

*31<sup>st</sup> Annual  
Eastern Fish Health  
Workshop*

27 – 31 March 2006  
Holiday Inn – Patriot's Point  
Mt. Pleasant, South Carolina

National Fish Health Research Laboratory  
USGS - Leetown Science Center  
11649 Leetown Road  
Kearneysville, West Virginia 25430



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### *Editorial Note*

Thirty-one years ago, a small group of federal researchers gathered together on the Eastern Shore of Maryland to share their research, discuss issues, plan new studies, and enjoy the fellowship of each other. That first meeting was originally inspired by Dr. Stanislaus Snieszko of the Eastern Fish Disease Laboratory (predecessor to the National Fish Health Research Laboratory) of the Department of the Interior and Drs. Carl Sinderman and Aaron Rosenfeld of the National Marine Fisheries Service Laboratory of the Department of Commerce at Oxford, Maryland. Both laboratories were somewhat close geographically and both researched problems associated with fish disease, but their emphasis differed between the freshwater and marine environment. The early workshops were a focal point that fostered communication between the two facilities and provided staff members with opportunities to plan and conduct collaborative studies. Within a few short years, fish disease research became well established in the graduate programs of several major universities in the eastern United States and participation in the workshop began to evolve beyond its original intent. Although the title of the workshop appears to be exclusive for fish, the workshop actually encourages much broader participation in all aspects of aquatic animal health from shellfish to mammals. Furthermore, the workshop remains true to its roots and encourages contributions from researchers, resource managers, biologists, and university personnel working within both marine and freshwater environments. Even though the Workshop has occasionally been held in conjunction with other organizations such as the Fish Health Section of the American Fisheries Society and the International Association of Aquatic Animal Medicine, it is not affiliated with any parent organization and the meeting is an entity unto itself. Today, the National Fish Health Research Laboratory is extremely proud to continue the tradition of the Eastern Fish Health Workshop and serve as its annual host. The staff of the National Fish Health Research Laboratory welcomes you to the 31<sup>st</sup> Annual Eastern Fish Health Workshop at the Holiday Inn and Conference Center of historic Mount Pleasant, South Carolina.

Robert N. Rosen wrote in *A short history of Charleston*, that "The beauty of Charleston mesmerizes people and makes it difficult for them to visualize the morality play that is Charleston's history. There is good and evil in that history, for the city is not innocent. Is Sullivan's Island the Ellis Island of black America? Or is it the scene of Edgar Allan Poe's "The Gold Bug"? Or is it just a nice oceanfront suburb? Is the Old Exchange Building a fancy architectural jewel designed to house 18th-century assemblies? Or is it the ghoulish prison of the Revolution, the place where the martyr Isaac Hayne spent his last night? Or is it the place where George Washington greeted his fellow citizens? And there is no question that slaves were sold for generations next to the very balcony from which the Declaration of Independence was read. It is the tragic and ironic aspects of Charleston's history that give it such power. It resembles the classic Greek tragedy- its

aristocratic and noble leaders were plagued by fatal flaws, by hubris, by pride, by something. They foresaw the decline of the aristocracy. As early as 1833, Hugh Legare wrote: "We are (I am quite sure) the last of the race of South Carolina."

Perhaps the drama was played out in the Civil War, which, as Sidney Andrews said, left "a city of ruins. "For it is, after all the fall of the noble hero that is the essence of Greek tragedy. When Henry James visited Charleston in 1905, some forty years after the Civil War had ended, he also was captivated by the antique quality of life, by "the Battery of the long, curved seafront, of the waterside public garden, furnished with sad old historic guns; by Fort Sumter and the start of the Civil War. "The Forts, faintly blue on the twinkling sea," he wrote, "looked like vague marine flowers; innocence, pleasantness ruled the prospect." James, a northerner, was reacting to the start of the Civil War - the firing on the flag at Sumter. But Fort Sumter is so far from the Battery. "The Flag would have been, from the Battery," he concluded, "such a mere speck in space. There is more. Charleston's history has a power even beyond the supposed climax, defeat in the Civil War..."

Some have written that there is just no way to completely explain all of the beauty and contradictions that abound in this historic jewel of the South, but in the days ahead, we hope that you will have the time to venture beyond the hotel and sample the enduring lore, legends, and history of this beautiful, southern seaport.

*Rocco C. Cipriano*

**Monday**

**March 27, 2006**

5:00 -7:00

**Registration in the Seabrook Room**

Social Reception

Cash Bar

**Tuesday**

**March 28, 2006**

7:00

**Breakfast: The Charleston Buffet**

**Jericho Room**

*Chilled Orange Juice, Sliced Fresh Fruit, Buttermilk Pancakes, Country Scrambled Eggs, Hickory Smoked Bacon, Hash Brown Potatoes, Danishes And Muffins, Cereals, Coffee And Assorted Teas*

**General Session 1:**

**Clifford E. Starliper, moderator**

8:00	Darwish	Laboratory Efficacy Of Florfenicol Against <i>Streptococcus iniae</i> Infection In Sunshine Bass	1
8:15	Zhang	Comparison Of Lipopolysaccharide And Protein Profiles Between <i>Flavobacterium columnare</i> Strains From Different Genomovars	2
8:30	Starliper	Evaluation Of Medium Components For Growth Of <i>Flavobacterium psychrophilum</i>	3
8:45	Hesami	Antimicrobial Resistance Patterns Of Ontario <i>Flavobacterium psychrophilum</i> Strains	4
9:00	Arias	Application Of Polyphasic Taxonomy To The Study Of Bacterial Fish Pathogens	5
9:15	Brown	Using DNA Microarrays To Compare Clinical Isolates Of The Fish Pathogen <i>Aeromonas salmonicida</i> .	6
9:30	Dacanay	From Sequence To Sickness: Pathogenesis In <i>Aeromonas salmonicida</i> subsp. <i>salmonicida</i>	7
9:45	Loch	Bacterial Infections In Representative Lake White Fish ( <i>Coregonus clupeaformis</i> ) Stocks In Michigan	8
10:00	<b>Coffee, tea</b>		

**General Session 2:**

**Harry Dickerson, moderator**

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10:30	Young, K.	Quantification Of A 16kda Defense Lectin (Ladderlectin) In Rainbow Trout ( <i>Oncorhynchus mykiss</i> ) Plasma	9
10:45	Russell	Characterization Of Ladder Lectin And An Intellectin In The Plasma Of Rainbow Trout ( <i>Oncorhynchus mykiss</i> )	10
11:00	Zhao	B Lymphocytes And Antibody-Secreting Cells In Channel Catfish Skin	11
11:15	Ye	The Impacts Of Redox Structure On Trout Antibody Affinity	12
11:30	Smith S.	Characterization And Utilization Of Affinity-Purified Atlantic Sturgeon ( <i>Acipenser oxyrinchus</i> ) Immunoglobulin	13
11:45	Baker	The Health Condition Of Impinged And Open Water Fish From The Mobile River	14

12:00 **Lunch in the Jericho Room**

*Caesar Salad, Southern Fried Chicken Served With Creamy Mashed Potatoes, Green Beans, Rolls And Butter, Coffee And Tea*

**Welcome:**

1:00	Panek	<b>Welcome</b>	
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**Special Session 1:** **Health Management And Clinical Conundrums In Public Aquaria**  
**Scott Weber, moderator**

1:15	Thorvalson	The South Carolina Aquarium Sea Turtle Rescue	15
1:30	Young, D.	Characterization Of A Systemic Iridovirus From The Banggai Cardinalfish ( <i>Pterapogon kauderni</i> )	16
1:45	Postell	<i>Coryphaena hippurus</i> - The Challenges Of Collecting And Exhibiting This Pelagic Species	17
2:00	Keller	Amyloodinium In Elasmobranchs	18
2:15	Innis	Laparoscopic Liver Biopsy In Fish: Equipment, Technique, And Preliminary Assessment Of Biopsy Quality	19
2:30	Gore	Challenges of Managing Horseshoe Crabs ( <i>Limulus polyphemus</i> ) In An Interactive Exhibit	20
2:45	Weber	Medical Management Of Cold-Stunned Sea Turtles Stranded On Cape Cod	21

3:00 **Coffee, Tea, Soda**

**Special Session 2: Challenges For Vaccination In Aquatic Animal Health**  
**John Lumsden, moderator**

3:30	Bromage	Vaccine Design	22
3:45	Panagala	Beneficial Use Of Attenuated Vaccines In Aquaculture	23
4:00	Simard	DNA Vaccines And Environmental Safety	24
4:15	Bootland	IPNV Cohabitation Challenge Of Atlantic Salmon Post-Smolts	25
4:30	Dickerson	<i>Ichthyophthirius multifiliis</i> : Challenges In Vaccine Development	26
4:45	Clark	Structural Analysis And Epitope Mapping Of <i>Ichthyophthirius</i> I-Antigens	27
5:00	<b>Adjourn</b>		
6:30	Car pool	From the hotel lobby	

7:30 **Evening Tour: Charleston in the Civil War**

Charleston's Civil War experience is based on *The Bombardment of Charleston*, authored by the Civil War Walk's founder and lead guide - Chris Phelps. Charleston enacted the opening scene of the conflict by hosting the secession convention in December 1860, which led South Carolina out of the Union, the first of eleven Southern states to withdraw. Four months later, in April of 1861, war was inaugurated in Charleston harbor when Southern forces fired on the U.S. garrison in Fort Sumter. Charleston paid an ultimate price for these actions when the might of the Union Army and Navy descended on her in 1863. Come with us to hear the story that followed this fateful time in Charleston's history. The tour is conducted by "America On Foot," lasts approximately two hours, and covers a distance of 1.5 miles. We shall meet our guides in Washington Park at the corner of Broad and Meetings Streets. Due to certain city ordinances placing restrictions on the number of individuals per tour guide, reservations must have been made in advance, therefore, tickets cannot be sold at the door.

**Wednesday**

**March 29, 2006**

7:00

**Breakfast: The Charleston Buffet**  
**Jericho Room**

*Chilled Orange Juice, Sliced Fresh Fruit, Buttermilk Pancakes, Country Scrambled Eggs, Grilled Link Sausage, Creamy Grits, Bagels and Cream Cheese, Cereals, Coffee And Assorted Teas*

**Special Session 3:**

**Advances In Crustacean Health And Disease**  
**Erin Burge, moderator**

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8:00	Shields	Ecological Determinants In Outbreaks Of Bitter Crab Disease ( <i>Hematodinium</i> sp.) In Snow Crabs, <i>Chionoecetes opilio</i> , From Conception Bay, Newfoundland, Canada	28
8:15	Lee	Molecular Diagnostics For <i>Hematodinium</i> And Other Protozoa In Water And Crustacean Hosts	29
8:30	Burge	Lysozyme Gene Expression As A Molecular Marker Of Hemocyte Location In Pacific White Shrimp, <i>Litopenaeus vannamei</i> , After Injection With <i>Vibrio</i>	30
8:45	Burnett, L.	Changes In Metabolism And Performance In Crustaceans Fighting Bacterial Infections	31
9:00	Shepard	White Spot Syndrome Virus (WSSV) In Wild <i>Litopenaeus setiferus</i> And <i>Callinectes sapidus</i> From The U.S. South Atlantic Coast	32
9:15	Li	Diagnosis Of <i>Panulirus argus</i> Virus 1 (Pav1) In The Caribbean Spiny Lobster Using Fluorescence <i>In Situ</i> Hybridization	33
9:30	Messick	An Overview Of Disease Surveys In Crustaceans From The Chesapeake Bay And United States Mid-Atlantic Coast	34
9:45	Oweson	Manganese Induced Immune Suppression in <i>Nephrops norvegicus</i>	35

10:00 **Coffee, tea**

**Special Session 4: What's Wrong With My Fish: Clinical Approaches In Pet Fish Medicine**  
**Robert Bakal, moderator**

10:30	Tepper	Clinical Aspects Of Water Biology And The Effects On Water Quality In Koi Ponds	36
10:45	Yosha	Selected Cases In Fish Medicine In Private Practice	37
11:00	Roberts	Frozen Fish: Private Fish Medicine In Buffalo, NY	38
11:15	Wolf	Dermal Mesenchymal Neoplasms In Goldfish, Koi And Carp	39
11:30	Lewbart	Laser Surgery To Remove Skin Tumors In Goldfish ( <i>Carassius auratus</i> )	40
11:45	Aiken	Safe and Effective Control of Ozone in Aquarium Life Support Systems	41

12:00 **Lunch** **In the hotel restaurant**

*Pan Seared Shrimp And Garden Vegetables With Creamy Red Bell Pepper Pesto Sauce Served Over Fettuccine with Mixed Greens And Parmesan*



*Dressing, Rolls And Butter, Coffee And Tea.*

**Special Session 5:**

**Imminent threats affecting our coral reefs  
Garriet Smith, moderator**

1:00	Johnston	The Microbial Diversity Associated With The Gorgonian Coral, <i>Pseudopterogorgia americana</i>	42
1:15	Polson	Assessment Of Microbial Communities Associated With An Acroporid Coral Disease Outbreak	43
1:30	Lipp	Investigations Of <i>Serratia marcescens</i> As A White Pox Pathogen In The Florida Keys	44
1:45	Schill	Coral Disease And Genetics Survey In St. John, USVI Using Non-Destructive Methods	45
2:00	Gil-Agudelo	Zooxanthellae Shifts And Yellow Band Disease	46
2:15	Smith G.	White Band Disease In The Caribbean	47
2:30	Sekar	Molecular Diversity Of Microbes Associated With Black Band Diseased Coral <i>Siderastrea siderea</i>	48
2:45	Pinzón	Defining The Reservoir Of The Pathogen <i>Aurantimonas coralicida</i> By Fluorescence <i>In Situ</i> Hybridization	49
3:00	<b>Coffee, Tea, Soda</b>		
3:30	Cook	Differential Diagnosis: A Need For The Use Of Multidisciplinary Tools To Investigate The Coral Disease White Plague Type II	50

**General Session 3:**

**Jill Rolland, moderator**

3:45	Mitchell	From Leidy To Snieszko: Pioneers Of Fish Health In The United States (1850 - 1950)	51
4:00	Egrie	The Current Status Of The United States National Aquatic Animal Health Plan	52
4:15	Kebus	Fish Health Medicine Certificate Program	53
4:30	Pasnik	Natural Content And Processing of Alternative Protein Sources: Histologic Effects In Fingerling Channel Catfish ( <i>Ictalurus punctatus</i> )	54
4:45	Shoemaker	Growth Response and Acquired Resistance of <i>Streptococcus iniae</i> -recovered Nile Tilapia, <i>Oreochromis niloticus</i>	55

## Adjourn

5:30 Car Pool from hotel lobby

6:00 **Evening Tour** **South Carolina Aquarium**  
Jason Crichton, host  
Charleston, SC

(Everyone welcome, no reservation required)

## Thursday

**March 30, 2006**

7:00 **Breakfast: The Charleston Buffet**  
**The Jericho Room**

*Chilled Orange Juice, Sliced Fresh Fruit, Buttermilk Pancakes, Country Scrambled Eggs, Hickory Smoked Bacon, Hash Brown Potatoes, Danishes And Muffins, Cereals, Coffee And Assorted Teas*

## Case Reports:

**The Puzzling, The Weird, The Unknown: Sharing Your Diagnosis**  
**Sue Marcquenski and Al Camus, moderators**

8:00	Camus	Hurricane Katrina And The Mississippi Catfish Industry, A Little Good News For A Change	56
8:10	Keller	Bacterial Endocarditis In A Giant Pacific Octopus, <i>Enteroctopus dofleini</i>	57
8:20	Govett	Enrofloxacin Resistant Meningoencephalitis In A Tiger Shark ( <i>Galeacerdo cuvier</i> )	58
8:30	Bowser	Koi Herpesvirus In New York State: The 2005 Common Carp Mortality Event	59
8:40	Yazdanpanah	Pancreatic Amyloidosis In Captive Tricolour Sharks	60
8:50	Lowry	Progressive Erosive Stomatitis In Green Moray Eels: A Case Study	61
9:00	Mitchell	The Big Belly Blues	62
9:10	Khoo	Pathology Associated With <i>Coleps</i> Spp. In Tilapia	63
9:20	Durburow	Three Disease Cases: Acid-Sulfate Soil, Largemouth Bass Wintertime Sudden Death, And Channel Catfish “Pimples”	64
9:30	Bowser	Unusual Spinal Deformity In Newly Hatched Yellow Perch	65
9:40	Pasnik	Atypical Clinical Signs of <i>Streptococcus agalactiae</i> in Nile Tilapia ( <i>Oreochromis niloticus</i> )	66
9:50	Peters	A Tale of Two Tumors: The Shrimp’s And The Clam’s	67

10:00 **Coffee, tea**  
**General Session 4:**

**Drew Mitchell, moderator**

10:30	Small	Molecular Detection And Identification Of <i>Hematodinium</i> spp.	68
10:45	Wheeler	Aspects Of The Pathology Of <i>Hematodinium</i> Infections In Snow Crabs ( <i>Chionoecetes opilio</i> ) From Newfoundland, Canada	69
11:00	Burnett, K.	Effects Of Hypercapnic Hypoxia On Clearance Of <i>Vibrio campbellii</i> In The Eastern Oysters, <i>Crassostrea virginica</i>	70
11:15	Xu	Putative Identification Of Expressed Genes Associated With The Attachment Of The Zebra Mussel ( <i>Dreissena polymorpha</i> ) Using Suppression Subtractive Hybridization cDNA Library	71
11:30	Fast	Recent Advances In Our Understanding The Host-Parasite Relationship Of <i>Lepeophtheirus salmonis</i> And Atlantic Salmon ( <i>Salmo Salar</i> )	72
11:45	Dove	Unusual Trematode “Egg Nests” In The Stomach Tissues Of Goggle-Eyed Scad, <i>Selar crumenophthalmus</i> (Bloch, 1793)	73

12:00 **Lunch**

**Jericho Room**

*Sliced Char-Grilled Breast Of Chicken Over Fresh Romaine Lettuce With Croutons, Parmesan Cheese And Caesar Dressing, Key Lime Pie, Coffee And Tea*

**General Session 5:**

**Janet Warg, moderator**

1:00	Panek	Disease And Adaptive Fishery Management: The Role Of The Fish Health Professional	74
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**Special Session 6:**

**New Aquaculture Drugs: Oxymoron, Myth, Or Reality**  
**Tom Bell, moderator**

1:30	Bell	Drugs For Domestic Aquaculture: Background And Session Strategy	75
1:45	Schnick	Drug Approval Status: Then And Now	76
2:00	Prater	The INAD/NADA Process: That's Not A Train, But A Light At The End Of The Tunnel	77
2:15	Bowker	Efficacy And Target Animal Safety Studies: Who Said This Was A Cake Walk?	78
2:30	Meinertz	Trials And Tribulations Developing Environmental Safety And Human Food Safety Data For Aquaculture Drug Approvals	79
2:45	Schnick	Drug Approval Status: Why We Are Where We Are And Not Where You Thought We Should Be	80

3:00 **Coffee, tea, soda**

**General Session 6:** **Laura Brown, moderator**

3:30	Lewis	Monitoring Hawaiian Invertebrates (Crustacea) For White Spot Syndrome Virus (WSSV)	81
3:45	Densmore	Comparative Susceptibility Of Early Life Stages Of The Bullfrog ( <i>Rana catesbeiana</i> ) To The Tadpole Edema Virus	82
4:00	Bowser	Largemouth Bass Virus In New York State	83
4:15	Faisal	Isolation Of Viral Hemorrhagic Septicemia Virus (VHSV) From Muskellunge ( <i>Esox masquinongy</i> ) From Lake St. Clair, Michigan	84
4:30	Lumsden	Isolation Of Viral Hemorrhagic Septicemia Virus Type IV From A Mortality Event In Lake Ontario Drum ( <i>Aplodinotus grunniens</i> )	85
4:45	Cipriano	Kinetics Of The Natural Microbial Populations Of Atlantic Salmon In Relation To Infection And The Recuperative Process	86

5:00 **Adjourn**

7:00 **Reception**

7:30 **Banquet**

*Seafood Medley Over Fettuccini With Fresh Vegetables, Sliced Sirloin Of Beef In Brandy Sauce, Chicken Stuffed With Cornbread In A Supreme Sauce, Tossed Seasonal Salad, Roasted Red Potatoes, Seasonal Vegetable Medley, Chef's Choice Of Assorted Desserts, Coffee And Iced Tea*

**Best Student Paper Award**

8:30 **Social and dance**

11:30 **Adjourn**

**Friday**

**March 31, 2006**

7:00 Breakfast (for participants of the Continuing Education Course)

**The Charleston Buffet**

*Chilled Orange Juice, Sliced Fresh Fruit, Buttermilk Pancakes, Country Scrambled Eggs, Grilled Link Sausage, Hash Brown Potatoes, Bagels and Cream Cheese, Cereals, Coffee And Assorted Teas*

8:00 Hartman Welcome And Introductions

8:15 Christy Emergency Coordination – The Florida SART Program

9:00 Rolland Response To Foreign Aquatic Animal Diseases

9:45 Hartman On Farm Preparedness For Natural Disasters

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10:15 **Coffee, tea**

10:30 Gustafson Aquaculture Biosecurity, Disinfection, Carcass Disposal  
Ellis

11:15 Roberts Emergency Needs Of The Private Pet Fish/Pond Owner

12:00 **Lunch**

*Marinated sliced sirloin topped with a brandy mushroom sauce served with roasted new potatoes and mixed greens with creamy parmesan dressing, French style green beans, rolls and butter, coffee and tea*

1:00 Sima Emergency Preparedness For Public Aquariums

1:45 Sillitti Emergency Preparedness For Aquatic Research Laboratories

2:30 **Informal Break**

2:40 Vannieu- ICS structure and overview  
wenhoven

3:00 Vannieu- Emergency Scenario exercise  
wenhoven

4:30 Hartman Discussion, Summary, Evaluation

5:00 **Adjourn**