

Pamela M. Campbell Ph. D.

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Education

Institute of Freshwater Ecology and Brunel University (1989-1992)

Cumbria/ Uxbridge, U.K.

Ph.D. Biology (Physiology/Endocrinology).

Brunel University (1985 – 1989)

Uxbridge, U.K.

B.Sc. (Honours) First Class Degree in Applied Biology

John Douglas Memorial Prize 1989

Part One Prize for Biology 1988

Professional experience

Principal Consultant (April 2000 – present)

ToxEcology – Environmental Consulting Ltd.

Vancouver, BC, Canada

- Services include: Scientific research, risk assessment, development of risk management strategies, expert analysis of data, project design and coordination, scientific report writing, editing, expert peer-review. Clients include: Fisheries & Oceans Canada, Environment Canada, Health Canada, Nova Chemicals Inc., Canadian Petroleum Products Institute, Science Council of British Columbia - Fisheries Renewal BC, Provincial Government of British Columbia - Ministry of Water, Land and Air Protection (formerly Ministry of Environment Lands and Parks), BC Green Economy Secretariat.
- NSERC Environment and Sustainable Development Panel member appointed for the period 2002-2005
- Invited participant – Canadian 5NR Expert Workshop. Setting the National Agenda for Endocrine Disrupting Compounds. February 12 to 18, 2000.
- Member of TSRI (Toxic Substances Research Initiative) Expert Technical Review Committee (Health Canada/Environment Canada), 1999 to 2003.
- Member of Advisory Committee for the BEST Program, British Columbia Institute of Technology (BCIT) 2001-2003

Environmental Manager (August 1998 – January 2000)

Canadian Scientific External and Regulatory Affairs

Procter and Gamble, Toronto, Canada

Responsibility for the development and execution of scientific management programs, and for coordinating regulatory and scientific external relations for North American projects. Assessment of potential business impact of regulatory change, environmental issues. Development of environmental risk assessments, and research strategies. Responsibility for work within industry associations for management of existing and emerging environmental issues.

- Member of the Endocrine Technical Implementation Panel (industry, government and academic scientists) charged with coordinating research strategies, peer-review of research proposals and oversight of research. Part of a global industry initiative to address long range research issues and including external peer review and extensive collaboration with academia and government.
- Invited participant to an expert Department of Fisheries & Oceans workshop on developing DFO's research strategy for endocrine disrupters. Oct 26-27, 1998 Ottawa, Canada

- Member of the Endocrine Modulators Industry Coordinating Group (EMICG) and member of CMCS & SDA task groups.
- Co-organiser of an International SETAC/OECD/European Commission workshop on Endocrine Disrupters and Invertebrates - Endocrinology, Testing and Assessment (EDIETA) conducted in the Netherlands, Dec. 12-15 1998. Prepared background materials, rapporteur for one of the working groups, and co-author of subsequent publication. This publication received an *Excellence Award* in 2000 from the Society for Technical Communication.
- Member of the CEPA (Canadian Environmental Protection Act) Industry Coordinating Group, the CMCS Environment Committee, the CCPA National Environmental Quality Committee

Ecotoxicologist (May 1996 – August 1998)

Scientific External and Regulatory Affairs - Europe

Procter and Gamble, European Technical Center (Eurocor), Belgium

Environmental research with responsibility for the development and execution of environmental management programs, including ecological risk assessments. Coordinating regulatory and scientific external relations for global projects.

- Responsible for the design and coordination of toxicity tests and risk assessments to evaluate the safety of product ingredients. Working on upstream projects directly with product research and development scientists to ensure acceptable environmental profiles of final products.
- Member of OECD expert working group on endocrine disrupters testing and assessment. Identifying and prioritising enhancements to existing OECD Test Guidelines to facilitate the detection of endocrine disrupting substances, and developing a proposal for future OECD work in this area.
- Member of the ECETOC (European Centre for the Ecotoxicology and Toxicology of Chemicals) Endocrine Disruptors Task Force. Roles include development of strategy and research planning, acting as expert reviewer of research proposals, including proposals submitted to CEFIC (European Chemical Industry) in the area of assessing the ecological impact of endocrine disruptors. Invited participant in the EMSG (Endocrine Modulators Steering Group) Testing Strategies Working Group, Chair of the Ecotoxicology Subgroup.
- Member of the ECETOC Mammalian Reproductive Toxicity Task Force - assessing new guidelines for reproductive toxicity testing methods.
- Co-organiser of a SETAC/OECD/EC workshop on endocrine modulators - wildlife testing and assessment methods (EMWAT) conducted in April 1997.
- Invited participant in CMA/WWF/EPA expert workshop in Kansas City, US March 17-19, 1997 providing input on testing methods to assess the ecological impact of endocrine disruptors to EPA's EDSTAC (Endocrine Disrupter Screening and Testing Advisory Committee).
- Invited speaker and participant at the U.K. Institute of Environmental Health workshop on wildlife and endocrine disruptors May 28-30, 1997 - contributing to setting the research agenda on the assessment of ecological effects for U.K. Government for 1997-2000.
- Coordinator of EMSG-funded research program "Endocrine modulators and aquatic organisms: An assessment of different testing approaches". Developing effective collaborations between industry groups, academics and government scientists to achieve research objectives.

Postdoctoral Researcher (January 1993 – April 1996)

West Vancouver Laboratory, B.C., Canada

Project conducted in the Molecular Biology Laboratory of Dr. R.H. Devlin, funded by The Leverhulme Trust (U.K.) and Canadian Department of Fisheries and Oceans (DFO) - Green Plan. Focused on examining the potential links between pollutant-induced changes at the molecular level and reproduction.

- Developed a reverse-transcriptase-competitive-PCR assay to quantitate CYP1A1 mRNA levels (a sensitive bioindicator of specific environmental pollution) in Pacific salmon. Used this RT-cPCR assay to study the response/sensitivity of chinook salmon to pollution exposure.
- Studied pollutant-induced changes in gene expression in Pacific salmon in both lab and field studies (including CYP1A1, aromatase, ribosomal protein L5 expression). The results of some of these studies were used, in conjunction with results showing effects in other marine species, to assess discharges from industrial operations which impinge on estuarine rearing habitat for juvenile chinook.
- Using *in vitro* culture systems and *in vivo* studies examined changes in gene expression in ovaries and testes of salmon exposed to organic pollutants, indicating a direct effect of organic contaminants at the gonadal level.
- Worked with various groups to determine the potential impact of pollutant exposure on the survival of threatened stocks of chinook salmon.

Research Assistant (November 1992 – January 1993)

Brunel University, Uxbridge, Middx, UK

Conducted research on the reproductive endocrinology of trout, and prepared manuscripts for publication.

Ph.D. Student (October 1989 – November 1992)

Institute of Freshwater Ecology and Brunel University, U.K.

Investigated the effects of stress on various reproductive parameters in salmonids (brown and rainbow trout) under the supervision of Professor J.P. Sumpter and Dr. T.G. Pottinger. This project established that stress-induced physiological changes in fish could be linked to changes of ecological significance including reduced reproductive capacity.

- Studied the effects of stress on plasma steroids and vitellogenin using radioimmunoassays and evaluated abundance and affinity of estradiol receptors and plasma steroid binding protein.
- Utilized an *in vitro* system to study the secretion of sex steroids by isolated ovarian follicles.
- Maintained salmonid cultures from artificial fertilisation to the juvenile stage, including broodstock husbandry.
- Established that stress has deleterious effects on reproductive endocrinology, and that these changes can reduce the reproductive success of fish by reducing the quality of gametes and hence offspring survivorship.

Student work placement (April 1988 – September 1988)

Ciba-Geigy Ltd., Basel, Switzerland.

Involved in screening potential anti-breast cancer drugs for post-menopausal women.

- Utilized enzyme assays and thin-layer-chromatography to determine the efficacy of aromatase inhibitors

Student work placement (April 1987 – September 1987)

Institute of Grassland and Animal Production, Reading, U.K.

Involved in developing and assessing different molecular techniques to locate prolactin mRNA in ruminant mammary tissue.

- Tissue culture of mouse mammary gland explants
- Utilized various histological techniques, immunocytochemistry and autoradiography

Student work placement (April 1986 – September 1986)

Commonwealth Institute of Biological Control, Silwood Park, Ascot, U.K.

The main focus of this project, funded by the New Zealand Government, involved the identification and screening of potential biocontrol agents to combat the spread of Gorse and Broom.

- Conducted a variety of feeding and oviposition tests.
- Developed an artificial diet to aid the culture of coffee berry borers

Publications (peer-reviewed)

Hutchinson, T.H., Brown, R., Brugger, K., **Campbell, P.M.**, Holt, M., Länge, R., McCahon, P., Tattersfield, L., and van Egmond, R. **2000**. Ecological Risk Assessment of Endocrine Disrupters. Environmental Health Perspectives Volume 108, Number 11.

LeBlanc, G.A., **Campbell, P.M.**, den Besten, P., Brown, R.P., Chang, E.S., Coats, J., deFur, P.L., Dhadialla, T., Edwards, J., Riddiford, L.M., Simpson, M., Snell, T., Thorndyke, M. **1999**. Invertebrate Endocrinology. In: Endocrine Disruption in Invertebrates: Endocrinology, Testing, and Assessment (EDIETA). Outcome from a SETAC/OECD/USEPA/EC workshop held December 12-15, 1998, Noordwijkerhout, NL. SETAC Special Publication, Pensacola FL 32501-3367, USA. 320pp [Note: This publication was awarded a FTCC 2000 *Excellence Award* by the Society for Technical Communication]

Ankley, G., Mihiach, E., Stahl, R., Tillitt, D., Colburn, T., McMaster, S., Miller, R., Bantle, J., **Campbell, P.M.**, Dickerson, R., Fry, M., Giesy, J., Gray, L.E., Guiney, P., Hutchinson, T., Kennedy, S., Kramer, V., LeBlanc, G., Mayes, M., Nimrod, A., Patino, R., Peterson, R., Purdy, R., Ringer, R., Thomas, P., Van der Kraak, G., and Zacharewski, T. **1998**. Overview of a workshop on screening methods for detecting potential [anti-] estrogenic/androgenic chemicals in wildlife. Environmental Toxicology and Chemistry; 17 (No. 1): 68-88

Campbell, P.M., and T.H. Hutchinson. **1998**. Wildlife and endocrine disrupters: requirements for hazard identification. Environmental Toxicology and Chemistry; 17 (No. 1); 127-135

Zacharewski, T., **Campbell, P.M.**, Routledge, E., Cooper, R., Kime, K., Wenzel, A., Huet, M-C. **1997**. In vitro methods. In: L.J. Tattersfield, P. Matthiessen, P.M. Campbell, R. Lange, N. Grandy eds. Endocrine modulators and wildlife: assessment and testing (EMWAT). SETAC-Europe/OECD/EC workshop held April 10-13, 1997, Veldhoven, NL. SETAC-Europe Special Publication, Brussels, Belgium.

Ashby, J., Houthoff, E., Kennedy, S.J., Stevens, J., Bars, R., **Campbell, P.**, Van Miller, J., Carpanini, F.M. and Randall, G. **1997**. The challenge of endocrine disrupting chemicals Environmental Health Perspectives: 105 (2); 164-169

Afonso, L.O.B., **Campbell, P.M.**, Iwama, G.K., Devlin, R.H. and Donaldson, E.M. **1997**. The effect of the aromatase inhibitor fadrozole and two polynuclear aromatic hydrocarbons on sex steroid secretion by ovarian follicles of coho salmon. General and Comparative Endocrinology: 106 (2); 169-174.

Campbell, P.M. and Devlin, R.H. **1997**. Increased ribosomal protein L5 and CYP1A1 gene expression in a teleost: the response of juvenile chinook salmon to coal dust exposure. Aquatic Toxicology: 38, 1-15.

Campbell, P.M., Kruzynski, G.M., Birtwell, I.K. and Devlin, R.H. **1996**. The quantitation of dose-dependent increases in CYP1A1 mRNA levels in juvenile chinook salmon exposed to treated BKME using two field sampling techniques. Environmental Toxicology and Chemistry: 15 (7): 1119-1124.

Campbell, P.M. and Devlin, R.H. **1996**. Expression of CYP1A1 in livers and gonads of Pacific salmon: Quantitation of mRNA levels by RT-cPCR. Aquatic Toxicology: 34: 47-69.

Campbell, P.M., Pottinger, T.G. and Sumpter, J.P. **1994**. Preliminary evidence that chronic confinement stress reduces the quality of gametes produced by brown and rainbow trout. Aquaculture 120:151-169.

Campbell, P.M., Pottinger, T.G. and Sumpter, J.P. **1994**. Changes in the affinity of estrogen and androgen receptors accompany changes in receptor abundance in brown and rainbow trout. General and Comparative Endocrinology. 94: 329-340.

Sumpter, J.P., Pottinger, T.G., Rand-Weaver, M. and **Campbell, P.M.** **1994**. The wide-ranging effects of stress on fish. Perspectives in Comparative Endocrinology: 535-538.

Campbell, P.M., Pottinger, T.G. and Sumpter, J.P. **1992**. Stress reduces the quality of gametes produced by rainbow trout. Biology of Reproduction 47: 1140-1150.

Campbell, P.M. **1992**. The Effects of Stress on the Reproductive Endocrinology and Gamete Quality of Trout. Ph.D. Thesis. Brunel University, Uxbridge, Middx., U.K.

Tyler, C.R., Sumpter, J.P. and **Campbell, P.M.** **1991**. Uptake of vitellogenin into oocytes during early vitellogenic development in the rainbow trout, *Oncorhynchus mykiss* (Walbaum). Journal of Fish. Biology 38: 681-689.

Technical Reports

Campbell, P.M. **2003**. Technical and Socio-Economic Background Study on the Flame Retardant Polybrominated Diphenyl Ethers (PBDEs). Prepared for Environment Canada, Pollution Prevention Branch, by ToxEcology Environmental Consulting Ltd. Final Report November 2003. 204pp

Campbell, P.M. and Berry, T. **2003**. Quantitative Cost-Benefit Analysis for Products Containing Nonylphenol and its Ethoxylates. Prepared for Environment Canada, Regulatory and Economic Analysis Branch, National Capital Region, Hull, Quebec, by ToxEcology Environmental Consulting Ltd and Compass Resource Management Ltd. Final Report June 2003. Contract: K2222-0-0021. 160pp

Campbell, P.M. and Orr, J. **2003**. 2-Methoxyethanol and 2-Butoxyethanol: Use Patterns in Canada, Environmental Profiles and Human Toxicology of Possible Substitutes, and the Feasibility of Performing an Exposure Assessment Study. Prepared for Toxics Management, Health Canada, Ottawa, Ontario by ToxEcology Environmental Consulting Ltd. Final Report May 23 2003. Contract: 4500050595. 192pp

Campbell, P.M. **2003**. Review of the High Production Volume Testing Program Robust Summaries for the Propylene Stream Category of Substances to be submitted by American Chemistry Council Petroleum Gases/Propylene Streams Working Group to USEPA. Prepared for Nova Chemicals by ToxEcology Environmental Consulting Ltd. March 06 2003.

Campbell, P.M., Delorme, P., Francois, D., Hart, C., Hodge, V., Kaminski, G., Kriz, C., Mulye, H., Sebastien, R., and Takacs, P. **2002**. The Concept of Assessment Endpoints: A Background Document for the PMRA Workshop on Assessment Endpoints for Environmental Protection. August 2002, 18pp.

Campbell, P.M. **2002**. Qualitative Screening of Risk Management Instruments for NP/NPEs in Municipal Wastewater Effluents. Prepared for the Environmental Technology Advancement Directorate, Environmental Protection Service, Environment Canada, Hull, Quebec by ToxEcology Environmental Consulting Ltd. July 2002. Contract: K2610-1-0105, 130pp.

Campbell, P.M. **2002**. Review of Sewer Use Bylaw Discharge Limits. Prepared for the Canadian Petroleum Products Institute by ToxEcology – Environmental Consulting Ltd. May 31, 2002. 68pp.

Campbell, P.M. **2002**. Alternatives for Nonylphenol Ethoxylates: Review of Aquatic Toxicity, Human Safety, Biodegradation, Technical and Economic Aspects. Prepared for Environment Canada, Regulatory and Economic Analysis Branch, National Capital Region, Hull, Quebec, and Pollution Prevention and Toxics Branch, Montreal, Quebec by ToxEcology Environmental Consulting Ltd. March 17, 2002. Contract: K2222-1-0019, 77pp.

Campbell, P.M. **2002**. Environmental Assessment Endpoints and Ecological Risk Assessment. Prepared for Health Canada, Pest Management Regulatory Agency, Ottawa, Ontario by ToxEcology Environmental Consulting Ltd. March, 2002. Contract: H5020-1-JS32.

- Campbell, P.M. 2002.** Analysis of the National Pollutant Release Inventory (NPRI) and the Reporting of Nonylphenol and its Ethoxylates. Prepared for Environment Canada, Pollution Prevention and Toxics Branch, Montreal, Quebec, by ToxEcology Environmental Consulting Ltd. February 03, 2002. Contract: KM351-1-6902, 185pp.
- Campbell, P.M. 2002.** Qualitative Screening of Risk Management Instruments for the reduction of NP/NPEs in Cleaning Products. Prepared for Environment Canada, Regulatory and Economic Analysis Branch, National Capital Region, Hull, Quebec, by ToxEcology Environmental Consulting Ltd. as part of the PSL2 assessment of Nonylphenol and its Ethoxylates by Health and Environment Canada. January 08, 2002. Contract: K0821-1-0069, 183pp.
- Campbell, P.M. 2001.** Toxicological Profile on Ethylene: Summary of Sources, Human Exposure, Health Effects, Environmental Fate and Effects. Prepared for NOVA Chemicals Inc., Calgary, Alberta/Washington D.C., by ToxEcology Environmental Consulting Ltd.: September, 2001. 10pp.
- Campbell, P.M. 2001.** Toxicological Profile on Alkylphenols: Summary of Sources, Human Exposure, Health Effects, Environmental Fate and Effects. Prepared for NOVA Chemicals Inc., Calgary, Alberta/Washington D.C., by ToxEcology Environmental Consulting Ltd.: August, 2001. 10pp.
- Campbell, P.M. 2001.** Nonylphenol and its Ethoxylates – Details on use in product categories, product imports, economic importance to producers, and country-specific actions in Europe. Prepared for Environment Canada, Regulatory and Economic Analysis Branch, National Capital Region, Hull, Quebec, by ToxEcology Environmental Consulting Ltd. as part of the PSL2 assessment of Nonylphenol and its Ethoxylates by Health and Environment Canada. July 03, 2001. Contract: K2222-1-0001, 103pp.
- Campbell, P.M. 2001.** Inventory and Technical/Socio-Economic Background Study for 2-Butoxyethanol and 2-Methoxyethanol. Prepared for Environment Canada, Regulatory and Economic Analysis Branch, National Capital Region, Hull, Quebec, by ToxEcology Environmental Consulting Ltd. as part of the PSLII assessment of 2-Butoxyethanol and 2-Methoxyethanol by Health and Environment Canada. June 01, 2001. Contract: K2222-0-0117, 242 pp
- Campbell, P.M. 2001.** Assessment of the feasibility of using an ecolabel scheme to promote sustainable growth of the aquaculture industry in British Columbia. Prepared for the Science Council of British Columbia by ToxEcology Environmental Consulting Ltd. as part of the Applied Research and Development Program of Fisheries Renewal BC. April 30, 2001. Project: FS00-38. 33 pp.
- Campbell, P.M. 2001.** Development of a BC Green Pages – A Business Plan. Prepared for the Green Economy Secretariat of the BC Ministry of Environment, Lands and Parks by ToxEcology Environmental Consulting Ltd. February 16, 2001. Project: 131160. 69 pp.
- Campbell, P.M., McCarty, L.S. and Holm, W. 2000.** Technical and Socio-Economic Background Study for Nonylphenol and its Ethoxylates. Prepared for Environment Canada, Regulatory and Economic Analysis Branch, National Capital Region, Hull, Quebec, by ToxEcology Environmental Consulting Ltd. as part of the PSLII assessment of Nonylphenol and its Ethoxylates by Health and Environment Canada. Contract: K0821-0-0021, 127 pp
- Panter, G.H., Tyler, C.R., Maddix, S., **Campbell, P.M.**, Hutchinson, T.H., Laenge, R., Lye, C., Sumpter, J.P. **1999.** Development, validation and use of an enzyme-linked immunosorbent assay (ELISA) to quantify vitellogenin concentrations in fathead minnows (*Pimephales promelas*). EMSG Aquatic Research Programme - Progress Report, Project A. 28pp. CEFIC-EMSG, B-1160 Brussels, Belgium.
- Brugger, K., **Campbell, P.M.**, Einarson, S., Hutchinson, T., Laenge, R., McCahon, P., Tattersfield, L., Van Egmond, R., Holt, M. **1999.** Screening and testing methods for ecotoxicological effects of endocrine disruptors: Response to the EDSTAC recommendations and a proposed alternative approach. European Centre for the Ecotoxicology and Toxicology of Chemicals (ECETOC) Technical Publication No. 39. 40pp. ECETOC, B-1160 Brussels, Belgium.

- Campbell, P.M. 1998.** Overview of aquatic research programme - assisting international process of validation of assays and ED testing strategies. Endocrine Disrupter Newsletter. Issue 1. European Centre for the Ecotoxicology and Toxicology of Chemicals (ECETOC). 4pp. ECETOC, B-1160 Brussels, Belgium
- Pasek, G., **Campbell, P.M.**, Pickard, J., McCleay, M. and McKinley, J.W. **1995.** Impact of coal dust on the marine environment. BCRI Report No. 2-11-0753. Prepared for Environmental Protection, Environment Canada - Pacific and Yukon Division. 50 pp.
- Campbell, P.M.** and Devlin, R.H. **1995.** Assessing the exposure of fish to pollutants: A sensitive molecular technique to quantitate CYP1A1 mRNA levels. Bulletin of the Aquaculture Association of Canada. 95-2: 33-41.
- Campbell, P.M. 1994.** Stressed fish produce gametes of poorer quality. Aquaculture Update No. 68: 1-2 (Ed.; Margolis L., Aquaculture Division, Pacific Biological Station, Nanaimo, B.C., Canada)
- Pottinger, T. G., **Campbell, P. M.** & Sumpter, J. P. **1991.** Functional consequences of stress during the reproductive period in rainbow trout. Trout News 13, 25-29.

Publications in Conference Proceedings

- Campbell, P.M.**, Huppé, F., Ferry, J-F, Kowlessar, I., Portugais, J. 2002. Nonylphenol and its Ethoxylates – Beyond the PSL 2 Assessment. Aquatic Toxicity Workshop, Whistler BC. October 20-23, 2002. Published: Canadian Technical Report of Fisheries and Aquatic Sciences, Technical Report #2438 p53
- Campbell, P.M.** 2002. Sewer Use Bylaws – Review of the Science and Practical Relevance for Source Control. Aquatic Toxicity Workshop, Whistler BC. October 20-23, 2002. Published: Canadian Technical Report of Fisheries and Aquatic Sciences, Technical Report #2438 p32
- Ankley, G.T., Cameron, K., **Campbell, P.M.**, Crane, M., DeFur, P., Huet, M-C., Ingersoll, C., LeBlanc, G., Matthiessen, P., Stahl, R., Tattersfield, L.J., Verthaak, D. 1999. The International SETAC workshop on endocrine disruption in invertebrates: Endocrinology, testing and assessment (EDIETA). Society of Environmental Toxicology and Chemistry, 20th Annual Meeting, 14-18 November, Philadelphia, USA
- Panter, G.H., **Campbell, P.M.**, Hutchinson, T.H., Kime, D.E., Laenge, R., Lye, C., McCahon, P., Sumpter, J.P., Tattersfield, L.J., and Tyler, C.R. 1999. Development of an endocrine disrupter screening assay with fathead minnows. Society of Environmental Toxicology and Chemistry - Europe, 9th Annual Meeting, 25-29 May, Leipzig, Germany.
- G. Glod, **P.M. Campbell**, T.C.J. Feijtel, P.H. Masscheleyn, E. Matthijs, A. Rottiers, M. Stalmans. 1999. Environmental Risk Assessment of C₁₂₋₁₄ Glucose Amide and its intermediates C₄- and C₆-N-methylglucamine. GDCh (Gemeinschaft Deutscher Chemiker) meeting, 3-5 May 1999, Wurzburg, Germany.
- Panter, G.H., **Campbell, P.M.**, Hutchinson, T.H., Kime, D.E., Laenge, R., McCahon, P., Sumpter, J.P., and Tattersfield, L.J. 1998. Effects of endocrine disrupters in fathead minnow. Society of Environmental Toxicology and Chemistry, 19th Annual Meeting, 16-20 November, Charlottetown, NC, USA.
- Laenge, R., **Campbell, P.M.**, Einarson, S., Hutchinson, T.H., McCahon, P. Scholz, N., Tattersfield, L., van Egmond, R. 1997. Endocrine disruptors in wildlife organisms: An approach to assess the hazard and the risk. IBC Conference “Endocrine Disrupters in the Environment” 14-15 May 1998. London, UK.
- Campbell, P.M.** Endocrine disrupter and wildlife: An approach to assess the hazard and the risk. Pseudo-hormones in the environment: reality or fiction? 1997. Study Day, Engineering Institute of Antwerp (Technologisch Instituut, Genootschap Milieutechnologie), 10 December, Antwerp, Belgium
- Laenge, R., **Campbell, P.M.**, Einarson, S., Hutchinson, T.H., McCahon, P. Scholz, N., Tattersfield, L., van Egmond, R. 1997. Endocrine disruptors in wildlife organisms: An approach to assess the hazard and the risk. Society of Environmental Toxicology and Chemistry, 18th Annual Meeting, 16-20 November, San Francisco, USA.

- Campbell, P.M.** and Devlin, R.H. 1996. Increased CYP1A1 and L5 gene expression: the response of chinook salmon to coal dust exposure. Proceedings of the Fourth International Symposium on the Biology of Fishes, July 21-27, University of San Francisco, U.S.A.
- Donaldson, E.M., Devlin, R.H. Higgs, D.A., Solar, I.G., Dye, H.M., **Campbell, P.M.** and Dosanjh, B. 1996. Biotechnology in salmonid aquaculture. Proceedings of the 5th Annual Meeting of the Japanese Society of Marine Biotechnology, Sendai, 18-19 May, 1996
- Afonso, L.O.B., **Campbell, P.M.**, Iwama, G.K., Devlin, R.H. and Donaldson, E.M. 1996. *In vitro* effects of the aromatase inhibitor Fadrozole (CGS 16949A) and PAHs on sex steroid secretion by ovarian follicles of coho salmon (*Oncorhynchus kisutch*). Proceedings of the Canada West Society for Reproductive Biology, 18th Annual Winter Workshop, Feb. 22-24, University of British Columbia, Vancouver, B.C., Canada. pp 27.
- Campbell, P.M.**, Kruzynski, G.M., Birtwell, I.K. and Devlin, R.H. 1995. Elevated CYP1A1 mRNA and increased predation on juvenile chinook salmon exposed to BKME in winter. Proceedings of the 2nd World Congress of Environmental Toxicology and Chemistry, Nov. 5-9, Vancouver, B.C., Canada.
- Campbell, P.M.** and Devlin, R.H. 1995. Fish and Pollution: A highly sensitive technique to assess exposure. Aquatech '95; Annual meeting of the Canadian Aquatic Biotechnology Network, Jan. 28, Vancouver, B.C., Canada.
- Campbell, P.M.** and Devlin, R.H. 1994. Induction of CYP1A1 in the livers, gills and gonads of juvenile chinook: Measurement of mRNA levels by RT-cPCR. Proceedings of the 2nd International Conference on the Environmental Fate and Effects of Bleached Pulp Mill Effluents, Nov. 6-9, Vancouver, B.C., Canada.
- Campbell, P.M.** and Devlin, R.H. 1994. The induction of P4501A1 (CYP1A1) in the livers and gonads of juvenile chinook salmon. Proceedings of the Third International Symposium of Marine Biotechnology, Aug. 7-12, Tromso, Norway.
- Campbell, P.M.** and Devlin, R.H. 1994. The induction of P4501A1 in the livers and gonads of juvenile chinook salmon. Proceedings of the High Performance Fish Symposium, June 16-21, University of British Columbia, Vancouver, Canada.
- Campbell, P.M.**, Pottinger, T.G. and Sumpter, J.P. 1993. Changes in the affinity of estrogen and androgen receptors accompany changes in receptor abundance in brown and rainbow trout. In: Proceedings of the XIIth International Symposium of Comparative Endocrinology, Toronto, Canada. pp A-17.
- Sumpter, J.P., **Campbell, P.M.**, Pottinger, T.G. and Rand-Weaver, M. 1993. The wide-ranging effects of stress in trout. In: Proceedings of the XIIth International Symposium of Comparative Endocrinology, Toronto, Canada. pp A-152.
- Pottinger, T.G., **Campbell, P.M.** and Sumpter, J.P. 1991. Stress-induced disruption of the liver-gonad axis. In: Reproductive Physiology of Fish (eds. Scott, A.P., Sumpter, J.P., Kime, D.E. and Rolfe, M.S.) pp 114-116.
- Campbell, P.M.**, Pottinger, T.G. and Sumpter, J.P. 1991. Effects of acute stress on time of ovulation, egg size, egg survival and sperm counts in rainbow trout. In: Reproductive Physiology of Fish (eds. Scott, A.P., Sumpter, J.P., Kime, D.E. and Rolfe, M.S.) pp 114-116.
- Carragher, J.P., **Campbell, P.M.**, Tyler, C.R. and Sumpter, J.P. 1989. Vitellogenin stimulates steroidogenesis in cultured ovarian follicles. In: Proceedings of the Xith International Symposium on Comparative Endocrinology, Malaga, Spain. pp 60

Editor

Tattersfield, L.J., P. Matthiessen, **P.M. Campbell**, R. Länge, N. Grandy eds. Endocrine modulators and wildlife: assessment and testing (EMWAT). Report on SETAC-Europe/OECD/EC workshop held April 10-13, 1997, Veldhoven, NL. SETAC-Europe Special Publication, Brussels, Belgium.

Reviewer

Member of the National Science and Engineering Research Council (NSERC) Environment and Sustainable Development Review Panel. Appointed for the period 2002-2005.

Member of Toxic Substance Research Initiative (TSRI - Federal research initiative administered by Health Canada & Environment Canada) Technical Review Committee. Reviewer of research proposals, progress and final reports, submitted under the Endocrine priority. 1999-2003

Reviewer of research proposals submitted to Memorial University's (Newfoundland, St. Johns, Canada) Research Infrastructure Funding Program in the area of Marine Sciences and the Environment. 1999

Ad Hoc reviewer of papers submitted to the following journals: Aquaculture, Journal of Experimental Zoology, General and Comparative Endocrinology, Journal of Fish Biology, Environmental Toxicology and Chemistry

Ad Hoc reviewer of research proposals for the MARS (German-Israeli Cooperation in Marine Sciences) research programme, EMSG (CEFIC) testing methods for endocrine disrupters research programme, and for EU DGXII -EMSG joint research funding. 1997/8

Ad Hoc reviewer of CICADS (Concise International Chemical Assessment Documents) for WHO - IPCS (International Programme on Chemical Safety). 1997/8

Professional memberships

Society of Environmental Toxicology and Chemistry (SETAC) member

Member of SETAC-Europe Meetings Committee 1997/1998

American Fisheries Society (AFS) member

American Chemical Society (ACS) member

Canadian Association for Water Quality (CAWQ) member

Water Environment Foundation (WEF) member 2000/2001

EcoDesign Resources Society (EDRS) member

Research Awards

Science Council of British Columbia. Research grant awarded for project '*Assessing the feasibility of using an ecolabel scheme to promote sustainable growth of the BC aquaculture industry*' under Applied Research and Development Program of Fisheries Renewal BC (2000-2001)

CEFIC Endocrine Modulators Steering Group (EMSG). Research grant awarded for a large scale collaborative project involving industry laboratories (Europe and NA), key academic and government scientists. P.M. Campbell was appointed project coordinator at start-up in 1997. Research objectives; (1) investigate effects of endocrine disrupters in aquatic organisms, including development of new test methods, and (2) conduct of literature reviews to prioritise research on: (i) aquatic invertebrates and (ii) the mechanisms of sex determination in commonly used test species (1997-2000).

Natural Sciences and Engineering Research Council of Canada (NSERC). Visiting Fellowship in Biotechnology. Awarded to study, using molecular techniques, the physiological responses of Pacific salmon to common environmental pollutants (1995-1996).

The Leverhulme Trust (U.K.) Research Award to conduct postdoctoral research in Canada. Awarded for research proposal "Fish and Pollution: Molecular Techniques to Assess Exposure" (1993-1995).

Natural Environment Research Council (NERC). Postgraduate Co-op fellowship leading to Ph.D. (co-operative award designed to encourage collaboration between university and industry/government laboratories), 1989-1992.

Presentations and Seminars

Alternatives to Nonylphenol Ethoxylates: Review of Aquatic Toxicity, Human Safety, Biodegradation, Technical and Economic Aspects. Presentation at a Multistakeholder Meeting on the Risk Management Strategy for Nonylphenol and its Ethoxylates, Ottawa, 10-11 June 2002.

Inventory of and Technical/Socio-Economic Study for 2-Butoxyethanol and 2-Methoxyethanol. Presentation to Environment Canada and Health Canada, 11 June, 2001.

Environmental Risk Assessment of the surfactant Glucose Amide using the European Union System for the Evaluation of Substances (EUSES) Risk Assessment Model. G.Glod, P. Campbell & P. Masscheleyn. Annual P&G Environmental Summit, 22 February 1999, Kentucky, USA.

The Endocrine Issue. Scientific External Affairs and Risk Policy. Annual P&G Environmental Summit, 3 February 1998, Chilston Park, Kent, UK.

Endocrine disrupters and wildlife. Presentation to members of the European Parliament and European Commission. January 1998, Brussels, Belgium. Invited speaker.

Endocrine disrupters and wildlife: An approach to assess the hazard and the risk. Pseudo-hormones in the environment: reality or fiction? Study Day, Engineering Institute of Antwerp (Technologisch Instituut, Genootschap Milieutechnologie), 10 December 1997, Antwerp, Belgium. Invited speaker.

Endocrine disrupters and wildlife: An approach to assess the hazard and the risk. Eighth Bruges Water Club Meeting "Potential estrogenic effects from trace pollutants in water", College of Europe, Bruges, Belgium. 23-24 October, 1997. Invited speaker.

Endocrine modulators - wildlife assessment and testing: An overview. Expert workshop on sex hormone disruptors in ecosystems sponsored by the U.K. Department of the Environment. Institute of Environment and Health, University of Leicester, U.K. 28-30 May 1997. Invited speaker.

Research priorities for assessing the effects of endocrine disruptors in wildlife. Endocrine Modulators Steering Group (CEFIC), Science Review Meeting. 29 April 1997. Frankfurt, Germany. Invited speaker.

Wildlife and endocrine disruptors: requirements for hazard identification. 23 April 1997. Scientific Committee Review, European Centre for the Ecotoxicology and Toxicology of Chemicals, Belgium.

Endocrine-mediated effects: recent science and regulatory activity. February 1997. P&G Environmental Summit III, Cincinnati, Ohio, US.

Pacific Salmon and Pollution: effects on gene expression and *in vitro* sex steroid production. February 1996. Procter and Gamble, European Technical Center, Brussels, Belgium.

Fish and Pollution: A highly sensitive technique to assess exposure. 1995. Aquatech '95, Westin Bayshore, Vancouver, B.C., Canada. Invited speaker

The induction of P4501A1 (CYP1A1) in the livers and gonads of juvenile chinook salmon. August 1994. Third International Symposium of Marine Biotechnology, Tromso, Norway

Increased CYP1A1 gene expression in the livers and gonads of juvenile chinook salmon. July 1994. The High Performance Fish Symposium, U.B.C., Vancouver, B.C., Canada.

Fish, Pollution, and Reproduction: Molecular techniques to assess exposure and its consequences. 1993. West Vancouver Laboratory research seminar series, Vancouver, B.C., Canada.

The consequences of mixing sex and stress. 1992. Brunel University research seminar series, Uxbridge, U.K.

Teaching Experience

Invited lecturer 1998-2001

University of Siena, Tuscany, Italy

International school for a multidisciplinary assessment of contaminants in the environment and of risks for human health. Responsible for teaching short course on “Endocrine disrupters - (1) background and review of the evidence from laboratory, epidemiological and field studies and (2) an approach to assess the hazard and the risk” to international PhD students and postdoctoral researchers.

Invited lecturer 1997

Brunel University, Uxbridge, U.K.

Responsible for teaching short course on “Molecular biology of P450 detoxification enzymes: Current perspectives on form, function and regulation” as part of the Pharmacology & Toxicology course for final year undergraduates and MSc students. Included overview of the extent to which increasing knowledge of P450s, and the molecular techniques used to study them, can be utilised in hazard and risk assessment.

Teaching assistant 1989-1992

Brunel University, U.K.

Assisted in laboratory practical sessions for second, third and fourth year undergraduates undertaking the Applied Biology and Applied Biochemistry honours degree courses. Assisted in the preparation and supervision of practicals in biochemistry, microbiology, physiology and immunology. Aided students in the collection and interpretation of data. Also involved in Environmental Studies M.Sc. course, demonstrating the use of various blood parameters in fish to monitor the health of the aquatic environment.

Continuing Education including Courses and Seminars:

Green Design & Planning in the City of Vancouver. Ian Smith, Senior Planner, City of Vancouver. Hosted by EcoDesign Resources Society. Oct 8, 2002

Water and the Future of Life on Earth. Workshop and Think Tank. Hosted by Continuing Studies in Science, Simon Fraser University & Liu Centre for the Study of Global Issues, University of British Columbia. Morris J. Wosk Centre for Dialogue, Vancouver, BC May 22-23, 2002.

Inter-disciplinary Linkages in Aquatic Sciences and Beyond. American Association of Limnology Summer Meeting, Victoria BC June 10-14, 2002

Air Pollutants in Urban Environments. TSRI Conference. Vancouver, BC Feb 2002

Watershed 2000. Watershed Management Conference. Water Environment Federation. Vancouver, BC, 8-12 July 2000

Business and Entrepreneurial Skills Training (BEST Programme). British Columbia Institute of Technology (BCIT) April-June 2000.

Notification of New Substances for the Canadian Marketplace: a practical workshop on meeting the requirements of the New Substance Notification Regulations of the *Canadian Environmental Protection Act* (CEPA). Toronto, Canada. 23-24 September 1998

People Development College (Helping Others Succeed) . P&G training course. 6-7 May 1998

Quality Assurance Training. P&G training courses. 1997/1998

Developmental and Reproductive Toxicology - The Center for Professional Advancement, Amsterdam, NL. 8-10 December 1997

Effective Meetings - P&G training course, Belgium. 18 November 1997

Perception, Communication and Management of Risks to Health. Workshop organised by The British Toxicology Society and the Journal of Communication Management. London, U.K. 15 April 1997

People and Communication Skills. P&G training course, Belgium. 6-7 January 1997.

Human Toxicology - Principles, Applied aspects of Toxicological Risks, International Regulatory Issues.
27-30 November 1996, EERO (European Environmental Research Organisation) Dresden, Germany.

CRAC/SERC Management and interpersonal skills development course - 1-8 August 1991, London , U.K.