



FISH HEALTH NEWSLETTER

American Fisheries Society/Fish Health Section

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Announcements:

Ana Baya will be representing the Fish Health Section at the Midyear Governing Board Meeting of the American Fisheries Society, to be held March 6-8, 2003.

New Book Releases from AFS:

Sustaining North American Salmon: Perspectives Across Regions and Disciplines

U.S. and Canadian fisheries professionals from multiple disciplines examine the history, current knowledge, and research needs of fisheries stakeholders, managers, and policy makers regarding salmon ecology, policy, and management in North America. This book offers a greater understanding of the complexity and repercussions of salmon management, currently a controversial issue between Canada and the United States. Information needs from biological, social, and economic perspectives are identified, enabling managers and policy makers to develop an action agenda to acquire and utilize this information.

This excellent reference for the management of salmon presents a synthesis of the history, ecology, sociology, economics, politics/institutions, and the future of one of the most economically and culturally significant fishes in America.

413 pp., paper, November 2002

Stock #: 550.39

List price: \$69
AFS member price: \$48
ISBN# 1-888569-40-9

To order:
Online: www.fisheries.org/cgi-bin/hazel-cgi/hazel.cgi
Phone: (678) 366-1411, or Fax: (770) 442-9742
Email: afspubs@pbd.com

The Hutton Junior Fisheries Biology Program:

The Hutton is an educational program for high school students designed to develop interest in a career in fisheries among groups underrepresented in the fisheries profession, including minorities and women. AFS encourages its members to consider mentoring a student during the summer of 2003.

For information on how you can get involved, go to <http://www.fisheries.org/Hutton.shtml>, or contact Christine Fletcher at cletcher@fisheries.org, phone: 301-897-8616, ext. 213.

Fish Health Section Listserv

Many of you have been receiving these periodic updates, however, it is inevitable that we have missed some of you in forming the database. If you are not currently receiving the updates and would like to, please send me an email bartholj@orst.edu and I will be happy to place you on the list. Alternatively, if you don't find this useful and would prefer to be removed from the list, please let me know and I will do so. I'd also encourage you to send announcements of jobs, meetings, and anything else that may be of interest to other members (websites, news bits, notices of job changes etc). The listserv is a great way of getting information out rapidly to the whole group and I appreciate any input on making it more effective.

Jerri Bartholomew

Jobs:

The following announcement is for a fish pathologist position that will be available this summer due to the retirement of John Schacte. More information about this position can be found at www.cs.state.ny.us/announ/sched-announcements/Feb03-2003/27-963.cfm

THE POSITION: This position exists in the New York State Department of Environmental Conservation and is located in Rome.

MINIMUM QUALIFICATIONS: On or before March 31, 2003, you must have:

1. A bachelor's degree in biology which included the required coursework listed below AND four years of full-time professional experience as a fish pathologist; **OR**
2. Current certification as a fish pathologist by the American Fisheries Society; **OR**
3. A degree from an accredited veterinary school AND two years of full-time professional experience as a fish pathologist.

Required coursework: 30 semester credit hours in at least six of the following areas: pathogenic bacteriology, parasitology, virology, pathology/histology, vertebrate physiology, water quality or pollution biology, limnology, animal nutrition, biochemistry, pharmacology; PLUS at least 8 semester credit hours in fish anatomy and physiology (laboratory coursework required), ichthyology or fish biology, or fish culture. (See Note 4.)

Substitution: If you qualify under option 1 above, with a bachelor's degree in biology, including the required coursework, and you have an advanced degree with specialization in a field related to fish pathology such as microbiology, parasitology, histology or biochemistry, you may substitute the advanced degree for required experience as follows:

Master's Degree - two years of experience

Ph.D. - four years of experience

DUTIES: As a Pathologist 2 (Aquatic) you would be responsible for implementing and maintaining a fish health management program for all DEC fish hatcheries in New York State and may also conduct such activities in private aquaculture facilities as required by State regulations. This includes coordination and consultation with State and regional fish management and fish health officials, concerning live fish and/or egg imports, stocking, and other regulatory activities that impact fish health. You would supervise and/or perform investigations to diagnose and treat both infectious and non-infectious diseases of hatchery fish, and may investigate fish disease problems in waters of the State. You would also be responsible for supervising the annual fish health inspection of all domestic and wild broodstock used in DEC's fish propagation program; maintain experimental laboratory strains of specific disease resistant fish; supervise applied research projects related to new disease epizootics, treatment or immunization techniques and nutritional anomalies; supervise all administrative activities of the unit including writing and/or review of all unit publications and reports, personnel actions including staff performance evaluations, and the maintenance of statewide inventories of fish health chemotherapeutic agents and antimicrobials. You would be responsible for fish health training activities for the Fish Culture Section and/or Bureau of Fisheries personnel, including workshops and preparation of instructional material. The Pathologist 2 (Aquatic) represents the Department as the State's official member of the Great Lakes Fishery Commission's Fish Health Committee and may also represent the Department nationally in professional societies or other organizations dedicated to advancing the fish health management profession.

Meetings and Workshops:

THE 26TH ANNUAL AFS/FHS MEETING AND THE 44TH ANNUAL WESTERN FISH DISEASE WORKSHOP

July 15-17, 2003

Renaissance Madison Hotel, Seattle, Washington, USA

For more details on the meeting, go to our website at www.nwifc.org/fhs2003.

The combined meeting of the AFS Fish Health Section and the Western Fish Disease Workshop will be held in the Seattle, Washington, on July 15-17, 2003. The USFWS Olympia Fish Health Center and the Northwest Indian Fisheries Commission (NWIFC) will be co-hosting the event. The meeting will focus on a wide range of topics involving diseases of wild and cultured fish and shellfish. A continuing education workshop will be held prior to the meeting on Monday, July 14, 2003.

First Call for Papers: Individuals interested in presenting at the meeting are initially invited to submit the following: (a) the title along with a short description (25 words or less) of the presentation, (b) whether it will be an oral or poster presentation, and (3) any specific equipment needs for the presentation. Oral presentations will be 12 minutes followed by 3 minutes of questions. Preliminary submissions are due by **May 2, 2003**, and will be used by the planning committee to begin developing an agenda for the meeting. Formal abstracts will also be required for each presentation and are due by **June 6, 2003**. Please follow the abstract format which is posted on our website at

www.nwifc.org/fhs2003. The preliminary title submission and abstracts should be either emailed to Marcia House at fhs2003@nwifc.org or sent via postal delivery on a 3.5" diskette to Marcia House, NWIFC, 6730 Martin Way East, Olympia, WA, 98516. Note:

Lodging: A block of rooms has been reserved at the Renaissance Madison Hotel in Seattle from July 13-18, 2003. Reservations should be made directly with the hotel before June 23, 2003, to receive the discounted room rate of \$143.00. Phone number: (800) 278-4159 or email address: groups@themadison.com.

Contact People:

Ray Brunson (USFWS): Ph(360-753-9046) or email at Ray_Brunson@r1.fws.gov

Bruce Stewart (NWIFC): Ph(360-438-1181 ext 338) or email at bstewart@nwifc.org.

AMERICAN FISHERIES SOCIETY 133RD ANNUAL MEETING

Québec City, Québec, Canada

August 10-14, 2003

Registration begins in February. See the AFS website for more details.

WHIRLING DISEASE – MANAGING THE RISK

The Ninth Annual National Whirling Disease Symposium

February 6 and 7, 2003

www.whirling-disease.org

Bell Harbor Conference Center, Seattle, Washington.

3RD INTERNATIONAL SYMPOSIUM ON FISH VACCINOLOGY

April 9 – 11, 2003 in Bergen, Norway

for more information go to the website:

<http://www.veso.no/courses/fishvaccinology/index.html>

28th ANNUAL EASTERN FISH HEALTH WORKSHOP -- 21-25 April 2003

The Eisenhower Inn and Conference Center

Gettysburg, PA

The National Fish Health Research Laboratory (Kearneysville, WV) is proud to host the 28th Eastern Fish Health Workshop at the Eisenhower Inn and Conference Center (Gettysburg, PA). Registration begins Monday, 21 April from 500 - 700 PM, followed by three full day sessions, 22, 23, 24 April 2003. Battlefield tours and a special night at the Farnsworth Mourning Theater and Ghost walk are planned as optional group activities. Not only will there be a complete session on the final day (24 April) but that evening features our Annual Banquet with entertainment (covered under registration). We encourage you to make your departure plans for Friday, 25 April. But Wait!!! Come early and stay late to visit the sites and sounds of this wonderful town and even take the opportunity to reap continuing education credits while you visit!

Continued Education Opportunity

Have you sat through talks on molecular biology and wished that you had a better knowledge of this important field? Here's an opportunity to do something about it! "Molecular Biology - The Basics," a 7 hour session presented by Dr. Ted Clark and Dr. Jim Casey of the Dept. of Microbiology and Immunology, College of Veterinary Medicine, Cornell University, is being organized through the Continuing Education Committee of the Fish Health Section of the American Fisheries Society. The session explains techniques used in contemporary molecular biology and targets individuals who have had little experience in this area of science. It will convene at the Eisenhower Inn on Friday, 25 April 2003 from 800 am - 400 PM. Individuals participating in this program will earn 7.0 credit hours of CE Credit from the Fish Health Section of the American Fisheries Society. For additional information please contact Dr. Paul R. Bowser (prb4@cornell.edu). The class size will be limited to 40 people, based on a first come basis. Cost is \$35 (or U.S. equivalent), which includes registration, handouts, breakfast, lunch and break.

For additional information, contact:

Dr. Rocco C. Cipriano, Chairman EFHW National Fish Health Research

Laboratory Kearneysville, WV 25430

PHONE: 304/724-4432

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E-mail: rocco_cipriano@usgs.gov

FISH IMMUNOLOGY WORKSHOP II

21 - 25 April, 2003, Wageningen, The Netherlands

For more information go to:

<http://www.zod.wau.nl/cbi/CURSUSSEN/FISH%20VACCINATION/index.htm>

PROPAGATED FISH IN RESOURCE MANAGEMENT

Special Symposium of the American Fisheries Society – this is being co-hosted by the FHS and there are some interesting management-related sessions planned for fish health June 16-18, 2003 - Doubletree Riverside Hotel, Boise ID

<http://www-heb.pac.dfo-mpo.gc.ca/congress/pfirm/>

11TH INTERNATIONAL CONFERENCE OF THE EUROPEAN ASSOCIATION OF FISH PATHOLOGISTS

21st - 26th September, 2003

Corinthia San Gorg Conference Centre, Malta

For more information go to the EAFP website - <http://www.eafp.org/confs.html>

SIXTH INTERNATIONAL SYMPOSIUM ON FISH PARASITES

University of the Free State in Bloemfontein, South Africa from 22 – 26 September 2003.
More information coming soon.

WESTERN DIVISION AFS 2003 ANNUAL MEETING

“Productive Pacific Ecosystems” Lake, Stream, Estuarine, and Marine Environments From Alaska to Baja

April 14-17 at the Hyatt – Islandia Hotel in San Diego, California

See the AFS website for more details –

<http://www.fisheries.org/wd/meet/2003/meet2003.htm>

FHS Nominations:

It is now past time to begin to reweave the fabric of our communities...
The ebbing of community over the last several decades has been silent and deceptive... So our challenge is to restore [it] for the twenty-first century through both collective and individual initiative.

Robert D. Putnam, 2000. *Bowling Alone*

Please look around, in the mirror and among your colleagues, and think about people who might be willing to serve the community of our Section in one of the positions listed below. Our officers and committees have held us together as a Section over the years, cheerfully for the most part. It's time to help them out by sending your nominations to me. Nominations accompanied by biographical sketches will be available in the on-line April FHS newsletter and voting will be completed by June 1, 2003. If you are a member who wishes to submit a nomination, please contact Margaret Ewing (msewing@okstate.edu).

I think Robert Putnam is right; as Bev Dixon would put it, Please Get Involved!

We need nominations for the following positions:

Vice-President (who then becomes the President-elect, President, and finally, the Immediate Past-President):

The office of Vice-President begins the leadership role leading to President and Past-President. This position provides continuity in the leadership of the Section over 4 years. The Vice-President selects the time and place for the annual meeting to be held three years hence, pending final approval by the Section EXCOM.

Nominating and Balloting Committee (3 years):

The Nominating and Balloting Committee of three members plus the Immediate Past-President solicits nominations for a slate of at least two candidates for each of the offices of Vice-President and Secretary-Treasurer. The Chair is the senior elected member. The Committee is responsible for verifying eligibility of all nominees before the official ballots are prepared. Nominations of Section members in good standing are submitted prior to March 15 to the Committee Chair. Nominations must have the consent of the nominees to be considered. In addition, the slate of candidates for the Professional Standards Committee, the Technical Standards Committee and the Nominating and Balloting Committee will be identified by the same date. The Nominating and Balloting Committee is responsible for timely preparation, mailing and tabulation of all mail ballots circulated to the membership and prompt reporting of the results to the President and the Newsletter editor.

Technical Standards Committee (3 years):

This Committee consists of three members elected by the Section. One new member is elected each year and the Chair is the senior member of the Committee. The Committee fosters and promotes the use of standard, reliable and sensitive technical procedures for detection, diagnosis and confirmation of aquatic animal diseases and for enhancing the health of aquatic animals. Committee members are recognized technical specialists. This Committee is responsible for editing, compiling and distributing the Fish Health Section Blue Book "Procedures for the Detection and Identification of Certain Finfish and Shellfish Pathogens".

Professional Standards Committee (3 years):

This Committee consists of three members elected by the Section, the senior member serving as Chair. Each member must be one of the following: certified Fish Health Inspector, certified Fish Pathologist or Doctor of Veterinary Medicine. No Section member who has had his or her certification revoked for cause may serve on the Committee. The committee is responsible for developing and maintaining a system for recognizing professional competence in the aquatic animal health field by administering the professional certification programs of the Section.

Evidences of two clonal lineages within the emerging fish pathogen *Pseudomonas anguilliseptica* by serological and genetic techniques.

Submitted by

**JESUS L. ROMALDE, SONIA LÓPEZ-ROMALDE, CARMEN RAVELO,
BEATRIZ MAGARIÑOS, ALICIA E. TORANZO**

Departamento de Microbiología y Parasitología. Facultad de Biología. Universidad de Santiago de Compostela. 15782, Santiago de Compostela, Spain.

Pseudomonas anguilliseptica is an emerging opportunistic pathogen for a variety of fish species cultured in marine and brackish waters worldwide [1]. The microorganism was originally described as the causative agent of the red spot disease of Japanese eel cultured in Japan. Since then, the pathogen has been isolated in different countries from a variety of cultured and wild fish species like European eel, black sea bream, ayu, salmonids, whitefish, Baltic herring, striped jack, and orange-spotted grouper [1, 2].

From 1990, outbreaks of winter disease, and haemorrhagic septicemia also caused by *P. anguilliseptica*, have been reported in farmed gilthead seabream (*Sparus aurata*) in several Mediterranean countries including France, Spain and Portugal [1, 3, 4]. This mortality syndrome has been responsible for severe economic losses in this important commercial fish species. In the last years, this pathogen has been also isolated from turbot (*Scophthalmus maximus*), another valuable marine-fish species cultured in Europe [3, 4, 5].

The serological and antigenic characteristics of a group of 32 *Pseudomonas anguilliseptica* strains isolated in Spain from seabream and turbot were compared with a total of 18 collection strains of this bacterial species with different geographical and host sources. The employment of different techniques, including slide agglutination, microagglutination and dot blot, allowed us the establishment of two serological groups, one comprising the majority of eel isolates, and the other including isolates from other fish species, regardless of their geographic origin. The study of the lipopolysaccharides and outer membrane proteins corroborated these results, indicating that the serological differences among strains are due to the somatic antigen and not to antigenic determinants of proteic nature. Therefore, a serological scheme of two “O” serotypes is proposed for *Ps. anguilliseptica*: serotype O1 compiling the isolates from turbot, seabream, seabass, herring and salmonids, and serotype O2 mainly associated to the European and Japanese eel isolates.

Genetic analysis by randomly amplified polymorphic DNA (RAPD) demonstrated the existence of intraspecific variability within *P. anguilliseptica*. Again, two major genetic groups could be established which were related with the host origin of the isolates, and perfectly correlated with the two serotypes proposed above. The results obtained can be of importance in improving the knowledge of epidemiological aspects of *P. anguilliseptica* as well as for the design of effective vaccine formulations. Two papers describing the full biochemical, serological and genetic characterization of this pathogen have been submitted [6, 7].

1. **Daly, J.G.** 1999. Other bacterial pathogens. In: Woo, P.T.K., Bruno, D.W. (Eds.), Fish diseases and disorders. Viral, bacterial and fungal infections. CABI Publishing. New York, pp 577-598.
 2. **Austin, B., Austin, D.A.** 1995. Bacterial fish pathogens: disease of farmed and wild fish. 3rd ed. Springer-Verlag, Heidelberg.
 3. **Berthe, F.C.J., Michel, C., and Bernardet, J-F.** 1995. Identification of *Pseudomonas anguilliseptica* isolated from several fish species in France. Dis. Aquat. Org. 21, 151-155.
 4. **López-Romalde, S., Magariños, B., Ravelo, C., Toranzo A.E., and Romalde, J.L.** 2002. Development of a PCR-based procedure for the rapid detection of *Pseudomonas anguilliseptica*. 4th International Symposium on Aquatic Animal Health. New Orleans, LO, USA.
 5. **Romalde, J.L., López-Romalde, S., Magariños, B., Núñez, S., and Toranzo, A.E.** 2002. Phenotypic characterization of Spanish isolates of *Pseudomonas anguilliseptica* causing winter disease in sea bream. Xth International Conference of the European Association of Fish Pathologists (EAFP). Dublin, Ireland.
 6. **López-Romalde, S., Magariños, B., Núñez, S., Toranzo, A.E., and Romalde, J.L.** (submitted). Phenotypic and genetic characterization of *Pseudomonas anguilliseptica* strains isolated from fish. J. Aquat. An. Health.
 7. **López-Romalde, S., Magariños, B., Ravelo, C., Toranzo, A.E., and Romalde, J.L.** (submitted). Existence of two O-serotypes in the emerging fish pathogen *Pseudomonas anguilliseptica*. Vet. Microbiol.
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Differential Diagnosis: SVCV vs. KHV in Koi

Andrew E. Goodwin

Spring viremia of carp (SVC) is an OIE reportable disease with the potential to cause severe mortality in common carp, koi, and other fish species, especially cyprinids (Ahne et al. 2002; OIE 2000). The first outbreak of SVC in North America occurred on a large koi farm last summer (Goodwin 2002), an event that has produced a great deal of concern among koi hobbyists and fish diagnosticians. Because of the nature of SVC and its regulatory burden, it is critical that diagnosticians quickly and correctly recognize potential SVCV cases. During the fall of 2002, the University of Arkansas at Pine Bluff Fish Disease Diagnostic Laboratory received 10 koi samples from pond owners concerned that their fish were dying from SVC. All of these cases were from the northeastern and midwestern US, but not Arkansas. Of these cases, 1 was diagnosed as ammonia toxicity, 2 were a bacterial infection, 2 were *Ichthyobodo sp.*, and 5 were infections by koi herpes virus (KHV). Given the current importance of SVC diagnosis, it is worthwhile to compare the clinical signs and of this disease to those of KHV and to consider some of the environmental characteristics useful in a quick differential diagnosis. The following factors are helpful in identifying suspect SVC cases.

SVC vs. KHV, Temperature: Check the water temperature that prevailed when the first losses occurred. Disease from KHV typically occurs when water temperatures are in the range of 21-26°C and peaks are about 23°C. SVC occurs at significantly lower temperatures. Deaths from SVC usually occur at 5-18°C with the peak at about 16°C (Fijan 1999). Fall koi losses that occur as water temperatures drop into the mid-twenties are much more likely to be KHV. Spring losses that occur as water temperatures warm into the teens might be SVC.

SVC vs. KHV, Gross clinical signs: SVC produces clinical signs typical of those seen with many septicemias. These include exophthalmia, petechial hemorrhage of the skin (especially ventral), abdominal distention, and bloody mucus trailing from the vent or easily expressed by slight pressure (Figure 1). The KHV produces few grossly visible clinical signs other than focally necrotic gill lesions that bear some resemblance to columnaris disease (Figure 2).



Figure 1: Exophthalmia and petechial hemorrhages on a common carp experimentally infected with Spring Viremia of Carp Virus.



Figure 2: Kill lesions on koi and common carp experimentally infected with KHV.

SVC vs. KHV, Gross internal signs: European strains of SVCV produce petecial hemorrhages of the muscle, swim bladder, and peritoneum (Fijan 1999). These signs do not seem to be as common with the Asian-related strains recently isolated in the US. Both European and Asian-related strains do produce ascites, edema of the internal organs (especially the posterior kidney), and bloody catarrhal inflammation of the intestine. Fish with KHV have few grossly visible internal signs.

Bacterial infections vs. SVC: Bacterial septicemias (especially motile aeromonads) will produce clinical signs similar to those seen with SVC. However, most koi bacterial infections (other than the atypical *Aeromonas salmonicida* associated with ulcer disease) are unlikely to occur at the low temperature favored by SVC. If it looks like septicemia, but water temperatures have been in the 5-15°C range, suspect SVC. In addition, if the koi owner has without success already treated the fish with appropriate doses of powerful systemic antibiotics (a very common occurrence), a diagnosis of bacterial septicemia is less likely.

Bacterial infections vs. KHV: The bacterial infection that most resembles KHV is focal columnaris infection of the gills. This can easily be ruled out by looking for characteristic flexing long, rod-shaped bacteria in hay stacks or floating against the cover glass. The absence of these bacteria rules out columnaris disease. The presence of these bacteria does not rule out KHV because they may be secondary invaders of KHV gill lesions.

Parasites vs. SVCV: Common protozoan infections of koi may cause damage to the skin and gills that will produce many of the same external signs as SVC. A notable exception is that the parasites are unlikely to cause the bloody catarrhal inflammation of the intestine that occurs in a high percentage of SVCV-infected fish. Of course, external parasites can easily be ruled out by microscopic examination, but non-professionals with substandard microscopes may not be able to detect *Ichthyobodo*.

Water quality vs. Virus: Water quality problems can be quickly and easily ruled out with suitable kits. Acute outbreaks of KHV may produce patterns of mortality resembling those usually associated with water quality problems; however, gill damage from water quality will be much more diffuse than typical KHV lesions. Poor water quality may predispose fish to bacterial infections that resemble SVCV (see Bacterial infections vs. SVC, above)

Fish size and age factors: These are not useful indications of SVC or KHV infection. On European fish farms, most outbreaks occur in naive young of the year carp. However, the outbreak of SVCV that occurred in feral carp in Wisconsin killed large mature fish demonstrating that naive populations are vulnerable at any age. The KHV kills all ages of koi with very high mortality.

Because SVC is an OIE reportable disease, any case with clinical signs and a water temperature history consistent with SVC, should be reported to state veterinary health authorities and moribund fish then tested by tissue culture in a laboratory competent to handle and diagnose SVC. In other cases, if tissue cultures from koi, common carp, or other cyprinid fishes produce a CPE typical of SVC virus within 2-4 days at 22°C, SVC virus should be suspected and the case reported. The SVC virus is easily distinguished from KHV in tissue culture. SVC virus produces a rapid and complete CPE on many cell lines at wide range of temperatures. The KHV is very fastidious growing only on specialized cell lines like the KF-1 line (Hedrick et al. 2000) and taking at least 7 days to produce CPE. The KHV can easily be detected in tissue cultures or fish tissues by PCR (Gray et al. 2002, Hedrick 2002).

The KHV disease is not currently a reportable disease in the US and does not carry the regulatory burden of SVC, however, KHV produces a highly contagious and devastating disease and exposed fish should be regarded as carriers unless peer-reviewed scientific study proves otherwise. Diagnosticians should question pond owners to determine where the infection may have come from and which other fish may have been exposed, then work with all parties to prevent further spread.

References

- Ahne, W., H.V. Bjorklund, S. Essbauer, N. Fijan, G. Kurath and J.R. Winton 2002. Spring viremia of carp (SVC). *Diseases of Aquatic Organisms* [52:261-272](#)
- Fijan, N. 1999. Spring viremia of carp and other viral diseases of warm-water fish. In: PTK Woo and DW Bruno (eds) *Fish Diseases and Disorders*, Vol. 3. CAB International, Oxon. pp 177-244
- Goodwin, A.E. 2002. First report of spring viremia of carp virus (SVCV) in North America. *Journal of Aquatic Animal Health* 14:161-164.
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[Gilad, O.](#); [S. Yun](#), [K.B. Andree](#), [M.A. Adkison](#), [A. Zlotkin](#), [H. Bercovier](#), [A. Eldar](#), [R.P. Hedrick](#), [RP](#). 2002. Initial characteristics of koi herpesvirus and development of a polymerase chain reaction assay to detect the virus in koi, *Cyprinus carpio koi*. *Diseases of Aquatic Organisms* 48: 101-108.

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Fish Health Newsletter – Editorial Policy

The *Fish Health Newsletter* is a quarterly electronic publication of the Fish Health Section of the American Fisheries Society and is available for downloading in Adobe pdf file format. Submissions on any topic of interest to fish health specialists and preliminary case reports are encouraged with the understanding the material is not peer-reviewed. Abstracts submitted to the *Journal of Aquatic Animal Health* are also encouraged. Submissions must be formatted in Microsoft Word, WordPerfect, or Rich Text Format, and can be sent by electronic mail or via 3.5” floppy disk to the editor’s address below. **Graphics files should be sent separately in jpeg format.**

Editor

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