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We all keep them, we know they are hairy and that they are large. They are our beloved tarantulas, or spiders from the mygalomorph family Theraphosidae Thorell 1870. As is brought up many times from members of the arachnid community in Europe, a tarantula is a species of wolf spider from the araneomorph family Lycosidae Sundevall 1833. Well, this is true, however in many parts of the world a "tarantula" is a spider from the family Theraphosidae and it is in this context I shall refer to it here.

So, aside from knowing the above traits I mentioned before, what is it that makes tarantulas different from those other spiders commonly found in the garden? To understand this question fully is not as easy as one might think. Interesting enough, the fact that tarantulas are mostly large and hairy really doesn't mean much when trying to accurately determine if you have one. Please keep in mind there is every possibility that you might encounter words or terms you are not familiar with, if that is the case, please have a look at the end of the article, I'll cover anatomy in enough detail there. If that does not suffice please email me for more information. Please also keep in mind this article is not to aid in an easy identification of a spider, just a precise, yet extremely compressed, explanation as to what is a theraphosid/tarantula based on phylogenetic research.

So lets begin at the start, determining if your spider is from the well known group the tarantulas are found in, the infraorder Mygalomorphae. The mygalomorphs are known as a "primitive" group of spiders, often commonly called trapdoors, even though perhaps as little as 35% may in fact utilize a burrow door. Mygalomorphs differ in several obvious ways to other groups of spiders, they possess the unique character combination of labial and maxillary cuspules; a reduced number of palpal sclerites in the male bulb; a subsegmentation of the basal segment of the posterior lateral spinnerets; as well as sternal sigilla.

These are the characters that define the Mygalomorphae (as per Raven 1985), their unique combination present in most members of this group. But not all, they are known in phylogenetic terms as synapomorphic (see discussion at the end of the article). Due to evolution having its way (as it always does) some members of this group may have lost certain traits, or perhaps gained them. Bear with me because it may get worse, the most important of differences are often very subtle in this Infraorder, therefore accuracy is very important.....

The Mygalomorphae consists of fifteen families, they are:

**ANTRODIAETIDAE** Gertsch, 1940

**ATYPIDAE** Thorell, 1870

**MIGIDAE** Simon, 1892

**ACTINOPODIDAE** Simon, 1892

**CTENIZIDAE** Thorell, 1887

**IDIOPIDAE** Simon, 1892

**CYRTAUCHENIIDAE** Simon, 1892

**NEMESIIDAE** Simon, 1892

**BARYCHELIDAE** Simon, 1889

**THERAPHOSIDAE** Thorell, 1870

**PARATROPIDIDAE** Simon, 1889

**DIPLURIDAE** Simon, 1889

**HEXATHELIDAE** Simon, 1892

**MICROSTIGMATIDAE** Roewer, 1942

I'll break down their presumed differences that define their monophyly here:

**Theraphosidae:** The well developed claw tufts and leg scopulae, in combination, are considered the autapomorphies, in association with the distinct maxillary lobes (shared also with the Paratropididae). Apart from the Ischnocolinae (a taxonomically confusing theraphosid subfamily), the Theraphosidae have well-developed scopulae on all tarsi. That character is considered a synapomorphy for the theraphosids (this character is also found in the family Barychelidae). Apart from that, no other character unique to the Theraphosidae is known. Also meaning no single character is known to distinguish a theraphosid. See, not so easy.

**Paratropididae:** The scaly cuticle, the claw tufts are thin and weak if present at all, the unpaired claw is absent on legs III and IV; and the cuticle of legs is clad only in strong setae and lacking fine hairs present in the other Theraphosoidina (a phylogenetic clade or group consisting of the families Theraphosidae, Paratropididae and Barychelidae). Paratropids are easily ID'd in the field due to a covering of mud on their cuticle.

**Barychelidae:** Three characters are known. The absence of a third claw, biserially dentate paired claws in males and well developed scopulae on tarsi I and II (also seen in the Theraphosidae).

**Nemesiidae:** Biserially dentate paired claws, the paired claws are broad and the palpal claw has teeth on the promargin.

**Dipluridae:** The posterior lateral spinnerets are very elongate (but with a secondary reduction in genera *Microhexura* and possibly also the subfamily *Masteriinae*), wide separation of the posterior median spinnerets and the lowered caput plus the elevated thoracic region.

**Hexathelidae:** From what I understand there is only one autapomorphic character within the hexathelids- numerous labial cuspules. Other characters need to be assessed which can also be found in other families, just not with the combination the hexathelids possess (further research needed, sorry!).

**Mecicobothriidae:** Elongate cymbium that encloses the bulb, the pseudosegmented apical segment of the posterior lateral spinnerets and the longitudinal fovea, characters that, associated with the elevated eye tubercle, low caput, and modified maxillary lobes, are unique in the Mygalomorphae.

**Microstigmatidae:** The booklung apertures are round rather than oval, the thorax is elevated as high behind the fovea as the caput; the apical segments of the posterior lateral spinnerets are domed; and the cuticle is scaly, not smooth as in most mygales. The combined presence of those features is unique in the Microstigmatidae, although all other features are found in other mygale families.

**Migidae:** Along the length of the outer surface of the cheliceral fangs are two low keels or ridges near the fang edge.

**Actinopodidae:** The actinopodids share a number of unique characters or combinations. Most evident are the maxillae which are square or at least subquadrate, a very elongate labium and short diagonal facing fang.

**Ctenizidae:** The Ctenizidae are characterized by the presence of stout curved spines on the lateral faces of the anterior pairs of legs of females.

**Idiopidae:** Three unique characters. The distal sclerite of the male palpal bulb is open

along one side so that the second haematadocha extends down the the bulb almost to the embolus tip. Dimorphic lobes on the males cymbium is the second unique character. The third character is the unusual excavation on the prolateral palpal tibia of the males that is usually highlighted by a region of short thornlike spines.

Cyrtachenidae: Three characters are possible autapomorphies, but all are ambiguous. Scopulae are present on tarsi I and II of all cyrtachenid genera, except *Kiama* and *Rhytidicolus*. The second character is the presence of multilobular spermethecae. The third and weakest character is that the spination of tarsi I and II is reduced in all cyrtachenids, except *Rhytidicolus*.

Atypidae: The very elongate, curved maxillary lobes, the broad and obliquely truncated posterior median spinnerets, the rotated nature of the maxillae and the teeth on the paired and unpaired claws of males and females are raised on a common process giving the appearance of one multipectinate tooth.

Antrodiaetidae: The third claw lacks teeth. Second, the form of the fovea is distinct from that of atypids, all Rastelloidina, and all Tuberculotae, except for possibly the mecicobothriids and the diplurids *Microhexura* and *Carrai*.

What I've mentioned here are the general phylogenetically determined differences between the families of the Mygalomorphae, while these features alone could be used to key a spider to a family, it is more often a matter of eliminating families rather than pinpointing one immediately. The characters mentioned are phylogenetic synapomorphies and autapomorphies, key characters determined through exhaustive study via cladistics to display differences that best define the relationships of these groups. There are additionally, many more features used in specific combinations, if you will, to assist in keying a mygale down to family. As you can imagine, it's a complicated task and usually, only experts are up to it. However regarding the tarantulas it is fairly simple to pinpoint a spider down to one of several families closely related to the Theraphosidae, just by looking at an obvious character such as the tarsal scopula, or perhaps the claw tufts. From there a better look at other characters mentioned above would determine which family a spider is from, or not for that matter! Possible, but not easy.

## References

Platnick, N. I. 2005: The world spider catalog, version 5.5. American Museum of Natural History, online at <http://research.amnh.org/entomology/spiders/catalog/index.html>

Raven, R.J. 1985: The spider infraorder Mygalomorphae (Araneae): cladistics and systematics. Bull. Amer. Mus. Nat. Hist. 182: 1-180.

Labium, maxillae and anterior portion  
of the sternum, ventral view.





