

A Pictorial Key of Some Families of True Spiders (Araneomorphae) Recovered in the Western Region of Saudi Arabia

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ABSTRACT. This survey that has been conducted in natural and managed ecosystems in the Western region of Saudi Arabia, showed that representatives of eleven families belonging to four superfamilies have been recovered. All of them belong to the true spiders suborder Araneomorphae. This collection is described as a diversified one, since it contains spiders belonging to two major groups; the first, the aerial web spinners, including the primitive line weavers and sheet weavers, the comb-footed spiders, and the orb spiders, and the second including the hunting spiders including the wolf, jumping crab, running, funnel-web spiders and the primitive hunters and weavers.

Introduction

Currently entomologists are becoming aware of the fact that long term pest management of injurious pests requires fundamental ecological understanding. True spiders (Araneomorphae) constitute a major component and an integral part of the biomortality complex of predators, but their impact on both predatory and injurious insect pests was underestimated^[1]. Although true spiders are categorised and recognized as general feeders on other arthropods, insects, in particular, constitute their main dietary item.

In Saudi Arabia, very few workers have conducted research on the spiders' population that prevail locally. Among those was Jocque^[2], who reported on family Linyphiidae, Faragalla and Badawi^[3], who reported on spiders recovered from termite nests, Faragalla and Taher^[4], who conducted an inventory survey of spiders in the Western Region of Saudi Arabia, and Ono and Jocque^[5]. Such survey is very timely because as witnessed today, Saudi Arabia has been embarking and expanding

in its agricultural potential. Thus, for intelligent pest management programs to be initiated, the role of natural biological control agents (including spiders) should be determined in natural and man-managed ecosystems. Therefore, field surveys represent a top priority at this junction for revealing what is present locally. Hence, extensive taxonomic lists and proper identification of potential pests, actual pests and their related natural enemies are urgently needed for scientific pest population management.

This work represents part of the survey made during the years 1985/1986 and 1986/1987 in some ecosystems of the Western region of Saudi Arabia with the aim of gaining more insights about the spider's fauna that locally exist, its proper identification, wherever possible, and with the far reaching goal that this information might further excite and encourage potential prospective researchers to delve in future studies on spiders.

Material and Methods

During the course of the survey period 1985/1986 and 1986/1987 weekly field trips were made to the collection sites in Wadi Khulais, (80 km North East of Jeddah), Wadi Fatma (50 km East of Jeddah) and Jeddah area to collect spiders. Different methods of collection were used including manual (hand picking), using mouth aspirators and standard 15-inch sweep net. Also pitfall traps were installed in a natural ecosystem and two man-managed agroecosystems. Each trap was made by introducing a wide funnel into a ½-litre size wide-mouth glass jar, taped and both were imbedded as one unit so that the top of the funnel was even with the soil surface. Approximately, 150-ml of 70% alcohol was poured in each trap to act as a preservative. The recovered catch was carried back to the lab for further studies. Finally, all specimens from manual collection or pitfall traps were transferred to 70% ethyl alcohol. Further studies of sorting, separation, labelling, were carried out.

Results and Discussion

The Spider Fauna

It is pertinent, at this point, to mention that the nomenclature and the systematic division in this work followed that of Gertsch^[6].

Superfamily: LYCOSIDAE

The hunting spiders

Family: LYCOSIDAE. *Lycorma ferox* (Lucas) (Fig. 1)

Jeddah 2.XI. 1985; Wadi Khulais 3.X. 1985; Wadi Fatma 5.XII. 1985.

This is the most widely dominant group of spiders. The most predominant family is LYCOSIDAE comprising the ubiquitous wolf spiders. Quite abundant numbers of these have been recovered of both sexes (♂ and ♀) in pitfall traps from natural ecosystems – mountainous slopes, wadi bottoms and sandy areas – and other agroecosystems. They are prevalent in man-managed agroecosystems in citrus and

date palm orchards among grasses and where the sunbeams penetrate the dense canopies made by date palm trees. These spiders were considered to consume a great amount of preys, especially insects. They represent an outstanding group that was picked up weekly exhibiting their continued presence and abundance throughout the year. Recent observations by the authors showed that their numbers in man-managed ecosystems, particularly vegetables, were far more than in natural ecosystems and this might be related to the presence of a high population density of the prey-complex of certain pests.



FIG. 1. The most abundant of all spiders, the wolf spider *Lycorma ferox* (Lucas) (Family: Lycosidae). (3×).

Family: AGELENIDAE. The funnel web spiders (Fig. 2)

Wadi Khulais 31.X. 1985; Wadi Fatma 6.XII. 1985.

This family represents the three-clawed hunting spiders. The cephalothorax is sub-oval or convex and the eyes typically lie in two rows near the front edge of the carapace. Their eyesight is poor and considered inferior to those relatives who place reliance on sight when hunting. They spin typical sheet webs of dry silk changing from small thin mesh into a thick blanket of considerable expanse. Most of them are shy hunters that hide under debris, vegetation in their funnel-webs, or confined to their silken sheet that they weave over the terrain, hence are called sedentary spiders.

ers. Our collection reflected their frequent presence, however their numbers were pronounced in man-managed agroecosystems where perennial grasses make a good ground cover.



FIG. 2. The funnel web spider warming itself on a thick blanket of his web (Family: Agelenidae) (2×).

Superfamily: CLUBIONOIDEA
The running spiders

Family: ZODARIIDAE (Fig. 3)

Wadi Khulais 7.II. 1986; Jeddah 7.IV. 1986.

They represent the two-clawed vagrants that wander over soil and vegetation aided with adhesive tarsal claw tufts. Some of them hide under stones and debris, while others live in sandy areas (sand dunes). They are nocturnal and come to the surface at night feeding on beetle larvae and other insects. Their eyes set close together in a small group near the front edge of the head. These whitish spiders are usually about an inch long, sometimes stay in loose tubular retreats in the cool sand. They were picked up commonly during summer from natural sandy terrains and wadis rich in sandy deposits.



FIG. 3. A zodariid spider climbing on a dry weed plant (Family: Zodariidae). (3×).

Family: GNAPHOSIDAE (Fig. 4)

Wadi Khulais 15.X. 1985; Jeddah 28.III. 1986; Asfan 8.V. 1986.

Zelotes sp., *Pterotricha* sp., *Berlandina* sp. and *Micaria* sp. are the vagabonds of this family and are mostly ground spiders. They have a noteworthy diversity of colors ranging from dull brown, gray, and black due to the short small hairs that give them a velvety appearance, especially *Zelotes* sp. The gnaphosids are found under leaf trash, stones and debris. Most members of the genus *Zelotes* are active runners and hunt from their retreats. They were collected in few numbers during the warm to hot season from a variety of habitats.



FIG. 4. A ganphosid spider *Zelotes* sp. perching on a stem of a shrivelled alfalfa plant (Family: Gnaphosidae). (3×).

Members of the two-clawed vagrants that belong to the crab spiders, that have the ability of moving sideways and backwards with great facility, are represented in this collection. They were observed wandering on plants and soil with flattened bodies that fit eminently for life in narrow crevices, under bark or debris. They spin no capturing webs and rely mostly on strategy of the chase to capture their preys. These are the typical crab spiders and are represented in our collection by two families.

Family: PHILODROMIDAE (Fig. 5)

Wadi Khulais 7.XII. 1985; Wadi Fatma 18.II. 1986.

These spiders have elongate bodies, long legs and a brush of hairs on legs having a pair of adhesive claw tufts on each tarsus. Philodromids are swift runners, especially on precipitous surfaces, however they live on vegetation and change their color to conform with the environment. Specimens were picked up from areas that were having an appreciable vegetation cover.

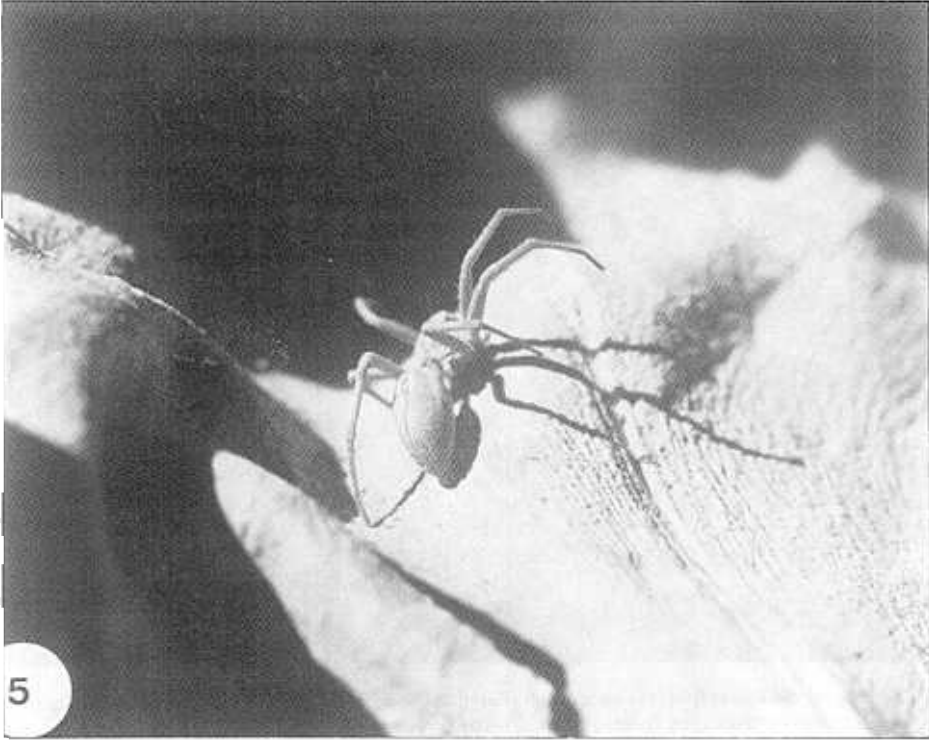


FIG. 5. A member of the family: Philodromidae on a dry leaf of a milky plant (Usher) *Calatropis procera* L. (2×).

Family: THOMISIDAE (Fig. 6)

Jeddah 18.XI. 1985; Wadi Khulais 8.1.1986.

These spiders have short wide bodies, supported by legs that are very unequal in size. The first two pairs are quite long and robust, while the hind pair is considerably shorter and weaker. These are specialists and excel as ambush that endowed with potent venom in compensation for their weak chelicerae. In keeping with their deception, ambushers are known to change color with the background of their hunting grounds. These tactfully dependent hunters usually build no snares or retreats. They have been collected from a variety of habitats and observed on flowers and leaves where they make their ambush for their preys. These spiders were picked up in abundance throughout the year, especially from habitats that are rich in flowers, wild ornamental plants and they exhibit a continued presence^[4].



FIG. 6. The tactful spider that rely on ambush (Family: Thomisidae) camouflaged and poised to ambush any insect attracted by colors of the *Oleander* flower (4×).

Family: SALTICIDAE. The jumping spider (Fig. 7).

Wadi Khulais 8.IV. 1985; Jeddah 8.IX. 1986; Wadi Fatma 7.X. 1986.

These spiders represent a unique group. The salticids are two-clawed vagrants who are specialists that stalk and attack insects with a precision and alertness not possible for most myopic types. They are big-eyed experts that hunt during day time. They have eight eyes with tapetum that help them form a crystal-clear sharp image of whatever in their surroundings. Most salticids spin retreats of thick white slightly viscid silk in crevices, under stones, on ground, under bark or on foliage of plants. These retreats are used as headquarters by molting or hibernating adults. Life in the sun bestowed them with a rich variety of brilliance of coloration not rivaled by any other group of spiders. Unlike the web-building spiders, these animals search for their prey and, therefore, exercise choice or preference in selecting their prey. Salticids were observed to wander over plant foliage, dark corners of remote buildings, on trash and refuse. This very impressive group of spiders was prominently represented and exhibited quite a variety in size and coloration. They were picked up from a variety of habitats including managed agroecosystems, rural deserted mud houses, especially from dark corners and even from within modern facilities.



FIG. 7. The brilliantly colored salticid spider (Family: Salticidae) exposing itself to the sun on a glistening plant leaf. (4×).

Superfamily: ARANEOIDEA
The combed-footed spiders

Family: THERIDIIDAE (Fig. 8)

Wadi Khulais 10.IV. 1986; Wadi Fatma 6.VI. 1985.

Members of this family are basically sedentary having small thick sizes and spent most of the time within the confines of their irregularly net-like webs. Each web is truly a snare spinned between plant leaves and stems where the spider stay upside down hanging to the web with its hind legs. Each individual has an ovoid to spherical abdomen (opisthosoma) which is smooth and has long legs. Both tarsi of the 4th pair of legs have long curved claws set up in a manner similar to a curved comb. These claws are efficiently used in fixing the lines and silk of their snares and help them in catching their preys.

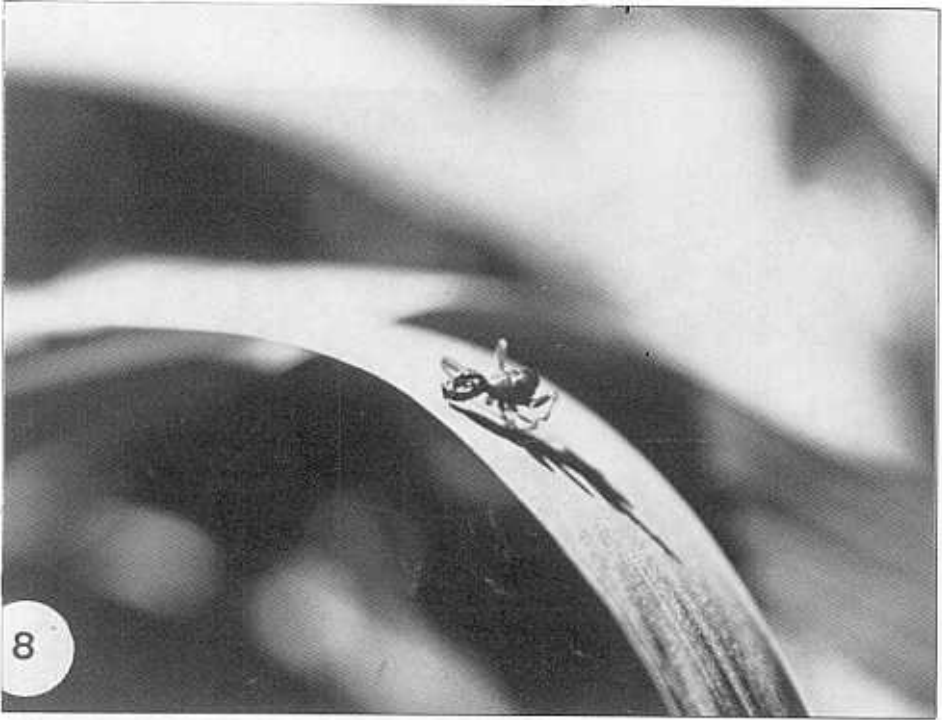


FIG. 8. A theridiid spider (Family: Theridiidae) on an inflorescence of a graminaceous plant.

Superfamily: PLECTRUROIDEA
The primitive hunters and weavers

Family: PHOLCIDAE (Fig. 9)

Wadi Khulais 18.IV. 1986.

This family belongs to a group that constitutes a major segment of spiders that enjoy the aerial life. They are pale spiders found in dark places and spin simple webs for catching their preys. They pholcids have special numerous processes that largely mask their generalized nature of their organs. They have elongate or globose bodies supported by exceedingly long thin legs, a feature that causes them to be mistaken for the daddy-long legs or the harvest men. They contain 8 eyes set together in an elevated tubercle. Like the orb spiders, they got the habit of shaking webs on that indicates that a prey fell on it. This shaking would lead to thorough entanglement of the prey, and the spider then swathe the victim with more silk. They were mostly active during summer in areas covered with vegetation, especially date palm groves and grasses under date palm and citrus trees.

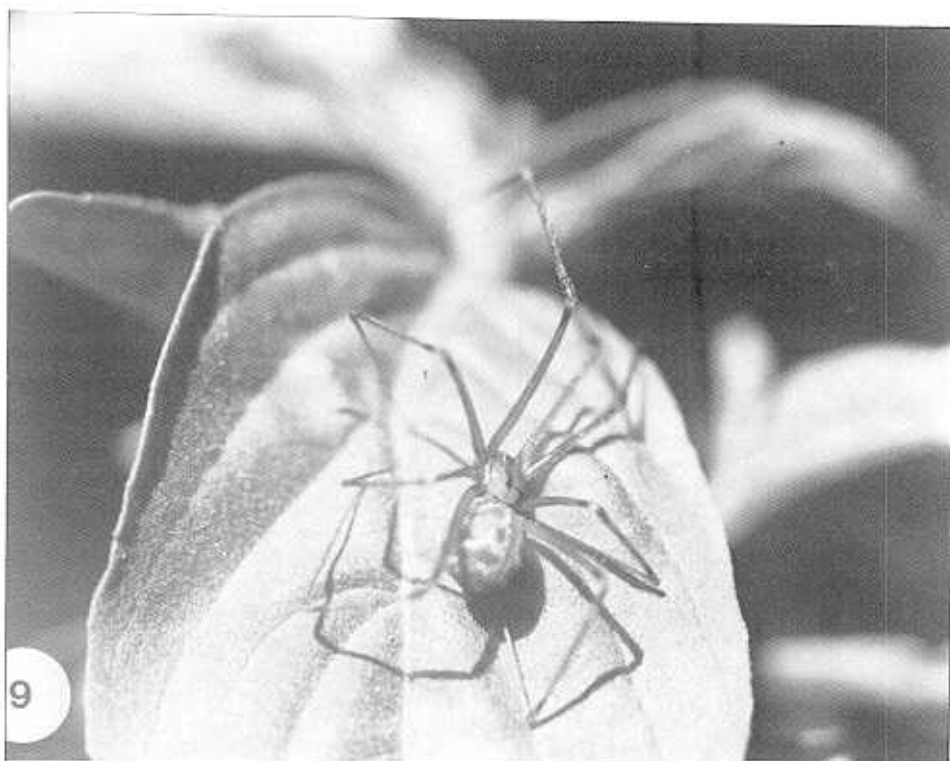


FIG. 9. A member of the family Pholcidae awaits its prey on an alfalfa leaf. (3×).

Family: ARGIOPIDAE (ARANEIDAE). The orb weaver (Fig. 10).

Wadi Fatma 10.V. 1986; Hada Ash Sham 16.V. 1986.

The members of this family are variegated forms and colors. They are experts in spinning the two-dimensional snares that are considered a crowning achievement of all aerial spiders. Their webs are almost invisible in ordinary light. The lines stretch to cover space as a tough net, into which fliers stumble, and being held on by the sticky elastic threads that make most powerful fliers helpless. Since the silk gland has been an integral part of their abdominal contents, hence they are able to produce silk of special different properties. The very interesting habit of agitating the whole web when the spider receive the victim's vibrations along the lines would result in more entanglement of its subdued prey. During this ordeal, many spiral segments or sectors of the web would be broken, then are repaired again by the spider. Numerous individuals have been picked up from orchards, row crops and acacia trees. This group of spiders is active during summer and is largely in catches from natural and man-managed agroecosystems. Their snares are observed between adjacent bushes of all sorts.

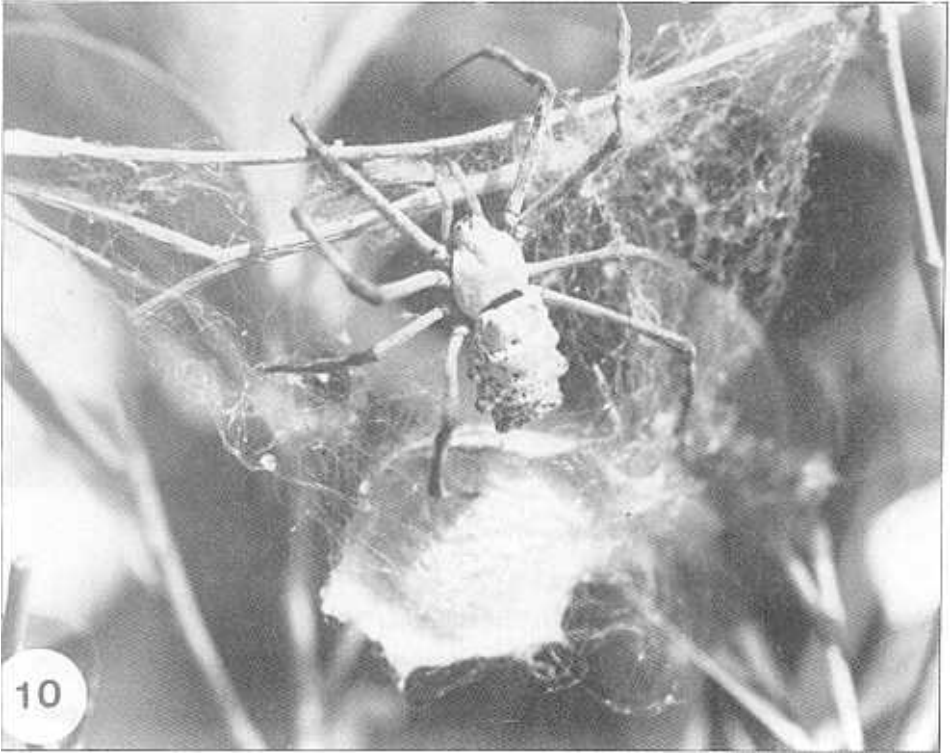


FIG. 10. The expert of all aerial spiders (the orb weaver) (Family: Argiopidae (Araneidae)) covering its egg case with silk from its spinners. (2×).

Family: CITHAERONIDAE (Fig. 11).

Wadi Khulais 10.III. 1986.

This is a rare family whose members range in length from ½-1 inch. Their abdomens are elongate and cylindrical, their eyes clumped together at the tip of their cephalothorax and all their legs are long having equal sizes. Their pedipalps are very prominent with thick tufts of hair at their tarsal ends.



FIG. 11. A member representing the rare Family: Cithaeronidae climbing on an inflorescence of a graminaceous plant. (3×).

Arachnology as a science started late compared to other disciplines in the world of science and the taxonomy of arachnids, especially spiders, is in a constant flux. There is no any established, well known facility or institution all over the world that have qualified or renowned authorities to tackle the problem of taxonomy. Therefore, currently every family, sub-family or even each genus has a specialist who cannot even break boundaries to delve into other genus and/or taxon. That is why taxonomy of spiders remains an unsolved problem, however, very few specialists of certain families are scattered all over the world. The very meagre information on taxonomy makes it difficult for any enthusiast to entertain such an ambitious undertaking. Recently, a well-known authority in lycosids, Dr. Mark Alderweireldt of the University of Gent, Belgium, (personal communication) remarked that the “taxonomy of lycosids is extremely complex and confused and, the work of Roewer (1950’s) made the situation even worse”. Bearing this in mind, a taxonomic key is suggested based on morphological characters for the spiders recovered and identified.

Key to the Families of Spiders

1. ● Chelicerae fused at base; tarsi long and flexible with many pseudosegments, Fig. 9 – PHOLCIDAE (Long-legged Spiders).
 - Chelicerae not fused at the base; tarsi not long and flexible, not with many pseudosegments 2
- 2.(1) ● With 3 tarsal claws, median often quite small, no claw tufts present 3
 - With 2 tarsal claws, with or without tufts 4
- 3.(2) ● Cephalothorax oval, sometimes distal leg segments with thick pads of hairs, spin no retreats, Fig. 1 – LYCOSIDAE (Wolf spiders).
 - Cephalothorax suboval to convex, eyes typically in two rows near front edge of carapace, legs long and thin, spin sheet-like webs with tubular or funnel-like retreat, Fig. 2 – AGELENIDAE (Funnel-web Spiders).
- 4.(3) ● Tarsi of the last pair of legs with a distinct comb formed by a single row of curved ventral toothed setae, usually small species with a large, round abdomen; spin irregular mass of webbing, Fig. 8 – THERIDIIDAE (Comb-footed Spiders).
 - Tarsi of the last pair of legs occasionally with serrated bristles, but not arranged in a ventral series 5
- 5.(4) ● Body elongate, long legs all same length, bristle of hairs on legs, pairs of adhesive claw tufts on tip of each tarsus, Fig. 5 – PHILODROMIDAE
 - Body not elongate, legs different size, no bristle of hairs 6
- 6.(5) ● Body short wide, legs 1st and 2nd pairs quite long and robust held sidewise and twisted off the normal axis so that dorsal surface is posterior and prolateral surface appears to be dorsal side, Fig. 6 – THOMISIDAE (Crab spiders).
 - All legs of the usual prograde type 7
- 7.(6) ● Spinnerets not all developed, anterior long, median and posterior pair reduced, sedentary areas, Fig. 3 – ZODARIIDAE.
 - Spinnerets well developed 8
- 8.(7) ● Somber coloration with markings, dull, gray, brown and black forms covered with short hairs, velvety appearance, Fig. 4 – GNAPHOSIDAE.
 - Distinctive brilliance of colored hairs, big-eyed arranged in rows, anterior median eyes quite large, Fig. 7 – SALTICIDAE (Jumping Spiders).
9. ● Eyes like in color, construct geometric symmetrical snares and webs, colorful, Fig. 10 – ARGIOPIDAE (Orb Weavers).
 - Eyes set together at tip of slender tubercle of carapace, cephalothorax and abdomen slender, legs long and equal sizes, Fig. 11 – CITHAERONIDAE.

Acknowledgement

The authors are indebted to Dr. Norman I. Platnick, Curator of Arachnida of the American Museum of Natural History for being generous with his time and the undeniable efforts during the identification of our collection.

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مفتاح مصور لبعض عائلات العناكب الحقيقية (أرانيمورفي) بالمنطقة الغربية من المملكة العربية السعودية

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نتيجة للحصر والمسح الذي تم في بعض الأنظمة الإكولوجية الطبيعية والزراعية بالمنطقة الغربية من المملكة العربية السعودية ، أمكن الحصول على أفراد من العناكب الحقيقية ، تمثل إحدى عشرة فصيلة تنتمي إلى أربع فصائل فوقية تابعة لرتيبة الأرانيمورفي . ويبدو أن فونة العناكب هذه تقع في مجموعتين رئيسيتين ، أولاها مجموعة العناكب الغزالة الهوائية ، وتشمل العناكب الناسجة للخيوط البدائية ، وناسجة البيوت الصفحية ، مشطية الأقدام ، الجرمية ، أما ثانيها فتحتوى على العناكب الصيادة ، وتشمل العناكب الذئبية ، والسرطانية الوثابة ، والعداءة ، وقمعيات البيوت ، والصيادة والنسّاجة البدائية .