

## TWO NEW SPECIES OF *CYDRELA* THORELL (ARANEAE: ZODARIIDAE) FROM THAILAND

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**ABSTRACT.** – Two new species of the spider genus *Cydrela* Thorell, 1873 (Zodariidae: Cydrelineae) are described from Thailand. *Cydrela pristina*, new species (male + female), was collected in primary montane cloud forests near the summit of Doi Inthanon, the highest mountain culminating at 2,563 m asl. *Cydrela decidua*, new species (female), was collected from a mixed deciduous forest of Phu Phan, a series of mountainous ranges situated in the northeastern part of the kingdom. The species previously described from Tibet, *C. linzhiensis* (Hu, 2001), new combination, is here transferred from *Storena* Walckenaer, 1805.

**KEY WORDS** – Cydrelineae, *Storena*, new combination, Tibet, Oriental Region, Doi Inthanon, Phu Phan.

### INTRODUCTION

During recent fieldwork in Thailand several interesting spider specimens were obtained from the summit of Doi Inthanon—the highest mountain in the country, culminating at 2,563 m. The mountain consists of a number of remnant patches of primary tropical montane cloud forests. Most of the specimens examined are members of the spider family Amaurobiidae, which is fairly common and can be considered as an abundant group of spiders inhabiting evergreen hill forests of northern Thailand (Dankittipakul et al., 2006; Dankittipakul & Wang, 2003, 2004). These forests also harbour many remarkable species of the Zodariidae that are well adapted for living in constantly moist forests of Southeast Asia. As a result, two new genera of the subfamily Zodariinae Simon were consequently described (Dankittipakul & Jocqué, 2004). Surprisingly, the expedition also led to a discovery of members of the subfamily Cydrelineae Simon, specifically the two *Cydrela* species described herein.

The Cydrelineae consists of several zodariid genera with species that live in savannas, semideserts or other arid areas of the African continent. Only a few species of the genus *Capheris* Simon, *C. escheri* Reimoser and *C. nitidiceps* Simon, were known from India, the easternmost point in the range of the subfamily. Therefore, *Cydrela* Thorell was previously considered an African genus with fourteen nominal species. The presence of *Cydrela* species in the Oriental

Region, especially in entirely contrasting type of habitat, is remarkable and throws a new light on the ecological range of the spider subfamily Cydrelineae. The present study expands the known distribution of the Cydrelineae towards the east and provides a better understanding of the actual geographical range of this subfamily.

At present six zodariid genera (*Asceua* Thorell, *Cydrela*, *Euryeidon* Dankittipakul & Jocqué, *Heradion* Dankittipakul & Jocqué, *Mallinella* Strand, and *Stenomorpho* Simon) have been reported from Thailand. The present description of new *Cydrela* species once more indicates that the forest floor fauna of Southeast Asia is still very superficially known.

### MATERIAL AND METHODS

All illustrations were made with a Nikon SMZ 800 stereomicroscope equipped with a drawing tube. Body measurements are in millimetre. Measurements of leg segments were taken from the dorsal side. Epigynes were drawn in natural and cleared state (after immersing in lactic acid for 10–20 minutes). Male palps were drawn in lateral and ventral view. Structures examined with the scanning electron microscope (JEOL LV-5400) were dried after immersion in hexamethyldisilazane (Brown, 1993), stud-mounted and sputter-coated for observation and photography.

The specimens examined are deposited in the collections of the Muséum d'histoire naturelle, Genève (MHNG), Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels (KBIN) and in the collection of the first author (PDC) which will be deposited in the MHNG later.

Abbreviations used in the text and in the figures are as follow: ALE, anterior lateral eyes; ALS, anterior lateral spinnerets; AME, anterior median eyes; LE, lateral eyes; MAp, Major ampullate gland spigot; ME, median eyes; MOQ, median ocular quadrangle; MS, median septum of epigyne; PER, posterior eyes row; Pir, piriform gland spigot; PLE, posterior lateral eyes; PLS, posterior lateral spinnerets; PME, posterior median eyes; PMS, posterior median spinnerets; RTA, retrolateral tibial apophysis. Spination: d, dorsal; pl, prolateral; r, retrolateral; v, ventral.

## TAXONOMY

### FAMILY ZODARIIDAE THORELL, 1881

#### *Cydrela* Thorell, 1873

#### *Cydrela pristina*, new species

(Figs. 1–12, 14–22)

**Type material.** – HOLOTYPE: Male (MHNG) THAILAND, Chiang Mai Province, Chomthong District, Doi [northern Thai, Doi = Mt.] Inthanon National Park, Doi Inthanon, Kew Mae Pan, 2,000–2,100 m, pitfall trapping, coll. S. Sonthichai & P. Dankittipakul, 25 Mar. –22 Apr.2000.

PARATYPES: 1 female (MHNG), 2,450 m, near the summit of Doi Inthanon, pitfall trapping, coll. S. Sonthichai & P. Dankittipakul, 25 Dec.1999 – 23 Jan.2000; 1 female (MHNG), 2,250 m, leaf litter sifting, coll. S. Sonthichai & P. Dankittipakul, 15 Jan.2000; 5 females (MHNG, PDC ZO–00159/60), 2,540 m, leaf litter sifting, coll. P. Dankittipakul, 4–7 Jul.2002; 1 male (MHNG TH–00/03), 2,500 m, leaf litter sifting, coll. P. J. Schwendinger, 28 Oct.2000; 1 female (KBIN), 1,630 m, coll. P. J. Schwendinger, 25 Feb.1986; 3 females (MHNG), 1,650–1,680 m, leaf litter sifting, coll. T. Chami-Kranon & A. Hasalem, 12 Jan.2005.

**Diagnosis.** – The male of *C. pristina*, new species can be distinguished from other members of the genus *Cydrela* by the bifid tibial apophysis (Figs. 9, 20), the lightly sclerotized conductor (Figs. 17, 20) on the retrolateral side of the membranous tegulum (Fig. 17) and the elongate embolus (Figs. 17, 19). Females can be recognized by the presence of a median septum and a hood on the epigyne (Figs. 10, 21), the small, anteriorly located copulatory orifices (Figs. 10, 21) and the strongly sclerotized spermathecae (Fig. 22).

**Etymology.** – The species name is a Latin adjective meaning “of former times” referring to the pristine forests the specimens were found in.

**Description.** – Male (holotype). Total length 6.97. Carapace 3.61 long, 2.32 wide. Abdomen 3.35 long.

Prosoma (Fig. 11) longly oval, widest between coxae II and

III, narrowed in front. Profile with raised cephalic area and slightly dip near fovea (Fig. 16); highest point between PME and deep fovea. Tegument smooth. Carapace light brown, silvery hairs present on cervical groove and ocular area. Legs dark green, posterior legs with numerous strong spines.

Eyes small, in three rows (2–2–4) (Figs. 11, 15); AER strongly procurved, ALE located in front of AME; PER slightly recurved, much wider than anterior one; all eyes circular; AME dark, remainder pale; AME the smallest, hardly larger than other six, which are subequal; AME their diameter apart, about their diameter from ALE; PME more than their diameter apart, at about 4–5 times that distance from PLE. MOQ longer than wide, about 1.0–1.4 times anterior width, and much wider behind than in front. Clypeus high, 5.2 to 5.8 times diameter of ALE, vertical. Eye sizes and interdistances: AME 0.04, ALE 0.08, PME 0.09, PLE 0.08; AME–AME 0.06, AME–ALE 0.06, PME–PME 0.07, PME–PLE 0.20, ALE–PLE 0.30; MOQ 0.34 long, front width 0.14, back width 0.30. Clypeus 0.46 high.

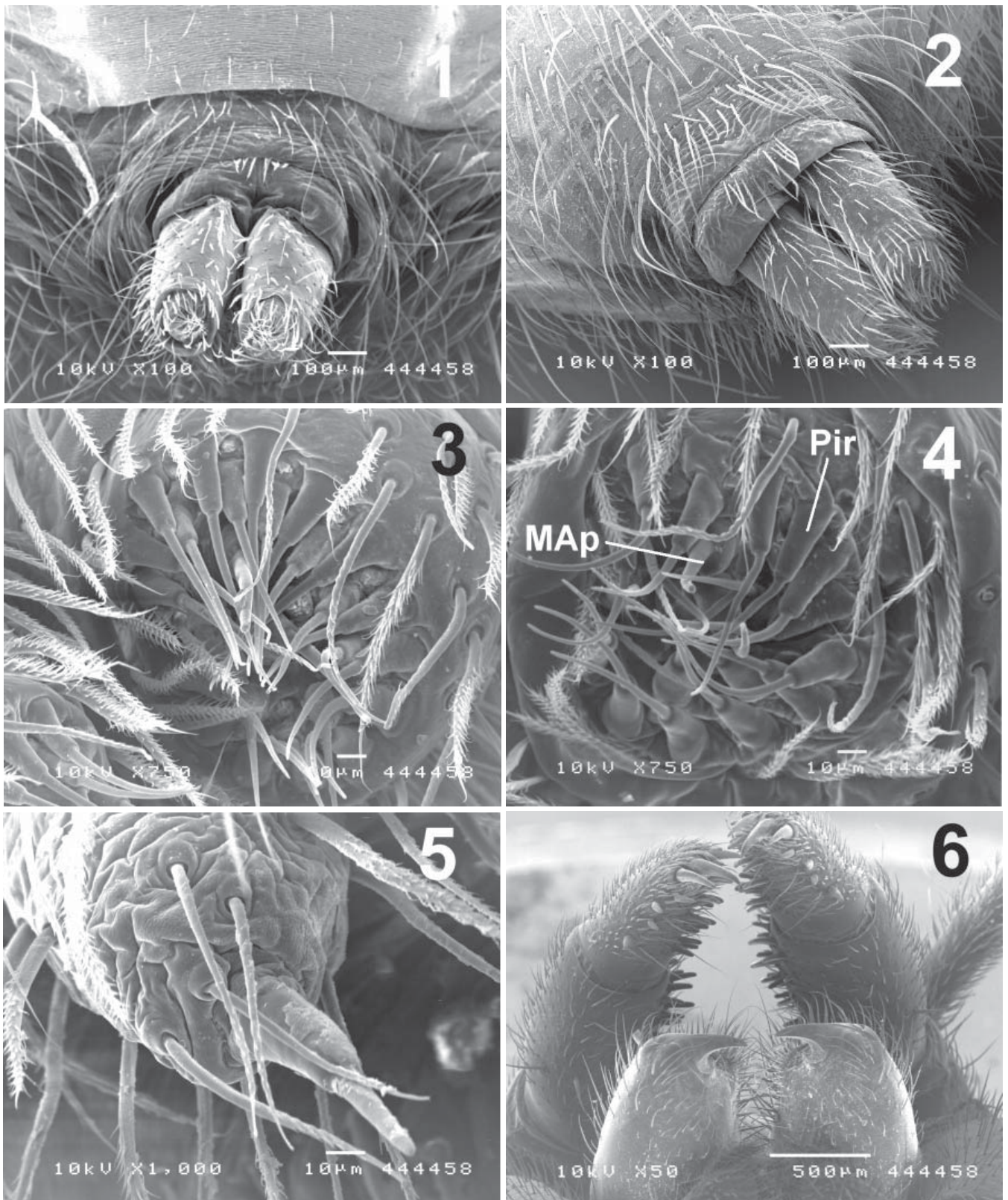
Chilum poorly developed, represented by lightly chitinized area, without hairs; double, poorly delimited. Chelicerae (Figs. 15, 16) strong, rather long; with relatively large lateral condyle; anterior surface densely haired, with pale promesal patch and retromesal gland (Fig. 7); no teeth present; fangs relatively long with thick base. Maxillae (Fig. 14) slightly swollen at base; rather broad, with anteromesal scopulae. Labium (Fig. 14) roughly triangular, with narrowed base. Sternum (Fig. 14) roughly triangular, almost straight anterior margin with small indentation on either side of center; slightly longer than wide. Precoxal sclerite small, lightly sclerotized.

Leg formula 4123 (8.77, 7.70, 6.87, 6.71). Leg measurements: femora: I 2.05, II 1.95, III 1.88, IV 2.30; patellae: I 0.91, II 0.94, III 0.90, IV 1.06; tibiae: I 1.80, II 1.40, III 1.20, IV 1.60; metatarsi: I 1.56, II 1.48, III 1.74, IV 2.40; tarsi: I 1.38, II 1.10, III 0.99, IV 1.41. Spination: spines usually few and short on legs I and II, more numerous long, slender spines on legs III and IV. Hinged hairs present. Metatarsal preening bush present on leg III. Trichobothria in 2 rows on tibiae, in 1 row on metatarsi and tarsi. Scopulae rarely present, mostly absent or spiniform. Pair tarsal claws with 8 teeth.

Spination: femora I d1–1–1 pl1 II d1–1–1 pl1 rl1 III d1–1–1 pl2 rl2 IV d1–1–1 rl1; patellae II pl1 III d1 pl2 rl1 IV d1 pl1 rl1; tibiae I pl1–1–1 v2–1–2 II pl1–1–1 v2–2–1 III d1–1–1 pl1–1–1 rl1–1 v2–2–2 IV d1–1–1 pl1–1–1 rl1–1 v2–1–1–2; metatarsi I v3–2–2 II pl1 v3–2–2 III d1 pl1–1 rl1–1 v3–2–2 IV d2–1 pl1–1–1 rl1–1 v2–1–1–1–3 tarsi II v1–1–1 III v1–1–1–1–1 IV v2–1–1–1–1.

Abdomen (Fig. 11) oval, with two dorsal sigilla; sparsely clothed with white hairs. Dorsum gray, provided with simple pattern consisting of two longitudinal bands, followed by pairs of pale patches, fused just in front of the spinnerets. Tracheal spiracle narrowed, lightly sclerotized. Six spinnerets (Figs. 1, 3–5): Anterior pair relatively long, cylindrical or slightly conical, clearly bisegmented; PLS slightly longer than half length of ALS, cylindrical, faintly bifurcated; PMS conical,





Figs. 1-6. *Cydrela pristina*, new species: 1, spinnerets of male; 2, spinnerets of female; 3, anterior lateral spinnerets; 4, anterior lateral spinnerets, different view; 5, posterior lateral spinneret with minor ampullate gland spigot; 6, female palpal tarsi. Abbreviations: Pir, piriform gland spigot; MAp, Major ampullate gland spigot.



tiny, provided with few spigots. Colulus represented by two groups of hairs. Epiandrum well developed, provided with two sclerotized depressions.

Male palp (Figs. 9, 17–20): Tibia with a large and protruding retrolateral tibial apophysis (Fig. 17), slightly bifid as seen from in front (Figs. 9, 20), dorsally with small triangular appendage curved inward (Fig. 18). Cymbium with few spines on distal part; retrolateral side protruding (Fig. 20), accommodating the conductor; cymbial fold absent. Subtegulum well-developed. Tegulum (Fig. 17) simple, widened at extremity, posterior portion lightly sclerotized; anterior part forming a groove, accommodating elongate embolus, originating on lateral base of tegulum.

Female (paratype). Total length 8.61. Carapace 4.0 long, 2.50 wide. Abdomen 4.61 long.

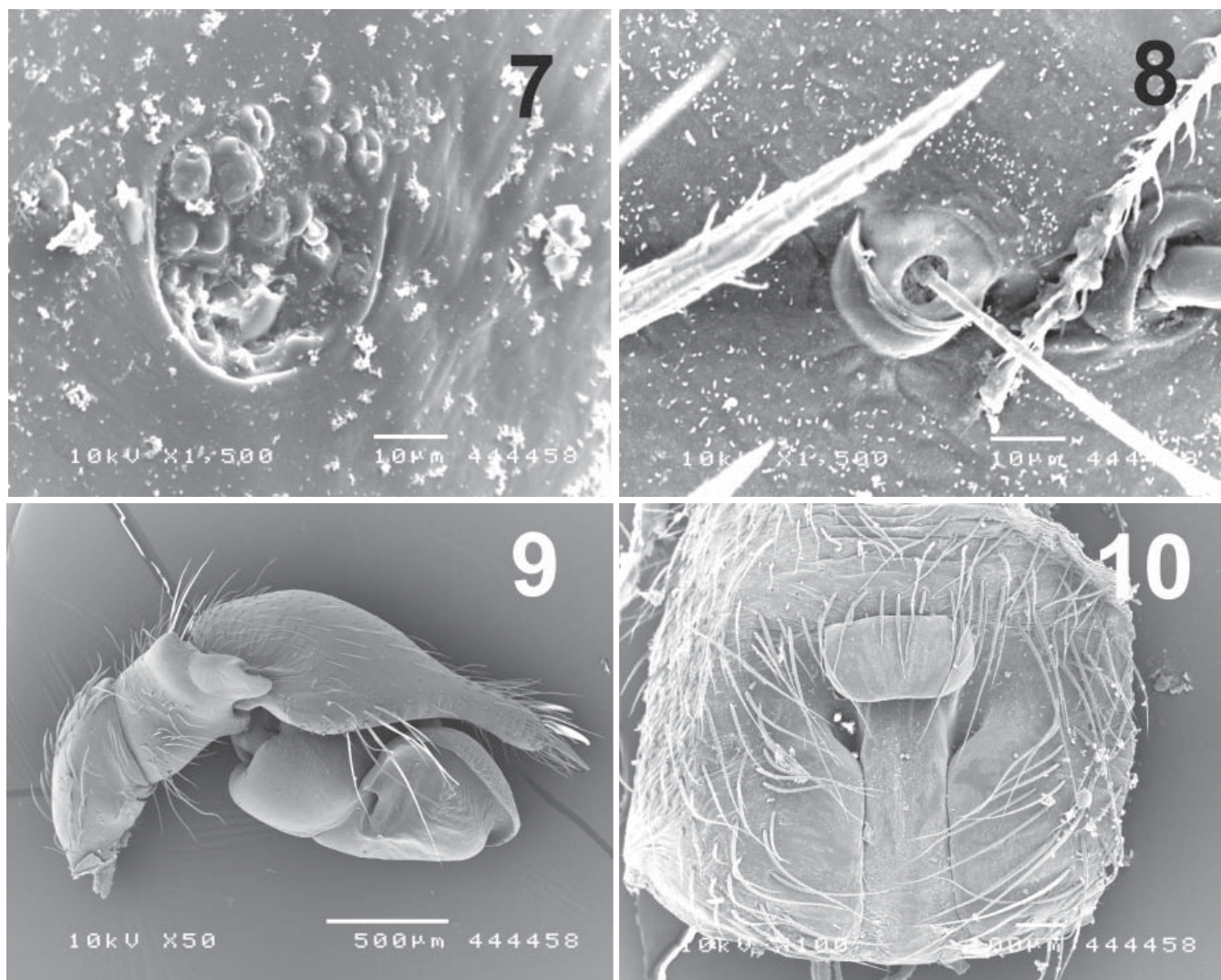
Coloration and pattern similar to male but usually with darker (Fig. 12), smaller females usually pale, mostly orange; legs of normal length; carapace slightly wider in front; carapace and opisthosoma without silvery hairs; a row of hairs running

from fovea to PME; chelicerae densely clothed with strong hairs. Spinnerets as in Fig. 2. Female palp (Fig. 6) swollen; triangular tarsi ventrally flattened; provided with large terminal claw and pairs of spines on prolateral side (Fig. 6).

Eye sizes and interdistances: AME 0.06, ALE 0.10, PME 0.10, PLE 0.10; AME–AME 0.07, AME–ALE 0.06, PME–PME 0.10, PME–PLE 0.28, ALE–PLE 0.44; MOQ 0.26 long, front width 0.18, back width 0.30. Clypeus 0.61 high.

Leg formula 4132 (8.95, 7.15, 6.90, 5.28). Leg measurements: femora: I 2.13, II 1.95, III 2.18, IV 2.37; patellae: I 1.00, II 1.00, III 1.02, IV 1.08; tibiae: I 1.68, II 1.40, III 1.24, IV 1.72; metatarsi: I 1.32, II 1.40, III 1.60, IV 2.50; tarsi: I 1.02, II 0.93, III 0.86, IV 1.28.

Spination: femora I d1–1–1 pl1 II d1–1–1 pl1 III d1–1–1 pl1 rl1 IV d1–1–1 rl1; patellae III d1–1 pl1–1 rl1 IV d1–1 pl1–1 rl1; tibiae I pl1 v1–1 II pl1 v1–1 III d1–1–1 pl1–1–1 rl1–1 v2–1–1–1–1 IV d1–1 pl1–1–1 rl1–1 v2–1–1–1–1; metatarsi I v2–1 II v2–2–3 III d1 pl1–1–1 rl1–1–1 v2–2–3 IV d1 pl1–1–1–1 rl1–1–1 v1–1–1–1–3 tarsi III v2–2–2 IV v2–2.



Figs 7–10. *Cydrela pristina*, new species: 7, cheliceral gland; 8, tarsal trichobothrium; 9, right male palp, retrolateral view; 10, female epigyne, ventral view.

Epigyne (Figs. 10, 21, 22): Simple, strongly sclerotized plate, provided with median septum and hood (Figs. 10, 21). Small, copulatory orifices anteriorly situated (Fig. 21). Copulatory ducts short, strongly sclerotized, leading to round, posteriorly located spermathecae (Fig. 22). Fertilization ducts simple.

**Natural history.**— Most of the specimens of *C. pristina*, new species examined were collected from primary tropical montane cloud forests (2,000–2,540 m) near the summit of Doi Inthanon. The forest floor was covered with a thick layer (9–22 cm depth) of decomposing organic matter. The annual mean temperature of these forests is 9 and 12 °C at the summit and Kew Mae Pan, respectively. The constantly low temperature is responsible for the formation of the daily cloud cover above 1,800 m of the mountain. The annual rainfall is over 2,300 mm where the spiders were collected. During the rainy season (July to late October) relative humidity of the air reaches 100 % and the soil becomes saturated with water. Additional physical factors of the type and other localities were also reported by Dankittipakul & Sonthichai (2002).

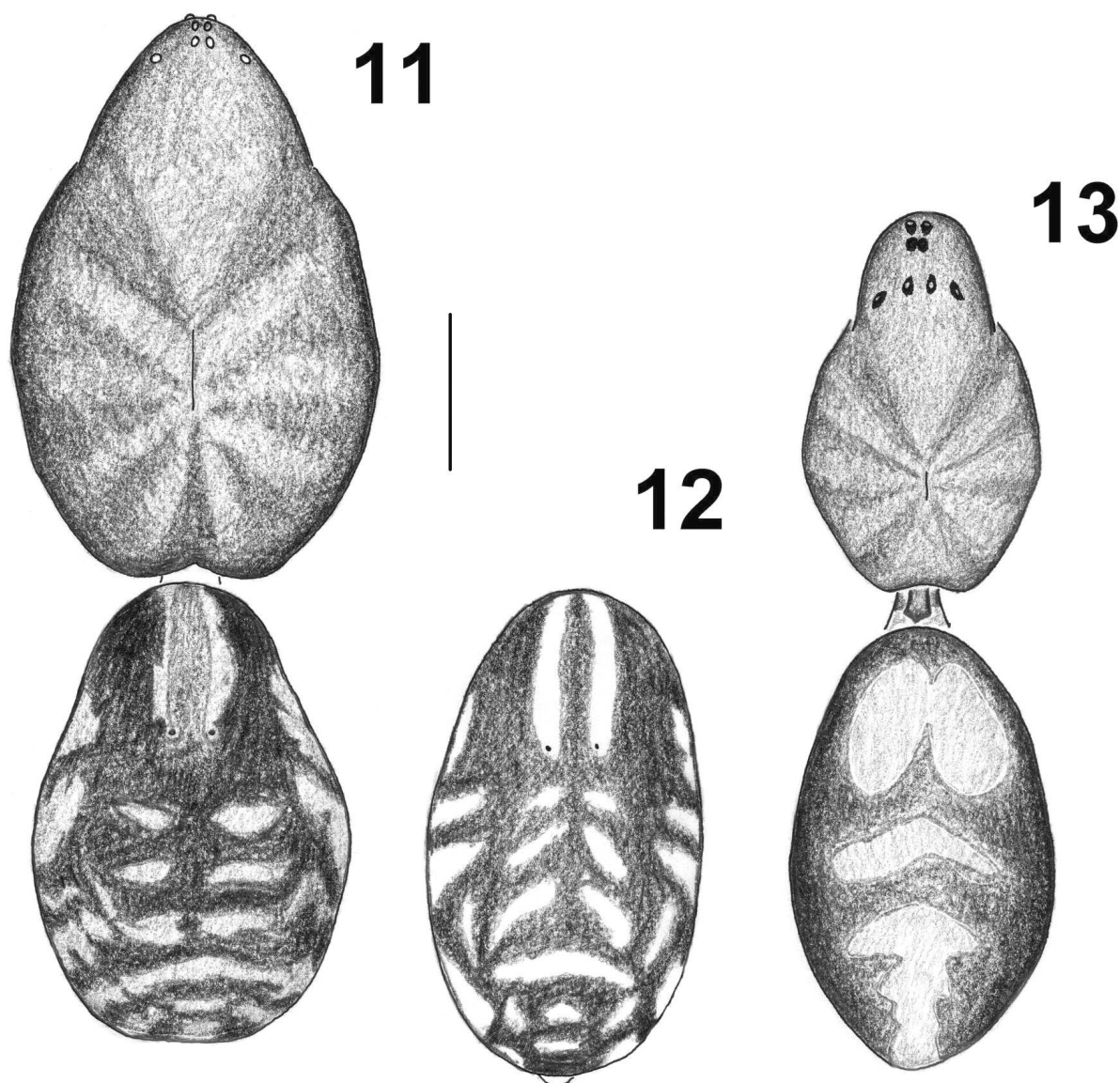
It is interesting to note that only four specimens examined were collected from evergreen hill forest at about 1,630–1,680 m asl. These specimens were obtained by leaf litter sifting in a damp swamp between steep ridges in evergreen hill forest. At this altitude forest litter of only three square metres collected near the swamp contained three females and two juveniles whilst the remaining 47 square metres of decomposing leaf litter layer nearby were inhabited by other zodariid genera, i.e. *Asceua*, *Euryeidon* and *Mallinella*.

**Distribution.**— Known only from the type locality and surroundings.

***Cydrela decidua*, new species**

(Figs. 13, 23, 24)

**Type material.** — HOLOTYPE: Female (MHNG), northeastern THAILAND, border between Kalasin and Sakon Nakhon Province, Phu [= Mt.] Phan, 524 m, partially dry stream bed in a mixed



Figs. 11-13. *Cydrela pristina*, new species: 11, male holotype, habitus, dorsal view; 12, female paratype, dorsal view of abdomen. *Cydrela deciduas*, new species. 13, female holotype, habitus, dorsal view. Scale bar = 1.0 mm.



evergreen deciduous gallery forest ca. 1 km of the main road near the summit, coll. P. J. Schwendinger, 7-8 Dec.1995.

**Diagnosis.** – Somatic features of the female *C. deciduas*, new species resemble that of *C. pristina*, new species but can be easily distinguished from the latter species by its smaller size and an epigyne with large genital orifices (Fig. 23), the internal structure of the epigyne with strongly convoluted entrance ducts and the kidney-shaped spermathecae (Fig. 24).

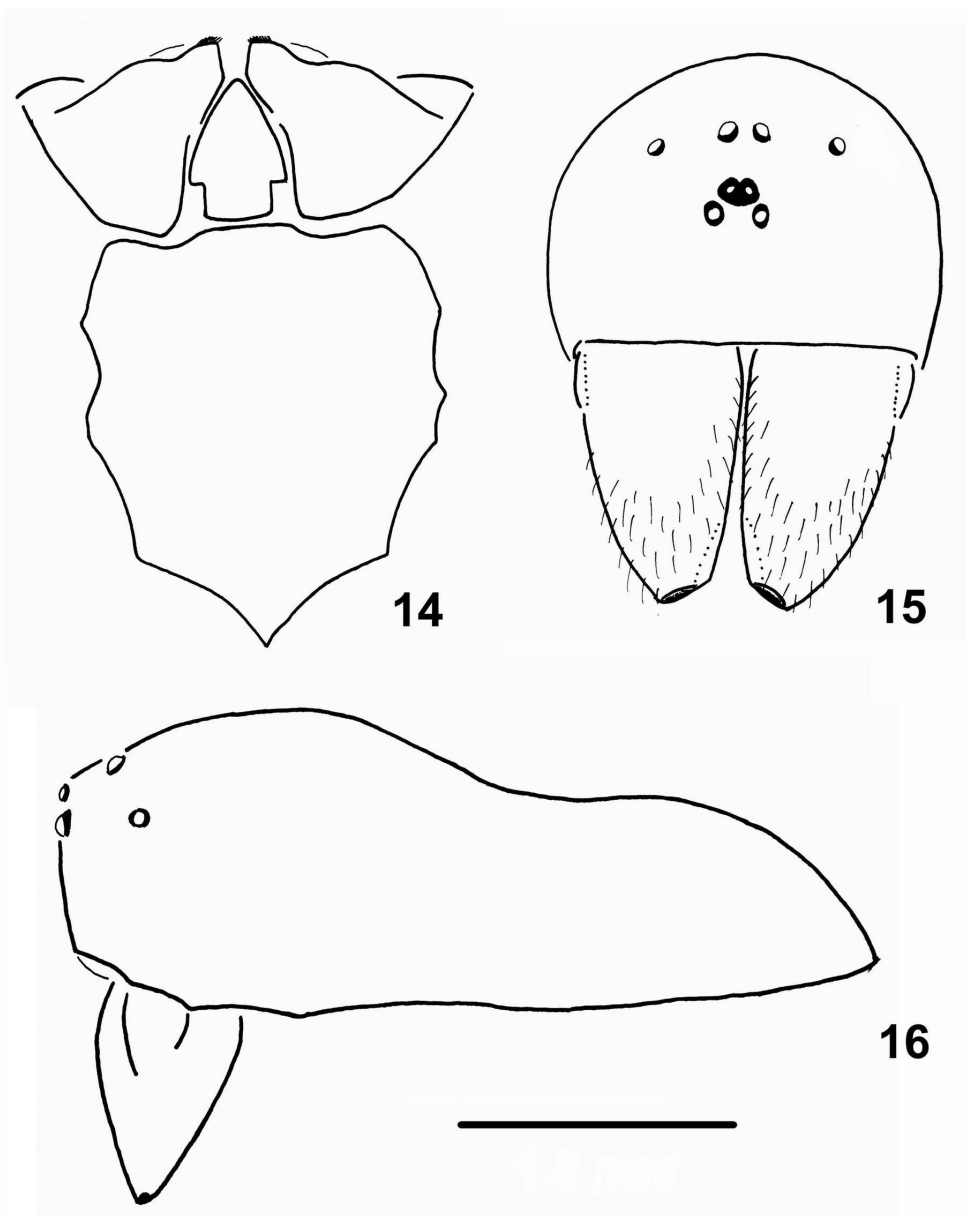
**Etymology.** – The species name is a Latin adjective meaning “fallen” and refers to the semi-deciduous woodland the specimen was found in.

**Description.** – Female (holotype). Total length 6.05. Carapace 2.46 long, 1.51 wide. Abdomen 3.14 long.

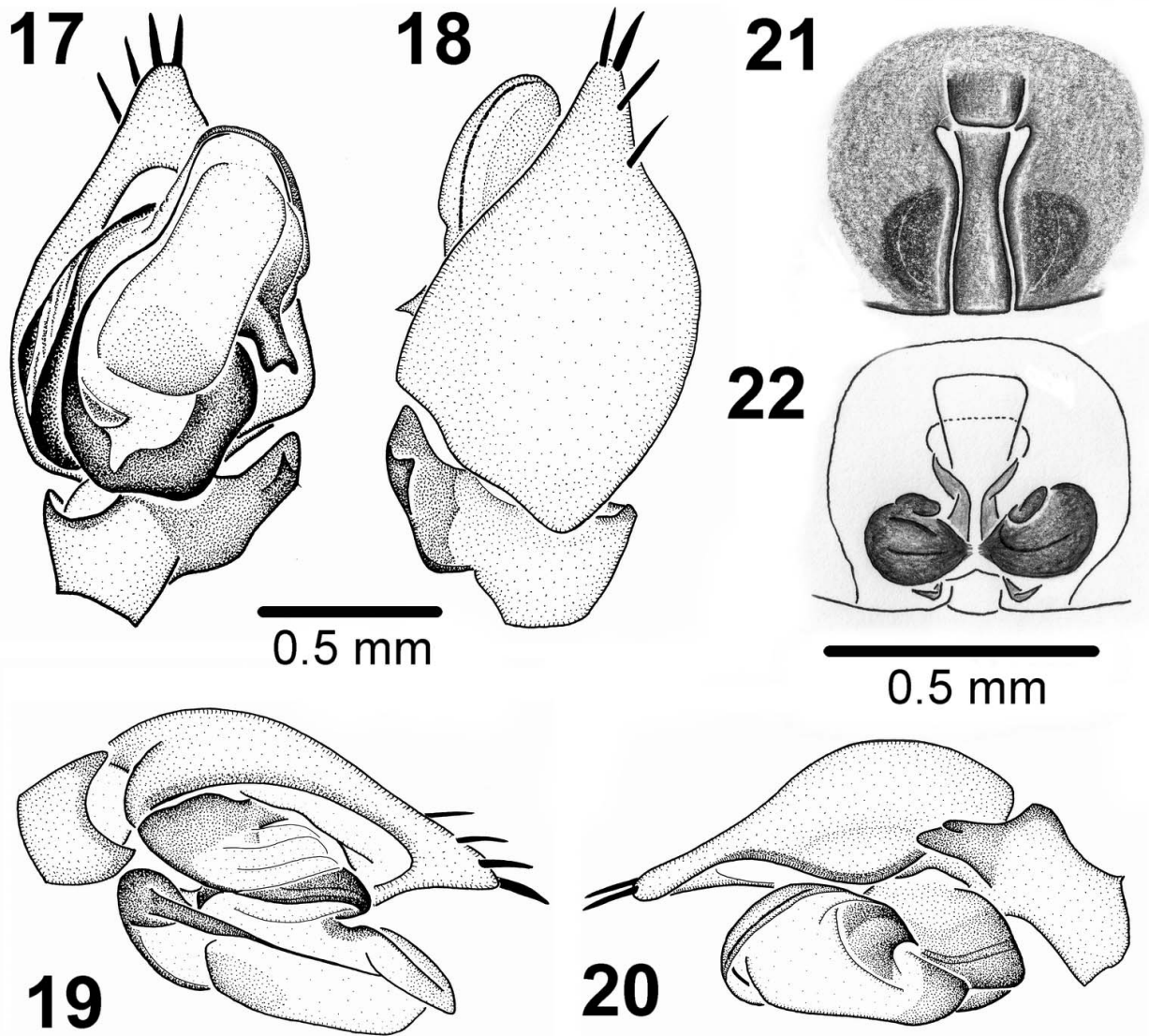
Prosoma longly oval, widest between coxae II and III, strongly narrowed in front. Profile with raised cephalic area

and slightly dip near fovea; highest point half way between PME and deep fovea. Tegument smooth. Carapace orange in colour, with a few long hairs on ocular area. Legs yellow, anterior legs provided with a few weak spines, posterior legs with numerous short ones.

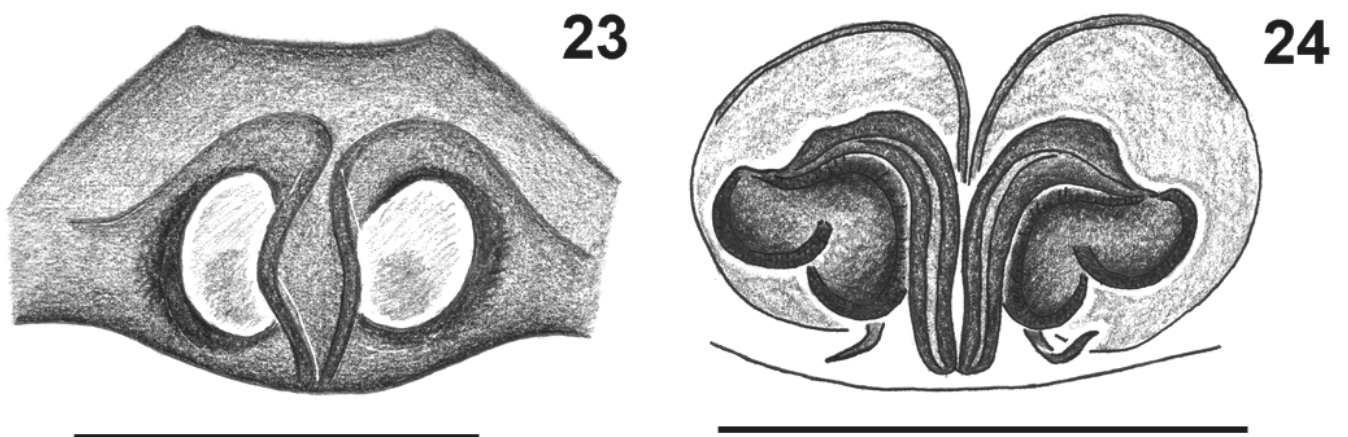
Eyes small, in three rows (2–2–4); AER strongly procurved, ALE located just in front of AME; PER slightly recurved, much wider than anterior one, PER clearly separated from AER; all eyes circular; AME dark, remainder pale; AME the smallest, hardly larger than other six, which are subequal; AME their diameter apart, about their diameter from ALE; PME more than their diameter apart, at about 3 times that distance from PLE. MOQ longer than wide and always much wider behind than in front. Eye sizes and interdistances: AME 0.06, ALE 0.08, PME 0.06, PLE 0.06; AME–AME 0.04, AME–ALE 0.08, PME–PME 0.08, PME–PLE 0.20, ALE–PLE 0.30; MOQ 0.30 long, front width 0.14, back width 0.20. Clypeus 0.26 high, convex, strongly retreating.



Figs. 14-16. *Cydrela pristina*, new species. Sternum (14); carapace, lateral (15) and frontal (16) views. Scale bar = 1.0 mm.



Figs. 17-22. *Cydrela pristina*, new species. Male holotype (17-20) and female paratype (21, 22). Male palp: ventral (17), dorsal (18), prolateral (19) and retrolateral (20) views. Female epigyne (21) and its internal structure (22). Scale bars = 0.5 mm.



Figs. 23, 24. *Cydrela decidua*, new species. Female holotype (23, 24). Epigyne (23), and its internal structure (24). Scale bars = 0.5 mm.

Chilum indistinct. Chelicerae strong, rather broad; anterior surface densely clothed with a patch of very thick hairs; fangs relatively long with thick base, no teeth present on cheliceral groove. Maxillae slightly swollen at base; rather broad, with anteromesal scopulae. Labium roughly triangular, with narrowed base. Sternum roughly triangular, almost straight anterior margin with small indentation on either side of center; slightly longer than wide. Precoxal sclerite absent.

Leg formula 4123 (5.60, 4.84, 3.84, 3.73). Leg measurements: femora: I 1.42, II 1.21, III 1.02, IV 1.56; patellae: I 0.56, II 0.56, III 0.48, IV 0.56; tibiae: I 1.50, II 0.83, III 0.75, IV 1.05; metatarsi: I 0.65, II 0.65, III 0.90, IV 1.52; tarsi: I 0.71, II 0.62, III 0.58, IV 0.91. Spination: Spines usually few and thin on legs I and II, more numerous short, stout spines on legs III and IV. Metatarsal preening bush present on leg III absent. Scopulae absent. Pair tarsal claws with tiny teeth, generally more than 10.

Spination: femora I d1–1 II d1–1 III d1 IV d1; patellae III pl1–1–1 d1 rl 1 ap 2 IV pl1–1–1 d1 rl1 ap 2; tibiae I v1 II pl1 v1–1–1 III pl1–1–1 d3 rl 2 v2 IV pl1–1–1 d3 rl2 v1–1–1; metatarsi I v2–1 II v4–2–1 III pl1–1–1 d1 rl2 v4–1–1 IV pl1–1–1 d1 rl3 v4–1–1–1.

Abdomen oval. Dorsum gray, provided with a simple pattern consisting of two pairs of spots, anterior one largest, followed by a pale folium. Six spinnerets. Anterior pair relatively long, cylindrical or slightly conical, bisegmented; posterior spinnerets much shorter than AS. Colulus represented by two groups of hairs.

Epigyne (Figs. 23, 24): Simple sclerotized plate with two large posterior genital orifices (Fig. 23) connected to a pair of receptacles (Fig. 24) then forming thick copulatory ducts which arise posteriorly; spermathecae kidney-shaped (Fig. 24).

**Natural history.** – The female holotype was collected from a 2–3 cm long burrow with a flap-shaped door (not a real trap door) that closed the entrance of the burrow. The burrow was located on a vertical road bank of a main road in a dry deciduous forest. Hewitt (1914) first observed that an African species, *C. friedlander* Hewitt, 1914, live in burrows with trap doors but the species was believed to be a member of *Capheris* instead of *Cydrela* (Jocqué, 1991). Several members of the genus *Psammorygma* Jocqué, another genus of the Cydrelineae, have been recorded (unpublished) to live in burrows with trap doors. We document here the evidence of burrow construction of the genus *Cydrela*.

**Distribution.** – Known only from the type locality.

#### *Cydrela linzhiensis* (Hu, 2001), new combination

*Storena linzhiensis* Hu, 2001: 92, Figs. 14.1–6 (description male).

**Type material.** – Holotype: Male, Tibet, Linzhi Province, 3,000 m, 13 May. 1987 (not examined).

**Remarks.** – *Cydrela linzhiensis* (Hu, 2001), new combination is considered a member of the Cydrelineae due to its peculiar eye arrangement (2–2–4), an elevated pars cephalica of the carapace, narrowing in front and the presence of a basolateral extension on the maxillae. *Cydrela linzhiensis*, new combination can be recognized by its very short, tiny, anterior pin-shaped embolus situated near the apex of the tegulum and a dorsally concave retrolateral tibial apophysis. Posterior spinnerets divided into two segments, not in one piece as illustrated in Figs. 14.1 and 14.4 given by Hu (2001).

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