

Professor Jim Callow BSc, PhD, CBiol, FSB

Emeritus Professor of Botany

[School of Biosciences \(/schools/biosciences/index.aspx\)](/schools/biosciences/index.aspx)

Contact details

Telephone +44 (0)121 41 45559 (tel:+44 121 41 45559)

Fax +44 (0)121 41 45925

Email j.a.callow@bham.ac.uk (mailto:j.a.callow@bham.ac.uk)

School of Biosciences
University of Birmingham
Edgbaston
Birmingham
B15 2TT
UK



About

Professor Callow is a leading international authority on the study of marine algae, with a focus on bioadhesion (how algal cells interact with and adhere to surfaces). In recent years the emphasis has been on interdisciplinary, collaborative investigations into the interactions between algal cells and micro/nanostructured materials, including those with 'biomimetic' implications, an area which has profound importance for the applied problem of marine biofouling.

Professor Callow leads two major European programmes in the area of nanomaterials for antifouling applications. For over 15 years the laboratory has played a key role as a centre of biological expertise in the programme on marine biofouling run by the US Office of Naval Research.

Qualifications

BSc, PhD

Biography

Jim Callow obtained a First Class Honours BSc and PhD in Botany from the University of Sheffield in 1966 and 1969 respectively. He was appointed to a Lectureship in the University of Leeds (1969-1982) and then to the titular Chair of Botany and Headship of the Department of Plant Sciences in the University of Birmingham in 1983. He was appointed the first Headship of the School of Biological Sciences (1988-1994). His appointment is currently held in the School of Biosciences. Professor Callow has been extensively involved in the work of the research committees of UK Research Councils (AFRC/BBSRC) and has held positions on the governing bodies of several UK plant science research centres. More recently he has been involved in several EU-funded research projects, notably as initiator and Coordinator of the interdisciplinary 6th Framework Integrated Project 'AMBIO' (Advanced Nanostructured Surfaces for the Control of Biofouling). He also initiated and coordinates the Marie-Curie Initial Training Network 'SEACOAT' (Surface Engineering for Antifouling-Advanced Coordinated Training).

Professor Callow's current research interests are in the cell biology of marine organisms (algae) in the context of recognition and adhesion processes, including those involved in the colonisation of substrates in the marine environment. This has led variously to studies on the role of interfacial physico-chemical properties in surface colonisation, studies on the molecular and mechanical properties of the bioadhesives ('glues') used by fouling organisms, studies on the cell biology of glue secretion and the role of biofilms in moderating the adhesion of algae. He has authored or co-authored over 150 papers in international, peer-reviewed journals.

Research

Research Theme within School of Biosciences: Organisms and Environment

Lab website address

<http://www.biosciences-labs.bham.ac.uk/callowj/ent/> (<http://www.biosciences-labs.bham.ac.uk/callowj/ent/>)

Short research description

- Cell biology of adhesion mechanisms used by marine algae in cell-substratum interactions
- Nanotechnology in the context of biological adhesion (collaborative interdisciplinary approaches with physical scientists and materials engineers).
- Novel approaches to the control of bioadhesion and marine biofouling

Full research description

Algal bioadhesion in the context of marine biofouling

Research focuses on three types of marine algae that cause biofouling problems on the hulls of ships; the green seaweed *Ulva*, the brown seaweed *Ectocarpus*, and the unicellular diatom *Navicula* (or its close relative, *Seminavis*).

We use these as model organisms with which to investigate bioadhesion processes in relation to biofouling. Funding is currently provided by the Office of Naval Research (USA), the EC (Framework 7) and industry.

Work involves interdisciplinary collaborations with surface scientists, physicists, nanotechnologists and polymer scientists in the US and Europe. To study surface selection cues involved in the recruitment of our test organisms we use well-characterised self-assembled monolayers of various types and engineered surfaces presenting various micro- to nanoscale topographies. Adhesion strength of attached cells is measured hydrodynamically.

The research is generating novel insights into how these organisms detect and respond to surface cues and this information is then used in knowledge-driven approaches to the development of practical antifouling coatings.

In other studies we are interested in understanding the cellular and physiological basis of surface selection. For example we recently established that the NO-signalling cascade is involved in perception and response of diatoms to surfaces of different wettability.

Other activities

Professor Callow is currently the Coordinator of [SEACOAT \(http://www.seacoat.bham.ac.uk/\)](http://www.seacoat.bham.ac.uk/), a Marie-Curie Initial Training Network in the area of marine antifouling.

Visiting Professor, Jožef Stefan International Postgraduate School, Ljubljana, 2008- to date

Publications

2011

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