

Redescription of *Cheiracanthium isiacum* (Arachnida: Araneae: Cheiracanthiidae) from Jazirat Shandweel District, Sohag Governorate, Egypt

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Abstract: The present article deals with the redescription of *Cheiracanthium isiacum* spider (Araneae: Arachnida: Cheiracanthiidae), which inhabits both olive and lemon trees' orchards, as well as the webs of *Cyrtophora citricola* spider. *Cheiracanthium isiacum* was collected from three sites at Jazirat Shandweel District, Sohag Governorate. The redescription was carried out using a new technique as the first in Egypt to estimate the structure of female and male parts especially genitalia and to clearly identify the genus and species

Keywords: Araneae, Taxonomy, Genitalia, Identification, *Cheiracanthium*.

1 Introduction

Family Cheiracanthiidae Wagner, 1887 (syn. Eutichuridae Lehtinen, 1967) is one of the araneomorphs (Araneomorphae: Opisthothelae: Araneae: Arachnida) spiders, the members of which are commonly known as yellow sac spiders. It includes more than 363 species belonging to 14 genera [1]. In Egypt, it represents one of the forty-one recorded spiders' families with one genus and one species [2]. Genus *Cheiracanthium* C.L. Koch, 1839, recorded in Egypt, is the largest genus within the family Cheiracanthiidae and contains 218 described species. The taxonomic status of this genus was subjected to changes, where it was placed in the family Clubionidae, Wagner, 1887 then transferred to the family Miturgidae, Simon, 1886 [3], and finally to the family Eutichuridae, Lehtinen, 1967 [4]. Recently the previous families were revised and the genus *Cheiracanthium* moved to the family Cheiracanthiidae [1].

Members of family Cheiracanthiidae according to [5], are small to medium-sized spiders, ranging between 5-12 mm in body length. The body color varies being white, pale yellowish or brownish. Male palps have variable retro-lateral tibial apophyses. In males, embolus (the end of the palpal bulb) varies in length, cymbium sometimes with basal apophysis, while median apophysis is absent. Genitalia of entelegyne females showed convex epigynal plate that sometimes is sclerotized.

In Egypt, almost all the spiders' works focus on their biology and ecology, as well as their use as biological control agents against crop pests [6-12]. The present study

aims to re-describe, in detail, the external morphology and genitalia structure of *Cheiracanthium isiacum* to promote its taxonomic status.

2 Material and Methods

Sampling of spiders carried out during a period of about two and half years (from September 2015 until January 2018) in three different habitats at Jazirat Shandweel District (26°37'59"N, 31°39'10"E), Sohag Governorate (Plate. 1). Spiders were collected using handpicking and beating trays methods. In the laboratory, both males and females were separated, photographed, and preserved in labelled bottles containing 70% ethyl alcohol. The most taxonomically important organs were removed using micro-scissor and fine sharpened needles under a stereomicroscope. These parts were cleared in clove oil or lactic acid and mounted on slides with the help of Hoyer's media. Species identification was carried out according to the keys and descriptions of [5, 13-16]. Also, Mr Hisham El-Hennawy (the Egyptian expert in Egyptian spiders' identification) confirmed species identification (personal communication).

Abbreviations used: a. spin. = Anterior spinnerets, ana. tu. = Anal tubercle, c.r. = Cephalic region, 1st cha. = First chamber, 2nd cha. = Second chamber, ch. = Chelicera, che. = Cheveron, cla. = Claw, cla tuf = Claw tuft, cly. = Clypeus, coc. = Cocoon col. = Colulus, con. = Conductor, con. d.= Connective duct, cop. d. = Copulatory duct, cop. op. = Copulatory opening, cox. = Coxa, cy. = Cymbium, cy. spu. = Cymbium Spur, e. = Embolus, en. = Endite, f. = Female, fa. = Fang, fe. = Femur, g.pl. = Genital plate, jo. = Joint, l. = Labium, le. 1= First leg, le. 2= Second leg, le. 3= Third leg,

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le. 4= Fourth leg, lu.b. = Lung books, m. = Male, me.spin. = Median spinnerets, met. = Metatarsus, mo. = Molt, o.ar. = Ocular area, op. = Opisthosoma, p. = Prosoma, pa. = Patella, pe. = Pedipalp, po.spin. = Posterior spinnerets, pro. te. = Promarginal teeth, re. = Retreat, ret. te. = Retromarginal teeth, rt. ti. apo. = Retrolateral tibial apophysis, sc. = Scopula, serr. = Serrula, si. = Sigilla, ste. = Sternum, spid. = Spiderlings, spin. = Spinnerets, ta. = Tarsus, teg. = Tegulum, teg. apo. = Tegular apophysis, th.r. = Thoracic region, ti. = Tibia, ti. apo. = Tibial apophysis, tr. = Trochanter.

3 Results

Cheiracanthium isiacum, O. Pickard-Cambridge, 1874:

Distribution in the present study: Seven hundred and sixty-two individuals were collected from the different studied sites. Five hundred and ten individuals were collected from the site of the olive trees, of them, 22 were adult females and 20 were adult males. Also, 236 individuals were collected from the lemon trees site, of them, 23 were adult females and 26 were adult males. In addition, 16 individuals were collected from webs of the spider *Cyrtophora citricola* found in the greenhouse; including one adult female.

Described materials

Female; Isoparatype: Five adult individuals measuring about 1.1 X 0.4, 1.3 X 0.5, 1.2 X 0.5, 1.5 X 0.75 and 1.4 X 0.6 cm in maximum length and width; respectively. The largest collected individual was about 1.5 X 0.75 cm in maximum length and width; respectively. Its prosoma was about 0.54 X 0.52 cm in maximum length and width; respectively and its opisthosoma was 1 X 0.8 cm in maximum length and width; respectively.

Male; Isoparatype: Four adult individuals measuring about 1.1 X 0.4, 0.9 X 0.35, 0.96 X 0.33, and 1.2 X 0.42 cm in maximum length and width; respectively. The maximum length and width of the largest collected individual were about 1.2 X 0.42 cm; respectively. The prosoma measures about 0.5 X 0.4 cm in maximum length and width; respectively and its opisthosoma measures about 0.7 X 0.4 cm in maximum length and width; respectively

Habitat: Members of this species were noticed hiding in smooth silken retreats, which are usually found in the cracks of the stems of the trees. Also, they make retreats by curling dead or living leaves for resting, mating, molting or laying eggs (Plate 2A-C).

Cocoon: The female encloses herself in a silken sac and then lays 110 eggs (n=2) inside the egg sac. It stays inside and guards over the eggs until the spiderlings emerge (Plate 2D-F).

General description: Members of this species are known as the black-footed spiders or the yellow sac spiders. They get these common names from their appearance. The males are

similar to females. Males have a narrower body and longer legs than females.

Description of female: Endites is longer than wide, black and covered with strong black hairs. Labium is elongated (Plate 3C and B), while chelicerae are long and robust. Cheliceral furrows have two pro-marginal teeth and two retro-marginal teeth. Fangs are long and moderately strong, straight; slightly projecting forwards and have red-brown color (Plate 3E and F). Pedipalps are brightly yellowish and their ends banded with red and black color and small needle-like claw (Plate 4A and B).

Carapace is slightly convex, without foveal marks (Plate 4C). Clypeus is very short (Plate 4D). The eight black eyes are arranged in two slightly parallel transverse straight rows. The antero-median eyes are the largest, while the postero-median ones are nearly equal in size and smaller than the antero-lateral eyes. The ocular area is strongly blackish-brown (Plate 4C and D).

Sternum is heart-shaped and brownish in color (Plate 4E). Legs are long and strong; almost lack spines except for the presence of few numbers on the third and fourth pairs. Each tarsus ends with two comb-like claws and a scopula between them (plates 4F; 5A-D).

Opisthosoma is very wide (Plate 5E and F). Epigyne is bean-shaped and epigynal field broader than long. It looks like a very flat depression, with raised margins in which the posteriors and the laterals are more distinctly developed than the anterior ones. The copulatory openings locate laterally within that depression (Plate 6A). Vulva: each copulatory opening leads to a short copulatory duct and the latter leads to a long-curved connective duct that connects the first and second chambers (Plate 6B and C). Spinnerets are short, small, yellowish green to pale yellow and covered with short fine white and black hairs. The anterior pair is the largest and segmented. The posterior pair is the longest one, while the median pair is the smallest (Plate 6D). Colulus is present. The anal tubercle has a yellowish green to pale yellow in color and its tip is covered with strong black hairs (Plate 6D).

Description of male: Endites, labium and chelicerae: resemble that of female (Plate 7A-D). Pedipalps are short, strong and similar in color to legs, except the dark-reddish brown distal parts. Coxa, trochanter and femur are normal. Patella: with small prominent spines and notches. Tibia has two small tibial apophyses and a long hooked like retro-lateral one. Cymbium is elongated with a hooked like retro-lateral extension (sharply pointed spur) that crosses the retro-lateral tibial apophysis. Embolus: very long and filiform, rises on tegulum and runs in a semi-circular manner. Conductor: fleshy and arises centrally in the pro-lateral half of tegulum. Tegular apophysis: has a specific shape, relatively broad, arises centrally on tegulum and divided distally into two, relatively broad lobe-like extensions and slightly long and thin ones (Plates 7E and F; 8A).

Clypeus, eyes and sternum are resembled that of female (Plate 8B and D). Legs are slightly similar to that of females, but they are longer and spiny (Plates 8E and F; 9A and C). There is a single longitudinal row of eleven spines on each of the metatarsus of the second pair of legs (plate 8F). The spines on the third pair of legs without definite arrangements (plate 9A). The most characteristic feature of males is the presence of a single longitudinal row of about

11 or 12 spines on the ventral surface of the metatarsi of the fourth pair (plate 9B).

Opisthosoma is slender (Plate 9D and E). Spinnerets is long and yellowish green in color. The posterior pair is the longest (longer than that of the female), while the median one is thin and nearly equal in length to the anterior one (Plate 9F). Colulus and anal tubercle are resembled that of female (Plate 9F).

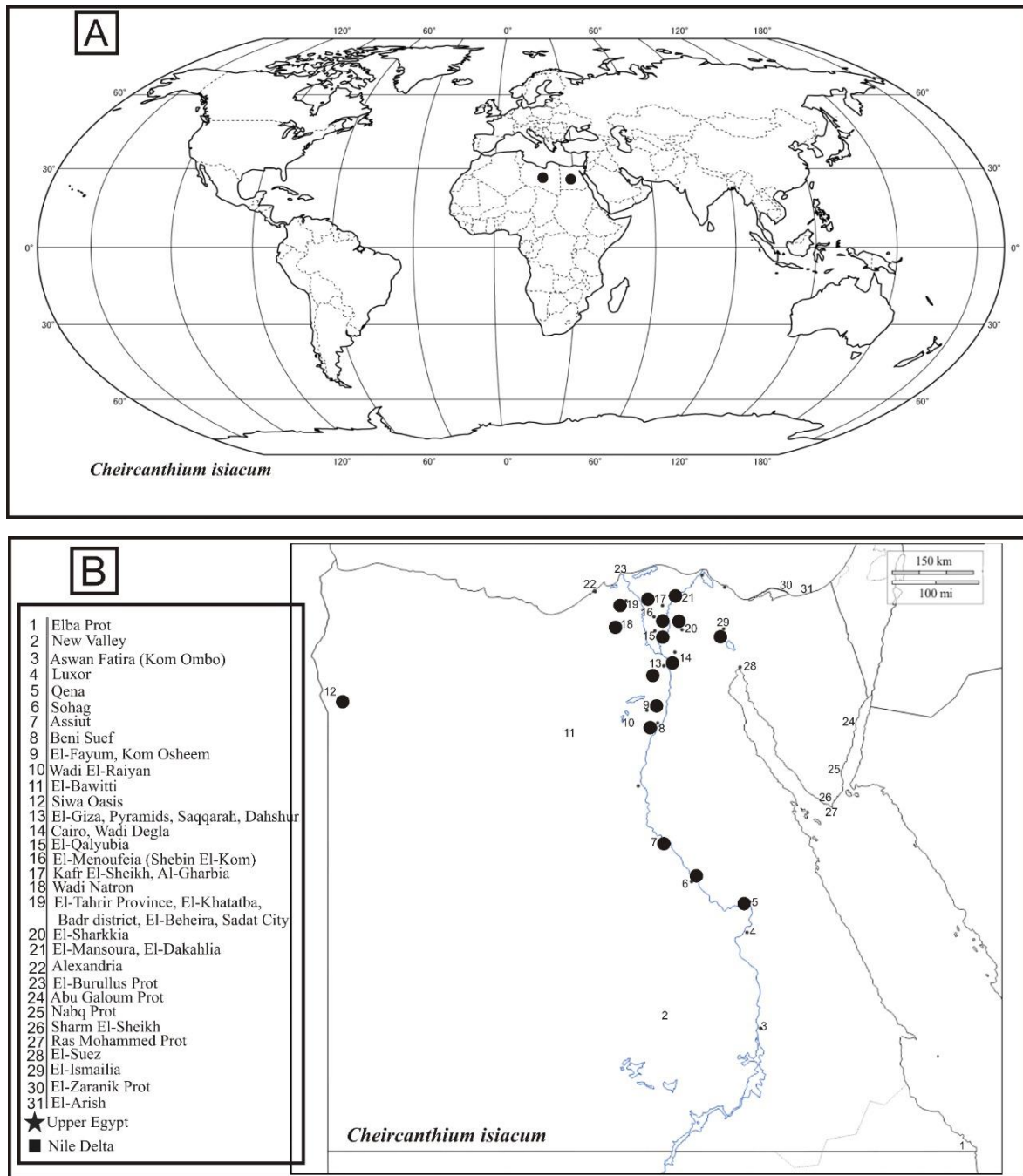


Fig. 1. Maps of distribution of *Cheiracanthium isiacum*. (A): a map of the world showing the worldwide distribution and (B): a map of Egypt showing the local distribution.

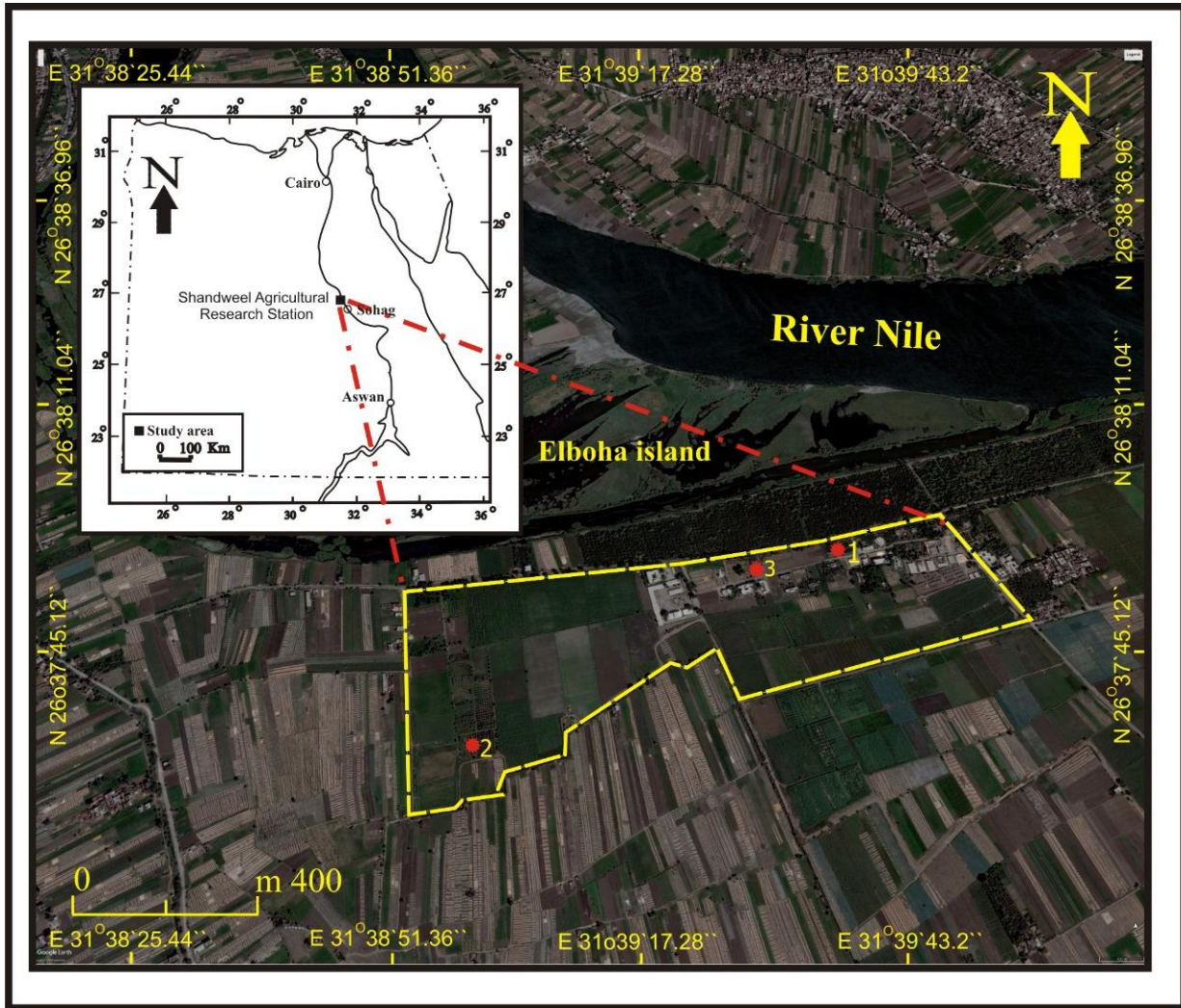


Plate 1. A map Showing the studied sites at Jazirat Shandweel District, Sohag Governorate, Egypt. (1= lemon trees site; 2= olive trees site; 3= green house).

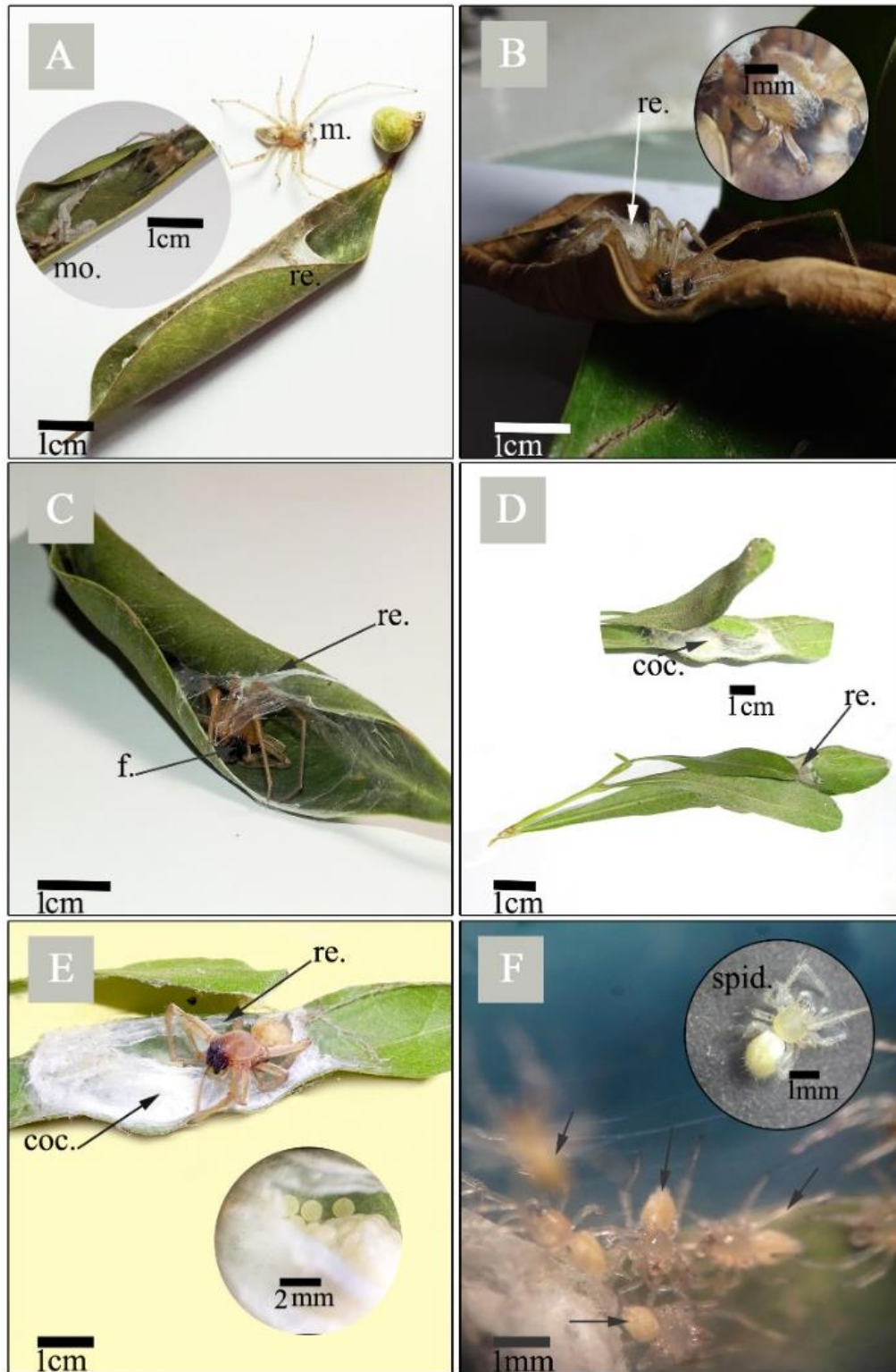


Plate 2. Light photographs of mature *Cheiracanthium isiacum* showing: An adult male inside its retreat (A&B); An adult female inside its retreat (C); The retreat (D); The adult female inside its retreat with its cocoon; (E) and the spiderlings with an enlarged one (F).

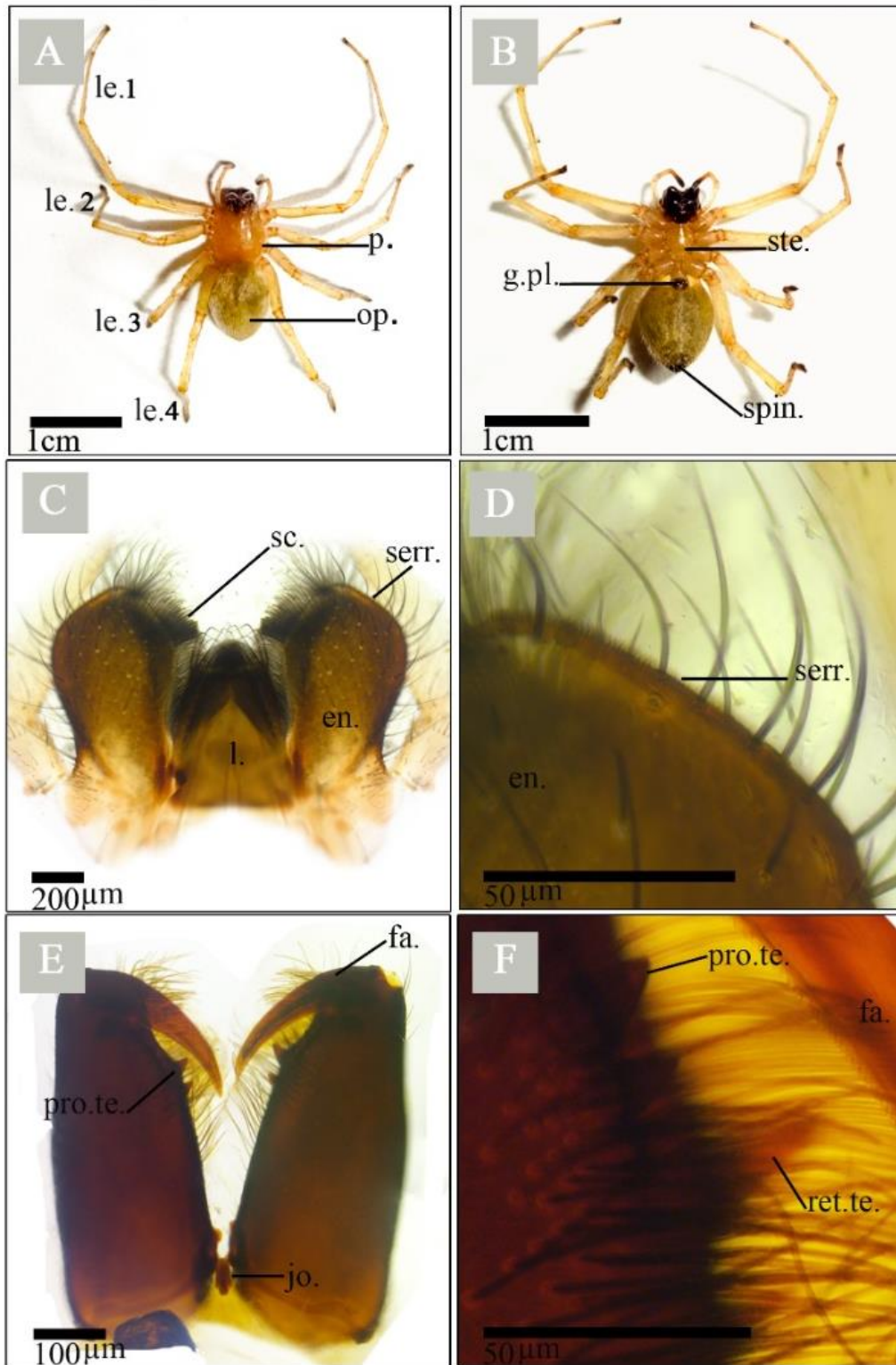


Plate 3. Light photographs of an adult female of *Cheiracanthium isiacum* showing: Dorsal and ventral views (A&B); Labium and endites with an enlarged endites to show serrula (C&D) and ventral view of the chelicerae with an enlarged cheliceral furrow (E&F).

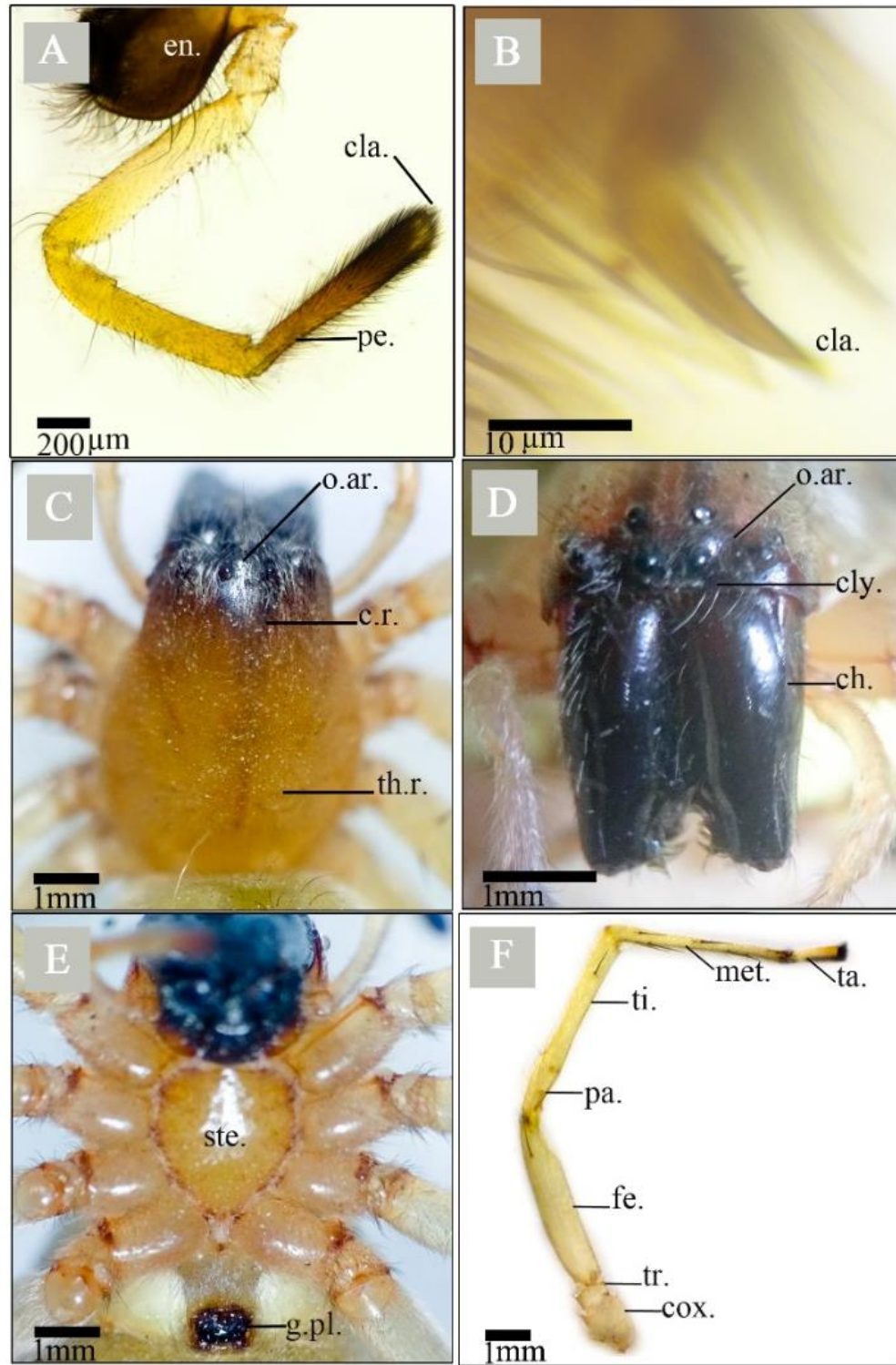


Plate 4. Light photographs of an adult female of *Cheiracanthium isiacum* showing: Endite and pedipalp with an enlarged distal part of pedipalp (A&B); The prosoma (C); An enlarged frontal view of the prosoma that illustrates the clypeus, ocular area and chelicerae (D); The sternum (E) and first leg (F)

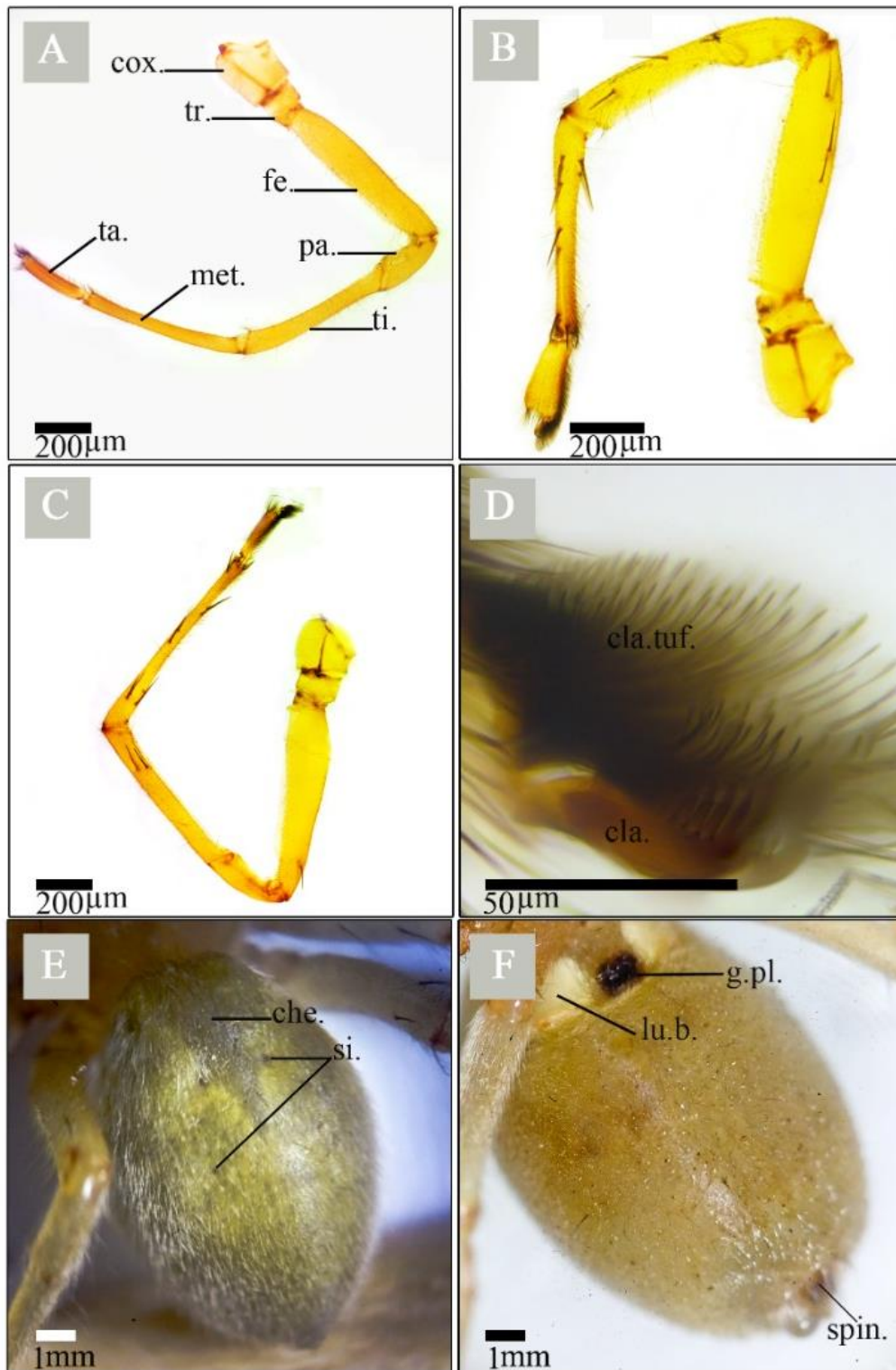


Plate 5. Light photographs of an adult female of *Cheiracanthium isiacum* showing: Second and third legs (A&B); Fourth leg with an enlarged distal part of the tarsus to show the claw and the claw tufts (C&D) and the dorsum and venter of the opisthosoma (E&F).

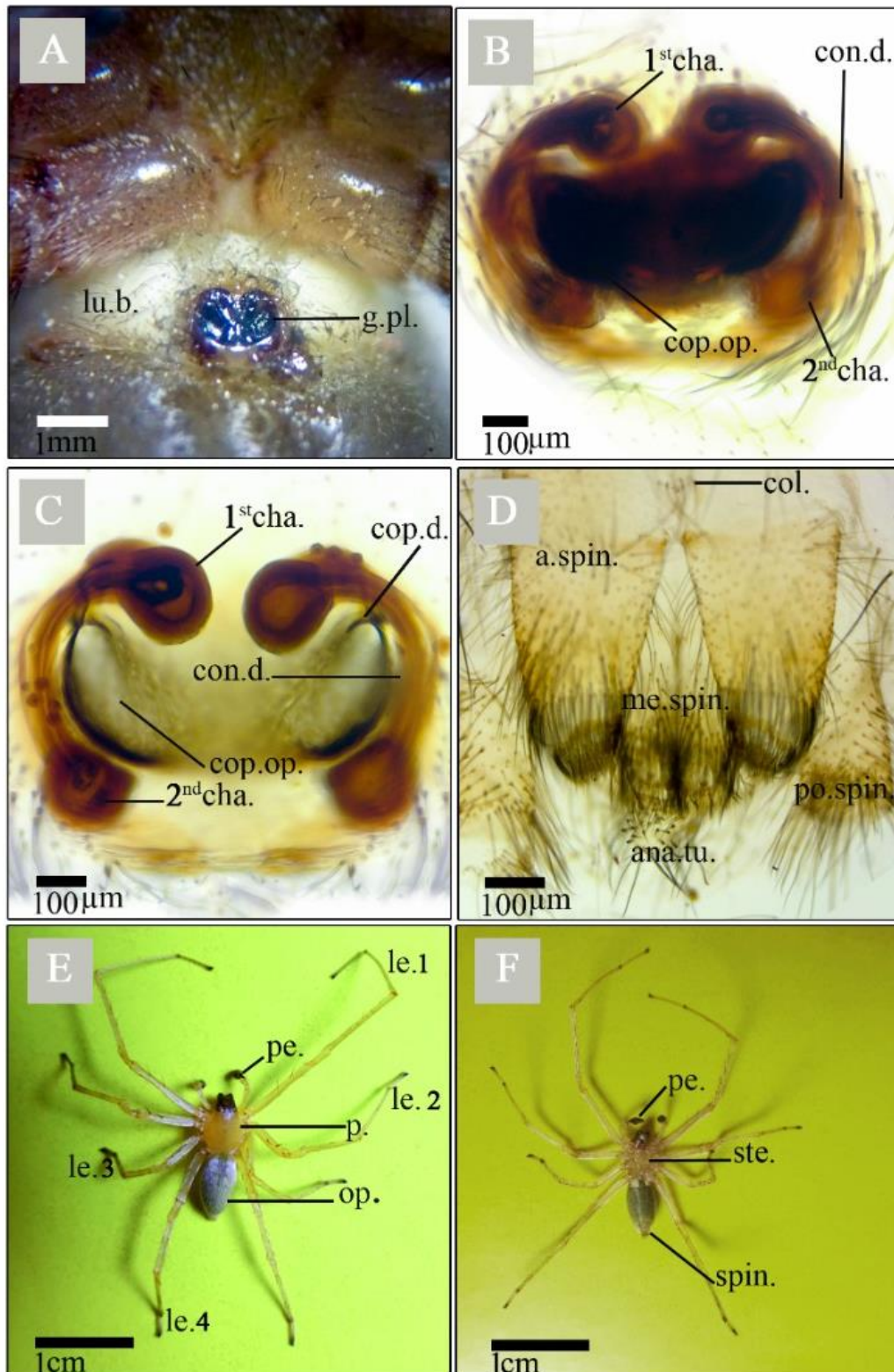


Plate 6. Light photographs of mature *Cheiracanthium isiacum* showing: The epigyne and the vulva of an adult female (A-C); The colulus, spinnerets and anal tubercle of an adult female (D) and dorsal and ventral views of an adult male (E&F).

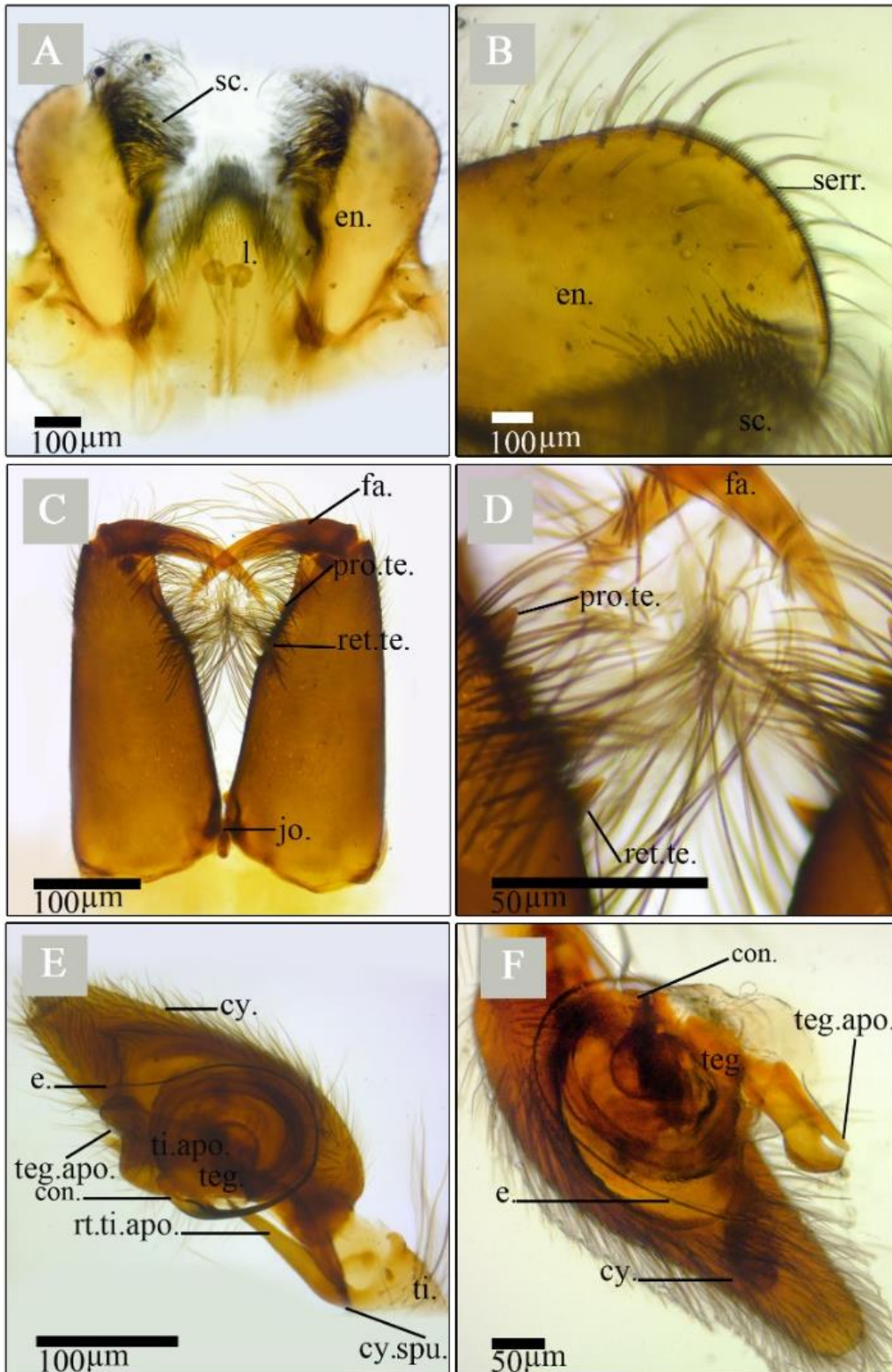


Plate 7. Light photographs of an adult male of *Cheiracanthium isiacum* showing: Labium and endites with enlarged endites to show serrula (A&B); Ventral view of the chelicerae with an enlarged cheliceral furrow (C&D) and different views of the palpal organ (E&F).

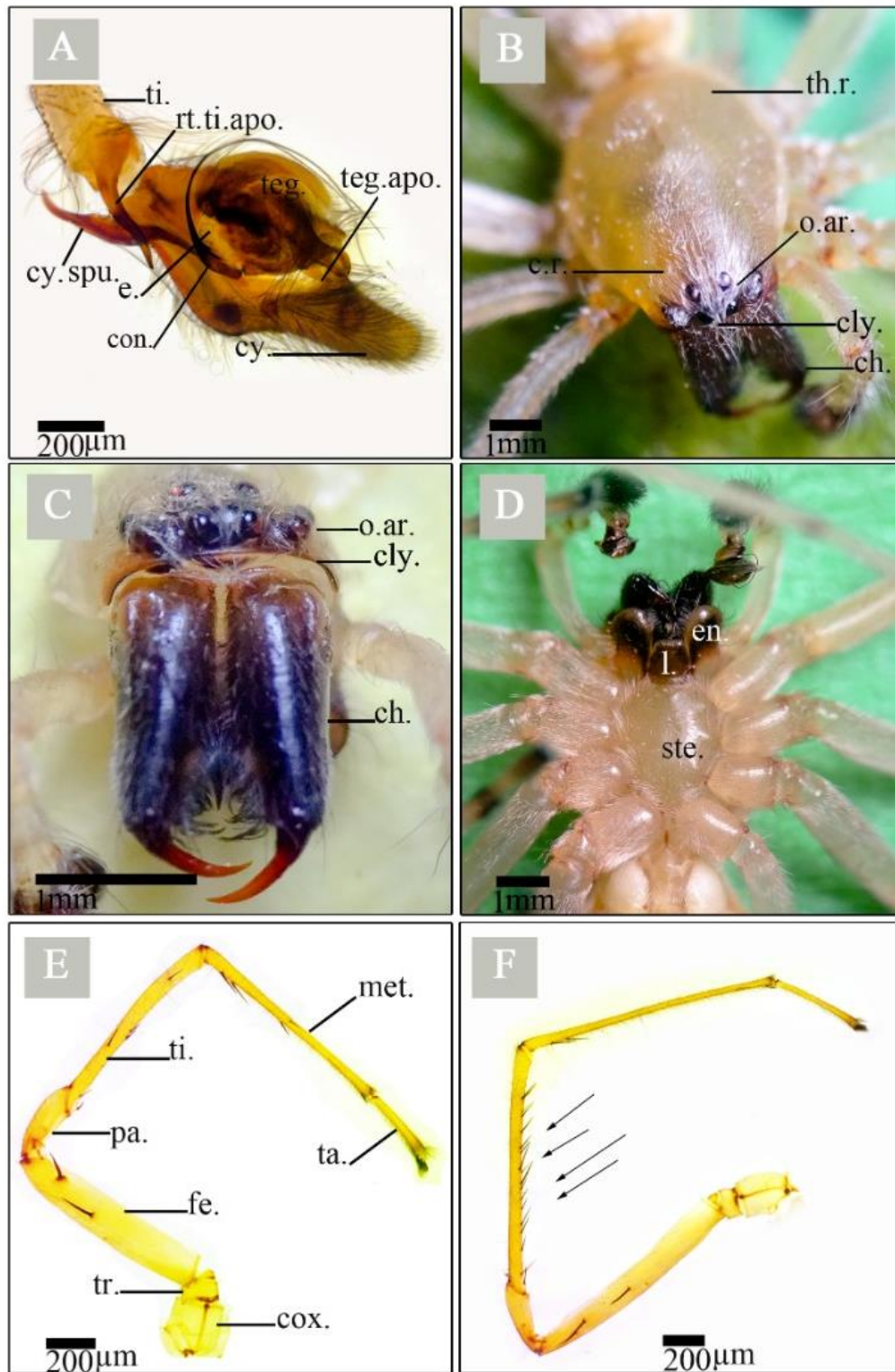


Plate 8. Light photographs of an adult male of *Cheiracanthium isiacum* showing: An enlarged palpal organ (A); The prosoma (B); An enlarged frontal view of the prosoma that illustrates the clypeus, ocular area and chelicerae (C); The sternum (D) and first and second legs (E&F).

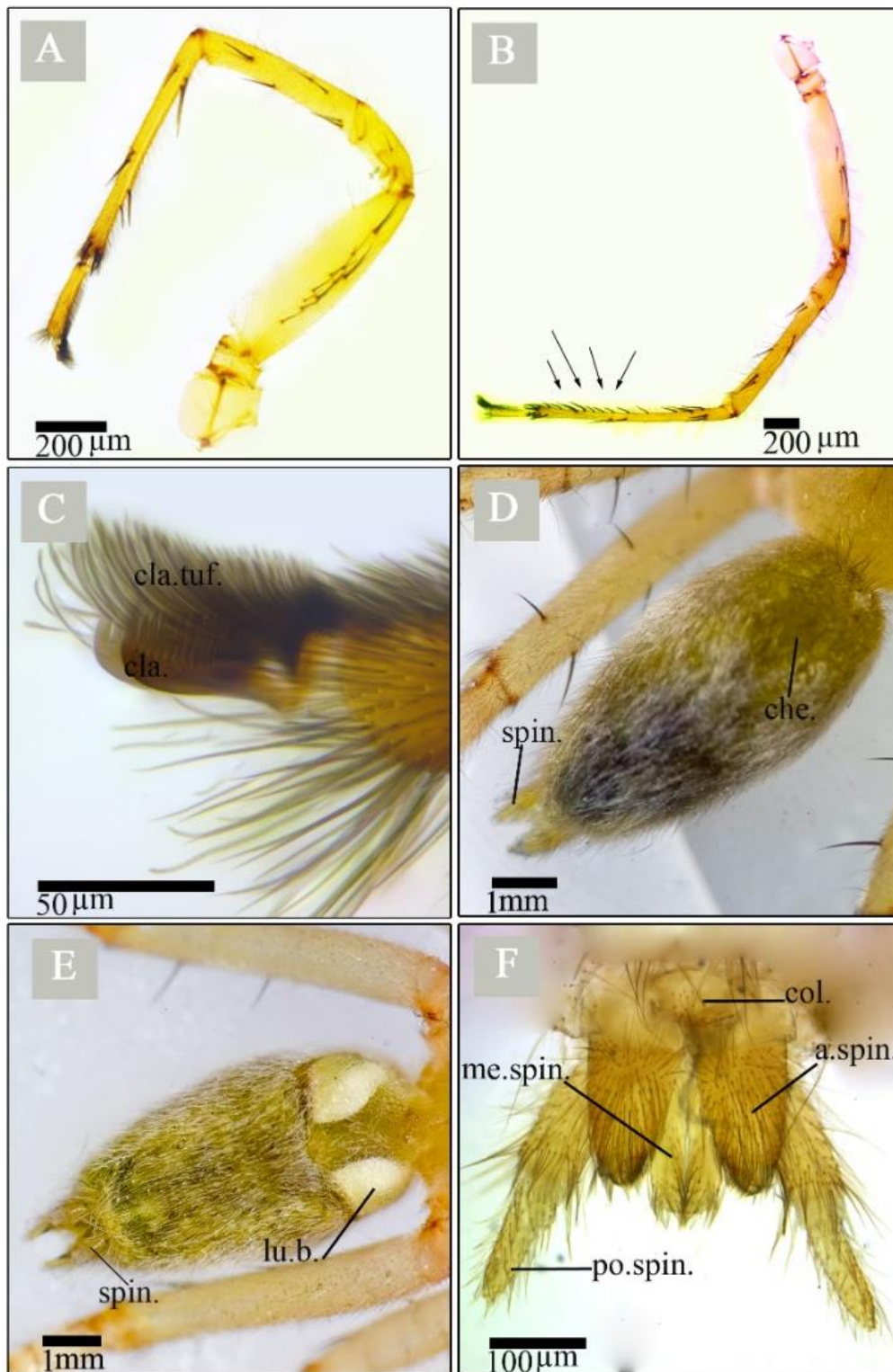


Plate 9. Light photographs of an adult male of *Cheiracanthium isiacum* showing: Third and fourth legs (A&B); An enlarged distal part of the tarsus to show the claw and the claw tufts (C); Dorsum and venter of opisthosoma (D&E) and the colulus, spinnerets and anal tubercle (F).

4 Discussion

According to the World Spider Catalog (2021), *C. isiacum* was collected from Libya and Egypt (Fig. 1A). The species was recorded in Qena, Sohag, Assuit, Beni Suef, El-Fayum, Siwa Oasis, El-Giza, Cairo, Nile Delta, El-Qalyubia, El-Menoufeia, Shebin El-Kom, El-Gharbia, Wadi Natron, Badr district, El-Khatatba, Sadat City, El-Sharkkia, El-Dakahlia and El-Ismailia [2, 17-26] (Fig. 1B).

Cheiracanthium isiacum described in the present study differs slightly from that described by [27]. The differences involved the presence and arrangement of spines in male and female legs. On the other hand, *Cheiracanthium isiacum* is similar to *C. furculatum* in morphology and their genitalia and to *C. milde* in the female vulva [28]. It differs from these two species in the shape of the pedipalpal tibia and tibial outgrowths.

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