SEEKING PROFESSIONAL ASSISTANCE

The diagnosis of many of the diseases of importance requires professional help. Unfortunately, very few individuals in the world today have training in shellfish pathology. They can be found in some government agencies, in some universities, and in some private organizations. Shellfish farmers will need to locate this help in their particular region.

A list of shellfish pathologists and pathology services appears at the end of this section. The list is not long. It is hoped that, as the recognition of shellfish health management grows, the number of professionals who can serve the industry will also increase.

In seeking the assistance of a shellfish pathologist or diagnostic professional, it is usually necessary to provide tissues for examination. These must be collected and delivered properly to be of use. One common mistake is failing to collect sick animals and tissues during a shellfish mortality. Often, a shellfish pathologist will be called to assist after the mortality has abated and no representative sick animals remain in the population. So, the first guideline is to enlist professional help during the actual problem, or at least to collect and chemically preserve tissues during this time.

The ideal way to deliver sick animal tissue for examination is fresh and within a few hours of collection, or to have a pathologist visit the mortality area to collect tissue and other samples. If this is not possible, representative sick animals should be delivered, on ice but unfrozen, to the examining pathologist within one day of collection. As a last resort, the tissues can be chemically preserved for testing, although fewer types of examinations can be done on preserved tissue than on fresh tissue.

Chemical Preservation of Tissues

There are many chemical solutions that can be used to preserve, or “fix,” shellfish for pathological examination. Although a particular pathologist may have a preference, the following fixatives will be adequate. The simplest fixative should be used when there is not sufficient time to prepare the more complicated but preferred fixative.

**Simplest fixative.** The simplest fixative is formaldehyde, purchased as a 37%-40% solution and diluted at 1 part formaldehyde to 9 parts seawater.
Preferred fixative. The preferred fixative, referred to as “Davidson’s” fixative, is prepared as follows. For 2 liters, combine and mix well:

- 600 mL 95% ethanol
- 400 mL 37%-40% formaldehyde
- 200 mL filtered seawater
- 600 mL tap water
- 200 mL glacial acetic acid

Whatever the fixative, shucked animals should be placed in the fixative with a volume of at least five times as much liquid as tissue mass.

In specific cases, the shellfish pathologist may require other types of tissue preparation, but this is an acceptable general method unless other specific instructions are given. Each container should be clearly labeled with the date and place of collection, the name of the species enclosed, and any other pertinent information.

**Warning!**
These chemicals are noxious. Use only with adequate ventilation. Do not let them come into contact with eyes or skin.
Also note that shells placed in Davidson’s or any other acidic fixative release carbon dioxide and other gases. To prevent pressure from building up in the fixing vessels, do not seal the lids of the containers.

**Shellfish Pathology Services**

Practitioners are listed alphabetically by state. Do not send any material without contacting them in advance.

Dr. Theodore R. Meyers  
Alaska Department of Fish and Game  
FRED Division  
P.O. Box 3-2000  
Juneau, AK 99302  
(907) 455-3597  
*Complete fish and shellfish disease diagnostic services for Alaskan facilities and for those out of state seeking certification of Crassostrea gigas spat. No charge.*
Dr. Joe Sullivan  
Alaska Department of Fish and Game  
FRED Division  
333 Raspberry Road  
Anchorage, AK 99502  
(907) 267-2249  
*Complete fish and shellfish disease diagnostic services for Alaskan facilities and for those out of state seeking certification of Crassostrea gigas spat. No charge.*

Dr. R. P. Hedrick  
Department of Medicine  
School of Veterinary Medicine  
University of California  
Davis, CA 95616  
(916) 752-3411  
*Oysters, abalone. Histology, $200 per 60 animals.*

Dr. Carolyn Friedman  
California Department of Fish and Game  
Fish Disease Laboratory  
2111 Nimbus Road  
Rancho Cordova, CA 95670  
(916) 355-0811  
*Bacteriology, parasitology. Preference given to government agencies, California-registered aquaculture and other aquaculture. No charge.*

Dr. Walter Blogoslawski  
NOAA, NMFS, NEFC  
Milford Laboratory  
212 Rogers Avenue  
Milford, CT 06460  
(203) 783-4235  
*Bacterial diseases of cultured oysters and clams. No charge; travel support required.*

Dr. John C. Harshbarger  
Dr. Esther C. Peters  
Smithsonian Institution  
Registry of Tumors in Lower Animals  
NHB-W216A  
Washington, DC 20560  
(202) 357-2647  
*Neoplasms and related diseases. No charge.*
Dr. John A. Couch
US EPA Environmental Research Laboratory
Gulf Breeze, FL 32561
(904) 932-5311
Toxicological pathology of molluscs, pathogenesis of parasitic infections (Perkinsus marinus, Haplosporidium), neoplasia, etiologic agent diagnosis. No charge.

Dr. James A. Brock
Aquaculture Development Program
335 Merchant Street, Rm 359
Honolulu, HI 96813
(808) 845-9561
General diagnostics for cold-blooded aquatic species. Supported by state of Hawaii.

Dr. Thomas C. Cheng
Marine Biomedical Research
Medical University of South Carolina
P.O. Box 12559 (Fort Johnson)
Charleston, SC 29412
(803) 795-7491 (or 7490)
Bacterial, protozoan, helminth, and arthropodan diseases; biochemical indicators of disease; large-scale surveys and epizootiological studies; consultation on preventive measures. Diagnostics, $250 per diagnosis.

Dr. Robert E. Hillman
Battelle Ocean Sciences
397 Washington Street
Duxbury, MA 12332
(617) 934-0571
Examination of shellfish stocks for evidence of parasites and pathogens. Sample of 50 individuals, $535.

Dr. Robin M. Overstreet
Dr. William E. Hawkins
Dr. Jeffrey M. Lotz
Gulf Coast Research Laboratory
P.O. Box 7000
Ocean Springs, MS 39564
(601) 875-2244
Molluscan and crustacean disease. No charge.
Dr. Robert E. Olsen
Oregon State University
Hatfield Marine Science Center
Newport, OR 97365
(503) 867-3011
Parasitology. Charge depends on service.

Dr. S. K. Johnson
Extension Fish Disease Diagnostic Laboratory
Department Wildlife and Fisheries Sciences
Nagle Hall, Texas A & M University
College Station, TX 77843
(409) 845-7471
General aquatic animal health and diagnostics; water quality management. Charge depends on service, usually under $25.

Dr. Sammy M. Ray
Ray Biological Consulting Co.
7213 Yucca Drive
Galveston, TX 77551
(409) 744-2761
Fluid thioglycolate culture analysis for Perkinsus marinus. $10 per oyster.

Dr. Eugene M. Burreson
Virginia Institute of Marine Science
Gloucester Point, VA 23062
(804) 642-7340
Protozoan parasites of oysters. No charge for Virginia residents.

Dr. Ralph Elston
Battelle Marine Sciences Laboratory
439 W. Sequim Bay Road
Sequim, WA 98382
(206) 683-4151
Complete fish and shellfish disease diagnostics and certification. Charges range from $200 to $1000, depending on service.
Dr. R. J. G. Lester
Department of Parasitology
University of Queensland
Brisbane, Australia 4067
(07) 377-3305
Protozoan and metazoan diseases of molluscs. No charge at present.

Dr. Susan M. Bower
Department of Fisheries and Oceans
Biological Sciences Branch
Pacific Biological Station
Nanaimo, BC, Canada V9R 5K6
(604) 756-7077
Parasites of abalone, scallops, oysters and clams on west coast of Canada; mussels, hemocytic neoplasia. No charge, but limited service as time and priority permit.

Dr. G. R. Johnson
University of Prince Edward Island
Atlantic Veterinary College
Diagnostic Services
550 University Avenue
Charlottetown, PEI, Canada C1A 4P3
(902)566-0864
Gross postmortem and histopathology, bacteriology for diagnostics and for depuration, marine toxin analysis (domoic acid), algal identification. Fee charged on a per test basis.

Dr. Takuo Sano
Laboratory of Aquatic Pathology
Department of Aquatic Biosciences
4-5-7, Konan, Minato-ku
Tokyo 108, Japan
(03) 471-1251
Aquatic pathology and virology. Charge not available.

J. F. McArule
Fisheries Research Centre
Abbotstown, Castleknock, Dublin 15, U.K.
(01) 210111; Telex 31236 FRC EI; Fax 205078
Diseases of farmed salmon and wild and farmed molluscs. No charge at present.
A. J. Figueras
Instituto Investigaciones Marinas (CSIC)
Eduardo Cabello 6
36208 Vigo, Spain
86 231930 / 86 292758; Fax 86 292762
Shellfish viruses, bacteria, and metazoan and protozoan parasites. Charge depends on sample size and frequency.