

Eperigone trilobata revealed as a trans-American species

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Introduction

Through Dr William Peck of Warrensburg, Missouri, I received a series of *Eperigone* specimens from Oregon for identification. The specimens had been collected by Dr Norman J. Fashing of Williamsburg, Virginia, in Darlingtonia Wayside, a state park and well-known site of *Darlingtonia californica*, the Cobra Lily, an endangered species of pitcher plant. Darlingtonia Wayside is 8 km north of Florence, Lane Co., Oregon. The specimens were found inside the pitchers and the available material consists of 42 ♀ and 6 ♂, 4 subadult ♂ and 11 juveniles. Some of the females were with egg-cocoons, so apparently these *Eperigone* specimens were not just passing, but live in, and probably also around, these pitcher plants. This is confirmed by Dr Fashing, who states (in litt.) that the spiders were found inside the pitchers on webs built in the dome of the pitcher. The plant lives partly from insects trapped in the pitchers and one may assume that the spiders live from the insects they are able to snare inside the dome. The collector did not observe any spiders outside the pitchers. The egg-cocoons were attached to the inside of the dome. In May and June most pitchers examined had spiders: out of 41 pitchers, 39 held spiders and 19 had egg-cocoons, with an average of 1.6 spiders per pitcher. From these numbers it is clear that the *Eperigone* species is a regular inhabitant of the pitchers, at least in Oregon. I would be surprised, though, if the relationship turned out to be obligatory. The pitcher of *Darlingtonia californica* is large, up to 75 cm high but this clearly is a maximum, and it has been found to contain a distinct biocenosis consisting of a chironomid larva, a phorid larva (both Diptera), and several species of mites as well as the *Eperigone* species (Fashing, 1981).

Identification

At first, identification of the specimens presented

a problem. The last revision of *Eperigone* dates back to 1928, when Crosby and Bishop revised all then known species. Many species have since been described, but the West Coast remains under-represented. Within the limits of the scanty descriptions and paucity of illustrations I concluded that none of the West Coast species was identical with the Oregon specimens, but that *E. trilobata* (Emerton) came very close to it. This is the type-species, described from New Haven, Connecticut, and Cambridge, Massachusetts, and later recorded from many of the eastern states and the Midwest. The western-most record comes from Canada (British Columbia: Laggan) by Emerton (according to Crosby & Bishop, 1928).

Besides the new record for Oregon, one from the northwest of Wyoming can also be added now. When checking the identity of *Eperigone socia* Chamberlin I found the ♀ holotype to be distinctly different from my Oregon specimens, but a ♂ specimen, labelled paratype and indeed originating from the same locality (Bridge Bay, Yellowstone Lake) and collected on the same day, appears to belong to *E. trilobata*. Since Chamberlin (1948: 529-530) mentioned only a female holotype and did not describe the male of *E. socia* it cannot be a paratype of *E. socia*, but the specimen provides at least a new record for *E. trilobata*.

	Oregon	Wyoming	Eastern states
Total length ♀	2.15-2.20		1.60-1.85 (1.9)
♂	1.75-2.10	1.6	1.50-1.80 (1.3-1.9)
Length			
cephalothorax ♀	0.95-1.0		0.72-0.86
♂	0.90-1.0	0.85	0.80-0.85
Length femur I ♀	0.80-0.85		0.62-0.69
♂	0.79-0.85	—	0.69-0.76
Ratio length			
ceph th/femur I ♀	1.17-1.25		1.12-1.19
♂	1.12-1.20	—	1.16-1.23
Length cymbium	0.35-0.37	0.31	0.31-0.35
Distance between epigyne lobes	0.025-0.037		0.025-0.037

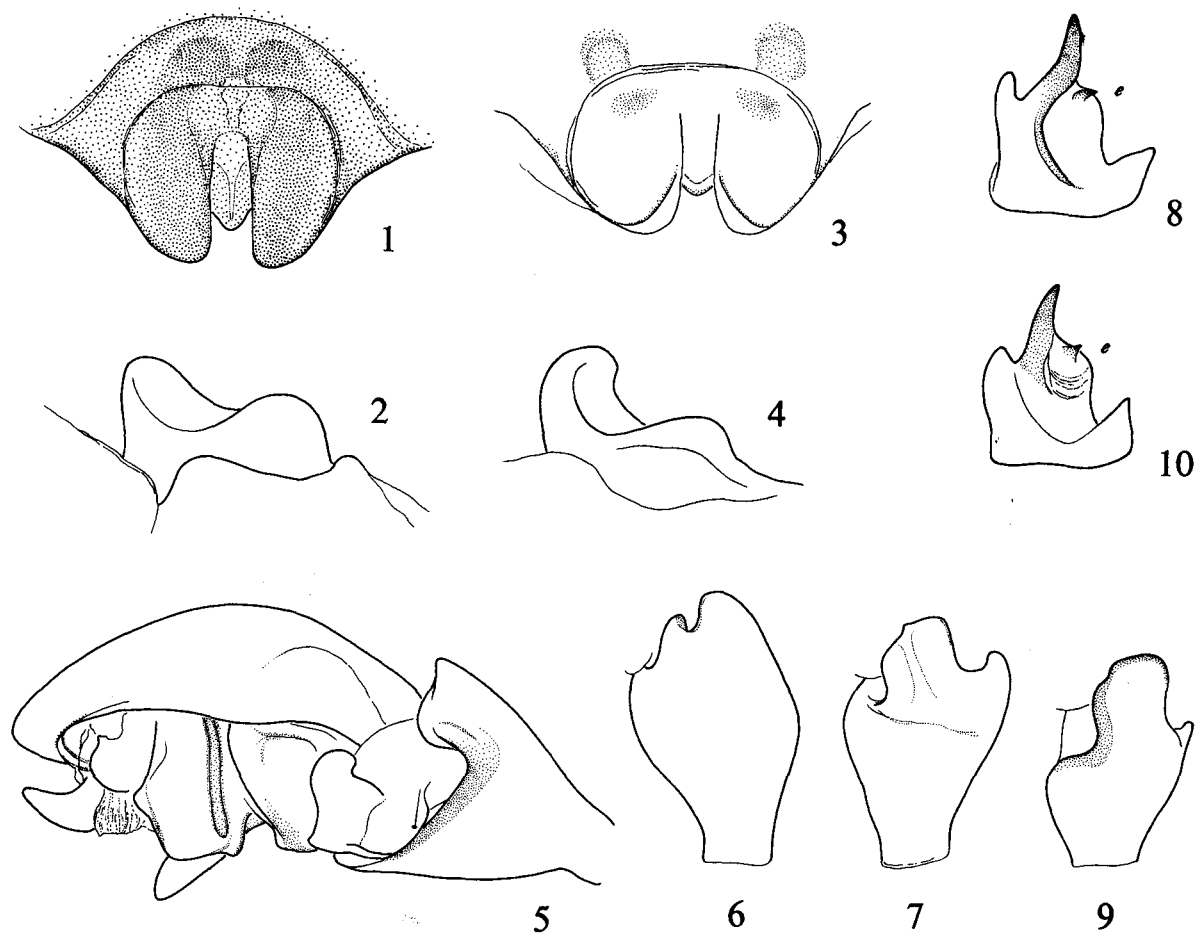
Table 1: Measurements of *Eperigone trilobata* from western and eastern states (in mm).

Measurements

The Oregon specimens show distinct, though slight differences from more eastern material of *E. trilobata* used for comparison, viz., a series of syntypes from New Haven, Connecticut, and specimens from Nantucket, Massachusetts, collected and recorded by Emerton (1930). In Table 1 I have also used data provided by various authors (mentioned in parentheses when outside my range of variation). The single Wyoming specimen is incomplete, but the available data are added in a separate column.

In general the Oregon specimens are larger than those from New England, with the single specimen from near Yellowstone Lake agreeing with eastern specimens. This more or less holds for all meristic data, including the length of the cymbium; there remains not much discrepancy between the Oregon and New England specimens when ratios are calculated, e.g. ratio length cephalothorax/length femur I.

Differences observed are not restricted to measurements only. If we compare the epigynes (Figs. 1-4) there is not so much a difference in size as in shape.



Figs. 1-10: *Eperigone trilobata* (Emerton). 1-2 Oregon female, epigyne, ventral (1) and lateral (2) views; 3-4 Connecticut female, epigyne, ventral (3) and lateral (4) views; 5-8 Oregon male, lateral view of palp (5), palpal tibia, mesal (6) and dorsal (7) views, embolic section in ventral view (8); 9-10 Connecticut male, dorsal view of palpal tibia (9), and ventral view of embolic section (10). 1-4, x 150; 5-10, x 142. (e = embolus).

The lobes are a bit wider in the eastern form than in the Oregon material, and the shape of the lobes in lateral view is conspicuously different in the two forms: in specimens from the east the tips curve strongly upward (ventrad) and perpendicularly, while in the specimens from the west the curvature is more gradual and less pronounced.

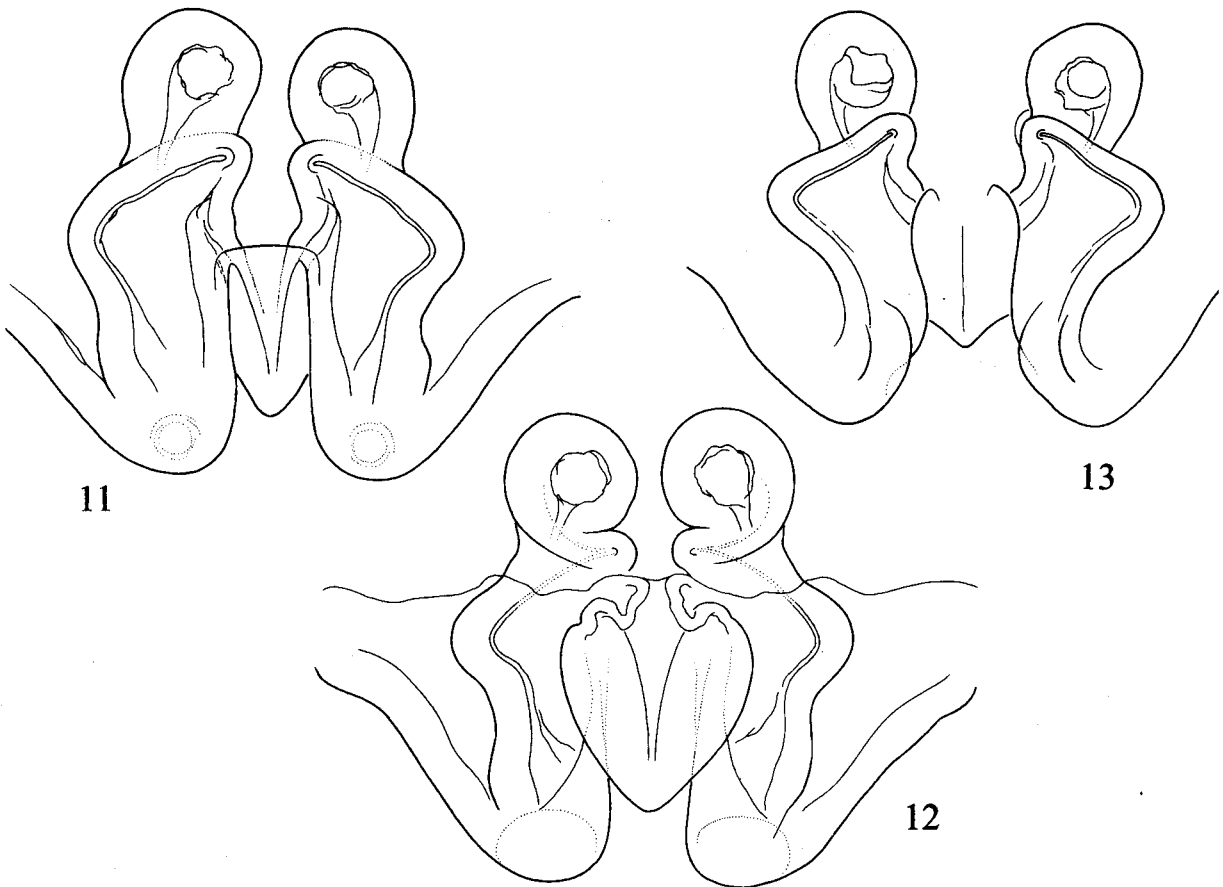
In the male palps (Figs. 5-10) the most striking differences are found in the shape of the tibial apophysis: in eastern specimens the apophysis is about as long as the remainder of the segment (Fig. 9), whereas in the Oregon specimens it is between one-third and half the length (Fig. 7). This apophysis consists of an extended dorsal surface of the palpal tibia, with a lamellate structure perpendicular to it on the inside. Looking at the palp from the outside, it is the

shape of this lamellate portion which gives the tibia its characteristic outline. Another difference can be found in the embolic section, where the various protrusions are slightly differently shaped (Figs. 8, 10). However, the overall pictures of epigynes and palps are the same.

The Wyoming specimen remains difficult to assign with certainty to either form. In size it agrees with the eastern specimens, but in the shape of the palpal organs it might be called intermediate, with a slight preference toward the eastern form.

Discussion

After this analysis I have come to the tentative conclusion that *Eperigone trilobata* occurs across North America from East to West, and shows clear



Figs. 11-13: *Eperigone trilobata* (Emerton). 11-12 Oregon female, vulva, ventral (11) and dorsal (12) views; 13 Connecticut female, vulva, ventral view. 11-13, x 320.

variation between the extremes of this range. The differences between the extremes are much smaller than between eastern *E. trilobata* and other described species. The slightly intermediate specimen from Wyoming suggests gradual change or clinal variation in certain characters rather than clearly separate populations or subspecies. I have examined only a small number of specimens from few and widely separated localities (populations). The conclusions therefore can be tentative only and are meant as a stimulus to collect series of *E. trilobata* and compare these with the above descriptions and illustrations. In order to facilitate comparison I have added illustrations of the vulvae of the eastern and western forms (Figs. 11-13), which have not previously been depicted.

Of the 42 female specimens from the pitchers of *Darlingtonia californica*, 34 had the epigyne covered with a bulbous mass of a dark brown and very hard substance. This mass completely covered the epigyne and could be removed by pushing and scraping only with great difficulty, after which it came off as a complete globular body with the impressions of the epigyneal lobes on the underside. This is probably a secretion, which seals off the entrances of the vulva. A comparable situation was apparently described by Chamberlin & Ivie (1933: 13, figs. 30, 31) for *Eperigone taibo* Chamb. & Ivie from Utah. The effect of this sealing is the prevention of other matings, but this does not necessarily have to be its function. In other families one sometimes finds broken off parts of the male palp, e.g. the embolus or an embolus cap, which block the entrance(s). Examples are also known of post-mating behaviour which prevents further matings. In the majority of spider species, however, the entrances remain free. In my opinion we should not think too quickly and too lightly about attaching a function to sealed epigyneal entrances. We might just as easily consider it a by-product. The exact origin of the substance is unknown.

The preserved material from Oregon contains seven females with their egg-cocoons. The cocoons are broadly bell-shaped with a flat, closed underside and the rim attached to the substrate. The diameter of the broad base lies between 3 and 3.5 mm, the height is about 1.5-2 mm. Counting from the outside revealed 7 (1 cocoon), 9 (1), 10 (1) and 11 (4) eggs

inside. There is no reason to believe that the cocoons are constructed in the pitchers exclusively, but since most pitchers examined held webs with spiders of *Eperigone trilobata* (see introduction) it can hardly be considered exceptional.

Material examined

21 ♀ 3 ♂ (7 egg-cocoons but more observed), U.S.A., Oregon, Lane Co., 8 km N of Florence in Darlingtonia Wayside, in pitchers of *Darlingtonia californica*, 18 May 1980, N. J. Fashing; 21 ♀ 3 ♂, same data but 9 June 1980. 4 ♀ 2 ♂ retained for the Leiden Museum, other material with Dr W. B. Peck, Warrensburg, Missouri.

1 ♂, U.S.A., Wyoming, Bridge Bay, Yellowstone Lake, 20 June 1938 (labelled: paratype of *Eperigone socius* Chamberlin) (AMNH).

3 ♀ 3 ♂, syntypes, U.S.A., Connecticut, New Haven, October 1881, J. H. Emerton (MCZ). 2 ♂, U.S.A., Massachusetts, Nantucket, 27 July 1928, J. H. Emerton (MCZ).

Specimens from Missouri and Kansas (collection W. B. Peck and Museum Leiden).

Acknowledgements

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