

Evaluation report for the MARICE project
(Marine Chemical Ecology – an interdisciplinary research platform)
Period: April 2006 to June 2008-09-18

The research platform MARICE started in April 2006 and three main topics were identified as focus for the platform, including: Chemical defences and signaling, Microalgal chemical ecology, and chemical ecology of biofilms. During the first years the platform has initiated several internal, as well as international workshops and symposia, has been active in renewal of basic education within their area, been awarded and also attracted further external grants. Moreover, the publication list contains 44 papers published 2006 to 2008, although some of them, e.g. most of the papers from 2006 may not have emanated as a direct result of the platform, since this started in April 2006. Moreover, some of the titles seem to include research branches that can hardly be defined from the research originally proposed by the platform. It may also be noted that some of the PI's have a higher output and seems more active within the platform than others. **Suggestion:** This should be recognized by the platform coordinators and used as a management tool during allocation of funding to the different parts of the platform in order to further optimize the national and international impact of the platform. Another notion is that cross-authorship between the different author groups/institutes are still rare. The reason for this is unknown, but in order to function as a platform I believe this has to be addressed. **Suggestion:** Invite inter-disciplinary (inter-institute) proposals from participants in order to stimulate thinking towards cooperation and cross-fertilization, which is a main aim with platforms like MARICE.

Despite these minor flaws, which can easily be addressed by the coordinators, the half-time report provided by the platform is indeed very impressive, with several very active researchers, a continuous recruitment of new graduate students and post-docs, international exchange, application of new, intriguing methods, and, finally, a refreshing and self-confident attitude. Therefore, my conclusion is that MARICE is a vital, albeit still developing, platform which will receive further international and national recognition in the future. Hence, I strongly recommend that this platform receives funding at the requested level for the rest of the period. *A*

Dear Prof. Turner:

This letter details my review of the Marine Chemical Ecology (MARICE) platform at the University of Gothenburg. This program was started in 2006, with the stated goals to promote new cooperation, scientific discovery, and education activities in the highly collaborative area of marine chemical ecology. Three research focus areas were selected at the start of the program: 1) chemical defences & signaling in seaweeds & invertebrates; 2) chemical ecology of microalgae; 3) chemical ecology of biofilms.

Substantial progress is already evident in all of these areas (see below), with the MARICE investigators summarizing in their 2008 report that they "have taken a large step towards becoming one of the leading MCE research groups in Europe". I contest this assessment: Overall I conclude that this program and its associated faculty, postdocs, and students have reached the stage of being THE leading marine chemical ecology research program in Europe, and they are rapidly overtaking other collaborative chemical ecology programs outside of Europe. I believe without hesitation that funding for the second half of the time period (2008-2010) should be approved for the MARICE platform. More detailed comments follow below.

The quality of the science performed in the period 2006-2008 by MARICE scientists has been superb. Forty-three new papers have been published in internationally-recognized, peer-reviewed scientific journals, and three PhD theses were successfully defended and degrees awarded to their authors. The publications occurred in highly-cited journals, including those focusing on ecology, evolution, molecular biology, marine science, chemistry, biochemistry, microbiology, environmental science, and toxicology. Most amazingly, since 2006 22 new research grants have been awarded to scientists associated with MARICE, totalling approximately 30M SEK. In addition, an infrastructure grant of 8.7M SEK has been awarded. Most impressively, MARICE leaders Pavid and Jonsson have recently been awarded a Linnaeus award (as part of a group of 10 scientists organized at University of Gothenburg) valued at 77.5M SEK. This level of productivity and fund-raising is well beyond what I expected and shows that the platform support is successfully leveraging resources for new activities and collaborations at an impressive rate.

Among the new research activities that have occurred as part of the MARICE platform, several are noteworthy for their originality and scientific importance. I will highlight only a few of the

most impressive here: the discovery that bloom-forming phytoplankton increase their cellular toxicity in response to cues from zooplankton grazers, deterring grazing and leading to more toxic blooms, playing a previously unrecognized role in the environmental impacts of these increasingly problematic events; and the focus on elucidation of surface-mediated interactions involving seaweeds and fouling bacteria, leading to the identification of antimicrobial defences localized on seaweed surfaces as part of a creative collaboration between marine ecologists, microbiologists, and analytical chemists. These new projects received a high level of support from the platform in order to increase their probability of success, which I judge to have been an excellent decision that has already brought rewards. Ongoing projects building on the earlier success of MARICE researchers include predator-induced resistance in seaweeds; multi-trophic interactions involving chemical cues; importance of biodiversity in ecosystem function; effects of chemical defences on biological invasions; hydrodynamic transport of chemical signals in the plankton; and antifouling chemical defences of marine sponges. All of these tackle important problems and questions in marine science, using a variety of complementary and modern approaches. In addition, several research projects are in the beginning phases, as is appropriate given the early stage of the program. These new projects involve application of diverse techniques, including analytical instrumentation and genetic approaches not previously used by chemical ecologists. New collaborations have been established with other platform programs (e.g., Chemical Biology, Theoretical Biology) and with scientists at the Centre for Environment and Sustainability, as well as with more than 40 scientists at institutions abroad, representing at least 10 countries). All of these achievements undeniably represent a recent increase in recognition for MARICE research by the international scientific community. **Thus, it can be concluded with confidence that the platform support has led to new initiatives and new research directions, as desired.**

In addition to world-class research, the MARICE program has led to new education and outreach activities. These include new undergraduate and masters courses (including an intensive, advanced graduate course in marine chemical ecology that was received enthusiastically by its 20 students in 2008); two new international workshops; and assistance with high school education activities as appropriate (including a week-long workshop for international high school students); and approximately 35 instances of public education in the form of radio, television, and newspaper articles for the non-scientific public. The leadership role of women has increased under the MARICE platform, with one new female tenured Associate Professor, one new Assistant Professor, and one newly graduated female PhD. A new mentorship program supports the growing leadership of these women. Interaction with industrial groups and companies also appears to be strong.

MARICE scientists propose to continue to use the three research goals stated at the beginning of this review to guide the next 2-3 years. Given their current level of success, this seems to me to be fitting. A number of projects testing novel and imaginative hypotheses are proposed, utilizing modeling, field ecology, mesocosm manipulation, genetic, biochemical, and spectroscopic approaches. They propose to strengthen interactions with evolutionary and molecular ecology which will be facilitated by the recently successful Linnaeus proposal. They intend to continue to offer one international training workshop per year, and have suggested likely topics as ones that I think have a high probability of gathering interest from the international scientific community.

In summary, I have no hesitation in recommending the MARICE platform for funding during the second period of their planned program. In my opinion they have exceeded expectations for success in research productivity, originality, collaborative activities, and education, and their plans for future success are promising and realistic

Signature:



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