SCOTTISH GOVERNMENT CONSULTATION ON SCIENCE IN SUPPORT OF MARINE, ENVIRONMENT, RURAL AFFAIRS & RELATED POLICIES: A COORDINATED AGENDA FOR MARINE, ENVIRONMENT & RURAL AFFAIRS SCIENCE (CAMERAS) (2011-2016)

EVIDENCE SUBMITTED BY THE SOCIETY FOR GENERAL MICROBIOLOGY (SGM)

Introduction

The Society for General Microbiology, founded in 1945, is an independent professional scientific body dedicated to promoting the 'art and science' of microbiology. It has now established itself as one of the two major societies in the world in its field, with some 5,000 members in the UK and abroad.

General Comments

The stated aims of the Strategy are certainly laudable. The key sectors identified as having the capability for growth sum up current thinking internationally. The promise of alternative (= renewable) energy sources has great potential. For example, there is the possibility of developing biofuels from waste material or non-food plants [an example would include seaweeds]. The food and drink industries are clearly of tremendous importance to Scotland. The dominance of whisky is apparent in international markets. For the future, the potential of aquaculture to include new species for food, the ornamental trade, and biotechnology should not be overlooked. Rapid developments in life sciences have put Scotland in the forefront of knowledge - marine biotechnology is a definite growth area.

Specific Questions

The Science: Key areas have been identified in the document. Clearly, there are profound environmental issues, of which renewable energy sources and biodiversity are just component parts. Research is needed to develop alternative energy sources utilising waves and biofuels, the latter of which need to be based on renewable non-food materials. There is income generation potential in the life sciences, notably biotechnology, and the Scottish lead in marine biotechnology needs to be enhanced. The European Centre for Marine Biotechnology is a worthy platform for further exploitation.

Issues: There is no shortage of scientific expertise across Scotland. The issue is to enable collaboration and co-operation, which may be achieved through co-operative ventures such as MASTS (Marine Alliance for Science & Technology Scotland) and the Scottish Institute for Food and Drink. In particular, there need to be mechanisms in place to encourage communication between researchers, which is the first step to collaborative activities. In a small country, there needs to be a greater level of collaboration between the different groups of scientists. However, the central issue is funding.

Headline Themes

1. Do you agree that the two broad categories of "Local Responses to Global Change" and "Optimising the Potential of Scotland's Natural Assets" are helpful in providing an overlying structure to the Co-ordinated Agenda?

There is broad agreement with the two categories.

2. Are the descriptions of these set out in Section 3 (and Annex 3) comprehensive?

Yes. The descriptions seem appropriate.

3. Do these cover the major policy challenges where science can contribute as you see them?

Yes. The emphasis needs to be on the mitigation of environmental effects, protection of the biodiversity, and its use in biotechnological processes.

4. Are they likely to remain broadly relevant over the longer time horizon (well beyond the 2016 focus of this Coordinated Agenda)?

As a best guess, these items are likely to be relevant for the foreseeable future.

5. Do you agree with the description of support for the National Capability Theme set out in Section 3 (and Annex 3)?

Yes.

6. What facilities, resources and data do you think are important for Scotland to maintain?

There are a broad range of relevant facilities already available across Scotland. It is important to retain these facilities, and the expertise which is often an integral part. However as a cautionary note, Scotland has lost some of its world class facilities, for example the Torry Research Station in Aberdeen. If Scottish science to is to taken seriously on the international stage, there needs to be expansion and not contraction of the research base.

7. Are there other resources that Scotland needs to acquire to support future policy development?

There are clearly gaps in biodiversity knowledge that need to be addressed.

Policy Issues

8. Have we correctly identified the key policy issues and the associated scientific opportunities in Section 3?

Yes. However, key policies need to be more explicitly defined to allow relevant bodies to focus on the demands of government.

9. Are there additional issues that should be included?

There are gaps in microbiology expertise, which is key to the developments in health sciences [understanding and mitigating the effects of human, animal and plant diseases] and to biotechnology [e.g. development of novel products].

10. What do you think will be the most important influences on Scotland's future in the Marine, Environment, Rural Affairs and related areas?

Environmental change and the effects of pollution.

11. Why do you think these are important?

Any deleterious change to the environment [global warming, flooding] must have an impact on society, and could include adverse effects on the food supply.

12. Are there other scientific opportunities which should be highlighted?

Those already identified have great relevance.

The Science

13. What existing areas of Scottish based scientific expertise should be maintained to contribute evidence to key policy issues?

It is difficult to predict which skills will be needed in the future. There is a strong argument for retaining all the existing disciplines. Scotland has a particularly strong base in the life science and 'punches above its weight' for a 'small country'. This can only be maintained with continued support from the government for higher education and the research institutes in Scotland. In the last five years several research institutes have been closed or affiliated to universities, thus weakening the research base in Scotland (e.g the Hannah Research Institute and the Rowett Research Institute).

14. How clear is the relationship between the scientific areas and the key policy issues?

Very clear. Research is mainly funded by accessing UK-wide schemes from research councils and industry. To enhance the research specific to Scotland, the Scottish government needs to target initiatives to Scotland's strengths or needs. Encouraging multidisciplinary schemes across Scotland (funding pots,

research networks, etc.) can enhance outputs and KE (Knowledge Exchange).

15. In which areas of science can we continue to make use of expertise supported elsewhere e.g. at the UK, EU and international levels?

Science is international – we have moved from the individualistic to the group approach whereby it is recognised that groups can contribute more thoroughly to a given task. In short, Scotland needs to maintain a multiplicity of disciplines and expertise.

16. In the time frame for CAMERAS (2011-2016) what new emerging areas of science are likely to mature and become available for more general use or application?

Biotechnology/molecular biology – novel product development.

17. Do we have the expertise available to be able to use these new opportunities?

Yes. There are formal and informal groupings of scientists which evolve to tackle specific questions. This approach is likely to continue, and is profitable insofar as co-operation often enables a question to be answered more completely.

18. In which areas does Scotland need to be self reliant?

This is difficult to answer, but surely it is appropriate for any country to have sufficient expertise or have access to the expertise where it is external to the country?

<u>Delivery</u>

19. Knowledge Exchange is essential for scientific activity to achieve impact. Do you agree that KE should be an explicit and integral aspect of the delivery of this Coordinated Agenda?

Yes. It is important for individuals to be able to exchange information. However, some disciplines have a reputation for secrecy.

20. How can we continue to improve the integration of evidence from a diverse range of sources into forms that are accessible to end users?

Scotland's 'pooling' initiatives in science have been very promising or fruitful thus far (Physics pooling – SUPA [Scottish Universities Physics Alliance] and Life Sciences – SULSA [Scottish Universities Life Sciences Alliance]) and are good frameworks to enable research to be focussed in a particular discipline. To foster research to benefit Scotland, maybe a similar framework can be employed. The new pooling initiative MASTS (mentioned above), concerning marine science, is likely to be approved within weeks.

21. How can we reconcile the requirement for science to be responsive and flexible to short term demands while at the same time ensuring that longer term strategic research continues to progress our knowledge and understanding?

This comes down to the need to provide adequate funding both for short and long-term projects. Although funding streams often provide 1, 2 or 3-year awards, short term (1-3 months) and long term (5-10 year) awards could be contemplated.

22. How can we ensure that the 2 way flow of knowledge from science to policy and from policy to the academic community is optimised?

Arrange for meetings/workshops, information sessions, such as through the auspices of the scientific societies, e.g. RSE.

General Comments

25. We would also welcome any other general comments you may have on any of the issues raised in this document.

Although the statements concerning Science and the Government's Economic Strategy, Section 1, are clear enough, they are rather restricted; they mention renewable energy, climate change, reduction in 'food miles' and ecotourism - these are all very fashionable at present. Other matters that are as important, are less clearly stated. For example, resource efficiency and waste reduction (indeed, these should both clearly apply to energy, but there is no evidence of this in the document). The coordination of up-to-date scientific information in CAMERAS is certainly key to success here.

Section 2 states that a key objective for CAMERAS is to align with the National Performance Framework, but the latter is a simplistic set of targets or indicators that do not align well with the Economic Strategy as stated. These targets are largely reactive rather than proactive in concept. The key to realising all of the National Performance Framework objectives as natural outcomes is effective education. Investment in future generations with truly broad education leading to a sense of community (rather than status of the individual) is the best way forward.

For example, a target of 50 % energy from renewables by 2020 is all very well, but more emphasis should be given to reduction of waste and minimising overall energy consumption.

Sources

This evidence has been prepared on behalf of SGM by Professor Brian Austin, Heriot-Watt University, Dr Paul Hoskisson, University of Strathclyde, and Professor Niall Logan, Glasgow Caledonian University.

About the SGM

Society membership is largely from universities, research institutions, health and veterinary services, government bodies and industry. The Society has a strong international following, with 25% of membership coming from outside the UK from some 60 countries.

The Society is a 'broad church'; its members are active in a wide range of aspects of microbiology, including medical and veterinary fields, environmental, agricultural and plant microbiology, food, water and industrial microbiology. Many members have specialized expertise in fields allied to microbiology, including biochemistry, molecular biology and genetics. The Society's membership includes distinguished, internationally-recognised experts in almost all fields of microbiology.

Among its activities the Society publishes four high quality, widely-read research journals (*Microbiology*, *Journal of Medical Microbiology*, *Journal of General Virology* and *International Journal of Systematic and Evolutionary Microbiology*). It also publishes a highly respected quarterly magazine, *Microbiology Today*, of considerable general educational value. Each year the Society holds two major scientific meetings attended by up to 1500 microbiologists and covering a wide range of aspects of microbiology and virology research.

The governing Council of the SGM has a strong commitment to improving awareness of the critically important role of microbiology in many aspects of human health, wealth and welfare. It has in this connection recently initiated a 'Microbiology Awareness Campaign' aimed at providing information to the government, decision makers, education authorities, media and the public of the major contribution of microbiology to society.

An issue of major concern to the Society is the national shortage of experienced microbiologists, particularly in the field of clinical microbiology and in industry. To attempt to improve this situation long-term, the Society runs an active educational programme focused on encouraging the teaching of microbiology in university and college courses and in the school curriculum, including primary schools. Some 570 schools are corporate members of SGM.

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