

CIRRICULUM VITAE

NAME Michael L. Kent
RANK Professor; Departments of Microbiology and Biomedical Sciences
EMPLOYMENT Departments of Microbiology, Fisheries and Wildlife and Biomedical Sciences
DATE HIRED 09/01/99
FTE DISTR. FTE: 9 month appointment, tenure track

A. Education and Employment

University of California Davis; PhD in Comparative Pathology, 1985
San Diego State University; MS in Biology, 1981
Humboldt State University; BS in Fisheries, 1977

Research Interests

Fish Diseases, Parasitology

Professional Experience

Aquaculturist, Hubbs-Seaworld Research Institute, San Diego, 1980-1981.

Staff Research Associate, University of California, San Diego, Office of Animal Resources, 1981-1982

Ph.D. Graduate Student (Sea Grant Trainee) University of California, Davis, Department of Medicine, School of Veterinary Medicine, 1982-1985.

Research Scientist, Battelle Marine Research Laboratory, Sequim, Washington, 1986-1988.

Research Scientist, Fish Health, Parasitology, and Genetics Section, Department of Fisheries and Oceans, Pacific Biological Station, Nanaimo, B.C., 1988-1999.

Head, Fish Health, Parasitology, and Genetics Section, Aquaculture Division, Department of Fisheries and Oceans, Pacific Biological Station, Nanaimo, B.C., 1997-1999.

Director, Center for Fish Disease Research, Oregon State University, 1999-2007

Associate Professor, Departments of Microbiology and Fisheries and Wildlife, Oregon State University, Corvallis, Oregon, 1999-2001

Professor, Departments of Microbiology and Fisheries and Wildlife, Oregon State University 2001-2007.

Professor, Departments of Microbiology and Biomedical Sciences (College of Veterinary Medicine), Oregon State University 2008-present

B. **Teaching and Advising**

Credit Courses

General Parasitology (MB480/580) 3 units
2002 – present 92 students in Spring 2008

Veterinary Parasitology (VM760) 5 units
2004 – present 50 students

Team taught:

Diseases of Fish, lecture (MB 492/MB 592) 2000 - present
Spring 2000 18 students

Diseases of Fish, lab (MB 493/MB 593) 2000 - present
Spring 2000 18 students

Seminar/Evolution and Genetics of Disease Organisms (MB 507)
Spring 2001 10 students

Non-credit Courses, Workshops and Seminars

Early in his career, Dr. Kent was the principle lecturer and coordinator of seven fish disease workshops sponsored by and held at the Scripps Aquarium, Scripps Institution of Oceanography, La Jolla, California, held approximately biannually since 1985 – 1995. The workshops involved both lectures and laboratories and were attended by approximately 60 veterinarians and aquaculturists. In addition, he has given many guest lectures and short courses on fish diseases at several universities and colleges including University of British Columbia, Simon Fraser University, University of Victoria, Atlantic Veterinary College, Western Veterinary College, Malaspina College, University of Oregon and Albert Einstein School of Medicine.

Dr. Kent has taught several short courses/workshops on health management of zebrafish and other laboratory fishes in research facilities. He is one of 3 instructors in for a week long course at the NIEHS Mount Desert Island Biological Laboratory held annually since 2007 and co-taught a 1 day course on zebrafish health at the Intl. Ass. Aquat. Animal Med. Meeting in the Bahamas in May 2006.

Taught and co-organized a one day workshop on parasite control to Oregon sheep growers, held at CVM OSU, December 2007 and January 2009.

Dr. Kent is an Adjunct Professor at the Atlantic Veterinary College, Prince Edward Island and the University of Hawaii Marine Biology Institute.

Graduate Students and Postdoctoral Trainee

Graduate Students, Major Professor

Chris Whipps. PhD. Thesis title: "Phylogeny and taxonomy of parasites of the Multivalulida (Myxozoa: Myxosporaea) based on comparative DNA sequence analysis". Winter 2004

Briana Keafer. MS. Thesis title: Development and disease of opakapaka *Pristipomoides filamentosus* larvae in culture. Spring 2005.

Melanie Poort. PhD. Thesis title: Mechanisms for the interaction of environmental mycobacteria with host cells. Spring 2007

Jennifer Ramsay. PhD. Thesis title: Husbandry stress of zebrafish, *Danio rerio*; implications and fitness. Fall 2008

Jayde Ferguson. PhD. Thesis title: Impacts of parasites on wild coho salmon in Oregon. In Progress.

Trace Peterson. PhD. In progress since fall, 2008

Justin Sanders. PhD. In progress since in fall, 2008

Benjaporn Somrithivej. In progress since fall, 2009

Graduate Students, Major Co-advisor

The following students except Newbound conducted their thesis research under Dr. Kent's supervision in his laboratory at the Pacific Biological Station. As the Fisheries and Oceans Canada is not a degree-granting institution, the students had academic homes and major professors in Canadian universities.

Ross Shaw, PhD – 1999. "Biology of *Loma salmonae* (Microsporea) in salmonid fishes." University of British Columbia, Vancouver, BC. Research Associate, University of British Columbia.

Jon Moran, PhD - 1999. "Development of the marine myxozoan, *Kudoa thyrsites* (Gilchrist, 1924), in netpen-reared Atlantic salmon (*Salmo salar* L.) in British Columbia." Simon Fraser University, Burnaby, BC. Post-doctoral fellow at University of California, Davis.

Sophie St. Hilaire, PhD - 2000. "Epidemiology of IHN virus in pen-reared Atlantic salmon in British Columbia." University of Ontario, Guelph. Veterinarian for Fisheries and Oceans Canada, Pacific Biological Station.

Sophie St. Hilaire, MSc - 1996. "Epidemiology of *Kudoa thyrsites* in pen-reared salmon in British Columbia." Western Veterinary College, Saskatoon, SK. Veterinarian for Fisheries and Oceans Canada, Pacific Biological Station.

Sonja Saksida, MSc - 1995. "An evaluation of an indirect immunofluorescent antibody technique for the diagnosis of plasmacytoid leukemia in chinook salmon (*Oncorhynchus tshawytscha*)." University of Guelph, Ontario. Veterinarian working for EWOS, Ltd (feed company).

Craig Stephen, PhD - 1994. "A field investigation of marine anemia in farmed salmon in British Columbia." Western Veterinary College, Saskatoon, SK. Director, Center for Coastal Health, Malaspina College, Nanaimo.

Garret Newbound, MSc - 1993. "Production and use of monoclonal antibodies to detect plasmacytoid leukaemia." Atlantic Veterinary College, Charlottetown, PEI. Post-doctoral fellow, Ohio State University.

Graduate Students – Committee Member since arriving at OSU

Joseph Maxwell, PhD, Microbiology, Spring 2001

Charles Criscione, PhD, Zoology – Spring 2005

Amarisa Marie, MS, Fisheries and Wildlife – Winter, 2003

Inchiro Misumi, MS, Fisheries and Wildlife – Spring, 2003

Amanda Brown, PhD, Dept. Zoology, University of British Columbia – Spring, 2005

Richard Stocking, MS, Microbiology – Spring 2006

Sarah Bjork, PhD, Microbiology – in progress

Alena Pribyl, PhD, Fisheries and Wildlife – Winter, 2010

Kate Schletz Saili, PhD, Environ. Mol. Toxicol. – in progress

Chris Zielenski, MS, Microbiology – Fall 2008

Michael Raboin, PhD, Zoology – in progress

Kirsten Bixler, MS, Fisheries and Wildlife – April, 2008. Served as Research Reviewer.

Jack Mortenson, PhD, Fisheries and Wildlife – June, 2009. Served as Research Reivewer.

Brittany Morgan, Honors International Degree in Biology – December 2008
Blastocystis hominis: a comparative study of the factors affecting high prevalence in the United States and Venezuela. Served as committee member

Carson Bee, Honors International Degree in Biology. The effects of global climate change on the distribution of malaria. Served as major advisor.

Graduate Committees External Examiner

M.Sc.-Simon Fraser University. Laura Brown . 1989. The use of antibiotics for the control of vertical transmission of bacterial kidney disease in coho salmon, *Oncorhynchus kisutch*..

Masters of Pest Management - Simon Fraser University. Mark J. Higgins. 1990. The potential of *Myxidium salvelini* (Myxozoa, Myxosporea) as a biological tag for sockeye salmon, *Oncorhynchus nerka* (Walbaum).

M.Sc. - Simon Fraser University. Lee Nikl. 1990. Investigations into immunostimulant use for the enhancement of immunity to the furunculosis bacterium, *Aeromonas salmonicida*, in coho and chinook salmon.

PhD – University of Toronto. Chongxie Xiao. 1999. Actinosporea from Lake Sasajewun, Algonquin Park, Ontario

PhD – University of Tasmania. Vanessa L. Findlay. 2000. Demonstration and manipulation of aquired resistance to amoebic gill disease in Atlantic salmon, *Salmo salar* L.

PhD – University of Tasmania. Teresa S. Howard. 2000. Paramoebiasis of sea-farmed salmonid in Tasmania – as study of its aetiology, pathogenicity, and control.

PhD – University of Tasmania. Greetje M. Douglas-Helders. 2002. Epidemiology of amoebic gill disease.

PhD – University of Tasmania. Carley A. Bagley. 2006. Potential risk factors of amoebic gill disease in Tasmanian Atlantic salmon.

PhD – University of Toronto. Anne Kohler. 2007.

PhD – Norwegian School of Veterinary Science. Anders Jorgensen. 2008. Genetic studies of diplomonads flagellates from fish

Post-doctoral Trainees

Dominique Hervio. 1995-1997. Internal funds of Fisheries Oceans Canada. Development of molecular-based diagnostic tests for pathogenic myxozoans parasites.

Christopher Whipps. 2005-present. NCRR NIH. Control of diseases in zebrafish research facilities.

Veterinary Summer Students

Amy Posiel. 2007. Evaluation of disinfectants for *Cryptosporidium parvum* (Merck Summer Fellowship).

Megan Jurasek. 2008. Development of a lectin based to differentiate for *Haemonchus* ova.

Brian Dugovich. 2008. Endoparasites of greater sage-grouse in Oregon.

Michael Glynn. 2009. Parasites of coho salmon

C. Scholarship and Creative Activity

Publications

Over 200 reviewed primary articles, 2 books, 13 book chapters, 33 non-peer reviewed papers, and 15 papers in conference proceedings

Papers in Peer Reviewed Journals

Jurasek, M.E. Bishop-Stewart, J.K., Storey, B.E., Kaplan, R.M., **Kent, M.L.** 2010. Modification and further evaluation of a fluorescein-labeled peanut agglutinin test for identification of *Haemonchus contortus* eggs. Vet. Parasitol. 69:209-213

Sanders, J.L., Lawrence, C., Nichols, D.K., Brubaker, J.F., Peterson, T.S., Murray, K.N., Kent, M.L. *Pleistophora hyphessobryconis* (Microsporidia) infecting zebrafish (*Danio rerio*) in research facilities. Dis. Aquat. Org. (in press).

Brown, A.M.V., **Kent, M.L.**, Adamson, M.L. 2010. Low genetic variation in the salmon and trout parasite *Loma salmonae* (Microsporidia) supports marine transmission and clarifies species boundaries. Dis. Aquat. Org. (in press).

Mansfield, K.G., Riley, L., **Kent, M.L.** 2010. Workshop summary: detection, impact, and control of specific pathogens in animal resource facilities. ILAR. 51:171-179.

Ferguson, J. A., Schreck, C.B., Chitwood, R., **Kent, M.L.** 2010. Persistence of infection by metacercariae of *Apothallus* sp., neascus, *Nanophyetus salminicola* and two myxozoans (*Myxobolus insidiosus* and *M. fryeri*) in coho salmon *Oncorhynchus kisutch* Walbaum). J. Parasitol. (in press).

- Whipps, C.M., Boorom, K., Bermudez, L.E., **Kent, M.L.** 2010. Molecular characterization of *Blastocystis* species in Oregon identifies multiple subtypes. Parasitol. Res. 106: 827-832.
- Cui, Z., Samuel-Shaker, D., Watral, V., **Kent, M.L.** 2009. Attenuated *Mycobacterium marinum* protects fish against mycobacteriosis. J. Fish Dis. 33: 371-375. PMID: 19912456
- Ramsay, J.M., Watral, V., Schreck, C.B., **Kent, M.L.** 2009. *Pseudoloma neurophilia* (Microsporidia) infections in zebrafish (*Danio rerio*): Effects of stress on survival, growth and reproduction. Dis. Aquat. Org. 88: 69-84.
- Pribyl, A. K., Schreck, C.B., **Kent, M.L.**, Parker, S.J. 2009. The differential response to decompression in three species of nearshore Pacific rockfish. N. Am. J. Fish. Mang. (in press).
- Ramsay, J.M., Watral, V., Schreck, C.B., **Kent, M.L.** Husbandry stress exacerbates mycobacterial infections in adult zebrafish, *Danio rerio* (Hamilton). J. Fish Dis. (in press).
- Ramsay, J.M., Feist, G.W., Varga, Z.M., Westerfield, M., **Kent, M.L.**, Schreck, C.B. 2009. Rapid cortisol response of zebrafish to acute net handling stress. Aquaculture (in press).
- Landers, D.H., Simmonich, S.M., Jaffe, D., Geiser, L., Campbell, D.H., Schwindt, A., Schreck, C.B., **Kent, M.L.**, Hafner, W., Kimberly, H., Usenko, S., Ackerman, L., Schrlau, J., Rose, N., Blett, T., Erway, M. M. 2010. The Western Airborne Contaminant Assessment Project (WACAP): An Interdisciplinary Evaluation of the Impacts of Airborne Contaminants in Western U. S. National Parks. Environ. Sci. Tech. (in press)
- Schwindt, A.R., **Kent, M.L.**, Ackerman, L.K., Simonich, S.L., Landers, D.H., Blett, Schreck, C.B. 2009. Reproductive abnormalities in fish from western U.S. National Parks. Trans. Am. Fish Soc. 138: 522-531.
- Jacobs, J.M., Stine, C.S., Baya, A.M., **Kent, M.L.** 2009. A review of mycobacteriosis in marine fishes. J. Fish Dis. 32: 119-130.
- Monaghan, S.R., **Kent, M.L.**, Watral, V.G., Kaufman, R.J., Lee, L.J.J., Bols, N.C. 2009. Animal cell cultures in microsporidial research: their general roles and their specific use for fish microsporidia. In Vitro Cell. Dev. Biol. (in press).
- Broussard, G.W., Norris, M.B., Schwindt, A.R., Fournie, J.W., Winn, R.N., **Kent, M.L.**, Ennis, D.G.. 2009. Chronic *Mycobacterium marinum* infection acts as a tumor promoter in Japanese medaka. Comp. Biochem. Physiol –Part C (Toxicol. Pharmacol.) 149: 152-160

- Kent, M.L.**, Feist, S.W., Harper, C., Hoogstraten-Miller, S., Law, J.M., Sánchez-Morgado, J.M., Tanguay, R.L., Sanders, G.E., Spitsbergen, J.M., Whipps, C.M. 2009. Recommendations for control of pathogens and infectious diseases in fish research facilities. *Comp. Biochem. Physiol –Part C (Toxicol. Pharmacol.)* 149: 240-248
- Harriff, M.J., Danelishvili, L., Wu, M., Wilder, C., McNamara, M., **Kent, M.L.**, Bermudez, L.E. 2009. *Mycobacterium avium* genes MAV_5138 and MAV_3679 are transcriptional regulators that play a role in invasion of epithelial cells, in part by their regulation of CipA, a putative surface protein interacting with host cell signaling Pathways. *J. Bacteriol.* 191:1132–1142
- Whipps, C.M., Matthews, J.L., **Kent, M.L.** 2008. Distribution and genetic characterization of *Mycobacterium chelonae* in laboratory zebrafish (*Danio rerio*). *Dis Aquat. Org.* 82: 45-54.
- Ferguson, J.A., Atkinson, S.D., Whipps, C.M., **Kent, M.L.** 2008. Molecular and morphological analysis of *Myxobolus* species of salmonid fishes with the description of a new species. *J. Parasitol.* 94:1322-1334.
- Rodnick, K.J., St-Hilaire, S., Battiprolu, P., Seiler, S.S., **Kent, M.L.**, Powell, M., S., Ebersole, J.L. 2008. Evidence for sex and or habitat differences in swimming performance, parasite infestation, tissue biochemistry, and morphometrics of juvenile coho salmon in Oregon's West Fork Smith River. *Trans. Am. Fish. Soc.* 137: 1571-1590.
- Schwindt, A.R., Fournie, J.W., Landers, D.H., Schreck, C.B., **Kent, M.L.** 2008. Mercury levels in salmonids from western U.S. National Parks and correlations with age and macrophage aggregates 2008. *Environ. Sci. Tech.* 42: 165-170.
- Ackerman, L.K., Schwindt, A.R., Simmonich, S.L., Kock, D.C., Blett, T.C., Schreck, C.B., **Kent, M.L.**, Landers, D.H. 2008. Atmospherically deposited PBDEs, pesticides, PCBs, and PAHs in western US National Park Fish: Concentrations and consumption guidelines. *Environ. Sci. Tech.* 42: 2334–2341
- Zhao, Y, Sun, C., **Kent, M.L.**, Whipps, C.M., Deng, J. 2008. Description of a new species of *Myxobolus* (Myxozoa: Myxobolidae) based on morphological and molecular data. *J. Parasitol.* 94: 737-742.
- Work, T.M., Takata, G., Whipps, C.M., **Kent, M.L.** 2008. A new species of *Henneguya* (Myxozoa) in the big eyed scad (*Selar crumenophthalmus*) from Hawaii. *J. Parasitol.* 524-529.
- Ostland, V.E., Watral, V., Whipps, C.M., Austin, F.W., St-Hilaire, S., Westerman, M.E., **Kent, M.L.** 2008. Biochemical, molecular, and virulence characteristics of select

Mycobacterium marinum isolates in hybrid striped bass (*Morone chrysops* x *Morone saxatilis*) and zebrafish (*Danio rerio*). Dis. Aquat. Org. 79: 107-118.

Harriff, M.J., Wu, M. **Kent, M.L.**, Bermudez, L.E. 2008. Species of environmental mycobacteria vary in their ability to grow in human, mouse, and carp macrophages, associated with the absence of mycobacterial virulence genes observed by DNA microarray hybridization. Appl. Environ. Microbiol. 74:275-285

Bildfell, R.J., Whipps, C.M., Gillin, C., **Kent, M.L.** 2007. DNA-based identification of a hepatic trematode infection in an elk calf. J. Wildl. Dis. 43: 762-769.

Zhao, Y., Zhou, Y. **Kent, M.L.**, Whipps, C.M. 2008. Replacement of the preoccupied name *Davisia* Laird 1953, and description of a new myxozoan species (Myxosporea: Sinuolineidae) from *Sebastiscus marmoratus* (Cuvier, 1829) in the East China Sea. J. Parasitol. 94: 269-279.

Ferguson, J., Watral, V., Schwindt, A., **Kent, M.L.** 2007. Spores of two fish Microsporidia (*Pseudoloma neurophilia* and *Glugea anomala*) are highly resistant to chlorine. Dis. Aquat. Org. 76: 205-214

Whipps, C.M., Butler, W.R., Pourahmad, F., Watral, V.G., **Kent, M.L.** 2007. Molecular systematics support the revival of *Mycobacterium salmoniphilum* (ex Ross 1960) sp. nov., nom. rev., a species closely related to *Mycobacterium chelonae*. Int. J. Syst. Evol. Microbiol. 57: 2525-2531.

Harriff, M.J., Bermudez, L.E., **Kent, M.L.** 2007. Experimental exposure of zebrafish (*Danio rerio* Hamilton) to *Mycobacterium marinum* and *Mycobacterium peregrinum* reveals the gastrointestinal tract as the primary route of infection: A potential model for environmental mycobacterial infection. J. Fish. Dis. 30: 587-600

Whipps, C.M., Dougan, S.T., Kent, M.L. 2007. *Mycobacterium haemophilum* infections of zebrafish (*Danio rerio*) in research facilities. FEMS Microbiol Lett. 270: 21-26.

Watal, V., **Kent, M.L.** 2007. Pathogenesis of *Mycobacterium* spp. in zebrafish (*Danio rerio*) from research facilities. Comp. Biochem. Physiol –Part C (Toxicol. Pharmacol.). [Special Issues for Proceed. NCRRA Aquat. Animal Models Human Dis. Conf. 30 Oct – 2 Nov, 2005, Athens, Georgia] 145:55-60.

Whipps, C.M., **Kent, M.L.** 2006. Phylogeography of the cosmopolitan marine parasite *Kudoa thyrsites* (Myxozoa: Myxosporea). J. Eukaryot. Microbiol. 53: 364-373.

Kent, M.L., V. Watral, M. Wu, L. Bermudez. 2006. *In vivo* and *in vitro* growth of *Mycobacterium marinum* at homoeothermic temperatures. FEMS Microbiol. Lett. 257: 69-75.

Ramsay, J.M., Feist, G.W. Varga, Z.M., Westerfield, M., **Kent, M.L.**, Schreck, C.B. 2006. Whole-body cortisol is an indicator of crowding stress in adult zebrafish, *Danio rerio*. Aquaculture 258: 565-574.

Jirků, M., Bolek, M.G., Whipps, C.M., Janovy, J., **Kent, M.L.**, and Modrý, D. 2006. A new species of *Myxidium* (Myxosporea: Myxidiidae), from the western chorus frog, *Pseudacris triseriata triseriata*, and Blanchard's cricket frog, *Acris crepitans blanchardi* (Hylidae) from eastern Nebraska USA: morphology, phylogeny and critical comments on amphibian *Myxidium* taxonomy. J. Parasitol. 92:611-619.

Poort, M.J., Whipps, C.M., Watral, V.G. Font, W.F., and **Kent, M.L.** 2006. Molecular characterization of a *Mycobacterium* species in non-native poeciliids in Hawaii using DNA sequences. Journal of Fish Diseases 29:181-185.

Whipps, C.M., Burton, T., Watral, V.G., St-Hilaire, S., **Kent, M.L.** 2005. Assessing the accuracy of a polymerase chain reaction test for *Ichthyophonus hoferi* in Yukon River Chinook salmon (*Oncorhynchus tshawytscha*). Dis. Aquat. Org. 68: 141-147.

Adlard, R.D., Bryant, M.S., Whipps, C.M., **Kent, M.L.** 2005 Multivalvulid myxozoans from eastern Australia: Three new species of *Kudoa* from scombrid and labrid fishes of the Great Barrier Reef, Queensland Australia. J. Parasitol. 91: 1138-1143.

Kent, M.L., V. Watral, M. Wu, L. Bermudez. 2006. *In vivo* and *in vitro* growth of *Mycobacterium marinum* at homoeothermic temperatures. FEMS Microbiol. Lett. 257: 69-75.

Whipps C.M., **Kent, M.L.** 2006. Polymerase chain reaction detection of *Pseudoloma neurophilia*, a common microsporidian of zebrafish (*Danio rerio*) reared in research laboratories. Contemp. Top. Lab. Anim. Sci 45: 13-16.

Schwindt, A.R., N. Truelove, C. B. Schreck, J.W. Fournie. D.H. Landers, **M.L. Kent** 2005. Evaluation of macrophage aggregates in brook (*Salvelinus fontinalis*) and rainbow (*Oncorhynchus mykiss*) trout. Dis. Aquat. Org. 68: 101-113.

Gozlan, R.E. S. St-Hilaire, S.W. Feist, P. Martin, **M.L. Kent**. 2005. Disease threat to European fish. Nature 435: 1046 (23 June 2005)

Kent, M.L., D.J. Speare. 2005. Review of the sequential development of *Loma salmonae* (Microsporidia) based on experimental infections of rainbow trout (*Oncorhynchus mykiss*) and Chinook salmon (*O. tshawytscha*). Folia Parasitol. 52: 63-68.

Villeneuve, D.L. L. R. Curtis, J. J. Jenkins, K. E. Warner, F.A. Tilton, **M. L. Kent**, V.G. Watral, M. E. Cunningham, D. F. Markle, D. Sethajintanin, O. Krissanakriangkrai, E. R. Johnson, R. Grove, and K. A. Anderson. 2005. Environmental stresses and skeletal Deformities in Fish from the Willamette River, Oregon, USA. Environ. Sci, Tech. 39: 3495-3506.

Cunningham, M.E., D.F. Markle, V.G. Watral, **M. L. Kent**, L.R. Curtis. 2005. Patterns of fish deformities and their association with trematode cysts in the Willamette River, Oregon. *Environ. Biol. Fish* 73: 9-19.

Diamant, A., C.M. Whipps, **M.L. Kent**. 2004. A new species of *Sphaeromyxa* (Myxosporea: Sphaeromyxina: Sphaeromyxidae) in devil firefish, *Pterois miles* (Scorpaenidae), from the northern Red Sea: morphology, ultrastructure, and phylogeny. *J. Parasitol.* 90: 1434-1442.

Kent, M.L., V. Watral., C.M. Whipps, M.E. Cunningham, C.D. Criscione, J. R. Heidel, D. L. Curtis, J. Spitsbergen, D. Markle. 2004. A digenean metacercaria (*Apophallus* sp.) and a myxozoan (*Myxobolus* sp.) associated with vertebral deformities in cyprinid fishes from the Willamette River, Oregon. *J. Aquat. Animal Health* 16:116-129.

Kent, M.L., J.L. Matthews, J. K. Bishop-Stewart, C. M. Whipps, V. Watral, M. Poort, L. Bermudez. 2004. Mycobacteriosis in zebrafish (*Danio rerio*) research facilities. *Comp. Biochem. Physiol –Part C (Toxicol. Pharmacol.)*. 138: 383-390 [Special Issues for Proceed. NCCR Aquat. Animal Models Human Dis. Conf. 29 Sept. – 2 Oct. 2003. Manassa, VA.]

Whipps, C.M., M. El-Matbouli, R.P. Hedrick, V. Blazer, **M. L. Kent**. 2004. *Myxobolus cerebralis* internal transcribed spacer 1 (ITS-1) sequences support recent spread of the parasite to North America and within Europe. *Dis. Aquat. Org.* 60:105-108.

Yokoyama, H, C M. Whipps, **M.L. Kent**, K. Mizuno, H. Kawakami. 2004. Post-mortem myoliquefaction caused by *Kudoa thyrsites* (Myxozoa: Multivalvulida) from Japanese flounder and *Kudoa lateolabracis* n. sp. from Chinese Sea Bass. *Fish Pathol.* 39: 79-85.

Køie, M., C.M. Whipps, **M.L. Kent**. 2004. *Ellipsomyxa gobii* (Myxozoa: Ceratomyxidae) in the common goby *Pomatoschistus microps* (Teleostei: Gobiidae) uses *Nereis* spp. (Annelida: Polychaeta) as invertebrate hosts. *Folia Parasitol.* 51: 14-18

Work, T.M., R.A. Rameyer, G. Takata, **M.L. Kent**. 2004. Protozoal and epitheliocystis-like infections in the introduced bluestripe snapper *Lutjanus kasmira* in Hawaii. *Dis. Aquat. Org.* 57:59-66.

Whipps, C.M., G. Grossel, R.D. Adlard, H. Yokoyama, M.S. Bryant, B.L. Munday, **M.L. Kent**. 2003. Phylogeny of the Multivalvulidae (Myxozoa: Myxosporea) based upon comparative rDNA sequence analysis. *J. Parasitol.* 90: 618-622.

Kent, M.L. and J.K. Bishop-Stewart. 2003. Transmission and tissue distribution of *Pseudoloma neurophilia* (Microsporidia) of zebrafish *Danio rerio*. *J. Fish Dis.* 26:1-4.

Whipps, C.M., R.D. Adlard, M.S. Bryant, R.J.G. Lester, V. Findlay, **M. L. Kent**. 2003. First report of three *Kudoa* species from eastern Australia: *Kudoa thyrsites* from mahi

mahi (*Coryphaena hippurus*), and *Kudoa amamiensis* and *Kudoa minithyrsites* n. sp. from sweeper (*Pempheris ypsilychnus*). J. Eukary. Microbiol.. 50: 215-219.

Whipps, C.M., V.G. Watral, V.G. and **M.L. Kent**. 2003. Characterization of a *Mycobacterium* sp. in rockfish (*Sebastes alutus* and *Sebastes reedi*) using rDNA sequences. J. Fish Dis. 26: 1-5.

Whipps, C.M., R. D. Adlard, R.D., M. Bryant, and **M.L. Kent**. 2003. Two unusual myxozoans, *Kudoa quadricornis* n. sp. (Multivalvulida) from the muscle of yellowspot trevally (*Carangoides fulvogattatus*) and *Kudoa permulticapsula* n. sp (Multivalvulida) from the muscle of Spanish mackerel (*Scomberomerus commersoni*) from the Great Barrier Reef, Australia. J. Parasitol. 89: 168-173.

Spitsbergen, J.M. and **M.L. Kent**. 2002. The state of the art of the zebrafish model for toxicology and toxicologic pathology research – advantages and current limitations Toxicol. Pathol. 31(suppl.): 62-87.

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Kent, M.L., and R.P. Hedrick. 1985 The biology, taxonomy, associated pathology and control of PKX, the causative agent of proliferative kidney disease (PKD) in salmonid fishes. In: Program and abstracts of the 60th annual meeting of the American Society of Parasitology, 4-8 August 1985, Athens, Georgia. p. 127.

Kent, M.L., and R.P. Hedrick. 1985. Affinities of PKX, the causative agent of proliferative kidney disease with the phylum Myxozoa. In: Proceedings of the Joint Fish Health Section, American Fisheries Society - Western Fish Disease Group Workshop, 30, 31 July and 1 August 1985, Seattle, Washington. p. 21.

Kent, M.L., and R.P. Hedrick. 1984. The protozoan causing proliferative kidney disease may be a member of the phylum Myxozoa. In: Program and abstracts of the Joint Workshop of the Fish Health Section of the Am. Fish Soc. and the Midwest Fish Disease Group, 10-12 July 1984. p. 5.

Kent, M.L. 1984. The pathology, life cycle and control of *Goussia carpelli* in goldfish. In: Program and abstracts of the Joint Workshop of the American Fisheries Society/Fish Health Section and the and the Midwest Fish Disease Group, 10-12 July 1984. p. 20.

Technical Reports

Landers, D.H., Simonich, S.L., Jaffe, D.A., Geiser, L.H., Campbell, D.H., Schwindt, A.R., Schreck, C.B., **Kent, M.L.**, Hafner, W.D., Taylor, H.E., Hageman, K.J., Usenko, S., Ackerman, L.K., Schrlau, J.E., Rose, N.L., Blett, T.F, and Erway, M.M., 2008, The fate, transport, and ecological impacts of airborne contaminants in Western National Parks (USA), Volume 1: U.S. Environmental Protection Agency Report EPA/600/R-07/138, 348 p. ([on-line report in pdf format](#), 25 MB

St-Hilaire, S., **M. L. Kent**, G. K. Iwama. 1998. Factors affecting the health of farmed and wild fish populations: A perspective from British Columbia. Fish. Oceans Can./Can. Stock. Ass. Secret. Res. Doc. 98/168.

Kent, M.L. 1998. Development of non-lethal tests for *Renibacterium salmoninarum* and *Nucleospora salmonis*. Prepared for Creative Salmon, Ltd., Tofino, British Columbia. 14 p.

Kent, M.L., and I. Solar. 1994. Prevención y control de enfermedades de la trucha [Prevention and control of diseases of trout]. Prepared for Proyecto Canada - Ecuador de Recursos Humanos. Hatfield Consultants Ltd., West Vancouver, B.C. 46 p.

Kent, M.L., and R.A. Elston. 1989. Toxicopathic liver disease of pen reared salmon in Port Townsend Bay - 1988 Studies. Prepared for Washington State Department of Ecology. 21 pp.

Kent, M.L. 1989. Diseases and pathological changes associated with soft flesh in pen-reared chinook salmon. Prepared for Moore-Clarke Canada and B.C. Research. 13 pp.

Grants and Contracts Dr. Kent is the PI unless otherwise indicated

2009-2014. NIH NCRR. **Veterinary Training in Aquatic Animal Models**
Dr. Kent is co-investigator and will be the Deputy Director of the program
\$ 953,835

2009-2010. “**Condition and Spawning Success of Adult Spring Chinook Salmon in the Willamette River**”. U.S. Army Corps of Engineers \$ 73,938
Dr. Kent is co-PI and oversees pathology investigations on adult salmon.

2009. **Characterization of KHV Latency and GeneExpression during KHV Latency in Koi.**
Ling Jin (PI). Kent is co-investigator. \$74, 956.00

2008-2013. **“Control of Diseases in Zebrafish Research Facilities”**. NIH NCRR R24
\$ 1,096,500

2008-2013 **“International Zebrafish Stock Center”**

Dr. Kent is co-PI and oversees diagnostic service provided by the Center.

The ZIRC provides a zebrafish resource center to NIH researchers and others.

\$165,539 to Kent via sub-contract

2007-2009 **“Development of a SPF Zebrafish Facility.”** NIEHS EHSC (co-PI with R. Tanguay)
\$ 39,650

2008-2010. **The Effects of Decompression and the Efficacy of Recompression as a Bycatch Mortality reduction Tool for Rockfish.** NOAA Fisheries \$ 61,374

Carl Schreck is PI. Kent oversees pathology studies

2008-2010. **Extent of Endocrine Disruption in Trout of Western National Parks** USDI-BLM
Carl Schreck is PI \$103,340

Kent oversees pathology studies

2008-2009. **Pathogenesis of *Blastocystis* infection.** Erkkila Foundation (Good Samaritan Hospital)
Luiz Bermudez is P.I. \$ 17,000

2007 **“Development of SPF *Pseudoloma*-free zebrafish”** NIEHS OSU Environmental Health
Science Center \$ 39,650

2007. **“Evaluation of Blastocystis strain types in Oregon.** Blastocystis Research Foundation.
\$ 5,000

2007 **“Impacts of Pathogens on Wild Coho Salmon”** Oregon Sea Grant
\$ 11,846.

2007-2009 **“Impacts of Pathogens on Wild Coho Salmon in Oregon”** Oregon Department
of Fisheries and Wildlife – support for Kent’s PhD Student, Jayde Ferguson
\$ 61,000

2005-2007. **“Endocrine disruption in trout in Rocky Mountain National Park”**. US
National Park Service. Carl Schreck is PI, Kent is co-investigator. \$ 61,398

2003-2008. **“Control of Diseases in Zebrafish Research Facilities”**. NIH NCRR R24
\$ 884,375

2003-2008. **“International Resource for Zebrafish”**. National Institutes of Health.

Dr. Kent was a co-investigator. The grant is administered through University of Oregon.

(Total grant is \$ 7,507,000)

\$ 103,005 to Kent

2002-2007. **“Western Airborne Contaminants Assessment Program- Fish Studies”**. U.S. National Park Service. \$ 337,000

2006. **“Promotion of neoplasia by mycobacteria using a medaka model”** NIEHS MFBSC Pilot Study. \$32,000

2006-2007 **“Control of Disease of Zebrafish Research Facilities: Development of in vitro Culture System for *Pseudoloma neurophilia*”**. \$33,960

2003-2004. **“Screening of Compounds for Efficacy Against Myxozoan Infections”**. InterVet International. \$ 64,772

2003 **“*Mycobacterium* Infections of Fish”** AHD CRIS USDA Animal Health and Disease Section 1433. \$ 17,764

2003-2004 **“Virulence of Mycobacteriosis from Fishes”**. Marine and Freshwater Biomedical Institute Pilot Project \$ 20,000

2004 **“Investigation of Disease in Introduced and Native Hawaiian Fish 1. Screening Hawaiian fishes for an apicomplexan parasite.** Hawaii Coral Reef Initiative. \$ 20,000

2003-2004. **“Development of a Non-lethal, PCR Based Test for *Ichthyophonus*”** Alaska Department Fish and Game \$ 24,962

2002-2004 **“Environmental Stresses and Fish Deformities in the Willamette River”** Oregon Watershed Enhancement Board \$ 442,000.

Kent was co-investigator, and resources support a technician to conduct pathology/infectious disease studies

2000-2003. **Molecular Systematics of *Kudoa***. Canadian National Biotechnology Strategy, Ottawa, Canada. Can\$ 80,000 through Agricultural Research Foundation.

1999-2002, **Investigations on Antibiotic Control for Bacterial Kidney Disease**, Oregon Department of Fisheries and Wildlife. \$ 120,000.

1998-2001. ***Kudoa thyrsites* and Softflesh in Farmed Atlantic salmon”**. Canadian National Science and Engineering Research Council (NSERC), Strategic Research Grant. Can \$ 504,000.

Dr. Kent was a co-investigator with an allocation of approximately \$ 230,000. Kent supervised life cycle studies at HMSC and ongoing parasite collections and in vivo vaccine trails at the Pacific Biological Station.

2000-2002. **Cross Protection Against *Myxobolus cerebralis* infections by exposure to *Myxobolus arctus*.** National Partnerships with US Fish and Wildlife Service. \$ 19,320.

2000. **Survey of Rockfish and Lingcod Pathogens.** Oregon State University Sea Grant. \$ 10,000.

1998-1999. **Investigations on Bacterial Mouth Rot in Atlantic salmon.** Can\$ 75,000. National Sciences and Engineering Research Council of Canada (NSERC) Industrially Oriented Research Grant to University of British Columbia. Dr. Kent was a co-investigator with an allocation of Can \$23,000.

Dr. Kent supervised collection and isolations of suspect bacteria.

1995-1999. **Epidemiology, Pathology, Immunology, and Control of *Loma salmonae* in Farmed salmonids.** NSERC Strategic Research Grant. R. Olfason, PI, Kent was co-investigator Total Can \$510,000 Can \$ 144,000 to Kent

1998-1999. **Development of Non-lethal Sampling Methods for Prespawning Chinook Salmon for Infection by *Renibacterium salmoninarum*.** Provided by Creative Salmon Ltd, Tofino, British Columbia. Can\$ 46,000.

1998. **Efficacy of TNP-470 for the control of *Kudoa thyrsites* infections".** Provided by Moore-Clark, Ltd. Can\$ 18,600.

1995-1998. **Salmon Farming and Its Interactions with the Fisheries Resources of British Columbia".** Department of Fisheries and Oceans "High Priority" Reallocation Grant. Can\$ 270,000.

1995-1997 **"Development of a Molecularly Defined Vaccine s for Myxosporean Parasites".** NSERC Strategic Research Grant to University of Victoria. Can\$ 172,000. Dr. Kent was a co-investigator with an allocation of Can\$ 26,000. Dr. Kent supervised in vivo studies and parasite purifications.

1995-1997. **Microcystins and Netpen Liver Disease"** NSERC Strategic Research Grant to University of British Columbia. Can\$ 160,000. Dr. Kent was a co-investigator with an allocation of Can\$ 23,200/year. Dr. Kent supervised in vivo and pathology studies.

1992-1995. **"Microcystin Class of Tumour Promoting Hepatotoxins".** NSERC Strategic Research Grant. Can\$ 362,000 to University of British Columbia. Dr. Kent was a co-investigator with an allocation of Can\$ 67,500. Dr. Kent supervised in vivo and pathology studies.

1991-1994. **Sensitive Diagnostic Techniques for the Detection and Control of Plasmacytoid Leukemia in Canadian Aquaculture.** NSERC Strategic Research Grant to University of Prince

Edward Island. Can\$ 293,000. Dr. Kent was a co-investigator with an allocation of \$ 82,500. He supervised transmission studies and field investigations.

1993. Disease Reservoirs Around Salmon Farms". British Columbia Ministry of Agriculture, Food and Fisheries. Can \$ 27,000.

1991. **Stress and Its Role in Marine Anemia**". British Columbia Ministry of Agriculture, Food and Fisheries. Can\$ 14,000.

1989-1992. Determination **of the Chemical Structure and the Source of the Netpen Liver Disease Toxin**. NSERC Strategic Research Grant to University of British Columbia. Can\$311,000. Dr. Kent, was a co-investigator with an allocation of Can \$45,000.

D. Service

Departments, Centers and Programs

Director, Center for Salmon Disease Research (1999-2007)

Responsibilities as Center Director included:

1. Supervision of the Salmon Disease Laboratory (i.e., oversee budget, maintenance, long range development of new facilities and capabilities, and supervision of the facilities manager and secretary).
2. Overall coordination of all Center-initiated research proposals and cooperative research programs
3. Scheduling and coordinating advisory committee meetings and program reviews
4. Assisting current and prospective members in the preparation of various program projects proposals
5. Representation of the Center at all internal and extramural functions requiring or benefiting from Center participation

Technical Advisory Committee, Center for Interdisciplinary Marine Resource Studies (2000-2004)

Administrative Review for Director, Veterinary Diagnostic Laboratory (Nov 02)

External Advisory Committee member for the Marine Freshwater Biomedical Center and Linus Pauling Institute (2001 to present)

Department of Microbiology: Chair, Graduate Recruitment Committee (2006-present).

Search Committee – Assistant Dean of College of Agriculture Science. 2007.

Chair, Post-tenure Review for Dr. Michael Taylor. 2005-2007.

Service to Profession

American Fisheries Society Publications Awards Committee (1998 – present).

Associate Editor for the journal "Progressive Fish Culturist" (1990-1995).

Editorial Board, Journal of Fish Diseases (2000-present)

Editorial Board, Journal of Eukaryotic Microbiology (2002-present)

Editorial Board, Diseases of Aquatic Organisms (2003-present)

Committee Member, Ashton Cuckler New Investigator Award, Am. Soc. Parasitol.
(2006-present)

Scientific Advisor for Canada Genomics in Lice and Salmon (GiLS) (2008 to present)

Ad Hoc Manuscript Reviews

Journal of Parasitology, Journal of Eukaryotic Microbiology, Folia Parasitologica., Acta Protozoologica., Parasitology Research., Parasitology, International Journal for Parasitology, Journal of Aquatic Animal Health, Journal of Fish Diseases, Diseases Aquatic Animal, Canadian Journal of Fisheries and Aquatic Science, Journal of the World Aquaculture Association, Systematic Parasitology, Folia Parasitologica, Ecological Applications, etc.

Ad Hoc Proposal Reviews

Whirling Disease Foundation, NSERC (Canada), USDA SBIR program, Sea Grant Oregon, British MAFF –Strategic Research Proposals, NRC British Council Joint S&T Fund AquaNet (Canada), Washington Sea Grant, Western Regional Aquaculture Consortium Great Lakes Fishery Trust, National Sea Grant NOAA Northeast Lobster Commission, Aquaculture Collaborative Research and Development Program (Canada) (2 proposals), The Leverhulme Trust Fellowship application, Center for Tropical and Subtropical Aquaculture, British Columbia Science Council (7 proposals in 2003). Natural Sciences and Engineering Research Council of Canada (NSERC).

Professional Societies

Dr. Kent is a member of the American Society of Parasitologists, Society of Protozoologists, and Fish Health Section of the American Fisheries Society. He was the President of the latter society (2000-2001). He was also the Chair of the Professional Standards Committee of this society (1995-1997).

Service to Public (professionally related)

Member of the panel of experts for the Alberta Whirling Disease Action Committee (1997-1999)

Board Member, Technical Advisory Committee (Research Subcommittee) USDA Western Regional Aquaculture Consortium (2001-2004)

Member of the USDA ARS OSQR National Program Review Panel. 2004.

Member of the USDA SBIR Aquaculture Review Panel. Feb 2007.

Presented 1.5 lecture on livestock parasitology to Oregon 4-H students, 28 June 2007.

E. Awards

Recipient of the 2009 Pfizer Research Excellence Award – College of Veterinary Medicine

Recipient of the James and Mildred Oldfield/E.R. Jackman Team Award 2005.

Recipient of the 2004 Journal of Aquatic Animal Health Best Paper Award (June 2005).

Recipient of the R.E. Foerester Award. This award will be presented annually in recognition of the Fisheries and Oceans Canada, Science Branch, Pacific Region, publication that makes the most significant contribution to fisheries science or to the objectives of the Department – 2001.

Recipient of the Department of Fisheries and Oceans Deputy Minister's Commendation for contributions to the Department - 1997.