A peer-reviewed version of this preprint was published in PeerJ on 31 October 2017.

View the peer-reviewed version (peerj.com/articles/3972), which is the preferred citable publication unless you specifically need to cite this preprint.

https://doi.org/10.7717/peerj.3972
The public reputation of spiders is that they are deadly poisonous, brown and nondescript, and hairy and ugly. There are tales describing how they lay eggs in human skin, frequent toilet seats in airports, and crawl into your mouth when you are sleeping. Misinformation about spiders in the popular media and on the World Wide Web is rampant, leading to distorted perceptions and negative feelings about spiders. Despite these negative feelings, however, spiders offer intrigue and mystery and can be used to effectively engage even arachnophobic individuals. As such, we contend that spider biology can be a convincing hook for engaging people of all ages in science-related learning. Towards this end, and in order to provide an enthusiastic knowledge base for spider-related learning, we provide essential information about spider biology followed by a compilation of Spider World Records. We choose a world-record style format, as it is known to be an effective tool of engaging youth and adults alike. We group our records into the categories of Taxonomy, Morphology/Physiology and Ecology/Behaviour. We further reported on curiosities and clarify fake news about these underappreciated animals. Our contribution is specifically aimed to raise public awareness and attractiveness of spiders, meanwhile providing the first official knowledge base for world spider records.
Spider World Records: a resource for using organismal biology as a hook for science learning

Stefano Mammola\textsuperscript{1,2,*}, Peter Michalik\textsuperscript{3,4}, Eileen Hebets\textsuperscript{5} & Marco Isaia\textsuperscript{1,2,**}

1. Laboratory of Terrestrial Ecosystems, Department of Life Sciences and Systems Biology, University of Torino, Torino, Italy
2. IUCN SSC Spider & Scorpion Specialist Group, Torino, Italy
3. Zoologisches Institut und Museum, Ernst-Moritz-Arndt-Universität, Greifswald, Germany
4. Research Associate, Division of Invertebrate Zoology, American Museum of Natural History, New York, USA
5. School of Biological Sciences, University of Nebraska-Lincoln, Lincoln, USA

* corresponding author: stefanomammola@gmail.com
** corresponding author: marco.isaia@unito.it

Keyword: Araneae, Extremes, Misinformation, Science education, Urban legends, Arachnophobia, Spider biology
Abstract

The public reputation of spiders is that they are deadly poisonous, brown and nondescript, and hairy and ugly. There are tales describing how they lay eggs in human skin, frequent toilet seats in airports, and crawl into your mouth when you are sleeping. Misinformation about spiders in the popular media and on the World Wide Web is rampant, leading to distorted perceptions and negative feelings about spiders. Despite these negative feelings, however, spiders offer intrigue and mystery and can be used to effectively engage even arachnophobic individuals. As such, we contend that spider biology can be a convincing hook for engaging people of all ages in science-related learning. Towards this end, and in order to provide an enthusiastic knowledge base for spider-related learning, we provide essential information about spider biology followed by a compilation of Spider World Records. We choose a world-record style format, as it is known to be an effective tool of engaging youth and adults alike. We group our records into the categories of Taxonomy, Morphology/Physiology and Ecology/Behaviour. We further reported on curiosities and clarify fake news about these underappreciated animals. Our contribution is specifically aimed to raise public awareness and attractiveness of spiders, meanwhile providing the first official knowledge base for world spider records.
INTRODUCTION

There exists a growing trend for youth and adults alike to be increasingly physically inactive and associated with this, to spend less and less time outdoors (Guthold et al., 2010; Hallal et al., 2012; Schaefer et al., 2014; Tremblay et al., 2014). As a result, in most urban settings—where the majority of human populations now reside (54% in 2014; United Nation, 2014)—people are losing their connection with their natural environment and with the organisms they share it with. Despite this, human curiosity and intrigue with animals persists, especially in youth. Some of the first words that children learn or noises children make are often animal-specific, as suggested by the multiple “first words” books for babies and toddlers (e.g., Priddy, 2004; Machell, 2005). Similarly, animal-related children’s books presumably facilitate early reading due in large part to their ability to retain a child’s interest and attention—see the multiple Eric Carle books on animals, e.g. "The Very Hungry Caterpillar", "The Very Busy Spider", "Brown Bear, Brown Bear, What do you See?". Even among adults, animals are a useful tool for attracting attention, as evidenced by the numerous viral videos focused on cats, dogs, and other animals (e.g. Try to stay SERIOUS – The most popular CAT videos had 17,465,589 views on YouTube as of June 2 2017). Following from these observations, we propose that organismal biology can be an extraordinarily useful tool for engaging people of all ages in science-related learning. We strongly maintain, however, that the organism-specific toolset needs to be based upon accurate scientific data.

Though an individual's daily experience(s) with their environment and the organisms within may be decreasing (on average), the daily accessibility of "science"-
related facts and stories is ever-increasing. The quality of these “facts” and stories, however, can be quite variable. The (often) readily and easily accessible internet as well as associated social media venues enable the rapid spread of evidence-based information. While such easy access to science and related stories can be helpful for increasing interest and enthusiasm for science, if the information is not accurate it can do far more harm than good. For organisms that are particularly effective at capturing the public’s attention and imagination —e.g. spiders and their relatives—misinformation is unfortunately quite common.

Spiders, and arachnids in general, are animals that can simultaneously instill both terror and intrigue, making it extraordinarily easy to engage even the most biophobic individual into arachnid-based discussions and activities. Arachnids tend to generate polar opposite reactions from people, scientists and non-scientists alike. They are either loved or feared (and “hated”), with few individuals feeling ambivalence towards them (Hillyard, 1994; Mulkens, de Jong & Merckelbach, 1996; Woody, McLean & Klassen, 2005; Rinck & Becker, 2007; Knight, 2008). Even the fear of spiders though can enhance science learning, as spider-phobic individuals in particular have been shown to demonstrate preferential recall to spider-relevant information (Smith-Janik & Teachman, 2008). Because arachnids are able to evoke strong reactions, they provide an excellent opportunity for engaging youth in science learning.

In addition to leveraging a charismatic group of organisms like arachnids for science engagement, we take advantage of the reality that youth often tend to think in extremes. Indeed, for people of all ages, the entire range of superlatives exerts a powerful spell on human curiosity. Scientists are no exception, as they are similarly
attracted by formidable species and extreme biological discoveries (e.g., Watson & Walker, 2004; Glaw et al., 2012; Sendra & Reboleira, 2012; Wilson et al., 2012; Andersen et al., 2015; Klug et al., 2015). Additionally, the excitement of scientists often coincides with the public’s interest, as evidenced by a recent paper by McClain et al. (2015) focusing on the largest-sized species occurring in the ocean. In only a few months, this paper received impressive attention from scientists as well as the media, both in term of visualizations, citations and altmetric score—i.e. a measure of the attention that research outputs receive online in social media, traditional media and reference managers (999 Altmetric score as of 2 June, 2017).

To facilitate the use of spider biology for increasing public engagement and interest in science, we assemble data from peer-reviewed scientific literature about spider records and spider-related curiosities. We present our findings in a world-record style format, as this is known to be an effective means of engaging youth and adults alike. The Guinness World Records' website (www.guinnessworldrecords.com), for example, reports an impressive variety of records from very ordinary ones such as the highest peak or the deeper abyss to weird and peculiar ones such as the heaviest birth or the fastest delivery of a cricket ball. Numerous spider-related world records have similarly already been claimed in peer-review scientific papers (e.g., Jäger, 2001; Kunter & Coddington, 2009; Agnarsson, Kuntner & Blackledge, 2010; Lepore et al., 2012; Smithers & Whitehouse, 2016). Officially, spiders hold 51 world records—although only 12 of them are true biological records (Guinness World Records, 2017a–l) and the remaining are related to Spider-Man and other non-biological topics. Here, we build off of records in the scientific literature to provide an accessible resource for what
we consider the most interesting and exciting spider world records. We do not intend this to be an exhaustive list, but more of a “highlights”. This information will not only be useful for educators aiming to increasing interest and enthusiasm for animals, but also for scientists studying arachnids (arachnologists), as a source of ideas for future research avenues.

We begin our synthesis with a brief introduction to spiders. Next, we present the Spider World Records in four distinct sections. I - Taxonomy, arachnology and arachnologists: encompasses records related to the history of the science of arachnology, and the taxonomy and nomenclature of living and fossil spiders. II - Morphology and physiology: includes records related to spider morphology and physiology (the latter referring mostly to venom and silk). III - Ecology and behaviour: comprises records related to the behaviour of spiders (e.g. courtship, hunting strategies), to their ecology and habitat preferences, and to their conservation status and rarity. IV – Curiosities: includes a few records that are not strictly biological.

A BRIEF INTRODUCTION TO SPIDERS

Spiders (Araneae) belong to the class Arachnida together with ten other orders: scorpions (Scorpiones), harvestmen (Opiliones), pseudoscorpions (Pseudoscorpionida), windscorpions (Solifugae), mites and ticks (“Acari”), micro-whip scorpions (Palpigradi), hooded tickspiders (Ricinulei), tailless whipscorpions (Amblypygi), and shorttailed whipscorpions and whipscorpions (Uropygi)—common names based on Breene et al. (2003). All spiders are hypothesized to have descended from a common ancestor (i.e. they represent a monophyletic group; Garrison et al., 2016; Wheeler et al., 2016) and
the group encompasses more than 46,700 extant species, distributed among 4,059
genera and 113 families (WSC, 2017). They are considered to be one of the most
successful groups of organism in terms of their long evolutionary history and diverse
ecological impacts—they are distributed in virtually all terrestrial ecosystems and play a
key role as generalist carnivorous predators (Turnbull, 1973; Foelix, 2011). Indeed, a
recent study by Nyffeler & Birkhofer (2017) estimated that the global spider community
consumes between 400 and 800 million tons of prey annually—an enormous amount
and a finding which drew impressive media attention around the world, resulting in
headlines such as “Spiders outdo humans and whales as they chop through 800 million
tons of prey a year” in the UK based newspaper “The Telegraph”.

In terms of body form (i.e. anatomy), a spider is divided in two parts: (i) the
prosoma and (ii) the opisthosoma. These two body parts (i.e. tagma) are joined by a
narrow stalk called a pedicel. The prosoma is relatively hard and carries six pair of
appendages: the chelicerae, the pedipalps, and four pair of walking legs. The chelicerae
function in spider feeding and venom injection takes place through their fangs. So far,
only two spider families, hackled orbweavers (Uloboridae) and Holarchaeidae, are
known to lack venom glands connected to their fangs. Just behind the chelicerae are
the pedipalps—the first pair of appendages behind the mouth. The pedipalps of adult
males are modified into copulatory organs and facilitate the transfer of sperm to mature
females. The four pair of walking legs are located just behind the pedipalps. All walking
legs originate from the first body part, or prosoma, unlike the way they are sometimes
portrayed in spider merchandise—e.g. attached to a single body part or inaccurately
originating from the second body part. In addition to the six pair of appendages, the
eyes are also located on the prosoma. Most spiders possess eight eyes, but in some species this number may be reduced or eyes may be entirely lacking (see Spider World Records).

The second body part—the opisthosoma or abdomen—is soft, expandable, and shows high variation in shape and pattern among species (Figure 1). The abdomen of spiders houses the respiratory structures, the heart, most of the digestive system, the excretory system, silk producing system, and the reproductive system. In addition to these internal systems, the genital openings are located on the underside (i.e. ventral surface) and are barely visible in mature males and immatures. In females, the genital opening can be covered by a hardened (i.e. sclerotized) structure, the so-called epigyne. At the back end (i.e. posterior) of the abdomen most spiders have their spinnerets, which are used for producing silk. Depending upon the species, a single spider can possess up to eight different silk glands, each extruding a distinct type of silk. Silk is deployed in almost every aspect of a spider's life—from web construction to egg protection (Foelix, 2011).

Understanding the basic body form of spiders empowers students of all ages to acquaint themselves with biological diversity that they encounter daily. For example, it enables them to readily distinguish insects (three body parts and six legs) from arachnids (two body parts and eight legs). It also provides them a foundation from which they can ask more in-depth questions and embark on their own research to answer newly inspired curiosities. How is a spider heart similar to and/or different from a human heart? What does spider excreta look like? Why? Do spiders have blood? How exactly do male spiders use their pedipalps to transfer sperm to female spiders? How do
spiders eat? Do spiders take bites out of prey like many other predators? Are there any spiders that live and work together peacefully?

In addition to providing an increased awareness of the basic form and function of these abundant and omnipresent animals to which all youth can relate (i.e. spiders), our goal is to share some incredible facts and stories relating to both spiders and the scientists who study them (i.e. arachnologists). In the next section, we highlight select spider world records as a means of demonstrating how spider natural history and behavior can inspire the learning of physics (through properties of silk or walking upside down), chemistry (through studies of venom or digestive enzymes), agriculture and food (through the use of spiders as biocontrol agents), and many more topics that relate directly to educational learning objectives—e.g. the Next Generation Science Standards in the USA (https://www.nextgenscience.org/). More specifically, we have next compiled a series of spider world records that we hope will serve as entry points into some of the incredible stories that spiders, and the scientists who study them, have to offer.
METHODS

We began the compilation of the Spider World Records by verifying and including all available biological records on spiders reported in the Guinness World Record website (see Guinness World Records, 2017a–l). Wherever we observed discrepancies between the information found in the official Guinness World Record and those found in the scientific literature, we detailed it in the explanation of the relative record (see, e.g., "Smallest adult male spider"). A thorough search of the available literature was than conducted to track further documentations of extremes in spider biology. This included finding peer-reviewed international articles by means of literature searches engines—Web of Sciences, Google Scholar, etc.—but also personal communications with arachnologists and other scientists conducting research on the topics under evaluation.

Most records related to taxonomy were compiled exploring the online catalog of spiders (World Spider Catalog—WSC, 2017), including updated species counts and all literature on spider taxonomy from 1757 to date.
We have organized our compiled world records into four general categories: I. Taxonomy, arachnology, and arachnologists; II. Morphology and physiology; III. Ecology and behaviour; and IV. Curiosities.

I. Taxonomy, arachnology and arachnologists

(a) Largest spider family – Jumping spiders, *Family Saltidicae*. The largest spider family is Salticidae with 5,950 species currently described, distributed in 625 genera (WSC, 2017; see also Guinness World Records, 2017a).

(b) Smallest spider family – Shared by three families. The smallest families of spiders are Huttoniidae, Sinopimoidae, and Trogloraptoridae, all of which include one single species—*Huttonia palpimanoides*, *Sinopimoa bicolor*, and *Trogloraptor marchingtoni*, respectively. *H. palpimanoides* is endemic to New Zealand (Paquin, Vink & Dupéré, 2010), *S. bicolor* is restricted to rainforest in China (Li & Wunderlich, 2008), while *T. marchingtoni* was discovered in few caves in southwestern Oregon, USA (Griswold, Audisio & Ledford, 2012).

(c) First listed spider alphabetically – *Abacoproeces molestus* Thaler (*Linyphiidae*). *Abacoproeces molestus* is the first spider species listed alphabetically in the World Spider Catalog (WSC, 2017), while *Zyuzicosa zeravshanica* Logunov (Lycosidae) is the last.

(d) Longest scientific name – *Acanthoscurria hirsutissimasterni* Schmidt (*Theraphosidae*). This spider’s name has thirty-three characters. Names with thirty-two characters are more common, such as *Allocubionoides*
wolchulsanensis (Linyphiidae), Anophthalmoonops thoracotermitis (Oonopidae),
Mecysmauchenioides nordenskjoldi (Mecysmaucheniidae), Megalephyphantes
pseudocollinus (Linyphiidae), and Troglohyphantes typhlonetiformis
(Linyphiidae).

(e) Shortest scientific name – Gea eff Levi (Araneidae). This spider has only six
characters in its name. Names with seven characters are found in the genus Ero
(Mimetidae) and Copa (Corinnidae).

(f) First described fossil – An amber spider. Although the earliest report of a fossil
spider ("Spinnenstein/Sternstein/Siegstein") in European literature can be found
in Schwenckfeld (1603), Kundmann (1737: plate XII, Fig. 13) illustrated and
described the first amber spider. See Selden & Penney (2010) for further details.

(g) First spider(s) ever described in binomial nomenclature – Shared by 68 species.
The record for the first spider ever described in binomial nomenclature is shared
by 68 species described by Carl Alexander Clerck in 1757 (see WSC, 2017).
Actually, some of them are nowadays considered nomen dubia or have been
synonymized, leaving the total to 53 currently valid species (see WSC, 2017).
These species own a second record, being among the first animals ever
described using the binomial system of nomenclature (see also "First
arachnologist in history"). (Figure 2a)

(h) First arachnologist in history – Carl Alexander Clerck (1709–1865). Although
reports about spiders can be found in very old writings such as those of Aristotle
and Pliny, according to Bonnet (1955) the father of the modern arachnology was
Carl Alexander Clerck, author of the first book on spiders using the binomial
system of nomenclature, *Svenska Spindlar* (Clerck, 1757). His book was published only one year before the seminal "*Systema Naturae*" of Carl von Linné (Linnaeus, 1758), which marks the beginning of the binomial system of nomenclature. In order to consider Clerck’s spider descriptions valid under the system of zoological nomenclature, his work is deemed to be published on 1 January 1758, which is regulated in the International Code of Zoological Nomenclature (Article 3.1; ICZN 1999).

(i) *Most prolific arachnologist – Eugène Simon (1848-1924).* In terms of publications, the most prolific arachnologist was the French naturalist Eugène Louis Simon. Over his life, he authored more than 270 spider-related scientific works, and he described (or revised the status) of 5,633 species—although some of them were later synonymized or considered *nomen dubia* (WSC, 2017). (Figure 2b)

(j) *First catalogue of spiders – 1942.* Carl Friedrich Roewer (1881–1963) own the record for publishing the first catalogue of spiders, i.e. the first volume of "*Katalog der Araneae von 1758 bis 1940*", published in 1942. It included the list of spider species, synonyms and references published from 1758 to 1940. This remarkable publication provided the baseline, together with the competing catalog of Bonnet (1955, 1956, 1957, 1958, 1959) for further implementations (e.g., Brignoli, 1983; Platnick, 1989; 1993; 1998), up to the complete online taxonomic catalogues of spiders developed in the last decades (Platnick, 2000–2014; WSC, 2017; see also World Spider Catalog Archive, 2014–2017).
(k) Longest publication on spiders – Bibliographia Araneorum. With 6,481 pages, the longest publication on spiders is the *Bibliographia Araneorum* (Bonnet, 1955, 1956, 1957, 1958, 1959), representing the culmination of 40 years of work of the arachnologist Pierre Bonnet (1897–1990).

(l) First congress of Arachnology – Germany, 1960. The first scientific arachnological meeting was held at the University of Bonn (Germany) in 1960. It was organized by Ernst Kullmann (1931–1996). According to the congress photo, at least 18 arachnologists attended this meeting (Kraus, 1999). (Figure 2c)

(m) Most attendees at a congress of arachnology – 365. With 365 participants, the 20th International Congress of Arachnology (2–9 July 2016, Golden, Colorado, USA) was the largest arachnological congress ever held. It was organized by Paula Cushing (Denver, USA). (Figure 2d)

(n) Oldest fossil spider – ~300 MYA. The oldest known true spiders date back to the Carboniferous age, around 300 Myr ago. Most likely, specimens of *Palaeothele montceauensis* (Selden) (Mesothelae) are the earliest described fossil species, from the Upper Carboniferous (Stephanian) of Montceau-les-Mines, France (Selden, 1996).

(o) Oldest fossil spider in amber – 125–135 MYA. The oldest described amber spider (125–135 Myr ago) is an undetermined Linyphiinae, preserved in a small piece of Lebanese amber (Penney & Selden, 2002; Guinness World Records, 2017k). This fossil specimen is also the oldest linyphiid spider known to date.

(p) Oldest recorded spider silk – 140 MYA. Although spiders are known to produce silk since the Mid-Devonian (410 Myr ago), the oldest spider silk record dates
back to the Earliest Cretaceous (~140 Myr ago). The silk is preserved in a piece
of amber, which was found within alluvial soils of the Ashdown Formation,
Hastings (Brasier, Cotton & Yenney, 2009; Guinness World Records, 2017i).

(q) Oldest web with entrapped prey – 110MYA. The oldest web with entrapped prey
is preserved in a cylindrical stalactitic mass of amber, dating back to Early
Cretaceous (around 110 Myr ago). The fossil sample was discovered in San Just
(Spain), and contains 26 strands of sticky silk entrapping a beetle, a parasitic
wasp, a mite and a fly (Peñalver, Grimaldi & Delclòs, 2006; Guinness World
Records, 2017i).

(r) First entire genome sequenced – 2014. In 2014, the entire genome—the
complete set of genetic material in an organism—of the African social velvet
spider Stegodyphus mimosarum Pavesi (Eresidae) was sequenced for the first
time by Sanggaard et al. (2014). In the same study, the author published the first
draft assembly of the genome of the mygalomorph spider Acanthoscurria
geniculata (C.L. Koch) (Theraphosidae). The estimate genome size for S.
mimosarum is 2.55 GB, whereas for A. geniculata is 6.5 GB.
II. Morphology and physiology

(a) *Largest fossil spider* – Mongolarachne jurassica (*Selden, Shih & Ren* (*Mongolarachnidae*). With a body length of ~2.5 cm and first legs of nearly 6 cm, *M. jurassica* from Middle Jurassic (~165 Myr ago) found in the strata of Daohugou in Inner Mongolia is the largest known fossil spider know to date (*Selden, Shih & Ren*, 2011, 2013).

(b) *Largest living spiders* – Theraphosa blondi (*Latreille*) (*Theraphosidae*) and Heteropoda maxima Jäger (*Sparassidae*). The Goliath bird-eater, *T. blondi* is possibly the largest known spider by mass. According to Guinness World Records (2017b), a single reared individual reached a leg span of 28 cm and a weight of 170 g. *H. maxima* (*Sparassidae*), discovered from caves in Laos, is possibly the largest known spider by leg span—up to 30 cm; Jäger (2001). With a total body length up to 39.7 mm and a leg span of over 10 cm, females of *Nephila komaci* Kuntner & Coddington (*Nephilidae*) are the largest known orb-weaver spiders (*Kuntner & Coddington*, 2009). (Figure 3a, 3b)

(c) *Smallest adult female spider* – Anapistula ataecina Cardoso & Scharff (*Symphytognathidae*). The record for the smallest adult female spider goes to one specimen of the type series of *A. ataecina*, with a body length of 0.43 mm. The species was discovered in the Frade cave system (Portugal); the male is still unknown (*Cardoso & Scharff*, 2009).
(d) *Smallest adult male spider* – *Patu digua* Forster & Platnick (*Symphytognathidae*).

With a total length of about 0.37 mm (not including the chelicerae), *P. digua* is the smallest adult male spider ever described (Forster & Platnick, 1977). Instead, the Guinness World Records (2017d) reports the congeneric *P. marplesi* Forster as the smallest spider (0.3 mm). However, according to the original description, the male holotype of *P. marplesi* has a prosoma length of 0.22 mm, and an abdomen of 0.21 mm (Forster, 1959)—in contrast to 0.15 mm and 0.25 mm (prosoma and abdomen, respectively) in the holotype of *P. digua* (Forster & Platnick, 1977). Intra-specific variability in the body size is possibly at the base of this discrepancy. It is also worth noticing, that there are other spiders of similar size for which only the female is described (WSC, 2017)—see, e.g., "Smallest adult female spider".

(e) *Most legs – Ten.* In insects, the expression domain of the Hox gene Antennapedia (Antp) controls the expression of legs. Khadjeh et al. (2012) used RNA inference to down-regulate this gene in the spider *Achaearanea tepidariorum* (C. L. Koch) (Araneae), giving rise to a 10-legged phenotype, which is, therefore, the spider with the highest number of legs.

(f) *Best diurnal eyesight – Jumping spiders and wolf spiders.* Despite the majority of spiders possess eight eyes, most species are known to have poor eyesight (Foelix, 2011). This is especially true in web-spinning spiders, relying mostly on vibrational cues for foraging and mating, rather than on visual perception. Two notable exceptions are found in jumping spiders (Salticidae) and wolf spiders (Lycosidae), being mostly diurnal active ground dwellers. Spiders from both
families possess enlarged eyes and a pronounced visual acuity, used in foraging and mating.

(g) **Best nocturnal eyesight – Net-casting spiders, family Deinopidae.** The best nocturnal eyesight documented to date is found in the net-casting spiders (*Deinopis* spp.). They possess enlarged posterior median eyes that are reported to be 2,000 times more sensitive to light than human eyes, thus appearing physiologically designed for detecting movement at night (Blest & Land, 1977). It has been suggested that these visual cues are fundamental to net-casting spiders for capturing cursorial prey items (Stafstrom & Hebets, 2016). (Figure 3c)

(h) **Highest number of eyes – Eight.** The highest number of eyes in spider is eight, as found in countless species. An anecdotic record is held by *Troglohyphantes polyophthalmus* Joseph (Linyphiidae), which possesses sixteen eyes according to the original description—as emphasized by the specific epithet (Joseph, 1881). However, this species was described on a specimen killed in the early stage of moulting, so that the number of eyes appeared doubled.

(i) **Least number of eyes – Zero.** The first eyeless spider ever described is *Stalita taenaria* Schiödte (Dysderidae) from the Postojnska cave in Slovenia (Schiödte, 1847). *S. taenaria* shares the record for the less number of eyes (zero) with more than 1,000 anophthalmic spider species inhabiting caves and other subterranean habitats around the world (Mammola & Isaia, 2017). (Figure 3d)

(j) **Largest web (area) – 2.8 meters square.** The Darwin’s bark spider, *Caerostris darwini* Kuntner & Agnarsson (Araneidae) spins a web whose surface ranges from 900 to 28,000 cm². The largest measured web in this species was about 2.8
m², being therefore the largest orb web ever measured (Kuntner & Agnarsson, 2010; see also Guinness World Records, 2017f). Prior to the discovery of this species, the record was held by representatives of the genus *Nephila* (Nephilidae), capable to spun orb webs of more than 1 m diameter (Kuntner & Coddington, 2009). (Figure 3e, 3f)

(k) **Largest web (dimension) – 25 meters.** The anchor lines of the web of Darwin's bark spider, *Caerostris darwini* Kuntner & Agnarsson (Araneidae), are capable of bridging over 25 m, being the longest web among all spiders (Kuntner & Agnarsson, 2010; Gregorič et al., 2011; see also Guinness World Records, 2017g).

(l) **Strongest silk – 520 MJ/m³.** The Darwin's bark spider, *Caerostris darwini* Kuntner & Agnarsson (Araneidae), produces the toughest known spider silk—see also "Largest web". Tensile testing has shown that certain threads may reach the toughness of 520 MJ/m³ (average= 350 MJ/m³). The silk of *C. darwini* is therefore over 10 times tougher than Kevlar® (Agnarsson, Kuntner & Blackledge, 2010; see also Guinness World Records, 2017e). (Figure 3e)

(m) **Strongest cocoon silk - Maximum stress = 0.64 GPa and strain = 751%.** The record for the most stretchable egg sac silk goes to the stalk silk of the cocoon of *Meta menardi* (Latreille) (Tetragnathidae), for which tensile testing pointed out a maximum stress and strain of 0.64 GPa and 751%, respectively (Lepore et al., 2011). On the other hand, the toughness of the egg case silk threads recorded to date (G= 193 MJm⁻³) is spun by the hermit spider *Nephilengys cruentata* (Fabricius) (Nephilidae) (Alam et al., 2016).
Highest number of eggs – >3,000. The number of eggs laid by spiders is highly variable depending on species and female body mass (Marshall & Gittleman, 1994). For example, Robinson & Robinson (1976) reported more than 2,400 eggs for a species of Nephila (Nephilidae). The same authors estimated that for other species one female may produce as many as 3,000 eggs in multiple egg sacs. According to available evidences, Nephila pilipes (Fabricius) is possibly the spider capable to lay the highest number of eggs per clutch. In this species, the egg sac usually contains more than 3,000 eggs (Higgins, 2002). Higgins observed how female fecundity—number of eggs laid per clutch—is a function of pre-laying female mass (see Higgins 2002: p. 382). The mass of the largest female sampled by Higgins was 6.9 g and so, it is possible to estimate that the clutch size of this female should be equivalent to 9,724 eggs.

Least number of eggs – One. In Telema tenella (Simon) (Telemidae), a European cave-dwelling spider, the lowest number of eggs found in a single egg sac is one (Sic!) (Juberthie, 1985). The tendency to lay small numbers of eggs is a well-known adaptation to hypogean habitats. Studies on subterranean spiders are however scarce: it appears likely that T. tenella shares this record with other cave species for which the number of eggs/cocoon was never quantified (Mammola & Isaia, 2017).

Longest life span – ~40 years. In spiders, data about lifespan in the wild are extremely scarce. It was assumed that the enigmatic Tasmanian Cave Spider, Hickmania troglodytes, reaches a life-span of several decades (Doran et al.1999). The longest longevity reported is found in Theraphosidae in captivity,

(q) **Longest sperm – 0.65 mm.** The longest known spider sperm by far is reported for the goblin spider *Neoxyphinus termitophilus* (Bristowe) (Oonopidae). With approximately 0.65 mm, one sperm measures around 1/3 of the body length of this spider (Lipke & Michalik, 2015). The sperm is transferred coiled and encapsulated in groups resembling the so-called synspermia, which have a diameter of approximately 0.07 mm in this species. The longest transfer form (0.08 mm) is held by another goblin spider, *Orchestina* spp. (Lipke & Michalik, 2015).

(r) **Most extreme sexual size dimorphism – Females weighing 125 times that of males.** Sexual size dimorphism is a morphological syndrome in which conspecific male and female sizes differ significantly. Among terrestrial animals, the most extreme female-biased gigantism is found in orb weaving spiders (Foellmer & Moya-Laraño 2007). Golden orb weaving spiders (Nephilidae) are the most extremely sexually size dimorphic. Female on average can be up to 125 heavier than mating males (Kuntner et al., 2012). (Figure 3g)

(s) **Most unusual sexual size dimorphism – Males larger than females.** In most web-building spiders, females are larger than males. The water spider *Argyroneta aquatica* (Clerck) (Cybaeidae) is one of the few spiders in which males are larger than females, possibly showing the most extreme male-biased sexual size dimorphism among spiders (Schütz & Taborsky. 2003; 2005; Seymour & Hetz,
It has been suggested that larger males should have mobility advantages over smaller ones when moving under water (Schütz & Taborsky, 2003).

(t) Fastest spider – Cebrennus rechenbergi Jäger (Sparassidae). The flic-flac behavior of the Maroccan flic-flac spider C. rechenbergi is possibly the fastest locomotory behavior documented for spiders (for a description see Jäger, 2014: p. 350, f. 152–161). It was interpreted as a last resort escaping behavior, by which the speed of the spider—2 m/s according to estimations—can increase up to two times the normal running speed. This striking behavior has also inspired the construction of a robot with similar motional elements (King, 2013).

(u) Fastest predatory strike – Zearchae sp (Mecysmaucheniiidae). The fastest predatory strike in spiders was documented in the family Mecysmaucheniiidae. This family currently comprises 25 described species of tiny ground-dwelling spiders distributed in New Zealand and southern South America, that rely on active hunting to prey capture. By means of high-speed video calculations, Wood et al. (2016) documented the speed of the power-amplified predatory strikes in 14 species belonging to this family. The fastest was a species in the genus Zearchae, capable of striking with a speed of 0.00012 s and releasing a power output of 60000 W/Kg (mean values of 3 recording events).

(v) Most venomous to humans – Funnel-web spiders (Hexathelidae). In general, only very few spider taxa are known for a potent venom—e.g. widow spiders causing latrodectism and recluse spiders can cause severe skin lesions and systemic effects. Wandering spiders of the South American genus Phoneutria are known to be very poisonous by transferring large quantities of a strong
neurotoxin during a single bite. However, it is important to emphasize that verified bites from other spider species cause only minor and transient effects (Vetter and Isbister 2008). Funnel-web spiders are considered to be the most dangerous spiders—to humans—in the world (White, 2000; Isbister et al., 2005). Within the family, the most venomous spider is possibly the Sydney funnel-web spider male, *Atrax robustus* O. Pickard-Cambridge. In this species, just 0.2 mg/kg of the venom of the male is lethal for humans (Guinness World Records, 2017c). On the other hand, according to literature reviews (Isbister et al., 2005), the tree-dwelling Australian funnel web spider *Hadronyche cerberea* L. Koch has the highest rate of severe envenomations (75%), in contrast to 17% in *A. robustus*. Since the development of antidotes against funnel spider envenomation, no fatal bites have been reported (Nentwig & Kuhn-Nentwig, 2013b).

(w) **Least venomous – Shared by two families.** Least venomous spiders are representative of the family Uloboridae and Holarchaeidae, by having secondarily reduced their venom glands. Uloboridae have evolved an alternatively hunting strategy: they wrap their prey in silk, cover it in regurgitated digestive enzymes and toxins and then ingest the liquified body (Weng, Barrantes & Eberhard, 2006). On the other hand, Holarchaeidae entirely lacks openings of the poison glands (Kuhn-Nentwig, Stöcklin & Nentwig, 2011; Nentwig & Kuhn-Nentwig, 2013a).
III. Ecology and behavior

(a) Best ballooners – Most spiders. Many spiders, especially small species or immature stages, disperse by releasing one or more silk threads to catch the wind (the so-called ballooning behaviour). Airborne dispersal is particularly widespread amongst higher Entelegyne spiders (Bell et al., 2005). Distances travelled by spider ballooners can reach >1,000 km, as testified by sailors who reported spiders caught in their ships in the middle of oceans (Bell et al., 2005). Possibly, the longest distance covered with ballooning is 3,200 km, as reported by Gressit (1965) for an unidentified linyphiid spider. (Figure 4a)

(b) Best sailors – Fishing spiders (Pisauridae). The ability to walk on water has evolved independently among over 1,200 species of vertebrates and invertebrates (Bush & Hu, 2006). In spiders, spiders in many families are capable of locomotion on the surface of water (Suter, 2013). Most likely the best sailors are the adults of fishing spiders Dolomedes spp. (Pisauridae), capable of moving across water surfaces taking advantage of wind currents (Suter, 1999). More recently, it was demonstrated that ballooning linyphiids and tetragnathids may also display sailing-related behaviours, as specific responses to landing on water surfaces after ballooning (Hayashi et al., 2015)—see also "Best ballooners". (Figure 4b)

(c) Highest altitude – >6,000 meters. A male specimen of Euophrys omnisuperstes Wanless (Salticidae) was collected at an altitude of ca. 5,900 m a.s.l. during an expedition in Mount Makalu (Nepal/China). Immature specimens collected by
Major Kingston at an altitude of ca. 6,700 m in Mount Everest (Nepal/China) were tentatively attributed to same species (Wanless, 1975). Therefore, most likely *E. omnisuperstes* owns the record of the spider dwelling at the highest altitude.

(d) **Largest prey – Fish, toads, birds, bats.** Websites are full of stories and videos about spiders foraging on any kind of vertebrate animals. Although we acknowledge that some of them are truly impressive, we remain skeptical and rely on scientific literature. Accordingly, we report four scientifically documented cases of vertebrate prey:

- The largest fish captured by a spider is a goldfish *Carassius auratus* (Cyprinidae) of ~9 cm length of presumably 15 g weight. It was captured by a pisaurid spider in a garden pond in Sydney (Nyffeler & Pusey, 2014). However, under the assumption that the largest wandering spider, the ctenid *Ancylometes rufus* (Walckenaer) weighing up to 7 g, is as effective in overpowering oversized prey as the smaller-sized pisaurids, fish of up to 30 g might conceivably be killed in the wild (Nyffeler & Pusey, 2014).

- The largest amphibians captured by spiders are possibly toads. Menin and colleagues (2005) reported the predation of an individual of *Theraphosa blondi* (84.12 mm) (see "Largest living spiders") on a juvenile *Bufo marinus* (Bufonidae) of 90.52 mm length.

- According to Brooks (2012), the largest bird found wrapped in a spider orb web is a laughing dove *Streptopelia senegalensis* (Columbidae) of 80 g (wing chord of 138 mm).
- The largest bat found wrapped in a spider web is a Gould’s wattled bat, *Chalinolobus gouldii* (Vespertilionidae), weighing around 15 g (estimated value). It was captured by an unidentified web-building spider (Nyffeler & Knörnschild, 2013).

(e) *Shortest Mating* – <1 second. Given the wealth of literature and observations it is not easy to decide about the shortest mating. However, we think that mating of certain wasp spiders (*Argiope* spp.), the one-palped spider *Tidarren argo* Knoflach & van Harten (Theridiidae) and the dark fishing spider *Dolomedes tenebrosus* (Hentz) (Pisauridae) can be considered the shortest, when considering mating as an interaction of two conscious partners. In these species, the male dies almost immediately after the insertion of his copulatory organ—spontaneous death—and is usually cannibalized by the female afterwards (Foellmer & Fairbairn, 2003; Knoflach & Van Harten, 2001; Schwartz, Wagner & Hebets, 2013). (Figure 4c)

(f) *Longest mating* – >18 hours. Due to the paucity of information, we were unable to establish an absolute winner for this category. However, *Troglohyphantes* spiders (Linyphiidae) represents suitable candidates. In certain species, a protracted mating lasting >18 hours was documented by Deeleman-Reinhold (1978). (Figure 4d)

(g) *Most elaborate courtship* – *Jumping spiders, Salticidae*. With a certain degree of subjectivity, the mating dance of peacock spiders *Maratus* spp. (Salticidae), can be listed among the most elaborate and beautiful courtship displays in arthropods (Girard, Kasumovic & Elias, 2011) attracting much
attention especially in the social media—e.g. the videos about the courtship displays of different species of *Maratus* in the *Peacockspiderman* YouTube channel had cumulatively more than 12 million views as of June 2 2017. (Figure 4e)

(h) **Most endangered – Shared by 36 species.** Thirty-six species of spiders are listed in the 'critically endangered' IUCN category (IUCN, 2015), being therefore the most endangered species of spiders. Habitat changes and deterioration represent the major threats for these species. Some endangered Theraphosidae are also frequently commercialized as pets (see "Most wanted as pet"). However, it is worth noticing that only a minor part of the extant spider species has been evaluated against IUCN criteria (Cardoso et al., 2011).

(i) **Most wanted as pet – Tarantulas.** As far as we are aware, the Gooty sapphire *Poecilotheria metallica* Pocock (Theraphosidae) is among the most commercialized spider species. According to IUCN (2015), *P. metallica* is considered 'critically endangered', not only for the degradation of its natural habitat, but also due to its indiscriminate collection by pet traders. Since 2002, reports of advertised *P. metallica* exported illegally from India and put on sale on the internet have been documented (Molur, Daniel & Siliwal, 2016).

(j) **Most peaceful – Social spiders.** The vast majority of spiders conduct a solitary lifestyle, and generally display an aggressive behavior even toward conspecifics. However, a reduced number of species have evolved different forms of group living lifestyles (Lubin & Bilde, 2007). Two main forms of sociality has arisen in spiders: i) cooperative species ("social" sensu Lubin & Bilde, 2007) live in
family-group territories wherein they share communal nests and capture webs, which they inhabit together cooperating in foraging and raising young; ii) colonial species (territorial permanent-social” sensu Avilés, 1997) occur in aggregations, but individuals in the colony generally forage and feed alone and there is no maternal care beyond the egg stage. Among these two group living styles, coloniality is the most common form, being reported in at least 12 families (Whitehouse & Lubin, 2005). Social spiders are rarer, being found in at least six families: Agelenidae, Dictynidae, Eresidae, Oxyopidae, Theridiidae, Thomisidae (Lubin & Bilde, 2007). Genus Anelosimus (Theridiidae) shows the highest number of group-living species.

(k) Rarest – Unclear. In lack of detailed information about biology, ecology, range of distribution, and population size of the different species, rarity is extremely difficult to define from a biological viewpoint (Gaston, 1994). It is therefore challenging to assess which is the rarest spider species in the world. As an example, Smithers & Whitehouse (2016) suggested Nothophantes horridus Merrett & Stivens (Linyphiidae) as the rarest spider in the world, being recorded exclusively from two abandoned limestone quarries near Plymouth, covering a surface of circa 0.1 km² (Cardoso & Hilton-Taylor, 2015). However, the reputation of "rarest spiders" is possibly shared by numerous spiders described on the base of a single specimen, and never recorded thereafter (see WSC, 2017).

(l) Strangest habitat – Underwater. Spiders are well-known to be ubiquitous in terrestrial ecosystem (Foelix, 2011). In our opinion, the diving bell spider Argyroneta aquatica (Clerck) (Cybaeidae) owns the record of the most peculiar
habitat, being the only known spiders living a wholly aquatic life. *A. aquatica* possesses specific adaptations to breathe in immersion, being therefore able to hunt, to consume prey, to moult, to deposit eggs and to copulate underwater (e.g., Seymour & Hetz, 2011; Mammola, Cavalcante & Isaia, 2016). On the other hand, there are other species that are able to conduct a partially aquatic life, such as *Desis marina* (Hector) (Desidae), inhabiting intertidal habitats (e.g., McQueen & McLay, 1983). (Figure 4f)

(m) **Strangest diet – Leaf tips.** Spiders are renowned to be carnivorous. Being the only spider—mostly—herbivorous, *Bagheera kiplingi* Peckham & Peckham (Saticidae), distributed from Mexico to Costa Rica, owns the record for the strangest diet. From behavioral observations and stable-isotope analysis, Meehan et al. (2009) showed that the diet of this spider predominantly comprises specialized leaf tips, the so-called Beltian food bodies. There are other spider species occasionally feeding on vegetal products (e.g. pollen), with at least 95 reports documented in literature (Nyffeler, Olson & Symondson, 2016). (Figure 4g)

(n) **Best mother – matriphagy.** Providing offspring with food is thought to be the most important form of parental care. Possibly, the most 'unusual and extreme form of care' (Evans, Wallis & Elgar, 1995) is called matriphagy, in which the mother sacrifices herself to feed her offspring. This peculiar form of parental care has evolved at least in six spider families (Schneider, 1996).

(o) **Best father –** Dolomedes tenebrosus (*Hentz, 1844*) (Pisauridae). In numerous spiders, females eat their mating partner just after the copula (see "Shortest
Mating"). Such self-sacrifice is evolutionary advantageous if being eaten sufficiently increases offspring number or fitness (paternal effort hypothesis) or, either, the fertilization success. Recent experiments conducted by Schwartz, Wagner & Hebets (2016) on the dark fishing spider, D. tenebrosus, demonstrated an impact of male consumption on offspring size and overall survival—indicating that self-sacrifice behavior should be adaptive.

(p) **Best date – Nuptial gifts in Pisaura mirabilis (Clerck) (Pisauridae).** "Nuptial gifts" are nutrients that males of a number of species—especially Arthropods—offer to females prior to, during, or shortly after copulation (Gwynne, 2008). In spiders, nuptial gifts have been documented in various forms as e.g. glandular secretion or wrapped prey items. The most spectacular is reported for P. mirabilis (e.g., Van Hasselt, 1884; but see Itakura, 1993 for a possible other species), as it consists of large prey items wrapped up in silk by the male (Prokop & Maxwell, 2012). The male offers his gift during courtship and, while the female is feeding on it, he successfully mates with her.

(q) **Most creative prey capture – Bolas spiders.** Bolas spiders (Araneae, Mastophorini) have evolved a unique hunting tactic that combines chemical mimicry—mimics pheromone blends to attract the prey—with a bola-like weapon, which consist of a silk thread ending with a droplet of adhesive glue that the spider swing to catch its flying prey (Yeargan, 1994).

(r) **Best thieves – Kleptoparasites.** In spiders, best thieves are kleptoparasites, i.e. spiders regularly stealing food from the web of other spider species. Kleptoparasites generally do not build webs, but exploit other spiders’ web for
any of their activity. To date, kleptoparasitism has been documented in five spider families—Theridiidae, Dictynidae, Salticidae, Symphytognathidae and Mysmenidae (Vollrath, 1987). (Figure 4h)
IV. Curiosities

(a) **The longest journey – Into space.** In 1973, two females of *Araneus diadematus* Clerck (Araneidae) were sent into space on the Skylab 3 mission to the US Skylab space station (Witt et al., 1976). They are the first spiders that travelled in space (Guinness World Records, 2017). Witt et al. (1976) observed that web spun in space had modified features—unusual distribution of radial angles, low number of turning points—indicating a deviation from earth webs, which was attributed to the absence of gravity.

(b) **Most delicious – Personal preference.** It is difficult to assess which is the most delicious species of spider, as flavour is rather subjective and a matter of gourmets (see also "Most eaten by humans"). It is worth noting, however, that in some countries, spiders are considered a food delicacy. As an example, in Cambodia and Thailand *Haplopelma albostriatum* (Simon) (Theraphosidae) is served fried as street food (Ray, 2002), but also sold canned with salt. A few species in Thailand are also used to flavour vodka and whiskey. In Venezuela, the jungle tribe Piaroa commonly eat *Theraphosa blondi* roasted.

(c) **Most eaten by humans – Many.** Likely, the most eaten spiders are eaten accidentally. In many countries, the legal limits governing the presence of arthropods in processed foods are indeed large enough so that over time a large amount of spider parts is ingested (see, e.g., CFSAN, 1998).

(d) **Most feared – Indiscriminate.** Countless species of spiders terrify the public alike. With a prevalence rate ranging from 3.5 to 6.1 % of the population (Jacobi, 2004;
“arachnophobia” is indeed documented to be the most common phobia related to animals (Hofmann, Alpers & Pauli, 2009).

(e) Most iconic spider – Spiderman. Arachnid symbolism is found through human history (Melic, 2002). Possibly, the most famous, successful and iconic character inspired by arachnids is Spider-Man, the famous Marvel superhero created by Stan Lee and Steve Ditko in 1962. However, it is worth noticing that according to a recent survey (Da-Silva et al., 2014) there are at least 123 other comics’ characters inspired to Arachnids in the Comics literature.

DISCUSSION

We provide an initial list of spider world records, categorized into the general topics of taxonomy and the history of arachnology, morphology and physiology, and ecology and behaviour. We add a fourth grouping that encompasses topical spider curiosities that do not fit neatly into the aforementioned categories. Throughout this list we provide multiple fun facts that we suspect will intrigue readers of all ages. For example, we highlight the largest and smallest spiders, the largest prey eaten, the fastest runners, the highest fliers, the species with the longest sperm, the most venomous spider species, and many more. These facts are reminiscent of those found in the National Geographic Weird but true! series, of which there are currently 26 available books; a sure indication of public interest. We hope that our compilation will similarly inspire science educators to embrace the biology of spiders for engaging their students in science learning.

As a means of making both the science and the scientists more accessible, we provide historical information on the arachnologists who study spiders. Our list also
encompasses the evolutionary history of spiders through mentions of the oldest fossil spider, the oldest spider in amber, the oldest recorded spider silk. By reviewing this list readers can ascertain that early spiders did not build webs, despite having the capacity for producing silk. Inspired research could explore the initial functions of spider silk and the evolutionary history of its use. Similarly, our records regarding the physical properties of spider silk hint at an astounding biomaterial. With some imagination, we suspect that science educators can bring their students into creative discussions and research surrounding potential translational innovations associated with spider silk.

We importantly note that our list is far from being exhaustive. We also acknowledge that there may be records that were missed, as they may be hidden in old papers or in contributions written in languages unspoken by the authors. In spite of the biases inherent in a compilation such as we provide, we hope that this contribution will provide a useful tool for finding specific answers about many curiosities concerning spiders, meanwhile challenging scientists to find new world spider records.

One might notice the timing of many of our world records, with many of them indicating research published since 2010. This accurately reflects the relative infancy of arachnology; relative to other organismal systems such as mammals, birds, or even insects. By some estimates, arachnologists have described only one third of the spider species worldwide (Agnarsson, Coddington & Kuntner, 2013); and even among the described species, basic information about their biology and natural history remain unknown. Indeed, our knowledge of spiders is still in its early stages and with the expected future discoveries of thousands of new species and novel observations of species already known to science will surely come new records and new curiosities.
Our hope in putting together this initial list is that it will inspire a new generation of scientists to take notice of spiders and their relatives and to engage in their own observations and conduct their own research. Arachnids offer unparalleled opportunities for community science projects, but we need local educators and scientists to lead the charge. Finally, in order to transform this overview in a community-driven knowledge base, we will implement this list in the website of the International Society of Arachnology (www.arachnology.org).

ACKNOWLEDGMENTS

Many thanks to all friends and colleagues who posed to us bizarre questions about spiders, stimulating the idea for this paper. Rebecca Wilson, Yael Lubin, Theo Blick, Jens Runge, Philippe Vernon, Cecilia Ruffino, Filippo Milano, Raquel Galindo, and Silvia Grilli provided information and/or suggested some of the records listed herein. We thank Irene Frigo for the help in creating the layout of figure 1. We are grateful to Matjaz Kuntner, Peter Jäger, Barbara Knoflach-Thaler, Riccardo Cavalcante, Francesco Tommasinelli, Fulvio Gasparo, Adam Fletcher, Steve Le Roux, Olaf Craasmann, Maximilian Paradiz, Nicky Bay, Patrick Coin, and Pieceoflace photography for sharing their photos of spiders.

Competing interests

We have no competing interests.
LITERATURE CITED


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Figure 1 (on next page)

General anatomy of a spider and variation in body forms.

Dorsal view of a spider showing its general organization and variation in its appearance exemplified by few representative of the 113 known spider families.
Figure 2 (on next page)

Taxonomy, arachnology and arachnologists.

a) Original illustrations of some of the first spiders described in binomial nomenclature (Modified from Clerck, 1757); b) Eugène Louis Simon (1848–1924), the most prolific arachnologist in history (Photo credit: en.wikipedia.org); c) The first Congress of Arachnology in history at the University of Bonn (Germany) in 1960 (Modified from Kraus, 1999); d) The largest congress of Arachnology (2–9 July 2016, Golden, Colorado, USA) (Photo credit: Congress Organizing committee).
Morphology and physiology.

**a)** The Goliath bird-eater, *Theraphosa blondi* (Theraphosidae), the largest known spider by mass (Photo credit: Steve Le Roux); **b)** *Heteropoda maxima* (Sparassidae), the largest known spider by leg span, in its typical ambushing position (Photo credit: Peter Jäger); **c)** The enlarged posterior median eyes of a net-casting spider (*Deinopis* sp., Deinopidae) viewed under ultraviolet light (Photo credit: Nicky Bay) **d)** *Stalita taenaria* (Dysderidae), the first eyeless spider ever described (Photo credit: Fulvio Gasparo); **e)** The Darwin's bark spider, *Caerostris darwini* (Araneidae), produces the toughest known spider silk (Photo credit: Matjaz Kunter); **f)** The web of the Darwin's bark spider can reach an area of 2.8 m², being therefore the largest orb web ever measured (Photo credit: Matjaz Kunter); **g)** Golden orb weaving spiders (*Nephilidae*) exemplify the most extreme male-biased sexual size dimorphism in spiders. The white arrow points at the male (Photo credit: Matjaz Kunter).
Ecology and behavior.

a) A ballooning spider—numerous spiders can disperse through the air by releasing one silk threads to catch the wind (Photo credit: Pieceoflace photography); b) A fishing spider, Dolomedes spp. (Pisauridae), capable of effective locomotion on the surface of water (Photo credit: Olaf Craasmann); c) A male and female of the one-palped spider *Tidarren argo* (Theridiidae) during the copula: in this species, the male dies almost immediately after the insertion of his copulatory organ and is usually cannibalized by the female afterwards (Photo credit: Barbara Knoflach-Thaler); d) A cave-dwelling spider of the genus *Troglohyphantes*. In some species, a protracted mating lasting >18 hours was observed (Photo credit: Francesco Tommasinelli); e) A male of *Maratus elephans* (Salticidae) performing its courtship display (Photo credit: Adam Fletcher); f) The water spider, *Argyroneta aquatica* (Cybaeidae), the only known spiders living a wholly aquatic life (Photo credit: Riccardo Cavalcante); g) *Bagheera kiplingi* (Salticidae), the only known spider with a mostly herbivorous diet—it predominantly consumes specialized leaf tips of *Acacia* (Photo credit: Maximilian Paradiz); h) A kleptoparasitic spider (Theridiidae: *cf. Neospintharus* sp.; arrow) dwelling in the web of a Northern Black Widow, *Latrodectus variolus* (Theridiidae) (Photo credit: Patrick Coin).