

## On *Agelena labyrinthica* (Clerck, 1757) and some allied species, with descriptions of two new species of the genus *Agelena* from China (Araneae: Agelenidae)

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### Abstract

Seven allied species of the funnel-weaver spider genus *Agelena* Walckenaer, 1805, including the type species *Agelena labyrinthica* (Clerck, 1757), known to occur in Asia and Europe, are reviewed on the basis of the similarity of genital structures. Two new species are described: *Agelena chayi* sp. nov. and *Agelena cuspidata* sp. nov. The specific name *A. silvatica* Oligier, 1983 is revalidated. The female is newly described for *A. injuria* Fox, 1936. Two specific names are newly synonymized: *Agelena daoxianensis* Peng, Gong et Kim, 1996 with *A. silvatica* Oligier, 1983, and *A. sublimbata* Wang, 1991 with *A. limbata* Thorell, 1897. Some names are proposed for these species to represent some particular genital structures: conductor ventral apophysis, conductor median apophysis, conductor distal apophysis and conductor dorsal apophysis for male palp and spermathecal head, spermathecal stalk, spermathecal base and spermathecal apophysis for female epigynum.

**Key words:** genital structure, revalidation, synonym, review, taxonomy

### Introduction

The funnel-weaver spider genus *Agelena* was erected by Walckenaer (1805) with the type species *Araneus labyrinthicus* Clerck, 1757. The genus has been studied for more than two hundred years; however, it might still be polyphyletic now. Lehtinen (1967) suggested that only a few Palearctic species should be included in this genus, the other species should be transferred to other genera of Ageleninae C.L. Koch, 1837. Levy (1996) stated that the obvious heterogeneity of the genital characters of *Agelena* inevitably led to the formation of a number of separate genera. On studying Israeli agelenids, Levy erected a new genus *Agelescape* Levy, 1996 to accommodate the species *Agelena affinis* Kulczynski, 1911 and

*Agelena livida* Simon, 1875, and transferred four other species to the genus *Benoitia* Lehtinen, 1967.

At present, there are 74 species and 1 subspecies from Asia, Europe and Africa placed in this mostly still unrevised genus, *Agelena*, including nearly 20 species from China (Platnick 2005; Song *et al.* 1999). During our research on agelenid spiders mainly from China, we found that many species shared the same somatic pattern, but the genital structures are quite different. So if the polyphyly of *Agelena* is to be solved, more species from larger area should be revised using a comparison of genital structures with the type species, *A. labyrinthica* (Clerck). Any species distantly related to the type one should be transferred out of this genus.

In order to facilitate the comparison, we carefully studied the type species, *Agelena labyrinthica*, and designated some names to the genital structures (see the description of the type species below). During our research, we found five Chinese species, *A. chayu* sp. nov. and *A. cuspidata* sp. nov., *A. injura* Fox, 1936, *A. limbata* Thorell, 1897, *A. silvatica* Oliger, 1983 (revalidated) and another species from the Middle East, *A. orientalis* C. L. Koch, 1837 share very similar genital structures with the type species: the grooved and complicated conductor and the presence of spermathecal apophysis. Obviously, they should be placed in the same species group and they are true spiders of *Agelena* s. str.. In this paper, we put these allied species together and describe the female of *A. injuria* for the first time and synonymize *A. sublimbata* Wang, 1991 with *A. limbata*, *A. daoxianensis* Peng *et al.* 1996 with *A. silvatica*.

Most of the other species of this genus mainly from China are quite different from these allied species. Eight species, share the un-grooved conductor arising from the central section of the tegulum retrolaterally and the absence of spermathecal apophyses. Among them, three Chinese species, *A. bistrinata* Grube, 1861, *A. difficilis* Fox, 1936, *A. opulenta* L. Koch, 1878 and an European species, *A. gracilens* C. L. Koch, 1841, share the long, strongly curved embolus in male palp and the laterally or medially originated spermathecal heads in the female epigynum. Hence, we propose a new genus to accommodate them (Zhang *et al.*, in press). The epigynal atria of *A. koreana* Paik, 1965 (known in Korea, also found in China, male undescribed) and *A. scopulata* Wang, 1991 (only the female specimen from the south of China examined) look like *A. labyrinthica*, but their spermathecal stalks are thin, the spermathecal heads originate near the former end of the stalks, the embolus is short and the median apophysis is located between the embolus and the conductor. They should be placed in one group; the other two species, *A. cymbiformia* Wang, 1991 (both sexes examined) and *A. bifida* Wang, 1997 (not examined) are different from each other, though they are all without the patellar apophysis. The former have a big conductor, particular median apophysis and little embolus located between the conductor and the median apophysis, while the conductor of the latter has a bifid apex and the median apophysis arise from the area between conductor and embolus.

There are also other six Chinese species placed in *Agelena* untouched since their orig-

inal descriptions and confused to us: *A. micropunctulata* Wang, 1992, *A. poliosata* Wang, 1991, *A. secsuensis* Lendl, 1898, *A. tungchis* Lee, 1998, *A. otiforma* Wang, 1991 and *A. sangzhiensis* Wang, 1991. The types of these specimens are unavailable even though some of them described recently. Only females of the former four species were described with one or a few specimens. Judged by the original figures and descriptions, *A. micropunctulata*, *A. poliosata* and *A. secsuensis* might be related to the type species, but the spermathecal apophysis was never figured. *A. secsuensis* is very similar to *A. difficilis*, and might be synonymized with the latter. The species, *A. sangzhiensis*, might be invalid, because the female of it is quite similar to *A. difficilis* (probable senior synonym) and the male might be *A. koreana*. From the figures of *A. otiforma*, the species seems quite different from all other Chinese species of *Agelena*.

Thus, more work needs to be done on *Agelena*. This paper is only the beginning.

### Materials and methods

All specimens were preserved in 75% ethanol and examined, drawn and measured under a Tech XTL-II stereomicroscope equipped with an Abbe drawing device. Eye sizes were measured as the maximum diameter in dorsal or frontal view. Leg measurements are shown as: total length (femur, patella and tibia, metatarsus, tarsus). All measurements given are in millimeters.

Terms used in this study are: Eyes: ALE = anterior lateral eye; AME = anterior median eye; MOA = median ocular area; PLE = posterior lateral eye; PME = posterior median eye.

Specimens from the following collections were examined:

CYNU: College of Life Sciences, Yunnan Normal University; China;

MHBU: Museum of Hebei University, China;

NHMB: Natural History Museum Basel, Switzerland;

NHRS: Swedish Museum of Natural History, Stockholm, Sweden;

USNM: National Museum of Natural History, Washington, D.C., USA;

ZMUC: Zoological Museum, University of Copenhagen, Denmark.

### Taxonomy

Seven species are described: *A. labyrinthica* (Clerck, 1757), *A. chayu* sp. nov., *A. cuspidata* sp. nov., *A. injuria* Fox, 1936, *A. limbata* Thorell, 1897, *A. orientalis* C. L. Koch, 1837 and *A. silvatica* Oliger, 1983,

The diagnosis used to differ these allied species (or *Agelena* s. str.) from other ageleline spiders (or genera) is as follows:

Relatively large-sized (total length about 916mm); both eye rows strongly procurved; chilum divided; chelicerae with 3 promarginal and 3 or 4 retromarginal teeth; posterior spinnerets long and two segments divided; male palp with one patellar apophysis and two tibial apophyses, embolus relatively strong and short, conductor provided with 4 (ventral, median, distal and dorsal) apophyses, median apophysis weakly sclerotized; female epigynum with a large atrium, nearly the same position of spermathecal heads and the presence of spermathecal apophyses.

The single character that sets these species apart is the presence of spermathecal apophyses on the surface of the base of spermathecae. This character is only shown in a few previous works (e.g. Levy 1996, p. 87, figs. 8, 13), but its importance has never been mentioned.

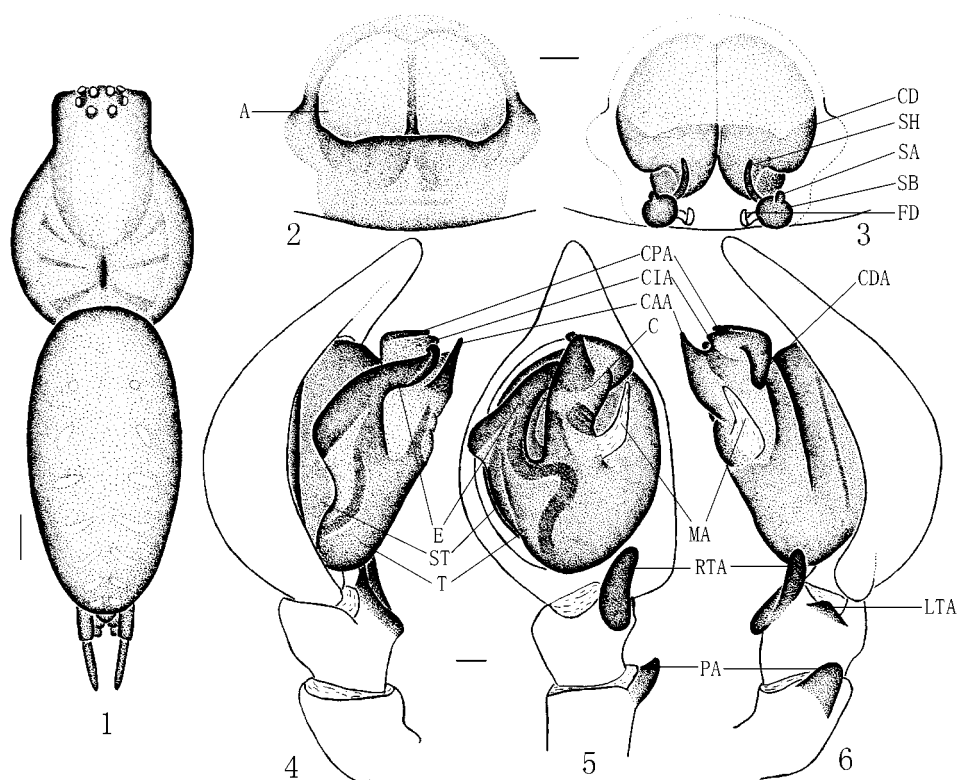
### *Agelena labyrinthica* (Clerck, 1757) (Figs. 1–6)

*Araneus labyrinthicus* Clerck 1757: 79, pl. 2, fig. 8 (Types lost).

*Agelena labyrinthica* (Clerck, 1757): Dahl 1931: 13, figs. 18–20; Drensky 1942: 52, figs. 14a–b; Lehtinen 1967: 209, figs. 216, 221; Blauwe 1980: 13, figs. 20–25; Song 1980: 159, figs. 85a–d; Song *et al.* 1981: 85, figs. 8–9; Hu 1984: 203, figs. 214.14; Guo 1985: 110, figs. 2–51.1–4; Zhu & Shi 1985: 121, figs. 106a–d; Yaginuma 1986: 138, fig. 73.2; Song 1987: 190, fig. 149; Zhang 1987: 135, figs. 112.1–4; Hu & Wu 1989: 179, figs. 148.1–3; Feng 1990: 139, figs. 114.1–4; Chen & Gao 1990: 114, figs. 143a–b; Chen & Zhang 1991: 185, figs. 182.1–3; Zhao 1993: 299, figs. 137a–c; Levy 1996: 87, figs. 9–13; Roberts 1998: 259; Song *et al.* 1999: 354, figs. 205G, 207A; Hu 2001: 129, figs. 41.1–3; Kim & Tak, 2001: 119, figs. 6a–f; Song *et al.* 2001: 273, figs. 171A–C.

**Material examined:** **China: Hebei:** Area of Mt. Taihang, 16 males, 32 females, June to July, 1999, F. Zhang leg. (MHBUS); Weichang (41°56'N, 117°45'E), Saihanba Forestry Centre, 1 female, 16 July 1998, W.L. Lie leg. (MHBUS); Yuxian, Xiaowutai (39°57'N, 115°2'E), 1 male, 3 July 1998, F. Zhang leg. (MHBUS); Xiaowutai, 1 female, 2 August 1998, W.L. Lie leg. (MHBUS); Xiaowutai, 1 male, 90 females, 14 July 2002, F. Zhang *et al.* leg. (MHBUS); Zhangbei, Zhangbei Rangeland (41°23'N, 114°56'E), 2 males, 4 females, 31 July 1998, W.L. Lie leg. (MHBUS); Zhangbei (41°09'N, 114°42'E), 1 female, July 2000, D. Li leg. (MHBUS); Linshou (38°18'N, 114°22'E), Wuyuezhai, 1 male, 21 June 1998, W.L. Lie leg. (MHBUS); Fengning (41°12'N, 116°38'E), 1 male, 1 female, 27 July 2002, G.M. Tang *et al.* leg. (MHBUS); Pingquan (41°01'N, 118°41'E), 4 females, 30 July 1982 (MHBUS); **Inner Mongolia:** Hesigten Qi, Dalai Nur (43°17'N, 116°35'E), 1 male, 3 July 2002, Z.S. Zhang leg. (MHBUS); **Jilin:** Changchun (43°54'N, 125°19'E), Jinyuetan, 1 female, 27 August 1981 (MHBUS); Tumen (42°57'N, 129°51'E), Near Baihe River, 6 males, 4 females, 12 July 2003, F. Zhang *et al.* leg. (MHBUS); Tumen, Near Tumen River, 2 males, 2 females, 13 July 2003, F. Zhang *et al.* leg. (MHBUS); Jiaohe (43°42'N, 127°21'E), 4 females, 27 July 2003, F. Zhang *et al.* leg. (MHBUS); Mishan, Near Xinkai Lake (45°17'N, 132°48'E), 3 females, 17 July 2003, F. Zhang *et al.* leg. (MHBUS); **Liao-**

**ning:** Beipiao (41°48'N, 120°47'E), 2 males, 5 females, 29 July 2003, F. Zhang *et al.* leg. (MHB); Beipiao, Shanbaota (41°51'N, 120°51'E), 7 females, 30 July 2003, F. Zhang *et al.* leg. (MHB); **Heilongjiang:** Fuyuan (48°21'N, 134°18'E), 1 male, 6 females, 21 July 2003, F. Zhang *et al.* leg. (MHB); Shuifenhe (44°25'N, 131°11'E), 2 males, 7 females, 15 July 2003, F. Zhang *et al.* leg. (MHB); **Sichuan:** Qinchuan (32°36'N, 105°12'E), Daqinggou, 2 males, 2 females, 13 July 2003, J.X. Zhang *et al.* leg. (MHB); Qinchuan, Muyu, 2 females, 21 July 2003, J-X. Zhang *et al.* leg. (MHB); **Shandong:** Weihai (37°31'N, 122°07'E), Cuizhulou, 2 females (MHB); **Xinjiang:** Zhaoshu (43°08'N, 81°06'E), 3 females, 21 July 1982 (MHB); **Gansu:** Sunan (38°50'N, 99°30'E), 1 female, 6 August 2003, W.Q. Wang and X.J. Li leg. (MHB); **Qinhai:** Xinin (36°38'N, 101°48'E), Xishan, 2 females, 4 July 1998, Y. Zeng *et al.* leg. (MHB); **Switzerland:** 5 males, 9 females (NHMB).



**FIGURES 1–6.** *Agelena labyrinthica* (Clerck, 1757). **1.** Male, dorsal view. **2.** Female, epigynum, ventral view. **3.** Same, vulva, dorsal view. **4.** Left palp of the male, prolateral view. **5.** Same, ventral view. **6.** Same, retrolateral view. Scale bar: 1, 1.0mm; 2–6, 0.2 mm. Abbreviations: A = atrium; C = conductor; CD = copulatory duct; CDA = conductor dorsal apophysis; CDiA = conductor distal apophysis; CMA = conductor median apophysis; CVA = conductor ventral apophysis; E = embolus; FD = fertilization duct; LTA = lateral tibial apophysis; MA = median apophysis; PA = patellar apophysis; RTA = retrolateral tibial apophysis; S = spermathecae; SA = spermathecal apophysis; SB = spermathecal base; SH = spermathecal head; ST = subtegulum; T = tegulum.

**Diagnosis:** The species is similar to *A. orientalis* (Levy 1996: 86, figs. 4–8), but can be recognized by the hooked embolus, the slightly blunt conductor median apophysis of the male palp, and by the invisible copulatory openings of the epigynum.

**Description:** The general description has been made by many authors, e.g. Song (1987: 190).

Male palp (Figs. 4–6): patella with one apophysis, tibia with two apophyses: the retrolateral tibial apophysis (or RTA, larger and arising ventrally) and the lateral tibial apophysis (short and broad, small, behind the RTA in a ventral view). Embolus strongly sclerotized, with hooked tip. Conductor with three processes on its apex: conductor ventral apophysis (often strongly sclerotized), conductor distal apophysis (slightly sclerotized) and conductor median apophysis (almost unsclerotized), respectively. Also, under the conductor distal apophysis retrolaterally, another process, conductor dorsal apophysis (also found in most species of Coelotinae) with tip curved backwards.

Epigynum (Figs. 2–3), with saccate copulatory ducts. Spermathecae can be separated into three portions: spermathecal head (medially originated, thin and small), spermathecal base and spermathecal stalk (between the other two apophyses and indistinct, while distinct in the other species mentioned below, with the exception of *A. orientalis*, just as these structures of Coelotinae and *Tamgrinia* Lehtinen, 1967 of Amaurobiidae). On the surface of spermathecal base is a peculiar small process, called spermathecal apophysis (found only in these 7 species). The fertilization ducts are small, arising from the posterior end of the spermathecae.

**Distribution:** China (Hebei, Inner Mongolia, Jilin, Liaoning, Heilongjiang, Sichuan, Shandong, Xinjiang, Gansu, Qinhai); Palearctic.

#### *Agelena chayu* sp. nov. (Figs. 7–12)

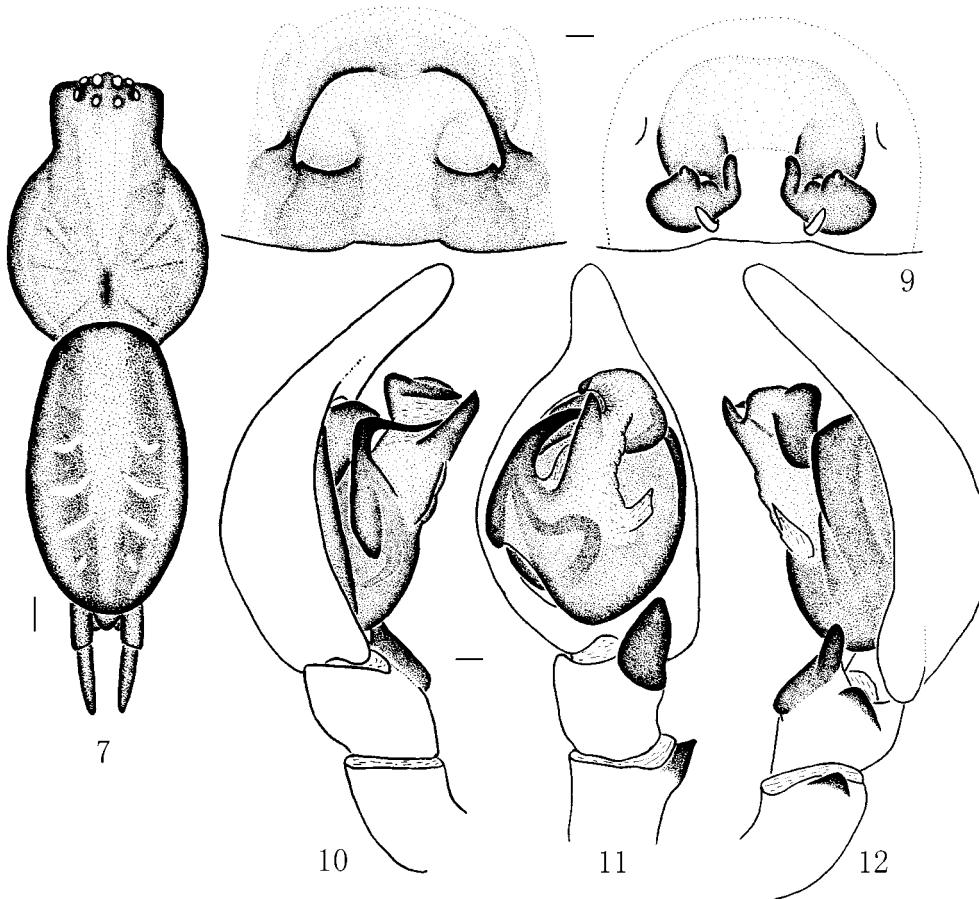
**Type material:** Holotype male, Xiachayu (28°30'N, 97°00'E), Chayu, Tibet, China, 8 August 2002, M.S. Zhu *et al.* leg. (MHBU); Paratypes: 2 males, 23 females, same data as holotype; 7 males, 8 females, same locality as holotype, 8 July 1980, G. CHEN leg. (MHBU).

**Etymology:** The specific name refers to the type locality, and is a noun in apposition.

**Diagnosis:** The new species is similar to *A. limbata* (Figs. 25–31), but can be distinguished from the latter by the small patellar apophysis, the thin embolus, the absence of the conductor median apophysis, the small median apophysis of the male palp; the wide epigynal median septum, the strong spermathecal heads; and the not round spermathecal base of the female.

**Description:** Male (holotype): Total length 11.93: prosoma 6.22 long, 4.59 wide; opisthosoma 6.22 long, 3.67 wide. Fovea longitudinal. Cervical groove and radial furrow distinct. Both eye rows strongly procurved and the posterior row wider than the anterior one. AME 0.30, ALE 0.28, PME 0.23, PLE 0.30. AME–AME 0.15, AME–ALE 0.10,

PME–PME 0.28, PME–PLE 0.23. MOA 0.80 long, front width 0.73, back width 0.70. Clypeus height 0.73. Chelicerae with 3 promarginal and 3 or 4 retromarginal teeth. Distal segment of posterior spinnerets much longer than basal one. Leg formula: 4123.



**FIGURES 7–12.** *Agelena chayu* sp. nov. **7.** Male, dorsal view. **8.** Female, epigynum, ventral view. **9.** Same, vulva, dorsal view. **10.** Left palp of the male, prolateral view. **11.** Same, ventral view. **12.** Same, retrolateral view. Scale bar: 7, 1.0mm; 812, 0.2 mm.

Measurements of legs:

	Femur	patella+ tibia	metatarsus	tarsus	total
I	6.73	8.47	7.04	3.16	25.40
II	6.32	7.75	6.43	2.96	23.46
III	5.92	6.73	6.22	2.55	21.42
IV	7.24	8.16	8.57	3.06	27.03

Coloration of male holotype: Prosoma deep yellow, eyes area and its retrolateral areas yellow brown. Chelicerae brown, with orange lateral condyles. Labium and endites yellow.

lowish brown. Sternum deep yellow. Legs yellow. Dorsum of the opisthosoma grey, with two longitudinal stripes and four chevron-like markings. Spinnerets yellowish.

Male palp (Figs. 10–12), with a small, blunt patellar apophysis and two tibial ones. Anterior portion of the embolus thin, with an acute tip. Distal portion of conductor with ventral, distal and dorsal apophyses. Median apophysis membranous and small, with a sharp tip.

Female (one paratype): Total length 15.40: prosoma 7.29 long, 5.00 wide; opisthosoma 9.28 long, 6.83 wide. Distal portions of femora and tibia with distinct brown annulate patches. Other characters as in male.

Measurements of legs:

	Femur	patella+ tibia	metatarsus	tarsus	total
I	6.02	7.34	5.10	2.35	20.81
II	5.71	6.73	4.79	2.35	19.58
III	5.41	5.81	4.69	2.04	17.95
IV	6.63	7.55	6.43	2.45	23.06

Epigyne (Figs. 8–9), with wide median septum of epigynal atrium and two acute processes on the posterior margin near the intersections to lateral margins and copulatory openings situated in the inner part of the processes. Copulatory ducts saccate, anterior parts broad and gradually decreased backwards. Spermathecal heads near midline. Spermathecal stalks short. Spermathecal apophysis originated anteriorly. Fertilization ducts arising from posterior end of spermathecae.

**Distribution:** China (Tibet).

#### *Agelena cuspidata* sp. nov. (Figs. 13–18)

**Type material:** Holotype male, Haba, Zhongdian (Shangri-La) (27°48'N, 99°42'E), Yunnan, China, 8 August 2002, B.Y. Mao and J.S. Xu leg. (MHBU); Paratypes: 1 male, 3 females, same data as holotype; Zhongdian, Sanba, 2 males, 6 females, 8 August 2002, Z.Z. Yang leg. (MHBU).

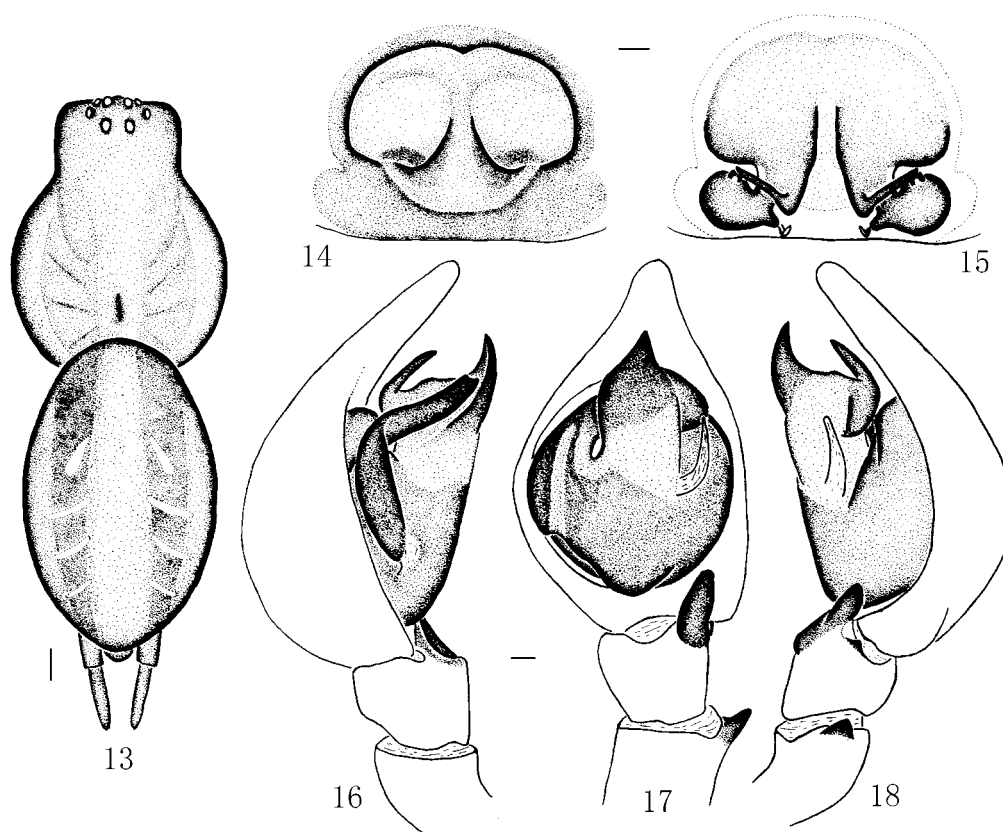
**Etymology:** The specific name is derived from the cuspidal tips of the ventral and distal apophyses of conductor; adjective.

**Diagnosis:** The new species resembles *A. limbata* (Figs. 25–31), but can be distinguished by the small patellar apophysis, the small and peak-like lateral tibial apophysis, the slightly bifid tip of embolus, the cuspidal conductor apophyses (ventral and distal), indistinct conductor median apophysis, and the slender tegular median apophysis of male palp, as well as the slender spermathecal heads of female epigynum.

**Description:** Male (holotype): Total length 12.24: prosoma 6.22 long, 4.90 wide; opisthosoma 7.04 long, 4.59 wide. Fovea longitudinal. Cervical groove and radial furrow



distinct. Both eye rows strongly procurved, posterior row wider than anterior one. AME 0.25, ALE 0.25, PME 0.20, PLE 0.25. AME–AME 0.30, AME–ALE 0.18, PME–PME 0.33, PME–PLE 0.35. MOA 0.78 long, front width 0.70, back width 0.70. Clypeus height 0.73. Two margins of chelicerae with 3 teeth, respectively. Two segments of the posterior spinnerets equal in length. Leg formula: 4123.



**FIGURES 13–18.** *Agelena cuspidata* sp. nov. **13.** Male, dorsal view. **14.** Female, epigynum, ventral view. **15.** Same, vulva, dorsal view. **16.** Left palp of the male, prolateral view. **17.** Same, ventral view. **18.** Same, retrolateral view. Scale bar: 13, 1.0mm; 14–18, 0.2 mm.

Measurements of legs:

	femur	patella+ tibia	metatarsus	tarsus	total
I	6.22	7.65	6.34	2.86	23.07
II	6.12	7.45	5.81	2.65	22.03
III	5.51	6.12	5.50	2.35	19.48
IV	6.63	7.65	7.14	2.65	24.07

**Coloration:** Prosoma light yellow brown, lateral margin yellow. Chelicerae yellow brown. Lateral condyle red yellow. Labium and endites yellow. Sternum red yellow. Legs

yellow. Dorsum of the opisthosoma grey brown, with two longitudinal stripes and four grey chevron-like markings. Spinnerets yellowish.

Male palp (Figs. 16–18), with a small patellar apophysis and two tibial apophyses. Lateral tibial apophysis small and peak-like. Tip of embolus slightly bifid. The conductor ventral and distal apophyses cuspidal and the median one indistinct. Median apophysis membranous, thin and long.

Female (one paratype): Total length 11.22; prosoma 4.89 long, 3.57 wide; opisthosoma 6.63 long, 4.59 wide. Legs with yellow brown annulate patches on the tips of femora, tibiae and metatarsi. Other characters as in male.

Measurements of legs:

	femur	patella+ tibia	metatarsus	tarsus	total
I	3.88	4.79	3.16	1.63	13.46
II	3.88	4.49	2.86	1.53	12.76
III	3.47	3.77	2.75	1.33	11.32
IV	4.49	4.90	3.98	1.63	15.00

Epigyne (Figs. 14–15), with a big atrium and a slightly wide median septum. Copulatory openings large and distinct. Copulatory ducts saccate, anterior parts broad, gradually decreasing backwards in width. Spermathecal heads slender and long, its bases bulging. Spermathecal stalks distinct. Spermathecal apophysis anteriorly originated. Fertilization ducts situated behind the bases of spermathecal heads.

**Distribution:** China (Yunnan).

#### *Agelena injuria* Fox, 1936 (Figs. 19–24)

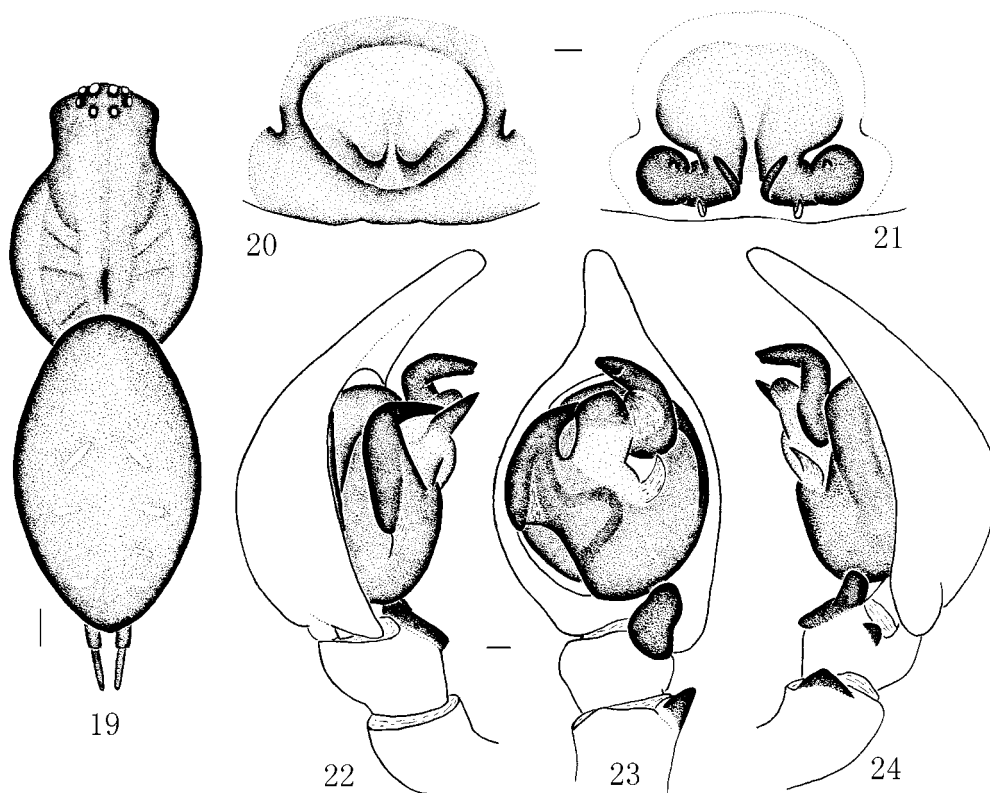
*Agelena injuria* Fox 1936: 122, fig. 2 (male holotype from Yao-Gi, Mupin, Szechwan [=Sichuan], China, 14 July 1929 and a male paratype from Tatsientu, 20 July 1923, USNM Cat. No. 1150, examined).

**Additional material examined: China: Sichuan:** Kangding (2560 m alt., 30°4'N, 101°57'E), 1 male, 7 females, 15 July 2000, M.S. Zhu *et al.* leg. (MHBU).

**Diagnosis:** The species is closely related to *A. cuspidata* sp. nov. (Figs. 13–18), but can be distinguished from the latter by the narrow and blunt lateral tibial apophysis, the curved, strong conductor distal apophysis, and the small median apophysis of male palp; the small copulatory openings and the different positions of spermathecal apophyses of the epigynum.

**Redescription of male:** Male palp (Figs. 22–24), with a wide patellar apophysis and two tibial apophyses. Lateral tibial apophysis small, with blunt tip. Tip of embolus cuspidal. Conductor with ventral, distal, median and dorsal apophyses and the distal one long, strong and curved ventrally. Median apophysis membranous, small and acute. For further details, see Fox (1936).

**Description of female:** Total length 13.67: prosoma 5.51 long, 3.98 wide; opisthosoma 9.28 long, 6.63 wide. Fovea longitudinal. Cervical groove and radial furrow distinct. Both eye rows strongly procurved, posterior row wider than anterior one. AME 0.30, ALE 0.25, PME 0.20, PLE 0.28. AME–AME 0.10, AME–ALE 0.15, PME–PME 0.30, PME–PLE 0.28. MOA 0.75 long, front width 0.70, back width 0.70. Clypeus height 0.75. Chelicerae with 3 teeth on each margin. Distal segment of posterior spinnerets much longer than basal one. Leg formula: 4123.



**FIGURES 19–24.** *Agelena injuria* Fox, 1936. 19. Male, dorsal view. 20. Female, epigynum, ventral view. 21. Same, vulva, dorsal view. 22. Left palp of the male, prolateral view. 23. Same, ventral view. 24. Same, retrolateral view. Scale bar: 19, 1.0mm; 20–24, 0.2 mm.

Measurements of legs:

	femur	patella+ tibia	metatarsus	tarsus	total
I	4.08	4.90	3.37	1.84	14.19
II	3.98	4.59	3.26	1.63	13.46
III	3.77	3.98	3.16	1.53	12.44
IV	4.49	5.10	4.39	1.84	15.82

Coloration: Prosoma yellow, eyes area yellow brown. Prosoma with two brown longitudinal strips. Chelicerae brown. Lateral condyle orange. Labium and endites yellow

brown. Sternum deep yellow. Legs deep yellow. Dorsum of the opisthosoma brown, with four chevron-like grey markings. Spinnerets yellow.

Epigyne (Figs. 20–21), with a big and slightly oval atrium. Copulatory openings visible. Copulatory ducts saccate, anterior part broad, gradually decreasing backwards. Spermathecal heads close to median line. Spermathecal stalks wide. Spermathecal apophyses present. Fertilization ducts situated behind spermathecal base.

**Distribution:** China (Sichuan).

***Agelena limbata* Thorell, 1897 (Figs. 25–30)**

*Agelena limbata* Thorell 1897: 255 (female syntype, from Mont(e) Carin Cheba, Burma, ZMUC 00008622, examined; female and juvenile syntype, from Carin Cheba, Burma, in NHRS, examined; Unknown number of female and male syntypes, in Museo civico di Storia Naturale, Genova, Italy, not examined); non Bösenberg & Strand (1906).

*Agelena sublimbata* Wang 1991: 410, figs. 21–23 (female holotype, male allotype, six female and one male paratypes from Mt. Xishan, Kunming, Yunnan, China, deposited in Hunan Biological Institute, Changsha, China, not examined); Song *et al.* 1999: 355, figs. 206C, N, 207F. (**New synonymy**)

**Additional material examined: Myanmar: China: Yunnan:** Dali (25°42'N, 100°10'E), Mt. Cangshan, 3 males, 3 females, 30 May 2001, E.B. Yang leg. (MHBUS); Jinhong (22°54'N, 100°48'E), Tropical Botanical Garden, 2 females, 25 June 2001, C. Zhang leg. (MHBUS); Jinhong, 2 females, 23 July 2000, M.S. Zhu *et al.* leg. (MHBUS); Menghai, Daluo (21°40'N, 100°03'E), 2 females, 31 July 2000, leg. M.S. Zhu *et al.* (MHBUS); Mengla (21°29'N, 101°33'E), Mohan, 1 female, 25 July 2001, M.S. Zhu *et al.* leg. (MHBUS); Yangbi (25°27'N, 99°54'E), 1 female, 6 July 1999, Z.Z. Yang leg. (MHBUS); Yangbi, Pingpo (25°35'N, 100°04'E), 1 female, 10 August 2001, Z.Z. Yang leg. (MHBUS); Zhengkang (23°55'N, 99°02'E), Junsai, 1 female, 10 August 2001, G.X. Luo leg. (MHBUS); Yongsheng (26°42'N, 100°44'E), 1 female, 7 August 1999, Z.C. Pi leg. (MHBUS); Kunming, Xishan (25°03'N, 102°36'E), 1 female, 5 March 2003 (matured till May. 7), Z.Z. Yang leg. (MHBUS); Yunxian (24°26'N, 100°07'E), 2 males, 2 females, 21 July 2003, Z.Z. Yang leg. (MHBUS); Weixi (27°09'N, 99°17'E), 1 female, 11 August 2002, B.Y. Mao and J.S. Xu leg. (MHBUS); Hekou (22°31'N, 103°59'E), 1 female, 23 August 1988, Y.C. Jiao and H.Z. Wang leg. (CYNU); Yuxi (24°22'N, 102°32'E), 2 females, 8 July 1983, H.Z. Wang leg. (CYNU); Ruili (24°00'N, 97°50'E), 1 female, 18 May 2004, Z.Z. Yang leg. (MHBUS); Yingjiang (24°41'N, 97°56'E), Gangmen, 1 male, 16 May 2004 (matured till the end of May), Z.S. Zhang and Z.Z. Yang leg. (MHBUS); Gongshan (27°43'N, 98°39'E), 1 male, 1 female, 2 May 2004 (matured till 12 May), Z.S. Zhang and Z.Z. Yang leg. (MHBUS); Gongshan (27°43'N, 98°39'E), 1 female, 3 May 2004, Z.S. Zhang and Z.Z. Yang leg. (MHBUS).

**Diagnosis:** The species is similar to *A. injuria* (Figs. 19–24), but can be recognized by the arched patellar apophysis, the narrow conductor ventral apophysis, the small conductor

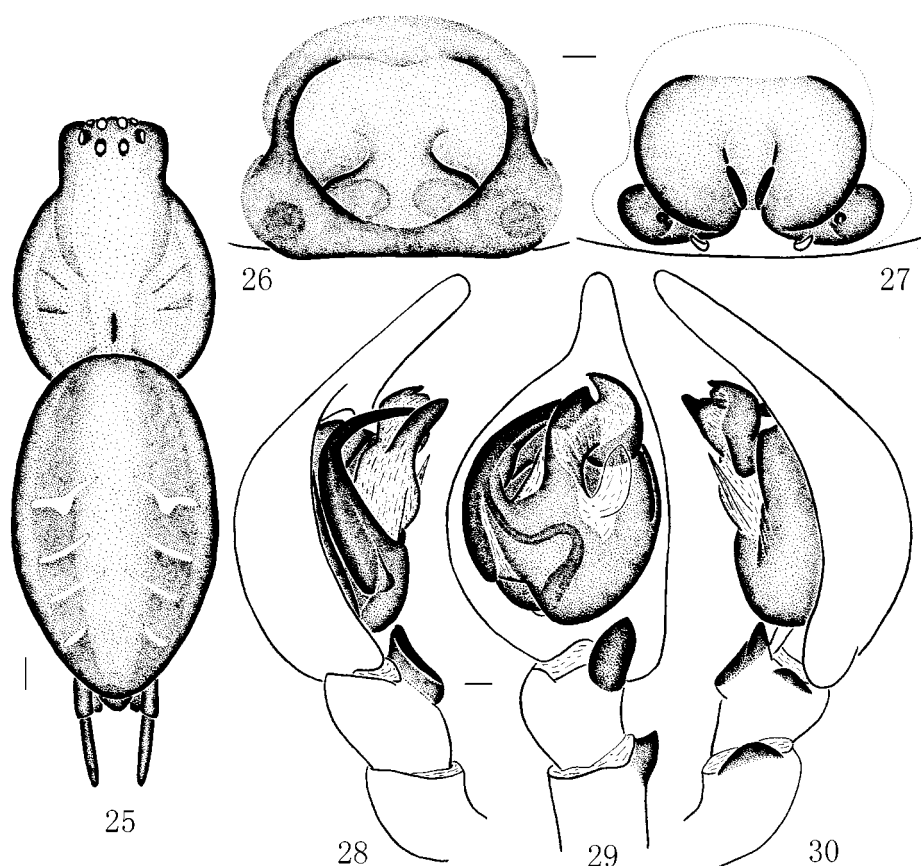
median one, the weakly sclerotized conductor distal one, the big median apophysis of male palp; the large epigynal atrium and copulatory openings and the big spermathecal apophysis of females.

**Redescription:** Male palp (Figs. 28–30), with a wide, arched patellar apophysis and two tibial ones. Tip of embolus acute. Apex of conductor with ventral, median and distal apophyses, all small. Median apophysis big and membranous, with acute tip.

Epigyne (Figs. 26–27), with a big and oval atrium. Copulatory openings visible. Copulatory ducts saccate, anterior portions broad, gradually decreasing posteriorly in width. Spermathecal heads near the middle. Spermathecal stalks wide. Spermathecal apophyses present. Fertilization ducts situated behind spermathecal base.

For further details see Thorell (1897) and Wang (1991).

**Distribution:** China (Yunnan); Myanmar.



**FIGURES 25–30.** *Agelena limbata* Thorell, 1897. **25.** Male, dorsal view. **26.** Female, epigynum, ventral view. **27.** Same, vulva, dorsal view. **28.** Left palp of the male, prolateral view. **29.** Same, ventral view. **30.** Same, retrolateral view. Scale bar: 25, 1.0mm; 26–30, 0.2 mm.

**Remarks:** This species was described by Thorell (1897) without drawings. The figures of it given first by Bösenberg & Strand (1906) were based on a misidentification,

which was followed by other arachnologists since then. After the syntypes of *A. limbata* were examined, we are sure that *A. limbata* should also be revised. Topotypes of *A. sublimbata* were collected and examined; it was actually the same species as *A. limbata*. Thus, the distribution of this species should be reassigned and the name of *A. silvatica* Oligier, 1983, which was designated as a junior synonym of this species by Marusik & Koponen (2000), should be revalidated (see below).

### *Agelena orientalis* C. L. Koch, 1837

*Agelena orientalis* C. L. Koch 1837: 14 (male holotype from Greece: Nauplia, not examined); Brignoli 1976: 563, fig. 43; 1978: 502; Levy 1996: 86, figs. 48.

*Agelena syriaca* C. L. Koch 1843: 110, fig. 827.

*Agelena taurica* Thorell 1875a: 75.

*Agelena gracilens taurica* Thorell 1875b: 81.

**Diagnosis:** The species is similar to *A. labyrinthica* (Figs. 1–6), but can be distinguished from the latter by having the tip of embolus spiraled straightly, the acute tip of conductor median apophysis of male palp and the visible copulatory openings of the epigynum.

**Redescription:** Male palp with a slightly narrow patellar apophysis and two tibial apophyses. Tip of embolus acute. Apex of conductor with three conspicuous apophyses, and the dorsal apophysis extending retrolaterally. Median apophysis membranous.

Epigynum with a large atrium and distinct copulatory openings. Copulatory ducts saccate. Spermathecal heads arising from the inner part of the ball-like bases of spermathecae. Spermathecal stalks indistinct. Spermathecal apophyses present. Fertilization ducts situated behind the bases of spermathecal heads.

For further detail see Levy (1996: 86, figs 4–8).

**Distribution:** Italy to Central Asia, Iran

**Remarks:** The genital structures of this species are here redescribed using new terms proposed in this paper, based on the precise figures of Levy (1996).

### *Agelena silvatica* Oligier, 1983 revalidated (Figs. 31–39)

*Agelena silvatica* Oligier 1983: 628, figs. 7–11 (male holotype, male and female paratypes from Lazovsky Reserve, Far East of Russia, deposition in Leningrad, Russia, not examined).

*Agelena limbata*: Bösenberg & Strand 1906: 296, pl. 8, fig. 104, pl. 16, fig. 461; Strand 1918: 83, pl. 1, fig. 20; Lee 1964: 65, figs. 23g–I; Hu 1984: 205, figs. 215.1–3; Yaginuma 1986: 138, figs. 73.1, 75.1–30; Feng 1990: 140, figs. 115.1–4; Chen & Gao 1990: 115, figs. 144a–b; Chen & Zhang 1991: 186, figs. 183.1–3; Wang 1997: 253, figs 6–10; Song *et al.* 1999: 354, figs 205I, 206H, 207B; Marusik & Koponen 2000: 56. (**Misidentification**)

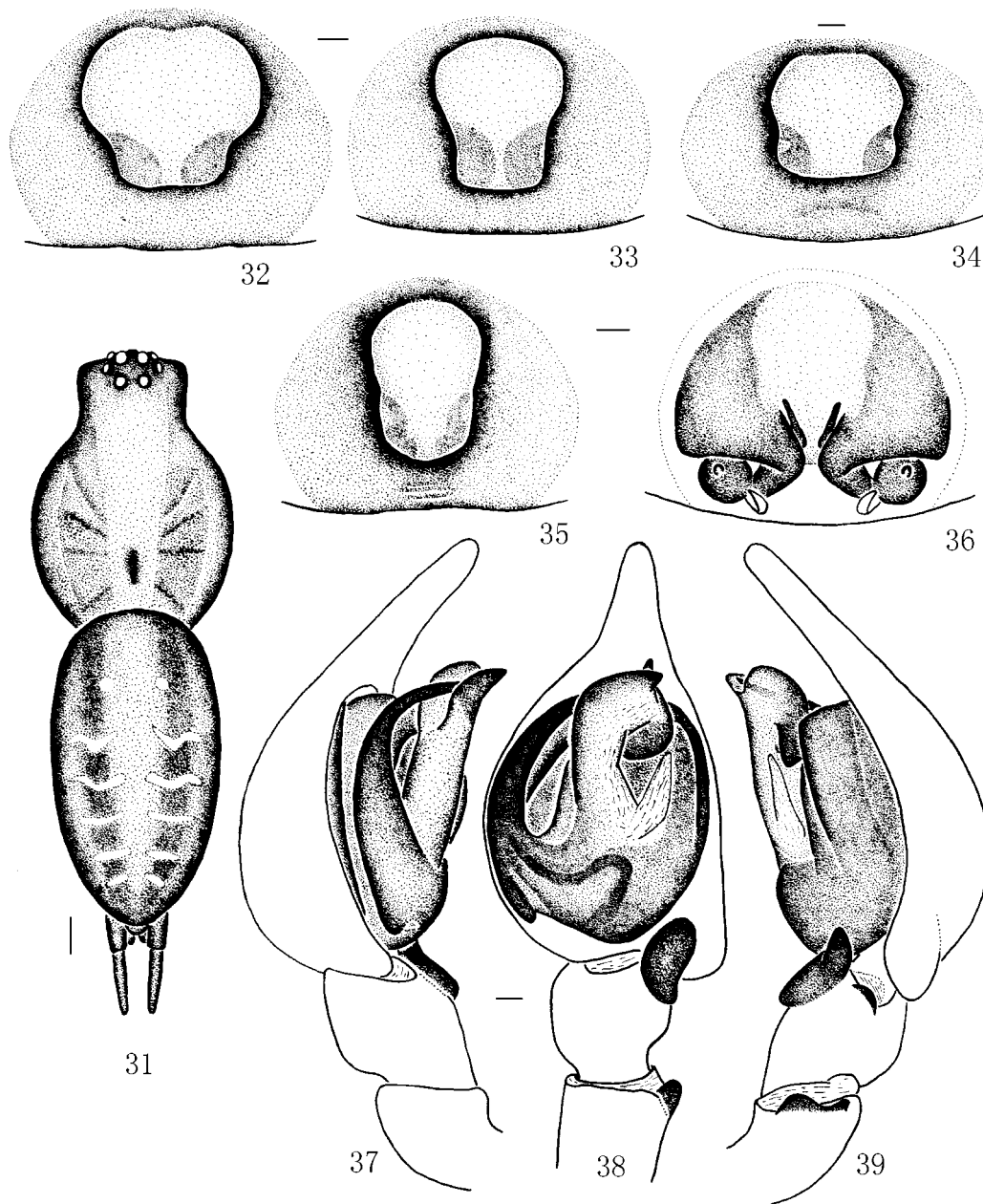
*Agelena aglaosa* Wang & Wang 1991: 41, figs. 6–7 (female).

*Agelena agraulosa*.—Hu 2001: 130, figs. 42.1–2 (male).

*Agelena daoxianensis* Peng, Gong & Kim 1996: 17, figs. 1–3 (female holotype from Daoxian,

**Material examined:** **China:** **Helongjiang:** Yichun (47°42'N, 128°56'E), Nanshan, 7 males, 35 females, 23 July 2003, F. Zhang *et al.* (MHBUS); Suifenhe (44°25'N, 131°11'E), 2 males, 3 females, 15 July 2003, F. Zhang *et al.* leg. (MHBUS); **Jilin:** Jiaohe (43°42'N, 127°21'E), 2 females, 27 July 2003, F. Zhang *et al.* leg. (MHBUS); Mt. Changbai (42°02'N, 128°08'E), 9 males, 19 females, 810 July 2003, F. Zhang *et al.* leg. (MHBUS); **Henan:** Dengfeng, Mt. Shaoshi (34°30'N, 112°56'E), 7 males, 16 females, 17 July 2003, J.Y. Yang leg. (MHBUS); Huixian (35°27'N, 113°47'E), 2 females, 12 July 2002, J.Y. Yang leg. (MHBUS); **Hubei:** Shennongjia, Muyu (31°28'N, 110°22'E), 12 females, 24 September 2001, M.S. Zhu *et al.* leg. (MHBUS); Badong, Chadianzi (30°56'N, 110°19'E), 3 females, 21 August 2003, leg. J.X. Zhang *et al.* leg. (MHBUS); **Hunan:** Fenghuang (27°56'N, 109°36'E), Nanhua Mountain Forest Park, 5 females, 24 July 2001, J.X. Zhang and Z.S. Zhang leg. (MHBUS); Jishou (28°18'N, 109°43'E), 1 female, 23 July 2001, J.X. Zhang and Z.S. Zhang leg. (MHBUS); Shangzi, Badagong Mountain Nature Reserve (29°42'N, 109°54'E), 1 male, 12 August 2001, D.C. Zhang leg. (MHBUS); Daoxian (25°31'N, 111°33'E), 1 male, 26 May 2002, Z.S. Zhang and J.Y. Yang leg. (MHBUS); **Guizhou:** Fanjin Mountain area, 8 males, 33 females, 30 July 2001, J.X. Zhang and Z.S. Zhang leg. (MHBUS); Libo, Maolan Nature Reserve (25°23'N, 108°04'E), 28 female, 10–11 August 2001, J.X. Zhang and Z.S. Zhang leg. (MHBUS); Jiangkou (27°41'N, 108°50'E), 1 female, 5 August 2001, J.X. Zhang and Z.S. Zhang leg. (MHBUS); Tongren (27°43'N, 109°12'E), 3 males, 10 females, 25 July 2001, J.X. Zhang and Z.S. Zhang leg. (MHBUS); Meitan, Longquan Mountain Forest Park (27°52'N, 107°35'E), 4 males, 11 females, 3 August 2003, J.X. Zhang *et al.* leg. (MHBUS); Meitan, Yongxin (27°52'N, 107°35'E), 10 females, 24 August 2003, J.X. Zhang *et al.* leg. (MHBUS); Meitan (27°46'N, 107°29'E), Putuo Temple, 2 females, 2 August 2003, J.X. Zhang *et al.* (MHBUS); Songtao, Ganlong (28°19'N, 108°42'E), 1 female, 7 August 2003, J.X. Zhang *et al.* leg. (MHBUS); **Sichuan:** Qingchuan (32°36'N, 105°12'E), Dagou Nature Reserve, 3 females, 13 July 2003, J.X. Zhang *et al.* leg. (MHBUS); Qingchuan, Muyu, 1 female, 14 July 2003, J.X. Zhang *et al.* (MHBUS); Baoxin, Fengtongzhai Nature Reserve (30°42'N, 102°40'E), 1 female, 22 July 2003, J.X. Zhang *et al.* (MHBUS); Baoxin (30°22'N, 108°50'E), 2 males, 8 females, 23 July 2003, J.X. Zhang *et al.* (MHBUS); Hejiang (28°48'N, 105°49'E), 4 females, 2930 July 2003, J.X. Zhang *et al.* leg. (MHBUS); Mt. Emei (29°32'N, 103°19'E), Baoguo Temple, 2 females, 24 July 2003, J.X. Zhang *et al.* leg. (MHBUS); **Chongqing:** Chengko (31°58'N, 108°40'E), 3 females, 13–16 August 2003, J.X. Zhang *et al.* leg. (MHBUS); **Guangxi:** Juwandashan Mountain area, 1 female, 2729 July 2003, X.J. Yang and J.Y. Yang leg. (MHBUS); **Fujian:** Wuyi Mountain (26°54'N, 116°42'E) area, Tongmu, 1 male, 1 female, 19 July 2003, C. Zhang leg. (MHBUS); Shanghang, Gutian (25°13'N, 116°49'E), 1 male, 2 June 2004 (matured till June 14), leg. F. Zhang (MHBUS); **Japan:** Shigi-san Mountain, 2 males, 2 females, 3 August 2003, M. Sekine leg. (MHBUS).

**Diagnosis:** The species is similar to *A. labyrinthica* (Figs. 1–6), but can be distinguished from the latter by the wide and saddle-like patellar apophysis, the acute tip of embolus, the absence of conductor median apophysis of male palp; the relatively small epigynal atrium, interiorly originated spermathecal heads, and the different positions of the spermathecal apophyses in females.



**FIGURES 31–39.** *Agelena silvatica* Oligier, 1983. **31.** Male, dorsal view. **32–35.** Female, epigynum, ventral view. **36.** Same, vulva, dorsal view. **37.** Left palp of the male, prolateral view. **38.** Same, ventral view. **39.** Same, retrolateral view. Scale bar: 31, 1.0mm; 32–39, 0.2 mm.



**Redescription:** Male palp (Figs. 37–39), with a saddle-like patellar apophysis and two tibial apophyses. Tip of embolus acute. Conductor median apophysis absent. Median apophysis membranous.

Epigynum (Figs. 32–36), with a conspicuous atrium. Copulatory openings invisible. Copulatory ducts saccate. Spermathecal heads near the midline. Spermathecal stalks distinct. Spermathecal apophyses small. Fertilization ducts arising posteriorly from the junctions of spermathecal stalks and bases.

For further details see Bösenberg & Strand (1906).

**Distribution:** China (Helongjiang, Jilin, Henan, Hubei, Hunan, Guizhou, Sichuan, Chongqing, Guangxi, Fujian); Russia; Korea; Japan.

**Remarks:** Topotypes of *A. silvatica* were collected and examined by Marusik & Koponen (2000) and they synonymized it with *A. limbata*. Judged by the figures of Oliger (1983), we consider their decision was correct. And, after collecting and examining some topotypes of *A. daoxianensis*, we think that *A. daoxianensis* should be treated as a junior synonym of *A. silvatica*.

The epigynal atria of this species are variable in different specimens. This leads easily to misidentifications.

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