Zoogeography

Ten fossil species of Pipunculidae are known, 2 from Dominican amber (Oligo-Miocene: 20–25 ma), 7 from Baltic amber (Oligocene: 25–40 ma), and 1 from Florissant shale (Miocene: 11–25 ma) (Evenhuis 1994, Grimaldi et al. 1994; De Meyer 1995). The fossil species are *Cephalosphaera baltica* Carpenter & Hull, *Metanephrocerus collini* (Carpenter & Hull), *Nephrocerus oligocenicus* Carpenter & Hull, *Protonephrocerus florissantius* Carpenter & Hull, *Protoverrallia succinia* (Meunier), *Verrallia andreei* Aczél, *Verrallia exstincta* Meunier, *Verrallia kerteszia* Meunier and two undescribed species of *Eudorylas*. *Protonephrocerus florissantius* was discovered in Florissant shale (Colorado), suggesting that this currently Neotropical genus once had a much more widespread distribution. Species were described by Carpenter and Hull (1939) as extremely modern, differing from existing species only at the specific level.

The generic conservatism exhibited by these fossils indicates that the family has an ancient origin, likely considerably pre-Oligocene. A possible pipunculid recorded from 70,000,000-yr-old Canadian Lower Cretaceous amber (McAlpine and Martin 1969) supports this notion. Such an ancient origin for the Pipunculidae is not surprising, given that Hennig (1981) believed the Cyclorrhapha could not have arisen later than the Jurassic (140 million years ago).

Two monophyletic groups, the *P. nodus* clade and the lineage including *P. papulus, P. abnormis*, and *P. xanthopodus*, appear to have their origins in the western montane region of North America. The ancestor of each clade likely occurred throughout the mountains of California and Arizona. A vicariance event apparently separated the California and Arizona populations, leading to the separation of *P. papulus* from the *P. abnormis–xanthopodus* lineage.

The ranges of *P. abnormis* and *P. xanthopodus* are almost entirely sympatric, but this may be secondary. Although allopatric speciation is likely the