

PRELIMINARY BIODIVERSITY ASSESSMENT AND NOTES ON THE BIOLOGY OF THE ARACHNIDS (ARACHNIDA: SCORPIONES, AMBLYPYGI AND ARANEAE) OF BAHÍA HONDA (VERAGUAS, PANAMA)

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SUMMARY

A preliminary assessment of the diversity of arachnids of the orders Scorpiones, Amblypygi and Araneae was carried out in the area of Bahía Honda, (Veraguas, Panama), in the course of four visits to the region in 2001 and 2002.

Four species of scorpions were identified as belonging to the genera *Ananteris*, *Centruroides* and *Tityus*, all members of the family Buthidae. *Tityus ocellote* Francke & Stockwell, 1987, species previously known only from Costa Rica, was discovered for the first time in the territory of Panama. It is hoped that with intensive surveys of Bahía Honda's wet forests, or when these forests are fully regenerated, a primitive scorpion, *Opisthacanthus elatus* (Gervais, 1844) (Family Ischnuridae), relatively common in the wet forests of the central region of the Isthmus of Panama, may be collected.

Two species of the order Amblypygi, or tailless whip scorpions, were found: *Paraphrynus laevifrons* (Pocock, 1894), and *Phrynus gervaisii* (Pocock, 1894). None of the genera nor species of the orders Scorpiones and Amblypygi identified among the samples from Bahía Honda is endemic of Panama.

Of the order Araneae (spiders), 172 species were identified in 125 genera, that belong to 30 families. Four of these families are members of the

primitive mygalomorphs (Actinopodidae, Ctenizidae, Dipluridae and Theraphosidae) and the rest are araneomorphs.

Of those Araneae present in Bahía Honda, 22% of the 172 species are endemic to Panama. Of the Araneae present in Bahía Honda, *Mabellina* Chickering, 1946, and *Orvilleus* Chickering, 1946, monotypic genera of the family Salticidae, are the only genera considered endemics of Panama. The presence of *Orvilleus* at Playa Manglarito was recognized from two photos of a male, which could not be identified to the species level.

The spiders found at Bahía Honda show clear relationships with those of Central America and Mexico and a lesser relationship to those of South America. This confirms the validity of the two marine corridors postulated to exist before the closure of the land bridge – corridors that isolated the western half of the Isthmus of Panama with migrating of organisms from South America.

A description and illustration of the male and of the spermatheca of the female of *Actinopus robustus* (O. P. Cambridge, 1892) (Actinopodidae), are presented here for the first time, species relatively common in open areas of Panama.

The presence in the territory of Panama of the following families, genera and species is here documented for the first time:

- An undetermined species belonging to the genus *Diplura* C. L. Koch, 1850 (Dipluridae): one female without an abdomen was studied (Bahía Honda), and additional female specimens were collected in the Provinces of Panama and Darién.
- *Eustala bifida* F. O. P. Cambridge, 1904 (Araneidae) – a species previously known from United States to Costa Rica.
- *Hahnia banksi* Fage, 1938 (Hahnidae), family and species previously known only from Costa Rica, reported here for the first time for Panama.
- A male of the genus *Tutaibo* Chamberlin, 1916 (Linyphidae), collected at Playa del Sol, provisionally identified as *T. phoeniceus* O. P. Cambridge, 1894, species previously known from Guatemala and Venezuela.
- *Tinus ursus* Carico, 1976 (Pisauridae), genus and species previously known only from Costa Rica, reported here for the first time for Panama.
- *Plexippus fannae* Peckham & Peckham, 1896 (Salticidae), species previously known from Guatemala and Colombia.
- *Tulpus hilarus* Peckham & Peckham, 1896 (Salticidae), previously known from Guatemala and Colombia.

- *Azilia affinis* O. P. Cambridge, 1893 (Tetragnathidae), previously known from United States to Costa Rica.
- A species new to science (which is now under study) belonging to the genus *Amphidraus* (Salticidae, Euophryinae), based on the study of a male and a female collected on the island Canales de Tierra. This discovery extends the distribution area of the species some 850 km north, including Panama. The genus, which includes four additional species described from South America, is here reported for the first time for Panama.

In view of their present incidence and wide distribution in Panama, we think that with more intensive sampling we may find in Bahía Honda the following six families of Araneomorphae: Caponiidae, Hersiliidae, Filistatidae, Sicariidae (which includes the medically important genus *Loxosceles*), Gnaphosidae and Miturgidae. The genus *Tityus* (Scorpiones, Buthidae) includes species known to us to have caused death by poisoning people in different regions of Panama, but *Tityus ocellote* does not appear to be dangerous to humans as we did not find in patients accidentally stung in Bocas del Toro islands and Bahía Honda cases of severe envenomation.

The spider of greatest medical interest that we found in Bahía Honda is *Phoeneutria boliviensis* (F. O. P. Cambridge, 1897) (Araneae, Ctenidae).

In addition to descriptions, we offer illustrations that help to identify specimens, and data on the biology and distribution of the spiders of the region.

INTRODUCTION

A basic requirement for any plan designed to protect the fauna of a region is a good knowledge of the diversity of the species found there. We welcomed the chance we were given to draw up an inventory of the arachnids present in Bahía Honda, but the data we obtained must be considered as preliminary in view of the small scale of the sampling. Even so, our inventory provides important basic information necessary for the recognition of future changes that could come about in the region and those endemic species that are in most urgent need of protection.

The arachnids of Panama have been the most extensively studied in all Central America and for a good part of South America, but those

present in the Province of Veraguas are known only from isolated specimens mentioned in monographic studies, generic revisions, and faunal listings of Panama (cf. Cambridge O. P. 1889-1902, Cambridge F. O. P. 1897-1905, Petrunkevitch 1925, Banks 1929, Chickering 1946, Levi 1962, 1985, Nentwig 1993, Galiano 1968, 1980, Platnick 1974, 2000-2003, and Huber 2000) etc. No special effort had been made to draw up an inventory of the arachnids of this region, or part of it, particularly of the coastal zone that is cut off from the rest of the country and maintains little communication by roads.

It is in this coastal area that the most ancient and most interesting fragments of the flora and fauna of the region are found. The central areas of Veraguas (close to the Central Cordillera) have been populated and urbanized for many more decades, which means that a great part of the flora and fauna have suffered notable alterations. On most of the species mentioned here we have very little detailed biological information, and in most cases these species were known only by their original descriptions, based on only one sex.

To help in the recognition of the taxa, we have provided line drawings and color photographs of some of them. Most of the data on the number of genera and species described in each family of the order Araneae, and on the distribution of the species, are taken from *The World Spider Catalog*, version 3.0, by Norman I Platnick, American Museum of Natural History, New York (<http://research.amnh.org/entomology/spiders/catalog81-87/index.html>). For the diversity and distribution of the scorpions we turned to the catalogue of Fet, Sismo, Lowe and Braunwalder (2000) and The Scorpion Files of Jan Ove Rein, University Library, Trondheim, Norway (<http://www.ub.ntnu.no/scorpion-files.htm>). The specimens of our study were deposited in the collection of Laboratorio de Artrópodos Venenosos (Laboratory of Poisonous Arthropods), G. B. Fairchild Museum of Invertebrates, at the University of Panama.

METHODOLOGY

To collect the scorpions we used black light lamps (between 7 and 10 p.m.), light that makes the scorpions' cuticle shine pale blue and

makes them easier to find. A large number of arachnids were captured with five Malaise traps and fifty yellow plates containing soapy water. Most of the spiders (50-60%) were immature, that lack diagnostic structures and, in general, cannot be identified to species. We took color photos of live spiders in the field. The specimens were preserved in 95% alcohol for their later sorting, identification and labeling at the Laboratory of Poisonous Arthropods (LAV) of the Museum of Invertebrates, University of Panama (MIUP).

Of all the species cited as present in Bahía Honda, we did not collect any specimens of *Cuppiennus getazi* Simon, 1891 (Ctenidae), but its presence was confirmed thanks to the study of one photo of a female. In the same way, we were able to recognize the presence of *Orvilleus* Chickering 1946, a monotypic genus, identified from a photo taken by Niko López in January, 2002.

For the identification of the specimens and to prepare line drawings, we used a LEICA MZ APO stereomicroscope and we consulted the reference collections of arachnids in the LAV, identified by experts, and the extensive literature on arachnids held in this laboratory. Most of the specific determinations within the order Araneae depend on a detailed study in the female of structures present in the epigyne or the spermatheca, and in the male's palpus, the sclerites and apophysis present, and in the chelicerae the teeth and denticles present on the promarginal and retromarginal grooves. Identification to genera and families within the order Araneae requires a study of the arrangement of the eyes in the cephalothorax, recognition if the cribellum is present or absent, and the shape of the cribellum, the arrangement and morphology of the spinnerets, the number of tarsal claws, the length and development of the legs and the presence of different types of hairs, macroseta, etc. The inspection of all these morphological details calls for the use of a high-quality stereomicroscope, with adequate augmentation (50X) and intense illumination.

Most of the spider coloration fades in alcohol, so coloration is rarely used in the identification of species.

Unfortunately, many of the descriptions of spider species have been based on studies of only one sex and no later studies have been added

to the original descriptions, many of which date from the nineteenth century and the early years of the twentieth.

To find out whether there have been cases of poisoning by arachnids among the workers of Bahía Honda, we interviewed and questioned twenty workers that had been bitten by arachnids (spiders, scorpions). No one bothered to keep the specimen that had poisoned him, and for the identification of the putative arachnid we had to rely on the descriptions given by the workers and in our knowledge of the local fauna.

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of a large number of works; our identifications would have been impossible without their help.

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CATALOG OF SPECIES

1) Order **Scorpiones**: Figs. 1-3, 10-12.

Scorpions are the most primitive living group of the class of Arachnida. Their bodies are divided into two parts: the cephalothorax and the abdomen (subdivided into a wide mesosoma and a thin metasoma, resembling a tail) (Fig. 1). Two chelicerae are inserted on the anterior part of the cephalothorax, each of them having three segments (basal coxa with a tibia and a mobile digit, the tarsus), these are used for crushing the prey and for cleaning the body. One pair of eyes is placed on the middle of the anterior part of the cephalothorax, and a variable number of eyes are placed laterally, eyes used to detect movements and intensity of light but do not form images. The two large pedipalps, having six segments, each terminate in a pincer-shaped appendage are used to capture prey, for defense and for sensorial perception. The cutting edge of the mobile digit (tarsus) and of the fixed digit (fixed to the tibia) of the pedipalp have arrangements of granules that are

important for the identification of the genera. Like all the arachnids, scorpions have four pairs of legs.

The ventral surface of the cephalothorax has a pair of pectines (Fig. 2) with a variable number of teeth and fulcra (the latter are not present in the genus *Ananteris*, Fig. 3). When walking, the scorpion makes continuous movements of the pectinal teeth over the substrate, and detects details of the surface (its chemical composition and spatial layout) by means of chemical and mechanical receptors in the pectinal teeth. Ventrally in the mesosoma we find four pulmonate books which open to the exterior by spiracles in the third to sixth sterna. In the terminal part of the metasoma (known as the 'tail'), is the telson which encloses the poison glands and terminates in a sting (aculeus) that serves to inject the poison. At the base of the sting is a small subaculear spine (of variable shape, and absent in the families Ischnuridae and Chactidae). The articular membrane between the telson and the fifth metasomatic segment contains the anus, surrounded by four anal papillae. To defecate, the scorpion draws back the metasoma and ejects whitish semisolid faeces (formed almost totally of guanine) The fifth metasomal segment is distinctly longer in males of many species of *Tityus* and in some species of *Chactas* (Chactidae).

Female scorpions are viviparous, and the newborn scorpions climb immediately onto the mother's back (Fig 11) where they remain until they molt and disperse. They are very cryptic animals, rarely active during daylight hours.

In Bahía Honda we identified four species of scorpions belonging to the following three genera of the Buthidae family: *Ananteris* Thorell, 1891, *Centruroides* Marx, 1890, and *Tityus* C. L. Koch, 1836.

1.1. The genus *Ananteris* has 24 described species, with a typical disjunct distribution, a single species is known from West Africa, Guinea-Bissau, and 19 species are found in Central and South America (Fet et al 2000). Only one species of *Ananteris* has been reported from Panama, *A. platnicki* Lourenço, 1993, which was identified on the island of Canales de Tierra, Bahía Honda. This species was previously known from Costa Rica (holotype from San Vito, Puntarenas) and Panama (Provinces Panama

and Coclé). Adult specimens of *Ananteris platnicki* are the smallest buthids in Panama, less than 3 cm long, cream-colored and with numerous small dark-brown maculations. They can be easily recognized because they lack fulcra in the pectines (Fig. 3), have 17 to 20 pectinal teeth and a distinctive sub-aculear tubercle. Usually they are found on the ground, hidden under stones and tree-trunks. They lack medical importance as their poison is known to have no sickening effects on humans. They have not been collected inside houses.

1.2. The genus *Centruroides* has 54 described species and numerous subspecies. It is of great medical importance in the USA and in Mexico, but in Panama no cases have been reported of human deaths from poisoning by species of *Centruroides*. These species have supernumerary granules at the sides of the 7 to 9 primary rows of denticles in the chelae of the pedipalps, granules that are absent in the species *Tityus* (with 12 to 17 primary rows of denticles). Two species of *Centruroides* have been identified in Bahía Honda, as follows :

1.2.1 *Centruroides bicolor* Pocock, 1898 (Fig. 10), a species present in Costa Rica and in the Pacific area of Panama as far as the Azuero Peninsula, and found in Bahía Honda. It is one of the largest buthids in Panama (males 100-120 mm in length). It often goes into houses and was found on numerous occasions in the guest-house of Playa del Sol, but no serious poisoning to humans has been reported. Members of the station staff who have been accidentally stung by these scorpions (hidden in the towels hanging in the bathroom, or inside shoes or clothes left on the floor) complained of severe pain immediately after the sting, but this wears off in an hour or two and no marks remain on the skin at the sting site.

1.2.2. *C. margaritatus* (Gervais, 1841) (Figs. 1-2, 11) is a species found from Mexico to Ecuador and Venezuela and is present in Bahía Honda. It is the commonest species of scorpion in all the urban areas of Panama. It looks for cockroaches in the houses and in any place outside where

garbage is allowed to accumulate. It is the scorpion that causes the greatest number of accidental stings of people in Panama, but the only medical consequence of the sting is a sharp pain that lasts for several minutes, and hyper-sensitive people may suffer from salivation and a partial temporary paralysis of the tongue.

1.3. The genus *Tityus* is an exclusively New World taxon that has the largest number of species in the Buthidae (139 species, year 2003) and urgently needs a taxonomic revision. The species reported here is a new record for Panama: *Tityus ocellote* Francke & Stockwell, 1987 (Fig. 12), previously known only from Costa Rica. We had collected specimens in 1984 and 1985 from several islands of the Archipelago of Bocas de Toro, where it is fairly common on some islands (Popa, Colón and Bastimentos). Strangely enough, people stung by this species seem to suffer no serious consequences as we found no one who had been made ill from stings by this species of *Tityus*. We know of human deaths and cases of systemic poisoning by all the other species of *Tityus* present in Panama.

We expect that the primitive scorpion *Opisthacanthus elatus* (Gervais, 1844) (family Ischnuridae), relatively common in the wet forests in the central part of the Isthmus of Panama, may be collected one day in Bahía Honda, when the vegetation matures there and the proportion of wet forests increases. It is a species with massive chelae on the pedipalps (their main form of defense), a thin metasoma, and very weak poison that is not a medical hazard.

2. Order **Amblypygi**: Fig. 13.

Members of this order are characterized by having the first pair of legs transformed into two long multisegmented flagella, not used for walking, and these arachnids walk on three pairs of legs. The pedipalps are bordered by long spines, and are used to capture their prey, holding it while they devour it with the chelicerae. But these pedopalp spines are not strong enough to perforate human skin. The body of the amblypygi is flattened dorsal-ventrally, and when the animal is disturbed it flees, moving sideways

very fast. These arachnids, do not have chemical nor mechanical defenses, hide during the day in dark damp places and are active at night (like most of the arachnids). The gravid female secretes the embryos through her genital aperture, together with a gelatinous material which hardens quickly to form a wrap that keeps the lentil shaped sac with the embryos fastened to the ventral surface of her abdomen. On emerging, the young climb onto the mother's back (Fig 13, same as the scorpions), and stay there until they molt and disperse.

The amblypygi are found under the bark of trees, at the base of palm leaves, under stones, under logs rotting on the ground, and on the walls of caves. The two genera of amblypygi present in Panama, *Paraphrynus* Moreno 1940 and *Phrynus* Lamarck, 1801, differ in the number of spines between the two longest spines on the dorsal surface of the tibia of the pedipalps: *Phrynus* has a single small spine (*Paraphrynus* has two spines).

The following two species of amblypygi are present in Panama and were identified among the material collected in Bahía Honda :

2.1. *Paraphrynus laevifrons* (Pocock, 1894), a species found from Mexico to Colombia (Mullinex 1975). In Cuevas de Chilibre, the largest and best studied caves in the Centre of Panama, there is a large population of *Paraphrynus laevifrons*, their main invertebrate predator.

2.2. *Phrynus gervaisii* (Pocock, 1894) (Fig 13) is a species widely distributed, from Costa Rica to Guyana and Ecuador (Quintero, 1981). The inquiline relationship between the amblypygi *Phrynus gervaisii* and colonies of the aggressive Ponerinae ant *Paraponera clavata* Smith, 1958, was studied by LeClerc et al (1987) and by Rolando Pérez (Pérez 1996) on Barro Colorado Island.

3. Order **Araneae**

The following two suborders were identified as present in Bahía Honda: Mygalomorphae and Araneomorphae.

A. Spiders **MYGALOMORPHAE**: Figs. 4-9, 14-18.

The most primitive spiders are included in this suborder. Known in Panama by the common name 'tarantula'; they have parallel chelicerae and a hairy body. In some species of Theraphosidae, many hairs on the dorsal abdominal surface become detached with deliberate leg movements and could cause skin rashes and contact allergies. We identified the following four families of this suborder in Bahía Honda:

1. ACTINOPODIDAE: Figs. 4-8, 14-15.

This family has three genera, two are present in America: *Plesiolenia* Goloboff & Platnick, 1987 (with two species in Chile) and *Actinopus* Perty, 1833. The labium of the Actinopodidae is longer than wide, the ocular area width is at least half that of the cephalothorax, the chelicerae have two rows of teeth, and the cephalothorax has a procurved fovea (Raven 1985).

Twenty-eight species have been described in the genus *Actinopus*, 27 of which are found in South America. In Panama, there is only one endemic species: *Actinopus robustus* (O. P. Cambridge, 1892). Even though the animal is fairly common in Panama, no descriptions of the male nor of the female spermathecae were available. These descriptions are here presented. The genus is characterized by the presence of a well-developed rastellum in the female, like a long projection of the chelicerae (less apparent in the male), the cheliceral fang has an incomplete ridge on the inner margin of the distal half (Goloboff & Platnick 1987, report the absence of this ridge on the Actinopodidae), the sternal sigillae are confluent and form a fairly deep branched area, with cusps (projections very short, dark, blunt on their distal part) on third patellae and tibiae (Goloboff & Platnick 1987). The males of *Actinopus* have two apophyses in the bulb of the palp (a parembolic and a basal one) (Goloboff & Platnick 1987).

Actinopus robustus is fairly common in open areas in Panama, where the soils are made out of compacted clay. It is often found in the patio of houses, even within cities. They dig tunnels into solid mud, using their well-developed rastellae on their chelicerae, and then constructs a movable door with an inner reinforcement of silk – (hence the English name 'trapdoor spiders') (Fig. 14). This door serves to close hermetically the entrance to the

tunnel, especially against torrential rains or when enemies are detected. Boys in country areas use an age-old method to lure spiders out of their tunnels, licking a straw and dangling it into the tunnel, so the spider bites it hard with its chelicerae and is then dragged out of the tunnel, clinging to the straw.

Actinopus robustus (O. P. Cambridge, 1892): Figs. 4-8, 14-15.

The holotype female was collected by Bouchard, Province of Veraguas, Panama, and deposited in the Godman & Salvin collection, England. The format of the descriptions follows that in Goloboff & Platnick (1987). Dimensions are in millimeters.

Male: Cephalothorax and appendages brownish-red, abdomen greyish-brown with numerous small irregular tegumentary cream-colored markings in the cardiac region. The cephalothorax (Fig. 1) is 6.9 mm long by 6.9 mm wide and 3.6 mm high, with posterior margin distinctly emarginated; a very narrow, raised border; the pars cephalica greatly elevated, convex, 3.6 times the height of the pars thoracica, occupying 0.43 mm of the length of the cephalothorax. A deep, strongly procurved fovea, without depressions occupies 0.29 mm of cephalothorax width.

The eyes occupy 0.61 of the cephalic width, the width of the ocular quadrangle is 1.8 times its length, and the length of the clypeus is 0.43 that of the ocular quadrangle. No hairs are present on the border of the cephalothorax anterior to the anterior-median eyes nor behind the posterior-median eyes; the pars thoracica is hairless except for 8 or 9 small hairs dispersed at each side of the posterior emargination.; anterior to the insertion of these little hairs the area has a slightly depressed surface and shallow transverse grooves. The cheliceral apex is narrow, with thick hairs on the anterior margin of a well-developed rastellum formed by two apical cusps. An intercheliceral tumescence is absent. Cheliceral fang with a keel on the inner surface which reaches the apex, and with a small basal external tooth. Inner cheliceral margin with a row of eight teeth and the outer margin with seven distinctly larger teeth, and 13 tiny denticles scattered between the two margins.

The labium lacks cusps (Fig. 5), width 0.79 of length, and separated from the sternum by a shallow groove. The palp (Figs. 6-7) is very long; the palpal

coxae have no cuspules, and the width is 0.69 times the length; the tibia of the palp is long, width is 0.30 of length and there is no inconspicuous retrodistal expansion; the palpal tibia is 0.95 times the length of the femur; length of the palpal femur 0.87 times that of the femur 1; palpal embolus sharply curved but is not widened; palpal bulb with two apophyses – the parembolic and the basal one; palpal tarsus with a distal emargination; the bulb as in Fig. 7.

Sternum : width equals to length (3.7 mm); a deep rounded depression in the middle, the sigilla are confluent and branched (Fig. 5).

Leg formula is 4123, tibia I without processes nor retrodistal spines; metatarsus I normal, straight; tibia III not excavated.

Trichobothria : tibia I, two parallel rows, four in each row.

Spines: tarsi I and II with a short ventral apical spine; a longitudinal row of 13 bristles, and a less defined row on tarsus I; retrolateral face of tibiae I and II with numerous strong spines; patella I without spines; patella III with a regular dorsal row of 7 short spines and 26 spines scattered along the prolateral side; apex with 17 short strong spines.

Paired tarsal claws : I and II, both with a small basal denticle.

Preening combs are not present in any metatarsi but these have numerous thin, scattered setae; metatarsi III and IV with no preening combs on their ventral surfaces. All tarsi with rather sparse scopulae, more dense on legs III and IV.

Abdomen: spiniform setae on the cardiac region and numerous finer hairs well separated. Spinnerets: short, posterior spinneret with apical article shorter than the other two.

FEMALE : Spermathecae long, straight, without expansions, the bursa copulatrix is distinctly sclerotized (Fig. 8)

Related species: Most of the species described in the genus *Actinopus* are known by one sex only (11 species described on the basis of males, 11 on females, only four are known by both sexes and two were based on immatures). For the descriptions, authors have used different formats and at present no valid comparisons can be made on the relationships between *A. robustus* and the other nominal species.

Proportion of males and variation: Of 391 specimens of *A. robustus* collected in Antón and Río Hato, Province of Coclé, between 1977 and 1986, only 2.04% were males, the rest were females. The following eye malformations were found in eight specimens: absence of the left posterior median eyes, absence of the right anterior lateral eyes, and three specimens had no eyes at all on the right side.

2. CTENIZIDAE: Figs. 9, 16.

All the members of this family dig tunnels in the ground, mainly in gullies in modified areas. The tunnels are reinforced with saliva, earth and a thin layer of silk, and finally the tunnel is closed with a trapdoor similar to that of the Actinopodidae. To excavate these tunnels – which may be single or branched, with several trapdoors - they use their apical rake of teeth (rastellum) on the chelicerae. A ball is made of the excavated earth and their spiny hind legs are used to kick it out of the tunnel. They make two kinds of doors, both articulated with a silk hinge, and they use their chelicerae to keep them closed with a tight grip: one thick door that fits tightly at the tunnel entrance and a flexible one, made with a thin layer of silk and earth. The tunnels serve as their refuge, as a place to capture preys at the entrance (Fig. 9), and as a site for making an egg cocoon attached to the wall of the tunnel. The young stay in the tunnel with the mother for up to eight months and then disperse. Of the nine genera described as belonging to the Ctenizidae, only four have been reported in America: *Bothriocyrtum* Simon, 1891; *Cycloscomia* Ausserer, 1871; *Hebestatis* Simon, 1903, and *Ummidia* Thorell, 1875.

Members of the genus *Ummidia* (Fig. 16) are recognized by the absence of scopulae on the tarsi of females, the dorsum of tibia III is concave, trochanters I and II are distinctly concave, the cephalothorax fovea is strongly procurved and two rows of strong teeth are present on the grooves of the chelicerae. In the genus *Ummidia* 25 species have been described. They prey on large ground arthropods and occasionally small lizards are captured. These spiders are paralysed by wasps of the family Pompilidae and used as food to complete the development of their young. The only species of the genus *Ummidia* that has been reported for Panama and Costa Rica is *U. rugosa* (Karsch, 1880). The male of this species has not been described, and

in our sampling in Bahía Honda we captured one female and 13 juveniles but no male.

3. THERAPHOSIDAE: Figs. 17-18.

Like the members of the Dipluridae, the Theraphosidae do not construct a movable door at the entrance to their tunnel but they differ in using a small quantity of silk weaving outside the tunnel entrance. Of the 105 genera assigned to this family, 55 genera are found in America, and nine of them in Panama. In Bahía Honda we collected the following two species of Theraphosidae, both from tunnels in the ground:

3.1. Members of the genus *Sericopelma* Ausserer, 1875, have no plumose hairs, and the females have only one spermatheca, crescent-shaped and covered with tiny spines (Valerio 1980). Eleven species have been described as exclusive to America (one from Brazil, one from Venezuela, and the others are known from Central America and Panama).

Two species of *Sericopelma* have been reported for Panama: *S. commune* F. O. P Cambridge, 1897 (Fig. 17), endemic, and *S. rubronitens* Ausserer, 1875 (Fig 18) from Central America and Panama. One female of *Sericopelma* sp. was collected at Playa del Sol, Bahía Honda, but could not be further identified because females have few diagnostic characters.

3.2. In the genus *Lasiodora* C. L. Koch, 1850, 37 species have been described. They are characterized by their large size (between 90 and 120 mm body length, except for *L. parvior* which measures 17 mm and *L. panamana*, 25 mm), by the presence of stridulatory hairs on the prolateral face of coxae I. The following two endemic species have been reported from Panama but only the females are known : *L. parvior* Chamberlin & Ivie, 1936, and *L. panamana* Petrunkevitch, 1925 This last species was collected at Manglarito and at Playa del Sol, Bahía Honda.

4. DIPLURIDAE:

The members of this family dig tunnels spiders in the soil and make a large silk funnel using their two distinctive postero-lateral spinnerets, which are extremely long. The irregular funnel of fine silk leads to the exterior

from the tunnel entrance, which is generally hidden under a rock or a fallen tree-trunk. The silk funnel has several planes of irregular layers of silk, all hung from different points around the entrance to the tunnel, and is used for the capture of prey (Coyle 1995). Of the 24 genera described in this family, 11 have been reported for America. Two are known to be present in Panama, but were not collected in Bahía Honda: *Ischnothele* Ausserer, 1875 (with 12 species, only one reported for Panama, *I. caudata* Ausserer, 1875, widely distributed from Mexico to Brazil) and *Masteria* L. Koch, 1873, (with 22 species described, two reported for Panama). *Masteria spinosa* (Petrunkevitch, 1925), is endemic in Panama, and the other species *M. downeyi* (Chickering, 1966), is known in Costa Rica and Panama.

In the genus *Diplura* C. L. Koch, 1850, 20 species have been described, all exclusive to South America and Cuba. The genus is here reported for the first time for Panama on the basis of material that could not be identified to the rank of species because no males were collected (males have characteristics that allow a diagnosis to species, although ten species of *Diplura* have been described based only on females). The following material of *Diplura* sp. has been examined from Panama: PROVINCE OF PANAMA: Altos de Cerro Campana, Quebrada Anguillosa, April 8-9, 1977, coll. D. Quintero; Parque Nacional Soberanía, Reserva Forestal Madden, May 9, 1970, coll. D. Quintero det. *Diplura* sp., Fred Coyle. PROVINCE OF DARIEN: Arretí, Nov. 23, 2001, coll. R. Miranda.

B. Spiders **ARANEOMORPHAE**: Figs. 19-44.

In the present suborder of the order Araneae we find more than 90% of all the spiders known in the world. They have divergent movements with their chelicerae, each moves in a direction contrary to that of the other. The Araneomorphae family with the greatest diversity is Linyphiidae with 557 genera described (but nearly a third of them are monotypic genera), followed by the Salticidae, with 533 genera. Both were identified in Bahía Honda.

In Panama 46 families of Araneomorphae have been reported, and in the present inventory 26 families are reported (56% of the total). These 26 families of Araneomorphae are presented in alphabetical order, together

with the most relevant aspects of the morphology and biology of their genera. We present here the first report for Panama of the family Hahniidae. We suspect that the following six families with more intensive sampling will probably be found in the future in Bahía Honda because they are widely distributed throughout Panama: Caponiidae, Hersiliidae, Filistatidae, Sicariidae (which includes the medically important genus *Loxosceles*), Gnaphosidae and Miturgidae.

1. ANYPHAENIDAE:

These spiders, with eight eyes set in two rows, have a group of tarsal lamelliform hairs at the distal end of their legs (2 to 8 rows of spatuliform hairs), and two tarsal claws. They are wanderers and do not spin webs to trap their prey. They lay their eggs in a refuge, tied with a few silk threads, without a thick cover for the egg sac because they have no cylindrical glands (Ramírez 1995). They have the tracheal spiracle conspicuously separated from the six spinnerets, closer to the epigastric furrow in the subfamily Anyphaeninae (Platnick 1974, Ramírez 1995). This family includes 54 genera in the world, of which 16 have been reported for Panama. From Bahía Honda we reported the following five genera, all belonging to the subfamily Anyphaeninae: *Anyphaena* Sundevall, 1833; *Hibana* Brescovit, 1991; *Lupettiana* Brescovit, 1997; *Teudis*, O. P. Cambridge, 1896, and *Wulfila*, O. P. Cambridge, 1895. These genera include small spiders, from 4 to 10 mm, pale, with four or more teeth on the cheliceral retromargin.

1.1. In the genus *Anyphaena*, 79 species have been described, with worldwide distribution. They have the tracheal spiracle in the middle of the abdomen, the outer margin of the endites is nearly straight and the male palp has two projections on the tegulum - ventral and retrolateral (Brescovit 1997). Three species of *Anyphaena* have been reported in Panama. In Bahía Honda, we could not identify to species the female *Anyphaena* sp. collected on Island Canales de Tierra and we hope that some males might be collected before long.

1.2. In the genus *Hibana*, 17 species have been described as exclusive to America. They have eyes of almost equal size, the tracheal spiracle is very close to the epigastric furrow, the female epigynum has an oval median depression, and the basal part of the embolus of the male palp is considerably lengthened (Brescovit 1997). Six species have been reported in Panama. At Bahía Honda, a single immature *Hibana* was collected at Playa del Sol, and it was not possible to identify the species.

1.3. *Lupettiana* is a genus with nine described species, all exclusive to America. The species of *Lupettiana* have on the male palp a tibial retrolateral apophysis, curved at the top. The epigynum of the female has wavy lateral margins, the middle area only slightly sclerotized (Brescovit 1997). The only species reported in Panama is *Lupettiana mordax* (O. P. Cambridge, 1896), found from the USA to Brazil. We found two females and an immature between El Edén and Río Limón, Bahía Honda. The median apophysis of the palp of the male of *L. mordax* is very small, and the male has a ventral projection with a conical apex on the tegulum. The female is the same size as the male (length 5.6 mm), and has the lateral margins of the epigynum lengthened in front, and oval spermathecae (Brescovit 1997)

1.4. The genus *Wulfila* includes 43 species exclusive to America. They are recognizable by the marked ventral distal projection on the tegulum of the male palp, and because the palpal tibia has an expanded retrolateral apophysis inserted near the base, and the legs are long and thin (Brescovit 1997). Eleven species of *Wulfila* have been reported in Panama. In Bahía Honda we identified the following two species, both endemic to Panama : *W. maculatus* Chickering, 1937, species previously known only from Barro Colorado Island; and *W. mandibulatus* (Petrunkevitch, 1925), known from the Provinces of Panama and Colón. The male (3.77 mm in length) of *W. maculatus* has a tibial apophysis half the length of the palpal tibia, and the cymbium nearly double the length of the palpal tibia. The female (length 4 mm) of *W. maculatus* has two external copulatory openings in the epigynum, each with posterior and

middle borders. The male (3.4 mm long) of this species have a large tibial apophysis on the palp, near the middle of the tibia, and another small one near the apex of the tibia. The female (2.8 mm long) of *W. mandibulatus* has the epigynum in the form of a transverse rectangular plate (Petrunkevitch 1925).

2. ARANEIDAE: Figs. 19-24.

This family is known to spin fairly conspicuous orbicular webs (described as webs 'of high impact' by Craig 1987), with closely spaced spirals of sticky silk fibres. The webs serve to trap preys and in some species they also serve as a refuge. Many of the species are strictly diurnal and the spiders stay in the vertical webs during the day (*Argiope*, *Gasteracantha* and *Micrathena*) (Scharff and Coddington 1997). The family includes 168 genera, 39 of which have been reported for Panama, with 170 species. In Bahía Honda, the following 17 genera were identified, which included 36 species: *Acacesia* Simon, 1892; *Alpaida* O. P. Cambridge, 1889; *Araneus* Clerck, 1757; *Argiope* Audouin, 1826; *Cyclosa* Menge, 1866; *Eriophora* Simon, 1864; *Eustala* Simon, 1895; *Gasteracantha* Sundevall, 1833; *Larinia* Simon, 1874; *Mangora* O. P. Cambridge, 1889; *Metazygia* F. O. P. Cambridge, 1903; *Micrathena* Sundevall, 1833; *Parawixia* F. O. P. Cambridge, 1904; *Pronous* Keyserling, 1881; *Verrucosa* McCook, 1888; *Wagneriana* F. O. P. Cambridge, 1904; and *Witica* O. P. Cambridge, 1895.

2.1. In the orb-weaving spiders of the genus *Acacesia*, six species have been described, exclusive to America. These species have a triangular folium (a pigmented design or pattern) on the abdominal dorsum, in the centre of which there is a dagger-shaped marking with a black outline. In females the scape of the epigynum always extends posteriorly from the base (Glueck 1994). Two species of *Acacesia* have been reported from Panama. In Bahía Honda we identified *A. cor nigera* Petrunkevitch, 1925, which is found from Mexico to Brazil. The males (3.3 to 4.4 mm long) have a paracymbium on the palp with a broad distal lobe, always longer than the proximal lobe (Glueck 1994). The female (5.4 to 9 mm long) has an elongate epigynum with a lip on the posterior end of the scape.

2.2. In the genus *Alpaida*, 137 species have been described, exclusive to America. The body in this species is hairless, the cephalothorax is orange colored, and the epigynum is usually a transverse sclerotized structure, with posterior lips, and openings on each side of a median, short triangular scape that might have an anterior indentation (Levi 1988). The male of *Alpaida* has a notable characteristic on its palp: the radix, embolus and the terminal apophysis are fused into a single sclerite, a character not seen in other araneid genera (Levi 1988). In Panama 13 species of *Alpaida* have been reported. In Bahía Honda we identified *A. truncata* (Keyserling, 1865), a widespread species that is found from Mexico to Argentina. *A. truncata* is the only species of the genus *Alpaida* that has the abdomen truncate posteriorly, with four black posterior humps in both sexes. The more or less vertical webs of *A. truncata*, usually lacks a free sector, and the spiders sits in a retreat outside of the web plane (a curled leaf) and holds a signal line with one leg IV, and the cephalothorax is facing away from the orbweb (Levi 1988).

2.3. The genus *Araneus* includes 648 species that have been described worldwide. The epigynum always has an annulate scape (often with a spoon-shaped end directed posteriorly), the palpal patella has two setae, a very distinctive median apophysis, with spines or hooks on either end of the palpal bulb, and the cephalothorax is usually covered by setae (Levi 1991^a). Eight species of *Araneus* have been identified in Panama. In Bahía Honda we identified the two following species: *A. guttatus* (Keyserling, 1865), which is found from Costa Rica to Argentina and in the Caribbean, and *A. pagnia* (Walckenaer, 1841), distributed from the USA to Ecuador and in the Caribbean. Females (8.7 mm long) of *A. guttatus* have two dark, circular depression on the anterior border of the median plate of the epigynum (Levi 1991a). The male (4.8 mm long) of this species has a cone-shaped embolus (Levi 1991a). The female of *A. pagnia* is distinguished by an epigynum with a V-shaped slit opening ventrally on each side of the scape and a transverse white patch ventral on the abdomen. The male of *A. pagnia* is recognized by two equal-sized spines on the median apophysis, the first coxa has a hook on

the distal margin and by the tip of the embolus directed toward the tip of the cymbium (Levi 1991a)

2.4. In the genus *Argiope*, 82 species have been described worldwide. Three have been reported for Panama (Levi 1968). Only one species was found in Bahía Honda: *Argiope argentata* (Fabricius, 1775) (Figs. 19-20), with a widespread distribution, from southern USA to Argentina (but not present in Chile). These spiders can be seen in the patios and gardens of houses, clinging to the middle of their web during the day, silvery scales cover the carapace and the anterior part of the abdomen and a transverse white band across the venter (Levi 1968). *A. argentata* is characterized by an extraordinary sexual dimorphism: the male is 4 mm long, and the female around 12 mm. The female has on the posterior face of the epigynum two depressions, one on each side (Levi 1968). In their almost vertical webs, the adults has four zigzag stabilimenta forming a cross (Fig. 19), but these bands may be absent or incomplete. The immatures form a disc-shaped stabilimentum in the centre of the web (Fig. 20). The females deposit an egg sac, dorso-ventrally flattened, with a very resistant covering, usually greenish and with a serrated edge.

2.5. The genus *Cyclosa* includes 171 described species with a worldwide distribution. They spin a fine-meshed vertical web with a vertical stabilimentum composed of prey remains and stored, wrapped food; the female rests in the center, longitudinally camouflaged, and is difficult to see (Fig. 21). The male of *Cyclosa* has a paramedian apophysis in the palpus, and the female has an abdomen that is longer than wide and extends posteriorly beyond the spinnerets, and an epigynum divided by a scape posteriorly directed (Levi 1999). Eight species have been reported in Panama, only *C. bifurcata* (Walckenaer, 1842) was identified in Bahía Honda. This species is found from Costa Rica to Argentina and on the island of Hispaniola. The female (5.3 to 9.7 mm long) has five abdominal tubercles (two anterior-dorsal and three posterior) and the median plate of the epigynum is very large and sclerotized (Levi 1999). The male palpus has a conductor projecting beyond the bulb and a long, curved conductor tooth (Levi 1999).

2.6. The genus *Eriophora* has 20 species described worldwide. The female epigynum has a long scape, attached to the anterior of the base, and bends backward (Levi 1970). It often breaks off during mating, but rarely the tip of the scape breaks off in *E. edax* (Levi 1970). The radix, stipes and median apophysis of the palp of the male are much elongated, and the tegulum is compact. It also has a paramedian apophysis (Levi 1970). Females of *Eriophora* spin very strong webs, capable of trapping even small insectivorous bats (Levi 1970, shows a photo of *E. fuliginea* feeding on a captured bat in Panama). In Bahía Honda we identified three of the four species of *Eriophora* reported for Panama: *E. fuliginea* (C. L. Koch, 1838) (Fig. 22), found from Honduras to Brazil, and two species whose distribution extends from the USA to Brazil: *E. edax* (Blackwall, 1863), and *E. ravilla* (C. L. Koch, 1844). Males (12 to 16 mm long) of *E. fuliginea* have the median apophysis on the palp that lacks a spur and has a flat distal edge, and the embolus has a very distinctive fold near the tip (Levi 1970). The female (14 to 30 mm long) of *E. fuliginea* has a flat scape and the epigynum has a shield-shaped base (Levi 1970). The male (8 to 12 mm long) of *E. edax* has a cylindrical embolus in the palp (Levi 1970) and the female of the same species (12 to 16 mm long) has a keel on the epigynal scape and a large median sclerite projecting from the base of the epigynum (Levi 1970). The male (9 to 13 mm long) of *E. ravilla* is recognized by the spur on the median apophysis of the palp (Levi 1970), and the female by the wrinkled base of the epigynum (Levi 1970).

2.7. In the genus *Eustala*, 90 species have been described, present only in America (Chickering 1955). They are nocturnal spiders that eat their webs during the day and rest appressed to dead branches (Levi 1977). At nightfall they spin their vertical webs, with no retreat, one or two meters above ground (maximum height inside the canopy is not known) (Levi 1977). The females of *Eustala* are recognized as unique among the Araneidae in having the scape of the epigynum projecting anteriorly (with the exception of two species of *Metazygia*), and the males in having a single patellar macroseta on the palp, and the median apophysis is a white cone-shaped structure hanging down from the ventral part of the palpus. The genus *Eustala* has the largest

number of species among the Araneidae of Panama, 33 species have been reported. Seven species were identified in Bahía Honda, as follows: *E. bifida* F. O. P. Cambridge, 1904, known from USA to Costa Rica, and reported here for the first time for Panama; *E. devia* (Gertsch and Mulaik, 1936), found from the USA to Panama; *E. fuscovittata* (Keyserling, 1864), from Mexico to Brazil; *E. longembola* Chickering, 1955, known only from males, is present from Guatemala to Panama; *E. panamana* Chickering, 1955, endemic to Panama (hitherto known only by the holotype female from Cerro Punta, Province of Chiriquí), and *E. semifoliata* (F. O. P. Cambridge, 1899), known only by females from Guatemala to Panama.

2.8. The genus *Gasteracantha* includes 69 described species, only two are found in America. All the females of *Gasteracantha* have a sclerotized tubercle between the epigynum and the spinnerets, and their cephalothorax is square and rebordered (Levi 1996). The male cephalothorax is narrow anteriorly, and the paramedian apophysis in the palpus is circular (Levi 1996). The only species of *Gasteracantha* present in Panama is *G. cancriformis* (Linnaeus, 1758) (Fig. 23) a species widely distributed in America and very common in open fields in the tropics. There is a large variability in colors on the dorsum of the abdomen: yellow, white, orange, red, or black, with markings on a white ground (Levi 1996). Males (2.4 mm long) and females (4.3 mm long) have three spines (sometimes six, form of the spines is variable) projecting laterally and towards the back of the strongly sclerotized, flattened back of the abdomen (Levi 1996).

2.9. The genus *Larinia* includes 46 species described worldwide. They have an elongated, oval abdomen with longitudinal lines along the back and a preference for spinning their webs in open spaces, grasslands (Harrod, Levi and Leibensperger 1991). The spider sits in the hub of the web at night and on the vegetation to the sides of the web in daytime (Harrod, Levi and Leibensperger 1991). On the male palp, the most visible structure is the median apophysis, well developed and placed near the embolus (Harrod, Levi and Leibensperger 1991). The epigynum is lightly sclerotized and has a wrinkled scape enclosing a pocket with a lip at its tip (Harrod, Levi and

Leibensperger 1991). Only one species has been reported from Panama, *L. directa* (Hentz, 1847) found from the USA to Brazil and identified by us in samples of Bahía Honda. The cephalothorax is yellow, with an orange-brown longitudinal stripe extending backwards from the posterior-median eyes. The males (length 4.2 to 5.2 mm) have a thin tubular embolus placed diagonal to the main axis of the palp (Harrod, Levi and Leibensperger 1991). The female (6 to 10.5 mm long) has an epigynal scape almost as wide as it is long, with a very wide distal lip (Harrod, Levi and Leibensperger 1991).

2.10. The genus *Mangora* includes 51 described species worldwide. On the prolateral surface of the third tibia, the males and females of *Mangora* have very distinctive transverse rows of long, feathered trichobothria, and the abdomen is attached to the cephalothorax at a peculiar angle (Levi 1975). Many species of *Mangora* build their finely meshed orb-web with many closely spaced threads between the radii, without an open radius nor a retreat. The web is placed horizontally or vertically in bushes or pastures, especially in modified habitats (Levi 1975). Nine species of *Mangora* have been reported for Panama (Chickering 1954), and we identified two in Bahía Honda, as follows: *M. pia* Chamberlin and Ivie, 1936, endemic in Panama (Provinces of Panama and Colón), and *M. spinula* F. O. P Cambridge, 1904, found from Mexico to Panama. The male of both these species has a thick basal macroseta on the fourth femur. The male (4 to 5 mm long) of *M. pia* has a chitinized tooth in the endites, dorsal to the serrula, and its embolus is small, almost hidden. The female (5 to 6 mm) has a strongly ole (2.3 mm long) of *M. spinula* has an embolus in the palp originating near the distal end of the bulb, and three apophyses, terminal, subterminal and middle. The female (3.4 mm) has four teeth on the cheliceral promargin and two large teeth on the retromargin of the chelicerae; the epigynum is slightly sclerotized, and divided distally by a groove into two lobes, with a depression just anterior to the two lobes.

2.11. The genus *Metazygia* contains 89 species exclusive of America. The cephalothorax is hairless, the posterior median eyes are close together and face up, and the abdomen is oval, widest at the middle (Levi 1995). The male

of *Metazygia* has a small hook on the distal margin of the first coxa (Levi 1995). All the species build a vertical orbicular web in open habitats, with secondary vegetation, and they have a retreat in a curled leaf placed at the highest point of insertion of the web (Levi 1995). From this hide-out they keep a signal thread to recognize presence of prey caught in the web. Nine species have been reported in Panama, and in Bahía Honda we identified the following two species: *M. keyserlingi* (Banks, 1929), which is found from Costa Rica to Colombia and Trinidad, and *M. pallidula* (Keyserling, 1864), distributed from Mexico to Peru. In both these species the scape not extending beyond posterior margin of epigynum. In the male (2.3 to 3.6 mm long) of *M. keyserlingi* the embolus has no lobes, and the female (3.5 to 5.7 mm) has the anterior and lateral genital openings on the plate of the epigyne (Levi 1995). In the male (2.5 to 4.2 mm long) of *M. pallidula* the embolus has two lobules, and the embolus lamella has a sharp point (Levi 1995). The female (3.8 to 6.5 mm) of *M. pallidula* has a pair of oval openings in the shape of ears on each side of the epigynum; the cephalothorax is orange with a dark cephalic area, and the abdomen is pale with a pair of undefined black markings and an undefined dark folium (Levi 1995)

2.12. In the genus *Micrathena*, 105 species have been described as exclusive to America. These spiders are easily recognized by the very distinctive spiny abdominal projections in the females (which are not found on the abdomen of the males of most of the species), by the absence of hairs or tubercles on the cephalothorax behind the lateral eyes, and by the sclerotized ring around the spinnerets (Levi 1985). *Micrathena* stays in the centre of the web, with the cephalothorax facing downwards and the abdomen horizontal, parallel to the ground (Levi 1985). Unlike other araneids, *Micrathena* first bites prey that falls into their webs and then injects poison to immobilize it, wrapping it in layers of silk. Females of *Micrathena* deposit their egg sacs, with short tufts of silk fibres on the surface, among the vegetation near their web (Levi 1985). Twenty two species have been reported from Panama and we identified the following six species in Bahía Honda: *M. donaldi* Chickering, 1961, found from Costa Rica to Colombia; *M. horrida* (Taczanowski, 1873), from Mexico to Argentina and the Antilles; *M. mitrata* (Hentz, 1850), known from the USA to

Brazil; *M. quadriserrata*, F. O. P. Cambridge, 1904, distributed from Mexico to Venezuela; *M. saccata* (C. L. Koch, 1836), from Honduras to Brazil; and *M. sexspinosa* (Hahn, 1822) (Fig. 24), found from Mexico to Brazil.

2.13. In the genus *Parawixia* 28 species have been described worldwide. The males of this genus are characterized by having the paramedian apophysis in the shape of a disk, with a finger-like projection on the distal edge; in females, the scape of the epigynum is longer than wide, and originates at the rear end of the base (Levi 1992). Most of the species of *Parawixia* live in the forest canopy (Levi 1992). Many of them build an enormous web, with rather loose silk fibres, and sit in the centre of the web or in a rolled-up leaf placed on the edge of the web, a meter or two above ground (Levi 1992). Only one species of *Parawixia* has been reported as having social behaviour, *P. bistrinata* (Rengger, 1836), species known from South America. Six species have been reported from Panama, and only one was identified in Bahía Honda: *P. rigida* (O. P. Cambridge, 1889), found from Guatemala to Panama. This species is recognized by a white marking in the middle of the ventral surface of the abdomen, and the female (12 to 17 mm long) has a long scape, flattened laterally (Levi 1992). The males measure between 7.4 and 8.8 mm in length and are characterized by having the median apophysis curved, and with an indentation in the distal part (Levi 1992).

2.14. The genus *Pronous*, with 17 species described worldwide, is found in secondary forests and on grasslands. Members of this genus are characterized by the large size of their posterior median eyes, twice the diameter of the anterior median eyes, face laterally and are closer to the lateral eyes than to each other (Levi 1995). This structural apomorphy sets apart *Pronous* from all the other genera of the Araneidae (Levi 1995). *Micrathena* and *Pronous* share the following two apomorphies: the fourth pair of legs is longer than the first, and the abdomen of the male is almost rectangular (Levi 1995). Four species of *Pronous* have been reported from Panama, and the following three were identified in Bahía Honda : *P. intus* Levi, 1995, distributed from Costa Rica to Brazil; *P. shanus* Levi, 1995, endemic in Panama (Provinces of Coclé and Panama), and *P. wixoides*

(Chamberlin and Ivie, 1936), from Panama to Ecuador. Males of *P. shanus* (3.8-4.8 mm long) have the narrow transverse spine of the median apophysis placed in the middle of the median apophysis as well as an outer spine at right angle and a narrow notch between the outer spine and the median apophysis (Levi 1995). The males of both *P. intus* and *P. wixoides* present the outer edge of the median apophysis entire, with no indentation (Levi 1995). Males of *P. intus* (3.5 to 4.7 mm in length) present a thick embolus, whereas in *P. wixoides* it is long, thin and threadlike (Levi 1995). In the epigynum of the females of *P. shanus* (4.3 to 5-6 mm), there is an oval median plate with a small longitudinal ridge in the middle, and the edge of the epigynum has a raised border (Levi 1995). Females of *P. wixoides* (3.6 to 5.0 mm) have the sides of the posterior median plate almost parallel to each other, and a long median division (Levi 1995). Females of *P. intus* (4.6 to 5.6 mm) have the posterior median plate with a small ventral division (Levi 1995).

2.15. In the genus *Verrucosa*, only seven species have been described: one in Australia and the rest in America. Females of *Verrucosa* are the only araneids that rest in the web with the cephalothorax facing upwards (Levi 1976). The species are characterized by having tubercles on the posterior end of the abdomen, which is wider than long or as wide as long (Levi 1976). The male of *Verrucosa* has a distinctive curved tubercle on the tibia of the second leg, directed forward, with two macrosetae at its end. The male palp has the paramedian apophysis fused to the proximal part of the long, narrow conductor (Levi 1976). Only one species has been reported from Panama: *Verrucosa arenata* (Walckenaer, 1842) (5 to 11.9 mm long), found from the USA to Panama and in the Antilles, and identified among the material in Bahía Honda. The long scape of the epigynum almost reaches the spinnerets (Levi 1976). *V. arenata* is found in the woods and also in gardens. The female constructs a refuge on a fairly low, overhanging branch (Levi 1976), usually on the upper side of a broad leaf, which she folds longwise along the rachis, fastening it with strands of silk.

2.16. The genus *Wagneriana* has 41 species exclusive to America. The species of *Wagneriana* are characterized by their high cephalothorax, and in

the thoracic groove of the female there are two or more macrosetae, absent in *W. tauricornis* (Levi 1991b). The paramedian apophysis of the male palp of *Wagneriana* is an L-shaped rod, the embolus and the terminal apophysis are fused, and the base of the median apophysis is modified (a small depression or teeth but lacks the large concavity present in males of *Eriophora* and *Parawixia* (Levi 1991b). All the species construct a complete orbicular web, with no open sections, and they do not construct refuges but stay on the web with the cephalothorax facing downwards (Levi 1991b). Four species have been reported from Panama, and in Bahía Honda we identified the following two species: *W. taboga* Levi, 1991b, distributed from Panama to Venezuela, and *W. tauricornis* (O. P. Cambridge, 1889), distributed from the USA to Peru. Females of *W. taboga* (length 4.7 to 6.5 mm) have the epigynum framed on each side by lateral lobes, and the median plate consists of two round lobes (viewed from behind); the males (3.6 to 4.2 mm) have a sclerotized filament on the palps over the distal edge of the tegulum (Levi 1991b). The females of *W. tauricornis* (length 4.5 to 6.7) have a narrow neck at the base of the epigynum, and the males (3.8 to 4.9 mm) have a cymbium parallel to the median apophysis of the palp (Levi 1991b)

2.17. The genus *Witica* includes three species exclusive to America. The abdomen of the females of *Witica* have a kind of tail, usually with a constriction at its base, and the epigynum is flat, only lightly sclerotized and with a pair of depressions (Levi 1986a). The male of *Witica* is one of the smallest araneid spiders, 1.5. to 1.9 mm in length; the abdomen is sclerotized and the palp lacks a median apophysis and a conductor (Levi 1986a) but has a large embolus tip. The webs of *W. crassicaudus* are spun between trees about 1.5 meters apart, with the hub 1.5 meters above the ground (Levi 1986a). It does not make a stabilimentum, nor a retreat or decorations on lines (Levi 1986a). The only species reported in Panama is the *W. crassicaudus*, Keyserling, 1965, distributed from Mexico to Peru, and identified among the material of Bahía Honda. In the females (6.5 to 12 mm in length), the epigynum has a median septum as wide or wider than depressions at each side. In the males (1.4 to 1.7 mm), the base of the tip of the palpal embolus is cylindrical, curved tube (Levi 1986a).

3. CLUBIONIDAE:

Recent taxonomic revisions of this family (Brescovit and Bonaldo 1992, Brescovit, Bonaldo and Mikhailov 1994) have introduced drastic changes in the classification of these errant spiders (they do not spin webs to trap their prey). They have two tarsal claws, eight eyes in two rows and use their silk to build a tubular shelter in rolled leaves of plants or under stones on the forest floor, where they hide during the day. Two genera have been reported for Panama: *Clubiona* Latreille, 1804, with 412 described species, only one of them is present as an endemic in Panama (*C. alicae* Chickering, 1937) and *Elaver* O. P. Cambridge, 1898, with 45 described species, nine reported for Panama. In Bahía Honda we found only one species of Clubionidae: *Elaver lutescens* (Schmidt, 1971), widely distributed from Panama to Brazil and known only from females. The female of this species (7 mm body length) has a pale abdomen, nearly white, and on the epigynum the anterior, distinctive tongue-shaped scape has a wide base, not constricted.

4. CORINNIDAE:

Members of this family are recognized by the following combination of characters: two tarsal claws, cephalothorax and legs strongly sclerotized, eight eyes in two rows, anterior lateral spinnerets conical and close together at their bases, with a short distal segment, and the tegulum of the male with no median apophysis (Bonaldo 2000). The family is made up of 65 genera, of which 14 have been reported for Panama. In Bahía Honda we identified seven genera and ten species as follows: *Castianeira* Keyserling, 1879, with three species; *Trachelas* L. Koch, 1872, with two species; and *Corinna* C. L. Koch, 1841; *Creugas* Thorell, 1878; *Mazax* O. P. Cambridge, 1898; *Megalostrata* Karsch, 1880; *Parachemmis* Chickering, 1937, each with one species.

4.1. The genus *Castianeira*, with 132 species worldwide, is characterized by the presence of a thoracic groove, often strong, and by the anterior median eyes which are of the same size or slightly larger than the anterior lateral eyes. We identified the following three species of *Castianeira* in Bahía Honda:

C. dubia (O. P. Cambridge, 1898), known from Mexico to Panama, and *C. alba* Reiskind, 1969, reported from Costa Rica and Panama. Both species mimic ants or mutillid wasps and measure between 5.35 to 8.45 mm in body length (Reiskind 1969). Females of these two species have a wide oval abdomen with a small dorsal sclerite and several transversal bands of yellowish-white hairs alternating with brown or black bands. *Castianeira cincta* Banks, 1929, an endemic species in Panama previously known only from the central area of the isthmus, is distinctively smaller than the other two species, measuring 2.6 to 3.85 mm in body length.

4.2. The genus *Corinna* includes 69 species, three of which have been reported for Panama (Bonaldo 2000). Members of the genus have a subquadrangular cephalothorax with little narrowing of the cephalic area, chelicera with a long fang and the male palp has a tegular process and a sclerotized conductor with the prolateral margin bent ventrally, site where the embolus can be retracted. The only species we collected in Bahía Honda is *Corinna bulbosa* F. O. P. Cambridge, 1899, which measures 7 to 10 mm and is found from Mexico to Panama.

4.3. The genus *Creugas* includes 18 species in America, three of them in Panama. The species of this genus have males with an S-shaped reservoir, not spiraled, and the embolus with an apical division or a median process. The female epigynum has two small posterior openings for copulation or a large anterior copulatory opening with a well defined posterior margin. *Creugas mucronatus* (F. O. P. Cambridge, 1899), is the only species of this genus that we identified in Bahía Honda. Male total length is 11.5 mm, and that of the female 14 mm. The cephalothorax and chelicerae are black, the abdomen is creamy-white, with a dorsal, reddish-brown shield.

4.4. The genus *Mazax* has six species in America, all mimics of Myrmicinae ants. Two species of *Mazax* are known from Panama. In Bahía Honda we found *Mazax spinosa* (Simon, 1897), a species known from Central America and the Lesser Antilles. This species (4.6 to 6.6 mm long) has the pedicel wrinkled, the thoracic groove hardly perceptible and the cephalic region

scarcely narrowed. The male shows a constriction in the middle of the abdomen (Reiskind 1969).

4.5. The genus *Megalostrata* has five species reported as exclusive to America. Only one species is known from Panama, *M. raptor* (L. Koch, 1866), which is found from Mexico to Panama. The male chelicerae are almost as long as the cephalothorax and they have two large teeth on the retromargin (Bonaldo 2000). The female of the genus *Megalostrata* has two genital openings in the epigynum, the posterior region of the epigyneal plate is scarcely sclerotized and presents secondary spermathecae (Bonaldo 2000).

4.6. The genus *Parachemmis* includes three species, all American, and only one in Panama, *P. fuscus* Chickering, 1937, endemic to Panama (the central region of Panama and Colón Provinces). The palp of the male of *Parachemmis* has a simple retrolateral apophysis on the tibia and an articulated ventral apophysis (Bonaldo 2000). The female of the species has two genital openings and long copulatory ducts (Bonaldo 2000). The male (7.9 mm long) of *P. fuscus* has a wide laminar tegular process on the palp near the base of the embolus (Bonaldo 2000). The cephalothorax is dark red with blackish lines and the dorsum of the abdomen is brown. The coloring of the female (9.4 mm in body length) is very similar to that of the male.

4.7. The genus *Trachelas* includes 86 species, nine of which have been reported for Panama. The species of *Trachelas* are recognized by the brilliant red cephalothorax that contrasts with the pale color of the abdomen, by the total absence of macrosetae on the legs, and by the presence of series of ventral cusps on the three distal segments of the anterior pair of legs. Some species of *Trachelas* invade houses, and there have been reports in the USA of people being bitten and suffering severe pain and swelling. We found two species in Bahía Honda: *T. prominens* Platnick and Shadab, 1974, known from Mexico to Panama, and *T. triangulus* Platnick and Shadab, 1974, endemic in the centre of the Isthmus of Panama.

5. CTENIDAE: Figs. 25-28.

Among the diagnostic characters of the members of this family is that they have two tarsal claws (except for *Cupiennius* who has three), and the eyes arranged in three rows: 2, 4 and 2. They have teeth on both cheliceral margins. The genus includes 38 described genera, of which six are known in Panama. Two genera – *Ctenus* and *Phoneutria* - are notorious in medicine for their powerful neurotoxic venom that has caused the death of people and of domestic animals. Four genera were found in Bahía Honda, as follows: *Acanthoctenus* Keyserling, 1877, *Ctenus* Walckenaer, 1805, *Cupiennius* Simon, 1891, and *Phoneutria* Perty, 1833.

5.1. The genus *Acanthoctenus* is characterized by having a cribellum divided into two oval parts, and by the seven or more long spines on the ventral face of tibia I. This genus includes ten species, all in America, of which two are widely distributed in Panama. In Bahía Honda we identified *Acanthoctenus spiniger* Keyserling 1877, about 12.5 mm in length, known from Mexico to Venezuela. We found it under the bark of a tree-trunk rotting on the ground.

5.2. The males of the genus *Ctenus* have a well developed basal projection on the embolus. Like *Phoneutria*, they have no lateral spines on tibia I but they do have five pairs of macrosetae on its ventral margin. Of the 247 species described in *Ctenus*, four are known in Panama. We identified two species in Bahía Honda: *Ctenus sinuatipes* F. O. P Cambridge, 1897, known from Costa Rica and Panama, and *C. w-notatus* Petrunkevitch, 1925, a species endemic in Panama, whose male had never been described and we collected one male and two females.

5.3. The members of the genus *Cupiennius* have the tibia I equipped with lateral macrosetae and both sexes have four pairs of macrosetae on the ventral face of tibia I. Nine species have been described, seven of which are present in Panama. We identified the following three species in Bahía Honda:

5.3.1. *Cupiennius coccineus* F. O. P Cambridge, 1901 (Fig. 25) found in Costa Rica and Panama. In *C. coccineus*, as well as in *C. granadensis*, the sternum and the leg coxae are dark brown, and males have no maculae on the leg femora. The female (33 mm long) of *C. coccineus*

has femora of legs I to IV dark red (Fig. 25), and the male (24 mm) has the conductor of the embolus of the palp leaf-shaped (Lachmut, Grasshof and Barth 1985).

5.3.2. *C. granadensis* (Keyserling, 1877), is found from Costa Rica to Colombia. The female (14 mm long) of *C. granadensis* has the seminal receptacle I with distinctly S-shaped seminal ducts, and the male (14 mm) has the conductor of the embolus of the palp so transparent that it is hardly perceptible (Lachmut, Grasshof and Barth 1985).

5.3.3. *C. getazi* Simon, 1891, a species known in Costa Rica and Panama (Figs. 26-27, a grey variety on a mango tree near the beach at Playa del Sol, Bahía Honda, and a red variety; these specimens were not collected). The female (27 mm long) of *C. getazi* has the sternum and leg coxae almost black, on the ventral side of femora I – IV many small black spots; the male (21 mm long) has bulb with terminal apophysis bent downwards and markings on the femora of legs I to IV (Lachmut, Grasshoff and Barth 1985).

5.4. In both sexes of the genus *Phoneutria* a dense scopula is present on the internal face of the pedipalp tibiae and tarsi. In the male, the pedipalp tibia is distinctively longer than wide, and the ventral apophysis of the tibia is absent or very little developed. A striking feature of the behaviour of the only species of *Phoneutria* present in Panama, *P. boliviensis* (F. O. P Cambridge, 1897), is its defensive behavior: it raises the two anterior pairs of legs and moves its body repeatedly from side to side (Fig. 28). This species is the most dangerous spider in Panama, on account of its powerful neurotoxic venom, its large size (male 34 mm and female 40 mm), its aggressiveness, and the frequent invasion of houses (Quintero 1998).

6. DICTYNIDAE:

This family includes 48 genera, five of which have been reported in Panama. They are small spiders, between 1.2 and 8 mm long, with an undivided cribellum, whose calamistrum (comb of bristles on the fourth leg metatarsus) has a single row of bristles. They spin irregular tangled webs of cribellate silk (lack any glue on the threads), often on plants but also on

objects near the ground in open spaces. They are even found on fences, stone walls and on the walls of buildings (Chamberlin and Gertsch 1958). The male palp has no median apophysis, and has a retrolateral apophysis on the tibia. In Bahía Honda we found specimens of the following two genera, but were unable to identify the specimens to species :

6.1. *Dictyna* Sudenvall, 1833, is a genus with 114 described species, four of which have been reported for Panama. In both sexes the cheliceral promargin has three subcontiguous teeth, and the cheliceral retromargin has a single small tooth. The femur of the palp of the males is not modified and the embolus is a long spine of variable thickness. One female was collected, but this sex has no diagnostic specific characters that would enable us to make a more accurate determination.

6.2. *Thallumetus* Simon, 1893, is a genus with ten described species, three of them have been reported for Panama. Cheliceral promargin with three teeth and chelicera retromargin smooth, without visible teeth. The males of this genus have a strongly enlarged femur, and the tibia has two angled sclerotized processes. We collected one immature specimen, but were unable to determine the species.

7. HAHNIDAE:

This family is comprised of 25 genera, 15 of which are known in America. The distinctive feature shown by the members of this family is the arrangement of the three pairs of spinnerets in a transverse line. They have three tarsal claws. They are small (2 to 4 mm) and pale, except for a few patterns of color on the abdomen dorsum. They spin small webs of uncribellated silk, of irregular layers, sometimes placed in small hollows on the ground (Opell and Beatty 1976). This is the first report of this family in Panama. On Islas Canales, Bahía Honda, we identified a female of the genus *Hahnia* C. L. Koch, 1841, genus that includes 93 species. The members of the genus *Hahnia* have the tracheal spiracle closer to the base of the spinnerets than to the epigastric groove, and the antero-median eyes are much smaller than the antero-lateral (Opell and Beatty 1976). We identified

Hahnia banksi Fage, 1938, previously known from a single female (1.7 mm) which was described and collected among columns of army ants, *Eciton hamatum* (Fabricius, 1782) in Costa Rica (Fage 1938).

8. LINYPHIIDAE:

This is one of the spider families with the greatest diversity, includes 557 described genera. They are small, between 2 to 3.5 mm in length. The endites (maxillae) are parallel, and the chelicerae have fine lateral stridulatory grooves, have no condilus, and strong teeth appear on both edges of the cheliceras. The webs, very delicate and convex, are formed of horizontal layers of silk suspended by tangles of vertical strands, usually from nearby plants. The spider remains under the convex cupula (Foelix 1996). Eleven genera had been recognized in Panama, and in Playa del Sol, Bahía Honda, we identified a male of the genus *Tutaibo* Chamberlin, 1916, the first report of this genus in Panama, and which we identified tentatively as *T. phoeniceus* (O. P. Cambridge, 1894), a species formerly known in Guatemala and in Venezuela. Nine species have been assigned to *Tutaibo*, seven of which are from South America (two present in Colombia), one from the southern United States, and *T. phoeniceus* is found, as mentioned above, in Guatemala and Venezuela. The members of the genus *Tutaibo* are blackish, red or purple. The cephalothorax of the male is raised anteriorly but without lobules, and the palps have a large sclerotized apophysis on the anterior part of the tegulo and a large émbolo. The female is distinguished by the internal structure of the epigyne, the copulatory duct being rolled around the sperm (Millidge 1991).

9. LYCOSIDAE: Fig. 29.

This family is known as 'wolf-spiders', includes 99 genera which are characterized by their three tarsal claws. They are errant spiders, preferring to hunt their prey in the open. One genus in the tropics spins funnel-shaped webs on plants (*Sosippus*, see Brady 1962), webs which are confusingly similar to those of the family Agelenidae. They vary from small to large (2 to 35 mm in length), have three rows of eyes (4, 2, 2), the second row of postero-median being the largest (Fig. 29). They have a deep curve in the

trochanter of all the long legs. Eight genera have been reported in Panama, and in Bahía we found the following six : *Allocosa* Banks, 1900; *Hogna* Simon, 1885; *Lycosa* Latreille, 1804; *Pardosa* C. L. Koch, 1847; *Pirata* Sudenvall, 1833, and *Trochosa* C. L. Koch, 1847. The material of the last three genera could not be identified to species because they were immature animals or females that lack specific diagnostic characters.

9.1. *Allocosa* is a genus with 145 species described, of which only one has been reported from Panama, *A. panamena* Chamberlin, 1925, species that we identified in Bahía Honda. Adults of *A. panamena* measure between 3.1 to 6.3 mm in length, and are widely distributed from Mexico to Ecuador. They have two teeth on the cheliceral retromargin and two dark rings on the tegument of all the leg femora and tibiae.

9.2. *Hogna* is a genus with 233 species, four of which have been recognized in Panama. Species of *Hogna* measure between 10 to 24 mm in length and have three teeth on the retromargin of the chelicerae. Males have a spur on the palp at the base of the median apophysis. Females have the epigyne septum in the form of an inverted 'T', the longitudinal piece as long as the transversal or even longer. In Bahía Honda we found two female specimens 5.7 mm long of *H. tivor* (Chamberlin and Ivie, 1936), species endemic in Panama and hitherto known only from the central area of the isthmus.

9.3. The genus *Lycosa* includes 262 species. Members of *Lycosa* can reach the impressive size of 30 mm in length and in Europe their bites never deserved their bad reputation stuck to them since the Middle Ages, the dramatic alteration of the behaviour of people bitten; known as 'tarantism' (Foelix 1996). In South America, the bite of *Lycosa erythrognatha* Lucas, 1836, can cause necrotic skin lesions (Foelix 1996). Two species of *Lycosa* have been reported from Panama. In Bahía Honda we identified *L. cerrofloresiana* Petrunkevitch, 1925, a species known from El Salvador to Panama. The cephalothorax of the male of *L. cerrofloresiana* (7.8 mm long) is brown, with a yellow band in the middle, and the legs are yellow with diffuse markings. The females (16 mm long) have three teeth on each cheliceral

margin, and the epigyneal septum, separating two copulatory cavities, is widened transversally at the posterior margin (as in *Hogna*)

10. MIMITIDAE:

This family includes 12 genera, is remarkable for preying exclusively on other living spiders, and hence known as 'pirate spiders'. They are often found under leaves, waiting to attack other spiders, biting into one of their legs and the injected poison acts very quickly, paralysing the victim. The females of all the members of this family have rows of spines on the prolateral face of the tibiae and metatarsi I and II, the rows formed by short spines are interspersed with much longer ones. The males do not have this type of spine arrangement (Platnick and Shadab 1993). Two genera are known in Panama, and both were found in Bahía Honda: *Gelanor* Thorell, 1869, and *Mimetus* Hentz, 1832.

10.1 The genus *Gelanor* includes 16 species from America and one from India, and has eight species reported for Panama. *Gelanor* species (3.9 to 4.8 mm in length) are recognized by the extension of the sternum between the coxae IV, and by the fact that the tibiae and metatarsi of legs III and IV have few spines. The only species we found in Bahía Honda was *Gelanor distinctus* O. P. Cambridge, 1899, which is endemic in Panama from the Province of Chiriquí to the central part of the isthmus.

10.2 The genus *Mimetus* includes 62 species, eight of them known in Panama. The species of *Mimetus* are characterized by the short sternum, which does not reach coxae IV, and by the numerous spines on the tibiae and metatarsi of legs III and IV. In Bahía Honda we found *Mimetus trituberculatus* O. P. Cambridge, 1899, endemic in Panama. Only the female of *M. trituberculatus* is known (3.75 mm in length), previously collected only in Remedios, Province of Chiriquí. These females present a prominent upper margin on the epigyneal opening, with no emargination in the middle.

11. OECOBIIDAE:

This family is composed of six genera, only two of them present in America. In Panama, only *Oecobius* Lucas, 1848, has been reported, with two species: *O. concinnus* Simon, 1893, widely distributed from the USA to Venezuela, and *O. navus* Blackwall, 1859, a cosmopolitan species. The genus *Oecobius* includes 82 species. Members of this family are small spiders (1.5 to 4.5 mm in length) that have the cribellum partially divided in the distal part. They capture their prey, mainly ants, by immobilizing them with layers of cribellated silk that they secrete and propel with their hind legs, repeatedly circling halfway around the prey, facing away (Shear 1970). They have a greatly enlarged, mobile anal tubercle formed by two segments and surrounded by long hairs inserted around the base of the apical segment (Shear 1970). They have no teeth on the chelicerae. We collected one female of *Oecobius* in Bahía Honda but could not make a specific identification.

12. OONOPIIDAE:

This family has 56 described genera, 11 of them reported in Panama. They are small spiders, less than 2 mm long, living mainly on the ground in the woods among the fallen leaves, and sometimes on tree bark. They do not spin webs for hunting preys; they are errant and only spin silk bags in which to hide during periods of inactivity or to cover their eggs (Shear 1986). They have no thoracic groove in the cephalothorax, cribellum nor a calamistrum, and have 2 to 6 eyes. We collected two genera in Bahía Honda: *Dysderina* Simon, 1891, and *Oonops* Templeton, 1835.

12.1 The genus *Dysderina* includes 44 species, 13 reported for Panama.

Members of this genus are distinguished by conspicuous grooves on the sternum, and the abdomen is almost completely covered by two shields: a dorsal and a ventral one. We were unable to identify to species two females of *Dysderina* that we collected in Bahía Honda.

12.2 The species of *Oonops* have the anterior lateral eyes set well apart. They have no shields on the abdomen, and they present numerous spines on the legs (Chickering 1951). Eight species of *Oonops* have been reported

for Panama, and we identified from Bahía Honda a male of *O. donaldi* Chickering, 1951. This species is endemic in Panama and is known only from males (1.6 mm long), previously reported in the Provinces of Colón and Coclé (Chickering 1951).

13. OXYOPIDAE: Fig 30.

This family, known under the common name of 'lynx spiders', includes nine genera, four of which have been reported in Panama. They are hunters, active in the daytime in search of prey in the open (among brushwood, grassland and very few are arboreal). They may also lie quiet, waiting for their prey. The diagnostic characters of lynx spiders are the arrangement of the eight eyes in three rows (2, 4, 2), hexagonally positioned (eye arrangement that sets them apart from the Ctenidae); the very long macrosetae on the tibiae and metatarsi of their elongated legs, with three tarsal claws; and the long abdomen. We found in Bahía Honda the following three genera: *Hamataliwa* Keyserling, 1887, with 54 described species; *Oxyopes* Latreille 1804, with 273 species, and *Peucetia* Thorell, 1869, with 62 species.

13.1. Members of the genus *Hamataliwa* are mostly tree-dwellers. They are recognized by their having the cephalothorax very high and convex, the first pair of legs long and robust, and leg IV short and weakly developed. Their cryptic coloration is a mix of grey, brown and yellow. They have a single tooth on the cheliceral retromargin (same as species of *Oxyopes*) (Brady 1964, 1970). Ten species of *Hamataliwa* have been recognized for Panama, and in Bahía Honda we identified the following two species: *H. puta* (O. P. Cambridge, 1894), distributed from Mexico to Panama, and *H. tricuspidata* (F. O. P. Cambridge, 1902), found from Costa Rica to Guyana. The epigynum and the palp of *H. puta* (male 4.7 to 5.3 mm long, and female 4.7 to 6.1 mm) were illustrated by Brady (1970). When compared to other species of this genus, *H. tricuspidata* has a distinctive coloration (cephalothorax orange-yellow, the clypeus has a band of brown scales) and a different eye arrangement (the anterior lateral eye row is wider than the posterior median or of equal width) (Brady 1970).

13.2. Members of *Oxyopes* have leg IV more robust and distinctively longer than leg III. Three species of *Oxyopes* are known from Panama. In Bahía Honda we found males and females of the following two species of *Oxyopes*: *O. bifidus* F. O. P. Cambridge 1902, distributed from Mexico to Panama, and *O. salticus* Hentz, 1845, known from USA to Brazil. *O. salticus* is one of the most common spider inhabitants of tall grass and herbaceous vegetation in Central America (Brady 1975). They have mid-ventral black stripes on the femora and vertical black lines on the face, and the males have four longitudinal dusky stripes on the pale yellow carapace (Brady 1975). The genitalia of *O. bifidus* is diagnostic (see illustrations in Brady 1975), males are 4 to 5 mm long and females 4.8 to 6.6 mm long.

13.3. Three species of *Peucetia* are known to be present in Panama, and in Bahía Honda we identified a single species, *P. viridans* Hentz, 1832 (Fig. 30) which is found from the south of the USA to Panama and in the Antilles. Species of *Peucetia* are often found on the back of leaves, waiting for their prey, and given their large size (male 8.3 to 14.5 mm, female 11.8 to 21.6 mm) and bright green coloration dashed with yellow-orange, they have been much collected and studied. The females mate only once, and protect their egg sac until the young are born and disperse, a period of some six to eight weeks (Willey and Adler 1989, Fink 1987). Females of *P. viridans* spit toxic saliva while they are caring for their eggs (Fink 1984, 1987).

14. PHOLCIDAE:

Worldwide 66 genera of Pholcidae are recognized. Members of this family present in the Americas have been revised recently, and this has changed completely the former poor generic classification (47 genera, Huber 2000). They are extremely common in all types of buildings (synanthropic species), among fallen leaves in woods, in tree bark, caves, etc., and present a wide distribution in the most varied habitats. They generally spin tangled, three-dimensional webs. Species that live among fallen leaves spin small webs that are reduced silk sheets and they walk about on the ground (Huber 2000). Others spin dome-shaped webs with a tangle of silk lines on top

(Huber 2000). They are about one to 15 mm long, and have very long, thin legs and a round abdomen. They have no cribellum, they are haplogynous (females have simple genital organs, without fertilization ducts), they usually have 8 or 6 eyes, but sometimes fewer. The chelicerae are joined at the base and have a blade instead of teeth. Six genera have been recognized in Panama, and in Bahía Honda we found three: *Anopsicus* Chamberlin and Ivie, 1938, *Modisimus* Simon, 1893, and *Physocyclus* Simon, 1893.

14.1. The genus *Anopsicus* includes 64 species, all of them in America. We identified only one species of *Anopsicus* in Bahía Honda, *A. chickeringi* Gertsch, 1982 (female and male, 1.9 mm), previously known as endemic in the central part of the Isthmus of Panama. The males of *Anopsicus* have a spatulate tarsal appendage on the palp (Gertsch 1982), they do not have a proximo-lateral apophysis on the chelicerae and the palpal femur has a ventro-distal apophysis (Huber 2000).

14.2. In the genus *Modisimus*, 56 species have been described in America and an additional species is cosmopolitan. In Panama eight species of *Modisimus* have been recognized but none could be identified among the material in Bahía Honda as we had found only females of this species. The members of the genus are easily recognized by their six eyes set in an ocular tubercle.

14.3. In the genus *Physocyclus*, 20 species have been described, 18 from America, one from China and the other is cosmopolitan. The only species of *Physocyclus* reported for Panama is *P. globobus* (Taczanowski, 1874), which is cosmopolitan. Males of *Physocyclus* have small conical apophyses, sclerotized, on the frontal face of their chelicerae, and stridulatory lateral grooves (Huber 2000).

15. PISAURIDAE: Fig. 31.

Of the 51 genera of this family, four have been recognized as present in Panama, with distribution exclusive to the Americas: *Ancylometes* Bertkau, 1880, with 11 species, *Architis* Simon, 1898, also with 11 species,

Staberius Simon, 1898, with two, and *Thaumasia* Perty, 1833, with 17 species. Spiders of this family are commonly known as 'nursery-web spiders', and measure between 8 to 30 mm, they have 8 eyes in two rows (4, 4, with the exception of the genus *Ancylometes* which has a cteniform eye arrangement of 2, 4, 2), the posterior row strongly curved backwards. The cheliceral retromargin has three or four teeth, and there are three tarsal claws. In Bahía Honda we identified all the four genera recognized for Panama, and we report for the first time the genus *Tinus* F. O. P. Cambridge, 1901, with the species *T. ursus* Carico, 1976, hitherto known only from Costa Rica.

15.1. The species of *Ancylometes* are distinguished by having four teeth on the cheliceral retromargin and the metatarsus is densely scopulated. The only species reported in Panama is *A. bogotensis* (Keyserling, 1877) (Fig. 31), found from Nicaragua to Bolivia; a male was identified in Bahía Honda.

15.2. Members of the genus *Architis* have three teeth on the retromargin of the chelicerae, and long thin legs with numerous macrosetae. Females have two openings in the epigynum, and the palp of the males is compact, with no free sclerites. Two species of *Architis* have been recognized for Panama (Carico 1981); in Bahía Honda we identified only *A. nitidipilosa* Simon, 1898, distributed from Panama to Brazil. The diagnostic feature of this species is that males, females and penultimate stages construct permanent three-dimensional capture webs among the vegetation, with a horizontal funnel opening into two long vertical sheets of silk (Nentwig 1985).

15.3. Only one species of *Staberius* has been recognized for Panama, the *S. spinipes* (Taczanowski, 1874), distributed from Panama to Paraguay. Members of this species are recognized by the exceptionally long, numerous macrosetas on the legs (they measure up to half the length of the segment). The tibial apophysis of the male is articulated, and the female epigynum has only one opening.

15.4. Four species of the genus *Thaumasia* have been reported for Panama, and in Bahía Honda we identified *T. argenteonata* Simon, 1898 (male 7 mm

long, female 9 mm), which is found from Panama to Peru. Members of *Thaumasia* can be recognized by the presence of four pairs of macrosetae on the ventral face of tibiae I and II and by the male palp having a long complex tibial apophysis. The female shows a pair of large convex lobes in the epigynum.

15.5. The species of *Tinus* are characterized by a pair of semicircular elevations on the epigynum and a dorsal dark band on the abdomen, with grooves at each side. The forward-facing median apophysis on the palp of the male is spatulate and membranous (Carico 1976). Species of *Tinus* have been collected on top of rocks, tree-trunks and among fallen leaves on stream margins (Carico 1976).

16. PRODIDOMIDAE:

In this family 26 genera are recognized. Members of this family are recognized for having long divergent chelicerae, the two tarsal claws without teeth, and a distinctive lobe on the sternum projecting between coxae IV (Platnick 1990), but little is known of the biology of most of the genera. The following two genera, exclusive of America, have been reported for Panama:

16.1. *Lygromma* Simon, 1893, with 18 described species, distributed from Mexico to Peru, three of them are known from Panama. They measure between 1.9 to 4.6 mm long. Species of *Lygromma* have been collected among fallen leaves under trees in rainy forests of Venezuela and in caves in the Galapagos and Jamaica. They may have eight eyes or six or none at all (Platnick and Shadab 1976). Chelicerae of *Lygromma* have between seven to nine denticles on the promargin. Males have two to four retro-lateral apophyses on the palpal tibiae and do not have paracymbium. The females have internal and external ducts on each side of the spermathecae.

16.2. In the genus *Neozimiris* Simon, 1903, ten species have been described, measuring between 1.5 to 5.6 mm in length. They have eight eyes in two rows, the second row being sharply procurved. Males of *Neozimiris* are recognized by the single, long retrolateral tibial apophysis on the palp, and the

females have a curved spermathecae with median, lateral and posterior ducts (Platnick and Shadab 1976). *Neozimiris* has been reported from Panama with only one species, *N. chickeringi* Platnick and Shadab, 1976 (2.3 mm in length, type from Madden Forest Reserve, Province of Panama), the female is unknown. Males of *N. chickeringi* are recognized by the sinuosity of the long retrolateral tibial apophysis on the palp.

Specimens of these two genera (*Lygromma*, *Neozimiris*) collected among fallen leaves at Playa del Sol, Bahía Honda, were sexually immature, so the species could not be identified. Same as the immature specimen of *Lygromma* studied from Bahía Honda, only the two following described species of *Lygromma* are known to lack eyes (Shear and Peck 1992): *L. gertschi* Platnick and Shadab, 1976, from Jamaica, and *L. anops* Peck and Shear, 1987, from Galapagos Islands. Both species of *Lygromma* were reported from caves, and they differ from the other species included in the genus in having tarsal claws without teeth (Platnick and Shadab 1976). So the *Lygromma* specimen found at Playa del Sol may well be a species not previously described.

17. SALTICIDAE: Figs. 32-37.

This is the most highly diversified family of the Araneomorphae, with 533 genera described, 84 of them in Panama. In Bahía Honda we identified 27 genera with a total of 37 species. All the members of the Salticidae are easily recognized by their enormous anterior median eyes at the front of the cephalothorax, eyes that provide them with excellent sight and the ability to distinguish colors and form images. In nearly all the other spiders, sight plays a minor part in their behaviour, and chemical and tactile stimuli are much more important. The better sight of the Salticidae is used in elaborate displays in courting, in locating and trapping their prey (they do not use webs for this purpose), and in their mainly daytime activities. They are known as "jumping spiders" as they use their hind legs to jump distances of up to 16 cm. At night, and on dark rainy days, members of the Salticidae take refuge in their silk nests, which also serve for moulting and for constructing their egg sacs.

Of the 27 genera of *Salticidae* we identified in Bahía Honda, we present 19 first, discussed in their ten subfamilies as follows: Lyssomaninae, Euophryinae, Dendryphantinae, Synemosyninae, Synagelinae, Amycinae, Thiodininae, Pelleninae, Sitticinae and Plexippinae. The other eight genera have not yet been placed in subfamilies, their taxonomic positions have not been defined, and we group them here as 'Miscellaneous genera'.

17.A. Subfamily LYSSOMANINAE:

Members of this subfamily have a very distinctive appearance, with a narrow, cylindrical abdomen, terminating in a point, with long thin legs, and four rows of eyes in a highly raised ocular region (third row being much narrower than the fourth). In Bahía Honda we found the genus *Lyssomanes* Hentz, 1884, but not the other genus of this subfamily known for Panama, *Chinoscopus* Simon, 1901. *Chinoscopus* has no ventral macrosetae on the legs, and whose cephalothorax is flatter than that of *Lyssomanes*. In addition, the male palp has no median apophysis. In Panama, 13 species of *Lyssomanes* are known, all associated with rainforests. They are mainly pale green (Fig. 32) and prefer to ambush their prey on top of broad leaves (Galiano 1980). We identified four species of *Lyssomanes* in Bahía Honda: *L. bitaeniatus* Packham and Wheeler, 1889, distributed from El Salvador to Venezuela; *L. bryantae* Chickering, 1946, endemic in Panama; *L. elegans* F. O. P. Cambridge, 1900, distributed from Mexico to Brazil; and *L. remotus* Peckham and Peckham, 1896, reported from Panama to Brazil. The last three species belong to the *viridis* group (Galiano 1980), characterized by an embolus on the male palp having its basal half thickened and membranous, as well as by the female oval or spherical spermathecae, and two orifices in the epigynum.

17.B. Subfamily EUOPHRYINAE:

Males of this subfamily are recognized for having in the palp a spiral, terminal embolus separated from the tegulum by an inflatable, soft distal hemotodocha. In Bahía Honda we found the following five genera belonging to this subfamily:

17.B.1. *Amphidraus* Simon, 1900, a genus known by four species exclusive to South America (Argentina, Brazil and Bolivia) and reported here for the first time for Panama. Members of this genus are very small animals, less than 3 mm in length (Galiano 1967), characterized by two teeth on the promargin and three on the retromargin of the chelicerae. The male palp has the patella longer than the tibia, and two apophyses are seen on the tibia – the upper one is thin, flexuous and black, directed towards the distal end, and the other is thick and brownish, directed towards the ventral face (Galiano 1962). On the island of Canales de Tierra, Bahía Honda, we collected a female and a male of an hitherto undescribed species of *Amphidraus* which we will describe separately.

17.B.2. *Cobanus* F. O. P. Cambridge, 1900, a genus with two species reported for Panama, of which we found *C. flavens* (Peckham and Peckham, 1896) in Bahía Honda. The species of *Cobanus* have four pairs of macrosetae on the ventral face of tibiae I and II, and three pairs on the metatarsi I and II, as well as two teeth on both the pro- and retromargins of the chelicerae. *Cobanus flavens* (male 5.5 mm in length, female 6.5 mm) is an endemic species in Panama, abdomen and legs II to IV yellowish but the cephalothorax and first pair of legs are brownish-red.

17.B.3. *Corythalia* C. L. Koch, 1851, a genus with 21 species reported for Panama. They have a single retromarginal tooth on the chelicerae, and the males have dense fringes of hairs on the third pair of legs (sometimes found also on the first and second pair). We identified the following four species of *Corythalia* in Bahía Honda: *Corythalia bicinta* Petrunkevitch, 1925 (Fig. 33) (male 4.6 mm, female 5.5 mm); *C. clara* Chamberlin and Ivie, 1936 (female 4.6 mm in length, male unknown) (these first two are endemic in Panama); *C. spiralis* (F. O. P. Cambridge, 1901) (male 5 to 10 mm long, female 6 mm), species distributed from El Salvador to Panama, and *C. sulphurea* (F. O. P. Cambridge, 1901) (male 4.4 mm long, female 4.8 mm), species known in Costa Rica and Panama.

17.B.4. *Sidusa* Peckham and Peckham, 1895, genus with 18 described species, not yet revised, so we have only the original descriptions. Their

habits are mainly arboreal. In 1903, Simon considered this genus as a member of the 'fissidentate' group (with a bifid tooth on the cheliceral retromargin), but Chickering (1946, p. 241) disagreed with the placement of *S. recondita* as a fissidentate. Two species of *Sidusa* have been recorded for Panama. In Bahía Honda we collected *S. recondita* Peckham and Peckham, 1896 (male 3.5 to 6 mm long, female 4 mm), animals with two dark bands on each side of the abdomen, and the cephalothorax is brown with a short central band of white hairs behind the thoracic groove.

17.B.5. The genus *Chapoda* Peckham and Peckham, 1896 has not been placed in a subfamily. But in a recent personal communication, W. P. Maddison considers *Chapoda* a member of the subfamily Euophryinae, following his yet unpublished molecular phylogeny, so we have placed it in this subfamily. Four species of the genus *Chapoda* have been described, all of them reported from Panama. They have a fissidentate tooth on the retromargin of the chelicerae. In Bahía Honda we identified *Ch. festiva* Peckham and Peckham, 1896; the male (5.8 mm in body length) has a dark brown cephalothorax with a band of white hairs along each side and a cream-colored abdomen with a cover of brilliant scales. The coloring of the female (5.5 mm long) is similar to that of the male.

17.C. Subfamily DENDRYPHANTINAE:

Males of this subfamily have a carina on the ventrolateral face of the basal cheliceral segment, and the embolus shows a backward rolling hidden behind its basal part, usually visible only from behind the embolus. The genital openings of the female are S-shaped, with entrances facing laterally on the anterior half of the epigynum (Maddison 1996). In Panama 23 genera of this subfamily have been reported, and we found the following five genera in Bahía Honda:

17.C.1. *Mabellina* Chickering, 1946, is a monotypic genus, endemic to Panama. We collected a male at Playa Limón, Bahía Honda, of *M. prescottii* Chickering, 1946, species described from males only (4.9 mm long), types collected in the Panama Canal area and in Valle de Antón, Province of Coclé.

They are animals with the cephalothorax flattened in the ocular area, and the ventral face of the tibia I has four macrosetae on the anterior lateral margin and three on the opposite margin. The cheliceral retromargin has a single fissident tooth, and two small teeth on the promargin.

17.C.2. *Messua* Peckham and Peckham, 1896, with eleven species exclusivas to America and seven species reported for Panama. Males have long tubular chelicerae, divergent, with a long sickle-shaped tooth on their retromargin. We collected the following two species of *Messua* at Bahía Honda: *M. laxa* (Chickering, 1946), the male is 3.7 mm long, the female 5 mm, species endemic in Boquete, Province of Chiriqui, Panama, and *M. octonotata* (F. O. P. Cambridge, 1901), male 4.5 mm, female 5 mm, species previously known from Guatemala to Panama (Province of Bocas del Toro, near Fortuna).

17.C.3. *Tulpius* Peckham and Peckham, 1896, with two described species, one in Brazil and the other in Guatemala. This is the first report of this genus for Panama, with *T. hilarus* Peckham and Peckham, 1896, collected at Playa del Sol, Bahía Honda, a species hitherto known in Mexico, Guatemala and Costa Rica. Males and females measure 4 mm in length. They have a flat cephalic region with an almost perpendicular slope behind the posterior lateral eyes and a ventral crest on the palp tibial apophysis. The legs are pale yellow, green iridescent scales are present dorsal on the abdomen, and the base of the abdomen has a narrow white anterior fringe.

17.C.4. *Zygoballus* Peckham and Peckham, 1885, is a genus with 21 described species, six have been reported for Panama. The cephalothorax is wider behind the posterior lateral eyes, with a sharp slope behind them. Males have strongly developed chelicerae, with a thick apophysis on the lower lateral surface. Four of the six species reported for Panama are endemic, and two species present a wider distribution: *Z. rufipes* Peckham and Peckham, 1885, is found from USA to Panama and we collected it in Bahía Honda. *Z. tibialis* O. P. Cambridge, 1901, has been reported from Guatemala to Panama. Females of *Z. rufipes* (4.3 to 6 mm long) have a dark brown cephalothorax and a pale abdomen with two wavy longitudinal bands in the

middle. Males of *Z. rufipes* (3 to 4 mm long) have iridescent greenish-red scales on the cephalic area.

17.C.5. The determination that the monotypic genus *Orvilleus* Chickering, 1946 is present in Bahía Honda was based on the study of two color photos taken by Niko López at Playa Manglarito in January, 2002 (Fig. 34). It was impossible to identify to species the male in those two photos because their coloration differ from the description of *O. crassus* given by Chickering (1946), based only on the holotype male collected in Reserva Forestal Madden, Province of Panama, and not reported again. The female of that species is unknown. Since no specimens of *Orvilleus* were found in Bahía Honda, it was not possible to verify morphological features that would have allowed us a determination to species, as these details were not visible in the photos.

17.D. Subfamily SYNEMOSYNINAE:

Members of this sub-family look very much like ants, and they wave their first pair of legs as though they were antennae. The embolus is attached to the tegulum, and in numerous species it is long and curls around the upper part of the cymbium. This subfamily has seven genera in Panama, two of them are reported here for Bahía Honda:

17.D.1. *Myrmarachne* MacLeay, 1839, is a very diversified genus with 194 species. The males have enormous chelicerae, flat on top and projecting horizontally, with several teeth (more than two on each groove) (Galiano 1969). Females have small, pluridentate chelicerae and the patellae, tibiae and tarsi of the palps are wide, dorsoventrally flattened. The epigynum has two circular openings with their corresponding pair of spermathecae (Galiano 1969). Four species of *Myrmarachne* have been reported in Panama. In Bahía Honda we identified *M. centralis* (Peckham and Peckham, 1892), a species found from Mexico to Panama. The male of *M. centralis* has the cephalothorax orange-brown, feathery white hairs in the middle of the thoracic groove, and measures 4.9 mm in length, and the female, 4.6 mm. Both sexes have a shield dorsal on the abdomen, divided into two oval segments, the posterior segment being the larger of the two (Galiano 1969). Both male and

female have five pairs of macrosetae on the ventral surface of tibia I (Galiano 1969).

17.D.2. The genus *Synemosyna* Hentz, 1846, has 19 described species, exclusive to America. The fore part of the sternum is truncated, and it is not narrower than the base of the labium. The chelicerae are short, vertical and pluridentate (Galiano 1966). The abdomen is cylindrical in both sexes. The female has a single opening in the middle of the epigynum (Galiano 1966).

Two species have been reported for Panama. In Bahía Honda we identified *S. americana* (Peckham and Peckham, 1885) which is widely distributed from Mexico to Venezuela (Galiano 1966) and resembles the ants of the genus *Pseudomyr mex* (Cutler and Müller 1991). The kidney-shaped spermathecae of the female are distinctively longer than they are wide (Cutler and Müller, 1991). The male (6.3 mm long) has a thin embolus without a 'pars pendula,' and the distal part of the embolus is much shorter than the cymbium. A conical apophysis lies on the retrolateral surface of the palpal tibia, and a basal tubercle is present on the anterior surface of the chelicerae (Galiano 1969).

17.E. Subfamily SYNAGELINAE:

Three genera of this subfamily have been recognized as present in Panama. We identified only *Peckhamia* Simon, 1901 in Bahía Honda. The genus includes seven species, exclusive to America, all characterized by their resemblance to ants. They are recognized by their articulated embolus and by their habit of waving their second pair of legs in the manner of antennae. Two species of *Peckhamia* have been reported for Panama and we identified in Bahía Honda *P. variegata* (F. O. P. Cambridge, 1900) (Fig. 35) which is endemic in Panama (Bugaba, Province of Chiriquí). Male (3 mm long) and female (3.5 mm) of *P. variegata* have similar coloring – a brilliant bluish-black cephalothorax with a band of white hairs behind the cephalic area, and a brown abdomen with white hairs at the constriction.

17.F. Subfamily AMYCINAE:

Three genera have been recognized in Panama of this subfamily, of which we identified *Acragas* Simon, 1900, in Bahía Honda. This

genus comprises 22 species, exclusive to America, of which six are present in Panama. *Acragas* species are recognized by their very high cephalothorax, with straight, parallel and vertical chelicerae, with their anterior surface flattened and sometimes with an external carina terminating in an apical tooth. Cheliceral retromargin with two to six teeth, and the palps are very long and thin. We identified in Bahía Honda two species, both endemic in Panama: *A. fallax* (Peckham and Peckham, 1896), of which the male had been reported from the Provinces of Colón, Panama and Coclé (Galiano 1968). Galiano (1968) considered that that the female described as *A. fallax* by Peckham and Peckham (from the Province of Chiriquí) is actually *Cobanus* sp. The other species identified in Bahía Honda is *A. peckhami* (Chickering, 1946) (male 6.8 mm long and female 6.1 mm), the clypeus has a central tuft of white hairs that extends to the ventral margin of the clypeus. The embolus of *A. fallax* males is bifurcated distally but in *A. peckhami* the embolus is thick, not bifurcated, and has a groove at the tip.

17.G. Subfamily THIODININAE:

All the four genera of this subfamily have been reported as present in Panama. In Bahía Honda we found only *Thiodina* Simon, 1900, a genus comprising 18 species exclusive to America. The species of *Thiodina* are characterized by being pluridentated and by having two pairs of sensorial bulbous setae on the ventral surface of the tibia of leg I. Three species of *Thiodina* have been reported in Panama, and in Bahía Honda we found *T. sylvana* (Hentz, 1845) (Fig. 36), which is distributed from USA to Panama. Male of *T. sylvana* measure 11mm in length and the female, 13 mm. The male is marked with spots of white scales on both sides of the cephalothorax and dorsal on the abdomen with thin parallel white bands, surrounded by small black spots.

17.H. Subfamily PELLEININAE:

Two of the three genera that make up this subfamily have been reported from Panama. In Bahía Honda we identified *Habronatus* F. O. P. Cambridge, 1901, a genus that comprises 97 species exclusive to America. Most of the activities of this species occur near ground level, and the males

have distinctive hair patterns that come into play during the complex courtship displays. The tegular apophysis of the male palp has a very distinctive elbow (Griswold 1987). The third pair of legs is much longer than the fourth. The epigynum of the female has a median pocket with a posterior opening. Of the two species of *Habronatus* reported from Panama we identified in Bahía Honda *H. banksi* (Peckham and Peckham, 1901) which is distributed from Mexico to Panama and Jamaica. The male of *H. banksi* (3 mm long) has no laterally fringed leg I and the patella III lacks apophyses. The female measures 4 to 4.8 mm in length (Griswold 1987).

17.I. Subfamily SITTICINAE:

This subfamily includes three genera, one of them, *Jollas* Simon, 1901, has been reported for Panama. The genus *Jollas* includes six species that are exclusive to America; they have no teeth on the retromargin of the chelicerae, and the fourth leg is much longer than the third (Galiano 1991). Two species have been reported from Panama. We identified *J. geniculatus* Simon, 1901 in Bahía Honda, a species that is found from Panama to Venezuela. The female (3.8 mm long) has a reddish-brown cephalothorax, darker around the ocular area, and a marginal line of white hairs (Banks 1929).

17.J. Subfamily PLEXIPPINAE:

Of the 13 genera included in this subfamily, only one, *Plexippus* C. L. Koch, 1846, has been reported for Panama. This genus includes 52 species, most of them in Europe, Asia and Africa. The species of *Plexippus* have the embolus attached to the tegulum. Only *P. paykulli* (Savigny, 1827) has been reported in Panama. It is a cosmopolitan, synanthropic species. We report here for the first time in Panama *Plexippus fannae* (Peckham and Peckham, 1896), species known only from males and previously known only from Colombia and Guatemala. *P. fannae* has a marked depression between the eyes, and the abdomen is whitish with two reddish-brown longitudinal dorsal bands.

17.K. MISCELANEOUS GENERA:

In Bahía Honda we identified the following eight genera, that have not been classified into subfamilies, all are exclusive to America, except for the genus *Marpissa* and the following two species: *Freya dyali* Roewer, 1951, known only by females from India, and *Frigga crocuta* (Taczanowski, 1878), species known from Panama, Ecuador, the Galapagos Islands, Perú, as well as the Marshall Islands and Queensland, Australia, places where it was probably introduced. In Bahía Honda we identified 13 species in those eight genera. Seven of these eight genera have the embolus fixed (not articulated): *Freya* C. L. Koch, 1850; *Frigga* C. L. Koch, 1850; *Nycerella* Galiano, 1982; *Pachomius* Peckham and Peckham, 1896; *Phiale* C. L. Koch, 1846 (these five genera have in common a likeness to *Freya*, and W. P. Maddison considers that they should form a separate subfamily, Freyinae) (Maddison, personal communication); *Balmaceda* Peckham and Peckham, 1894, and *Marpissa* C. L. Koch, 1846 (these last two genera do not resemble *Freya*). Males of *Itata* Peckham and Peckham, 1894, have the embolus articulated and move it in relation to the tegulum by expansion of the distal hematodocha.

17.K.1. The genus *Freya* comprises 31 species, of which 16 have been reported for Panama. *Freya* males measure 6.2 to 9.9 mm, and the females 6.5 to 11.2 mm. Male palps have a membranous conductor, almost parallel to the embolus in the apical division of the tegulum (Galiano 2001). The epigynum of the females of *Freya* is a plate with a keeled and curved groove around the anterior margin and on the posterior border, a copulatory pocket is present (Galiano 2001). We identified the following three species of *Freya* in Bahía Honda: *F. albosignata* (F. O. P. Cambridge, 1901), known in Guatemala and Panama, and two species endemic in Panama, *F. arraijanica* Chickering, 1946, previously known only from Arraiján, Province of Panama, and *F. bifurcata* (F. O. P. Cambridge, 1901), which had been collected in the central part of Panama and in the Provinces of Chiriquí (Boquete and Bugaba) and Coclé (Valle de Antón).

17.K.2. The genus *Frigga* includes ten species, two of them reported for Panama. Males of these species have bifid the apophysis on the tibia of the

palp. In Bahía Honda we identified *F. pratensis* (Peckham and Peckham, 1885), species distributed from Mexico to Colombia. Males of *F. pratensis* are 10 mm long, females 8 mm. The cephalothorax of the male is reddish-brown to black, with a central band of white scales running from the posterior lateral eyes to near the posterior margin, and white bands on the lateral margins. The abdomen is red with dark margins and a central longitudinal band of white scales. The *F. pratensis* female has a central, longitudinal groove in the epigynum and an emargination along the posterior margin.

17.K.3. The genus *Nycerella* includes nine species, five of them reported for Panama. Females of *Nycerella* have a smooth epygineal plate, with only two orifices on their surface, but in some species a pocket is present on the posterior margin (Galiano 1982). Males of *Nycerella* have a simple bulb and their embolus lacks any additional structures (Galiano 1982). We identified in Bahía Honda *Nycerella deleita* (Peckham and Peckham, 1896), species known from Mexico to Panama. Males of *N. deleita* are 5.1 mm long, females 6.2 mm. Male cephalothorax is black and the female's is brownish with a central, longitudinal band of white hairs (Galiano 1982).

17.K.4. Five species are recognized in the genus *Pachomius*, three of them reported for Panama. Males of *Pachomius* have a short, conical embolus, sometimes with denticles and folds at its base (Galiano 1994). In Bahía Honda we identified *P. dybowskii* (Taczanowski, 1871), a species distributed from Mexico to Ecuador and Brazil. Both sexes measure 5.7 mm long. Males of *Pachomius dybowskii* have a bulb with a basal, retro-lateral lobe. In the females, the grooves of the epigynum are almost horizontal.

17.K.5. In the genus *Phiale* 36 species have been recognized, ten of them reported from Panama. Some species of *Phiale* have polymorphic females with variable colorations (monomorphic males), and this variability makes difficult their identification (Galiano 1981). The cheliceral promargin of the female has two teeth, and the retromargin only one. In Bahía Honda we identified the following four species: *P. bicuspidata* (F. O. P. Cambridge, 1901), reported for Costa Rica and Panama (male 7 mm long, female 8 mm);

P. crocea C. L. Koch, 1846, species distributed from Panama to Brazil; *P. guttata* (C. L. Koch, 1846) (Fig. 37), species found from Costa Rica to Paraguay, and *P. simplicicava* (F. O. P. Cambridge, 1901), known only in Mexico and Panama.

17.K.6. Eight species are known in the genus *Balmaceda*, four of them reported for Panama. They are recognizable by the dorso-ventral flattening of their body, because they have two small teeth on the cheliceral promargin and the strong fissentaded tooth on the retromargin. Males of *Balmaceda* have a robust apophysis on the retro-lateral margin of the palpal tibia. In Bahía Honda we identified *B. picta* Peckham and Peckham, 1894, reported for Guatemala and Panama, the male measuring 6 mm long and the female 7.4 mm. Males of *B. picta* have the femur of the palp slightly curved, and the embolus projects from near the base of the bulb and occupies less than half the width of the bulb.

17.K.7. The genus *Marpissa* comprises 58 species of which *M. magna* Peckham and Peckham, 1894 is the only one reported for Panama. It was also identified in Bahía Honda. The species of *Marpissa* are 3 to 10 mm long. The abdomen is elongated and generally brightly colored. One tooth lies on the retromargin of the chelicerae, and two on the promargin (Logunov 1999). The male has a hooked tooth on the endite (maxilla), and the cephalothorax is dorso-ventrally flattened. The male of *Marpissa magna* measures 10.9 mm long and the female 10 mm.

17.K.8. Five species are known for the genus *Itata*, but in Panama only one has been reported, *I. completa* (Banks, 1929), endemic in the central part of the isthmus. We identified *I. completa* in Bahía Honda; males measure 9 to 10 mm long and females, 10.3 mm. The cephalothorax is dorsoventrally flattened and very wide, and the abdomen very long and narrow and truncated at the base (Chickering 1946). In the male, the retro-lateral margins of the tibia and the metatarsus of leg I are densely covered with hairs. The epigynal plate of the female is especially large, with a conspicuous emargination at the posterior margin.

18. SCYTODIDAE: Fig. 38.

These are known as 'spitting spiders' on account of their ability to squirt out a sticky venom from the tip of the vibrating cheliceral fang, a distance of 1 to 2 cm. The venom is synthesized in the anterior portion of poison glands inside the cephalothorax, the posterior part serving to prepare the gluey component of the poison. All the 'spitting spiders' have the dorsal surface of the cephalothorax notably arched, with no thoracic groove (and this is a diagnostic feature). In addition, they have six eyes arranged in three pairs, very thin legs, and the abdomen is globular-shaped. The bulb of the male palp lies near the base of the tarsus. The female has chitinous ridges behind the genital groove, linked in some species to chitinous lateral depressions.

The family Scytodidae has five genera but only *Scytodes* has been reported from Panama and it is the only genus present in America. *Scytodes* has 138 species, five reported in Panama (Valerio 1981). We found the following two species in Bahía Honda, with pantropical distributions and synanthropical: *S. fusca* Walckenaer, 1837 (Fig. 38), and *S. longipes* Lucas, 1844. They are very common spiders in dark places, under stones and fallen trees, and inside of caves, and they are often found inside of houses and on the outside walls, where they spin irregular webs.

19. SELENOPIIDAE:

This family includes three genera, only one of them reported for America and Panama: *Selenops* Latreille, 1819. The species of *Selenops* have 8 eyes in two rows, six in the anterior row and two in the rear. They have a flattened appearance, with long legs inserted on their sides, they make quick escapes by running sideways, not forward. They have two tarsal claws, either pectinate or smooth. They are often found under wide leaves and sometimes they invade houses. They spin a round flat egg sac covered with dense, resistant silk, and the female sits on top to protect the eggs. The genus *Selenops* comprises 91 species, 7 of which have been reported for Panama. They are between 7.5 to 17 mm long. In Bahía Honda we found a male of this genus that may well be of the opposite sex, not described, of one

of the following two species of *Selenops* present in Panama that are known only by the females:

19.1. *S. aissus* Walckenaer, 1837, with caudal margin of epigynum distinctly notched and strongly produced medially (reported from USA, Bahamas, Cuba, Martinique and from the following localities in Panama: Remedios, Province of Chiriquí, and Soná, Province of Veraguas, and

19.2. *S. buscki* Muma, 1953, with median caudal notch of epigynum much narrower than one-third of the epigynal width (previously known only from the holotype female from Taboga Island, Province of Panama).

20. SENOCULIDAE:

Members of this family have the habit of lying flat on the bark of trees and sometimes inside rolled dry leaves tied with silk strands (guarding an egg sac inside the roll). They are also seen on top of leaves along pathways and they escape very rapidly. They spin an elongated, oval egg sac, tied by silk thread to leaves. The eyes are arranged like those of the Ctenidae (2, 4, 2), the two anterior median eyes located near the lower margin of the clipeus. The tarsi of the legs have two or three irregular dorsal rows of trichobothriae (Griswold 1993). On each side of the epigynum, a horn-shaped projection faces forward, and behind it there is a depression leading to the copulatory opening (Griswold 1993).

The family has only one genus known in America: *Senoculus* Chickering, 1953, with 31 described species, of which we identified two species in Bahía Honda: *S. canaliculatus* F. O. P. Cambridge, 1902, known from Mexico to Panama (Chickering 1941), and *S. rubicundus* Chickering, 1953, a species previously considered endemic in the Canal region of Panama, and known only by the female (9.7 mm long). Both these species have three teeth both on the cheliceral pro and retromargins. The female of *S. canaliculatus* is dark yellow with brown markings.

21. SPARASSIDAE: Fig. 39.

This family includes very large spiders with teeth on both cheliceral margins. The legs are arranged for walking sideways and the first two pairs of legs are not thickened. They have two tarsal claws (like other

errant spiders) with teeth, and eight eyes in two rows (4 - 4). The family Sparassidae includes 89 described genera, with the greatest diversity of species occurring in the tropics. Seven of these genera have been reported for Panama. In Bahía Honda we identified the following two genera, both with an emargination in the leg trochanter: *Heteropoda* Latreille, 1804, and *Olios* Walckenaer, 1837.

21.1. The genus *Heteropoda* includes 174 described species, most of them reported from Asia and Australia. Only one species is known in Panama : *H. venatoria* (Linnaeus, 1767) (Fig. 39), a species with synanthropic habits and wide pantropical distribution. It is one of the largest spiders of Panama (22 to 28 mm long) and it often invades the dark corners of houses, looking for cockroaches. The long legs are placed laterally, the first and second pairs are positioned together on each side, giving the impression that the spider has only three pair of legs. Four pairs of ventral macrosetae insert on tibia I, and the anterior median eyes are smaller than the antero-lateral. They are known as 'banana spiders' because they are often carried in loads of bananas. Females of *H. venatoria* construct a flat, disk-shaped egg-sac, about 15 mm in diameter, with some 200 eggs, that the female carries on the ventral part of the sternum, held in place by a cheliceral grip. Two teeth are inserted on the cheliceral promargin and four on the retromargin.

21.2. The genus *Olios* includes 253 species, four of which have been reported in Panama. A fifth species, *O. ferrugineus* (C. L. Koch, 1834), known only from females, may well be present in Panama, as suggested by its present known distribution (Mexico, Guatemala and Brazil), but it has not been found in Panama yet. The species of *Olios* have two pairs of ventral macrosetae on tibia I, and the anterior median eyes are as large as the antero-laterals, or even larger. In Bahía Honda we identified two species of *Olios*, both of them known from only one sex: *O. formosus* Banks, 1929 (15 to 16 mm long), endemic in Panama (Barro Colorado Island and Fort Sherman), and known only from females, and *O. stylifer* (F. O. P. Cambridge, 1900) (9 mm long) has been reported from males in Mexico, El Salvador, Panama and Brazil. The male of *Olios* that we found in Bahía Honda could well be the undescribed

male of *O. formosus*. Unfortunately, we were unable to find females in association with this male, females that would have allowed us to check the identification and rule out the possibility that it is the undescribed male of *O. ferrugineus*. The *Olios* from Bahía Honda is quite different from the male of *O. stylifer*, a species reported by Harrison (1968) for Panama, in banana plantations in Changuinola, Province of Bocas de Toro. In the male of *O. stylifer* the bulb of the palp is cylindrical and truncated at the tip, and the embolus is spiral-shaped. We noticed that in Camino Plantación, Parque Nacional Soberanía, Province of Panama, females of *O. formosus* construct refuges in rolled-up leaves of bushes growing beside the paths. They tie them transversely with three thick silk fibres, leaving the ends open as a way of escape.

22. TETRAGNATHIDAE: Figs. 40 – 42.

This family includes 57 described genera. The family limits have been modified by revisions made recently by H. W. Levi, Harvard University; cited in the following paragraphs. The Tetragnathidae was formerly included in the Araneidae, particularly because they spin orbicular webs. Members of the Teragnathidae are recognized by the configuration of the male palp, with a lateral apophysis at the base of the embolus, the embolus is rolled around the conductor, and the tibia is cone-shaped. In the female the epigynum is flat (does not have a tridimensional configuration) or it is absent, and silvery or white markings are often seen on the dorsal area of the abdomen. The male chelicerae are much longer than those of the female, and they are used to grip or to immobilize the female during mating.

In Panama, 15 genera of Tetragnathidae have been reported. We identified the following seven genera in Bahía Honda: *Azilia* Keyserling, 1881; *Chrysometa* Simon, 1894; *Glenognatha* Simon, 1897; *Leucauge* White, 1841; *Mecynometa* Simon, 1894; *Nephila* Leach, 1815, and *Tetragnatha* Latreille, 1804.

22.1. In the genus *Azilia*, nine species have been described, all exclusive to America. These spiders have an egg-shaped abdomen, wider anteriorly, and the male chelicerae are not enlarged. The epigynum is slightly raised, with the

copulatory openings on the posterior face (Levi 1980). These species prefer to live in dark places and caves, and are active at twilight. They spin a web that may be vertical or horizontal, and the spider waits on the underside of the web and oscillates the web when disturbed (Levi 1980). *A. guatemalensis* O. P. Cambridge, 1889, has been reported from Panama, and it is found all over Central America and as far south as Peru, and in St. Vincent Island. We report here *Azilia affinis* O. P. Cambridge, 1893, for the first time in Panama, having collected two males (6.8 mm long) and four females (8.9 mm) on Isla Canales de Tierra, Bahía Honda. This species had been previously reported from USA to Costa Rica. They have transverse bands, shaped like inverted-V's dorsal on the abdomen, and on the underside there is a very distinctive pale square patch (Levi 1980). An X-shaped depression is present on the thoracic region (Levi 1980).

22.2. The genus *Chrysometa* includes 127 described species, exclusive of America. Palps of the male of this genus have a terminal apophysis, generally attached to the embolus, but there is no median apophysis (Levi 1986b). They also lack the long tribothriae on femur IV. The whole dorsal surface of the abdomen shows silvery markings and the underside is dark with a longitudinal line of silvery spots running on each side (Levi 1986b). Ten species of *Chrysometa* have been reported in Panama. In Bahía Honda we identified *Ch. alboguttata* (O. P. Cambridge, 1889), a species found from Mexico to Colombia. The transverse bar on the epigynum of *Ch. alboguttata* females is nearly four times wider than the septum (see Fig. 14, page 103, Levi 1986b). Males measure 2.9 to 4.6 mm in length and the females 3.5 to 5.2 mm. On the male palp of *Ch. alboguttata*, the projection of the middle apophysis (seen from below) is double, the lower projection is longer than the upper one (Levi 1986b, Fig. 566, page 185).

22.3. In the genus *Glenognatha* 20 species have been described, with worldwide distribution. They have a spherical abdomen and a flat cephalothorax, with three teeth on the cheliceral promargin and four on the retromargin. Males of *Glenognatha* have enlarged chelicerae, sharply divergent, and females have a very simple epigynum with an anterior internal

spherical chamber (Levi 1980). Two species of *Glenognatha* have been reported in Panama. In Bahía Honda we identified *G. foxi* (McCook, 1894) which is found from USA to Panama. Males of *G. foxi* measure 1.4 to 2.2 mm long and the females 1.6 to 2.6 mm in length (Levi 1980). The male of *G. foxi* has a large spherical tegulum on the palp.

22.4. *Leucauge* is a genus with 175 described species, characterized by the presence of feathery trichobotrias on the anterior surface of the femur of the fourth leg, similar to those present in species of *Mecynometa*. The species of *Leucauge* have the abdomen longer than the wide (Fig. 40), and a deep depression on the cephalothorax forms the thoracic groove. They are often found on modified lands, especially pastures. In Panama 14 species of *Leucauge* have been reported. We identified the following six species of *Leucauge* in Bahía Honda: *L. acuminata* (O. P. Cambridge, 1889), known all over Central America and in Panama; *L. argyra* (Walckenaer, 1842), found from USA to Brazil; *L. lugens* (O. P. Cambridge, 1896), known only from females reported from Mexico and Panama; *L. moerens* (O. P. Cambridge, 1896, Mexico), known from Mexico to Panama and Puerto Rico; *L. saphes* Chamberlin and Ivie, 1936, known only from females collected on Barro Colorado Island, Province of Panama, and *L. venusta* (Walckenaer, 1842), reported from USA to Panama.

The species *Leucauge acuminata*, *L. venusta* and *L. argyra* have longitudinal bands on the abdomen, whereas *L. saphes* has only one band on the silvery abdomen and a pair of dark markings at the base of the abdomen. In *L. lugens* and in *L. moerens*, the abdomen has no longitudinal bands but it has irregular markings which may be of several colours or occasionally spots might have a single color. In *L. acuminata* the abdomen projects over the spinnerets, and the epigyneal opening has no transverse anterior margin. In females of *L. venusta* the epigynum has a median depression, and on the mid-ventral surface of the abdomen there are small silvery markings and two silvery triangles. The male of *L. venusta* has the tibia of the palp as long as the cymbium or even longer. In females of *L. argyra* the epigynum has a median cone, and the male palp has the tibia shorter than the cymbium and the cymbium has a dorsal hook (Levi 1980).

22.5. It is very difficult to separate the species of *Mecynometa* from those of *Leucauge* (Levi 1980). In *Mecynometa* the abdomen has a posterior projection that extends beyond the spinnerets. In *Mecynometa* 13 species have been described, only one reported in Panama which was also found in Bahía Honda, *M. globosa* (O. P. Cambridge, 1889), a species known from Guatemala to Panama. The male of *M. globosa* is 2 mm in length and the female, 2.7 mm. In males, the abdomen is almost globular and the chelicerae vertical and parallel. The genital opening in the female epigynum is small and inconspicuous.

22.6. In the genus *Nephila* 52 species have been described, with worldwide distribution. Only one species of *Nephila* is known to be present in Panama, *N. clavipes* (Linnaeus, 1767) (Figs. 41-42), known from USA to Argentina. Females of *N. clavipes* spin an enormous web, 1 meter or more in diameter, with a barrier above used to intercept the flight of prey, barrier that extends the orbicular web more than a meter above. The web is decorated with a vertical stabilimentum (a ribbon of reinforced silk, whose function is not clearly understood) (Robinson and Robinson 1973) or with yellow pigments on the silk threads, pigments that presumably help to attract insects in flight to the web (on account of their ultra-violet reflecting properties) (Craig and Bernard 1990). Unlike other *tetragnatides* which carry out a complete daily overhaul of the web so the sticky fibres will not dry out or become soiled by dust, the adults of *N. clavipes* repair only half or one third of the web every day, whatever the damage the web might have suffered or whatever the amount of prey captured (Nentwig and Spiegel 1986). The young of *N. clavipes*, however, rebuild their whole web every day (Nentwig and Spiegel 1986). The spider immobilizes its prey by injecting venom with the chelicerae, then withdrawing from the prey or directly removing it from where it was captured and wrapping it with silk (Robinson and Mirick 1971). Immature females are often found with several adult males living in their enormous web, waiting for them to mature sexually and then trying to inseminate them. The males are small (4.6 to 10.5 mm long) and the distinctly large adult female measures between 19 to 34 mm (Fig. 41). It is also common to find cleptoparasitic

spiders, especially those of the genus *Argyrodes*, living in the enormous webs of *N. clavipes*. When these parasites become too numerous, the female leaves the web and builds another somewhere else. Genes of the silk have been isolated from the silk glands of *N. clavipes* and cloned in goats to collect silk proteins in the milk (Nexia Biotechnologies Inc., Canada). A sub-species has been described, *N. clavipes fasciculata* (De Geer, 1778), which has a similar distribution and has been poorly characterized.

22.7. The species of *Tetragnatha* are characterized by their elongated abdomen and the males have long, strong, and distinctly divergent chelicerae, with numerous teeth on both margins. The lateral eyes, anterior and posterior, are spaced well apart. They prefer to spin their webs in grasslands and on river banks where they cling to the stems and branches with their short third pair of legs, the other legs are extended horizontally. In the genus *Tetragnatha* 321 species have been described, with worldwide distribution, 32 of these species have been reported from Panama. In Bahía Honda we identified eight species, all present in the identification key of Chickering (1957): *T. cognata* O. P. Cambridge, 1889, known from Guatemala to Panama; *T. fragilis* Chickering, 1957, formerly considered endemic in the Provinces of Panama and Colón; *T. laboriosa* Hentz, 1850, found from Canada to Panama; *T. mexicana* Keyserling, 1865, from Mexico to Panama; *T. pallescens* F. O. P. Cambridge, 1903, from USA to Panama and in Caribbean islands; *T. pallida* O. P. Cambridge, 1889, known in Costa Rica and Panama; *T. tenuisima* O. P. Cambridge, 1889, from Mexico to Brazil and in the Caribbean islands, and *T. tropica* O. P. Cambridge, 1889, from Mexico to Panama.

Two of these eight species, *T. fragilis* and *T. tenuisima*, do not have macrosetae on the legs. The male of *T. fragilis* has on the prolateral cheliceral surface a short spur, with a bifid tip, and the paracymbium of the palp is also distinctively bifid at the tip (Chickering 1957). The male of *T. tenuisima* has a sinuous spur on the prolateral cheliceral surface, spur that has two robust tubercles on the apex, dorsal and ventrally, and the short paracymbium on the palp is not bifid. (Chickering 1957).

The following four species of *Tetragnatha* have macrosetae on the legs, and the palp tibia is much longer than the patella: *T. mexicana*, *T. pallescens*, *T. pallida* and *T. tropica* (Chickering 1957). Males of *T. pallescens* and *T. tropica* have a large tooth on the fore margin of the chelicerae (Okuma 1992), tooth absent on this margin in *T. mexicana* and *T. pallida*. Males of *T. pallescens* differ from those of *T. tropica* in having the conductor of the palp distinctively sickle-shaped, while in *T. tropica* it is only slightly curved, with a small tooth at the tip. The males of *T. mexicana* differ from those of *T. pallida* in having three spiral plates near the middle of the conductor, and the males of *T. pallida* have very long, thin and straight conductor and cymbium (Chickering 1957).

Two species of *Tetragnatha*, *T. laboriosa* and *T. cognata*, have macrosetae on the legs, an enormous tooth on the prolateral surface of the chelicerae (Okuma 1992), and the length of the palp tibia is almost equal to that of the patella. Males of *T. cognata* differ from those of *T. laboriosa* in having the conductor and embolus distinctly thickened and with a blunt tip (Okuma 1992), whereas those of *T. laboriosa* have twists in the embolus at the base of the conductor, and the conductor has a small wedge-shaped projection at the tip (Fig. 11F, page 231, Okuma 1992).

23. THERIDIIDAE:

In the Theridiidae 76 genera have been described. They spin irregular webs in which they hang head down, or else they hide in a slit near the edge of the web. Some of them spin small, irregular webs under stones or leaves or loose strips of tree bark. Few species have reduced number of eyes, from eight to six eyes, mostly those species that live in dark caves or among the fallen leaves of a thick forest. All the species of this family have a distinctive diagnostic comb on the tarsus of leg IV, and three tarsal claws. They immobilize their prey with viscous liquid silk, that they comb and throw with their calamistrum (row of specialized bristles) in their leg IV (Coddington 1986), followed by an injection of venom by the chelicerae. Very few of them have teeth on the chelicerae, and the abdomen is globe-shaped.

The most recent generic key for the Theridiidae is that of Levi and Randolph (1975). In Panama 27 genera of *Theridiidae* are reported. In

Bahía Honda we identified the following eleven genera: *Achaearanea* Strand, 1929; *Anelosimus* Simon, 1891; *Argyrodes* Simon, 1864; *Chrysso* O. P. Cambridge, 1882; *Episinus* Latreille, 1809; *Paratheridula* Levi, 1957b; *Steatoda* Sudenvall, 1833; *Theridion* Walckenaer, 1805; *Thwaitesia* O. P. Cambridge, 1881; *Thymoites* Keyserling, 1884; and *Tidarren* Chamberlin and Ivie, 1934.

23.1. In the genus *Achaearanea* 147 species have been described, 16 of them are present in Panama. We identified the following two species of *Achaearanea* in Bahía Honda, both collected among rolled up dry leaves on the vegetation and on the bark of trees: *A. nigrovittata* (Keyserling, 1884), distributed from Mexico to Paraguay, and *A. taeniata* (Keyserling, 1884), known from Guatemala to Peru. Females of *A. nigrovittata* (3.1 to 5 mm long) have a pair of openings in the epigynum, each partially covered in the middle by a membrane; males (1.4 to 1.6 mm long) have an U-shaped embolus surrounding the tegulum almost up to the upper margin (Levi 1963b). Females of *A. taeniata* (3.2 to 5.2 mm long) have two dark markings on the epigynum, a diameter or less apart, and the males (2.3 to 2.9 mm) have a cymbium with a finger-like projection on each upper margin (Levi 1963b).

23.2. In the genus *Anelosimus* 45 species have been described, some of them showing social and subsocial behaviour. They spin enormous webs that may cover the canopies of several neighbouring trees, with thousands of individuals living in the communal web. This is probably the genus of the *Theridiidae* that has been studied most thoroughly: five doctoral theses, the latest is by Ingi Agnarsson, George Washington University, and numerous published studies. The spiders have a series of denticles in the cheliceral retromargin, and a distinctive folium (pigmented design dorsal on the abdomen) (Levi 1963^a). Four species have been reported in Panama. In Bahía Honda we identified *A. studiosus* (Hentz, 1850), from USA to Argentina. Both sexes have dorsal of the abdomen a sinuous black longitudinal line, bordered in white (Levi 1963a). The male of *Anelosimus studiosus* (2.1 to 2.3 mm long) has the fleshy distal end of the embolus, narrower than the proximal part. The female (3.2 to 4.7 mm) has the width of the clear area in the

epigynum, double the length, and the seminal ducts are behind the receptacles (Levi 1963a).

23.3. The highly diversified genus *Argyrodes* comprises 226 species. They have colulus and one or two teeth on the retromargin of the chelicerae. The abdomen may be vermiform, with tubercles; it is seldom higher than long, except in the males of *A. globosus* which have a spherical abdomen (Levi 1962). Both sexes have on the frontal edge of the abdomen stridulatory grooves (Levi 1962). Males present modifications in the ocular area and in the clipeus, or in both (Levi 1962). They are cleptoparasitic spiders that live in the webs of other spiders, stealing the small prey that fall in the web, and they are thought to kill the owner of the web at moulting time, when the newly moulted spiders is left defenseless.

In Panama 22 species of *Argyrodes* have been reported. In Bahía Honda we identified the following five species: *A. attenuatus* (O. P. Cambridge, 1881), distributed from Costa Rica to Argentina and the Caribbean Islands; *A. caudatus* (Taczanowski, 1874), from USA to Argentina and the Caribbean Islands; *A. elevatus* Taczanowski, 1873, from USA to Argentina and the Galapagos Islands; *A. globosus* Keyserling, 1884, from USA to Ecuador, and *A. metaltissimus* (Soares and Camargo, 1948), from Panama to Brazil. In *A. attenuatus* the abdomen is distinctively vermiform, with parallel sides, and posterior to the spinnerets the abdomen is about ten times longer than on the anterior part (Levi 1962b). Eberhard reported (1979) from Puerto López, Meta, Colombia, that 40 individuals of *A. attenuatus* placed their small webs between one and three meters above the ground, and he discussed the attack and prey capture behaviour of that species. The male of *A. attenuatus* measures 9.3 mm long and the female, 16.5 mm. In *A. attenuatus* the abdomen extends above the spinnerets with a pair of lateral tubercles and a middle posterior tubercle with four points. The male of *A. caudatus* is 4.3 mm long, and the female 3.5 mm (Levi 1962b). In the male of *A. elevatus* the cephalothorax projects forward in the form of a bulb, with the anterior median eyes at the tip, and the clypeus projects forward, parallel under the cephalic projection. In females of *A. elevatus*, the epigynum is strongly sclerotized, raised and with an ample separation between the openings (Levi 1962b). Both

male and female of *A. globosus* measure 2.3 mm in length (Levi 1962b). The male abdomen of *A. globosus* is globular, without tubercles, and that of the female is higher than long, with a pair of dorsal, low angular projections. The male cephalothorax of *A. metaltissimus* has a plain cephalic projection, with one or two setae on the tip, but lacks eyes. The female abdomen of *A. metaltissimus* has a pointed end, with one or more spines distally, and posterior to the spinnerets the abdomen is about four to six times longer than on the anterior part. The male of *A. metaltissimus* measures 4 mm long and the female, 4.3 mm (Levi 1962b).

23.4. The genus *Chryso* comprises 63 species, all of small to medium size (measure 1 to 5 mm long) (Levi 1957a). The abdomen in *Chryso* has no colulus and presents a tubercle or a dorsal extension behind the spinnerets. Males of *Chryso* have a very complex palp, with radix and median apophysis (Levi 1962a). Twelve species have been reported in Panama. We identified the following two species of *Chryso* in Bahía Honda: *Ch. albomaculata* O. P. Cambridge, 1882, a species found from USA to Brazil, and *Ch. pulcherrima* (Mello-Leitão, 1917), a species with pantropical distribution. The male of *Ch. albomaculata* (1.9 to 3.1 mm long) has a median fold on the palp radix (Levi 1962a). The female of *Ch. albomaculata* (2.5 to 4.5 mm long) has a slightly sclerotized epigyneal plate, openings hardly visible, and both sexes have white markings on the abdomen (Levi 1962a). Their webs are found under stiff leaves of bushes, on open grounds and at the edge of forests (Levi 1957a). The male of *Ch. pulcherrima* (2 mm long) has a prominent conductor in the palp, with a distal hook. The female of *Ch. pulcherrima* (2.3 mm long) has an epigynum with a black circle on each side of a central transversely elongated depression (Levi 1962a).

23.5. The genus *Episinus* includes 81 described species, all have a modified abdomen, with tubercles and sometimes with small nipples, and the cephalothorax has a pair of horn-like projections between the median eyes (anterior and posterior) (Levi 1964). The male palp of *Episinus* is extremely complex, with large sclerites connected to a very large hematodocha (Levi 1964). Ten species of *Episinus* are known as present in Panama. In Bahía

Honda we identified *E. cognatus* O. P. Cambridge, 1893, known from USA to Brazil. The male palp of *E. cognatus* has a conductor with a distal hook and the female epigynum has a shallow depression with its lateral and anterior margins reinforced (Levi 1964). The male of *E. cognatus* measures 3.9 to 4.3 mm long, and the female, 4.5 to 6 mm.

23.6. The monotypic genus *Paratheridula* includes a single species, *P. pernicioso* (Keyserling, 1886), with a widespread distribution from USA to Chile. Levi (1957b) published on specimens of this species from the following localities in Panama: Boquete (Province of Chiriquí), Panama city, and Pedro Miguel (Province of Colón). We present the first record for the Province of Veraguas (one male from Playa del Sol, Bahía Honda). The male (1.5 mm long) has a very simple palp, without a conductor, median apophysis nor radix, only a basal hematodocha is present. The female of *Paratheridula pernicioso* (1.4 to 2.2 mm long) has a poorly defined epigynum, with two median, small and round openings. The abdomen is grey in the female, with three to six black blotches of variable sizes.

23.7. The large genus *Steatoda* includes 129 species, all are small to medium size spiders (2 to 11 mm long), generally with a dark coloration and having a very large cololus (Levi 1957c). Males of *Steatoda* might have enlarged chelicerae and a sclerotized ring on the anterior part of the abdomen (Levi 1962c). Females of *Steatoda* might have one or more teeth on the cheliceral promargin and lack teeth on the retromargin (Levi 1962c). One species of *Steatoda*, *S. fulva* (Keyserling, 1882), present in USA and Mexico, is known as a predator specialized in ants, that webs nets on top of ant colony entrances, and abandons its web if the ants no longer use that particular ant colony (Hoelldobler 1970). Six species of *Steatoda* are known from Panama. In Bahía Honda we identified *S. erigoniformis* (O. P. Cambridge, 1872), a pantropical species. The embolus in the male palp of *S. erigoniformis* makes a prominent loop on top of the conductor and the female has a depression on the posterior margin of the epigynum (Levi 1962c). The males of *S. erigoniformis* measure 1.8 to 3.4 mm long, and the females, 2.5 to 3.2 mm (Levi 1957c).

23.8. In the gigantic genus *Theridion* 624 species have been described. *Theridion* is the second largest genus in the Araneae, after *Araneus* (Araneidae). Males of *Theridion* have a complex palp with a free median apophysis, conductor, embolus and radix (Levi 1963c). Females of *Theridion* are difficult to identify if they have not been collected together with male (Levi 1963c). In Panama 22 species of *Theridion* are known to be present. In Bahía Honda we identified the following two species of *Theridion*: *T. hispidum* O. P. Cambridge, 1898, present from Mexico to Paraguay and the Caribbean, and *T. metabolum* Chamberlin and Ivie, 1936, endemic to Panama, and previously collected from the Provinces of: Panama (Summit Botanical Garden), Colón (Barro Colorado Island, Fort Sherman), and Coclé (El Valle de Antón) (Levi 1959). Males of *Theridion hispidum* (1.6 to 2.2 mm long) have a very long and thin loop of the palp embolus, that make a single turn around the bulb, and the filiform portion of the embolus inserts on the distal border of it base (Levi 1963c). Males of *Theridion metabolum* (2.1 mm long) have a straight and sharp projection (only visible ventrally) on the median apophysis of the palp and they do not have an indentation in the tegulum (Levi 1963c).

23.9. The genus *Thwaitesia* includes 22 species. Both sexes have a nearly circular cephalothorax, chelicerae without teeth and the abdomen is higher than wide, with silvery maculations (Levi 1963d). The palp of the male of *Thwaitesia* has a large conductor and the duct of the embolus makes a loop around the median apophysis. Males of *Thwaitesia* do not have projections from their cephalothorax (Levi 1963d). Two species of *Thwaitesia* are known from Panama and we identified in Bahía Honda, *T. affinis* O. P. Cambridge, 1882, species present from Panama to Paraguay. The male of *Thwaitesia affinis* measure 2.7 mm long and has all the sclerites present in the palp; the coloration of cephalothorax, sternum and legs is yellow. Females of *T. affinis* (4.5 mm long) have a triangular abdomen, with the dorsal apex yellow and with silvery maculations, an epigynum with an oval depression, wider than long and a pocket on each side of the central genital opening (Levi 1963d). We collected five specimens of this species in Bahía Honda, under the leaves of bushes in open fields (two males and three females, El Edén, Río Limón).

23.10. The genus *Thymoites* includes 80 species. These are small spiders, measuring less than 2.5 mm in length, with a tooth on the cheliceral promargin and without teeth on the retromargin, and with drab colorations on the abdomen. Males of *Thymoites* have an elevated or projected ocular region and a suture might be present between the frontal row of eyes and the clypeus (Levi and Levi 1962). Female of *Thymoites* have a transparent epigynum, where the ducts are visible. In Panama 16 species of *Thymoites* are present. Two females and an immature of *Thymoites* were collected in Bahía Honda, between Río Limón and El Edén, but we were unable to identify them to species.

23.11. In the genus *Tidarren* seven species have been included, all the species have a white longitudinal line running from the highest point dorsal on the abdomen to the spinnerets (Levi and Randolph 1975). Males of *Tidarren* are small and have a single palp, extremely complex, with a gigantic conductor. The male discards one palp when reaching sexual maturity (if both palps are kept, it would be very difficult to walk for the male). Males are very rare in collections (Levi 1957a). Females of *Tidarren* have an epigynum that resembles a wide peak laterally (see Fig. 50, page 46, Levi and Randolph 1975) and their abdomen is higher than long, with a dorsal tubercle. Two species of *Tidarren* are known from Panama. In Bahía Honda (Playa Limón and Isla Canales) two females of *T. haemorrhoidale* (Bartkau, 1880) were collected, species with a widespread distribution from USA to Argentina. Females of *T. haemorrhoidale* have a small dorsal tubercle and measure 2.4 to 7 mm long, males measure 0.9 to 1.4 mm (Levi 1957a).

24. THOMISIDAE: Fig. 43.

Their common name is 'crab spiders' because they position the first two pairs of legs like a crab, legs distinctly thicker than the other legs, ambushing their prey on top of vegetation. They have only two tarsal claws, as other errant spiders that do not use webs to catch their preys. Although they have their legs inserted laterally, they can walk forward, sideways, and backwards. They have eight eyes arranged in two transverse rows (4 – 4) and

the lateral eyes of each row are located on prominent tubercles. The family Thomisidae includes 165 genera, eleven known to be present in Panama. In Bahía Honda we identified the following five genera: *Misumenoides*, *Misumenops*, *Strophius*, *Tmarus* and *Tobias*.

24.1. In the genus *Misumenoides* F. O. P. Cambridge, 1900, 37 species have been included. All the species have a transverse white carina on the frontal margin of the cephalothorax, males have short emboli, spur-like, positioned on the distal end of the tegulum. Females of *Misumenoides* have an epigynum poorly sclerotized, with a shallow atrium. Five species of *Misumenoides* are present in Panama. In Bahía Honda we identified the following two species, both present from Mexico to Colombia: *M. magnus* (Keyserling, 1880) and *M. parvus* (Keyserling, 1880). Females of *M. magnus* measure 9.8 mm long, have wide brown lateral bands on the cephalothorax, and their epigynum has a convex, blunt tubercle on the anterior margin. Males of *M. magnus* measure 4 mm long, have a long, straight tibial apophysis on the palp, with simple distal end. In addition, they have a shorter apophysis ventrally on the palp tibia. Males of *Misumenoides parvus* have a short tibial apophysis, thicker at its base, with an outward directed point, and have a long ventral apophysis, curved upwards.

24.2. The genus *Misumenops* F. O. P. Cambridge, 1900, includes 126 species. Males of *Misumenops* have an embolus with a distal spiral. Females of *Misumenops* have numerous setae on the body and legs and the epigynum has a median septum that divides a shallow atrium. Five species of *Misumenops* have been reported for Panama. We identified in Bahía Honda *M. pallens* (Keyserling, 1880), species present from Guatemala to Argentina. The female of *M. pallens* (7.5 mm long) has a rough surface on the cephalothorax, with large number of short setae, and five depressed areas dorsal on the white-yellow abdomen. The male of *M. pallens* has thin legs, distinctly less pubescent than the female, and the yellow cephalothorax has a median white spot.

24.3. The genus *Strophius* Keyserling, 1880, includes eleven species, exclusive of America. Although the species of *Strophius* do not resemble ants, *S. nigricans* Keyserling captures selectively and carries the bodies of dead workers of *Camponotus crassus* Mayr in São Paulo, Brazil (Oliveira and Sazima 1985). A single species of *Strophius* is known to be present in Panama: *S. hirsutus* O. P. Cambridge, 1891, known only from females from Costa Rica and Panama. The known distribution of *S. signatus* O. P. Cambridge, 1892, species known only from males (3.5 mm long) collected in Mexico, Guatemala (Cambridge 1892) and Brazil (Mello-Leitão 1929), suggests it might be present in Panama. Three males and four immature specimens of *Strophius* were collected in Bahía Honda (between Río Limón and El Edén); these specimens are different from the original description of *S. signatus* given by Cambridge (1891) and Mello-Leitão's description of the same species. We suspect that those specimens from Bahía Honda represent the unknown males of *S. hirsutus*, but to confirm their identification we need to collect *Strophius* females from the same locality.

24.4. The genus *Tmarus* Simon, 1875, includes 207 species that have a strong projection anterior on the cephalothorax and the abdomen is distinctly elongated, with a dorsal tubercle on the posterior end and dark colored maculae (Chickering 1950). Males of *Tmarus* have two tibial retrolateral apophyses on the palp. They embrace twigs with their legs while waiting in ambush for preys. Females of *Tmarus* have a sclerotized epigynum, with a small hood and two spermathecae with grooves on the surface (Dondale and Redner 1978). In Panama 32 species of *Tmarus* are known to be present. In Bahía Honda the following four species of *Tmarus* were identified, all endemics of Panama: *T. innotus* Chickering, 1965, species known only from males (2.8 mm long) from Barro Colorado Island, Province of Panama; *T. parki* Chickering, 1950, species known only from the holotype male (5.1 mm long) from the Panama Canal Area; *T. probus* Chickering, 1950, species known only from males (3.6 mm long) from the Provinces of Panama (Balboa, Madden Dam, Arraiján and Taboga Island) and Coclé; and *T. studiosus* O. P. Cambridge, 1892, species known from both sexes (male 4.5 mm, female 6 to 7 mm long) from the Provinces of Chiriquí (Bugaba), Panama and Colón.

Males of *T. innotus* are easily recognizable because they have a distinctive dorsal tubercle above the spinnerets and have the retrolateral and ventral apophyses on the palp tibia poorly developed. The other three species of *Tmarus* have a very well developed retrolateral apophysis on the palp tibia.

Males of *T. parki* have short and straight ventral apophysis on the palp tibia, inserted near the base and the dorsal apophysis is longer than half the bulb length. Males of *T. probus* have a hook-shaped ventral apophysis on the palp tibia and their dorsal apophysis is long, with a sharp distal end and curved ventrally, with four small denticles, and the bulb has a basal spine. Females of *T. studiosus* have an epigyneal plate with a central cuneiform wedge, apex pointing downward.

24.5. The genus *Tobias* Simon, 1895, includes 17 species, exclusive of America. Members of the genus *Tobias* have projecting lateral angles and dorsal integumental tubercles on the abdomen. Only one species of *Tobias* is present in Panama, *T. taczanowskii* Roewer, 1951 (Fig. 43), species distributed from Panama to Bolivia and Hispaniola. We identified *T. taczanowskii* in Bahía Honda. Females measure 9.7 mm long and males 3.1 mm. Females of *T. taczanowskii* have seven dorsal tubercles on the yellow abdomen, and a median black band, the central posterior abdominal tubercle is quite distinct and blunt.

25. TRECHALEIDAE: Fig. 44.

All members of this family have eight eyes arranged in two rows, 4 and 4, and the posterior row is recurved. They have long, thin legs, flexible tarsi (a diagnostic character), and leg III is distinctively shorter than leg IV. Males of the Trechaleidae have on the palp tibia a retrolateral apophysis and a margin ventro-distally raised. These spiders are found frequently living on the margins of rivers and other fresh water bodies where they have a remarkable ability to walk very fast on the water surface. This family includes 12 genera, eleven are exclusive of America and one monotypic genus has been described from Japan. Five genera of the family Trechaleidae are present in Panama, and in Bahía Honda we identified the following two genera: *Dryines* Simon, 1903, and *Trechalea* Thorell, 1869.

25.1. Four species have been described in the genus *Dryines*, three known only from females from South America and the other species present in Panama is known only from the male. All the species of *Dryines* have three teeth on the cheliceral retromargin and four teeth on the promargin. In Panama, *Dryines lineatipes* Petrunkevitch, 1925, is known only from the original description of the holotype male (2.5 mm long), from Wilcox Camp, San Lorenzo River, Province of Colón. The cephalothorax and legs are yellow, the legs have longitudinal black lines, and the dorsal surface of the abdomen is grey. On the margins of Río Limón, Bahía Honda, we collected a male (3.5 mm long) of this poorly known species.

25.2. Females of *Trechalea* have lobes in the middle of the epigyneal plate and the male palp has a median apophysis with a sharp and highly visible chitinous projection (Carico 1993). In the genus *Trechalea* 19 species have been described, exclusive of America. The only species present in Panama is *T. extensa* (O. P. Cambridge, 1896) (Fig. 44), known from Mexico to Panama. In Fig. 44 the female is carrying an egg sac with the chelicerae. Carico (1993) points out that this is the derived, apomorphic, way to transport the eggs in the Trechaleidae. The plesiomorphic way to transport the egg sac is using the spinnerets. Van Berkum (1982) reports that *T. extensa* prefers to capture shrimps as prey and Carico (1993) indicates that collector could get an aggressive bite in the hand. The male of *T. extensa* measures 18 to 20 mm long and the female 20.4 mm (Carico 1993). The median apophysis of the male palp has a distinctive tubercle between the conductor and the ventral division (Carico 1993).

26. ULOBORIDAE:

Members of this family have a entire cribellum, they spin orbicular webs and have three tarsal claws, with the two dorsal claws pectinate. They are the only spiders that lack venom glands (immobilize their prey using with layers of silk). In the cheliceral promarginal and retromarginal grooves they have groups of small teeth, and few genera have one or two larger teeth. They have trichobothria on femora II to IV, and the leg III is short.

The eyes are almost uniform in size, some genera might have a reduction in the number of eyes, but all lack a tapetum (reflective layer present on the retina). This family includes 19 genera, five present in Panama. In Bahía Honda we identified the following two genera: *Philoponella* Mello-Leitão, 1917, and *Uloborus* Latreille, 1806.

26.1. Males of *Philoponella* have a wide and transverse thoracic groove, and a short apophysis is present on the palp conductor (Opell 1979). Females of *Philoponella* have a ventral atrium in the epigyneal plate and the posterior margin has two lateral lobes. The genus *Philoponella* includes 33 species, four present in Panama. In Bahía Honda we identified *P. tinges* (Chamberlin and Ivie, 1936), species present from Costa Rica to Colombia. The male of *P. tinges* measures 2.2 to 2.8 mm long, and the female, 2.8 to 4 mm. The male has a semicircular median apophysis on the palp bulb (Opell 1979) and the female has the two posterior lobes on the epigynum distinctly apart by a shallow depression (Opell 1979).

26.2. All the species of *Uloborus* have a cephalothorax pear-shaped, with a narrower cephalic region and numerous trichobothriae on the femur of leg I. In the genus *Uloborus* 76 species have been described, three of them are present in Panama. In Bahía Honda we identified *Uloborus trilineatus* Keyserling, 1883, species widely distributed from Mexico to Paraguay. Males of *U. trilineatus* measure between 3 to 4.2 mm long and the length of the conductor lobe is four times the width, and they have three longitudinal light lines on the cephalothorax (Opell 1979). The female of *U. trilineatus* has both epigyneal lobes united medially and measures from 4.4 mm to 7.2 mm in length.

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FIGURES

Figs. 1-3. Morphology of an scorpion. 1. *Centruroides margaritatus* (Gervais)

(Buthidae), dorsal view. 2. *C. margaritatus* (Gervais), ventral view. 3.

Pectines without fulcra in *Ananteris platnicki* Laurenço (Buthidae).

Figs. 4-5. *Actinopus robustus* (Cambridge) (Actinopodidae), male. 4.

Cephalothorax and chelicerae, dorsal view. 5. Underside of

cephalothorax: sternum, labium and palp coxae, ventral view.

Fig. 6-9. 6. *Actinopus robustus* (Cambridge) (Actinopodidae), male, right palp,

retrolateral view. 7. *A. robustus*, male, left palp, bulb and distal end of

tibia, ventral view. 8. *A. robustus*, female, spermathecae, dorsal view.

9. *Ummidia* sp. (Ctenizidae), capturing a cricket at a ground tunnel entrance.

Figs. 10-11. *Centruroides* scorpions. 10. *C. bicolor* (Pocock) (Buthidae),

male. 11. *C. margaritatus* (Gervais) (Buthidae), female carrying

nymphs dorsal on her body.

Figs. 12-13. 12. *Tityus ocellote* Francke & Stockwell (Buthidae), male. 13.

Phrynus gervaisii (Phrynidae), female transports her nymphs clinging to the dorsal surface of her body.

Figs. 14-18. Mygalomorph spiders. 14. *Actinopus* sp. (Actinopodidae), waiting

in ambush for passing by prey at the ground tunnel entrance, the

hinged door kept partially open. 15. *Actinopus robustus* (O. P.

Cambridge) (Actinopodidae), dorsal view of female. 16. *Ummidia* sp.

(Ctenizidae), at the entrance to the ground tunnel. 17. *Sericopelma*

commune F. O. P. Cambridge (Theraphosidae), female, dorsal view.

18. *S. rubronitens* Ausserer (Theraphosidae), male.

Figs. 19-22. Family Araneidae spiders. 19. *Argiope argentata* (Fabricius),

female on orb web with a cross-stabilimentum made out of silk from

aciniform glands. 20. *A. argentata*, immature on web with spiral-disk

stabilimentum. 21. *Cyclosa* sp., female disguised among prey remnants

and molts of a stabilimentum that extends vertically from the hub. 22.

Eriophora fuliginea, female on top of leaf.

Figs 23-25. 23. *Gasteracantha cancriformis* (Araneidae), female on orb web

with small stabilimentum. 24. *Micrathena sexspinosa* (Hahn)

(Araneidae), female on web. 25. *Cupiennius coccineus* (Ctenidae), female on top of leaf.

Figs. 26-28. 26. Family Ctenidae spiders. *Cupiennius getazi*, female, grey variety. 27. *C. getazi*, female, red variety, dorsal view. 28. *Phoneutria boliviensis*, female displaying distinctive aggressive behaviour, protecting her egg sac.

Figs. 29-31. Spiders that catch prey without a web (wandering spiders). 29. *Lycosa* sp. (Lycosidae), cephalothorax frontal view, showing arrangement of eyes. 30. *Peucetia viridans* (Oxyopidae), female with egg sac. 31. *Ancylometes bogotensis* (Pisauridae), female, notice a distinctive mottled design dorsal on her leg femora.

Figs. 32-37. Jumping spiders, family Salticidae. 32. *Lyssomanes* sp. (Lyssomaninae), female. 33. *Corythalia bicincta* (Euophryinae), male. 34. *Orvilleus* sp. (Dendryphantinae), male. 35. *Peckhamia variegata* (Synagelinae), male. 36. *Thiodina sylvana* (Thiodininae), male. 37. *Phiale guttata* (Miscellaneous Genera), female.

Figs 38-40. 38. "Spiting spider" *Scytodes fusca* (Scytodidae), female. 39. *Heteropoda venatoria* (Linnaeus) (Sparassidae), female holding her egg sac with her chelicerae, on top of a leaf. 40. *Leucauge idonea* (Tetragnathidae), female on her web.

Figs. 41-44. 41. *Nephila clavipes* (Linnaeus) (Tetragnathidae), mating pair, the distinctly smaller male is introducing the elongated embolus of one of his palps into the female's vagina. 42. *Nephila clavipes* (Linnaeus) (Tetragnathidae), female, dorsal view. 43. *Tobias taczanowskii* Roewer (Thomisidae), on the spadix of an Araceae. 44. *Trechalea extensa* (O. P. Cambridge) (Trechaleidae), female holding her egg sac with the fangs of her chelicerae (see additional comments in the text).

COLLECTING DATA OF THE ARACNIDS FROM BAHÍA HONDA, VERAGUAS, PANAMÁ.

Identifications by Diomedes Quintero A. and Roberto J. Miranda, Museo de Invertebrados G. B. Fairchild, Universidad de Panamá.

Abbreviations: L.: El Edén; C.T.: Isla Canales de Tierra; M.: Manglarito; P.L.: Playa Limón; R.L.: Río Limón; P.S.: Playa del Sol; S.: Salmonete.

1. SCORPIONES

BUTHIDAE			
<i>Ananteris platnicki</i> Lourenco, 1993	C.T.	6-18-dic-01	1 H + 1 im.
<i>Centruroides margaritatus margaritatus</i> (Gervais, 1841)	P.L.	7-12-ag-01	1 im.
<i>Centruroides margaritatus margaritatus</i>	P.S.	28-may-2-jun-02	1 M
<i>Centruroides bicolor</i> (Pocock, 1898)	P.S.	8-ag-01	2 M, 6 H
<i>Centruroides bicolor</i> (Pocock)	L.	12-dic-01	1 im. (en epífitas)
<i>Centruroides bicolor</i> (Pocock)	C.T.	14-dic-01	1 M, 2 H
<i>Centruroides bicolor</i> (Pocock)	P.S.	28-may-2-jun-02	3 im.
<i>Tityus ocelote</i> Francke & Stockwell, 1987	P.L.	1-3-marzo-02	1 M
<i>Tityus ocelote</i> Francke & Stockwell	L.	13-dic-01	1 im.
<i>Tityus ocelote</i> Francke & Stockwell	P.L.-L.	28-may-2-jun-02	1 im.
<i>Tityus ocelote</i> Francke & Stockwell	L.	1-jun-02	1 im.
<i>Tityus ocelote</i> Francke & Stockwell	P.S.	28-may-2-jun-02	1 im.

2. AMBLYPYGI

Phrynidae			
<i>Paraphrynus laevifrons</i> (Pocock, 1894)	R.L.-L.	28-may-2-jun-02	2 H + 1 im.
<i>Paraphrynus laevifrons</i> (Pocock)	C.T.	14-dic-01	1 M
<i>Paraphrynus laevifrons</i> (Pocock)	C.T.	28-may-2-jun-02	1 H, 2 im.
<i>Paraphrynus laevifrons</i> (Pocock)	M.	11-ag-01	1 im.
<i>Paraphrynus laevifrons</i> (Pocock)	P.L.	7-dic-01	1 im.
<i>Phrynus gervaisii</i> (Pocock, 1894)	P.S.	8-ag-01	1 M, 2 H

3. ARANEAE

ACTINOPODIDAE			
<i>Actinopus robustus</i> (O.P. Cambridge, 1892)	C.T.	7-17-dic-01	1 H
CTENIZIDAE			
<i>Ummidia rugosa</i> (Karsch, 1880)	P. S.	8-ag.-01	1 H
<i>Ummidia rugosa</i> (Karsch, 1880)	C.T.	28-may-2-jun-02	8 im.
<i>Ummidia rugosa</i> (Karsch, 1880)	R.L.-L.	28-may-2-jun-02	5 im.
DIPLURIDAE			
<i>Diplura</i> sp.	L.	7-17-dic-01	1 H

TERAPHOSIDAE			
<i>Sericopelma</i> sp.	P.S.	8-ag.-01	1 H
<i>Lasiadora panamana</i> (Petrunkevitch,1925)	M.	11-dic-01	1 H
<i>Lasiadora panamana</i> (Petrunkevitch,1925)	P.S.	6-18-dic-01	1 H
Gen 1	C.T.	28-may-2-jun-02	1 im.
ANYPHAENIDAE			
<i>Anyphaena</i> sp.	C.T.	7-12-ag.-01	1 H
<i>Hibana</i> sp.	P.S.	28-may-2-jun-02	1 im.
<i>Lupettiana mordax</i> (O. P. Cambridge, 1896)	R.L.-L.	28-may-2-jun-02	2 H + 1 im.
<i>Teudis</i> sp.	M.	11-ag.-01	1 im.
<i>Wulfila maculatus</i> Chickering, 1937	R.L.-L.	7-17-dic-01	1 M
<i>Wulfila mandibulatus</i> (Petrunkevitch,1925)	R.L.-L.	7-17-dic-01	1 M
<i>Wulfila mandibulatus</i> (Petrunkevitch,1925)	R.L.-L.	28-may-2-jun-02	1 H
<i>Wulfila</i> sp.	R.L.-L.	28-may-2-jun-02	1 im.
<i>Wulfila</i> sp.	R.L.-L.	28-may-2-jun-02	6 im.
??	P.S.	7-12-ag.-01	1 im.
??	P.L.	7-12-ag.-01	1 im.
??	L.	7-17-dic-01	2 im.
ARANEIDAE			
<i>Acacesia cornigera</i> Petrunkevitch, 1925	C.T.	28-may-2-jun-02	1 H
<i>Acacesia cornigera</i> Petrunkevitch, 1925	R.L.-L.	28-may-2-jun-02	1 M
<i>Alpaida truncata</i> (Keyserling, 1865)	L.	7-17-dic-01	1 im.
<i>Alpaida truncata</i> (Keyserling, 1865)	C.T.	28-may-2-jun-02	1 im.
<i>Alpaida truncata</i> (Keyserling, 1865)	R.L.-L.	28-may-2-jun-02	1 im.
<i>Araneus guttatus</i> (Keyserling, 1865)	P.S.	28-may-2-jun-02	1 H
<i>Araneus guttatus</i> (Keyserling, 1865)	C.T.	28-may-2-jun-02	1 H
<i>Araneus pegnia</i> (Walckenaer, 1841)	C.T.	28-may-2-jun-02	2 H + 3 im.
<i>Araneus</i> sp.	P.L.	7-ag.-01	1 im.
<i>Argiope argentata</i> (Fabricius, 1775)	P.S.	6-18-dic-01	1 H
<i>Argiope argentata</i> (Fabricius, 1775)	C.T.	28-may-2-jun-02	2 M + 1 im.
<i>Argiope argentata</i> (Fabricius, 1775)	R.L.-L.	28-may-2-jun-02	1 H + 2 im.
<i>Cyclosa bifurcata</i> (Walckenaer, 1841)	R.L.-L.	28-may-2-jun-02	1 im.
<i>Eriophora fuliginea</i> (C. L. Koch, 1843)	P.S.	8-ag.-01	1 H
<i>Eriophora fuliginea</i> (C. L. Koch, 1843)	P.L.	1-3-marzo-02	1 M
<i>Eriophora edax</i> (Blackwall, 1863)	P.L.	7-ag.-01	1 H
<i>Eriophora edax</i> (Blackwall, 1863)	P.S.	6-18-dic-01	1 H
<i>Eriophora edax</i> (Blackwall, 1863)	P.S.	28-may-2-jun-02	1 H

<i>Eriophora ravilla</i> (C. L. Koch, 1845)	P.S.	6-18-dic-01	1 H
<i>Eriophora</i> sp.	L.	7-17-dic-01	27 im.
<i>Eriophora</i> sp.	C.T.	28-may-2-jun-02	2 im.
<i>Eriophora</i> sp.	R.L.-L.	28-may-2-jun-02	16 im.
<i>Eustala bifida</i> F. O. P. Cambridge, 1904	R.L.-L.	28-may-2-jun-02	1 H
<i>Eustala devia</i> (Getsch & Mulaik, 1936)	P.S.	8-ag.-01	1 H
<i>Eustala fuscovittata</i> (Keyserling, 1863)	P.S.	8-ag.-01	1 H
<i>Eustala fuscovittata</i> (Keyserling)	P.L.	1-3-marzo-02	1 H
<i>Eustala fuscovittata</i> (Keyserling)	R.L.-L.	28-may-2-jun-02	2 H
<i>Eustala guttata</i> F. O. P. Cambridge, 1904	C.T.	7-17-dic-01	1 H
<i>Eustala guttata</i> F. O. P. Cambridge, 1904	P.S.	28-may-2-jun-02	1 H
<i>Eustala longembola</i> Chickering, 1955	P.S.	6-18-dic-01	1M
<i>Eustala panamana</i> Chickering, 1955	M.	11-ag.-01	1 H
<i>Eustala panamana</i> Chickering, 1955	C.T.	7-17-dic-01	1 H
<i>Eustala semifoliata</i> (O. P. Cambridge, 1899)	P.S.	6-18-dic-01	1 H
<i>Eustala</i> sp.	M.	11-dic-01	1 M
<i>Gasteracantha cancriformis</i> (Linnaeus, 1785)	P.S.	6-18-dic-01	1 H
<i>Gasteracantha cancriformis</i> (Linnaeus, 1785)	R.L.-L.	28-may-2-jun-02	1 H
<i>Larinia directa</i> (Hentz, 1847)	R.L.-L.	28-may-2-jun-02	1 H
<i>Larinia directa</i> (Hentz, 1847)	L.	7-17-dic-01	1 im.
<i>Mangora pia</i> Chamberlin & Ivie, 1936	P.S.	8-ag.-01	1 H
<i>Mangora pia</i> Chamberlin & Ivie, 1936	P.S.	6-18-dic-01	2 H
<i>Mangora pia</i> Chamberlin & Ivie, 1936	M.	11-dic-01	1 H
<i>Mangora pia</i> Chamberlin & Ivie, 1936	P.L.	7-17-dic-01	1 H
<i>Mangora pia</i> Chamberlin & Ivie, 1936	R.L.-L.	28-may-2-jun-02	8 im.
<i>Mangora spinula</i> F. O. P. Cambridge, 1904	C.T.	7-17-dic-01	5 H + 2 M
<i>Mangora spinula</i> F. O. P. Cambridge, 1904	L.	7-17-dic-01	3 H
<i>Mangora spinula</i> F. O. P. Cambridge, 1904	M.	11-dic-01	1 H
<i>Mangora spinula</i> F. O. P. Cambridge, 1904	R.L.-L.	28-may-2-jun-02	3 H + 1 M
<i>Mangora spinula</i> F. O. P. Cambridge, 1904	C.T.	28-may-2-jun-02	4 H
<i>Mangora</i> sp.	P.L.	7-ag.-01	1 im.
<i>Metazygia keyserlingi</i> (Banks, 1929)	P.L.	7-ag.-01	1 H
<i>Metazygia keyserlingi</i> (Banks, 1929)	C.T.	7-17-dic-01	1 H
<i>Metazygia keyserlingi</i> (Banks, 1929)	M.	11-dic-01	1 H + 1 M
<i>Metazygia pallidula</i> (Keyserling, 1864)	L.	7-17-dic-01	1 H
<i>Metazygia</i> sp.	R.L.-L.	28-may-2-jun-02	1 im.
<i>Micrathena donaldi</i> Chickering, 1961	L.	7-17-dic-01	1 H + 3 im.
<i>Micrathena donaldi</i> Chickering, 1961	R.L.-L.	28-may-2-jun-02	1 im.
<i>Micrathena horrida</i> (Taczanowski, 1873)	P.S.	8-ag.-01	1 H
<i>Micrathena horrida</i> (Taczanowski, 1873)	M.	11-ag.-01	1 H
<i>Micrathena horrida</i> (Taczanowski, 1873)	L.	7-17-dic-01	1 H
<i>Micrathena horrida</i> (Taczanowski, 1873)	R.L.-L.	28-may-2-jun-	3 im.

		02	
<i>Micrathena mitrata</i> (Hentz, 1850)	L.	7-17-dic-01	2 H
<i>Micrathena mitrata</i> (Hentz, 1850)	P.L.	7-17-dic-01	1 H
<i>Micrathena mitrata</i> (Hentz, 1850)	P.S.	6-18-dic-01	1 H
<i>Micrathena quadriserrata</i> F. O. P. Cambridge, 1904	M	11-ag.-01	5 H
<i>Micrathena quadriserrata</i> F. O. P. Cambridge, 1904	P.S.	6-18-dic-01	2 H
<i>Micrathena quadriserrata</i> F. O. P. Cambridge, 1904	P.L.	7-17-dic-01	2 H
<i>Micrathena quadriserrata</i> F. O. P. Cambridge, 1904	L.	7-17-dic-01	2 H
<i>Micrathena quadriserrata</i> F. O. P. Cambridge, 1904	M.	11-dic-01	1 M
<i>Micrathena saccata</i> (C. L. Koch,1836)	P.L.	7-17-dic-01	1 H
<i>Micrathena saccata</i> (C. L. Koch,1836)	L.	7-17-dic-01	1 H + 2 im.
<i>Micrathena saccata</i> (C. L. Koch,1836)	P.S.	6-18-dic-01	1 H + 1 im.
<i>Micrathena saccata</i> (C. L. Koch,1836)	R.L.-L.	28-may-2-jun-02	3 im.
<i>Micrathena sexspinosa</i> (Hahn,1822)	P.L.	7-ag.-01	1 H
<i>Micrathena sexspinosa</i> (Hahn,1822)	L.	7-17-dic-01	3 H + 1 im.
<i>Micrathena sexspinosa</i> (Hahn,1822)	P.S.	6-18-dic-01	2 H
<i>Micrathena sexspinosa</i> (Hahn,1822)	M.	11-dic-01	1 M
<i>Micrathena</i> sp.	R.L.-L.	28-may-2-jun-02	1 M
<i>Micrathena</i> sp.	R.L.-L.	28-may-2-jun-02	1 im.
<i>Parawixia rigida</i> (O. P. Cambridge, 1889)	P.S.	8-ag.-01	1 H
<i>Pronous intus</i> Levi, 1995	M.	11-ag.-01	2 H
<i>Pronous shanus</i> Levi, 1995	P.S.	7-12-ag.-01	1 H
<i>Pronous shanus</i> Levi, 1995	C.T.	7-17-dic-01	1 H
<i>Pronous shanus</i> Levi, 1995	P.L.	7-17-dic-01	1 M
<i>Pronous shanus</i> Levi, 1995	L.	7-17-dic-01	4 H
<i>Pronous shanus</i> Levi, 1995	M.	11-dic-01	1 M + 1 H
<i>Pronous shanus</i> Levi, 1995	R.L.-L.	28-may-2-jun-02	1 H + 2 M
<i>Pronous shanus</i> Levi, 1995	C.T.	28-may-2-jun-02	1 H
<i>Pronous wixoides</i> (Chamberlin & Ivie, 1936)	C.T.	28-may-2-jun-02	1 H
<i>Verrucosa arenata</i> (Walckenaer, 1841)	M.	11-ag.-01	1 H + 1 im.
<i>Verrucosa arenata</i> (Walckenaer, 1841)	P.L.	7-ag.-01	2 H
<i>Verrucosa arenata</i> (Walckenaer, 1841)	P.S.	6-18-dic-01	1 H
<i>Verrucosa arenata</i> (Walckenaer, 1841)	P.L.	7-17-dic-01	1 H
<i>Verrucosa arenata</i> (Walckenaer, 1841)	P.S.	6-18-dic-01	2 H
<i>Verrucosa arenata</i> (Walckenaer, 1841)	L.	7-17-dic-01	1 H
<i>Verrucosa arenata</i> (Walckenaer, 1841)	R.L.-L.	28-may-2-jun-02	1 H + 1 im.
<i>Verrucosa arenata</i> (Walckenaer, 1841)	C.T.	28-may-2-jun-02	2 H
<i>Wagneriana taboga</i> Levi, 1991	M.	11-ag.-01	1 H
<i>Wagneriana taboga</i> Levi, 1991	P.L.	7-ag.-01	1 H + 1 im.
<i>Wagneriana taboga</i> Levi, 1991	P.L.	7-17-dic-01	1 H
<i>Wagneriana tauricornis</i> (O. P. Cambridge, 1889)	P.S.	6-18-dic-01	2 H

	M.	11-dic-01	3 H
<i>Wagneriana tauricornis</i> (O. P. Cambridge, 1889)			
<i>Wagneriana tauricornis</i> (O. P. Cambridge, 1889)	R.L.-L.	7-17-dic-01	1 M
<i>Wagneriana tauricornis</i> (O. P. Cambridge, 1889)	R.L.-L.	28-may-2-jun-02	1 H + 2 im.
<i>Wagneriana</i> sp.	P.L.	7-ag.-01	1 H
<i>Wagneriana</i> sp.	R.L.-L.	28-may-2-jun-02	1 im.
<i>Witica crassicaudus</i> (Keyserling, 1865)	M.	11-dic-01	1 H
CLUBIONIDAE			
<i>Elaver lutescens</i> (Schmidt, 1971)	P.S.	6-18-dic-01	1 H
<i>Elaver lutescens</i> (Schmidt, 1971)	R.L.-L.	7-17-dic-01	1 H
<i>Elaver</i> sp.	C.T.	7-17-dic-01	1 H
<i>Elaver</i> sp.	R.L.-L.	7-17-dic-01	1 H
<i>Elaver</i> sp.	R.L.-L.	28-may-2-jun-02	1 H + 1 im.
CORINNIDAE			
<i>Castianeira alba</i> Reiskind, 1969	L.	7-17-dic-01	1 H
<i>Castianeira alba</i> Reiskind, 1969	P.S.	6-18-dic-01	1 M
<i>Castianeira alba</i> Reiskind, 1969	C.T.	7-17-dic-01	1 M + 1 im
<i>Castianeira cincta</i> (Banks, 1929)	P.L.	7-ag.-01	2 H
<i>Castianeira dubia</i> (O. P. Cambridge, 1898)	L.	7-ag.-01	2 H + 1 M
<i>Castianeira</i> sp.	C.T.	28-may-2-jun-02	2 im.
<i>Corinna bulbosa</i> F. O. P. Cambridge 1899	C.T.	7-ag.-01	1 H
<i>Corinna bulbosa</i> F. O. P. Cambridge 1899	R.L.-L.	28-may-2-jun-02	2 H
<i>Creugas mucronatus</i> (F. O. P. Cambridge 1899)	C.T.	28-may-2-jun-02	1 H
<i>Mazax spinosa</i> (Simon, 1897)	L.	7-17-dic-01	1 H
<i>Megalostrata raptor</i> (L. Koch, 1866)	P.S.	7-12-ag.-01	1 M
<i>Parachemmis fuscus</i> Chickering, 1937	L.	7-17-dic-01	1 H
<i>Trachelas prominens</i> Platnick & Shadab, 1974	R.L.-L.	28-may-2-jun-02	1 H
<i>Trachelas</i> sp.	C.T.	10-ag.-01	1 M
<i>Trachelas triangulus</i> Platnick & Shadab, 1974	R.L.-L.	7-17-dic-01	1 H
CTENIDAE			
<i>Acanthoctenus spiniger</i> Keyserling, 1877	R.L.-L.	7-17-dic-01	1 M
<i>Acanthoctenus spiniger</i> Keyserling, 1877	C.T.	7-17-dic-01	1 H
<i>Acanthoctenus spiniger</i> Keyserling, 1877	P.S.	6-18-dic-01	1 M
<i>Acanthoctenus</i> sp.	R.L.-L.	28-may-2-jun-02	1 im.
<i>Ctenus sinuatipes</i> F. O. P. Cambridge 1897	P.L.	1-3-marzo-02	1 H + 1 M
<i>Ctenus w-notatus</i> Petrunkevitch, 1925	C.T.	7-17-dic-01	2 H
<i>Ctenus w-notatus</i> Petrunkevitch, 1925	P.L.	1-3-marzo-02	1 M
<i>Ctenus</i> sp.	C.T.	28-may-2-jun-02	2 im.
<i>Ctenus</i> sp.	R.L.-L.	28-may-2-jun-02	2 im.
<i>Cupiennius coccineus</i> F. O. P. Cambridge 1901	P.S.	6-18-dic-01	1 H + 2 im.
<i>Cupiennius coccineus</i> F. O. P. Cambridge 1901	R.L.-L.	28-may-2-jun-02	1 H + 2 im.
<i>Cupiennius granadensis</i> (Keyserling, 1877)	P.L.	7-ag.-01	1 H + 1 M
<i>Cupiennius granadensis</i> (Keyserling, 1877)	M.	11-ag.-01	1 H + 1 M

<i>Cupiennius granadensis</i> (Keyserling, 1877)	L.	7-17-dic-01	1 H
<i>Cupiennius granadensis</i> (Keyserling, 1877)	P.L.	7-17-dic-01	1 H
<i>Cupiennius granadensis</i> (Keyserling, 1877)	R.L.-L.	7-17-dic-01	1 H
<i>Cupiennius granadensis</i> (Keyserling, 1877)	R.L.-L.	28-may-2-jun-02	3 H + 1 M + 2 im.
<i>Cupiennius</i> sp.	L.	7-12-ag.-01	1 im.
<i>Cupiennius</i> sp.	R.L.-L.	28-may-2-jun-02	1 im.
<i>Cupiennius</i> sp.	P.S.	28-may-2-jun-02	1 im.
<i>Cupiennius</i> sp.	C.T.	28-may-2-jun-02	3 im.
<i>Phoneutria boliviensis</i> (O.P. Cambridge, 1897)	P.L.	9-ag.-01	1 H
<i>Phoneutria boliviensis</i> (O.P. Cambridge, 1897)	P.L.	1-3-marzo-02	1 H + 1 im.
DICTYNIDAE			
<i>Dictyna</i> sp.	C.T.	28-may-2-jun-02	1 H
<i>Thallumetus</i> sp.	P.S.	6-18-dic-01	1 im.
HAHNIIDAE			
<i>Hahnia banksi</i> Fage, 1938	C.T.	28-may-2-jun-02	1 H
LINYPHIIDAE			
<i>Tutaibo</i> nr. <i>phoeniceus</i> (O. P. Cambridge, 1894)	P.S.	7-12-ag.-01	1 M
??	R.L.-L.	28-may-2-jun-02	2 H + 1 M
??	R.L.-L.	28-may-2-jun-02	4 H + 1 M
LYCOSIDAE			
<i>Allocosa panamena</i> Chamberlin, 1925	C.T.	28-may-2-jun-02	1 H + 1 M
<i>Hogna tivior</i> (Chamberlin & Ivie, 1936)	M.	11-dic-01	1 H
<i>Hogna tivior</i> (Chamberlin & Ivie, 1936)	L.	7-17-dic-01	1 H
<i>Hogna</i> sp.	P.S.	6-18-dic-01	1 M
<i>Hogna</i> sp.	R.L.-L.	28-may-2-jun-02	2 M
<i>Lycosa cerrofloresiana</i> Petrunkevitch, 1925	C.T.	28-may-2-jun-02	1 H
<i>Lycosa cerrofloresiana</i> Petrunkevitch, 1925	R.L.-L.	28-may-2-jun-02	1 H
<i>Pardosa</i> sp.	P.S.	7-12-ag.-01	12 im.
<i>Pirata</i> sp.	L.	7-17-dic-01	1 H
<i>Trochosa</i> sp.	P.S.	6-18-dic-01	1 M
MIMETIDAE			
<i>Gelanor distinctus</i> O. P. Cambridge, 1899	M.	11-dic-01	1 H
<i>Gelanor distinctus</i> O. P. Cambridge, 1899	R.L.-L.	28-may-2-jun-02	2 H + 2 im.
<i>Gelanor distinctus</i> O. P. Cambridge, 1899	C.T.	28-may-2-jun-02	1 H
<i>Mimetus trituberculatus</i> O. P. Cambridge, 1899	P.L.	1-3-marzo-02	1 H
<i>Mimetus trituberculatus</i> O. P. Cambridge, 1899	R.L.-L.	28-may-2-jun-02	3 H + 1 im.
OECOBIIDAE			
<i>Oecobius</i> sp.	P.S.	6-18-dic-01	1 H
OONOPIDAE			

<i>Dysderina</i> sp.	L.	7-17-dic-01	2 H
<i>Oonops donaldi</i> Chickering, 1951	R.L.-L.	7-17-dic-01	1 M
OXYOPIDAE			
<i>Hamataliwa puta</i> (O.P. Cambridge, 1894)	R.L.-L.	28-may-2-jun-02	1 H + 1 M
<i>Hamataliwa tricuspida</i> (F. O. P. Cambridge, 1902)	M.	11-ag.-01	1 M
<i>Hamataliwa</i> sp.	C.T.	28-may-2-jun-02	2 im.
<i>Oxyopes bifidus</i> F. O. P. Cambridge, 1902	M.	11-dic-01	2 H
<i>Oxyopes bifidus</i> F. O. P. Cambridge, 1902	L.	7-17-dic-01	2 M
<i>Oxyopes bifidus</i> F. O. P. Cambridge, 1902	R.L.-L.	28-may-2-jun-02	2 H + 1 M
<i>Oxyopes salticus</i> Hentz, 1845	R.L.-L.	28-may-2-jun-02	3 H + 1 M +2 im.
<i>Peucetia viridans</i> Hentz, 1832	C.T.	7-17-dic-01	1 M
<i>Peucetia viridans</i> Hentz, 1832	L.	7-17-dic-01	1 M
<i>Peucetia</i> sp.	M.	11-ag.-01	1 im.
<i>Peucetia</i> sp.	C.T.	28-may-2-jun-02	1 im.
<i>Peucetia</i> sp.	R.L.-L.	28-may-2-jun-02	2 im.
PHOLCIDAE			
<i>Anopsicus chickeringi</i> Gertsch, 1982	L.	7-17-dic-01	1 H
<i>Anopsicus</i> sp.	C.T.	28-may-2-jun-02	1 H
<i>Modisimus</i> sp.	P.L.	1-3-marzo-02	6 H
<i>Modisimus</i> sp.	C.T.	28-may-2-jun-02	1 H
<i>Physocyclus globosus</i> (Taczanowski, 1873)	P.S.	6-18-dic-01	2 H + 1 im.
PISAURIDAE			
<i>Ancylometes bogotensis</i> (Keyserling, 1876)	P.L.	1-3-marzo-02	1 M
<i>Architis nitidopilosa</i> Simon, 1898	C.T.	28-may-2-jun-02	2 H
<i>Staberius spinipes</i> (Taczanowski, 1874)	C.T.	28-may-2-jun-02	1 im.
<i>Thaumasia argenteonotata</i> (Simon, 1898)	L.	7-17-dic-01	1 H
<i>Tinus ursus</i> Carico, 1976	P.L.	1-3-marzo-02	1 H
PRODIDOMIDAE			
<i>Lygromma</i> sp. n.	P.S.	6-18-dic-01	1 im.
<i>Neozimiris</i> sp.	P.S.	3-marzo-02	1 im.
SALTICIDAE			
<i>Acragas fallax</i> (Peckham & Peckham, 1896)	P.S.	7-12-ag.-01	1 M
<i>Acragas fallax</i> (Peckham & Peckham, 1896)	P.S.	6-18-dic-01	1 M + 2 im.
<i>Acragas fallax</i> (Peckham & Peckham, 1896)	M.	11-dic-01	1 M + 1 H
<i>Acragas peckhami</i> (Chickering, 1946)	C.T.	7-17-dic-01	1 H
<i>Acragas</i> sp.	R.L.-L.	28-may-2-jun-02	1 H
<i>Amphidraus</i> sp. ?	C.T.	28-may-2-jun-02	1 H + 1 M
<i>Balmaceda picta</i> Peckham & Peckham, 1894	P.S.	6-18-dic-01	1 H
<i>Chapoda festiva</i> Peckham & Peckham, 1896	L.	7-17-dic-01	1 M
<i>Chapoda festiva</i> Peckham & Peckham, 1896	C.T.	7-17-dic-01	1 H
<i>Chapoda</i> sp.	C.T.	7-17-dic-01	1 H

<i>Cobanus flavens</i> (Peckham & Peckham, 1896)	C.T.	7-17-dic-01	1 M + 1 H
<i>Cobanus flavens</i> (Peckham & Peckham, 1896)	R.L.-L.	7-17-dic-01	1 H
<i>Cobanus flavens</i> (Peckham & Peckham, 1896)	M.	11-dic-01	1 M
<i>Cobanus flavens</i> (Peckham & Peckham, 1896)	P.S.	6-18-dic-01	2 M
<i>Cobanus flavens</i> (Peckham & Peckham, 1896)	R.L.-L.	28-may-2-jun-02	1 M + 1 H
<i>Corythalia bicincta</i> Petrunkevitch, 1925	P.S.	7-12-ag.-01	1 M
<i>Corythalia bicincta</i> Petrunkevitch, 1925	C.T.	10-ag.-01	1 H
<i>Corythalia bicincta</i> Petrunkevitch, 1925	L.	7-17-dic-01	1 H
<i>Corythalia bicincta</i> Petrunkevitch, 1925	P.S.	6-18-dic-01	1 H
<i>Corythalia bicincta</i> Petrunkevitch, 1925	C.T.	7-17-dic-01	2 H+ 1 M
<i>Corythalia clara</i> Chamberlin & Ivie, 1936	R.L.-L.	28-may-2-jun-02	1 M + 1 H
<i>Corythalia spiralis</i> (F. O. P. Cambridge, 1901)	L.	7-17-dic-01	2 M
<i>Corythalia spiralis</i> (F. O. P. Cambridge, 1901)	C.T.	7-17-dic-01	1 M
<i>Corythalia spiralis</i> (F. O. P. Cambridge, 1901)	P.S.	6-18-dic-01	1 H
<i>Corythalia spiralis</i> (F. O. P. Cambridge, 1901)	P.L.	7-17-dic-01	1 M
<i>Corythalia spiralis</i> (F. O. P. Cambridge, 1901)	R.L.-L.	28-may-2-jun-02	1 M + 1 H +3 im.
<i>Corythalia spiralis</i> (F. O. P. Cambridge, 1901)	C.T.	28-may-2-jun-02	1 M
<i>Corythalia sulphurea</i> (F. O. P. Cambridge, 1901)	P.S.	7-12-ag.-01	2 M
<i>Corythalia sulphurea</i> (F. O. P. Cambridge, 1901)	C.T.	7-17-dic-01	1 M
<i>Corythalia sulphurea</i> (F. O. P. Cambridge, 1901)	L.	7-17-dic-01	1 M + 1 H
<i>Corythalia</i> sp.	C.T.	28-may-2-jun-02	1 M
<i>Corythalia</i> sp.	C.T.	28-may-2-jun-02	1 H
<i>Freya albosignata</i> (F. O. P. Cambridge, 1901)	P.S.	7-12-ag.-01	2 M
<i>Freya albosignata</i> (F. O. P. Cambridge, 1901)	C.T.	7-17-dic-01	1 M + 1 H
<i>Freya albosignata</i> (F. O. P. Cambridge, 1901)	L.	7-17-dic-01	1 H
<i>Freya albosignata</i> (F. O. P. Cambridge, 1901)	P.L.	7-17-dic-01	1 M + 2 H
<i>Freya albosignata</i> (F. O. P. Cambridge, 1901)	C.T.	28-may-2-jun-02	1 M +1 H
<i>Freya albosignata</i> (F. O. P. Cambridge, 1901)	R.L.-L.	28-may-2-jun-02	1 H
<i>Freya arraijanica</i> Chickering, 1946	R.L.-L.	28-may-2-jun-02	1 H
<i>Freya bifurcata</i> (F. O. P. Cambridge, 1901)	R.L.-L.	28-may-2-jun-02	3 M
<i>Frigga pratensis</i> (Peckham & Peckham, 1885)	P.S.	8-ag.-01	1 im
<i>Frigga pratensis</i> (Peckham & Peckham, 1885)	M.	11-dic-01	1 H + 2 M
<i>Frigga pratensis</i> (Peckham & Peckham, 1885)	R.L.-L.	28-may-2-jun-02	4 H + 2 M + 11 im.
<i>Habronattus banksi</i> (Peckham & Peckham, 1901)	P.S.	7-12-ag.-01	4 H + 2 M
<i>Itata completa</i> (Banks, 1929)	P.L.	1-3-marzo-02	1 M
<i>Jollas geniculatus</i> Simon, 1901	C.T.	7-17-dic-01	1 H
<i>Lyssomanes bitaeniatus</i> Peckham & Wheeler, 1889	P.S.	8-ag.-01	1 M
<i>Lyssomanes bryantae</i> Chickering, 1946	P.S.	28-may-2-jun-02	2 H
<i>Lyssomanes elegans</i> F. O. P. Cambridge, 1900	R.L.-L.	28-may-2-jun-02	1 H
<i>Lyssomanes remotus</i> Peckham & Peckham, 1896	P.S.	7-12-ag.-01	1 M

<i>Mabellina prescottii</i> Chickering, 1946	P.L.	1-3-marzo-02	1 M
<i>Marpissa magna</i> Peckham & Peckham, 1894	P.S.	8-ag.-01	1 H
<i>Marpissa magna</i> Peckham & Peckham, 1894	P.S.	6-18-dic-01	2 H
<i>Marpissa magna</i> Peckham & Peckham, 1894	P.L.	1-3-marzo-02	1 H
<i>Messua laxa</i> (Chickering, 1946)	P.S.	8-ag.-01	1 M
<i>Messua octonotata</i> (F. O. P. Cambridge, 1901)	R.L.-L.	28-may-2-jun-02	1 H + 1 im.
<i>Messua octonotata</i> (F. O. P. Cambridge, 1901)	P.S.	28-may-2-jun-02	1 H
<i>Myrmarachne centralis</i> (Peckham & Peckham, 1892)	P.S.	7-12-ag.-01	1 M
<i>Nycerella delecta</i> (Peckham & Peckham, 1896)	L.	7-17-dic-01	1 H
<i>Nycerella</i> sp.	P.L.	1-3-marzo-02	1 H
<i>Pachomius dybowskii</i> (Taczanowski,1871)	L.	7-17-dic-01	1 H
<i>Pachomius dybowskii</i> (Taczanowski,1871)	P.S.	6-18-dic-01	1 M
<i>Pachomius dybowskii</i> (Taczanowski,1871)	R.L.-L.	28-may-2-jun-02	2 H + 1 M + 1 im.
<i>Peckhamia variegata</i> (F. O. P. Cambridge, 1900)	C.T.	28-may-2-jun-02	1 M
<i>Phiale bicuspidata</i> (F. O. P. Cambridge, 1901)	P.S.	7-12-ag.-01	1 M
<i>Phiale crocea</i> C. L. Koch, 1846	L.	7-17-dic-01	1 H
<i>Phiale crocea</i> C. L. Koch, 1846	R.L.-L.	28-may-2-jun-02	1 M
<i>Phiale guttata</i> (C. L. Koch, 1846)	R.L.-L.	28-may-2-jun-02	1 M + 6 im.
<i>Phiale simplicicava</i> (F. O. P. Cambridge, 1901)	L.	7-17-dic-01	2 H
<i>Phiale simplicicava</i> (F. O. P. Cambridge, 1901)	R.L.-L.	28-may-2-jun-02	6 H
<i>Phiale</i> sp.	R.L.-L.	28-may-2-jun-02	5 im.
<i>Plexippus fannae</i> (Peckham & Peckham, 1896)	P.S.	6-18-dic-01	1 M
<i>Plexippus fannae</i> (Peckham & Peckham, 1896)	C.T.	7-17-dic-01	1 M
<i>Plexippus fannae</i> (Peckham & Peckham, 1896)	L.	7-17-dic-01	1 M
<i>Sidusa recondita</i> Peckham & Peckham, 1896	L.	7-17-dic-01	2 H + 1 M
<i>Sidusa recondita</i> Peckham & Peckham, 1896	R.L.-L.	28-may-2-jun-02	6 H + 1 M + 6 im.
<i>Synemosyna americana</i> (Peckham & Peckham 1895)	R.L.-L.	28-may-2-jun-02	1 H
<i>Thiodina sylvana</i> (Hentz, 1845)	P.S.	8-ag.-01	1 M
<i>Thiodina sylvana</i> (Hentz, 1845)	P.L.	7-ag.-01	1 im.
<i>Thiodina sylvana</i> (Hentz, 1845)	P.L.	7-17-dic-01	1 H + 1 M
<i>Thiodina sylvana</i> (Hentz, 1845)	P.S.	6-18-dic-01	1 M
<i>Thiodina sylvana</i> (Hentz, 1845)	M.	11-dic-01	2 H + 1 M
<i>Thiodina sylvana</i> (Hentz, 1845)	R.L.-L.	28-may-2-jun-02	4 H + 6 M + 3 im.
<i>Thiodina sylvana</i> (Hentz, 1845)	P.S.	28-may-2-jun-02	1 M + 1 im.
<i>Tulpius hilarus</i> Peckham & Peckham, 1896	P.S.	1-3-marzo-02	1 im.
<i>Zygoballus rufipes</i> Peckham & Peckham, 1885	R.L.-L.	28-may-2-jun-02	1 H + 1 im.
??	R.L.-L.	28-may-2-jun-02	1 H
SCYTODIDAE			
<i>Scytodes fusca</i> Walckenaer, 1837	P.L.	7-ag.-01	1 H

<i>Scytodes fusca</i> Walckenaer, 1837	P.S.	6-18-dic-01	2 H
<i>Scytodes fusca</i> Walckenaer, 1837	P.S.	28-may-2-jun-02	1 M
<i>Scytodes longipes</i> Lucas, 1844	M.	11-ag.-01	1 H + 28 im.
<i>Scytodes</i> sp.	C.T.	28-may-2-jun-02	2 im.
SELENOPIDAE			
<i>Selenops</i> sp.	P.L.	7-17-dic-01	1 M
SENOCLIDAE			
<i>Senoculus canaliculatus</i> F. O. P. Cambridge, 1902	P.S.	6-18-dic-01	1 H + 50 im.
<i>Senoculus rubicundus</i> Chickering, 1953	P.L.	7-ag.-01	1 H
<i>Senoculus rubicundus</i> Chickering, 1953	P.S.	6-18-dic-01	1 H
SPARASSIDAE			
<i>Heteropoda venatoria</i> (L., 1767)	S.	13-ag.-01	3 H
<i>Olios stylifer</i> (F.O.P. Cambridge, 1908)	P.L.	7-ag.-01	1 M
<i>Olios formosus</i> Banks, 1929 ?	R.L.-L.	28-may-2-jun-02	1 M + 4 im.
<i>Olios</i> sp.	P.L.	7-ag.-01	2 im.
<i>Olios</i> sp.	M.	11-ag.-01	1 im.
??	C.T.	28-may-2-jun-02	3 im.
TETRAGNATHIDAE			
<i>Azilia afinis</i> O.P. Cambridge, 1893	C.T.	10-ag.-01	1 H
<i>Azilia afinis</i> O.P. Cambridge, 1893	C.T.	7-17-dic-01	2 H + 2 M
<i>Azilia afinis</i> O.P. Cambridge, 1893	C.T.	28-may-2-jun-02	1 H + 1 im.
<i>Chrysometa alboguttata</i> (O.P. Cambridge, 1889)	R.L.-L.	28-may-2-jun-02	1 H
<i>Glenognatha foxi</i> (Mc Cook, 1893)	P.S.	7-12-ag.-01	1 M
<i>Leucauge acuminata</i> (O.P. Cambridge, 1889)	P.S.	6-18-dic-01	1 H
<i>Leucauge acuminata</i> (O.P. Cambridge, 1889)	C.T.	28-may-2-jun-02	1 H + 1 im.
<i>Leucauge argyra</i> (Walckenaer, 1842)	P.S.	6-18-dic-01	1 H
<i>Leucauge argyra</i> (Walckenaer, 1842)	R.L.-L.	28-may-2-jun-02	1 H + 1 im.
<i>Leucauge argyra</i> (Walckenaer, 1842)	P.S.	28-may-2-jun-02	1 H + 1 M
<i>Leucauge lugens</i> (O.P. Cambridge, 1896)	P.L.	7-ag.-01	1 H
<i>Leucauge moerens</i> (O.P. Cambridge, 1896)	P.L.	7-17-dic-01	4 H + 1 M
<i>Leucauge moerens</i> (O.P. Cambridge, 1896)	P.S.	6-18-dic-01	10 H + 1 M
<i>Leucauge moerens</i> (O.P. Cambridge, 1896)	C.T.	7-17-dic-01	1 H
<i>Leucauge moerens</i> (O.P. Cambridge, 1896)	C.T.	28-may-2-jun-02	1 M + 4 im.
<i>Leucauge moerens</i> (O.P. Cambridge, 1896)	R.L.-L.	28-may-2-jun-02	9 H + 1 M + 9 im.
<i>Leucauge saphes</i> Chamberlin & Ivie, 1936	P.L.	7-ag.-01	1 H
<i>Leucauge venusta</i> (Walckenaer, 1841)	C.T.	7-17-dic-01	1 H + 1 M
<i>Leucauge</i> sp.	P.S.	6-18-dic-01	3 H
<i>Mecynometa globosa</i> (O.P. Cambridge, 1889)	P.S.	8-ag.-01	1 H
<i>Mecynometa globosa</i> (O.P. Cambridge, 1889)	L.	7-17-dic-01	1 H + 1 M
<i>Mecynometa globosa</i> (O.P. Cambridge, 1889)	P.S.	6-18-dic-01	3 H
<i>Mecynometa globosa</i> (O.P. Cambridge, 1889)	C.T.	28-may-2-jun-02	1 H
<i>Nephila clavipes</i> (Linnaeus, 1767)	P.L.	7-ag.-01	1 M

<i>Nephila clavipes</i> (Linnaeus, 1767)	C.T.	7-17-dic-01	1 M
<i>Nephila clavipes</i> (Linnaeus, 1767)	R.L.-L.	28-may-2-jun-02	1 M + 5 im.
<i>Tetragnatha cognata</i> O. P. Cambridge, 1889	P.L.	7-17-dic-01	1 H
<i>Tetragnatha fragilis</i> Chickering, 1957	P.L.	7-17-dic-01	1 H
<i>Tetragnatha fragilis</i> Chickering, 1957	R.L.-L.	28-may-2-jun-02	1 M
<i>Tetragnatha laboriosa</i> Hentz, 1850	P.S.	6-18-dic-01	2 H
<i>Tetragnatha laboriosa</i> Hentz, 1850	L.	7-17-dic-01	1 H
<i>Tetragnatha laboriosa</i> Hentz, 1850	M.	11-dic-01	2 H
<i>Tetragnatha mexicana</i> Keyserling, 1865	R.L.-L.	28-may-2-jun-02	1 H + 1 M
<i>Tetragnatha pallescens</i> F. O. P. Cambridge, 1903	C.T.	7-17-dic-01	2 H
<i>Tetragnatha pallida</i> O. P. Cambridge, 1889	P.L.	7-ag.-01	1 M
<i>Tetragnatha tenuissima</i> O. P. Cambridge, 1889	P.L.	7-17-dic-01	1 H
<i>Tetragnatha tenuissima</i> O. P. Cambridge, 1889	P.L.	1-3-marzo-02	2 H + 2 M
<i>Tetragnatha tenuissima</i> O. P. Cambridge, 1889	R.L.-L.	28-may-2-jun-02	1 im.
<i>Tetragnatha tropica</i> O. P. Cambridge, 1889	P.S.	6-18-dic-01	1 H
<i>Tetragnatha</i> sp.	P.L.	7-ag.-01	1 M
<i>Tetragnatha</i> sp.	P.S.	6-18-dic-01	1 H
<i>Tetragnatha</i> sp.	R.L.-L.	28-may-2-jun-02	2 im.
<i>Tetragnatha</i> sp.	R.L.-L.	28-may-2-jun-02	1 im.
THERIDIIDAE			
<i>Achaearanea nigrovittata</i> (Keyserling, 1884)	L.	7-17-dic-01	1 H
<i>Achaearanea nigrovittata</i> (Keyserling, 1884)	M.	11-dic-01	2 H
<i>Achaearanea nigrovittata</i> (Keyserling, 1884)	R.L.-L.	28-may-2-jun-02	5 H
<i>Achaearanea nigrovittata</i> (Keyserling, 1884)	C.T.	28-may-2-jun-02	1 H
<i>Achaearanea taeniata</i> (Keyserling, 1884)	P.S.	6-18-dic-01	3 H
<i>Achaearanea taeniata</i> (Keyserling, 1884)	C.T.	7-17-dic-01	3 H
<i>Achaearanea taeniata</i> (Keyserling, 1884)	R.L.-L.	28-may-2-jun-02	5 H + 1 M
<i>Achaearanea taeniata</i> (Keyserling, 1884)	C.T.	28-may-2-jun-02	1 H
<i>Achaearanea</i> sp.	P.S.	8-ag.-01	1 H
<i>Anelosimus studiosus</i> (Hentz, 1850)	R.L.-L.	28-may-2-jun-02	2 M + 1 H
<i>Anelosimus studiosus</i> (Hentz, 1850)	C.T.	28-may-2-jun-02	2 H + 1 im.
<i>Argyrodes attenuatus</i> (O. P. Cambridge, 1881)	L.	7-17-dic-01	1 M
<i>Argyrodes caudatus</i> (Taczanowski, 1874)	C.T.	7-17-dic-01	3 M + 1 H
<i>Argyrodes caudatus</i> (Taczanowski, 1874)	L.	7-17-dic-01	1 M
<i>Argyrodes caudatus</i> (Taczanowski, 1874)	R.L.-L.	28-may-2-jun-02	4 H + 1 M
<i>Argyrodes elevatus</i> Taczanowski, 1873	C.T.	7-17-dic-01	1 H + 1 M
<i>Argyrodes elevatus</i> Taczanowski, 1873	R.L.-L.	28-may-2-jun-02	3 H + 1 M
<i>Argyrodes globosus</i> Keyserling, 1884	R.L.-L.	28-may-2-jun-02	6 H + 2 M + 5 im.
<i>Argyrodes metaltissimus</i> (Soares & Camargo, 1948)	P.S.	28-may-2-jun-02	1 H

<i>Argyrodes metaltissimus</i> (Soares & Camargo, 1948)	R.L.-L.	28-may-2-jun-02	1 H
<i>Argyrodes</i> sp.	M.	11-ag.-01	1 H
<i>Argyrodes</i> sp.	R.L.-L.	28-may-2-jun-02	1 M
<i>Chrysso albomaculata</i> O. P. Cambridge, 1882	C.T.	28-may-2-jun-02	1 H
<i>Chrysso pulcherrima</i> (Mello-Leitão, 1917)	L.	7-17-dic-01	1 H
<i>Chrysso</i> sp.	P.S.	6-18-dic-01	1 H
<i>Episinus cognatus</i> O. P. Cambridge, 1893	C.T.	7-17-dic-01	1 H
<i>Episinus cognatus</i> O. P. Cambridge, 1893	M.	11-dic-01	1 H
<i>Episinus</i> sp.	M.	11-ag.-01	1 im.
<i>Paratheridula perniciosa</i> (Keyserling, 1886)	P.S.	28-may-2-jun-02	1 M
<i>Steatoda erigoniformis</i> (O.P. Cambridge, 1872)	R.L.-L.	28-may-2-jun-02	1 H
<i>Theridion hispidum</i> O. P. Cambridge, 1898	C.T.	28-may-2-jun-02	1 H + 1 im.
<i>Theridion metabolum</i> Chamberlin & Ivie, 1936	P.S.	28-may-2-jun-02	1 M
<i>Thwaitesia affinis</i> O.P. Cambridge, 1882	L.	7-12-ag.-01	1 M
<i>Thwaitesia affinis</i> O.P. Cambridge, 1882	R.L.-L.	28-may-2-jun-02	3 H + 1 M + 1 im.
<i>Thymoites</i> sp.	R.L.-L.	28-may-2-jun-02	2 H + 1 im.
<i>Tidarren haemorroidale</i> (Bertkau, 1880)	P.L.	7-ag.-01	1 H
<i>Tidarren haemorroidale</i> (Bertkau, 1880)	C.T.	7-17-dic-01	1 H
THOMISIDAE			
<i>Misumenoides magnus</i> (Keyserling, 1880)	P.S.	6-18-dic-01	1 H
<i>Misumenoides parvus</i> (Keyserling, 1880)	C.T.	7-17-dic-01	1 H + 1 M
<i>Misumenoides</i> sp.	P.S.	8-ag.-01	1 im.
<i>Misumenoides</i> sp.	P.L.	7-ag.-01	1 im.
<i>Misumenoides</i> sp.	L.	7-17-dic-01	1 M
<i>Misumenoides</i> sp.	R.L.-L.	28-may-2-jun-02	3 im.
<i>Misumenoides</i> sp.	C.T.	28-may-2-jun-02	1 im.
<i>Misumenoides</i> sp.	R.L.-L.	28-may-2-jun-02	1 im.
<i>Misumenops pallens</i> (Keyserling, 1880)	C.T.	28-may-2-jun-02	1 H
<i>Strophius</i> sp.	R.L.-L.	7-17-dic-01	1 M + 1 im.
<i>Strophius</i> sp.	R.L.-L.	28-may-2-jun-02	1 im.
<i>Strophius</i> sp.	R.L.-L.	28-may-2-jun-02	2 M + 2 im.
<i>Tmarus innotus</i> Chickering, 1965	C.T.	28-may-2-jun-02	1 M
<i>Tmarus parki</i> Chickering, 1950	P.S.	28-may-2-jun-02	1 M
<i>Tmarus probus</i> Chickering, 1950	R.L.-L.	28-may-2-jun-02	1 M
<i>Tmarus studiosus</i> O. P. Cambridge, 1892	R.L.-L.	28-may-2-jun-02	1 H
<i>Tmarus</i> sp.	R.L.-L.	28-may-2-jun-	1 H

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<i>Tobias taczanowskii</i> Roewer, 1951	R.L.-L.	28-may-2-jun-02	1 H + 1 M
TRECHALEIDAE			
<i>Dyrines lineatipes</i> Petrunkevitch, 1925	R.L.-L.	28-may-2-jun-02	1 M
<i>Trechalea extensa</i> (O.P. Cambridge, 1896)	P.L.	1-3-marzo-02	1 M
<i>Trechalea extensa</i> (O.P. Cambridge, 1896)	R.L.-L.	28-may-2-jun-02	1 H
<i>Trechalea</i> sp.	M.	11-ag.-01	2 im.
<i>Trechalea</i> sp.	P.S.	6-18-dic-01	1 im.
ULOBORIDAE			
<i>Philoponella tingens</i> (Chamberlin & Ivie, 1936)	P.S.	6-18-dic-01	3 H
<i>Philoponella tingens</i> (Chamberlin & Ivie, 1936)	C.T.	7-17-dic-01	2 H
<i>Philoponella</i> sp.	R.L.-L.	28-may-2-jun-02	1 H
<i>Uloborus trilineatus</i> Keyserling, 1883	P.S.	8-ag.-01	1 H
<i>Uloborus trilineatus</i> Keyserling, 1883	M.	11-dic-01	1 H
<i>Uloborus trilineatus</i> Keyserling, 1883	L.	7-17-dic-01	2 H
<i>Uloborus trilineatus</i> Keyserling, 1883	R.L.-L.	28-may-2-jun-02	3 H + 1 M
<i>Uloborus</i> sp.	C.T.	28-may-2-jun-02	1 H