

附录1 中国头孢藻属物种名录及分布
Appendix 1 Species list and distribution of *Cephaleuros* in China

物种 Species	入侵类型 Invasion types	国内分布范围 Distribution (China)	参考文献 References
茂盛头孢藻 <i>C. virescens</i>	皮下种 Subcuticular speices	海南、广东、广西、湖北、云南、福建、湖南 Hainan, Guangdong, Guangxi, Hubei, Yunnan, Fujian, Hunan	黎尚豪和毕列爵, 1998; 陈奕鹏等, 2016; Zhu et al., 2017; 蔡志英等, 2020; Fang et al., 2021
寄生头孢藻 <i>C. parasiticus</i>	细胞间质种 Intercellular species	广西、广东、海南、云南 Guangxi, Guangdong, Hainan, Yunnan	Zhu et al., 2017; 方姣等, 2020; Fang et al., 2021
卡氏头孢藻 <i>C. karstenii</i>	皮下种 Subcuticular speices	海南、广东、云南、湖北 Hainan, Guangdong, Yunnan, Hubei	黎尚豪和毕列爵, 1998; Zhu et al., 2017; Fang et al., 2021
散生头孢藻 <i>C. diffusus</i>	皮下种 Subcuticular speices	广东、云南、海南 Guangdong, Yunnan, Hainan	Zhu et al., 2017; 方姣等, 2020; Fang et al., 2021
宽阔头孢藻 <i>C. expansus</i>	皮下种 Ssubcuticular speices	广东、海南、广西 Guangdong, Hainan, Guangxi	Zhu et al., 2017; 方姣等, 2020; Fang et al., 2021
德鲁特头孢藻 <i>C. drouetii</i>	皮下种 Subcuticular speices	广东、广西、海南 Guangdong, Guangxi, Hainan	Zhu et al., 2017; 方姣等, 2020; Fang et al., 2021
肿毛头孢藻 <i>C. tumidae-setae</i>	皮下种 Subcuticular speices	广西、云南、海南 Guangxi, Yunnan, Hainan	Zhu et al., 2017; 方姣等, 2020; Fang et al., 2021
拉氏头孢藻 <i>C. lagerheimii</i>	皮下种 Subcuticular speices	广西、云南、江西 Guangxi, Yunnan, Jiangxi	黎尚豪和毕列爵, 1998; Fang et al., 2021
亨宁头孢藻 <i>C. henningsii</i>	皮下种 Subcuticular speices	广西 Guangxi	Zhu et al., 2017; 方姣等, 2020
极小头孢藻 <i>C. minimus</i>	细胞间质种 Intercellular species	湖南 Hunan	黎尚豪和毕列爵, 1998

参考文献

Cai ZY, Shi YP, Dai LM, Liu YX, Li LL, Jiang GZ, Yao YL, Mu HJ (2020) The foliicolous parasitic alga *Cephaleuros virescens* on *Hevea brasiliensis*. Journal of Northwest Forestry University, 35(1), 183–188. (in Chinese with English abstract) [蔡志英, 施玉萍, 戴利铭, 刘一贤, 李岚岚, 蒋桂芝, 姚永林, 穆洪军 (2020) 寄生橡胶树叶上的头孢藻. 西北林学院学报, 35(1), 183–188.]

Chen YP, Shi T, Cai JM, Li CP, Li BX, Huang GX (2016) Survey and pathogen identification of a new algae leaf spot disease on cassava in China. Chinese Journal of Tropical Crops, 37, 1787–1792. (in Chinese with English abstract) [陈奕鹏, 时涛, 蔡吉苗, 李超萍, 李博勋, 黄贵修 (2016) 木薯新发藻斑病在中国的发生调查及病原鉴定. 热带作物学报, 37, 1787–1792.]

Fang J, Li SY, Liu BW, Liu GX, Hu ZY, Zhu H (2021) Molecular phylogeny and morphology of *Cephaleuros* (Trentepohliales, Chlorophyta) from southern China. Phycologia, 60, 189–199.

Fang J, Zhu H, Liu GX, Hu ZY (2020) Newly recorded species of *Cephaleuros* in China. Plant Science Journal, 38, 47–57. (in Chinese with English abstract) [方姣, 朱欢, 刘国祥, 胡征宇 (2020) 头孢藻属中国新记录种. 植物科学学报, 38, 47–57.]

Li SH, Bi LJ (1998) Flora Algarum Sinicarum Aquae Dulcis, Tomus V: Chlorophyta. Science Press, Beijing. (in Chinese) [黎尚豪, 毕列爵 (1998) 中国淡水藻志(第五卷): 绿藻门. 科学出版社, 北京.]

Zhu H, Hu ZY, Liu GX (2017) Morphology and molecular phylogeny of Trentepohliales (Chlorophyta) from China. European Journal of Phycology, 52, 330–341.

附录2 头孢藻属已发表的叶绿体基因组统计(数据来源于NCBI, 获取日期: 2025年10月)。IR: 反向重复区。
Appendix 2 Published chloroplast genomes of *Cephaleuros* genus (accessed on 2025-10). IR, Inverted repeat.

序号 No.	物种 Species	标本号 Voucher number	GenBank编号 GenBank number	长度 Length (bp)	是否有IR区 IR region
1	茂盛头孢藻 <i>C. virescens</i>	SAG 42.85	NC060531	314,936	无 No
2	茂盛头孢藻 <i>C. virescens</i>	FJ1315	OQ848499	472,444	无 No
3	散生头孢藻 <i>C. diffusus</i>	HB1902	OQ848501	383,846	无 No
4	寄生头孢藻 <i>C. parasiticus</i>	GD1927	NC060533	266,729	无 No
5	卡氏头孢藻 <i>C. karstenii</i>	GD1942	NC060534	371,192	无 No
6	拉氏头孢藻 <i>C. lagerheimii</i>	GX1816	OQ848500	480,613	无 No

方姣, 覃黎明, 谌嘉丽, 金涵玉, 桂思媛, 吕诗颖, 郑伊可, 胡征宇, 朱欢, 刘国祥 (2026) 头孢藻属的分类学困境与物种多样性: 从形态学、分子系统学到组学. 生物多样性, 34, 25499. <https://www.biodiversity-science.net/CN/10.17520/biods.2025499>

附录3 头孢藻属物种常见的寄主种类

Appendix 3 The common hosts of *Cephaleuros* spp.

物种 Species	寄主 Hosts	来源 Sources	参考文献 References
茂盛头孢藻 <i>C. virescens</i>	珊瑚树 <i>Viburnum odoratissimum</i> , 亚洲络石 <i>Trachelospermum asiaticum</i> , 女贞 <i>Ligustrum lucidum</i> , 光亮山矾 <i>Symplocos lucida</i> , <i>Rhododendron metternichii</i> , 八角金盘 <i>Fatsia japonica</i> , <i>Acanthopanax sciadophylloides</i> , 具柄冬青 <i>Ilex pedunculosa</i> , 铁冬青 <i>Ilex rotunda</i> , 鸡爪槭 <i>Acer palmatum</i> , 交让木 <i>Daphniphyllum macropodum</i> , <i>Daphniphyllum teijsmannii</i> , 秋枫 <i>Bischofia javanica</i> , 蚊母树 <i>Distylium racemosum</i> , 山茶 <i>Camellia japonica</i> , 茶 <i>Camellia sinensis</i> , 长叶润楠 <i>Persea japonica</i> , 红楠 <i>Machilus thunbergii</i> , 荷花木兰 <i>Magnolia grandiflora</i> , 天仙果 <i>Ficus erecta</i> , 白背爬藤榕 <i>Ficus sarmentosa</i> var. <i>nipponica</i> , 青冈 <i>Quercus glauca</i> , 小叶青冈 <i>Quercus myrsinifolia</i> , 白背栎 <i>Quercus salicina</i>	日本 Japan	Suto et al., 2009
	杧果 <i>Mangifera indica</i>	巴西 Brazil	Vasconcelos et al., 2018
	番石榴 <i>Psidium guajava</i>	美国 United States	Sanahuja et al., 2018
	悬钩子属一种 <i>Rubus</i> sp.	美国 United States	Browne et al., 2019
	龙眼 <i>Dimocarpus longan</i>	印度 India	Kumar et al., 2019
	茶 <i>Camellia sinensis</i>	中国 China	Lee et al., 2020
	北美木兰属一种 <i>Magnolia</i> sp.	美国 United States	Baysal-Gurel et al., 2020
	山茶属一种 <i>Camellia</i> sp.	中国 China	Liu et al., 2021
	阳桃 <i>Averrhoa carambola</i>	印度 India	Reddy et al., 2023
	悬钩子属一种 <i>Rubus</i> sp.	墨西哥 México	Cortés Martínez et al., 2023
	黑莓 <i>Rubus fruticosus</i>	美国 United States	Hemphill et al., 2023
寄生头孢藻 <i>C. parasiticus</i>	茶 <i>Camellia sinensis</i>	印度 India	Ramya et al., 2013
	彩叶凤梨属一种 <i>Neoregelia</i> sp., 番石榴 <i>Psidium guajava</i>	美国 United States	Sanahuja et al., 2018
宽阔头孢藻 <i>C. expansus</i>	番石榴 <i>Psidium guajava</i> , 荦拔 <i>Piper longum</i>	泰国 Thailand	Sunpapao et al., 2015
卡氏头孢藻 <i>C. karstenii</i>	五桠果 <i>Dillenia indica</i>	美国 United States	Thompson & Wujek, 1997
	来檬 <i>Citrus aurantifolia</i> , 可可 <i>Theobroma cacao</i> , 马六甲蒲桃 <i>Syzygium malaccense</i> , 垂叶榕 <i>Ficus benjamina</i>	泰国 Thailand	Sunpapao et al., 2015
披毛头孢藻 <i>C. pilosa</i>	莽吉柿 <i>Garcinia mangostana</i>	泰国 Thailand	Sunpapao et al., 2015
疏松头孢藻 <i>C. solutus</i>	榴梿 <i>Durio zibethinus</i>	泰国 Thailand	Sunpapao et al., 2015
	牛心番荔枝 <i>Annona reticulata</i> , 叉叶木 <i>Crescentia alata</i>	哥斯达黎加 Costa Rica	Thompson & Wujek, 1997
	刺果番荔枝 <i>Annona muricata</i>	哥伦比亚 Colombia	Thompson & Wujek, 1997
散生头孢藻 <i>C. diffusus</i>	葫芦树 <i>Crescentia cujete</i>	萨尔瓦多 El Salvador	Thompson & Wujek, 1997
	大叶相思 <i>Acacia auriculiformis</i>	泰国 Thailand	Sunpapao et al., 2016
	太平洋面包树 <i>Artocarpus altitilis</i>	印度 India	Thomas et al., 2016
	绿红厚一种 <i>Calophyllum</i> sp.	哥斯达黎加 Costa Rica	Thompson & Wujek, 1997
内生头孢藻 <i>C. endophyticus</i>	悬钩子属一种 <i>Rubus</i> sp.	英格兰 England	Printz, 1964
青木头孢藻 <i>C. aucubae</i>	青木 <i>Aucuba japonica</i>	日本 Japan	Suto et al., 2009
冠状头孢藻 <i>C. biolophus</i>	青冈 <i>Quercus glauca</i> , 小叶青冈 <i>Quercus myrsinifolia</i> , 乌冈栎 <i>Quercus phillyraeoides</i> , 白背栎 <i>Quercus salicina</i> , 尖叶栲 <i>Castanopsis cuspidata</i> , <i>Pasania edulis</i> , 杨梅 <i>Morella rubra</i>	日本 Japan	Suto et al., 2009
	可可 <i>Theobroma cacao</i>	哥斯达黎加 Costa Rica	Thompson & Wujek, 1997
日本头孢藻 <i>C. japonicus</i>	日本女贞 <i>Ligustrum japonicum</i> , 光亮山矾 <i>Symplocos lucida</i> , 南烛 <i>Vaccinium bracteatum</i> , 马醉木 <i>Pieris japonica</i> , 地锦 <i>Parthenocissus tricuspidata</i> , 欧洲枸骨 <i>Ilex aquifolium</i> , 齿叶冬青 <i>Ilex crenata</i> , 全缘冬青 <i>Ilex integra</i> , 具柄冬青 <i>Ilex pedunculosa</i> , 铁冬青 <i>Ilex rotunda</i> , 红淡比 <i>Cleyera japonica</i> , 柃木 <i>Eurya japonica</i> , 厚皮香 <i>Ternstroemia gymnanthera</i> , 山茶 <i>Camellia japonica</i> , 茶梅 <i>Camellia sasanqua</i> ,	日本 Japan	Suto et al., 2009

物种 Species	寄主 Hosts	来源 Sources	参考文献 References
微小头孢藻 <i>C. microcellularis</i> 亨宁头孢藻 <i>C. henningsii</i>	茶 <i>Camellia sinensis</i> , 月桂 <i>Laurus nobilis</i> , 红楠 <i>Machilus thunbergii</i> , 天竺桂 <i>Cinnamomum japonicum</i> , 罗汉松 <i>Podocarpus macrophyllus</i>	日本 Japan	Suto et al., 2009
	光亮山矾 <i>Symplocos lucida</i> , 红楠 <i>Machilus thunbergii</i>	特立尼达和多巴哥 Trinidad and Tobago	Thompson & Wujek, 1997
	蕉叶白鹤芋 <i>Spathiphyllum cannifolium</i>	印度尼西亚 Indonesia	Schmidle, 1902
拉氏头孢藻 <i>C. lagerheimii</i>	香荚兰属一种 <i>Vanilla</i> sp.	哥斯达黎加 Costa Rica	Thompson & Wujek, 1997
极小头孢藻 <i>C. minimus</i>	鳄梨 <i>Persea americana</i>	哥伦比亚 Colombia	Thompson & Wujek, 1997
	蜜花堇 <i>Melicytus ramiflorus</i>	新西兰 New Zealand	Thompson & Wujek, 1997
	<i>Cunninghamia minimus</i>	中国 China	Karsten, 1891
	蜜汁树 <i>Knightia excelsa</i> , <i>Coprosma australis</i>	新西兰 New Zealand	Thompson & Wujek, 1997
	芭蕉属一种 <i>Musa</i> sp., 蝎尾蕉属一种 <i>Heliconia</i> sp.	所罗门群岛 Solomon Islands	Thompson & Wujek, 1997
肿毛头孢藻 <i>C. tumidae-setae</i>	可可 <i>Theobroma cacao</i>	哥斯达黎加 Costa Rica	Thompson & Wujek, 1997
	野牡丹属一种 <i>Melastoma</i> sp.	哥斯达黎加 Costa Rica, 萨尔瓦多 El Salvador	Thompson & Wujek, 1997
	苘麻属一种 <i>Abutilon</i> sp.	哥伦比亚 Colombia	Thompson & Wujek, 1997

参考文献

- Baysal-Gurel F, Bika R, Jennings C, Palmer C, Simmons T (2020) Comparative performance of chemical and biological-based products in management of algal leaf spot on magnolia. *Hortechonology*, 30, 733–740.
- Browne FB, Brannen PM, Scherm H, Taylor JR, Shealey JS, Fall LA, Beasley ED (2019) Evaluation of disinfectants, algicides, and fungicides for control of orange cane blotch of blackberry in the field. *Crop Protection*, 122, 112–117.
- Cortés-Martínez J, Cruz-Esteban S, Garay-Serrano E (2023) Identificación del alga *Cephaleuros virescens* s.l. en plantas de zarzamora (*Rubus* sp.) en el estado de Michoacán, México. *Acta Botanica Mexicana*, 130, 1–14.
- Hemphill WH, Brannen PM, Richardson EA, Oliver JE (2023) Distinctive features of the orange cane blotch disease cycle on commercial blackberry (*Rubus fruticosus*). *Horticulturae*, 9, 565.
- Karsten G (1891) Untersuchungen über die familie der chroolepideen. *Annales du Jardin Botanique de Buitenzorg*, 10, 1–66.
- Kumar V, Anal AKD, Gupta AK, Nath V (2019) Occurrence of algal leaf spot on longan (*Dimocarpus longan*) caused by *Cephaleuros virescens* in India. *The Indian Journal of Agricultural Sciences*, 89, 1241–1244.
- Lee SH, Lin SR, Chen SF (2020) Identification of tea foliar diseases and pest damage under practical field conditions using a convolutional neural network. *Plant Pathology*, 69, 1731–1739.
- Liu YD, Lin XD, Gao HG, Wang S, Gao X (2021) Study on the model of tea algal spot based on chlorophyll fluorescence spectrum technology. *Spectroscopy and Spectral Analysis*, 41, 2129–2134. (in Chinese with English abstract) [刘燕德, 林晓东, 高海根, 王舜, 高雪 (2021) 基于叶绿素荧光光谱技术的茶叶藻斑病模型研究. *光谱学与光谱分析*, 41, 2129–2134.]
- Printz H (1964) Die Chaetophorales der Binnengewässer. *Hydrobiologia*, 24, 1–376.
- Ramya M, Ponmurugan P, Saravanan D (2013) Management of *Cephaleuros parasitica* Karst (Trentepohliales: Trentepohliaceae), an algal pathogen of tea plant, *Camellia sinensis* (L.) (O. Kuntze). *Crop Protection*, 44, 66–74.
- Reddy DB, Srilatha P, Murthy KGK, Madhusudhan Reddy SIVS, Reddy NP, Reddy PP, Pavani T, Snehalatha G, Sravanthi D (2023) First report of *Cephaleuros virescens* causing algal leaf spot of *Averrhoa carambola* in India. *Plant Disease*, 107, 3641.
- Sanahuja G, Lopez P, Palmateer AJ, Chase AR (2018) Red rust of *Neoregelia Bromeliads* caused by a parasitic alga *Cephaleuros parasiticus* in Florida. *Plant Health Progress*, 19, 27–33.

- Schmidle W (1902) Notizen zu einigen Süßwasseralgen. *Hedwigia*, 41, 150–163.
- Sunpapao A, Pitaloka MK, Arikrit S (2015) The genus *Cephaleuros* Kunze ex EMFries (Trentepohliales, Ulvophyceae) from southern Thailand. *Nova Hedwigia*, 101, 451–462.
- Sunpapao A., Thithuan N., Pitaloka M. K., Arikrit S (2016) Algal leaf spot of *lansium parasiticum* caused by *cephalaleuros* sp in Thailand. *Journal of Plant Pathology*, 98, 369–369.
- Suto Y, Ohtani S (2009) Morphology and taxonomy of five *Cephaleuros* species (Trentepohliaceae, Chlorophyta) from Japan, including three new species. *Phycologia*, 48, 213–236.
- Thomas, BT, Thomas VP, Bhagya MV, Nair SS, Rajan R (2016) New record of phytoparasitic alga, *cephaleuros diffusus* thomson & wujekin (trentepohliaceae, chlorophyta) on *artocarpus incisus* (thunb.) l.f. kerala, india. *International Journal of Modern Botany*, 3, 1–4.
- Thompson RH, Wujek DE (1997) Trentepohliales: *Cephaleuros*, *Phycopeltis*, and *Stomatochroon*: Morphology, Taxonomy, and Ecology. Science Publishers, Enfield.
- Vasconcelos CV, Pereira FT, Duarte EAA, de Oliveira TAS, Peixoto N, Carvalhol DDC (2018) Physiological and Molecular Characterization of *Cephaleuros virescens* Occurring in Mango Trees. *Plant Pathology Journal*, 34, 157–16.