

NOTES ON SPECIES OF *EPERIGONE* (ARANEAE: LINYPHIIDAE) FROM CAPE COD, MASSACHUSETTS¹

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ABSTRACT: Six species of *Eperigone*, *E. augustae* Crosby & Bishop, 1933, *E. contorta* (Emerton, 1882), *E. tridentata* (Emerton, 1882), *E. trilobata* (Emerton, 1882), *E. maculata* (Banks, 1892), and *E. tenuipalpis* (Emerton, 1882) [NEW SYNONYMY] occur on Cape Cod. Both sexes of *Eperigone tenuipalpis* are redescribed. Epigynal plugs and abdominal pigment patterns of several species are described. Brief natural history notes are included.

The small spiders of the genus *Eperigone* are troublesome to identify. As is the case with many spiders, immatures of most species are almost impossible to identify with confidence. However, late subadult instars of some species can be recognized by the pattern of chevrons on the abdomen. The females of four species have epigynal plugs, which are characteristic of the species. The chaetotaxy of the epigynal margin is also species specific.

METHODS

Specimens were examined and illustrated with a Bausch & Lomb StereoZoom[®] 7 binocular microscope, equipped with 15X eyepieces. Drawings were made using an ocular grid, transferring the image by eye to gridded paper. Measurements were made with an ocular micrometer, and are accurate to 0.01 mm. For total length, carapace length and carapace width, measurements were made to the nearest 0.05 mm. The cephalic index is determined by dividing carapace length by carapace width. The position of metatarsal trichobothria (TmI, TmII) is measured to the nearest 0.01 mm. The Tm value (%) is determined by dividing the distance from the proximal end of the metatarsus to the trichobothrium by the total length of the metatarsus.

Eperigone tenuipalpis (Emerton, 1911)

This species was originally described as *Tmeticus tenuipalpus* by J. H. Emerton (1911); type locality Plum Island, Ipswich, Massachusetts. Crosby and Bishop (1928) revised the genus *Erigone* in 1928, refiguring and redescribing all species. Using type specimens and other material available,

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they included *tenuipalpis* with reservations, considering it an 'aberrant form'. The morphology of the genitalia of both sexes, however, merits placement of *Erigone tenuipalpis* in *Eperigone* [NEW SYNONYMY] as presently understood (cf. Millidge, 1987). In his recent revision of *Eperigone*, Millidge (1987) did not include *Tmeticus tenuipalpis* Emerton. The type specimens were not examined.

DIAGNOSIS.—Males have a long, slender palpal tibia with distinctive apophyses, and a large, darkly sclerotized supratégulum (Fig. 3); female epigynum divided longitudinally and with widely spaced lateral arms extending only a short distance beyond the square-ended dorsal plate (Fig. 8).

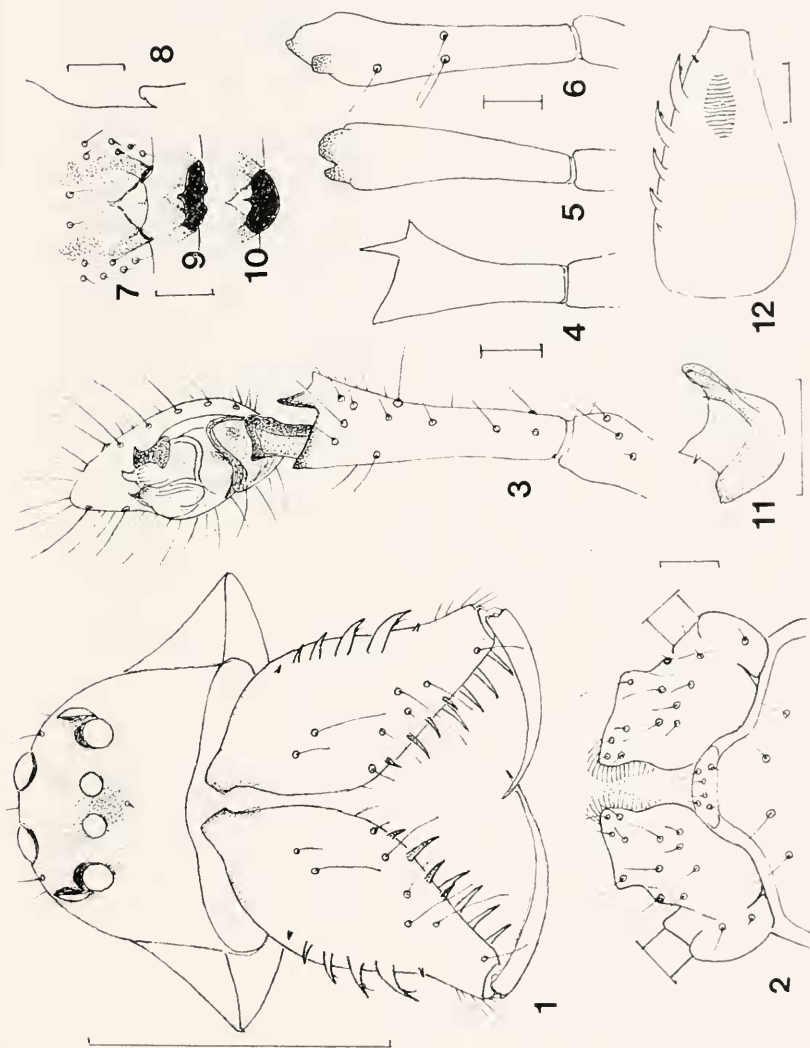
DESCRIPTION.—**Male.** Averages and range in mm. Total length 2.41 (2.21-2.70), carapace length 1.16 (1.10-1.30), cephalic index 1.41 (1.29-1.53), TmI 0.65 (0.60-0.70). Chelicerae with four retromarginal and promarginal teeth. Row of six setigerous denticles along anterio-lateral margin of chelicera, the first five increasing markedly in size distally with the sixth small (Fig. 1). Distinct file near distal end of chelicera in both sexes (Fig. 12). File with oval outline and circa fourteen regularly spaced ridges. Supratégular apophysis obvious, darkly sclerotized, tongue-like; otherwise projections of the embolic division only lightly sclerotized with none distinctively configured (Fig. 11). Dorsal apophysis of palpal tibia triangular distally, with secondary square-cornered apophysis below dorsal apophysis that projects dorsally (Fig. 6). Ventral apophysis bilobate (Fig. 5). Length of palpal tibia variable, averaging 0.41 mm, occasionally as short (0.28 mm) as shown in Fig. 4. Proximal two-thirds of ventral surface of palpal femur with four to five small setigerous denticles; distal half of prolateral surface with five small denticles also tipped with setae.

Pigmentation of both sexes similar. Cephalic area of carapace light orange-brown with eye area darker orange brown. Thin, dusky marginal line. Cervical groove darkened; thoracic radii broad and dusky. Sternum brown, suffused with dusky, darker markings toward periphery. Legs yellow-brown; proximal segments, especially femora, slightly darker. Abdomen dark gray with a contrasting pattern of six to seven chevrons that are fairly regular in outline (Figs. 25-27). Venter lighter gray, evenly colored, with narrow whitish line laterad. A darker ring around spinnerets, reduced ventrally.

Female. Averages and range in mm. Total length 2.60 (2.02-3.30), carapace length 1.22 (0.95-1.50), cephalic index 1.41 (1.22-1.63), TmI 0.67 (0.60-0.71). Chelicera with five teeth in each row; proximal tooth in retromarginal row minute. Denticles and spur of male chelicera replaced by setae. File as described for male (Fig. 12).

Epigynum moderately protuberant (Figs. 7-8, 22), with widely spaced lateral arms; genital openings barely extend beyond dorsal plate. Marginal setae of epigynum somewhat variable in length and position, with two longer setae in central area. Spermatheca usually visible through darkly pigmented cuticle. Epigynal plugs dark reddish in color, extending between but not into genital openings; more or less flat, irregularly oval in shape and usually with small pointed projection on anterior margin (Figs. 9-10, 23-24).

Immatures.—Carapace, sternum and appendages light olive-brown and with markings essentially like adults. Abdomen also patterned as adults. TmI, subadult males 0.64 (0.56 to 0.69), subadult females 0.63 (0.55 to 0.69). TmII, subadult males 0.60 (0.53 to 0.64), subadult females 0.59 (0.54 to 0.63). The chevrons of immatures are much like those of adults, but usually more distinct. The relatively high values for both TmI and TmII assist in the identification of older immatures.



Figures 1-12. *Eperigone tenuipalpis* 1. Male chelicerae, anterior. 2. Male chelicerae, ventral. 3. Left palp, ventral. 4. Left palp, ectal. 5. Left palp, ventral. 6. Left palp, dorsal (trichobothria shown). 7. Epigynum, ventral. 8. Epigynum, profile. 9-10. Epigynal plugs. 11. Embolic disk, right palp, ectal. 12. Cheliceral file, ectal. Unlabeled scale lines 0.1 mm.

SPECIMENS EXAMINED: Five males, 8 females and 39 subadults from West Falmouth, Barnstable County, Massachusetts, collected by the author in wrack (*Zostera detritus*) from a tidal marsh, 4 Feb. 1991; 7 males, 8 females and 35 subadults from same locality and habitat, 22 Nov. 1990; 7 females and 51 subadults from same locality and habitat, 14 Nov. 1990; 9 subadults from same locality and habitat, 30 October, 1990; and 1 female, same locality and habitat, 23 July, 1987. Specimens of both sexes and representative individuals of late subadult instars have been deposited in American Museum of Natural History (New York), Natural History Museum (London), United States National Museum (Washington, D.C.), and Canadian National Collection (Ottawa).

NATURAL HISTORY.—The area from which the samples were taken has been collected at regular and frequent intervals for several years. It is a broad Cape Cod tidal marsh bounded on the west by Buzzards Bay, dominated by salt marsh grasses and sedges (*Distichlis* and *Juncus*) and with patches of *Spartina alterniflora* along ditches. Scattered mats of wrack, the remains of eel grass (*Zostera marina* L.), occur near the level of higher tides, often supported above the surface on marsh grasses. Recent collections (fall 1990 and winter 1991) followed periods of unusually high tides and several episodes of onshore winds. These conditions often result in the production of extensive wrack mats. It is suggested here that the aggregations found were primarily the result of strong onshore winds and tidal action, the spiders being carried from an as yet to be identified specific microhabitat in the marsh. These aggregations dissipated after several days of calm weather. This species generally was difficult to find during the warmer months of the year.

The *E. tenuipalpis* population was numbered between from 30 to 75 adult and subadult individuals/m² of wrack. Associated with *tenuipalpis*, in the samples listed above and in comparable numbers, were *Grammonota trivittata* Banks and *Erigone aletris* Crosby & Bishop. The population of *G. trivittata* was also maturing during this same period, adults and immatures being represented in roughly equal numbers. *G. trivittata* is usually found on the muddy surface of the marsh or on loose webbing at the base of grass clumps. Equally abundant in these and other collections, *E. aletris* occurs as adults year-round in wrack mats and other types of tidal debris. However, the most common associates, at about twice the number of *E. tenuipalpis*, were adult female *Scolopembolus littoralis* (Emerton). Less abundant was *Satilatlas marxii* Keyserling. This last species is more often found in grass and sedge litter immediately at or above high tide level. *Pardosa littoralis* Banks and *Gnaphosa parvula* Banks commonly occur in and on wrack and other tidal detrital deposits.

Eperigone augustae Crosby and Bishop, 1933

Two essentially colorless adult males of *E. augustae* were collected in June in pitfall traps in pine woods. The specimens measured 0.90 and 0.95

mm in total length. These two specimens were the only ones collected in several hundred pitfall and litter collections made in the same area throughout the year.

Eperigone contorta (Emerton, 1982)

This species occurs in fresh and slightly brackish water marshes with grasses and sedges. While never found in great abundance, it may be collected with some effort in these preferred habitats. Adults have been collected most frequently in the colder months. It is found in association with other more abundant erigonines, such as *Ceratinopsis laticeps* Emerton, *Grammonota maculata* Banks, and *Scolopembolus littoralis*.

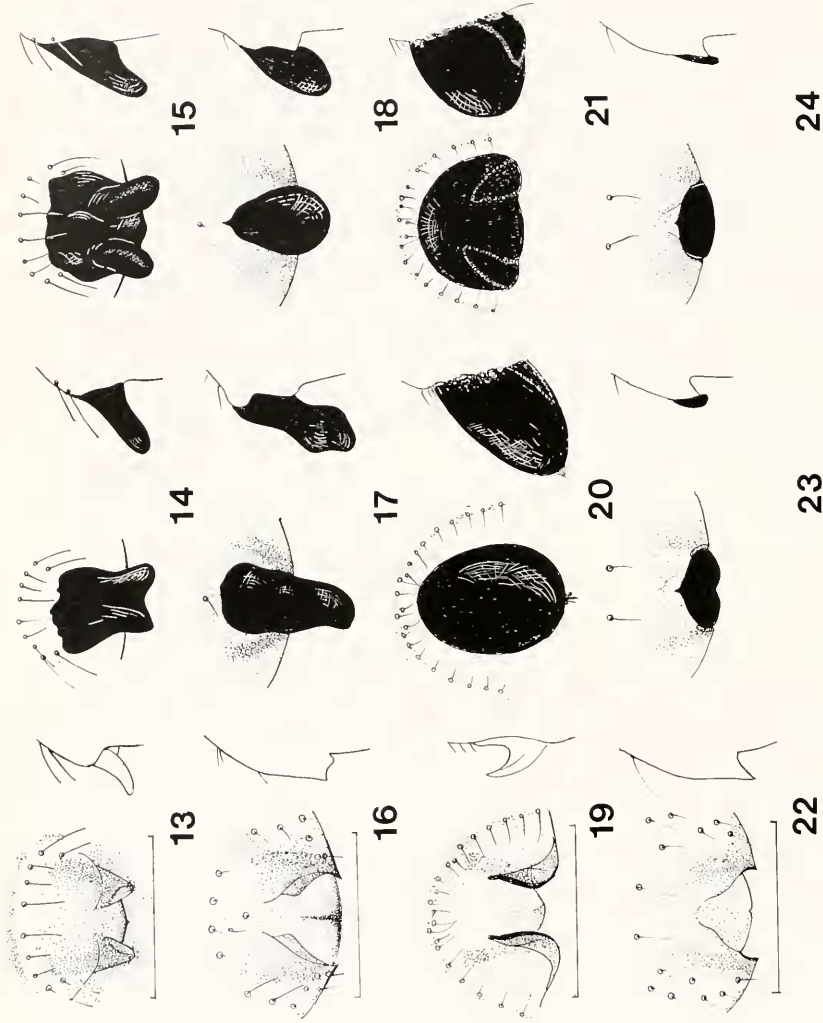
The epigynal plug of *E. contorta* (Figs. 14-15) is unusually structured, reflecting the general configuration of the epigynum (Fig. 13). It completely covers the ventral surface of the epigynum and extends around and well beyond the ends of the extended lateral arms. Dark orange-brown in color and quite hard, it cannot be removed by physical means without damaging the epigynum (cf. Millidge, 1987). It does not block the oviduct. The marginal setae of the epigynum are of moderate length, with the pair of setae at the midline slightly longer.

There is no pattern of chevrons on the abdomen. Immatures of this unpatterned species cannot be identified with confidence.

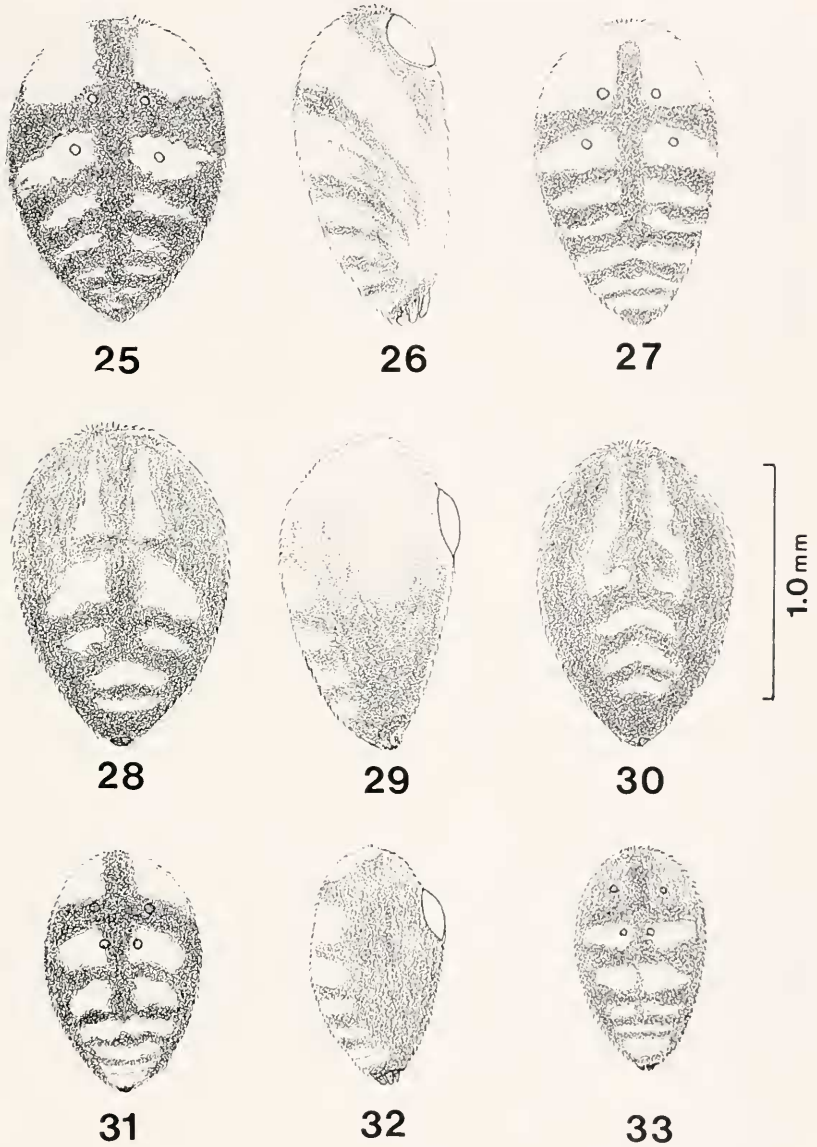
Eperigone maculata (Banks, 1892)

This is the most common *Eperigone*. Adults have been collected throughout the year in virtually all habitats. Unlike the other local species, *E. maculata* is found in greatest abundance in both deciduous and coniferous litter. Abundance averaged 31 to 34 individuals/m² of litter in the warmer months and 7/m² in colder months. This species is associated with other common forest litter inhabitants, such as *Lathys pallidus* (Marx), *Hahnia cinerea* Emerton, *Trabeops aurantiaca* (Emerton), *Phrurotimpus alarius* (Hentz), *Pocadicnemis americanus* Millidge, *Maso sundevalli* (Westring), and *Walckenaeria directa* (O. P.-Cambridge).

Both immatures and adults of *E. maculata* are readily distinguished from their associates by the abdominal pigment pattern (Figs. 31-33). Usually there are six chevrons, with the first varying from obvious to essentially lacking. The sixth chevron appears to be made up of a joining of the sixth and seventh, resulting in a distinct white spot. Over one hundred adult females taken in all seasons have been examined with no evidence of an epigynal plug.



Figures 13-24. Epigyna and two examples of epigynal plugs, ventral and profile views. 13-15, *Eperigone contorta*. 16-18, *E. tridentata*. 19-21, *E. tenuipalpis*. 22-24, *E. tenuipalpis*. Scale lines 0.1 mm.



Figs. 25-33. Abdominal pigment patterns. 25-27, *Eperigone tenuipalpis*. 25. Dorsal, typical. 26. Lateral. 27. Dorsal, variant. 28-30, *E. tridentata*. 28. Dorsal, typical. 29. Lateral. 30. Dorsal, variant. 31-33, *E. maculata*. 31. Dorsal, typical. 32. Lateral. 33. Dorsal, variant. Scale lines 1.0 mm.

Eperigone tridentata (Emerton, 1882)

E. tridentata is a moderately large species, averaging over 2 mm in total length. Usually it is found in moist leaf litter around the edges of lakes and ponds, and occasionally in great abundance, up to 25 individuals/m² of leaf litter. Adults may be found throughout the year but are most often taken in the colder months. Large numbers of *E. tridentata* mature in October and November, with males leading the females by several weeks. This species has a relatively dark, diffusely patterned abdomen (Figs. 28-30). There are usually only five chevrons, with the first being reduced to a narrow, longitudinal stripe. Females tend to be much darker than males and have less clearly defined chevrons. Immatures are patterned much as the adults, although with the chevrons clearer.

The chaetotaxy of the epigynal margin is illustrated in Fig. 16. The centrally located seta on the ventral plate is distinctive. The epigynal plug is a dark brown, rounded plug that covers the genital opening and a portion of the ventral plate (Figs. 17-18). Occasional specimens are found with the plug distorted (Fig. 17), suggesting that its formation had been interrupted. Fresh plugs are white and sticky. The plug is similar to, but is not as large as that of *E. trilobata*.

Eperigone trilobata (Emerton, 1882)

Another of the smaller species, *E. trilobata* is without chevrons on the abdomen, much like *E. contorta*. It is uncommon, and there is no specific habitat where one can go with any realistic expectation of collecting specimens. A few specimens have been taken in wetter environments, but also in dry grass fields. Most of my specimens have been taken in lawns, in pitfall traps, and among the broad basal leaves of plantain and dandelion, places where *Grammonota inornata* Emerton, *Grammonota gentilis* Banks, and *Erigone autumnalis* Emerton are consistently taken in greater numbers.

Adult *E. trilobata* have been taken throughout the year. Females with epigynal plugs have been taken in June and July. The plug is relatively large, dark brown, elongate-ovoid, usually with the lateral arms of the epigynum detectable just under the surface (Figs. 20-21). The outer margin of the epigynum is marked by a row of smaller setae (Fig. 19). There are no chevrons on the abdomen and immatures cannot be reliably determined.

REMARKS

Many of the 68 *Eperigone* species have been described from only one sex, female or male, and often from only a few specimens (cf. Millidge,

1978). Very little is known about the life history of most species, in part because they can be difficult to identify. About half of the species have cheliceral denticles or spurs or both. Also about half have chevrons on the abdomen. Some of the species have chevrons that are similar to those of species of other genera with which they are found, particularly species of *Grammonota* and *Bathyphantes*. Other attributes such as the presence or absence of cheliceral denticles and spurs, the chaetotaxy of the epigynal margin and the form of the epigynal plugs, can be helpful when dealing with the genus, especially in a regional context. Body dimensions and proportions were of limited assistance in separating the species of *Eperigone* dealt with here (Edwards, unpubl.); with the exception, however, of the relative position of the metatarsal trichobothrium of both subadult and adult *E. tenuipalpis*,

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(Continued from page 239)

development, molecular identification, satellite imagery and low technology control. Surprisingly, Dr. Johnson states that important aspects of the basic biology of the vectors and parasites are still mostly unknown, including where sand flies lay their eggs and what the reservoir hosts are. The vectors themselves have specific resting areas in the day; for example, the sand fly vector of visceral leishmaniasis rests in eroded termite hills and that for cutaneous leishmaniasis in rock quarries or caves.

There were several notes of entomological interest. Dr. R. T. Allen mentioned that he has found an undescribed species of symphylan from Delaware, and a new record of a dipluran from Delaware known previously from the Mediterranean. The recent heavy snow-fall prompted discussion of insects on snow, such as the *Chionea* crane fly or collembolan species, and of insects such as the box elderbug overwintering inside houses. There were 20 members and visitors in attendance.

Jon K. Gelhaus,
Corresponding Secretary