

Report on the Workshop under the research network SCOFDA (Sustainable Control of Fish Diseases in Aquaculture) with the title “Diagnosis and Control of Fish Diseases in Aquaculture” at the Royal Veterinary and Agricultural University, Frederiksberg C. Denmark held on November 4, 2003 and November 5, 2003.

A total of 60 participants from Denmark, Norway, Germany, the Netherlands, Spain, England, USA, Mexico, Scotland, Canada and the Czech republic were gathered during the two-day workshop at the Royal Veterinary and Agricultural University, Frederiksberg C. Denmark. Both researchers from universities and research organizations, aquaculturists and interested persons from governmental and private institutions were present. Special guest lecturers were:

Dr. Patrick Woo, University of Guelph, Canada

Dr. Jan Rombout, Wageningen Agricultural University, The Netherlands

Dr. Tony Ellis, Marine Laboratory, Aberdeen, Scotland

Dr. Dion Florack, Plant Research International, Wageningen, The Netherlands

Dr. Sarah Poynton, Leibniz Institute of Freshwater Ecology and Inland Fisheries, Berlin, Germany and John Hopkins University School of Medicine, Baltimore, USA and Miguel Rubio-Godoy from University of Bristol, England.

Following introductory and welcoming words from the organizer and research network leader K. Buchmann, Royal Veterinary and Agricultural University, Denmark, the participants were presented. Then Jan Rombout, Wageningen Agricultural University, The Netherlands, gave an overview about mucosal immunity in fish. This topic is of considerable interest to both parasitologists, virologists and bacteriologist. Jan emphasised the difference between systemic and mucosal immunity in fish. Evidence was presented for antigen-uptake in epithelia including gut, gills and skin. In this context the importance of T-cell like cells was considered but also effects of various forms of immunoglobulin in the different compartment were stressed.

Tony Ellis from the Marine Laboratory, Aberdeen, Scotland, presented results from recent studies on interferon and IPNV. Using RT-PCR Tony and his group have shown expression of MX-molecules in rainbow trout shortly after virus-infections. This molecule is connected to interferon production and will account for an immediate but short time protection against viral infections. In addition the involvement of Mx and interferon in apoptosis of host tissue such as liver was discussed.

P. T. K. Woo, University of Guelph, Canada gave an update on the parasitic haemoflagellate *Cryptobia salmositica* in his talk on control strategies against salmonid diseases. This parasitosis occurring from California to Alaska in all *Oncorhynchus* species was described in detail. Important questions was discussed ranging from infection, clinical signs, pathogenicity, protective antigens, innate immunity, acquired immunity, chemotherapy and immunotherapy to breeding for resistant fish.

D. E. A. Florack, Plant Research International B. V., Wageningen, The Netherlands reported on the production of pharmaceutical compounds and vaccines in plants. He presenting new molecular techniques for production of biopharmaceuticals and vaccines in plants such as potatoes, spinach and tobacco. This technique could be used in future for production of vaccines in fish-farming.

However, the group is working on optimization of the system securing correct glycolysation of vaccine proteins.

Miguel Rubio-Godoy, University of Bristol gave an interesting talk on immune responses in trout against *Discocotyle sagittata*. Basic epidemiological studies on infection in different hosts (brown trout and rainbow trout) were presented. It was seen that brown trout is less susceptible compared to rainbow trout. Production of antibodies and the effect on worms together with in vitro studies on complement effects on *Discocotyle* clearly showed some involvement of humoral immunity.

On the second day of the workshop Patrick Woo, University of Guelph, Canada presented a talk on Cryptobiosis – recent studies. Mortality rates of more than 50 percent in brood stocks due to *Cryptobia* infections really need increased research efforts. Basic factors in humoral and cellular immunity were highlighted. Not only the presence or absence of the 200 KDa metalloprotease but also the parasite's physiology and utilization of mono- and disaccharides seems to be important in discrimination between virulent and avirulent strains. The

Then Dr. S. Poynton, John Hopkins University School of Medicine, Baltimore USA and Leibniz Institute for Freshwater Ecology and Inland Fisheries, Berlin, Germany gave a very informing lecture on diplomonad flagellates – distribution, disease and control. Basic biology, morphology and diagnosis of the genera *Hexamita*, *Spironucleus* and *Octomitus* were presented. Both intestinal and systemic infections with diplomonad flagellates were treated. Especially the importance of shape of nuclei, the recurrent flagella and arrangement of basal bodies and microtubules were framed. In fact Sarah's TEM-studies on the various flagellates infecting salmonids will be interesting to follow. Also various aspects of medical treatment were highlighted.

Jens Sigh, Royal Veterinary and Agricultural University, Denmark presented his new work on expression of immune relevant genes in rainbow trout during *Ichthyophthirius* infections and Thomas Lindenstrøm, Royal Veterinary and Agricultural University, Denmark followed by describing cytokine expression in rainbow trout skin during *Gyrodactylus derjavini* infections.

Michael Dalgaard, Royal Veterinary and Agricultural University, Denmark had conducted studies on different susceptibilities to *Gyrodactylus salaris* infections of Baltic and Atlantic salmon strains. The quite clear difference and the importance of immunity in this context was discussed. Then Steen Jørndrup, showed his work conducted at Royal Veterinary and Agricultural University, Denmark. He found different carbohydrate localization on *Gyrodactylus derjavini* and *G. salaris* and corresponding carbohydrate binding capacities of their hosts *Salmo trutta* and *S. salar* which could be a factor in host specificity.

Niels Lorenzen, Katja Einer-Jensen, Jesper S. Rasmussen, Ellen Lorenzen, Danish Veterinary Institute, Aarhus, Denmark had worked on DNA-vaccines against VHS-virus. They had found that the appearance of the viral glycoprotein on the cell surface is required for induction of immunity to VHS in rainbow trout by a DNA vaccine. Then Jesper S. Rasmussen, Ellen Lorenzen, Katja Einer-Jensen, Niels Lorenzen showed their results from trials with vaccination of rainbow trout against VHS using a linear DNA-vaccines. DNA-vaccines against VHS-virus is very effective and the use in future control programmes should be considered.

Santiago Fernandez Gonzales, Royal Veterinary and Agricultural University, Denmark had been studying development of micro-arrays for detection of pathogens in fish and suggested that this new

technique could replace more classical diagnostic techniques in the future. Jeanette D. Møller, Danish Institute for Fisheries Research, Denmark is involved with research in rainbow trout fry syndrome and demonstrated that release of membrane vesicles in *Flavobacterium psychrophilum* was associated with pathogenicity of various bacterial strains. José Garcia, Universidad Complutense, Madrid, Spain is mainly focussing on the pathogenicity of *Yersinia ruckeri*. His work on an heat sensitive factor in this bacterium causing red mouth disease in salmonids showed that haemolysis and bacterial adherence to host cells is associated to the production of this molecule. At least the HSF can probably be used as a virulence marker.

Generally the discussions on the various topics presented were very vivid and active. Finally the present researchers were discussing the funding situation, forthcoming meetings and especially the EAFFP-meeting in September, 2005 to be held in Copenhagen. The organisation of this conference will be a major challenge. A forth-workshop on *Gyrodactylus* parasites and their biology was also mentioned. Probably a joint Norwegian-Danish organisation of the autumn 2004 meeting will be presented in the near future.

All participants and the invited lecturers were thanked for joining this workshop. It had a fruitful scientific profile but also the social contacts and events were considered to be important for future cooperation.

Reported by Kurt Buchmann

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