

# Diversity of nematodes in the family Tripylidae de Man, 1876 in Shanxi Province, North China

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The family Tripylidae de Man, 1876 is a predominantly aquatic group of nematodes, with species found on land, continental water and occasionally in sea. Traditionally the family includes five genera: *Tripyla* Bastian, 1865 (= *Promononchus* Micoletzky, 1923, *Paratripyla* Brzeski, 1963), *Tripylella* Brzeski & Winiszewska-Ślipińska, 1993, *Tripylina* Brzeski, 1963, *Trischistoma* Cobb, 1913 and *Tobrilia* Andrassy, 1967 (Andrassy 2007). To date, there are 34 valid species in *Tripyla*, 11 species in *Tripylella*, 22 species in *Tripylina*, 17 species in *Trischistoma* and two species in *Tobrilia*.

Since March 2011, a total of 930 soil and litter mixture samples from native forests, agricultural land, fruit orchards and grassland have been collected and examined from 20 locations in Shanxi province, China. The nematodes were obtained from the samples using the Whitehead and Hemming (1965) tray method. For morphological study, nematodes were killed and fixed using hot, 3% formaldehyde, and left to harden for at least two weeks. All nematodes were processed to glycerol, and mounted on glass slides, as described by Southey (1986) and modified by Davies and Giblin-Davis (2004). DNA extraction, PCR, sequencing and phylogenetic analysis were conducted as described in Zhao & Buckley (2009).

Based on morphological and molecular studies, six species in three genera were found from Shanxi Province: *Tripyla aquatica* Brzeski & Winiszewska-Ślipińska, 1993, *T. setifera* Bütschli, 1873, *Tripylina puxianensis* Xu et al., 2013, *Tr. zhejiangensis* Pham et al., 2013, *Trischistoma taiguensis* Xu et al., 2015 and *Tri. pellucidum* Cobb, 1913 (Figs 1-6). Among these, *Tripylina zhejiangensis* was the predominant species of Tripylidae. The natural habitat includes fruit trees, herbs and garden plants.

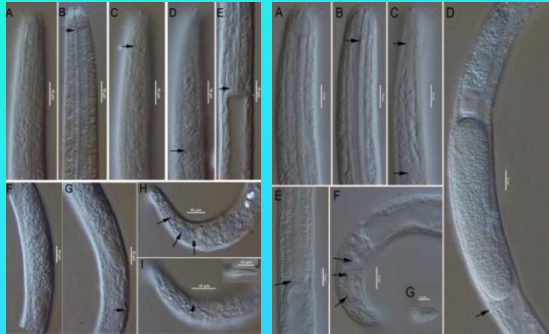


Fig. 3. *Trischistoma taiguensis* photomicrographs, female. A: Outer labial and cephalic setae; B: Dorsal teeth (arrow); C: Amphid (arrow); D: Nerve ring (arrow); E: Pharynx and intestine junction; F: Genital region; G: Vulva (arrow); H: Tail, Caudal glands (arrow); I: Caudal seta (arrow); J: Spinneret.

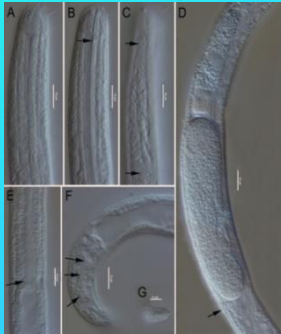


Fig. 4. *Trischistoma pellucidum* photomicrographs, female. A: Anterior region, inner papillae; B: Dorsal tooth (arrow); C: Amphid and nerve ring (arrows); D: Vulva (arrow); E: Pharynx and intestine junction (arrow); F: Caudal glands (arrows); G: Spinneret.

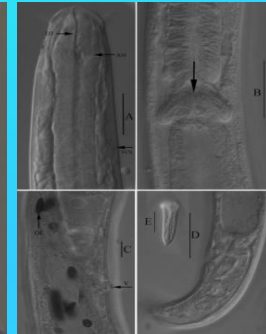


Fig. 5. *Tripylina puxianensis* photomicrographs, female. A: Dorsal tooth, amphid, ventromedian cervical seta (arrows); B: Cardial region (arrow); C: Vulva, debris in intestine (arrows); D: Tail; E: Spinneret.



Fig. 6. *Tripylina zhejiangensis* photomicrographs, female. A: Amphid (arrow); B: Dorsal tooth (arrow); C: Ventromedian cervical seta (arrows); D: Dorsal tooth (arrow); E: Cardial region (arrow); F: Vulva; G: Tail, caudal glands (arrows).

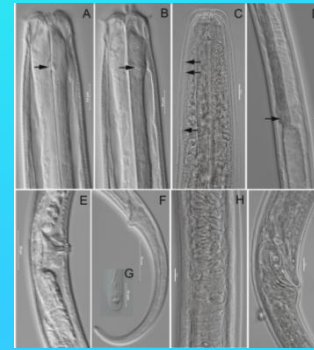


Fig. 1. *Tripyla aquatica* photomicrographs. Female (A, B, D-G). A: Dorsal tooth (arrow); B: Amphid (arrow); D: Cardia region (arrow); E: Vulval region; F: Tail; G: Spinneret. Male (C, H, I). C: Supplements (arrows); H: Spermatozoa in seminal vesicle; I: Spicule.

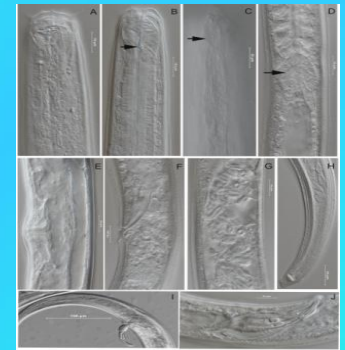


Fig. 2. *Tripyla setifera* photomicrographs. Female (A-F, H). A: Anterior region; B: Dorsal tooth (arrow); C: Amphid (arrow); D: Cardia region (arrow); E: Genital region, vulva; F: Anus; H: Tail. Male (G, I, J). G: Testis; I, J: Spicule.



Fig. 7. Bayesian tree inferred from SSU sequences under the GTR+I+G model (Posterior probability greater than or equal to 50% are given on appropriate clades; newly obtained sequences are in bold letters; the same as below).

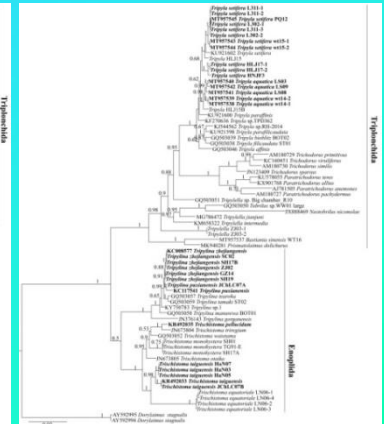


Fig. 8. Bayesian tree inferred from LSU D2-D3 sequences under the GTR+I+G model.

Our molecular phylogenetic results further indicated that the genera *Tripylina* and *Trischistoma* are sisters to *Trefusia* de Man, 1893 and is more closely related to Enoplida than to Triplonchida (Figs 7-8).