

On the spider fauna of the Oriental Region: new data from Thailand (Arachnida: Aranei)

К фауне пауков Ориентальной области (Arachnida: Aranei): новые данные из Таиланда

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KEY WORDS: Araneae, Indo-China, new records, Tarutao National Park.

КЛЮЧЕВЫЕ СЛОВА: Araneae, Индокитай, Национальный парк Тарутао, новые находки.

ABSTRACT. Spiders of 21 species in 17 genera and seven families collected from Satun, Sukhothai, Kanchanaburi, Chiang Mai, Chonburi, and Phuket Provinces of Thailand have been studied. Of them, 11 species are reported from Thailand for the first time and eight are new records for the fauna of Indo-China: *Argiope sapoa* Barrion et Litsinger, 1995, *Eriovixia excelsa* (Simon, 1889), *E. poonaensis* (Tikader et Bal, 1981), *E. yunnanensis* (Yin, Wang, Xie et Peng, 1990), *Janula triangularis* Yoshida et Koh, 2011, *Larinia nolabelia* Yin, Wang, Xie et Peng, 1990, *Neoscona* cf. *polyspinipes* Yin, Wang, Xie et Peng, 1990, *Parasteatoda* cf. *cingulata* (Zhu, 1998). The records of seven species, viz., *Araneus ellipticus* (Tikader et Bal, 1981), *E. poonaensis*, *E. yunnanensis*, *L. nolabelia*, *N. cf. polyspinipes*, *P. cf. cingulata*, and *Thomisus labefactus* Karsch, 1881, represent southernmost limits of their ranges. Live photos of 15 species, as well as drawings of the copulatory organs of *A. sapoa*, *E. yunnanensis*, *L. nolabelia*, *J. triangularis*, *P. cf. cingulata*, and *Larinia* sp., are provided. The undetermined *Larinia* female seems to belong to *L. nolabelia* that remains known from the male only. Additionally, a check-list all Thai species in the seven spider families studied is presented.

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РЕЗЮМЕ. Изучены пауки 21 вида, 17 родов, 7 семейств, собранные в Таиланде в провинциях Сатун, Сукхотай, Канчанабури, Чианг Май, Чонбури, Пхукет. Впервые для страны отмечены 11 видов, восемь из которых также новые для фауны Индо-

китая в целом: *Argiope sapoa* Barrion et Litsinger, 1995, *Eriovixia excelsa* (Simon, 1889), *E. poonaensis* (Tikader et Bal, 1981), *E. yunnanensis* (Yin, Wang, Xie et Peng, 1990), *Janula triangularis* Yoshida et Koh, 2011, *Larinia nolabelia* Yin, Wang, Xie et Peng, 1990, *Neoscona* cf. *polyspinipes* Yin, Wang, Xie et Peng, 1990, *Parasteatoda* cf. *cingulata* (Zhu, 1998). Для семи видов зафиксированы самые южные точки ареала: *Araneus ellipticus* (Tikader et Bal, 1981), *E. yunnanensis*, *E. poonaensis*, *L. nolabelia*, *N. cf. polyspinipes*, *P. cf. cingulata*, *homisus labefactus* Karsch, 1881. Приводятся фотографии живых особей для 15 видов, для *A. sapoa*, *E. yunnanensis*, *L. nolabelia*, *J. triangularis*, *P. cf. cingulata*, *Larinia* sp. даны рисунки копулятивных органов. Последний из перечисленных экземпляров (самка) предположительно относится к *L. nolabelia*, описанному только по самцам. Кроме того, приведен список всех тайских видов из 7 вышеозначенных семейств.

Introduction

In tropical ecosystems, arachnids are especially diverse and numerous but poorly studied yet. It is impossible to say how many species occur in the tropics. For instance, the Afrotropical rainforest canopies harbor spiders, of which three fourths are unknown to science [Seyfulina, De Bakker, 2008]. Although early works on Oriental arachnids date back to the 18th century, the tropical zone of SE Asia still remains poorly explored, with regards to either particular spider groups, or regional faunas of particular countries. The present paper contributes to the spider fauna of Thailand. This topic has a good history, but the literature and information on it is yet scattered. The first data on regional spiders



Map. Collecting localities: 1 — Ban Luang village; 2 — Sukhothai Historical Park; 3 — Erawan National Park; 4 — Sai Yok District; 5 — Pattaya city; 6 — Phuket Island; 7 — Tarutao National Park.

Карта. Точки сборов: 1 — деревня Бан Луанг; 2 — Исторический парк Сукхотай; 3 — Национальный парк Эраван; 4 — район Сай Йок; 5 — город Паттайя; 6 — остров Пхукет; 7 — Национальный парк Тарутао.

were mainly provided by Thorell [1881, 1890, 1897] and Simon [1886, 1901, 1904, 1909]. Additional data can be found in Giebel [1863], Karsch [1878], and Badcock [1918]. However, the continuation of the early century studies resumed relatively recently, in the late 1960s. A number of papers on spiders in agroecosystems, mainly paddy fields (e.g. Okuma [1968]; Vungsilabutr [1988]), and taxonomic works were published (e.g., Brignoli [1980]; Deeleman-Reinhold [1985, 1993]; Ono [1988]; Schwendinger [1989]). Recently, taxonomic studies intensified, with some 100 papers being published after the millennium and containing over two hundreds of newly described taxa (e.g., Benjamin [2010]; Jäger & Wunderlich [2012]; Tanasevitch [2014]; Chomphuphuang *et al.* [2017]; Azarkina [2019]).

Unfortunately, the data on Thai spiders have never been collated together, and a check-list for this country

has not been compiled. In their checklist of spiders from Singapore, Song *et al.* [2002] mentioned some 156 species also known from Thailand. Based on an analysis of the World Spiders Catalog [WSC, 2022], 664 species that have 'Thailand' mentioned in the column 'Distribution' can be found. It should be remembered that wide ranges are not detailed in the WSC, with no particular countries listed. Therefore, the above figure could actually be much higher. Some families, such as Linyphiidae and Salticidae, are currently under intensive study [Tanasevitch, 2014; Žabka, Gardzińska, 2017; Metzner, 2019; Seyfulina *et al.*, 2020]. Based on the latest papers, 47 linyphiid and 50 salticid species have been recorded from Thailand, which are notably low numbers in comparison to neighbouring countries: e.g., the salticids account for 133 species in Vietnam and 272 species in Malaysia.



Figs 1–4. Sampling sites: 1 — Sukhotai Historical Park; 2 — Sai Yok Noi Waterfall surroundings; 3–4 — Tarutao National Park.

Рис. 1–4. Места сборов: 1 — Исторический парк Сукхотай; 2 — окрестности водопада Сай Йок Ной; 3–4 — Национальный парк Тарутао.

Seyfulina *et al.* [2020] reported on new records of Salticidae from Thailand, with a checklist and chorological analysis. The present paper is a continuation of that study, presenting data on further seven families. The paper is aimed: (1) to provide new records for species collected during the fieldtrips to Thailand in 2011 and 2014; (2) to illustrate *Argiope sapoa*, *Eriovixia yunnanensis*, *Janula triangularis*, *Parasteatoda cingulata* and *Larinia nolabelia*, the species displaying unusual distribution and being recorded far from their currently known ranges; (3) to provide photographs of live specimens for 15 species; (4) to compose a detailed checklist of Thai spiders for the families Araneidae, Hersiliidae, Lycosidae, Oxyopidae, Theridiidae, Tetragnathidae, and Thomisidae.

Material and Methods

A total of 26 specimens in 17 genera and seven families have been studied. The spiders have been deposited in the Zoological Museum of the Moscow State University (ZMMU, curator K.G. Mikhailov). Each species listed below is provided with the information about its general distribution and habitat. If a species is recorded from Thailand for the first time, it is marked with an asterisk (*). For known species, only references to their original descriptions or records from Thailand are provided; full reference lists for each species can be found in WSC [2022].

Most specimens were collected by the first author during a short fieldtrip to Thailand in November 2014. Sampling was done by sweeping and hand-collecting in six localities. Two specimens caught in two localities four years earlier were found by the second author.

The specimens were photographed in the sampling plot or were taken alive to laboratory and then photographed with the aid of digital camera Nikon D810. Then specimens were preserved in 75% alcohol. Distributional map was produced by using the online mapping software SimpleMappr [Shorthouse, 2010]. Specimens were identified without re-examination of the types but on the basis of available literature (e.g., Song *et al.* [1999]; Yen *et al.* [2012]; etc.).

The surveyed localities in Thailand (Map) are as follows: 1 — Chiang Mai Province, Chom Thong District, Ban Luang village (18°32'40.6" N, 98°35'33.4" E), 23.11.2014; 2 — Sukhothai Province, Mueang Sukhothai District, Mueang Kao, Sukhothai Historical Park (17°01' N, 99°42' E), 20.11.2014; 3 — Kanchanaburi Province, Si Sawat District, Tha Kradan Sub-district, Eravan National Park (14°22'25" N, 99°08'46.1" E), 19.11.2014; 4a — Kanchanaburi Province, Sai Yok District, near Sai Yok Noi Waterfall (14°14'20.5" N, 99°03'29.0" E), 8.11.14; 4b — Kanchanaburi Province, Sai Yok District, Wang Krachae (14°14'06.6" N, 99°01'53.9" E), 19.11. 2014; 5 — Chonburi Province, Bang Lamung District, Mueang Pattaya, Pattaya, 18.11.2010; 6 — Phuket Province, Phuket Island, 17.11. 2010; 7a — Satun Province, Mueang Satun District, Kho Tarutao Island, Tarutao National Park (6°40'55" N, 99°38'43" E), 25.11.2014; 7b — the same locality, 26.11.2014. The location 4 is shown in Map as one dot because two localities lie close to each other (c. 3 km apart). A collecting locality for each species is given in square brackets. The collectors are R.R. Seyfulina (localities 1–4, 7) and V.M. Kartsev (localities 5, 6).

The sampling site in Chiang Mai Province (Map: 1) was in a small village named Ban Luang. One specimen was taken from a flower bed.

The sampling site in Sukhothai Province (Fig. 1, Map: 2) is situated in Sukhothai Historical Park (Mueang Kao) which

covers about 70 square km. Spiders were collected mostly from brunches and trunks of the trees forming park alleys (*Ficus* spp., *Cassia bakeriana* Craib, *Cocos nucifera* L., *Plumeria* sp., etc.).

The first sampling site in Kanchanaburi Province (Map: 3) was in the Eravan National Park near the waterfall cascade. The plot was mainly covered with *Ficus* spp. and low vegetation. One specimen was observed among brunches above water surface. The second sampling site of the same province (Fig. 2, Map: 4a) lies in the immediate proximity of the Sai Yok Noi Waterfall. It is mostly covered with *Ficus* spp.; grass undergrowth was examined by visual searching for spiders. The third place (Map: 4b) is another site of the same district near Khwae Noi River, close to the settlement Wang Krachae. One specimen was collected from pomelo-tree bosk (*Citrus maxima*).

The sampling site in Chonburi Province (Map: 5) lies on the territory of Pattaya City, and the information about this locality was not detailed. The plot in Phuket Province (Map: 6) on Phuket Island is also not fully detailed. Two spider specimens were collected from these sites.

The sampling site in Satun Province (Figs 3–4, Map: 7a,b) is situated in the Tarutao National Park on Kho Tarutao Island lying in the Straits of Malacca, Andaman Sea, approximately 40 km W of Thai shore, and only 4.8 km of Ko Langkawi, which is already part of Malaysia. About 90% of the island occupying 230 square km is covered with virgin evergreen rainforest. Main tree species are Lumpho or Malacca Teak (*Intsia palembanica* Miq.), Khiam (*Cotylelobium melanoylon* (Hook. f.) Pierre ex FIGS Heim), Yang Pai (*Dipterocarpus costatus* G. Don), Yang Sian (*Dipterocarpus gracilis* Blume), Daeng Kha (*Eugenia* spp.), and Takhian Hin (*Hopea ferrea* Laness.). The mixed deciduous forest is found on limestone mountains and hills. The sampling plot was located in the first forest type. Spiders were sampled mostly by sweeping over bushes and low vegetation.

It is necessary to mention that two of the aforementioned localities were mixed up in the legend to some figures in Seyfulina *et al.* [2020]: the locality 1 of Map and Fig. 2 should be treated as the ‘Sukhothai Historical Park’ rather than the ‘Sai Yok Noi Waterfall surroundings’ and vice versa for the locality 2 of Map and Fig. 1.

List of species

ARANEIDAE

Anepsion maritatum (O. Pickard-Cambridge, 1877)
Fig. 5.

Paraplectana maritata: O. Pickard-Cambridge, 1877: 32, pl. 7, fig. 7 (m, f).

Anepsion japonicum: Yin *et al.*, 1997: 117, fig. 42a–c.

Anepsion japonicum: Chotwong *et al.*, 2013: 92, figs 5–7, 12–14.

Anepsion maritatum: Tanikawa, Yamasaki, 2019: 11, figs 1A–FIGS.

MATERIAL. 2 ♀♀ (ZMMU) — [7], in air net.

COMMENTS. The southernmost record in Thailand. Widely distributed in Oriental Region. The nearest previous locality was in Manang District of Satun Province, situated at least 40 km NE of the present one [Chotwong *et al.*, 2013: sub *A. japonicum*]. Reported also from another 11 Provinces of Thailand (see Suppl. Tables 1, 2). Outside Thailand, it is found in India, Sri Lanka, Japan, China to Indonesia (Sulawesi) [WSC, 2021]. Observed on a silk thread being stretched between trees (Fig. 5).

Araneus ellipticus (Tikader et Bal, 1981)*

Neoscona elliptica: Tikader, Bal, 1981: 24, figs 45–49 (m, f).

Araneus ellipticus: Grasshoff, 1986: 118.

Neoscona elliptica: Yin *et al.*, 2012: 725, fig. 360a–k.

MATERIAL. 1 ♀ (ZMMU) — [7], sweeping over low vegetation.

COMMENTS. The first record for Thailand, lying at the southernmost limit of the species range (Suppl. Tables 1, 2). Reported from Bangladesh, India, China, Laos [WSC, 2021]. The nearest of previously known localities are in Khammouane Province of Laos [Jäger, Praxaysombath, 2009], some 1,400 km northward of Tarutao Island and somewhat southward of the type locality in Maharashtra, India [Tikader, Bal, 1981]. This seems to be a chortobiont spider.

Argiope pulchella Thorell, 1881
Fig. 6.

Argiope pulchella: Thorell, 1881: 74 (f).

Argiope pulchella: Yin *et al.*, 1997: 85, fig. 17a–i.

Argiope pulchella: Jäger, Praxaysombath, 2009: 38, figs 52–68, 74.

MATERIAL. 1 ♀ (ZMMU) — [1], in grass.

COMMENTS. The northernmost locality in Thailand. Distributed in the Oriental Region, reported from India to China and Indonesia [Sen *et al.*, 2015; WSC, 2021]. Previously found at least in four provinces of Thailand (see Suppl. Tables 1, 2). Usually, it is found on orb webs, which is stretched among ornamental plants (Fig. 6).

Argiope sapoa Barrion et Litsinger, 1995*
Fig. 24.

Argiope sapoa: Barrion, Litsinger, 1995: 577, fig. 358a–e (m).

MATERIAL. 1 ♂ (ZMMU) — [7], sweeping over low vegetation.

COMMENTS. The first record for Thailand (Suppl. Tables 1, 2), Indo-China, and outside the type locality (Quezon Province, Philippines: Barrion & Litsinger [1995]). The new distribution record lies SW of the type locality. Seems to be a chortobiont.

Diagnosis should be considered preliminary: there are some differences in the palp structure between the specimen examined and the drawing of holotype, namely the fine shape of apophysis and embolic bulge.

Eriovixia excelsa (Simon, 1889)*
Fig. 7.

Glyptogona excelsa: Simon, 1889: 337 (f).

Eriovixia excelsa: Tso, Tanikawa, 2000: 129, figs 17–22.

Eriovixia excelsa: Mi *et al.*, 2010: 41, figs 1–8.

MATERIAL. 1 ♀ (ZMMU) — [2], on orb-web.

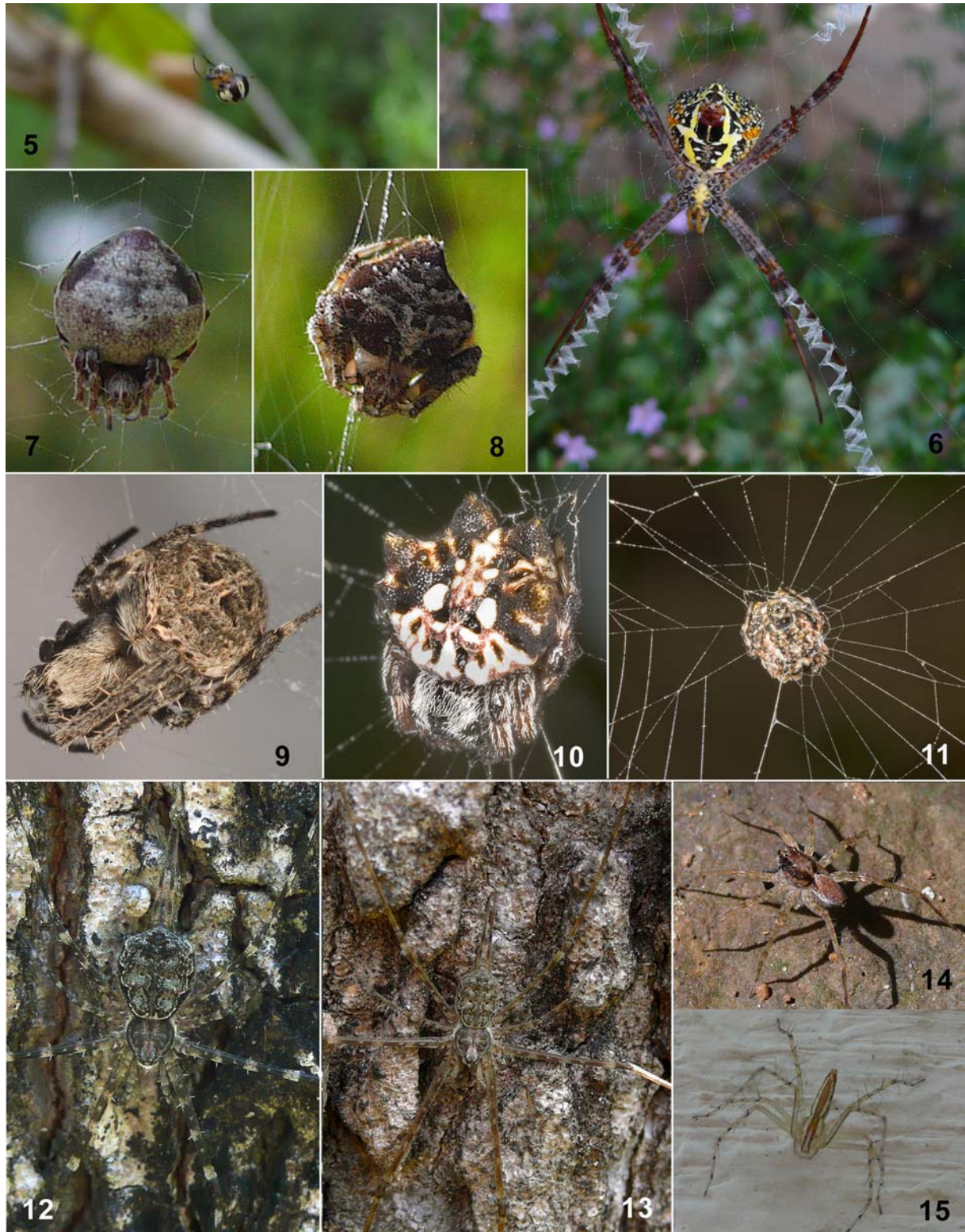
COMMENTS. The first record for Thailand and Indo-China (Suppl. Tables 1, 2). Reported from many countries of the region except for its central part: India, Pakistan, China, Taiwan, Philippines, Indonesia [WSC, 2021]. Its orb-web was quite wide, stretching between trees (Fig. 7).

Eriovixia poonaensis (Tikader et Bal, 1981)*
Fig. 8.

Neoscona poonaensis: Tikader, Bal, 1981: 29, figs 59–62 (f).

Eriovixia poonaensis: Mi, Wang, 2016: 731, figs 7–12.

MATERIAL. 1 ♀ (ZMMU) — [4b], on orb-web.



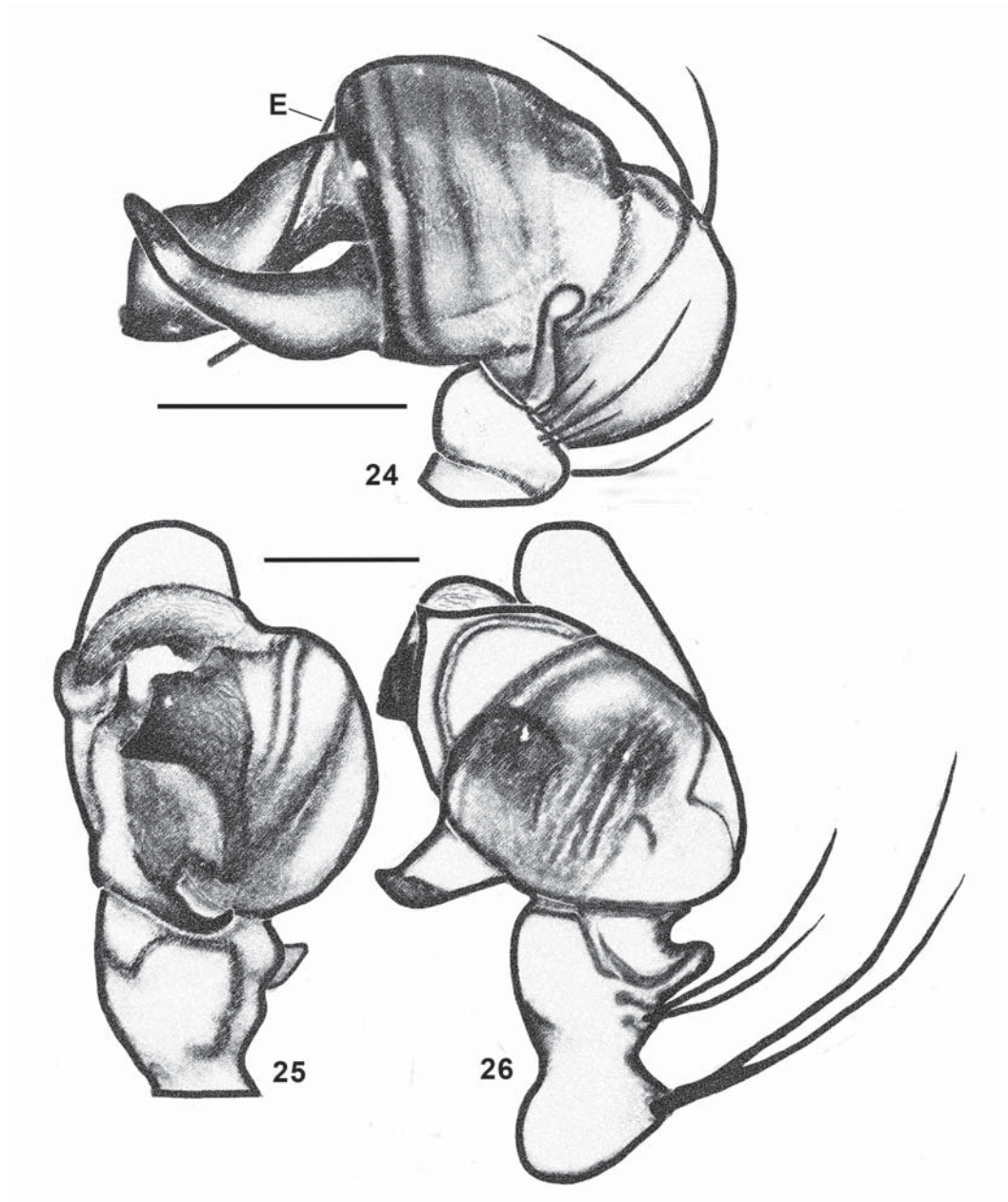
Figs 5–15. Habitus of the following species: 5 — *Anepion japonicum*; 6 — *Argiope pulchella*; 7 — *Eriovixia excelsa*; 8 — *E. poonaensis*; 9 — *Neoscona polyspinipes*; 10–11 — *Thelacantha brevispina*; 12–13 — *Hersilia striata*; 14 — *Pardosa sumatrana*; 15 — *Oxyopes javanus*; 5–12, 14–15 — females; 13 — male.

Рис. 5–15. Внешний вид следующих видов: 5 — *Anepion japonicum*; 6 — *Argiope pulchella*; 7 — *Eriovixia excelsa*; 8 — *E. poonaensis*; 9 — *Neoscona polyspinipes*; 10–11 — *Thelacantha brevispina*; 12–13 — *Hersilia striata*; 14 — *Pardosa sumatrana*; 15 — *Oxyopes javanus*; 5–12, 14–15 — самки; 13 — самец.



Figs 16–23. Habitus of the following species: 16 — *Guizygiella nadleri*; 17 — *Leucauge tessellata*; 18 — *Tetragnatha mandibulata*; 19 — *Tylorida ventralis*; 20–21 — *Parasteatoda cingulata*; 22–23 — *Thomisus labefactus*; 16–21 — females; 22–23 — male and subadult female.

Рис. 16–23. Внешний вид следующих видов: 16 — *Guizygiella nadleri*; 17 — *Leucauge tessellata*; 18 — *Tetragnatha mandibulata*; 19 — *Tylorida ventralis*; 20–21 — *Parasteatoda cingulata*; 22–23 — *Thomisus labefactus*; 16–21 — самки; 22–23 — самец и незрелая самка.



Figs 24–26. Mail palps: 24 — *Argiope sapoa*; 25–26 — *Larinia nolabelia*; 24, 26 — lateral view; 25 — ventral view; E — embolus. Scale bars: 24 — 0.5 mm, 25–26 — 0.25 mm.

Рис. 24–26. Пальпы самцов: 24 — *Argiope sapoa*; 25–26 — *Larinia nolabelia*; 24, 26 — вид сбоку; 25 — вид спереди; E — эмболос. Масштаб: 24 — 0,5 мм, 25–26 — 0,25 мм.

COMMENTS. The first record for Thailand and Indo-China, lying at the southernmost limit of the species range (Suppl. Tables 1, 2). Reported from India and southern China (Hainan, Guangxi, Yunnan: Mi & Wang [2016]; WSC [2021]). Found on an orb-web that was built up quite high above the soil level. The female live coloration is shown for the first time (Fig. 8). It is worth noticing that the abdomen pattern composed of fine white hairs almost disappeared in alcohol (cf. Fig. 8 and Fig. 8 in Mi & Wang [2016]).

Eriovixia yunnanensis (Yin, Wang, Xie et Peng, 1990)*
Figs 27–29.

Neoscona yunnanensis: Yin *et al.*, 1990: 115, figs 283–287 (f).

Eriovixia yunnanensis: Yin *et al.*, 1997: 302, fig. 209a–g.
MATERIAL. 1 ♀ (ZMMU) — [7], sweeping over low vegetation.

COMMENTS. The first record for Thailand and Indo-China, lying at the southernmost limit of the species range (Suppl. Tables 1, 2). Reported from many localities in the

Gaoligong Mts in Yunnan Province of China [Mi *et al.*, 2010], which are situated northward of the new locality. Seems to be a chortobiont.

Larinia nolabelia Yin, Wang, Xie et Peng, 1990*
Figs 25–26.

Larinia nolabelia: Yin *et al.*, 1990: 88, figs 223–226 (m).

Larinia nolabelia: Yin *et al.*, 1997: 320, figs 224a–d.

MATERIAL. 1 ♂ (ZMMU) — [7], sweeping over low vegetation.

COMMENTS. The first record for Thailand and Indo-China, lying at the southernmost limit of the species range (Suppl. Tables 1, 2). Described from China (no locality: Yin *et al.* [1990, 1997]; Song *et al.* [1999]) and to date not known outside this country. Seems to be a chortobiont. Female remains unknown.

The present identification is to be considered provisional, as there are some differences in the palp structure between the specimen examined and the drawings of the holotype.

Larinia sp.
Figs 30–31.

MATERIAL. 1 ♀ (ZMMU) — [7], sweeping over low vegetation.

COMMENTS. The studied specimen may belong to *L. nolabelia*, of which the female is not described yet. It was caught together with the male and has an appropriate body size and abdomen pattern. There is some resemblance in its epigyne coformation with that of *L. dinanea* Yin, Wang, Xie et Peng, 1990 mentioned in the diagnosis of *L. nolabelia* male [Yin *et al.*, 1990]. Epigynes of both species consist of a plate and a weak scape. Yet the shape of the plate and scape is square in *Larinia* sp., whereas these structures are sub-spherical and triangular in *L. dinanea* (cf. Figs 30, 31 and figs 207, 208: 83 in Yin *et al.* [1990]). Due to a bad condition of the specimen, its technical description is impossible.

Neoscona nautica (L. Koch, 1875)

Epeira nautica: L. Koch, 1875: 17, pl. 2, fig. 2 (m, f).

Neoscona nautica: Namkung, 2002: 260, fig. 19.22a–b.

Neoscona nautica: Yin *et al.*, 2012: 733, fig. 364a–g.

MATERIAL. 1 ♀ (ZMMU) — [7], sweeping over low vegetation.

COMMENTS. The southernmost locality in Thailand. Previously reported from at least three localities in Thailand (Suppl. Tables 1, 2). Distributed in the southern Palearctic and Oriental Region, tends to be circumtropical [Chyrsanthus, 1971; Sen *et al.*, 2015]. Occurs throughout tropical Asia and Pacific islands, introduced to both Americas and Africa [WSC, 2021].

Neoscona cf. *polyspinipes*
Yin, Wang, Xie et Peng, 1990*
Fig. 9.

Neoscona polyspinipes: Yin *et al.*, 1990: 104, figs 254–261 (m, f).

Neoscona polyspinipes: Yin *et al.*, 2012: 735, fig. 365a–h.

MATERIAL. 1 ♀ (ZMMU) — [5], on orb-web.

COMMENTS. The identification is provisional. If correct, then it is the first record for Thailand and Indo-China, lying at the southernmost limit of the species distribution

(Suppl. Tables 1, 2). Hitherto reported from SE China only (Hunan, Hubei: Yin *et al.* [2012]). Found on a typical orb-web (Fig. 9). The live female coloration is shown for the first time; so far, its habitus was illustrated by graphic drawings only [Yin *et al.*, 1990, 2012; Song *et al.*, 1999].

Thelacantha brevispina (Doleschall, 1857)
Figs 10–11.

Plectana brevispina: Doleschall, 1857: 423 (f).

Thelacantha brevispina: Tanikawa, 2009: 429, figs 57–58.

Thelacantha brevispina: Yin *et al.*, 2012: 584, fig. 281a–i.

MATERIAL. 1 ♀ (ZMMU) — [6], on orb-web.

COMMENTS. The southernmost locality in Thailand (Phuket Province) (Suppl. Tables 1, 2). Widespread in the Oriental Region, as well as in neighbouring regions of the Afrotropical and Australian Regions. According to WSC [2021], the species was also recorded from India to the Philippines, in Madagascar, Australia, French Polynesia. In Thailand, it is registered in four provinces (see Suppl. Table 2), the nearest location is in Chonburi Province [Hawes, 2017, 2019]. Observed sitting on an orb-web, which looked loose and irregular (Fig. 11). Such web construction is determined by a special spider behavior, when it makes a complicate maneuver from additional ‘bridge’ lines pulling the web threads (by the right leg IV and via silk ‘lasso’ from spinnerets) to tangle a prey [Hawes, 2017].

HERSILIIDAE

Hersilia striata Wang et Yin, 1985
Figs 12–13.

Hersilia striata: Wang, Yin, 1985: 45, fig. 1A–E (m, f).

Hersilia striata: Baehr, Baehr, 1993: 37, fig. 26c–g.

MATERIAL. 1 ♂ 1 ♀ (ZMMU) — [2], on tree trunk.

COMMENTS. A new locality in Thailand (Sukhothai Province) (Suppl. Tables 1, 2), already known from Prachuap Kirikhan and Chiang Mai Provinces [Baehr, Baehr, 1993], Prae Province [Dankittipakul, Singtripop, 2011]. Distributed in the Oriental Region. Found also in India, China, Myanmar, Taiwan, Indonesia (Java, Sumatra) [WSC, 2021].

LYCOSIDAE

Pardosa sumatrana (Thorell, 1890)*
Fig. 14.

Pardosa sumatrana: Chen, Gao, 1990: 129, fig. 161a–b.

Pardosa sumatrana: Yin *et al.*, 2012: 856, fig. 429a–h.

MATERIAL. 1 ♀ (ZMMU) — [7], on stony detritus.

COMMENTS. The first record for Thailand (Suppl. Tables 1, 2). Widespread in the Oriental Region. Reported from India, Bangladesh, Bhutan, China, Indonesia (Sulawesi), Myanmar, Nepal, Philippines, Sri Lanka [Barrion, Litsinger, 1995; Sen *et al.*, 2015; WSC, 2021].

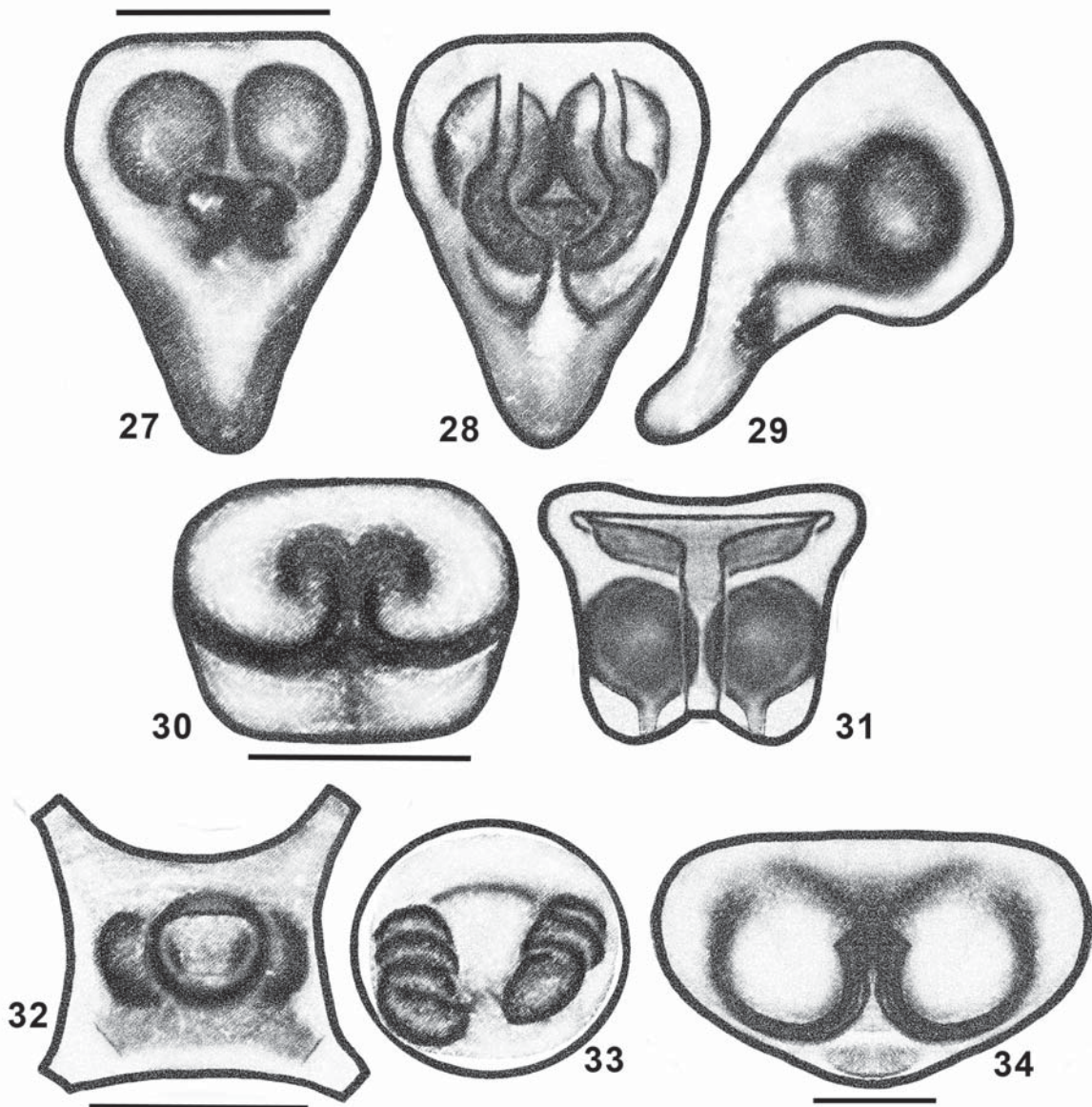
OXYOPIDAE

Oxyopes javanus Thorell, 1887
Fig. 15.

Oxyopes javanus: Barrion, Litsinger, 1995: 326, figs 193a–c, 194a–s.

Oxyopes javanus: Yin *et al.*, 2012: 912, fig. 461a–d.

MATERIAL. 1 ♀ (ZMMU) — [2], on a building.



Figs 27–34. Female copulatory organs: 27–29 — *Eriovixia yunnanensis*, 30–31 — *Larinia* sp.; 32–33 — *Janula triangularis*, 34 — *Parasteatoda* cf. *cingulata*; 27–32, 34 — epigynes; 28, 33 — vulvas; 27, 30, 32, 34 — ventral view; 28, 33 — dorsal view; 29 — lateral view; 31 — caudal view. Scale bar: 0.25 mm.

Рис. 27–34. Копулятивные органы самок: 27–29 — *Eriovixia yunnanensis*, 30–31 — *Larinia* sp.; 32–33 — *Janula triangularis*, 34 — *Parasteatoda* cf. *cingulata*; 27–32, 34, эпигины; 28, 33 — вульвы; 27, 30, 32, 34 — вид спереди; 28, 33 — вид сзади; 29 — вид сбоку; 31 — вид снизу. Масштаб: 0,25 мм.

COMMENTS. A new locality in Thailand (Sukhothai Province) (Suppl. Tables 1, 2). It was first reported by Okuma [1968] from northern and central Thailand, then found in many other Thai regions (see Suppl. Table 2). According to WSC [2020], the species is also registered in India, Bangladesh, Indonesia (Java), the Philippines, China (but Thailand is not mentioned).

TETRAGNATHIDAE

Guizygiella nadleri (Heimer, 1984)*

Fig. 16.

Zygiella nadleri: Heimer, 1984: 95, figs 1–6 (m, f).

Guizygiella nadleri: Yin *et al.*, 2012: 430, fig. 192a-figs.

MATERIAL. 2 ♀♀ (ZMMU) — [2], on leaf of *Plumeria* sp.

COMMENTS. The first record for Thailand (Suppl. Tables 1, 2). Distributed in the East part of the Oriental Region. Originally described from Vietnam [Heimer, 1984], later found in different localities of south China (Hunan, Guangxi, Yunnan: Yin *et al.* [2012]) and Laos [Jäger, 2007; Jäger, Praxaysombath, 2009]. Found in a silky retreat on a *Plumeria* leaf, near pond (Fig. 16). Its orb-web has a free sector for a signal thread [Heimer, 1984], as in representatives of *Zygiella sensu lato* (*Stroemiellus*, etc.).

Leucauge tessellata (Thorell, 1887)

Fig. 17.

Leucauge tessellata: Zhu *et al.*, 2003: 244, figs 134A–F, 135A–G, pl. VIIIA–D.

Leucauge tessellata: Yoshida, 2009: 15, figs 14–18.

MATERIAL. 1 ♀ (ZMMU) — [3], on cascade bank.

COMMENTS. Widely distributed in Oriental Region. Registered repeatedly throughout the country (Suppl. Tables 1, 2). Reported from many states including neighbouring countries: Malaysia [Nasir, 2016], Laos, Myanmar, India, Bhutan, China, Vietnam, Taiwan, Indonesia (Moluccas) [Sen *et al.*, 2015; WSC, 2021]. Found on a web stretched over a water stream (see Fig. 17).

Tetragnatha mandibulata Walckenaer, 1841

Fig. 18.

Tetragnatha mandibulata: Barrion, Litsinger, 1995: 516, figs 317a–e, 318a–h.

Tetragnatha mandibulata: Zhu *et al.*, 2002: 81, fig. 5A–N.

MATERIAL. 1 ♀ (ZMMU) — [2], on pond shore.

COMMENTS. Reported from a new locality in Thailand (Sukhothai Province) (Suppl. Tables 1, 2). Earlier, it was recorded from many localities of Thailand, mainly from agricultural lands in the northern part of the country (e.g. Okuma [1968, 1983]; Vungsilabutr [1988]; Saengyot & Napompeth [2008]; see also Suppl. Table 2). Distributed throughout the Oriental Region (from India to Philippines), as well as it is known from West Africa, Australia, Central America, Caribbean, Guyana, Brazil [WSC, 2021].

Tylorida ventralis (Thorell, 1877)

Fig. 19.

Meta ventralis: Thorell, 1877: 423 (m, f).

Tylorida ventralis: Yin *et al.*, 2012: 472, figs 216a–figs.

Tylorida ventralis: Sankaran *et al.*, 2017: 310, figs 1E–F, 2C, 7G–I, 12H–I, 15A–F, 16A–J, 17A–O, 18A–O, 19A–E.

MATERIAL. 1 ♀ (ZMMU) — [4a], on grass.

COMMENTS. The northernmost record in Thailand (Kanchanaburi Province) (Suppl. Tables 1, 2). Earlier records were made over a century ago from Malay Peninsula [Simon, 1901] (see Suppl. Table 2). Distributed throughout the Oriental Region. Reported from many countries, from India to Taiwan, Japan, Philippines, and New Guinea [Nasir, 2016; WSC, 2021]. The nearest to Thailand localities are situated in Myanmar [Nasir, 2016], Laos [Jäger, Praxaysombath, 2009], Malaysia [Workman, 1896], Vietnam [Simon, 1909].

THERIDIIDAE

Janula triangularis Yoshida et Koh, 2011*

Figs 32–33.

Janula triangularis: Yoshida, Koh, 2011: 82, figs 8–9, 40, 46–48 (f).

MATERIAL. 1 ♀ (ZMMU) — [7], sweeping over low vegetation.

COMMENTS. The first record for Thailand and the continental part of South-East Asia in general; the northernmost point of species distribution (Suppl. Tables 1, 2). Till now, distributed easterly of the Molucca Strait — in Brunei (type locality) and Singapore [Yoshida, Koh, 2011]. Male unknown. Inhabits low vegetation of forests, suggested to specialize on feeding by termites [Yoshida, Koh, 2011].

They possible capture the insects from the soil surface with the silk thread and lift them above like some theridiids do with ants (e.g. *Lasaeola tristis* (Hahn, 1833)). Due to sampling method, we have not observed the specimen in its net to confirm this suggestion, but termites have been seen within the sampling plot.

Parasteatoda cf. cingulata (Zhu, 1998)*

Figs 20–21, 34.

Achaearanea cingulata: Zhu, 1998: 85, fig. 48A–C (f).

Achaearanea cingulata: Yin *et al.*, 2012: 252, fig. 48a–figs.

MATERIAL. 1 ♀ (ZMMU) — [7], from tree crown.

COMMENTS. The current identification is provisional, as there are some differences in the epigyne structure of the examined specimen and the drawings of the holotype. If correct, it is the first record for Thailand and Indo-China, lying at the southernmost limit of the species range (Suppl. Tables 1, 2). Earlier reported from Hunan, Hainan, and Guangxi Provinces of China only [Yin *et al.*, 2012], which are 1700–2700 km NE of the new locality. Found eating another theridiid (a subadult female of *Theridion* sp. *sensu lato*) (see Fig. 21).

THOMISIDAE

Thomisus labefactus Karsch, 1881

Figs 22–23.

Thomisus labefactus: Karsch, 1881c: 38 (f).

Thomisus labefactus: Namkung, 2003: 541, fig. 42.21a–b.

Thomisus labefactus: Yin *et al.*, 2012: 1302, fig. 702a–e.

MATERIAL. 1 ♂ 1 ♀ (subadult) (ZMMU) — [7], on *Carex* sp.

COMMENTS. The southernmost record in Thailand, lying at the southernmost limit of the species range (Suppl. Tables 1, 2). Previously reported from the north part of the country (Chiang Mai Province: Saengyot & Napompeth [2008]). According to WSC [2021], the species is found in China, Korea, Taiwan, Japan (Thailand is not mentioned). The pair was found in the habitat maid of convolute leaf of *Carex* sp. (see Figs 22, 23). Male seems to be waiting for the immature female to moult.

Discussion

To sum up, 26 specimens belonging to 21 species in seven families and 17 genera have been collected and identified. Thirteen of them were collected from Satun Province. The families recorded are Araneidae (11 species), Hersiliidae (1), Lycosidae (1), Oxyopidae (1), Tetragnathidae (4), Theridiidae (2), Thomisidae (1). Eleven species represent new records for the fauna of Thailand (*Araneus ellipticus*, *Eriovixia excelsa*, *E. poonaensis*, *E. yunnanensis*, *Guizygiella nadleri*, *Pardosa sumatrana*) or Indo-China (*Janula triangularis*, *Larinia nolabelia*, *Neoscona cf. polyspinipes*, *Parasteatoda cf. cingulata*, *Argiope sapoa*). Yet, to date the latter species has never been recorded outside its type locality (the Philippines). The records of ten species lie at the southernmost limits of ranges of the corresponding species, either in Thailand (*Anepsion japonicum*, *Neoscona nautica*, *Thelacantha brevispina*), or compared to the entire species range (*Araneus*

ellipticus, *E. poonaensis*, *E. yunnanensis*, *L. nolabelia*, *N. cf. polyspinipes*, *P. cf. cingulata*, *Thomisus labefactus*). *Argiope pulchella* and *Tylorida ventralis* have the northernmost records of their distribution in Thailand. Three species are reported from new localities in Thailand (Sukhothai Province): *Hersilia striata*, *Oxyopes javanus*, *Tetragnatha mandibulata*. Two species are illustrated in their natural settings, demonstrating their live coloration (females) for the first time (*E. poonaensis*, *N. cf. polyspinipes*). The specimen of *Larinia* sp. is likely to be an undescribed female of *L. nolabelia* Yin, Wang, Xie et Peng, 1990.

An analysis of the available literature published since 1863 on the seven spider families under consideration has resulted in 150 species that have been recorded/described from Thailand. Unfortunately, some sources, including the WSC, contain mistaken data. It should be noted that the geographical names used in old papers nowadays might have an ambiguous interpretation and generate inaccuracies. In particular, it concerns the species described by Thorell, Simon, and Badcock from the area of modern Thailand or the neighboring countries. Some species from Patani Kingdom of Malay Peninsula, consisting of seven states and being independent from Siam till 1906, were actually collected from Thailand but not from Malaysia as it assumed now. The states ‘Jalor’ and ‘Raman’ correspond to the modern Yala Province of Thailand, ‘Ligeh’ to Narathiwat, ‘Nawng-Chik’ to Pattani. The locality ‘Biserat’ was situated in Jalor (see Badcock [1918, p. 287], i.e., in Yala Prov. ‘Paklat’ is located ‘about 6 miles above Paknam ... on the right bank of the river’ (Chao Phraya River: Schomburgk [1860]), i.e., in Samut Prakan Prov. In Badcock [1918], ‘Ban Sai Kau’ and ‘Nandock’ were possibly referred to ‘Sai Khao’ and ‘Nawngchik (Nawng-Chik)’ of the modern Pattani Province, K. Mahek, Jalor is [Kuala] Mabek, Jalor (Yala Prov.).

The type locality of *Epeira paviei* Simon, 1886 (= *Neoscona punctigera* (Doleschall, 1857)) known as ‘Snakes’ has unclear coordinates and may lie either in the mainland Thailand, Cambodia, or southern Vietnam.

The locality ‘Bachiou’ given by Simon [1886] without clarification causes a particular difficulty because this name is impossible to find even on old maps. It mentioned for the materials collected by A. Pavie from the area partly occupying the modern territories of Thailand, Cambodia and Vietnam. In four descriptions, this name was set directly before the Cambodian locality: ‘Bachiou, Pnom-Penh (Cambodge)’ [Simon, 1886: 143, 163, 164], which perhaps could be attributed to ‘Bachiou’ in Cambodia: e.g., in Gravely [1924: 591, *P. irretita*, Bachiou, Cambodia]. In their checklist, Murphy & Murphy [2000] considered Bachiou to lie in Thailand. When using ‘Bachiou’ for other eight cases separately, Simon [1886: 137, 141, 143, 146, 158, 163, 164] specified nothing in brackets, as it should be if the site would have belonged to Cambodia or any other

certain country. It seems that the author had no detailed information about the locality apart from its name. The final report for A. Pavie mission, published in 1904, contains one reference to the locality with a very similar designation: ‘*Rhacophorus maculatus* Gray. Bachieu (Saïgon). 1 exemplaire’ [Mocquard, 1904: 473]. So, the sampling site labeled as ‘Bachiou’ in A. Pavie’s collection and examined by Simon was highly likely to be situated in Saigon in Vietnam¹. This corresponds to Ono *et al.* [2012], who noted ‘Saigon’ as the type locality for two of the species described by Simon [1886] from Bachiou (*Heteropoda pressula* and *Pycnaxis nigrostriata*).

Based on the above information, *Pronous affinis* (Araneidae) and *Theridion subradiatum* (Theridiidae), which are still known from the type locality only (‘Jalor’: Simon [1901]), should be assigned to Thailand rather than to Malaysia. As for the spiders from ‘Bachiou’ [Simon, 1886], this type locality was erroneously attributed by Murphy & Murphy [2000] to Thailand for the following species: *Heteropoda pressula* (Sparassidae), *Pycnaxis nigrostriata* (Thomisidae), *Pardosa irretita* (Lycosidae), *Oedignatha sima* (Liocranidae). Actually, *H. pressula* and *O. sima* was recorded from Vietnam only (e.g., Simon [1886, 1904]; Ono *et al.* [2012]), although Simon [1897: 190–191] mentioned the latter species as Cambodian, while describing the genus *Oedignatha*. *P. irretita* was reported from Thailand (‘Ligeh’, Narathiwat) by Simon [1901]. *Pycnaxis nigrostriata* has been found in Vietnam [Simon, 1886, 1904; Ono *et al.*, 2012] and Malaysia (Pulau Pinang; Lehtinen [2016]) only.

So, with the aforementioned amendments and newly recorded species, a verified checklist of the Thai spiders for seven families under discussion currently contains 161 species in 81 genera (Suppl. Table 1). For those 103 species that have not been attributed to the country by WSC [2022] the localities have been clarified (Suppl. Table 2). Yet, 16 species of the jumping spiders have been added to the checklist published by Seyfulina *et al.* [2020], thus increasing a total number of the Thai salticids to 166 species (Suppl. Tables 1, 2); one species, *Burmattus pococki* (Thorell, 1985), was missed in Seyfulina *et al.* [2020]. As can be seen, Araneidae are the most diverse among the presented families (64 species) and they are just as rich in species as Salticidae which normally lead in the tropics by this parameter. This means that the spider species list for Thailand is very far from completion. Other families — Theridiidae, Tetragnathidae, Thomisidae, Lycosidae, Hersiliidae, and Oxyopidae — count 24, 23, 21, 11, 10, and 8 species respectively. Twenty three species are supposed to be the Thai endemics, their share varies from 4% (Tetragnathidae) to 50% (Hersiliidae), although their endemic status could perhaps result from the insufficient state of knowledge. Fifty nine species

¹ There is an area in modern Saigon, called by residents as *Lang Ong Ba Chieu*, meaning ‘the tomb of the Chieu couple’.

are known from the Indo-Malay Region (*sensu* Kryzhanovskiy [2002]); =the Oriental Region. Their percentage fluctuates from 22% (Tetragnathidae) to 75% (Oxyopidae). Another 38 species (24%) show limits of their range, extending to the north of Papuan Region and/or to the East Asian Region. The remaining 41 species (25%) have wide distribution ranges, of which only one is cosmopolitan (*Nesticodes rufipes*, Theridiidae). It is obviously that with more collecting activity many more species that are known from such countries of Indo-China as southern China, Island of Malaysia, and Indonesia will be found in Thailand, and *vice versa*, the species that are currently restricted to Thailand are likely to be found in the neighbouring countries.

It is noticeable that about 20% of the species in Suppl. Table 1 have the type material based on one sex only (male or female), demonstrating the insufficient knowledge of the Thai spider fauna. Yet, some species could have been described twice under different names, separately for males and females. Thailand remains one of the few large countries of the Oriental Region for which an exhaustive spider survey has not been compiled, and it is difficult even to count, how many species have been found here till now. We have estimated it as 900 species. In comparison, 522, 225, 425, and 1954 spider species have been found in Vietnam [Logunov, Jäger, 2015], Laos [Jäger *et al.*, 2012], Malaysia [Norma-Rashid, Li, 2009], and Indonesia [Stenchly, 2011], respectively. The most complete faunal survey was published for China (2361 sp., Song *et al.*, [1999]) and India (1882 sp., Caleb, Sankaran [2021]). In total, Siliwal and Molur [2006] computed some 2300 spider species that could inhabit South Asia, including the West Orient and the bordering part of the South Palearctic. In the cited work, 354 spider species have been reported from Sri Lanka, 138 from Pakistan, 222 from Nepal, 105 from Bhutan, and 50 from Bangladesh. The critical survey of South Asian spiders published by Murphy & Murphy [2000] reported on 723 genera and 3815 species for the area defined as the Eastern half of Oriental, or the Indo-Malay Region (*sensu* Kryzhanovskiy [2002]); in their list, we have found four additional species for Thailand which do not actually belong to the country. So, a total spider number of the Oriental Region, at whole, could hardly be less than 4000 species. It is obvious that further studies should be aimed at composing a full checklist of spiders for Thailand.

Compliance with ethical standards

CONFLICTS OF INTEREST: The authors declare that they have no conflicts of interest.

Supplementary data. The following materials are available online.

Supplement Table 1. Species composition and distribution of Araneidae, Hersiliidae, Lycosidae, Oxyopidae, Theridiidae, and Thomisidae from Thailand.

Supplement Table 2. Regional records of Araneidae, Hersiliidae, Lycosidae, Oxyopidae, Theridiidae, and Thomisidae in Thailand.

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