中国短毛藻属 *Elachista* (褐藻门)的分类学研究 I. 两个新种

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摘要: 本文对我国沿海岸采集的褐藻门(Phaeopyta)短毛藻科(Elachistaceae)短毛藻属(*Elachista* Duby)海藻进行了分类学研究。发现 2 个新种, 即长海短毛藻 *E. changhaiensis* Luan et Ding sp.nov.和暗色短毛藻 *E.fusca* Luan et Ding sp.nov.。文中对此 2 个种的形态特征进行了较详细的特征描述, 并对新种提供了相应的英语特征描述, 以及较完整的其他分类学信息, 与相似种进行了比较。长海短毛藻藻体黄褐色, 长同化丝直径 7~22 μm, 多室囊长 95~150 μm, 由 23~38 个小室组成; 短同化丝长 200~350 μm, 由 11~24 个细胞组成。暗色短毛藻藻体暗褐色, 长同化丝直径 8~14 μm, 多室囊分枝, 长 75~150 μm, 由 27~39 个小室组成; 短同化丝着生于长同化丝的基部, 长 0.13~0.33 mm, 由 5~13 个细胞组成。模式标本保存在中国科学院海洋研究所海洋生物标本馆(AST)。

关键词: 褐藻门; 短毛藻属; 分类; 新种; 中国海

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短毛藻属 *Elachista* 隶属于褐藻门 Phaeopyta 索藻目 Chordariales 短毛藻科 Elachistaceae, 由 Duby (1830: 972)[1]建立。其主要特征为藻体(孢子体)丛生或扩展; 基部由无色假膜组织组成, 呈垫状或半球状, 附着或部分深入其他海藻的组织中; 同化丝着生于假膜组织上, 在基部分枝, 可分为长同化丝和短侧丝(短同化丝), 侧丝多弯曲丛生; 基部生长, 色素体盘状, 多数; 单室囊和多室囊生于同化丝之间; 异型世代交替, 配子体为微小匍匐体。模式种为 *E. scutellata* Duby 1830: 972, nom.illeg.[=*E. scutullata* (Smith)Areschoug][1, 2]。

本属在国际上已报道了 65 个分类单位, 目前可接受的物种 23 个[2-6]。其中, 东亚报道了 11 个种(可接受的)[7-13], 我国报道了短毛藻 *E. fucicola* (Velley) Areschoug[8, 9, 11]和纤细短毛藻 *E. tenuis* Yamada[14, 15] 等 2 个种。

作者自 1999~2003 年对中国沿海多个地区进行了野外调查, 采集了一些该属的标本。结合我国过去的一些报道(文献)和样品, 经分类与鉴定研究, 发现我国短毛藻属新物种 2 个, 分别为长海短毛藻 *E. changhaiensis* Luan et Ding sp.nov.和暗色短毛藻 *E. fusca* Luan et Ding sp.nov.。本文对这 2 个种进行了较详细的描述, 其结果在一定程度上丰富了我国大型海洋褐藻的种类多样性。标本保存在中国科学院海洋研究所海洋生物标本馆(AST)。

1 材料与方法

1.1 实验材料

1999~2003 年作者在我国沿海野外现场调查采集的标本及之前保存在中国科学院海洋研究所海洋生物标本馆(AST)的部分标本。

1.2 实验方法

1.2.1 外形特征比较

主要包括藻体颜色、基部情况、同化丝的类型、繁殖器官等特征。

1.2.2 显微制片

徒手切片或整体装片。

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1.2.3 物种鉴定

通过分类特征的对比及相关数据的比较，结合文献报道鉴定物种。

1.2.4 绘图

利用显微镜和解剖镜的自配描绘装置对物种特征进行手绘图。图型上墨利用 Adobe Illustrator CS4 和 UGEE 绘影 G3 数位板完成[16-17]。

2 结果

2.1 长海短毛藻(新种)图 1

Elachista changhaiensis Luan et Ding sp.nov.

Thalli are yellow brown, semi-spherical**,** 0.3-0.4 cm in diameter, epiphytic on the surface of other macroalgae. The base of thallus is pseudomembranous structure, consisted of many colourless filaments, 1 150-1 250 μm long, with cells 75-200 μm long, 20-45 μm broad and L/B 1.7-8. The bases of some filaments insert into the host epidermis. The free long assimilating filaments and paraphyses (short assimilating filaments) are born on the outside edge of pseudomembranous structure. Long assimilating filaments are 3 700-4 300 μm long, consisted of 150-185 cells, and taper from lower part to upper part. The cells are 22-50 μm, 17-40 μm and 15-22 μm long, 16-22 μm, 9-15 μm and 7-10 μm broad, L/B 1.3-2.6, 1.9-3.3 and1.5-3 at the lower, middle and upper part, respectively. Short assimilating filaments are 200-350 μm long, consisted of 11-24 cells with 18-29 μm and 12-25 μm long, 5.5-8 μm and 6-8 μm broad, L/B 2.3-4 and 1.7-3.3 at lower and upper part, respectively. Chloroplasts are small sphere-shape. Hairs are unseen.

The plurangia are born on the outside cells of the pseudomembranous structure, unbranched or branched at the basal part, linear, dense, monostichous, 95-150 μm long, 5-6 μm broad, usually consisted of 23-38 chambers. The unangia are born on the pseudomembranous structure at the same plants as those of the plurangia, petiolate, elongated saccate, 98-150 μm long, 23-26 μm broad.

Habits: The plants are epiphytic on the blades of *Sargassum confusum* at the low tide zone, mixed with *Protectocarpus speciosus*. It is endemic to Haiyang island, Changhaixian, Liaoning, China.

Geographic distribution: the Yellow Sea.

Holotype: AST039025, collected by Luan Rixiao at Mar. 17, 2003**.**

Type locality: Changhai, Liaoning, China.

特征描述: 藻体黄褐色，半球形，直径 3~4 mm，附着于其他海藻上。基部为假膜体，由很多无色丝状体组成，长 1 150~1 250 μm，细胞长 75~200 μm，宽 20~45 μm，长为宽的 1.7~8 倍；丝体基部有少量伸入宿主表皮细胞间。在假膜体外缘生有游离的长同化丝和侧丝(短同化丝)。长同化丝长 3 700~4 300 μm，由 150~185 个细胞组成，由下向上渐细；下部细胞长 22~50 μm，宽 16~22 μm，长为宽的 1.3~2.6 倍；中部细胞长 17~40 μm，宽 9~15 μm，长为宽的 1.9~3.3 倍；上部细胞长 15~22 μm，宽 7~10 μm，长为宽的 1.5~3 倍。短同化丝长 200~350 μm，由 11~24 个细胞组成；下部细胞长 18~29 μm，宽 5.5~8 μm，长为宽的 2.3~4 倍；上部细胞长 12~25 μm，宽 6~8 μm，长为宽的 1.7~3.3 倍。色素体小球形。无毛。

多室囊着生于假膜丝体外部的细胞上，不分枝或在基部有分枝，线状，密集，单列，长 95~150 μm，宽 5~6 μm，由 23~38 个小室组成。单室囊与多室囊同体，着生于假膜体的细胞上，具有一柄细胞，长囊状，长 98~150 μm，宽 23~26 μm。

习性和产地: 在低潮线下附着于 *Sargassum confusum* 的叶面上，和 *Protectocarpus speciosus* 混生。产于辽宁长海县海洋岛。

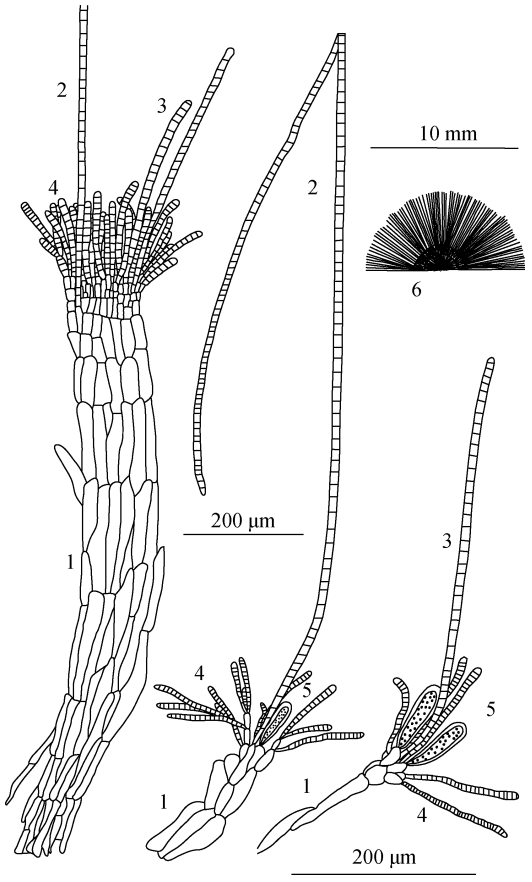

图 1 长海短毛藻 *E. changhaiensis* Luan et Ding sp.nov.

Fig. 1 *E. changhaiensis* Luan et Ding sp.nov.

注: 1. 垫部细胞; 2. 长同化丝; 3. 侧丝; 4. 多室囊; 5. 单室囊; 6. 藻体纵切面(AST039025)

1. Cells of cushion part; 2. Long assimilating filaments; 3. Paraphyses; 4. Plurangia; 5. Unangia; 6. Longitudinal section of thallus (AST039025)

地理分布: 黄海。

模式标本: 于 2003 年 3 月 17 日栾日孝采自辽宁省长海县, 模式标本号为 AST039025。

2.2 暗色短毛藻(新种)图 2

Elachista fusca Luan et Ding sp. nov.

Thalli are dark brown, hemisphere, with 1-4mm in diameter. The base is consisted of parenchymal cells to the cushion-like pseudomembranous structure, with a part stretching into the host organization. The cells of the cushion-like part are colourless, irregularly cylindrical, 20-175 μm long, 9-30 μm broad and L/B 1.7-9. The free assimilating filaments are born on the outside cells of the cushion-like pseudomembranous structure and consisted of long assimilating filaments and paraphyses (short assimilating filaments). The long assimilating filaments are 1.l-4 mm long, usually consisted of 135-216 cells with 17-40 μm long, 8-14 μm broad and L/B 1.4-3.3. The short assimilating filaments are born on the base of the the long assimilating filaments, 0.13-0.33 mm long, and consisted of 5-13 cells with 20-35 μm long, 5-7.5 μm broad and L/B 3-6. Hairs are unseen.

The plurangia and unangia are born on the same plants. The plurangia are linear, monostichous, born on the base of the short assimilating filaments or the outside cells of the pseudomembranous structure, unbranched or few branched, 75-150 μm long, 5-6 μm broad, usually consisted of 27-39 chambers. The unangia are born on the base of the assimilating filaments or the outside cells of the pseudomembranous structure, sessile, elongated saccate, 100-120 μm long, 25-35 μm broad.

Habits: The plants are epiphytic on *sargassum confusum* at the middle intertidal zone, intermixed with *Halothrix gracilis*. It is endemic to Dalian, Liaoning Province, China.

Geographic distribution: the Bohai Bay, China.

Holotype: AST9990072, collected by Luan Rixiao at Mar. 17, 1999**.**

Type locality: Dalian, China.

特征描述: 藻体暗褐色, 半球形, 直径 0.8~4 mm。基部由薄壁细胞组成垫状假膜体, 少部分伸入宿主组织间。基部垫状的假膜组织细胞无色, 多呈不规则圆柱形, 细胞长 20~175 μm, 宽 9~30 μm, 长为宽的 1.7~9 倍。垫部外为游离的同化丝, 同化丝可分成长同化丝和侧丝(短同化丝), 着生于假膜组织细胞上。长同化丝长 1.l~4 mm, 通常由 135~216 个细胞组成; 细胞长 17~40 μm, 宽 8~14 μm, 长为宽的 1.3~3.3 倍。短同化丝着生于长同化丝的基部, 长 0.13~0.33 mm, 由 5~13 个细胞组成; 细胞长 20~35 μm, 宽 5~7.5 μm, 长为宽的 3~6 倍。无毛。

单室囊和多室囊同体。多室囊线状, 单列, 着生于短同化丝基部或假膜组织外部细胞上, 多不分枝或少数分枝, 长 75~150 μm, 宽 5~6 μm, 通常由 27~39 个小室组成。单室囊着生于同化丝基部或假膜组织外部细胞上, 无柄, 长囊状, 长 100~120 μm, 宽 25~35 μm。

习性和产地: 在中潮带附着于 *Sargassum confusum* 体上, 和 *Halothrix gracilis* 等混生。产于辽宁大连。

地理分布: 中国渤海。

模式标本: 于 1999 年 3 月 17 日栾日孝采自中国大连, 模式标本号为 AST9990072。

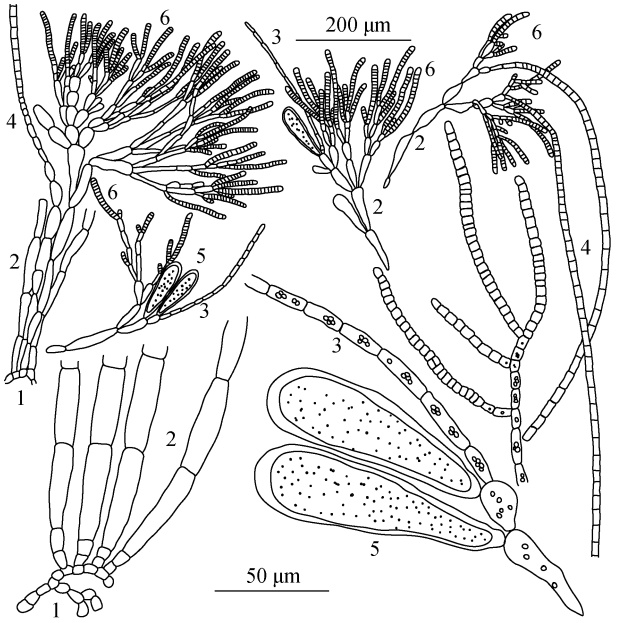

图 2 暗色短毛藻 *E. fusca* Luan et Ding sp.nov.

Fig. 2 *E. fusca* Luan et Ding

注: 1. 基层; 2. 垫部丝体; 3. 同化丝; 4. 毛; 5. 单室囊; 6. 多室囊 (AST 9990072)

1. Basal layer of thallus; 2. Filaments of basal cushion; 3. Assimilating filament; 4. Hairs; 5. Unangia; 6. Plurangia (AST 9990072)

3 讨论

本文报道了 2 个新种。其中长海短毛藻 *E. changhaiensis* Luan et Ding sp.nov.与 *E. tenuis* Yamada[10, 14-15] 相似, 暗色短毛藻 *E. fusca* Luan et Ding sp.nov.与 *E. tenuis* Yamada 和 *E. orbicularis* (Ohta)Skinner[10, 18]相似, 两个新种之间也有相似之处。比较结果见表 1。

表 1　新种与其相似物种间的比较

Tab. 1　The comparison between the new species and their related species

物种	藻体	同化丝	多室囊	
			长度等	小室个数
E. changhaiensis	黄褐色，较大，直径 3~4 mm	变化较大，直径 7~22 μm	95~150 μm	23~38
E. tenuis	藻体较大，直径 3~6 mm	稍细，直径 6~11 μm	多室囊不分枝，48~96 μm	8~13
E. fusca	暗褐色，较小，直径 0.8~1 mm	同化丝较短细，长 1~4 mm，变化较小，直径 8~14 μm，侧丝较细，直径 7~7.5 μm	多室囊分枝，75~150 μm	27~39
E. orbicularis	—	同化丝较长且粗，长 7.5 mm，直径 20 μm，侧丝较粗，上部直径 11 μm	—	—

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The morphological taxonomy on genus *Elachista* (Choradariales, Phaeophyta) in China seas I. Two new species

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Abstract: The specimens of genus *Elachista* in family *Elachistaceae* were investigated from Chinese coasts. Two new species were identified, viz. *E. changhaiensis* Luan et Ding sp.nov. and *E. fusca* Luan et Ding sp.nov.. The taxonomic characteristics of these species were described in detail with other data referring to species classification. *E. changhaiensis* Luan et Ding sp.nov. is yellow brown, and has long assimilating filaments with 7-22 μm in diameter, plurangia with 95-150 μm long and 23-38 chambers, and short assimilating filaments with 200-350 μm long and 11-24 cells. *E. fusca* Luan et Ding sp.nov. is dark brown, and has long assimilating filaments with 8-14 μm in diameter, plurangia branched with 75-150 μm long and 27-39 chambers, and short assimilating filaments born from the base of long assimilating filaments with 0.13-0.33 mm long and 5-13 cells. Holotypes were preserved in the Marine Biological Herbarium, the Institute of Oceanology, Chinese Academy of Sciences (AST).

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