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1 ***Parvilucifera rostrata***

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13 **SUMMARY** (1036/1000 characters)

14 The family Parviluciferaceae (Myzozoa, Perkinsozoa) encompasses ten species of generalist

15 parasitoids of dinoflagellates distributed in five genera and showing very similar morphology and life

16 cycles. Among those, *Parvilucifera rostrata* is distinguished by ultrastructural features of zoospores

17 (i.e., biflagellate infective stages) and the morphology of processes covering the wall of sporocytes

18 (i.e., last developmental stage). The life cycle starts with a zoospore invading a dinoflagellate host

19 concomitantly to its death, with the trophocyte (i.e., feeding stage) evident after ~24 hours and

20 changing in 3–4 days to an extracellular sporocyte, which also can act as resting stage. The sporocyte

21 turns from white to dark when hundreds of zoospores are ready to be released and infect novel

22 hosts. *P. rostrata* has been reported mainly in estuarine systems on the French side of the English

23 Channel, where it has been linked to the demise of toxic dinoflagellate blooms.

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25 (1443/1450 characters)

26 **KEY FACTS**

27 *P. rostrata* infects a broad range of sympatric dinoflagellate hosts in culture conditions, although
28 preference for *Alexandrium minutum* has been observed in field assemblages (apparent host
29 preference was also reported in other Parviluciferaceae species).

30 Host cells quickly lose motility following zoospore infections and sink, suggesting that parasitoid
31 developmental stages in natural conditions occur mostly in sediments. This is supported by the low
32 detection of *P. rostrata* in the plankton both by microscopy and metabarcoding analyses.

33 Zoospores are released through apertures in the late sporocyte wall that open only under the
34 presence of chemical cues from the hosts (similar behavior has been reported in other *Parvilucifera*
35 *species*). Due to this characteristic, sporocytes can thus be stored for months in the fridge (4°C) and
36 cryopreserved.

37 **DISEASE FACTS**

38 Zoospores have a very short life span once released (up to 15 hours). Infective success is thus directly
39 related to high host density.

40 Water temperature is an important factor affecting the infectivity of *P. rostrata*, with higher infection
41 rates being observed at temperatures higher than 20 °C. This is congruent with field data showing a
42 positive direct correlation between this variable and zoospore abundances in plankton assemblages.

43 **TAXONOMY AND CLASSIFICATION**

44 **PHYLUM:** Perkinsozoa

45 **CLASS:** Perkinsea

46 **ORDER:** Perkinsida

47 **FAMILY:** Parviluciferaceae

48 **GENUS:** *Parvilucifera*

49 **SPECIES:** *P. rostrata*

50

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53 were provided by Sophie Lepanse (MERIMAGE platform, Station Biologique of Roscoff) and Gérard
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55 within the Roscoff Culture Collection (RCC).

56 **Declaration of interests**

57 The authors declare no competing interests.

58 **Resources**

59 <http://www.aquasymbio.fr/en/node/40>

60 <https://www.roscoff-culture-collection.org/> (Roscoff Culture Collection)

61 **Literature**

- 62 1. Alacid, E. et al. (2017) In situ occurrence, prevalence and dynamics of *Parvilucifera* parasitoids
63 during recurrent blooms of the toxic dinoflagellate *Alexandrium minutum*. *Frontiers in*
64 *microbiology* 8, 1624.
- 65 2. Blanquart, F. et al. (2016) Evidence for parasite-mediated selection during short-lasting toxic
66 algal blooms. *Proc. R. Soc. B* 283, 20161870.
- 67 3. Garcés, E. et al. (2013) Host-released dimethylsulphide activates the dinoflagellate parasitoid
68 *Parvilucifera sinerae*. *The ISME journal* 7, 1065–1068.
- 69 4. Itoiz et al. (2022) Emerging Parasitic Protists: The Case of Perkinsea. *Frontiers in microbiology* 12,
70 735815.
- 71 5. Jeon et al. (2018). Revisiting the *Parvilucifera infectans*/*P. sinerae* (Alveolata, Perkinsozoa)
72 species complex, two parasitoids of dinoflagellates. *Algae* 33, 1–19.
- 73 6. Jephcott, T.G. et al. (2016) Ecological impacts of parasitic chytrids, syndiniales and perkinsids on
74 populations of marine photosynthetic dinoflagellates. *Fungal Ecology* 19, 47–58.
- 75 7. Lepelletier, F. et al. (2014) *Parvilucifera rostrata* sp. nov. (Perkinsozoa), a novel parasitoid that
76 infects planktonic dinoflagellates. *Protist* 165, 31–49.
- 77 8. Reñé, A. et al. (2021) Host preferences of coexisting Perkinsea parasitoids during coastal
78 dinoflagellate blooms. *Molecular Ecology* 30, 2417–2433.
- 79 9. Reñé, A. et al. (2021) New Perkinsea parasitoids of dinoflagellates distantly related to
80 Parviluciferaceae members. *Frontiers in microbiology*, 2199.
- 81 10. Schmitt, M. et al. (2022) Temperature affects the biological control of dinoflagellates by the
82 generalist parasitoid *Parvilucifera rostrata*. *Microorganisms* 10, 385.

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