



Acuicultura

Temario de curso

Adscripción	
Programa de posgrado	Acuicultura
Orientación	N/A
Fecha de registro en el DSE	

Información del curso		
Nombre del curso		
Sanidad y Patología en Acuicultura		
Periodo lectivo	Tipo	
Cuatrimestre I (enero-abril)		Optativo
Cursos previos		
Conocimientos de biología y cultivo de organismos marinos		
Créditos	Horas de teoría	Horas de laboratorio
6	32	40
Elaborado por		
Dr. Jorge A. Cáceres Martínez		
Aprobado en reunión de Consejo de Programa de Posgrado (CPP)		
03/11/2010		

Objetivos generales
Que el alumno conozca y comprenda los principios de las patologías que afectan a los organismos en cultivo, el control sanitario y su aplicación en acuicultura.

Contenido temático
1. Introducción 1.1. Importancia de la sanidad y la patología en acuicultura 1.2. Conceptos y definiciones Instrumentación Horas de teoría: 3
2. Las enfermedades en los moluscos 2.1. Enfermedades virales 2.2. Rickettsias y Chlamidias 2.3. Bacterias y hongos 2.4. Protozoarios 2.5. Metazoarios Horas de teoría: 5
3. Las enfermedades en los crustáceos 3.1. Enfermedades virales 3.2. Rickettsias y Chlamidias 3.3. Bacterias y hongos 3.4. Protozoarios



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3.5. Metazoarios
Horas de teoría: 5
4. Las enfermedades en los peces
4.1. Enfermedades virales
4.2. Rickettsias y Chlamidias
4.3. Bacterias y hongos
4.4. Protozoarios
Horas de teoría: 5
5. Técnicas de evaluación y diagnóstico
5.1. Análisis en fresco y necropsia
5.2. Técnicas parasitológicas
5.3. Bacteriología
5.4. Histopatología
5.5. Inmunología y biología molecular
Horas de teoría: 4
6. Medidas profilácticas y de control
6.1. Instalaciones de cultivo
6.2. Certificado sanitario
6.3. Cuarentena
6.4. Inspección
6.5. Tratamiento
Horas de teoría: 4
7. Registro y seguimiento sanitario
7.1. Certificación
7.2. Programas sanitarios (HACCP, GMP)
Horas de teoría: 3
8. Legislación y normas sanitarias
8.1. Legislación y normatividad internacional
8.2. Legislación y normatividad nacional
Horas de teoría: 3
9. Prácticas de laboratorio
9.1. Análisis en fresco
9.2. Técnica histológica
9.3. Diagnóstico molecular
9.4. Supervisión sanitaria
Horas de laboratorio: 40



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Bibliografía

1. Alday de Graindorge V. & Flegel T.W. (1999). Diagnosis of Shrimp Diseases. Food and Agriculture Organization of the United Nations and Mulitmedia Asia, Bangkok, Thailand.
2. Amend D., Yasutake W. & Mead R. (1969). A hematopoietic virus disease of rainbow trout and sockeye salmon. Trans. Am. Fish. Soc., 98, 796-804.
3. Antonio, D. B., Anfree, K. B., Moore, J. D., Friedman, C. S. and R. P. Hedrick. 2000. Detection of rickettsiales-like prokaryotes by in situ hybridization in black abalone, *Haliotis cracherodii*, with withering syndrome. J. Invertebr. Pathol., 75 (2): 180-182.
4. Arkush K.D., McNeil C. & Hedrick R.P. (1992). Production and characterization of monoclonal antibodies against channel catfish virus. J. Aquat. Anim. Health, 4, 81-89.
5. Arnzen J.M., Ristow S.S., Hesson C.P. & Lientz J. (1991). Rapid fluorescent antibody test for infectious hematopoietic necrosis virus (IHNV) utilizing monoclonal antibodies to nucleoprotein and glycoprotein. J. Aquat. Anim. Health, 3, 109-113.
6. Austin B. & Austin B.A. (1993). Bacterial Fish Pathogens. Ellis Horwood, Chichester, UK.
7. Bell T.A. & Lightner D.V. (1988). A Handbook of Normal Shrimp Histology. Special Publication No. 1, World Aquaculture Society, Baton Rouge, Louisiana, USA.
8. Berthe F.C.J., Burreson E. & Hine M. (1999). Use of molecular tools for mollusc disease diagnosis. Bull. Eur. Ass. Fish Pathol., 19(6), 277-278.
9. Berthe F.C.J., Le Roux F., Adlard R.D. & Figueras A.J. (2004). Marteiliosis of molluscs: a review. Aquatic Living Resources, 17(4), 433-448.
10. Bertolini J.M., Cipriano R., Pyle S.W. & McLaughlin J.A. (1990). Serological investigation of the fish pathogen *Edwardsiella ictaluri*, cause of enteric septicemia of catfish. J. Wildl. Dis., 26, 246-252.
11. Bondad-Reantaso M.G., McGladdery S.E., East I. & Subasinghe R.P. (2001). Asian Diagnostic Guide to Aquatic Animal Diseases. FAO Fisheries Technical Paper, No. 402, supplement 2. Food and Agriculture Organization of the United Nations (FAO), Rome, Italy, 240 pp.
12. Bootland L.M. & Leong J.A. (1992). Staphylococcal agglutination, a rapid method of identifying infectious hematopoietic necrosis virus. Appl. Environ. Microbiol., 58, 6-13.
13. Boulo V., Mialhe E., Rogier H., Paolucci F. & Grizel H. (1989). Immunodiagnostic of *Bonamia ostreae* (*Ascetospora*) infection of *Ostrea edulis* L. and subcellular identification of epitopes by monoclonal antibodies. J. Fish Dis., 12, 257-262.
14. Bower S.M., McGladdery S.E. & Price I.M. (1994). Synopsis of infectious diseases and parasites of commercially exploited shellfish. Ann. Rev. Fish Dis., 4, 1-199.
15. Bowser P.R & Plumb J.A. (1980). Fish cell lines: establishment of a line from ovaries of channel catfish. In Vitro, 16, 365-368.
16. Brock J.A. & Main K. (1994). A Guide to the Common Problems and Diseases of Cultured *Penaeus vannamei*. Published by the Oceanic Institute, Makapuu Point, P.O. Box 25280, Honolulu, Hawaii, USA.
17. Burreson E.M. & Ford S.E. (2004). A review of recent information on the Haplosporidida, with special reference to *Haplosporidium nelsoni* (MSX disease). Aquatic Living Resources, 17(4), 499-517.
18. Cáceres-Martínez, J. and R. Vásquez-Yeomans. 1997. Presence and Histopathological Effects of the Copepod *Pseudomyicola spinosus* in *Mytilus galloprovincialis* and *Mytilus californianus*. J. Invertebr. Pathol., 70 (2): 150-155.
19. Cáceres-Martínez, J., P. Macías-Montes de Oca and R. Vásquez-Yeomans. 1998. Polydora sp. infestation and health of the Pacific oyster *Crassostrea gigas* cultured in Baja California, NW



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- Mexico. Journal of Shellfish Research, 17: 259-264.
20. Cáceres-Martínez, J., Vásquez-Yeomans, R., Guerrero-Rentería, Y., Curiel-Ramírez, G. S., Olivas-Valdés, J. A. and G. Rivas. 2000. The marine mites *Hyadesia* sp. and *Copidognathus* sp. associated to the mussel *Mytilus galloprovincialis*. *J. Invertebr. Pathol.*, 76 (3): 216-221.
 21. Carnegie R.B. & Cochennec-Laureau N. (2004). Microcell parasites of oysters: recent insights and future trends. *Aquatic Living Resources*, 17(4), 519-528.
 22. Carnegie R.B., Barber B.J., Culloty S.C., Figueras A.J. & Distel D.L. (2000). Development of a PCR assay for detection of the oyster pathogen *Bonamia ostreae* and support for its inclusion in the Haplosporidida. *Dis. Aquat. Org.*, 42, 199-206.
 23. Chanratchkool P., Turnbull J.F., Funge-Smith S.J., MacRae I.H. & Limsuwan C. (1998). Health Management in Shrimp Ponds. Aquatic Animal Health Research Institute, Department of Fisheries, Kasetsart University Campus, Jatujak, Bangkok, Thailand, 152 pp.
 24. Comps, M. 1988. Epizootic diseases of oysters associated with viral infections. In: W. S. Fisher (ed.). *Disease Processes in Marine Bivalve Molluscs*. Am. Fish. Soc. Spec. Publ., Bethesda, Maryland, USA. 18: 23-37.
 25. Elston R.A. (1999). *Health Management, Development and Histology of Seed Oysters*. World Aquaculture Society. Baton Rouge, Louisiana, USA, 110 pp.
 26. Elston, R. A., Leibovitz, L., Relyca, D. and J. Zatila. 1981. Diagnosis of vibriosis in a commercial hatchery epizootic: diagnostic tools and management features. *Aquaculture*, 24: 53-62.
 27. Ferrer, I. 2001. Anisakiosis y otras zoonosis parasitarias transmitidas por consumo de pescado. *Revista AquaTIC*, 14: 1-21.
 28. Hill B.J., Williams R.F., Finlay J. (1981). Preparation of antisera against fish virus disease agents. *Dev. Biol. Stand.*, 49, 209-218.
 29. Hine P.M. & Thorne T. (2000). A survey of some parasites and diseases of several species of bivalve mollusc in northern Western Australia. *Dis. Aquat. Org.*, 40, 67-78.
 30. Howard D.W. Lewis E.J., Keller J. & Smith C.S. (2004). Histological techniques for marine bivalve molluscs and crustaceans. NOAA Technical Memorandum NOS NCCOS 5, 218 pp.
 31. Howard, D. W. and Smith, C. S. 1983. Histological techniques for marine bivalve mollusks. NOAA Technical memorandum NMFS-F/NEC-25. Massachusetts. 97p.
 32. Johnson S.K. (1995). *Handbook of Shrimp Diseases*. TAMU-SG-90-601(r). Texas A&M Sea Grant College Program, Texas A&M University, College Station, Texas, USA, 26 pp.
 33. Lauckner, G. 1983. Diseases of Mollusca: Bivalvia. In: O. Kinne (ed.). *Diseases of Marine Animals*. Vol. II Introduction to Scaphopoda. Biologische Anstalt Helgoland. Hamburg, 467-1038.
 34. Lightner D.V. & Redman R.M. (1998). Shrimp diseases and current diagnostic methods. *Aquaculture*, 164, 201-220.
 35. Lightner D.V. & Redman R.M. (1998). Strategies for the control of viral diseases of shrimp in the Americas. *Fish Pathol.*, 33, 165-180.
 36. Lightner D.V. (1996). *A Handbook of Shrimp Pathology and Diagnostic Procedures for Diseases of Cultured Penaeid Shrimp*. World Aquaculture Society, Baton Rouge, Louisiana, USA. 304 p.
 37. Lightner D.V. (1996). The penaeid shrimp viruses IHHNV and TSV: epizootiology, production impacts and role of international trade in their distribution in the Americas. *Rev. sci. tech. Off. int. Epiz.*, 15, 579-601.
 38. Lorenzen E., Carstensen B. & Olesen, N.J. (1999). Inter-laboratory comparison of cell lines for susceptibility to three viruses: VHSV, IHNV and IPNV. *Dis. Aquat. Org.*, 37, 81-88.
 39. Lotz J.M. (1997). Special topic review: Viruses, biosecurity and specific pathogen-free stocks in shrimp aquaculture. *World J. Microbiol. Biotechnol.*, 13, 405-413.



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40. Möller, H. and K. Anders. 1986. Diseases and parasites of marine fishes. Kiel: Moller, 365 pp.
41. Organización Mundial de Sanidad Animal. 2006. Manual de pruebas de diagnóstico para animales acuáticos.
42. Reddington J. & Lightner D.V. (1994). Diagnostics and their application to aquaculture. World Aquaculture, 25, 41-48.
43. Thoeson J.C. (1994). Suggested Procedures for the Detection and Identification of Certain Finfish and Shellfish Pathogens, Fifth Edition. Bluebook, American Fisheries Society, Bethsada, USA.
44. Walker P. & Subasinghe R.P. (2000). DNA-based Molecular Diagnostic Techniques. Research needs for standardization and validation of the detection of aquatic animal pathogens and diseases. FAO Fisheries Technical Paper, n 395, 93 pp