Olpidiopsis antithamnionis n. sp. (Oomycetes, Olpidiopsidaceae), a Parasite of Antithamnion floccosum (O. F. Müll.) Kleen from Newfoundland*

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Summary. Olpidiopsis antithamnionis n. sp. (Oomycetes, Olpidiopsidaceae) parasitic on Antithamnion floccosum (O. F. Müll.) Kleen (Rhodophyta, Ceramiaceae) is described from three sites in Newfoundland, Canada, and from culture.

Axial cells of the main and determinate branches of the host are the primary sites of fungal attack, although tetrasporangia and rhizoidal cells are also susceptible. Successful re-infection of A. floccosum was achieved in the laboratory although A. boreale and the trialliella-phase of Bonnemaisonia hamifera, both occurring with A. floccosum in the field, were immune. Regeneration of the host cells was observed, a phenomenon not previously reported in the fungal parasitism of other filamentous benthic marine algae.

Four species of Olpidiopsis Cornu (Oomycetes, Olpidiopsidaceae) have been described as parasites of marine algae; all may occur on members of the Rhodophyta. Johnson and Sparrow (1961) list three: O. andreei (Lagerheim) Sparrow, O. magnusii Feldmann and Feldmann and O. feldmannii Aleem. More recently Feldmann and Feldmann (1967) tentatively referred a fungal parasite of Radicilingua reptans (Kylin) Papenfuss to the genus as O.? dangeardii and Sparrow (1969) has described an unnamed Olpidiopsis infecting a species of Porphyra.

In a previous report the authors referred a fungus parasitic in Antithamnion floccosum (O. F. Müll.) Kleen (Rhodophyta, Ceramiaceae) to O. magnusii (Whittick and South, 1971). Subsequent studies have shown, however, that it should be more correctly assigned to a new species and the designation Olpidiopsis antithamnionis n. sp. is proposed. Populations from three localities in Newfoundland, Canada, and plants isolated in the laboratory form the basis of the investigation.

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Materials and Methods

Infected A. flaccosum was obtained from three localities in Newfoundland: Bay Bulls (47°17′N; 52°47′W); Portugal Cove (47°37′N; 52°52′W) and Logy Bay (47°37′N; 52°40′W) during October and November, 1970. At the first two localities plants occurred at depths of 5–10 m, associated with Antithamnion boreale (Gobi) Kjellm. and the trulliella-phase of Bonnemaisonia hamifera Hariot. Plants from Logy Bay were obtained from depths below 10 m, epiphytic on Ptilota serrata Kütz.

Both living and formalin preserved material was studied; staining with lacto-phenol cotton blue assisted in differentiating between the fungus and the host. Fungal planonts, released into sterile seawater, were observed live and after fixation with osmic acid vapour.

Infected A. flaccosum from Bay Bulls was the source of the cultures used in this study and the planonts, released into sterile seawater were used as an inoculum. Attempts were made, using this inoculum, to infect A. boreale and the trulliella-phase of B. hamifera in the laboratory, using cultured sporelings of the former and field material of the latter.

Cultures were maintained in sterile seawater enriched with phosphate, nitrate, P11 metals, S3 vitamins and vitamin B12 in the concentrations given by Provasoli (1964) for the ASP2 medium. Diatom growth was inhibited by the addition of germanium dioxide (3 mg/l of medium, Lewin, 1966). Cultures were incubated at 10°C at a light intensity of 500 lux emitted from cool white fluorescent tubes, in a 16 h light 8 h dark photoregime.

Results

Olpidiopsis antithamnionis n. sp.

Sporangia spherica (5) 20–40 μm diam., aut ellipsoidea 40–80 (100) μ, × 20–50 (80) μ, membranam levem habentia, 1–3 (8) omni in cellula hospitis. Plerumque 1, rarius 2–3 tubi emissionis cylindri 5–10 (20) μ long × 5–12 (20) μ diam.

Planantes irregulariter pyriformes, 5 × 3 μ, unicum corpus prominentes refractivum atque 2 flagella lateralia habentes, flagello posteriore paululuo longiore quam anterius. Sporae dormientes ignotae.

Planta Antithamnion flaccosum interficiens in tribus locis in Nova Terra, Canada.

Planta typica NFLD No. 6114.

Locus typi: Locus Boone Point, Bay Bulls, Newfoundland dictus.

Fig. 1. Fungal sporangium with discharge tube (d.t.) containing mature planonts (pl.)
Fig. 2. Contraction of the protoplasm and thickening of the algal cell wall to produce a sheathing effect (s), induced by the fungal infection of the adjacent cell
Fig. 3. Fungal sporangia in consecutive axial cells of the host
Fig. 4. Multiple fungal infection of a single host axial cell
Fig. 5. Regeneration of the host by protrusions arising from healthy distal cells and growing within the walls of the previously infected cells
Fig. 6. Regenerating of an infected axial cell by protrusions from both adjacent cells