

异纽类纵沟纽虫科一新属 新种——中华枝吻纽虫*

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提 要

在我国湛江市海滨发现了一种具分枝吻的纽虫, 经研究认为它是异纽目(Heteronemertea)纵沟纽虫科(Lineidae)的一新属和新种, 命名为中华枝吻纽虫(*Dendrorhynchus sinensis*)。这种纽虫的吻由一条较长的主枝和13条互生在主枝两侧的初级分枝构成; 每一初级分枝按不规则二叉式连续分枝, 形成2—4个末端分枝, 整个吻共有52个末端分枝。背神经纤维髓在脑中部分为两枝; 腹神经纤维髓内侧有一对巨型神经索细胞。本文还将这种纽虫与其他4种分枝吻纽虫在形态学上做了系统比较, 并按其分类依据编出检索表。

纽形动物(简称纽虫)分布于全世界各海洋中。其色泽鲜艳, 形状各异。许多种分布于近海或沿岸地区, 但也有极少数种栖息于半咸水、淡水或潮湿的陆地, 还有一部分远洋多针纽虫, 浮游于深海远洋中。

我国对纽形动物的研究尚属空白, 对其形态、分类和分布情况还不了解。1983年冬从广东省湛江市海滨采到一种不常见的纽虫, 吻翻出体外不是直管状而呈树枝状的分枝吻。根据外部形态观察, 头部两侧具水平头裂明显, 无疑属于异纽目(Heteronemertea)纵沟纽虫科(Lineidae), 经切片观察分析认为它与国外过去所发现的3属4种具分枝吻纽虫不同, 应为一新属新种, 定名为中华枝吻纽虫(*Dendrorhynchus sinensis*)“dendro”是希腊语, 意为“树枝”, “rhynchus”是吻的意思。具分枝吻纽虫在我国是首次发现, 故用“中华(sinensis)”做为种名。

标本采自湛江市(21°02'3N, 110°23'0E)霞山海滨公园的海滩上。活体纽虫经8% MgCl₂ 溶液麻醉, 待吻全部伸出后迅速由基部剪下。虫体与吻分别用波氏(Bouin)固定剂固定, 12小时后分别移至70%酒精溶液中保存。54℃石蜡包埋, 切片厚度6—7μm, 用马罗瑞(Mallory)三色染色剂染色。

标本编号为湛江8304, 标本及切片现保存在山东海洋学院水产系无脊椎动物实验室。

* 中国科学院科学基金资助的课题。

湛江水产学院冯玉爱同志采集标本, 青岛医学院韩雪梅、王世明、徐以琳同志协助显微照像, 牛成勋同志制作石蜡切片和染色, 官琦同志协助绘图, 一并致谢。

收稿日期: 1984年6月4日。

描 述

枝吻纽虫属(新属) *Dendrorhynchus* gen. nov.

头部侧面有一对水平头裂(纵沟),无眼点;具有分枝状吻;吻由较长的主枝、互生在主枝两侧的初级分枝、二叉式次级分枝和末端分枝构成,所有分枝在同一平面上。吻主枝有三层肌肉,其中环肌层有一处肌肉交叉;末端分枝有两层肌肉,环肌层没有肌肉交叉。脑的背神经纤维髓分叉,腹神经纤维髓内侧有一对巨型神经索细胞。前肠背面与吻腔腹面之间有内脏肌肉,没有纵肌形成的肌肉板。吻腔壁背面环肌与体壁背面环肌有交织。循环系统主要包括一U形脑血管,侧血管,一条中背血管,并具有一条吻腔中背血管。尾须不存在。

中华枝吻纽虫(新种) *Dendrorhynchus sinensis* sp. nov.

正模标本 1个,编号:湛江 8304。

1. 外部形态

活体的前部(2/5)为浅褐色,中部(2/5)深褐色,体后部(1/5)浅褐色。固定后全身呈灰褐色,中部色较深。正模标本长85mm,宽3—4mm。身体背腹扁平,头部明显,头部腹面中央有一狭长形的口。吻孔在口前端腹面,距顶端很近。头部两侧有明显的水平头裂,口前方腹面中央有一条浅的吻道沟。身体中部两侧没有侧鳍状结构,体后端逐渐变细,但没有肌肉尾须(图1)。

2. 体壁

体壁结构与所有异组类的体壁结构基本一致。组织学观察从外向内看到8层结构(图2: 1—7, 9)其中,外纵肌和环肌十分发达,位于前肠区,其厚度达100—120 μm 。环肌外的周缘神经鞘在背面中央突起,形成中背神经。侧神经索位于外纵肌与环肌层之间。前肠区体壁中的结缔组织层十分发达,厚20—25 μm ,腺皮层与外纵肌层通过这层结缔组织而隔开。在中肠区,背腹体壁之间有发达的背腹肌和肠侧盲囊。吻腔与内纵肌、消化道与内纵肌之间充满间充组织(图3;图版I: 9, 10)。

3. 吻道和吻腔

吻孔在体前端腹面,开口在吻道沟内,距体前端很近。吻孔在体内接一短管——吻道。吻道向后延伸并对称地向背面和腹面扩展,呈菱形(图版I: 1)。吻道在口前端背面与吻腔相连接。吻道壁是由环肌纤维构成的。吻腔几乎与体等长。在脑部附近吻腔的横截面呈倒钟形(图版I: 2, 6)。口后的吻腔呈扁圆形,中肠区的吻腔壁向内收缩,边缘不规则,在体后部吻腔逐

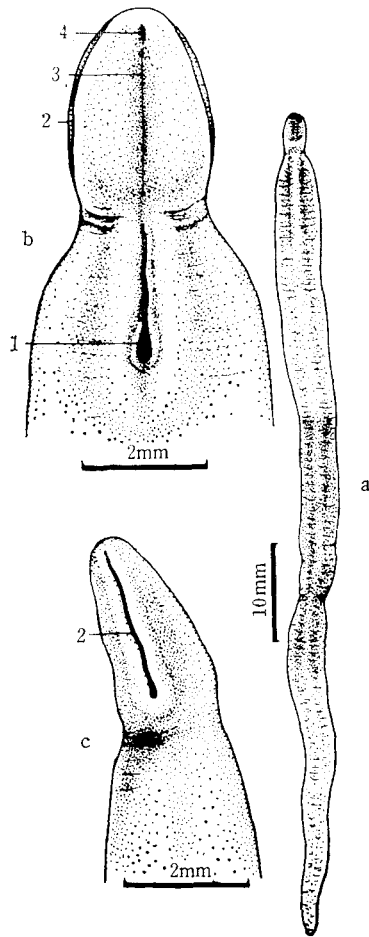


图1 中华枝吻纽虫(a. 整体背面;
b. 头部腹面; c. 头部侧面)
1. 口; 2. 头裂; 3. 吻道沟; 4. 吻孔

渐变细,没有肌肉尾须(图1)。

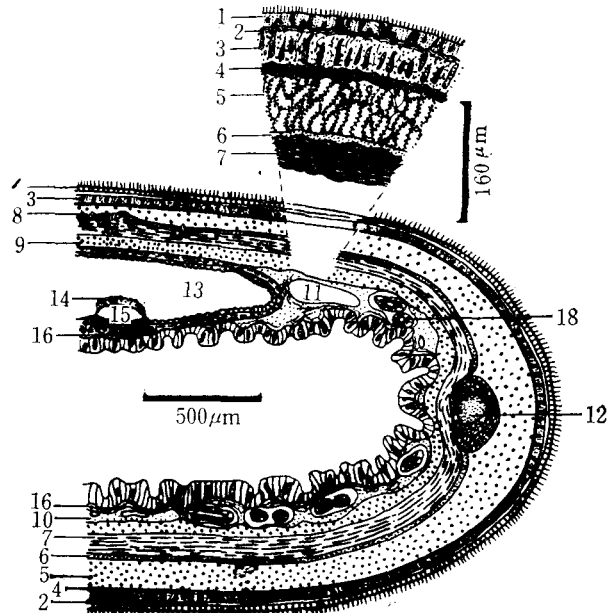


图2 中华枝吻纽虫前肠区横切面

1. 柱状纤毛表皮层; 2. 亚表皮环肌层; 3. 腺皮层; 4. 结缔组织层; 5. 外纵肌层; 6. 周缘神经鞘; 7. 环肌层; 8. 中背神经; 9. 内纵肌层; 10. 间充组织; 11. 侧血管; 12. 侧神经索; 13. 吻腔; 14. 吻腔绒毛; 15. 中背血管; 16. 内脏环肌层; 17. 前肠; 18. 肾管

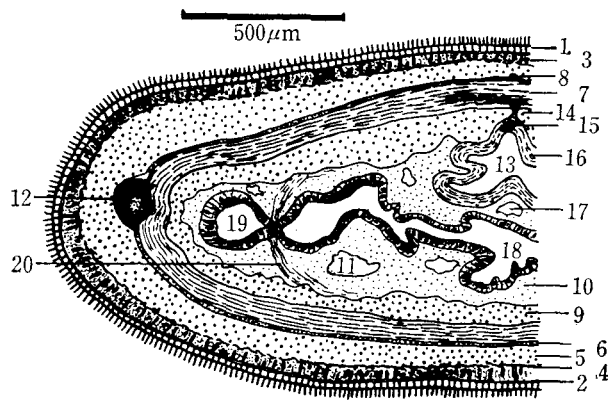


图3 中华枝吻纽虫中肠区横切面

1. 纤毛表皮层; 2. 亚表皮环肌层; 3. 腺细胞皮层; 4. 结缔组织层; 5. 外纵肌层; 6. 周缘神经鞘; 7. 环肌层; 8. 中背神经; 9. 内纵肌层; 10. 间充组织; 11. 侧血管; 12. 侧神经索; 13. 吻腔; 14. 吻腔壁环肌与体壁环肌相交织; 15. 吻腔中背血管; 16. 吻腔壁环肌; 17. 中背血管; 18. 中肠; 19. 肠盲囊; 20. 背腹肌

渐缩小。吻腔壁有两层肌肉,外层是环肌,内层是纵肌。中肠区吻腔壁环肌十分发达(图版 I: 8),吻腔壁背面的环肌与体壁背面的环肌有交织现象(图 3)。

4. 吻

吻呈树枝状,由主枝、初级分枝、次级分枝和末端分枝构成。主枝长 8mm,直径 1.5mm 左右,近端圆锥形,远端逐渐变细。吻主枝两侧互生着 13 条初级分枝,每一初级分枝按二

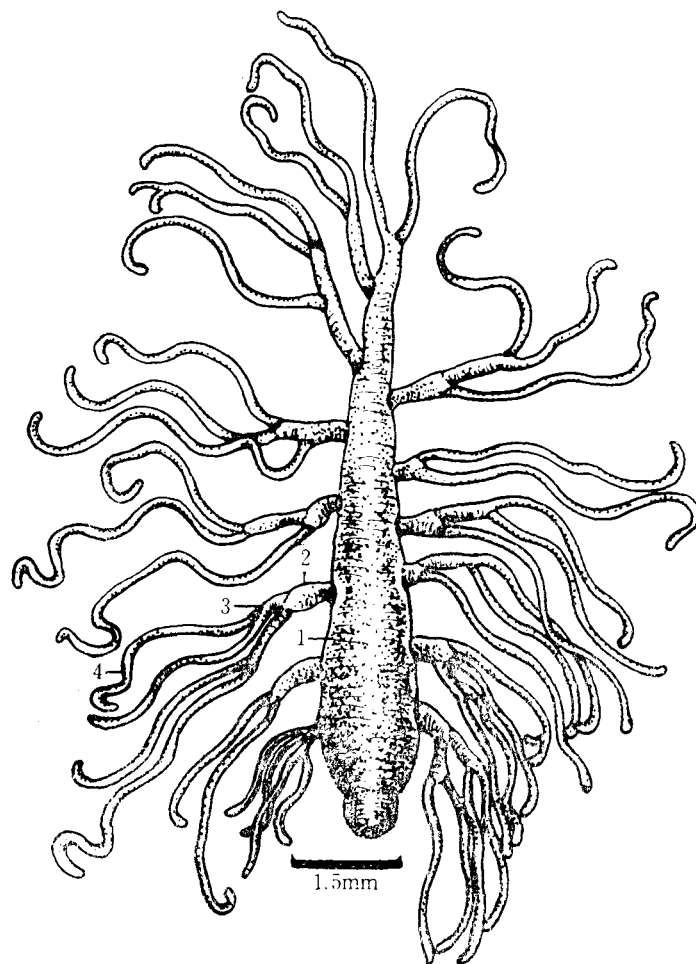


图4 中华枝吻纽虫的吻

1.主枝; 2.初级分枝; 3.次级分枝; 4.末端分枝

叉式分枝产生次级分枝, 每一次级分枝最终产生 2—4 个末端分枝。固定后整个吻共有 52 个末端分枝, 所有分枝均在一个平面上(图 4)。

相比之下, *Gorgonorhynchus* 属的二种分枝吻纽虫的吻主枝很短, 按规则二叉式连续分枝 6 次, 共有 64 个(2^6)末端分枝, 所有分枝不在同一平面上; *Panorhynchus argentinensis* 的吻主枝呈细长圆锥形, 两侧有 11 个按互生方式生长的初级分枝, 每一个初级分枝按二叉式产生两个末端分枝, 没有次级分枝, 共有 22 个(11×2)末端分枝, 所有分枝呈螺旋形排列, 不在同一平面上; *Polybrachiorhynchus dayi* 的吻则有一较长的主枝, 主枝两侧互生着 12 条初级分枝, 每个初级分枝按二叉式连续分枝 3 次, 产生次级分枝、三级分枝和末端分枝。整个吻共有 96 个(12×2^3)末端分枝, 所有分枝均在一个平面上。

吻的末端分枝数目被认为是一项分类依据, 但上述纽虫末端分枝数目并不是实际数目, 而是理论上的数目。因为吻在外翻过程中有的末端并没有充分翻出或在固定过程中发生局部自切, 故实际数目往往小于理论数目^[3]。中华枝吻纽虫按理论讲应有 $52(13 \times 2)^2$

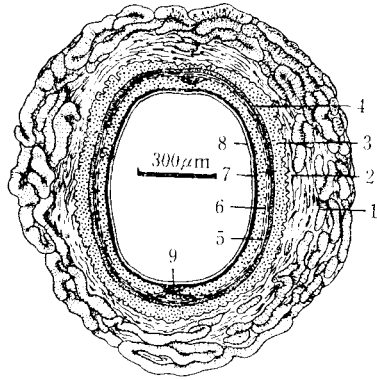


图 5 吻主枝的横切面

1.腺表皮层(150—160 μm); 2.外结缔组织层(30—40 μm);
3.外纵肌层(40—50 μm); 4.周缘神经鞘(10—15 μm);
5.环肌层(10—15 μm); 6.内纵肌层(40—50 μm); 7.内结
缔组织层(8—10 μm); 8.内皮层(8—10 μm); 9.环肌交叉

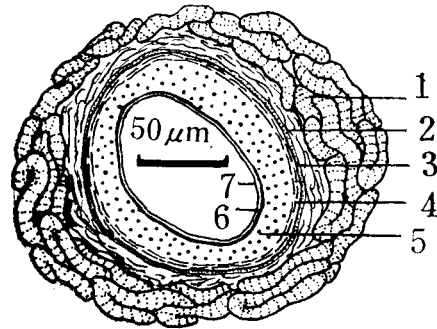


图 6 中华枝吻纽虫吻的末端分枝横切面

1.腺表皮层; 2.外结缔组织层;
3.内纵肌层; 4.神经鞘; 5.环肌
层; 6.内结缔组织层; 7.内皮层

个末端分枝。

组织学观察吻有 8 层非常明显的结构(图 5: 1—8)。其中腺表皮层最发达,其厚度是其它 7 层结构厚度的总和。腺表皮层相互叠压,有许多皱折。腺表皮层下是疏松的结缔组织层,边缘不整齐,向外伸入到腺表皮层的皱折中,向内伸入到外纵肌层中。环肌层在腹面产生一个 X 形肌肉交叉(图 5; 图版 I: 11)。吻的环肌层是否有肌肉交叉,有多少个肌肉交叉是纵沟纽虫科分属的重要依据^[3]。 *Gorgonorhynchus* 属的两种纽虫吻主枝的环肌层没有肌肉交叉^[1]; *Panorhynchus argentinensis* 吻主枝的环肌层有一个肌肉交叉^[6]; *Polybrachiorhynchus dayi* 吻主枝的环肌层则有两个肌肉交叉^[3]。

中华枝吻纽虫吻的初级分枝和次级分枝的各层肌肉结构退化,末端分枝的外纵肌层则完全消灭,环肌层没有肌肉交叉(图 6)。

5. 循环系统

循环系统基本上是由脑部的脑血管、消化道两侧的侧血管、消化道背方的中背血管、肛门附近的肛血管组成。中华枝吻纽虫的血腔系十分发达。

脑血管始于吻孔前背方的结缔组织内,在吻道两侧扩展形成宽大的腔隙并在脑与吻道之间向体后延伸(图版 I: 1)。在吻道之后,由于吻腔的扩展而使脑血管变狭窄。细长的脑血管在倒钟形吻腔的腹面愈合,从底面和两侧将吻腔包围,呈“U”字形(图版 I: 2, 6)。在“U”字形脑血管的腹面产生两个血管,背面一个较小,在吻腔之内,中背血管就从这里开始。中背血管首先凸入吻腔,并沿吻腔壁腹面延伸。吻腔壁由于中背血管的凸入,在吻腔壁腹面产生脊状突起,这个突起成为吻腔脊。吻腔脊有许多微血管绒毛伸向吻腔,绒毛高 20—25 μm (图版 I: 4—6)。“U”字形脑血管腹面产生的另一个血管较大,在吻腔之外,位于吻腔脊的腹面(图版 I: 6)。由于这个血管将来形成食道血管故称之为食道血管。食道血管在脑后部扩大并产生血管分枝进入食道区(图版 I: 5, 7)。

在吻腔内伸延的中背血管,当它伸延到中肠区时便脱离吻腔,而在吻腔腹面向中肠背面之间的间充组织内伸延(图 3; 图版 I: 8)。中背血管直达体后部,与肛血管相通。

“U”字形的脑血管在吻道两侧向后伸延形成侧血管。在前肠区侧血管沿消化道背面两侧延伸,而在前肠以后的区域内则移至消化道腹面两侧(图 2, 3),最终侧血管也汇入体后部的肛血管内。侧血管与中背血管之间有很多横连接血管。

大多数异纽类没有吻腔血管^[6]。异纽类的脑纽虫属 (*Cerebratulus*) 的种类有吻腔血管,但在吻腔腹面。中华枝吻纽虫具有吻腔血管,而且沿吻腔背面中央伸延(图 3; 图版 I: 8),成为吻腔中背血管。在整个中肠区的横切面上都能看到这条血管,直径在 30 μm 左右。其他 4 种分枝吻纽虫都不具有这条吻腔中背血管。

6. 排泄系统

中华枝吻纽虫的原肾集中在前肠区消化道与体壁之间腹面与侧面的间充组织内(图 2; 图版 I: 9)。侧血管和前肠肠壁外的血管丛周围也有肾小管。

7. 消化系统

狭长裂缝状的口位于体前端腹面,在脑的后面。口接口腔。口腔壁衬以柱状纤毛表皮,这层纤毛表皮在组织学上与消化道内壁的纤毛表皮完全一样(图版 I: 7)。

在异纽类中,前肠肠壁外有否内脏肌肉层、前肠背面与吻腔腹面之间是否有纵肌板是非常重要的分类依据^[2,3]。中华枝吻纽虫的前肠壁外有内脏肌肉层,前肠背面与吻腔腹面之间则没有纵肌形成的肌肉板(图 2)。

消化道的内壁由柱状纤毛细胞构成,含有丰富的嗜酸性腺细胞。前肠的肠壁有一些凹陷,没有形成侧盲囊(图 2; 图版 I: 9)。中肠的肠壁凹陷开始膨大并深入到身体两侧体壁内的间充组织内,形成十分发达的侧盲囊(图 3; 图版 I: 10)。侧盲囊在中肠两侧向体后延伸,前后侧盲囊之间有背腹肌。侧盲囊在中肠后段逐渐消失。肛门开口在体末端腹面。

8. 神经系统

神经系统主要是由头部吻腔两侧的脑、身体两侧的侧神经索、体壁环肌外层的周缘神经鞘和周缘神经鞘在背面中央形成的中背神经组成。脑包括一对背脑神经节和一对腹脑神经节。每个脑神经节内有致密的神经细胞,脑神经节的中央为神经纤维细胞构成的神经纤维髓。背脑神经节与腹脑神经节之间有神经鞘相隔(图版 I: 6)。吻腔两侧的背脑神经节和腹脑神经节之间通过吻腔背面和腹面的背连接神经和腹连接神经而连接起来,将吻腔包围(图版 I: 2)。吻腔两侧的腹脑神经节向体后延伸,形成贯穿全身的侧神经索。侧神经索外围的神经鞘与体壁内的周缘神经鞘相连,在体壁背面中央,周缘神经鞘膨大形成中背神经。

中华枝吻纽虫的神经系统与其他 4 种分枝吻纽虫的神经系统相比有一些不同之处。

Serna de Esteban 和 Moretto^[6] 以背神经纤维髓的形状和神经纤维髓周围的巨型神经索细胞的数目为分类依据,鉴定了当时的分枝吻纽虫的一新属新种 *Panorhynchus argentinensis*; Gibson^[3] 也成功地运用了这两项分类依据鉴定了分枝吻纽虫的另一新属和新种 *Polybrachiorhynchus dayi*^[3]。

Gorgonorhynchus 属的两种纽虫的背神经纤维髓在脑的后部分为两枝; *Panorhynchus argentinensis* 和 *Polybrachiorhynchus dayi* 的背神经纤维髓不分枝。中华枝吻纽虫的背神经纤维髓在脑的中部分为两枝。在脑中部的横切面上可看到在背脑神经节内有两个单独的

背神经纤维髓的横切面,边缘光滑,有神经鞘包围(图版 I: 6)。背面一个较小,直径 100—120 μm ;腹面一个较大,直径 140—150 μm 。

Gorgonorhynchus 属的两种纽虫腹神经纤维髓周围有 1 对巨型神经索细胞; *Panorhynchus argentinensis*^[6]有 1 对以上巨型神经索细胞; *Polybrachiorhynchus dayi*^[3]则有 7 对神经索细胞。中华枝吻纽虫的腹神经纤维髓腹面内侧有一对巨型神经索细胞,直径在 25 μm 左右(图版 I: 3)。

9. 感觉器官

感觉器官包括水平头裂、头腺、额器和脑感器。头部两侧的水平头裂为狭长裂缝,长 2mm 左右,深 0.4mm 左右,是纵沟纽虫科的主要特征。头裂内衬以丰富的纤毛感觉细胞。头腺呈微小颗粒状,位于头部前端吻道背面。头腺通过头部顶端背面的额器而开口于体外。脑感器发达,呈卵圆形,位于脑后,前端贴在背神经纤维髓的腹面,主要部分却在背神经纤维髓之后(图版 I:5)。脑感器内有丰富的神经细胞和一些与化学感受有关的腺细胞。脑感器前端有一短管,称为脑感器通道,另一端接头裂的末端。脑感器通道的内壁衬以纤毛感觉细胞。外界的刺激通过头裂内壁上的纤毛感觉细胞传给脑感器通道内壁上的纤毛感觉细胞,最后传至脑感器和脑。

10. 生殖系统

由于标本是在 12 月份采到的,解剖观察中没有发现任何性腺结构,无法辨别其雌雄性。

讨 论

迄今为止,世界范围内已报道过 3 属 4 种具分枝吻纽虫,即: *Gorgonorhynchus repens* Dakin & Fordham (1931)^[4], *Gorgonorhynchus bermudensis* Wheeler (1940)^[7] *Panorhynchus argentinensis* Serna de Estaban & Moretto (1969)^[6], *Polybrachiorhynchus dayi* Gibson (1977)^[3]。它们属于异纽目 (Heteronemertea), 纵沟纽虫科。

纵沟纽虫科分枝吻纽虫各属的分类依据主要为: 分枝吻的形式; 吻主枝和末端分枝肌肉层数; 吻主枝环肌层与末端分枝环肌层的肌肉交叉的数目; 吻腔壁环肌层是否与体壁环肌层交织; 前肠背面与吻腔腹面之间有无纵肌板; 脑的背神经纤维髓的形状; 脑的腹神经纤维髓周围的巨型神经索细胞的数目; 有无尾须等^[4]。

中华枝吻纽虫新属新种 (*Dendrorhynchus sinensis* gen. et sp. nov.) 是现在新发现的第五种分枝吻纽虫。它的体壁结构 (外纵肌、环肌、内纵肌) 的特点和脑所在位置 (口后) 都说明它属于异纽目 (Heteronemertea), 头部两侧具有水平头裂符合纵沟纽虫科的特征。中华枝吻纽虫与其他 4 种分枝吻纽虫不同, 有其独特的特征。它的吻分枝形式比 *Panorhynchus argentinensis* 复杂, 但比 *Polybrachiorhynchus dayi* 简单。它的吻主枝有三层肌肉, 其中环肌层有一个肌肉交叉, 背神经纤维髓分为两枝, 腹神经纤维髓内侧有一对巨型神经索细胞。吻腔壁环肌与体壁环肌有交织现象。前肠壁外有内脏肌肉形成的环肌层; 前肠背面与吻腔腹面之间没有纵肌板。体末端没有尾须。此外, 中华枝吻纽虫还有独特的吻腔中背血管, 这是其他 4 种分枝吻纽虫所没有的。

下面列表说明中华枝吻纽虫与其他 3 属分枝吻纽虫的特征异同。

表 1 中华枝吻虫与其他三属枝吻虫的主要特征比较表
 Table 1 The Principal Characters of *Dendrorhynchus sinensis* compared with those of *Gorgonorhynchus*, *Panorhynchus* and *Polybrachiorhynchus*

属 Genus	<i>Gorgonorhynchus</i>	<i>Panorhynchus</i>	<i>Polybrachiorhynchus</i>	<i>Dendrorhynchus sinensis</i>
特征 Character				
头部两侧其水平头裂 Head with horizontal cephalic slits	+	+	+	+
眼 Eyes	-	-	-	-
尾须 Caudal cirrus	+	-	+	-
吻分枝形式 Form of proboscis branching	吻主枝短, 所有分枝为二叉式连续分 6 次 Main axial branch is short, with all the branchlets dichotomously and successively branching 6 times	吻主枝长, 11 个互生初级分枝, 每个初级分枝分 1 次 Main axial branch is long, with 11 alternative primary branchlets each branching once	吻主枝长, 12 个互生初级分枝, 每个初级分枝按二叉式分 3 次 Main axial branch is long, with 12 alternative primary branchlets, each dichotomously branching 3 times	吻主枝长, 13 个互生初级分枝, 每个初级分枝按不规则二叉式分 1-2 次 Main axial branch is long, with 13 alternative primary branchlets, each irregularly and dichotomously branching 1-2 times.
末端分枝最大值 Maximum number of terminal branchlets	64	22	96	52
吻分枝所在平面 Level of the proboscis branching	不在同一平面上 Not in the same level	不在同一平面上 Not in the same level	在同一平面上 In the same level	在同一平面上 In the same level
吻主枝的肌肉层数 Number of muscle layers of main axial branch	2	3	3	3
末端分枝的肌肉层数 Number of muscle layers of terminal branchlets	3	2	2	2
吻主枝环肌层肌肉交叉 Muscle cross of circular muscle layer of main axial branch	-	1	2	1
末端分枝环肌层肌肉交叉 Muscle cross of circular muscle layer of terminal branchlet	2	-	-	-
吻腔壁背面环肌与体壁背面环肌交织 Interweaving of dorsal circular muscle of proboscis sheath with those of the body wall	-	-	-	+

表 1(续)

前肠背面与吻腔腹面之间的纵肌板 Longitudinal muscle plate between dorsal side of foregut and ventral side of rhynchocoel	+	-	+	-
背神经纤维髓的形状 Form of dorsal fibrous cores	分叉 Forked	不分叉 Unforked	不分叉 Unforked	分叉 forked
腹神经纤维髓周围巨型神经索细胞 Giant neurochord cells round ventral fibrous cores	1 对 one pair	多于 1 对 more than one pair	7 对 7 pairs	1 对 one pair
前肠壁外的内脏肌肉层 Splanchnic muscle around foregut	-	+(spiral)	+(circular)	+(circular)
吻腔中背血管 mid-dorsal rhynchocoelic blood vessel	-	-	-	+
吻道环肌层数 Number of circular muscle layers around rhynchodaeum	2	1	1	1
原肾主收集小管数 Number of main collecting tubules in excretory system	2	数个 several	许多 Numerous	许多 Numerous

可按下列检索表检索目前世界上已发现的 5 种具分枝吻的纽虫

(Key to Five Nemertean Species which Possess a Multibranch Proboscis)

- 1A 吻主枝短,全部分枝为二叉式 _____ 2
(Main axial branch is short, with all the branchlets branching dichotomously. _____ 2)
- 1B 吻主枝长,初级分枝为互生式 _____ 3
(Main axial branch is long, with alternate primary branchlets _____ 3)
- 2A 脑区附近体壁肌肉为三层,吻在第四级分枝后出现不规则二叉式分枝 _____ *Gorgonorhynchus bermudensis*
(Three layers of body wall musculature near the brain, and irregular dichotomous branchlets appear from fourth branchlets onward _____ *Gorgonorhynchus bermudensis*)
- 2B 脑区附近体壁肌肉不是三层,所有的吻分枝均为规则二叉式分枝 _____ *Gorgonorhynchus repens*
(Not three layers of body wall musculature near the brain, and all the branchlets are of regular dichotomy. _____ *Gorgonorhynchus repens*)
- 3A 初级分枝仅分一次,所有分枝呈螺旋状,不在一个平面上 _____ *Panorhynchus argentiensis*
(The primary branchlets branch only once, all the branchlets in open spiral from main axial branch, not in the same level _____ *Panorhynchus argentiensis*)
- 3B 初级分枝连续分 2—3 次,所有分枝呈枝状,在一个平面上 _____ 4
(The primary branchlets successively branch 2—3 times, all the branchlets are rami-form and in the same level. _____ 4)
- 4A 初级分枝按二叉式分 3 次,产生 8 个末端分枝;体末有尾须 _____ *Polybranchiorhynchus dayi*
(The primary branchlets dichotomously branch 3 times, giving 8 terminal branchlets; caudal cirrus present. _____ *Polybranchiorhynchus dayi*)
- 4B 初级分枝按二叉式分两次,产生 2—4 个末端分枝;体末无尾须 _____ *Dendrorhynchus sinensis*
(The primary branchlets dichotomously branch twice, giving 2—4 terminal branchlets; no caudal cirrus _____ *Dendrorhynchus sinensis*)

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ON *DENDRORHYNCHUS SINENSIS* GEN. ET SP.
NOV. OF LINEID HETERONEMERTEAN

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ABSTRACT

A new species of proboscis worm (Nemertean) possessing a multibranched proboscis was found in South China Sea. It is named as *Dendrorhynchus sinensis*, a new genus and species of the Family Lineidae, Order Heteronemertea. The descriptions of this new genus and species are given below:

Dendrorhynchus gen. nov.

A single pair of horizontal lateral cephalic slits on the head, but no eyes. The proboscis is multibranched, consisting of a long main axial branch, alternative primary branchlets laterally, dichotomous secondary branchlets and terminal branchlets, all the branchlets bein in the same level. The main axial branch contains three muscle layers (outer and inner longitudinal, middle circular) and only one muscle cross in the circular muscle layer. The terminal branchlets contain two muscle layers (outer circular inner longitudinal) with no muscle cross in the circular layer. The dorsal fibrous cores of cerebral ganglion are forked. A pair of giant neurochord cells are located at the inner side of the ventral fibrous cores. The forgut with a delicate layer of circular splanchnic muscle but no longitudinal muscle plate between dorsal wall and rhynchocoel. The circular muscle of dorsal side of the proboscis sheath is interwoven with those on the dorsal side of the body wall. The blood system consists of a U-shaped cephalic lacuna, lateral

blood vessels, a mid-dorsal blood vessel developed into a long rhynchocoelic villus and a middorsal rhynchocoelic blood vessel in the rhynchocoel sheath. There is no caudal cirrus.

Dendrorhynchus sinensis sp. nov.

1. External Appearance

The specimen was collected on the beach of Xiashan Beach Park, Zhanjiang City, Guangdong Province, along the South China Sea (21°02'3 N, 110°23'0 E). The live worm is light brown colored in the anterior (2/5) and posterior (1/5) part of the body (2/5), dark brown colored in the middle (2/5). After fixation it is of an overall greyish brown, but darker in the middle. The specimen is 85 mm long, 3—4 mm wide, with a clear head and lateral cephalic slits on both sides of the head. There is a shallow rhynchodaeal groove in the middle of the ventral side in front of the mouth.

2. Body wall, Musculature and Parenchyma

The structure of the body wall is similar to that of all other heteronemerteans. The histological observation reveals eight layers. Among them, the outer longitudinal muscle and the circular muscle are highly developed, with a thickness of 100—120 μm in the foregut region, the connective tissue layer of the foregut region also highly developed, 20—25 μm and the glandular dermis layer is separated from the outer longitudinal muscle layer by this connective tissue layer. In the mid-intestinal region, there are well-developed dorsal-ventral muscles between the dorsal and ventral body wall. Between the alimentary canal and the inner longitudinal muscle is filled with parenchyma (Fig. 3; Plate I: 9, 10).

3. Rhynchodaeum and Rhynchocoel

The proboscis pore is at the ventral side of the anterior end of the body, and connected to the rhynchodaeum inside the head. The rhynchodaeum extends posteriorly and expands symmetrically towards the dorsal and ventral sides in a rhombic shape (Plate I: 1). The rhynchocoel is nearly as long as the body, its cross sectional shape near the brain resembling that of a bell placed upside down (Plate I: 2, 6). There are circular muscle (outer) and longitudinal muscle (inner) in the proboscis sheath. The circular muscle of proboscis sheath is highly developed in mid-intestinal region. (Plate I: 8). The circular muscle in the dorsal side of proboscis sheath is interwoven with those in the dorsal side of the body wall (Fig. 3), a phenomenon rarely found in the four species of the Lineidae with branched proboscis so far reported^[3].

4. Proboscis

Proboscis of *Dendrorhynchus sinensis* resembles the branches of a tree, consisting of a long main axial branch, primary branchlets, secondary branchlets and terminal branchlets. The main axial branch, with a length of 8 mm and a diameter about 1.5 mm, is of a conical shape in the proximal portion and tapering gradually to the distal end. From the main axial branch arise primary branchlets laterally and alternately. Each of the primary branchlets finally gives 2 to 4 terminal branchlets. The whole proboscis shows theoretically 52 terminal branchlets, all of them in a same plane (Fig. 4).

Dendrorhynchus sinensis possesses a proboscis which reveals very clear a structure of eight layers (Fig. 5). The circular muscle layer is X-shaped (Fig. 5; Plate I: 11). The outer longitudinal muscle layer in terminal branchlets disappear and without muscle

cross in the circular muscle layer (Fig. 6).

5. Circulatory system

Dendrorhynchus sinensis possesses a blood system which consists mainly of a cerebral lacuna, lateral blood vessels, a mid-dorsal blood vessel and an anus lacuna. The cerebral lacuna begins in the connective tissue in the anterior part of the head, expands into a wide lacuna along the rhynchodaeum and extends posteriorly between the brain and the rhynchodaeum (Plate I: 1). After passing the rhynchodaeum, the lacuna becomes thinner because of the expansion of the rhynchocoel. This slender cerebral lacuna, closed at the ventral side of the rhynchocoel, surrounds the rhynchocoel from under and bilaterally in a U-shape (Plate I: 2, 6). From this U-shaped lacuna arise ventrally two other lacunae: (1) the smaller dorsal one is the mid-dorsal blood vessel. After protruding into the rhynchocoel, the mid-dorsal blood vessel runs ventrally along the wall of the rhynchocoel; The wall of the rhynchocoel, because of the protrusion, also projects ventrally, forming a rhynchocoelic ridge; On the ridge there are numerous villi about 20—25 μm , rising towards the rhynchocoel (Plate I: 4—6); (2) the larger ventral one, is outside the rhynchocoel and on the ventral side of the rhynchocoelic ridge (Plate I: 6), named oesophageal lacuna because it changes later into the oesophageal blood vessel.

6. Excretory system

The protonephridium concentrates in the parenchyma between the digestive tract and the body wall in the ventral and lateral sides of the foregut region (Fig. 2; Plate I: 9).

7. Digestive system

The mouth, like a narrow and elongate slit, is connected to the oral cavity, the wall of which is lined with columnar ciliated epithelium (Plate I: 7).

There is a delicate splanchnic circular muscle layer around the foregut (Fig. 2). Between the dorsal side of the foregut and the ventral side of the rhynchocoel there is no longitudinal muscle plate formed by the longitudinal muscle (Fig. 2). In Heteronemertean, the splanchnic circular muscle layer and longitudinal muscle plate are two very important criteria for taxonomy (Friedrich 1960^[2], Gibson 1977^[3]). The inner wall of the intestinal epithelium is composed of ciliated columnar cells and acidophilic glandular cells. The mid-intestine forms a highly developed lateral diverticula but disappears gradually at the posterior part of the intestine.

8. Nervous System

The nervous system consists mainly of the brain, lateral nerve cords, the peripheral neural sheath and the mid-dorsal nerve. The brain includes a pair of dorsal cerebral ganglion and a pair of ventral cerebral ganglion. In the center of the ganglions there are nerve fibrous cores. The dorsal and ventral ganglions are separated by a nerve sheath (Plate I: 6) and connected by the dorsal and ventral nerve commissures on the dorsal and ventral sides of the rhynchocoel (Plate I: 2). The ventral cerebral ganglion extends posteriorly and becomes the lateral nerve cords that run throughout the body. The nerve sheath round these cords are connected to the peripheral nerve sheath inside the body wall. The latter, by expansion, forms the mid-dorsal nerve in the middle of the dorsal side of the circular muscle layer.

In *Dendrorhynchus sinensis*, the dorsal nerve fibrous core is forked in the middle part of the brain. In the inner ventral side of the ventral nerve fibrous core there is

a pair of giant neurochord cells about 25 μm in diameter (Plate I: 3).

9. Sense organs

The horizontal cerebral slits along either side of the head is about 2 mm in length and about 0.4 mm in depth. The highly-developed and oval-shaped cerebral sense organ is situated behind the brain (Plate I: 5).

The small particle shaped, cephalic glands are situated at the anterior end of the head and at the dorsal side of the rhynchocoel. They open to the outside of the body through the front organ at the dorsal part of the head.

10. Reproductive system

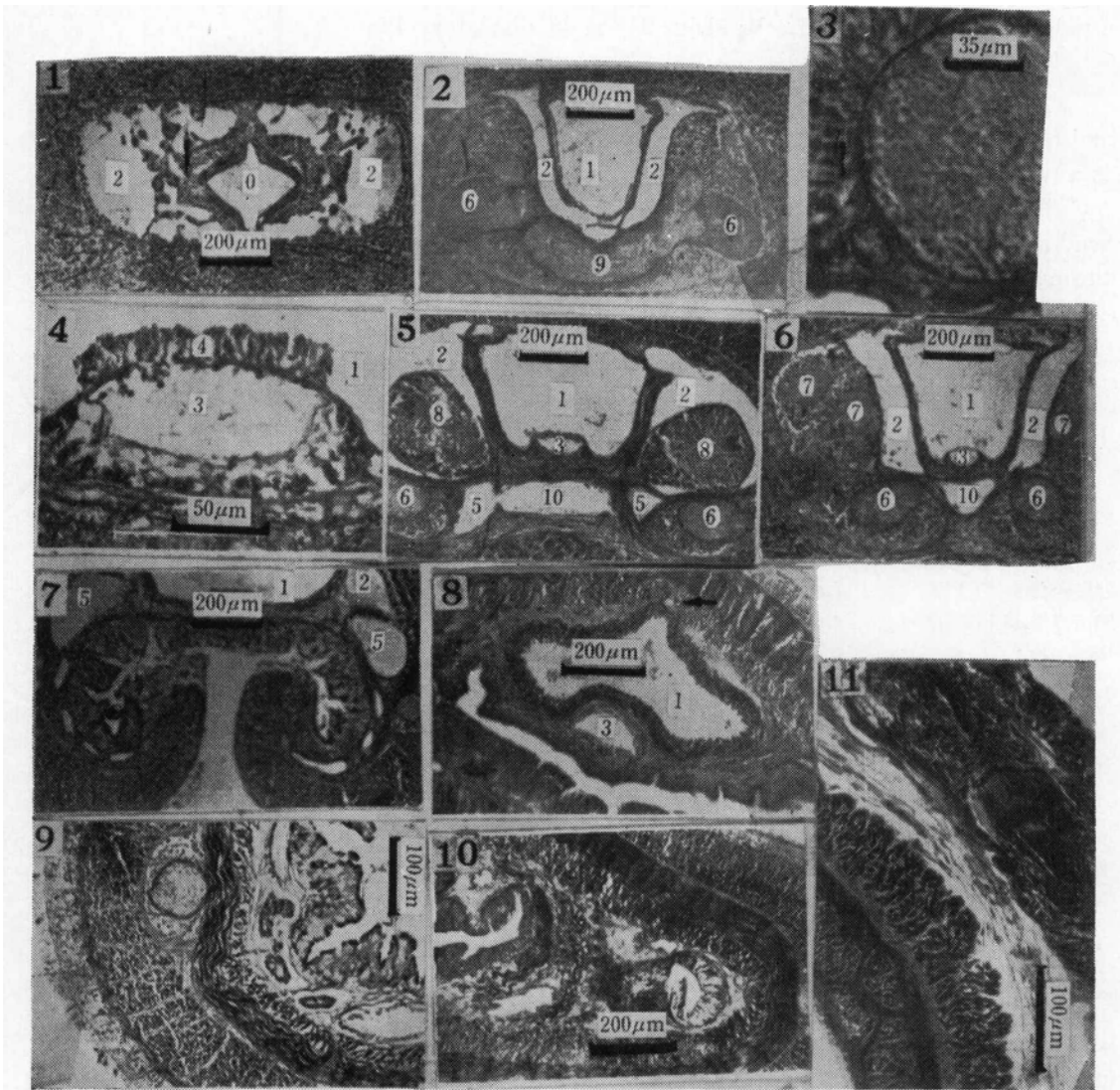
The specimen was collected in December, no gonad is found in our sectional examinations.

Discussion

Four species of nemerteans with branched proboscis have so far been reported in the world: *Gorgonorhynchus repens* by Dakin and Fordham (1931, 1936)^[1], *G. bermudensis* by Wheeler (1936)^[7] (1940a), *Panorhynchus argentinensis* by Serna de Esteban and Moretto (1969)^[6], *Polybrachiorhynchus dayi* by Gibson (1977)^[3]. They all belong to the Lineidae of the order Heteronemertea.

The main criterion for classification of the species of Lineidae with branched proboscis are: the form of the branched proboscis, the number of muscle layers in the main axial branch and the terminal branchlets of the proboscis, the number of muscle cross in the circular muscle layers of the main axial branch and the terminal branchlets; the presence or absence of inter-weaving between the circular muscle layer of the proboscis sheath and that of the body wall, the presence or absence of the longitudinal muscle plate formed by the longitudinal muscles between the dorsal side of the foregut and ventral side of the rhynchocoel, the number of giant neurochord cells in the inner side of the ventral fibrous cores of the brain, and the presence or absence of a caudal cirrus (Gibson 1981)^[4].

The nemertean with a branched proboscis—*Dendrorhynchus sinensis*, new genus and new species recently found along the beach of Zhanjiang City is obviously different in the above-mentioned features from four species of three genera so far reported (See the Table 1). Evidences in our study show that it belongs with the Lineidae of Heteronemertea and is named *Dendrorhynchus sinensis*.



1. 吻道的横切面, 示吻道两侧宽大的脑血管; 2. 腹脑连接的横切面, 示腹脑连接及U字形脑血管; 3. 腹脑神经纤维髓及其内侧的巨形神经索细胞; 4. 吻腔脊的放大, 示吻腔内的中背血管及其表面的吻腔绒毛; 5. 脑后部的横切, 示发达的脑感器; 6. 脑中部的横切, 示分叉的背脑神经纤维髓; 7. 过食道的横切, 示食道血管; 8. 中肠的横切, 示发达的吻腔壁环肌, 箭头所示吻腔中背血管; 9. 前肠的横切, 示体壁各部分结构; 10. 中肠横切, 示发达的背腹肌及肠盲囊; 11. 吻的横切, 示吻的7层结构及环肌层的肌肉交叉

0——吻道; 1——吻腔; 2——脑血管; 3——中背血管; 4——吻腔绒毛; 5——食道血管; 6——腹脑神经纤维髓; 7——背脑神经纤维髓; 8——脑感器; 9——腹脑连接; 10——食道血管