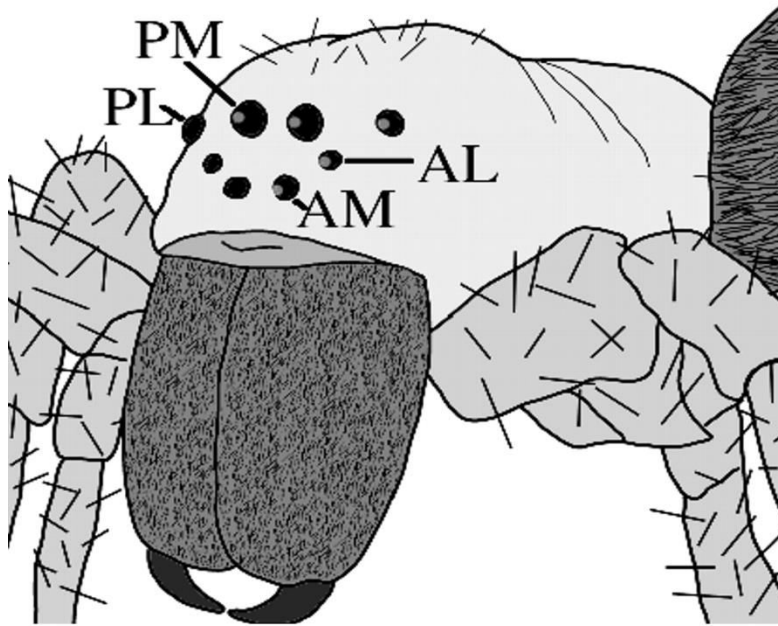


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Eyes in spiders

- Important Taxonomic character
- Eye arrangement in different families is unique

Morphological Identifications of Model Arthropods



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Eyes in spiders

- 99% of all spiders have 8 eyes
- 1% nearly all have 6, but there are a few exceptions.
- Varying number of eyes in the same spider family.
- For example, there are spiders in Cybaeidae that have eight eyes, six eyes, and two eyes

Morphological Identifications of Model Arthropods

Sensory structures

- Spiders, in fact, do taste, and also smell, through special **sensory organs** on their legs, as well as on their pedipalps.
- And they hear – or, more specifically, they sense vibrations – through hairs and tiny slits distributed over much of their body.
- A spider's sensitivity to vibrations is finely tuned.

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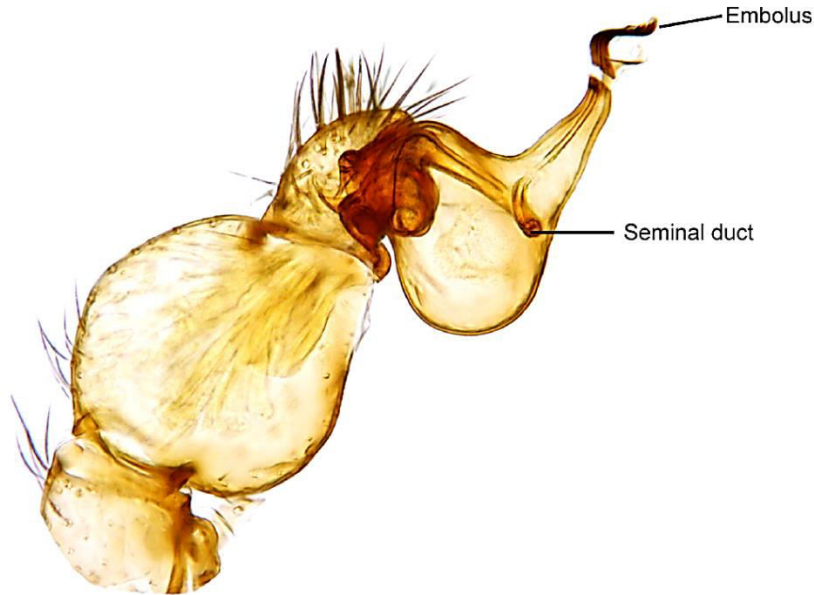
Principles of Systematics

Module# 94

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**Morphological
Identifications of
Model Arthropod**

Morphological Identifications of Model Arthropods

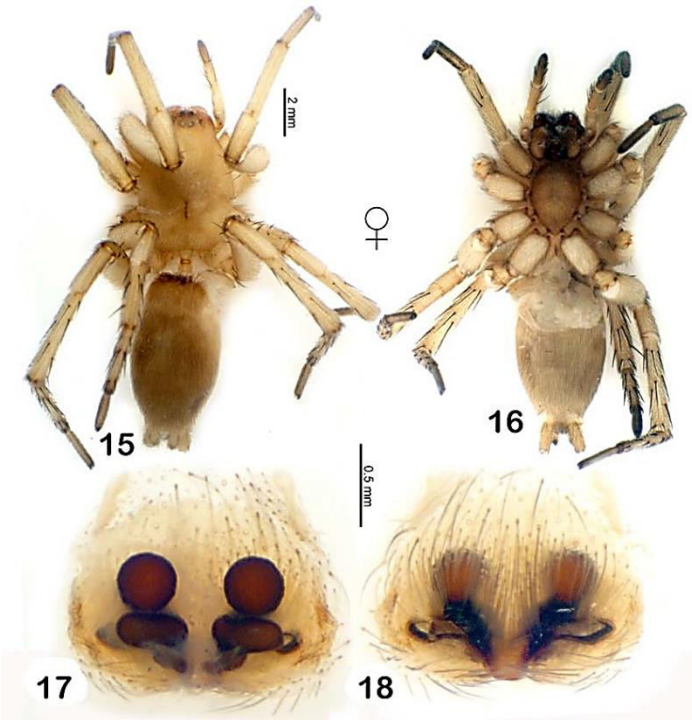


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Padipalp/Epigyne

- **Pedipalps** (commonly shortened to palps or palpi) are the second pair of appendages of chelicerates
- **Epigyne** or epigynum is the external genital structure of female spiders.

Morphological Identifications of Model Arthropods

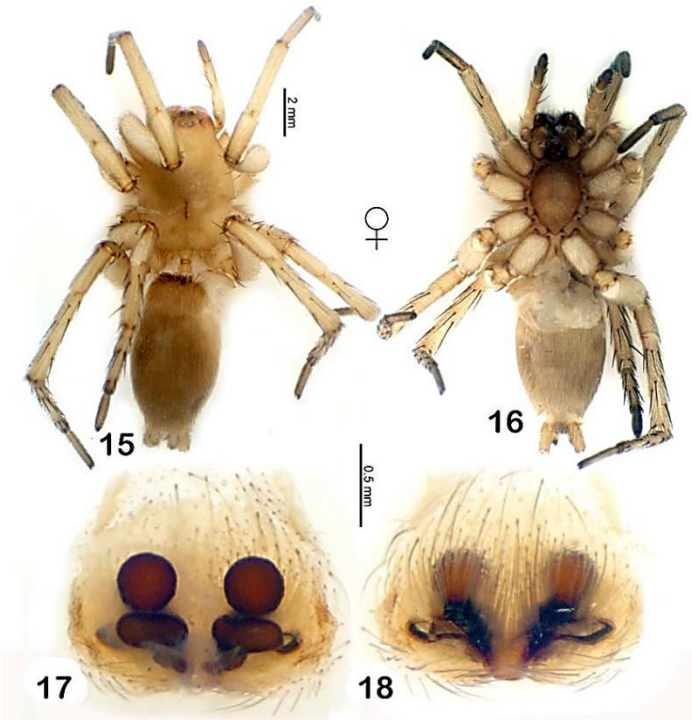


Padipalp/Epigyne

- As the epigyne varies greatly in form in different species, even in closely related ones.
- Distinctive characteristic for recognizing species.

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Morphological Identifications of Model Arthropods



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Reproduction in Spiders

- Male find a female
- A male spider deposits his sperm into a sperm web, holding it in his palps.
- Female spiders produce either one egg sac containing several to a thousand eggs or several egg sacs each with successively fewer eggs. Females of many species die after producing the last egg sac.

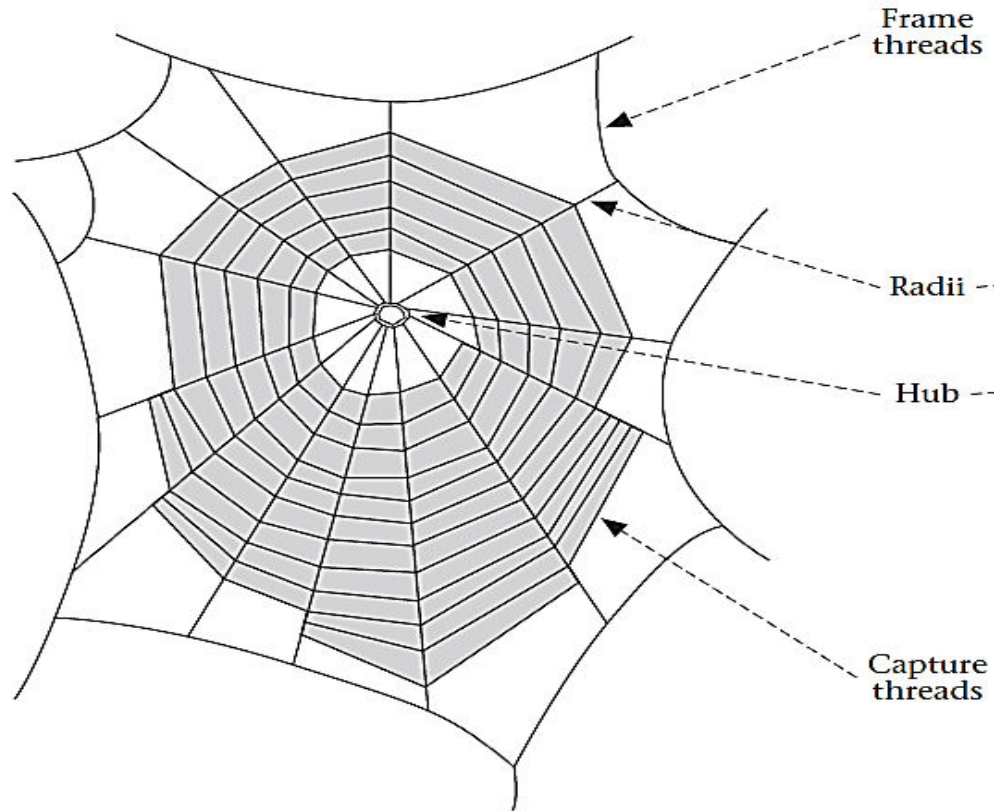
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Module# 95

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**Morphological
Identifications of
Model Arthropod**

Morphological Identifications of Model Arthropods

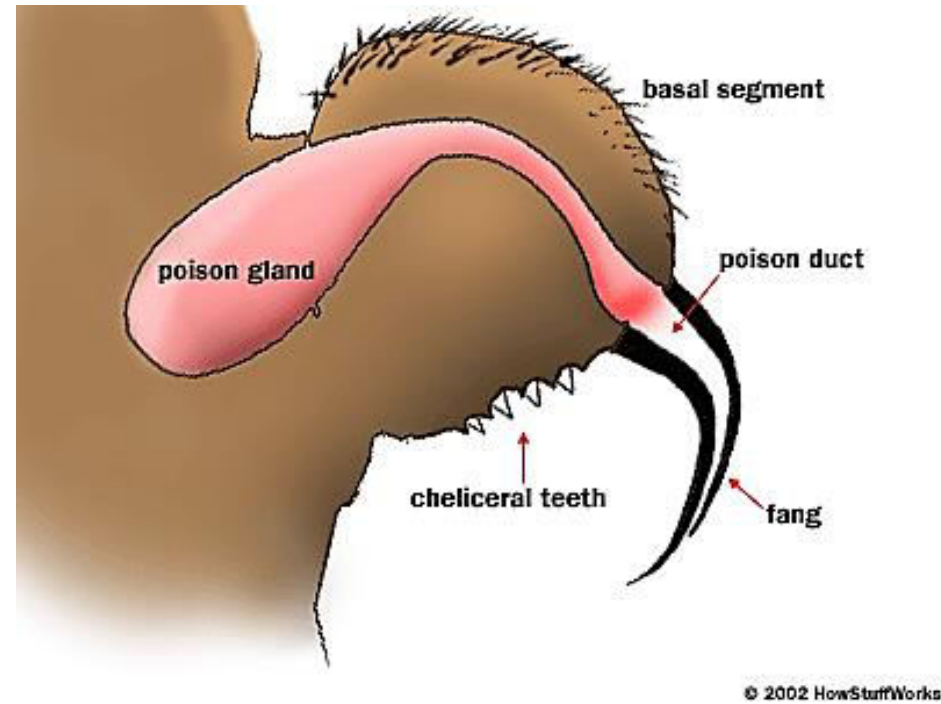


Spider web

- Orb-web spiders
- Hunters
- Design of web
- Web/prey size
- Wind director/prey density
- Repair/vibrations/self-eating/sticky nature/quality of silk

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925079&source=Inms&tbn=isch&sa=X&ved=2ahUKEwj89K-
Sjp_tAhU1rHEKHfiCALgQ_AUoAXoECBEQAw&biw=1360&bih=
657

Morphological Identifications of Model Arthropods



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Morphological Identifications of Model Arthropods

- 2nd part is abdomen
- No skeleton inside their bodies
- Hard outer shell called exoskeleton
- Molting
- Males are smaller than females

END

Principles of Systematics

Module# 96

Principles of Systematics

Identifications of Family Salticidae

Identification of Family Salticidae



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- As of 2019, it contained over 600 described genera
- Over 6000 described species.
- Largest family of spiders
- 13% of all species

Identification of Family Salticidae



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- Jumping spiders are generally recognized by their eye pattern.
- All jumping spiders have four pairs of eyes, with the anterior median pair being particularly large.
- Best vision among arthropods

Identification of Family Salticidae

- The legs are not covered with any very prominent spines.
- Their front four legs generally are larger than the hind four
- Not held in the outstretched-arms attitude characteristic of the Thomisidae.
- The body length from 1 to 25 mm (0.04–0.98 in).

Identification of Family Salticidae



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- Prior to jumping, the spider attaches a silk thread to the surface beneath it, so it can climb quickly back to its perch if needed.
- Jumping spiders hunt and feed on small insects.
- All are carnivorous, but a few species also eat pollen and nectar.

Identification of Family Salticidae



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- Female jumping spiders build a silk case around their eggs and often stand guard over them until they hatch.
- Young jumping spiders emerge from the egg sac looking like miniature versions of their parents.
- They molt and grow into adulthood.

Principles of Systematics

Module# 97

Principles of Systematics

Identifications of Family Salticidae

Identification of Family Salticidae

- Jumping spider can jump quite far, achieving distances more than 50 times its body length.
- Legs not strong or muscular in appearance.
- Salticids are able to quickly **increase the blood pressure** in their

Identification of Family Salticidae

- Some jumping spiders mimic other insects such as ants.
- Others are able to camouflage themselves to blend into their surroundings, helping them sneak up on prey.
- Salticids hunt diurnally as a rule, which is consistent with their

Identification of Family Salticidae



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- Although jumping spiders are generally carnivorous.
- Many species have been known to include nectars in their diets and one species, *Bagheera kiplingi* feeds primarily on plant matter

Identification of Family Salticidae



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- During courtship "dance" colored or iridescent parts of the body are displayed.
- In addition to the display of colors, jumping spiders perform complex sliding, vibrational, or zigzag movements to attract females.
- Many males have

Identification of Family Salticidae

- These amplified sounds presented to the females resemble buzzes or drum rolls.
- Species vary greatly in visual and vibratory components of courtship.
- If receptive to the male,
the female assumes a
passive, crouching
position.
- In some species, the

Identification of Family Salticidae



- The male then extends his front legs towards the female to touch her.
- If the female remains receptive, the male climbs on her back and inseminates her with his palps.

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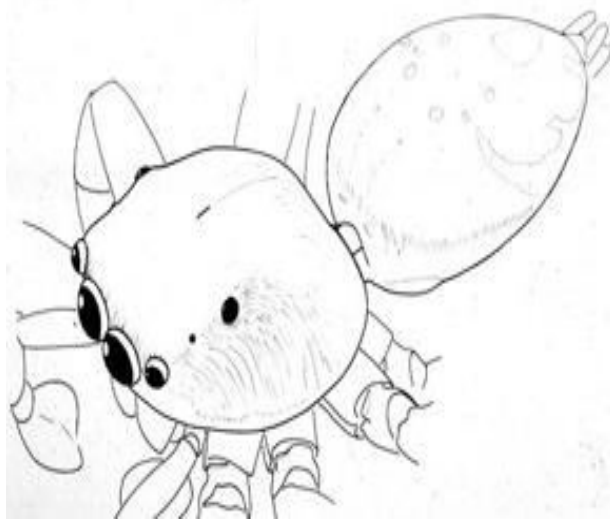
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Module# 98

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Identifications of Family Salticidae

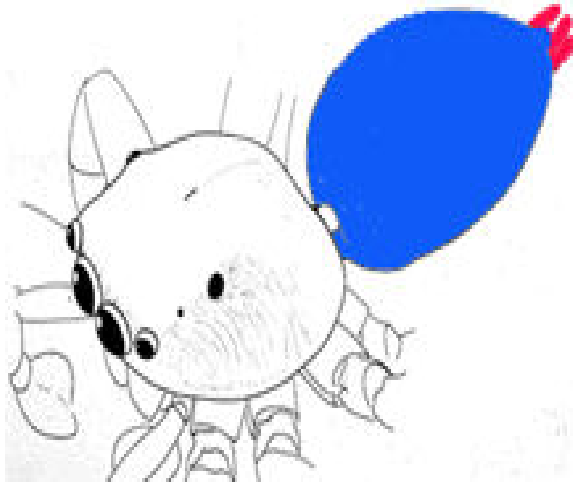
Identification of Family Salticidae



- Note that there are eight eyes, four in front and four on top.

http://tolweb.org/accessory/Jumping_Spider_External_Anatomy?acc_id=1952

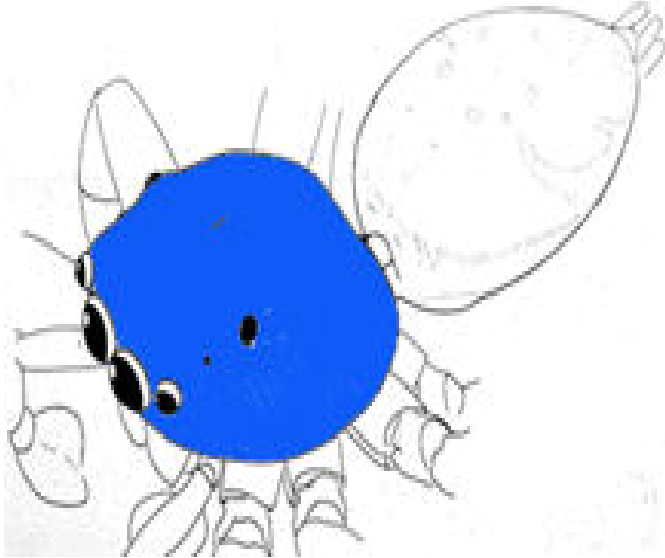
Identification of Family Salticidae



http://tolweb.org/accessory/Jumping_Spider_External_Anatomy?acc_id=1952

- The body is divided into two main parts, the **posterior** of which is the opisthosoma or abdomen, shown in blue:
- The spinnerets are shown in red. These are the silk-producing appendages.
- Jumping spiders, although they do not usually use silk to catch

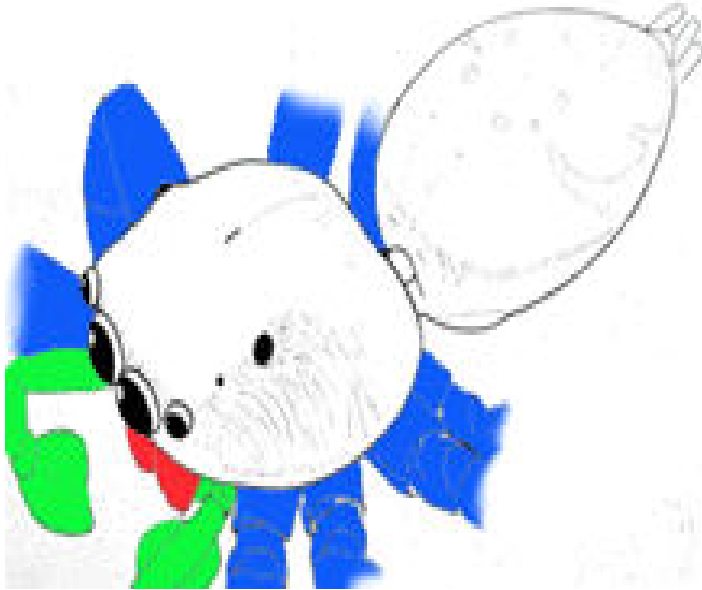
Identification of Family Salticidae



- The anterior body part is the prosoma or cephalothorax.
- It is covered above by a shell or carapace:

http://tolweb.org/accessory/Jumping_Spider_External_Anatomy?acc_id=1952

Identification of Family Salticidae



http://tolweb.org/accessory/Jumping_Spider_External_Anatomy?acc_id=1952

- Belonging to the prosoma are the main appendages:
- In this diagram the chelicerae (jaws with fangs) are shown in red, the palpi in green, and the legs in blue.

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**Identifications of
Family
Oxyopidae**

Identification of Family Oxyopidae



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- **Lynx spiders**
- The common name refers to their quickness and agility; lynx-like in nature.
- Family Oxyopidae
Thorell, 1870
- 9 genera worldwide,
419 species (WSC)

Identification of Family Oxyopidae



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- Oxyopid body length ranges from 3-25mm.
- Primarily tropical and subtropical in distribution, but also in temperate zones
- Primarily vegetation dwellers found on grasses, shrubs, and trees.

Identification of Family Oxyopidae



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- Feed on Insects and spiders
- Oxyopids are active hunters during both day and night.
- They use their vision to detect and legs to catch prey, sometimes jumping up to 2cm into the air to catch insects in flight

Identification of Family Oxyopidae



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- Some lynx's also capture prey by jumping from a stationary location much like a Salticid.
- An interesting member of *Tapinillus* is a web building, social lynx spider.
- Eight eyes

Identification of Family Oxyopidae



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- Most species make little use of webs
- Instead spending their lives as hunting spiders on plants.
- Many species frequently visit flowers in particular, ambushing pollinators, much as crab spiders do
- Most of them have

Identification of Family Oxyopidae



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- Oxyopidae in general rely on keen eyesight in stalking, chasing, or ambushing prey, and also in avoiding enemies.
- Active hunters/Chase prey
- Some members of the genus *Oxyopes* are abundant enough to be

Principles of Systematics

Module# 100

Principles of Systematics

**Identifications of
Family
Oxyopidae**

Identification of Family Oxyopidae

- High carapaces
- Distinctive eyes
- Numerous spines on their legs
- Bright colors in some species
- Some have cryptic coloration.

Identification of Family Oxyopidae



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- The abdomen is usually oval shaped and tapers to a point.
- The long legged hunting spiders are capable of running very fast and jump on their prey like a cat. This is why their common name is lynx spider.
- Although their eyesight is not as good as that of the jumping spiders

Identification of Family Oxyopidae



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- The male performs a dance before the female using its legs, abdomen and especially his palps.
- The female spider spins a cocoon that she attaches to a plant.
- She will guard the eggs until they hatch.
- Identified by the very

Identification of Family Oxyopidae

- Their abdomen is like a pencil ending in a point.
- Some oxyopids may produce several egg sacs, while others only one.
- Lynx's are very protective of their egg sacs, guarding them avidly.

END

- Many will not eat while

Principles of Systematics

Module# 101

Principles of Systematics

**Identifications of
Family
Oxyopidae**

Identification of Family Oxyopidae

- Generalist predator that feeds on a wide variety of insect prey, including several economically important insect pests.
- This family is one of the most abundant beneficial spider species in gardens, yards, and agricultural fields throughout world

Identification of Family Oxyopidae

- To capture prey, the striped lynx spider will sit and wait in grassy areas and herbaceous vegetation for small insects to land close enough for them to stalk and capture.
- This spider can detect odors given off by insect prey and will spend time in areas

Identification of Family Oxyopidae

- There is evidence that spiderlings can learn specific odors during foraging and retain specific prey preferences from these experiences later in life.
- Newly hatched spiderlings can feed on nectar, which can help them live longer and reduce cannibalism

Identification of Family Oxyopidae

- Other sources of sugars, including honeydew, may be potentially important to immature spiders
- The striped lynx spider is considered a major predator of bollworm and tobacco budworm larvae in cotton fields and the southern green stink bug in soybean fields

Identification of Family Oxyopidae

- The striped lynx spider is significantly affected by insecticide use that causes decreased survival and other sublethal effects, such as causing males to decrease the amount of time they spend courting and mating with females

END

- Predatory potential and

Principles of Systematics

Module# 102

Principles of Systematics

Identifications of Family Araneidae

Identification of Family Araneidae

- The family Araneidae is a member of the order Araneae (Foelix, 1982).
- The Araneidae include the spiders who spin the elaborate webs most often seen.
- Araneids are one of the most successful of the spider families; they have over 3,500 species

Identification of Family Araneidae

- The spiders vary greatly in size as well, some species of *Singa* are about 2 mm in length while some of the *Nephila* can grow to over 50 mm, even killing small birds.
- Because of this great variety of species a great variety of orb web designs exists.

Identification of Family Araneidae

- Eight eyes
- Eyes are arranged in two horizontal rows
- Males are usually smaller than females
- Spiders in the family Araneidae will demonstrate several different strategies of predation.

Identification of Family Araneidae

- Some will immediately wrap their prey in the web then bite
- Some wrap, move, then bite
- Some just seize their prey with their chelicerae, move them to the hub of the web, and then wrap up their prey.

Identification of Family Araneidae

- Spiders are found in woods, caves, grasses and almost any other habitat imaginable
- Being bitten by an orb weaver is very uncommon
- Only bite if they feel threatened and trapped without a chance for escape
- A bite is often compared to a bee sting, and for most people, is nothing serious. Should be observe in their environments

END

Principles of Systematics

Module# 103

Principles of Systematics

**Identifications of
Family
Araneidae**

Identification of Family Araneidae

- Present anywhere with abundant prey and structures to support the web
- Most noticeable in late summer in fall, when webs and adults reach their largest size.
- Food sources vary, but typically any small insects they catch in

Identification of Family Araneidae

- Some of the bigger orb weavers (Argiope genus) have been observed eating small frogs and humming birds (only if ensnared within the web).
- The adult males will wander in search of a mate, and as such, typically do not stay on a web for long, if they

Identification of Family Araneidae

- The most commonly noticed orb weaver is female, since she sits on her web, feeding and eventually waiting for the males to find her.
- Toward the end of fall, the females will lay their last clutch of eggs, and then die at the first frost.
- The eggs can survive

Identification of Family Araneidae

- The warmth of the spring will cause the eggs to mature, releasing a new generation of orb weavers.
- A single egg sac can contain upwards of several hundred eggs
- Juvenile orb weavers will spin "perfect" orb

Identification of Family Araneidae

- Orb weavers are very docile, non-aggressive spiders that will flee at the first sign of a threat (typically they will run or drop off the web).
- They **are not dangerous** to people & pets, and are actually quite beneficial because they will catch and eat a lot of pest-

Identification of Family Araneidae

- Feed on medium-sized insect in the web
- Spider bite the prey, wrap it in silk, wait for it to die, then begin to eat.
- As a first step in eating, the spider will literally vomit digestive fluid over the prey.
- The prey is chewed with the "jaws" (chelicerae), and the

Identification of Family Araneidae

- The spider repeats this process as often as necessary to digest, and ingest, all but the inedible hard parts.
- What is discarded afterwards is a small ball of residue.

END

Principles of Systematics

Module# 104

Principles of Systematics

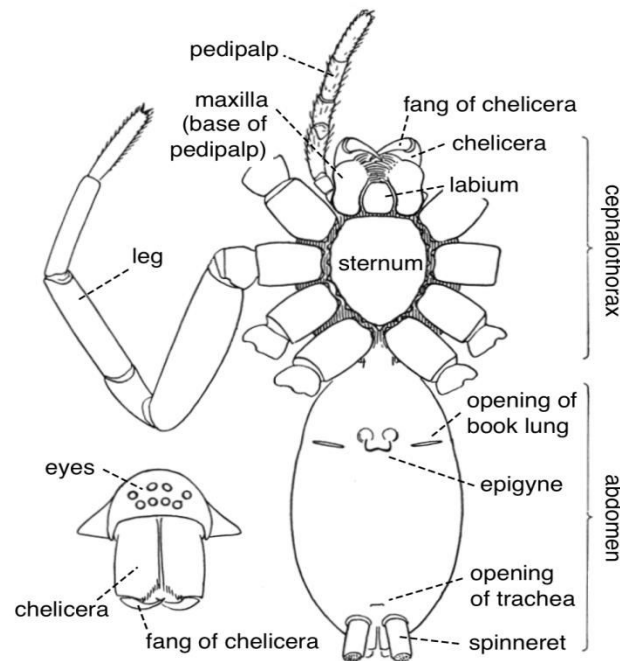
Identifications of Family Araneidae

Identification of Family Araneidae

- Eight eyes
- Three tarsal claws
- The eyes in 2 rows of 4 with the lateral eyes widely separated from the medial eyes.
- The carapace is often flat with a distinct head region.

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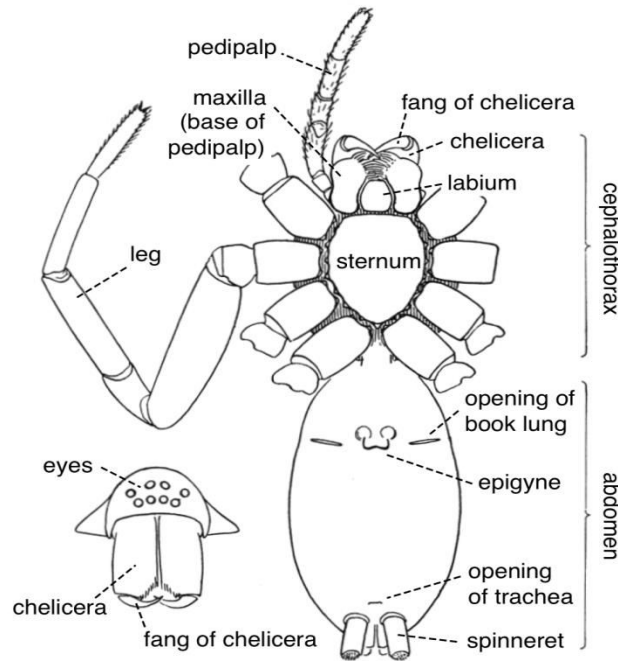
Identification of Family Araneidae



- Labium is wider than long and swollen at anterior edge
- Maxilla are widest anteriorly
- Legs with 3 claws and often furnished with strong spines and trichobothria on all segments except tarsi.

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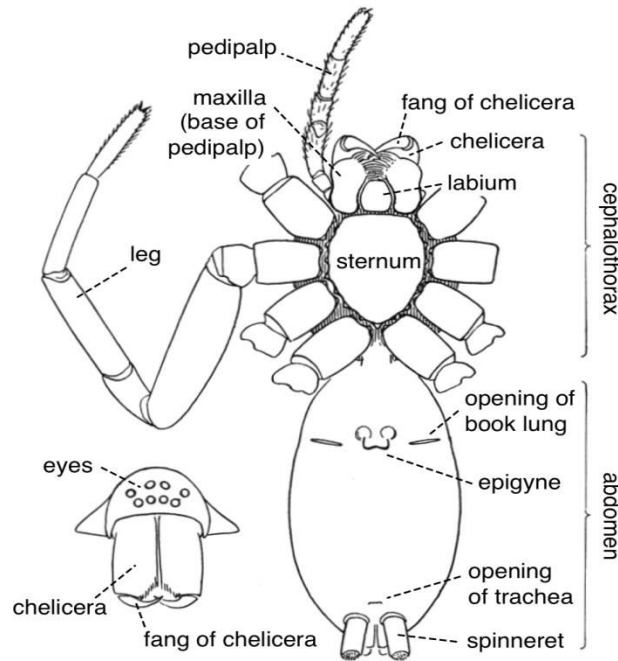
Identification of Family Araneidae



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- Often legs are clearly annulated.
- The abdomen is usually globose and nearly always with species-specific often bright colour patterns.
- The tracheal spiracle is situated close to spinnerets.

Identification of Family Araneidae



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- Neoscona
- Tetragnathidae
- Regular webs/Time of web making
- Repair/new web
- Common in agro-ecosystems
- Biocontrol agent

Principles of Systematics

Module# 105

Principles of Systematics

Identifications of Family Lycosidae

Identification of Family Lycosidae

- Wolf Spiders
- Active hunters
- Ground spiders
- Some species climb plant to chase prey
- Widespread from the Arctic to the Subtropics.

Identification of Family Lycosidae

- Preferred habitat varies between species but includes open grasslands, suburban lawns, deciduous forests, deserts, coastal dunes, sandy soil and wet terrain such as marshes and swamps

Identification of Family Lycosidae

- Preferred habitat varies between species but includes open grasslands, suburban lawns, deciduous forests, deserts, coastal dunes, sandy soil and wet terrain such as marshes and swamps
- Mainly feed on insects

Identification of Family Lycosidae



<https://bugguide.net/node/view/89936>

- Eight dark eyes of unequal size arranged in three rows, the first having four eyes.
- The abdomen and the cephalothorax are usually as long as wide.
- The long legs have three microscopic claws at each tip.

Identification of Family Lycosidae



<https://bugguide.net/node/view/89936>

- Nocturnal
- Their dark mottled colors help camouflage them among the leaves.
- Do not spin webs
- Some dig burrows in the ground, others make holes under rocks, and many have

Identification of Family Lycosidae



<https://bugguide.net/node/view/89936>

- They are robust and agile hunters with excellent eyesight.
- Do not spin webs
- Some dig burrows in the ground, others make holes under rocks, and many have no retreat at all.
- Live and hunt alone

Identification of Family Lycosidae



<https://bugguide.net/node/view/89936>

- The abdomen must be held in a raised position to keep the egg case from dragging on the ground.
- However, despite this handicap, they are still capable of hunting
- Another aspect unique to wolf spiders is their

Identification of Family Lycosidae



<https://bugguide.net/node/view/89936>

- Spiderlings emerge from their protective silken case
- Climbed up their mother's legs and crowd onto the dorsal side of her abdomen.
- The mother carries the spiderlings for several weeks before they are

Identification of Family Lycosidae



<https://bugguide.net/node/view/89936>

- Wolf spiders inject venom if continually provoked.
- Symptoms of their bites include swelling, mild pain, and itching.

American Wolf spider

- Australian wolf spiders have also been associated with

Principles of Systematics

Module# 106

Principles of Systematics

Identifications of Family Lycosidae

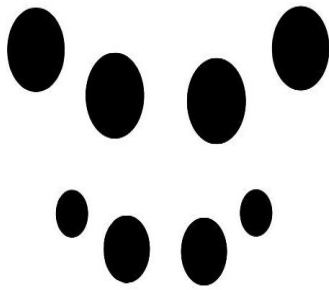
Identification of Family Lycosidae



<https://www.biodiversityexplorer.info/arachnids/spiders/lycosidae/index.htm>

- They are robust and agile hunters with excellent eyesight
- They live mostly in solitude and hunt alone
- Wolf spiders resemble Nursery Web Spiders (family Pisauridae), but wolf spiders carry their egg sacs by attaching them to their spinnerets, while the Pisauridae carry

Identification of Family Lycosidae



Pisauridae



Lycosiade

- Two of the wolf spider's eight eyes are large and prominent, which distinguishes them from the nursery web spiders whose eyes are all of roughly equal size.
- 10-35 mm size
- Unlike most other arachnids, which are generally blind or have poor vision, wolf spiders have **excellent eyesight**.

<https://bugguide.net/node/view/89936>

Identification of Family Lycosidae

- *Hogna* is the genus with the largest of the wolf spiders
- Found everywhere
- Body colour is brown and dull so inconspicuous on ground
- Collector notice them when spiders are disturbed by ground vibration

Identification of Family Lycosidae

- Do not spin web
- *Hippasa* and *Sosippus* are seen build funnel retreat, outside of which expended into sheet web
- These spiders wait for prey
- Prey into sheet/spiders come out/bite/kill/suck prey

Identification of Family Lycosidae

- No particular location of these webs on ground
- Danger/Extreme end of tube
- Morning travelling on vehicle/Train
- *Hippasa* webs look very conspicuous due to deposition of dew drops on them.

END

Principles of Systematics

Module# 107

Principles of Systematics

Identifications of Family Lycosidae

Identification of Family Lycosidae

- Members of genus *Lycosa* inhabit varied habitat
- Found on dry ground
- Under stones/Logs/ in crevices
- Seen in large numbers near heaps of cow dung, kept for drying

Identification of Family Lycosidae

Why near cow dung:

- For preying on insects like Diptera which come to lay their eggs in cow dung
- Other insects are attracted by smell.
- Seen at night chasing their prey and occasionally coming in human habitations for food search.

Identification of Family Lycosidae

- Some members of *Lycosa* prefer
- Cool, moist cavities under stone, where they lie in day time.
- *Paradosa* and *Aractosa* prefer humid atmosphere
- Frequently found at the edges of ponds, lakes, rivers etc.

Identification of Family Lycosidae

- *Paradosa* *birmanica*.
Paradosa *samatrana*
common near water
source.
- When disturb, they hide
under stones and soil
crevices
- Run on water surface
-
- Jump in water to chase prey

END

Principles of Systematics

Module# 108

Principles of Systematics

Identifications of Family Lycosidae

Identification of Family Lycosidae

- *Lycosids* mainly feed on insects
- Diptera
- Lepidoptera
- Hymeniptera
- Coleoptera
- Collembola

Identification of Family Lycosidae

- May consume young spiders of their own species
- As well as different species
- Cannibalistic/importance
- Feed at night
- Feeding mechanism