RUSSIAN ACADEMY OF SCIENCES (RAS)

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RESOLUTION

of the

International Scientific-and-Practical Conference «Periphyton and Fouling: Theory and Practice'2008»

The Conference «Periphyton and Fouling: Theory and Practice» took place in St.-Petersburg research center of the Russian Academy of Sciences (St.-Petersburg, 22-25 October 2008). It was funded by the Russian Academy of Sciences, Russian Foundation for Basic Research, Joint Public Company "RusHydro".

The Conference tasks included:

- *Overview of current knowledge and ongoing research in the biology and distribution of sessile and vagile organisms, forming fouling(periphyton) assemblages, distribution of fouling assemblages themselves, formation of fouling assemblage elements, major aspects and processes characteristic for biodiversity (from species diversity patterns to mechanisms that enhance diversity) of freshwater and marine fouling assemblages in natural, transformed and artificial ecosystems*
- *Identify causes and consequences of the development of biofouling in artificial ecosystems*
- *Discuss scientific fundamentals of monitoring and development of strategies and approaches to use fundamental knowledge in solving practical problems*

A total of 59 scientists from academic and applied scientific institutions, specialists, engineers, top managers of industrial companies, representatives of St-Petersburg City Government, independent experts and journalists actively participated in the conference. 5 participants sent their presentations (2 oral and 3 posters) to the Organizing C-tee and these contributions were presented for them. The conference also had 17by-correspondence participants also presented publications to the Book of Abstracts. Representatives of 14 countries (Russia, Belarus, Germany, Ukraine, Latvia, United Kingdom, Poland, Sweden, Australia, Israel, USA, Canada, Moldova, The Netherlands) took part in meeting preparation and/or participated in the meeting personally, demonstrating the importance of the conference topics:

- *Biology and ecology of periphyton organisms;*
- *Prerequisites, cause, consequences and forecasts of fouling communities (periphyton) development;*

- *Science-based approaches for the prevention and control of fouling organisms and fouling assemblages;*
- *Basic knowledge for innovations and practical use of fouling organisms (they are not all bad…)*

The Book of Abstracts was issued before the start of the conference. It covers all of the four major topics, and includes contributions by regular and by-correspondence participants. Two abstracts sent after the publication deadline were issued as an Addendum to the Book of Abstracts.

The conference included 3 plenary and 4 thematic sessions, a poster session and two round tables (1. *"Methods of collection and treatment of samples and measurements, scientific background for monitoring of biofouling in marine and inland waters in natural and transformed ecosystems", 2. Toward scientific-and-practical cooperation in development of proposals on the use of fouling organisms for coastal zone remediation in the Baltic Sea region*).

Emphasizing the fundamental importance of periphyton and fouling, the conference participants consider it important to further develop the concept of periphyton as a specific ecological group of hydrobionts. They also recognized the need for further discussion on problems of the status, general features and peculiarities of the biology of fouling organisms's and the development of periphyton and fouling communities in marine, brackish and fresh waters. Presentations and discussion during the conference revealed a similarity in the theoretical positions of different schools of thought on issues about the structure of fouling communities, strategies regarding their formation in natural waters and in antropogenically altered waterbodies as well as at(in) hydrotechnical installations.

Presentations on the mechanisms and strategies of colonization of natural and artificial hard substrates by fouling organisms were of great interest to participants, as well as mathematical models describing the process of colonization and formation of communities were presented and discussed.

A number of presentations were devoted to the ecological role of periphytic communities in water-bodies of different types and to the impacts of environmental factors on them. Several studies demonstrated the importance of these communities in the transformation of matter and energy in water-bodies, their role in water clearance and improvement of water quality. There were reports of the results of investigations of some mechanisms of development and functioning

of periphytic communities. Several studies illustrated the utility of fouling organisms and peryphyton in monitoring environmental quality.

The diversity in topics and involvement of not only scientists and professional hydrobiologists, but also managers and engineers, who directly deal with the problems of fouling and biological obstacles presented by these organisms in every-day use of hydro technical installations and facilities, those who have experience developing technical solutions for solving the problem of fouling and there consequences were a highlight of this conference.

A combination of discussions on theoretical and practical aspects of perihyton and fouling development in the context of one meeting allowed the development of major directions for collaboration between basic and applied sciences and practice. An important direction for collaboration would be in addressing theoretical and practical questions related to periphyton and fouling of human constructed structures and their impacts on water bodies, which involves:

- development of approaches to assess impacts of periphyton development and fouling on the ecosystem as a whole and research on physical, chemical and biological processes on underwater structures;
- development of a system to predict possible scenarios of periphyton and fouling community development on technical equipment and installations that are under construction or under design;
- development of recommendations to prevent biofouling on underwater hydrotechnical structures.

Questions related to negative impacts of fouling organisms on hydro- and nuclear power plantscould be an important area for co-operation between research institutions and power generating companies . Other potential areas of collaboration could be: the prevention of fouling in service and drinking water systems and facilites, the development of novel environmentally safe technologies, and the development of alternatives to chlorination with sodium hypochlorite and other chemical treatments that are currently in wide use at power plants). Given the importance of all of the above mentioned directions for cooperation, the conference approved a presented scientific background and provisional plan for the development of a proactive program for prevention of biofouling at power plants.

Theoretical and practical issues related to non-indigenous species were subjects of several presentations. It was noted that human-mediated impacts on marine and inland ecosystems

facilitate biological invasions, including furthering the dispersal of fouling species. Species that play the role of habitat engineers are of special concern because they can transform habitats, and thus impact structures and systems as well as biological communities. Their effects are twofold. As fouling species they are a significant nuisance for hydrotechnical structures. As habitat engineers, they not only impact the benthic and periphyton communities, but can impact whole ecosystem.

Presentations devoted to the positive role of fouling communities in coastal zone remediation in marine and freshwater could also call them inland aquatic ecosystems garnered great interest from all participants. Some of these presentations demonstrated commercial benefits of the use of fouling species for coastal water quality improvement, technologies for producing food and food supplements for poultry farming, producing balanced organic fertilizers, and others. Following this, round table #2 discussed perspectives for scientific and practical co-operation in the development of proposals for assessment of the spatial distribution of underwater habitats and use of fouling assemblages in coastal zone remediation in the Baltic Sea region.

Discussion of best methods was an important part of the conference. Of primary importance were methods for sample collection, storage and processing, the documentation of samples, scientific background for monitoring of fouling in water-bodies and main-stream and side-stream monitoring in hydrotechnical facilities, as well as the application of bio-assays using fouling organisms and assemblages. Of primary importance is that methods are standardized at each step in research. Round table #1 discussed all of these issues and recommended the preparation and publication of a manual of major methods for the study of fouling communities. Based on the discussion of theoretical and practical issues related to periphyton and fouling in marine, brackish and fresh waters, the conference participants agreed to the following:

1. To declare that the International Scientific-And-Practical Conference «Periphyton and Fouling: Theory and Practice'2008» ("P&F:T&P'2008") was very informative and productive, thus successfully achieved its major objectives.
2. To suggest organizing this Conference on a regular basis (once every 3 years), engaging a broader scope of Russian and international scientific organizations together with all other interested parties (institutions, industrial enterprises and companies, consulting agencies, etc.).
3. To recommend that the Organizing Committee of "P&F:T&P'2008" launch a regularly updated Website on the problems of biofouling. The Website can be hosted at the internet portal of the Zoological Institute RAS and at the portal of the Council

"PROBLEMS OF BIODETERIORATIONS", division of biological sciences RAS. This Website will post all Conference materials, detailed resolutions of round tables, and current or revised editions of contributions presented at the Conference (with authors' permission).

4. To approve reported results of theoretical studies on periphyton and fouling and to recommend that all authors publish their research in leading Russian, CIS and international peer reviewed journals.
5. To encourage the Russian Foundation for Basic Research to issue an urgent Call for bilateral proposals (e.g., Russia-Ukraine) to study the mechanisms of antropogenic transformation of aquatic systems and mechanisms of biofouling.
6. To approve the scientific background for biofouling control in water supply systems at power plants, and to develop major directions for co-operation between the Russian Academy of Sciences, JPC "RusHydro", National Academy of Sciences of Ukraine, and other interested parties.
7. To prepare innovative international proposals to assess the role of fouling communities in the structure and function of aquatic ecosystems, and to develop methods to use fouling communities, in the restoration of coastal ecosystems in the Baltic Sea region. These proposals can be prepared for submission to the 2nd and 3d Calls by the Baltic Sea Region Program (INTERREG-4) 2007-2013 and to other open European calls for proposals.
8. To prepare a draft of the collective monograph on methods used for the study of periphyton and on the scientific background of monitoring of fouling species and communities.
9. To thank the International Organizing Committee for preparation and successful running of the Conference.