

广东中山水栖寡毛类区系调查

王宗兴 崔永德 梁小民 王洪铸*

(中国科学院水生生物研究所 武汉 430072; 中国科学院研究生院 北京 100049)

摘要: 中山市位于珠江三角洲中南部,区内分布江河、溪流、水库、池塘等多种水体,迄今未见对该地区水栖寡毛类区系的研究报道。通过2005年6月和12月两次调查,记述中山市水栖寡毛类31种,隶属4科16属,包括1个国内新纪录种即扇形管盘虫(*Aulophorus flabelliger*)以及19个广东省新纪录种。区系分析表明,中山有较多的喜温种类。

关键词: 水栖寡毛类;广东中山市;区系;新纪录

中图分类号: Q958 **文献标识码:** A **文章编号:** 0250-3263(2008)01-69-06

Aquatic Oligochaeta from Zhongshan, South China

WANG Zong-Xing CUI Yong-De LIANG Xiao-Min WANG Hong-Zhu*

(Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan 430072;
Graduate School of Chinese Academy of Sciences, Beijing 100049, China)

Abstract: Zhongshan City, located in the delta of Pearl River in Guangdong Province, covers an area of 1 800 km², with various water bodies including rivers, streams, reservoirs and ponds. Previously, the fauna of freshwater Oligochaeta in this area has not been studied. Based on the surveys in 16 water bodies conducted in June and December, 2005, a total of 31 species (including 19 species new to Guangdong Province) of aquatic oligochaetes belonging to 16 genera and 4 families are recorded from Zhongshan City. Faunistic analysis has shown that Zhongshan area has more thermophilus species than northern areas of China.

Aulophorus flabelliger of Naididae is recorded from China for the first time, and described as follows.

Aulophorus flabelliger Stephenson, 1931 (Fig. 2)

Material: IHB GD2005006a-b, two whole-mounted specimens; IHB GD2005006c-d, two glycerine-mounted specimens; GD2005006e, one specimen in 10% formalin; all from plant roots in Beitaiyong stream (22°26'29.7" N, 113°22'34.9" E) of Zhongshan in June, 2005. The specimens are deposited in the Institute of Hydrobiology (IHB), Chinese Academy of Sciences, in Wuhan, China.

Description: Five complete preserved specimens about 3 mm long, 0.18 mm wide, 21 - 26 segments. Body is transparent. No eyes. Dorsal chaetae from VI onwards. 1 hair per bundle, 72 - 76 μm long. 1 palmate needle per bundle, 44 - 48 μm long, 2.7 - 2.9 μm thick, with nodulus distal; teeth strongly diverging, maximally 12 μm wide, distal one 12 μm long and proximal 10 μm long, with web and 20 - 25 intermediate teeth. Ventral bifids of - 3 - 5 per bundle, 90 - 102 μm long, 2.4 - 2.5 μm thick, longer and thinner than the rest, with nodulus proximal; distal tooth 5.0 μm long and proximal 2.9 μm long. Those following 3 - 4 per bundle, 44 - 52 μm long, 1.9 μm thick, with

基金项目 广东省中山市物种资源调查项目及国家自然科学基金项目(No. 30470205);

* 通讯作者, E-mail: wanghz@ihb.ac.cn;

第一作者介绍 王宗兴,男,硕士研究生;研究方向:寡毛类分类与生态学;E-mail: wangzongxing@163.com。

收稿日期:2007-06-26,修回日期:2007-11-11

nodulus distal; distal tooth much shorter and thinner than proximal (1.5 μm 2.9 μm in length, 0.7 μm 2.1 μm in base thickness). Branchial fossa with 3 pairs of long, cylindrical gills, and a pair of finger-like parallel palps. Portable tube about 4 mm long, 0.24 mm wide, delicate and transparent.

Remarks: This tropical species was originally described from Kenya^[18], and subsequently reported from Somalia^[14], Australia^[12], India^[15] and southern USA^[13]. Our material conforms to the previous descriptions (*op. cit.*) in most aspects, but needles are different to some extent (Table 2). Under an oil immersion objective, needles of our specimens were found to have numerous intermediate teeth, which have not been mentioned before. The forms of specimens from Somalia and India were reported to have web indentations near distal teeth of needles, and those from Kenya, Australia and USA near proximal teeth. The authors are of the opinion that the difference in needles is a matter of observation, for the numerous teeth are rather difficult to be distinguished from the web; under a 40 \times objective, the needles of Zhongshan worms were similar to the published drawings. In addition, hairs and needles of the present specimens are somewhat shorter than those in the previous descriptions.

Distribution and habitat: Zhongshan of South China (new record), India, East Africa (Kenya, Somalia), Australia, and USA (Louisiana); all tropical and subtropical regions (31°N - 29°S). Decomposing roots of water-plant in ponds and streams.

Key words: Aquatic Oligochaeta; Zhongshan, South China; Fauna; New record

中国水栖寡毛类研究以前主要集中于长江流域,迄今已记载 35 属 75 种^[1-7]。关于珠江水系寡毛类的研究较少,仅记述 16 种^[1,8-11],对中山地区则无报道。

中山市(22°12' ~ 22°48' N, 113°10' ~ 113°38' E)地处珠江三角洲中南部,面积约 1 800 km²,年平均温度 22℃,年降水量达 1 738 mm,区内分布江河、溪流、水库、池塘等多种类型水体。

我们于 2005 年 6 月及 12 月对中山市不同生境的水栖寡毛类进行了 2 次调查,旨在为该市环境保护和资源利用提供基础资料。

1 材料与方法

1.1 调查区概况 调查涵盖 16 个主要代表性水体(图 1)。西江(X1 ~ X8)、横门水道(H1 ~ H5)、洪奇沥、坦洲涌、兰溪河等河流:细沙或淤泥底质,水深 0.5 ~ 11 m,浑浊,凤眼莲茂盛或无水生植物,生境比较单一。北台涌(B1 ~ B3)、逍遥谷等溪流:砂石底质,水深 0.2 ~ 0.7 m,流速大,水质清澈,两岸植物丰富,生境多样。长江水库、逸仙水库等水库:底质为黄色黏土,水深 4 ~ 11 m,静水,清澈,岸边植物丰富。沙溪鱼塘、斗门大桥(附近水塘)、藕塘(杨贺村)等池塘:底质为淤泥,水深 1 ~ 2 m,静水,挺水植物丰富。

1.2 采样方法 采集工具为 1/16 m² 彼得生采泥器和手抄网等。在解剖镜下捡出水生寡毛类标本。现场观察活体标本,然后用 10% 福尔马林固定。封片方法包括甘油临时封片和永久封片两种,前者用以观察刚毛等外部结构,后者便于永久保存。永久封片用明矾胭脂红染色,二甲苯透明,加拿大树胶封片。绘图和测量依据固定标本。

2 种类与分布

共鉴定水栖寡毛类 4 科 16 属 31 种(表 1)。其中仙女虫科 10 属 22 种,占总数的 71%;颤蚓科 4 属 7 种,占 22.6%;带丝蚓科 1 种;线蚓科 1 种,未性熟,只鉴定到科。所获种类中 19 种为广东省新纪录,1 种为中国新纪录。

水栖寡毛类在不同水体分布不均匀,丰富度差异较大。在生境多样的水体如北台涌等,种类远较其他水体丰富,计 22 种,占总种数的 71%;在生境单一水体如西江、沙溪鱼塘等,种类较少,仅有 1 ~ 3 种。在污染较严重的石岐河和神湾,仅见耐污种霍甫水丝蚓。

中山水栖寡毛类有较多的喜温成分,约 40% 为喜温种类,其中森珀头鳃虫和扇形管盘虫是热带种,在我国目前仅见于广东和广

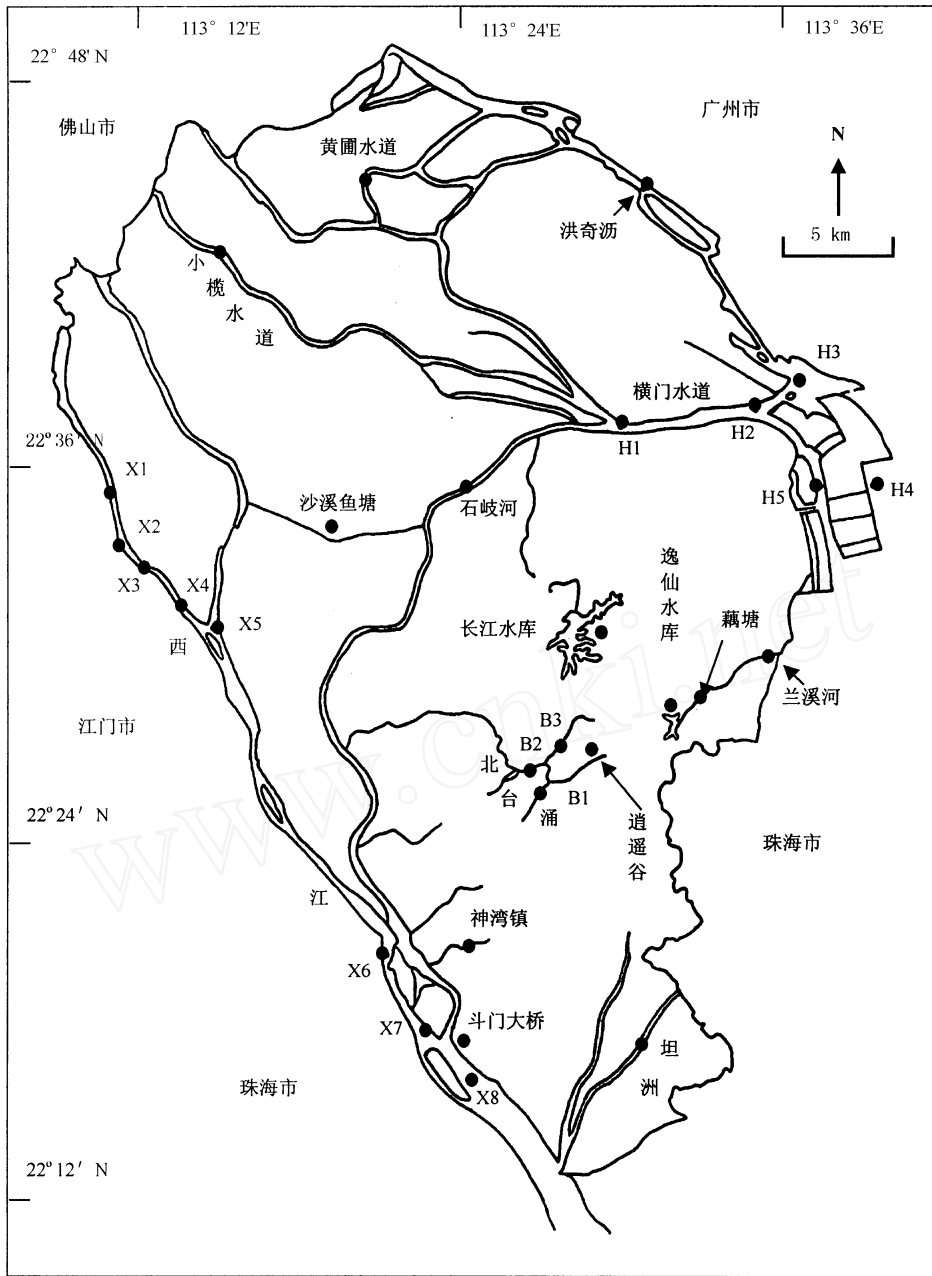


图 1 样点分布

Fig. 1 Sampling sites

西^[11],在国外分布于南亚、东非、澳洲和美国南部等地区^[12-17]。

3 中国新纪录种描述

扇形管盘虫 *Aulophorus flabelliger* Stephenson, 1931 (图 2)

标本: IHB GD2005006a-b, 2 条整体封片标本; IHB GD2005006c-d, 2 条甘油封片标本; GD2005006e, 1 条标本保存于 10% 福尔马林。所有标本均采自中山北台涌溪流(22° 26' 29.7" N, 113° 22' 34.9" E)的水生植物基部。标本保存于中国科学院水生生物研究所。

表 1 中山淡水水栖寡毛类种类与分布

Table 1 Taxa and distributions of a aquatic oligochaetes from Zhongshan, South China

种类 Species	溪流 Streams					河流 Rivers					水库 Reservoirs		池塘 Ponds			
	BT	XY	XJ	H	HQ	X	HP	T	SW	L	SQ	C	Y	O	S	D
	带丝蚓科 Lumbriculidae															
夹杂带丝蚓 <i>Lumbriculus variegatus</i> *		+														
线蚓科 Enchytraeidae																
线蚓科一种 Enchytraeidae	+	+														
仙女虫科 Naididae																
盘缠毛腹虫																
<i>Chaetogaster diastrophus</i> *							+	+								
朗氏毛腹虫 <i>C. langi</i> *							+									
普通仙女虫 <i>Nais communis</i> *	+	+								+						
豹行仙女虫 <i>N. pardalis</i>	+															
简明仙女虫 <i>N. simplex</i> *	+							+								
参差仙女虫 <i>N. variabilis</i> *	+															
多突瓣皮虫 <i>Slavina appendiculata</i>	+								+							
尖头杆吻虫 <i>Stylaria fossularis</i> *		+								+						
森珀头鳃虫 <i>Branchiodrilus semperi</i> *	+															
指鳃尾盘虫 <i>Dero digitata</i>	+						+	+				+				
背尾盘虫 <i>D. dorsalis</i>	+							+								
白雪尾盘虫 <i>D. nivea</i>	+						+					+				
钝缘尾盘虫 <i>D. obtusa</i> *	+						+									
扇形管盘虫 <i>Aulophorus flabelliger</i>	+															
叉形管盘虫 <i>A. furcatus</i>	+	+	+				+				+		+			
有栉异仙女虫 <i>Allonais pectinata</i> *								+								
巴拉圭异仙女虫 <i>A. paraguayensis</i> *		+										+				
瓜辽异仙女虫 <i>A. gvaliorensis</i> *	+	+										+	+			
尖头小吻盲虫 <i>Pristinella acuminata</i>		+					+	+		+				+		
珍琴小吻盲虫 <i>P. jenkinae</i> *	+	+														
长毛吻盲虫 <i>P. longiseta</i> *	+							+								
平叉吻盲虫 <i>P. synclites</i> *	+													+		
颤蚓科 Tubificidae																
霍甫水丝蚓 <i>Limnodrilus hoffmeisteri</i>	+	+	+	+							+	+		+	+	
克拉泊水丝蚓 <i>L. claparedianus</i>															+	
多毛管水蚓 <i>Aulodrilus plurisetus</i> *	+	+	+													
日本管水蚓 <i>A. japonicus</i> *	+															
湖沼管水蚓 <i>A. limnobius</i> *	+															
淡水单孔蚓 <i>Monopylephorus limosus</i> *										+						
苏氏尾鳃蚓 <i>Branchiura sowerbyi</i>	+	+														
种类数 Number of species	22	12	3	1	0	0	7	9	2	4	1	5	2	2	1	0

国内新纪录; * 广东省首次纪录。BT:北台涌; XY:逍遥谷; XJ:西江; H:横门水道; HQ:洪奇沥; X:小榄水道; C:长江水库; Y:逸仙水库; HP:黄圃; T:坦洲; SW:神湾镇; L:兰溪河; SQ:石岐河; O:藕塘; S:沙溪鱼塘; D:斗门大桥。

New record for China; * New record for Guangdong Province. BT:Beitaiyong; XY:Xiaoyaogu; XJ:Xijiang; H:Hengmenshuidao; HQ:Hongqili; X:Xiaolanshuidao; C:Changjiangshuiku; Y:Yixianshuiku; HP:Huangpu; T:Tanzhou; SW:Shenwanzhen; L:Lanxihe; SQ:Shiqihe; O:Outang; S:Shaxiyutang; D:Doumendaqiao.

描述: 5 条完整标本体长约 3 mm(固定), 宽 0.18 mm, 21~26 节。体透明, 无眼。背刚毛始于 1 节; 发状刚毛每束 1 条, 长 72~76 μm ; 针状刚毛每束 1 条, 长 44~48 μm , 宽 2.7~2.9 μm , 毛节远端, 刚毛远端扩张成掌状膜, 两叉间具 20~25 小齿, 掌宽 12 μm , 远叉长 12 μm , 近叉长 10 μm 。腹刚毛每束 3~5 条, ~ 1 节者细长, 长 90~102 μm , 宽 2.4~2.5 μm , 毛节近端, 远叉长于近叉 (5.0 μm 2.9 μm); ~ 2 节后腹刚毛短粗, 长 44~52 μm , 宽 1.9 μm , 毛节远端, 远叉细且短 (长度比为 1.5 μm 2.9 μm , 基部宽度比为 0.7 μm 2.1 μm)。尾鳃盘具 3 对长柱状鳃, 1 对平行尾杆, 长 0.23 mm。具透明负管, 长筒状, 长约 4 mm, 宽 0.24 mm。




讨论: 本种为热带种, 模式产地为肯尼

亚^[18], 此后又陆续发现于索马里^[14]、澳大利亚^[12]、印度^[15] 及美国^[13]。我们的描述与过去的报道基本一致, 但针状刚毛有些差别 (表 2)。油镜观察发现中山标本针状刚毛叉间布满小齿, 其他地区标本仅报道在靠近近叉 (肯尼亚、澳大利亚和美国标本) 或远叉处 (索马里和印度标本) 具缺刻, 没有小齿。我们认为, 这种差异可能是源自观察, 因为小齿甚多, 与膜难以区分; 在 40 倍物镜下, 我们的标本也与已有的描述相似。除此之外, 与其他地区标本相比中山标本背刚毛略短。

分布与生境: 广东中山 (新纪录)、印度、东非 (肯尼亚、索马里)、澳大利亚、美国南部, 均为热带或亚热带地区 (31°N~29°S)。栖息于小溪和水塘的植物根部。

表 2 世界不同地区扇形管盘虫的比较

Table 2 Comparison of *Aulophorus flabelliger* from different regions of the world

地区 Regions		中国 China	索马里、印度 Somalia, India	肯尼亚、澳大利亚、美国 Kenya, Australia, USA
体长 Length (mm)		3	2.2~3.4	2.8
体节 Segments		21~26	22~34	27
腹刚毛 Ventral setae				
~	每束 Per bundle	3~5	4~5	5~7
	长 Length (μm)	90~102	110~120	87~108
~ posterior	每束 Per bundle	3~5	2~4	1~4
	长 Length (μm)	44~52	47~50	42~59
发状刚毛 Hair	长 Length (μm)	72~76	84~102	68~91
针状刚毛 Needle	长 Length (μm)	44~48	56~62	47~82
形态 Shape				
鳃 (对) Gills (pairs)		3	3	2 或 3
资料来源 Author (s)		本文	[14, 15]	[12, 13]

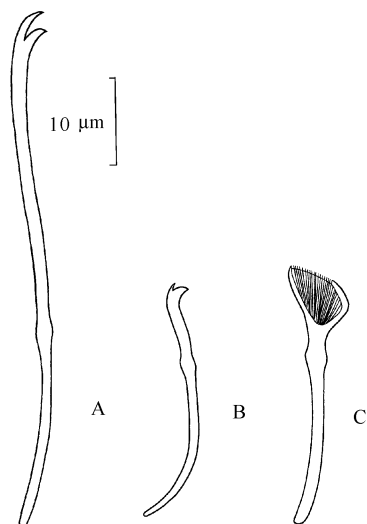


图 2 扇形管盘虫

Fig. 2 *Aulophorus flabelliger* Stephenson, 1931

A. 节腹刚毛; B. 节腹刚毛; C. 节针状刚毛。

A. Ventral chaeta of ; B. Ventral chaeta of ;

C. Needle of .

致谢 中国科学院水生生物研究所冯伟松副研究员、博士生舒凤月及中山市环保局李强工程师在采集工作上给予帮助,谨致谢忱。

参 考 文 献

- [1] Brinkhurst R O, Qi S, Liang YL. The aquatic Oligochaeta from the People's Republic of China. *Canadian Journal of Zoology*, 1990, **68**: 901 ~ 916.
- [2] Wang H Z, Liang YL. A preliminary study of oligochaetes in Poyang Lake, the largest freshwater lake of China, and its vicinity, with description of a new species of *Limnodrilus*. *Hydrobiologia*, 2001, **463**: 29 ~ 38.
- [3] 梁彦龄. 南京仙女虫类之新种及新记录. 水生生物学集刊, 1958, 41 ~ 58.
- [4] 梁彦龄. 中国水栖寡毛类的研究. 花马湖的水栖寡毛类. 海洋与湖沼, 1979, **10**(3): 271 ~ 283.
- [5] Liang YL. Preliminary study of the aquatic Oligochaeta of the Changjiang (Yangtze) River. *Hydrobiologia*, 1987, **15**: 195 ~ 198.
- [6] 梁彦龄, 谢志才. 武陵山地区的水栖寡毛类. 见: 宋大祥编. 西南武陵山地区无脊椎动物. 北京: 科学出版社, 1997, 383 ~ 394.
- [7] 王洪铸. 中国小蚓类研究——附中国南极长城站附近地区两新种. 北京: 高等教育出版社, 2002, 1 ~ 228.
- [8] Ersós C, Qi S. Two aberrant Tubificidae (Oligochaeta) from Pearl River in the People's Republic of China. *Hydrobiologia*, 1985, **127**: 193 ~ 196.
- [9] Qi S, Ersós C. Ecological survey of the aquatic oligochaetes in the Lower Pearl River (People's Republic of China). *Hydrobiologia*, 1985, **128**: 39 ~ 44.
- [10] Qi S. Some ecological aspects of aquatic oligochaetes in the Lower Pearl River (People's Republic of China). *Hydrobiologia*, 1987, **155**: 199 ~ 208.
- [11] 梁彦龄, 王洪铸, 谢志才. 中国水栖寡毛类的研究. 仙女虫科和颤蚓科的新记录和稀有种. 水生生物学报, 1998, **22**(1): 54 ~ 61.
- [12] Brinkhurst R O, Jamieson B G M. The Aquatic Oligochaeta of the World. Edinburgh: Oliver & Boyd, 1971, 1 ~ 860.
- [13] Brennen W M. Occurrence of *Stephensoniana trivandran* in North America, with an additional record for *Dero (Aulophorus) flabelliger* (Oligochaeta: Naididae). *The Southwestern Naturalist*, 1980, **25**(2): 257 ~ 282.
- [14] Ercolini A. Notizie sistematiche Sopra I Naididae Della Somalia (Oligochaeta, Microdrili). *Monitore Zoologico Italian (N. S.)*, 1970, (Suppl.): 273 ~ 308.
- [15] Kalpana K, Naidu K V. *Aulophorus flabelliger* Stephenson, 1931, a rare and interesting freshwater oligochaete new to Asia. *Hydrobiology*, 1979, **67**(3): 273 ~ 274.
- [16] Naidu K V. Studies on the fresh-water Oligochaeta of South India. *Hydrobiologia*, 1965, **26**(3-4): 463 ~ 483.
- [17] Sperber C A. Taxonomical study of the Naididae. *Zoologiska Bidrag Fran Uppsala*, 1948, **28**: 1 ~ 296.
- [18] Stephenson J. Report on the Oligochaeta: Mr. Pmer-Cooper's investigation of the Abyssinian fresh waters (Dr. Hugh Scott's Expedition). *Proceedings of the Zoological Society of London*, 1932, 227 ~ 256.