

GLOBAL REPORT ON THE EVALUATION OF THE RESEARCH UNITS ON BIOLOGICAL SCIENCES

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1. GENERAL COMMENTS

1.1. Ecological Sciences

Ten of the research centres reviewed by the panel were active in one or more of the ecological sciences (Community ecology, Biosystematics, Ecophysiology, Conservation, Biology, etc.). Some of these centres are completely specialized in Ecology, others have Ecology along with other disciplines, such as Anthropology, Biochemistry and Genetics. The degree of integration of such diverse disciplines varies from one centre to another. However, in some centres commendable efforts are made to joint the disciplines under a common theme (i.e. Evolution), or a joint facility (e.g., DNA sequencing). Much of the ecological work is directed towards issues of Biodiversity and Conservation, and, consequently, includes a large share of field work, species enumeration and monitoring. Some groups have chosen designated ecosystems for detailed study, such as dune systems, and the typical Portuguese "montado". This development is encouraged by the panel, because focusing on a single ecosystem is likely to bring coherence and collaboration within the research centre.

The panel was surprised to note that, although many members of the ecological centres have joint publications with external scientists, often from other Portuguese institutes or from abroad, rarely is there any co-authorship among members of the same centre. The Panel feels that this reflects a high degree of individuality and deficiency of collaboration among the members of most of the centres.

Several ecological groups have now incorporated molecular techniques (e. g., DNA finger printing) to solve questions of population structure, evolution and conservation. This development, as indicated the panel's previous review, is expected to spread and is to be encouraged.

The panel recognizes that Ecological Sciences in Portugal draw greatly from basic biological disciplines, such as Taxonomy and Morphology. Some of the centres are also responsible for the maintenance of valuable collections (herbarium, botanical garden, fungi archive), and it is recommended that a sustainable solution be sought for the maintenance of these collection, certainly this responsibility transcends the terms of

reference of the panel's reviews. Because of their strengths in Taxonomy and Morphology and the unique Ecology of the Iberian situation, Portuguese ecologists ought to be in a prime position to contribute to major international trends focusing on Biodiversity, Biogeography and evolutionary processes. A few groups are turning their attention to these issues, and we recommend that this be further encouraged.

Many ecological groups in Portugal conduct projects with applied aspects (taxonomical inventories, water quality assessment, and advice on landscape management). While it is appreciated that these activities fulfil an important societal responsibility, the panel warns against too much focus on a great diversity of applied projects because this detracts attention from fundamental scientific base of the group. In addition, it is recommended that overheads charged on these projects return not only to the faculties, but also to the centres themselves, in such a way that funds can be reserved for strengthening fundamental science.

General Recommendations for Centres in Ecological Sciences

- Remove fragmentation and unite forces (specifically applicable to Évora).
- Improve internal coherence and strive for joint publications with co-authors from the same centre(all centres).
- Capitalize on the uniqueness of the systems studied, and focus on a few ecosystems. Research activities on different ecosystems should be connected by common scientific objectives.
- Organise internal strategic meetings (possibly with the advisory committee) to reflect on the theoretical basis and the fundamental questions addressed by the centre.
- Separate applied projects from the fundamental mainstream research and try to capitalize on the overheads on such projects.

We are pleased to report that, in general, we have seen some real progress in most research centres: better organization; better focus; better productivity. However, though a couple of centres have been rated as "very good", none has yet reached "excellence". This usually is not because of a lack of productivity, but because of a failure to yet recognize "cutting edge" problems and to address them in an innovative way. To do this will require a "step change" in approach that could only be facilitated by better exposure to the international science community, and especially by more effective use of external advisory panel guidance.

1.2. Biochemistry/Cell Physiology/Genetics

The Panel evaluated six units covering Biochemistry, Cell Physiology and Genetics, including microbial and plant biology, developmental biology and neuroscience. Five of these are associated with Universities and one with the Gulbenkian Institute. This sample of research units is too small to make major generalizations, particularly since other research units with considerable activity in the biological sciences are being evaluated by the Health Science and Biotechnology panels.

Areas covered and quality

- Microbial physiology and microbial genetics are well covered, with strength in yeast genetics at the University of Aveiro and in fungal systematics and yeast physiology at the University of Minho and the New University of Lisbon.
- There is some strength in plant biology at the University of Lisbon, but in other centres the plant biology groups are small and relatively weak.
- The developmental biology group at the Gulbenkian Institute is very strong.
- Among the units evaluated, neuroscience is represented only at the University of Aveiro, where it has yet to reach its potential.
- Leadership is a critical requirement; it is notable that the most successful units have strong leaders with a clear vision for the unit's future.

Recommendations

The need for national provision of essential expensive high-technology equipment - for example for proteomics and advanced optical microscopy - raised in the last report remains acute. A centrally accessible transgenic animal facility has been established at the Gulbenkian Institute and this is a very important resource.

It will be important for the units to adopt an interdisciplinary approach to the problems they are addressing, allowing them to take the essential next step to mechanistic rather than phenomenological studies. This is clearly recognized by the developmental biology group, but needs to be universally adopted.

2. COMMENTS FOR EACH UNIT

2.1. Ecological Sciences

Evaluation Panel I:

Arsélio Pato de Carvalho (Coordinator)

Peter Calow

Nico van Straalen

Marco Vighi

UNIT: Instituto do Ambiente e Vida (ID 45)

COORDINATOR: Isabel Abrantes

CLASSIFICATION: Very Good

This Unit results from a fusion with another unit in Botany, which had been rated as Fair in the previous evaluation. The unit has now consolidated its activities around three major research themes: Biodiversity and Evolution; Biological Interactions and Biotechnology; and Environmental and Ecological Studies. These three themes bring together the work that is being carried out in six different subunits, and this organization should benefit on interaction between disciplines. However, the panel remains to be convinced that such integration is possible between some of the areas of activity of the centre because of lack of identification of common themes.

The strength of the centre lies in its high productivity and very well developed collaborative links with international partners. Some publications in top quality journals are indicative of excellence. However, it will be necessary to ensure that this level of publications will be maintained in the future some members that contributed very

significantly to the centre have left it. Another positive aspect is the training programs of the centre which involves a large number of graduated students who benefit from high quality advanced courses organized with a strong participation of internationally known scientists.

The panel recommends that the centre pay more attention to strategic reflection on fundamental scientific questions to be addressed and to the areas in which the centre strives to attain excellence. In particular, the centre should identify strong leaders in each of the three themes so as to facilitate the ongoing process of maximizing quality. The centre should maintain its former position in Ecotoxicology both by collaboration with the University of Aveiro and by further developing its own expertise in this area.

No added value is evident from the joining of the two centres in the absence of a clear strategy and identification of strong leadership for each of the three broad research themes. Each theme should address only a few key questions in which the unit feels it can achieve excellence. The panel notes that now many publications listed resulted from programs led by members that now left the centre and/or are integrated in other centres. This should be a matter of concern.

We recommend that sufficient attention be paid to the core facilities already existing, such as the DNA sequencer, which should be operating at full capacity to serve a wide community at the University. Such effort does not seem to have been made.

It is brought to the attention of the coordinator and group leaders that due to the rapid advances taking place in Biological Sciences, the ability to achieve and maintain excellence and competitiveness on an international stage is an increasing challenge; this is taken into account in the recommendations made in this assessment.

Programmatic Funding

The panel very strongly recommends financing to contribute to acquiring the freeze-fixation and freeze-substitution systems, and/or cabinets with controlled environment facilities, in a total value of 60 000 Euros.

UNIT: Centro de Estudos de Ecosistemas Mediterrânicos (ID 87)

COORDINATOR: José Manuel Pereira Branco Mascarenhas

CLASSIFICATION: Poor

(The centre should be selectively and profoundly reformulated into a smaller subunit with a few well defined themes to be integrated in a larger Ecology unit at the University of Evora. In order to be viable, the subunit on "Ecosistemas Mediterrânicos" should be reduced in size to include only members who are productive).

The University of Évora presented three research units in the field of Ecology, of which this is one of them. The centre addresses aspects of landscape ecology, spatial planning and interaction of human activity with "montado" ecosystems. The activities are distributed over seven research lines ranging from taxonomical inventories to human health. When adjusted for people actually working with the centre, the publication rate for the centre, particularly in international journals, was considerably less than expected for a research unit which has been operating for nearly a decade. Also, the panel felt that the centre lacked direction and scientific motivation in most of the questions addressed. The centre does not capitalize effectively on the scientific opportunities that arise from the unique situation of the Portuguese landscape.

The Centro de Estudos de Ecosistemas Mediterrânicos is being evaluated for the third time and shows clear fragilities, which have been previously pointed out. The suggestions made by the panel in the past have not been followed, nor have the leaders of the centre corrected its course, which is leading the centre into a difficult scientific position.

Nevertheless, the panel was pleased with the presentation made by Professor João Paulo Almeida Fernandes, who substituted for the coordinator, relative to a potential future philosophy for the centre, which raises some positive perspectives for future developments, especially in the new perspective of reformulation of the centre's subunit of a larger centre in Évora, as suggested below. Professor Almeida Fernandes is encouraged to carry through his ideas. In order to optimize resources and scientific potential at University of Évora, the evaluation panel recommends that, instead of there being three centres in Ecology, as currently proposed, that there be just one centre composed of three sub-units, which could operate independently, but interactively. One sub-unit could be on Mediterranean Ecosystems, after profound restructuring the present

unit. The new subunit should focus on only a few specific themes which it will be capable of developing with scientific credibility. In order to be viable, the subunit on "Ecosistemas Mediterrânicos" should be reduced in size to include only members who are productive, and should have unquestionable scientific leadership. Researchers from "Laboratórios de Estado" or Hospitals, due to regulations of FCT, can not be included as members of the subunit, but can collaborate in the activities of the subunit.

The other two sub-units would result from the split of the Centro de "Ecologia Aplicada", as is being proposed, one on "Macroecologia e Conservação" and the other on "Ecologia Química", focusing on few specific themes which these subunits are capable of developing credibly. These subunits have already been organized and redefined to an appropriate dimension, and were evaluated with the recommendation to incorporate the new centre.

Therefore, it is recommended that the groups of "Macroecologia e Conservação" and "Ecologia Química" should integrate immediately the new proposed centre, as subunits, and that the subunit on "Ecosistemas Mediterrânicos", which has not yet been subject to reorganization, should integrate the new proposed centre, in a second phase, only after profound reformulation of the group which presently composes the "Centro de Estudos de Ecosistemas Mediterrânicos", as suggested above. Such reformulation of the group on "Ecosistemas Mediterrânicos", should be submitted to the FCT for proper evaluation, before integrating the new centre.

It is brought to the attention of the coordinator and group leaders that, due to the rapid advances taking place in Science, the ability to achieve high quality and competitiveness in research is an increasing challenge; this is taken into account in the recommendations made in this assessment.

Prgrammatic Funding

None.

UNIT:Centro de Ciências Biológicas e Geológicas (ID137)

COORDINATOR: Miguel Ângelo Carvalho

CLASSIFICATION: Fair

The unit has focused its activities on three diverse scientific areas: 1. Biodiversity; 2. Molecular Biology and Biotechnology; and 3. Marine Biology. The panel detects dedication by the members of the center, who are working under adverse conditions. They have a good insight in their own strength (the uniqueness of their study systems) and their own weaknesses (instability of the research team and lack of strong leadership). However, such dedication and perception has lead to only moderate scientific productivity, although there is good expectation for improvement in the near future.

It is clear to the panel that basically most researchers are working individually with little coordination. The panel believes that this is detrimental to the development of the unit, and is of the view that definite steps need to be taken to improve the situation. The panel appreciates the difficulty that the centre has in maintaining continuity of human capital, and also the difficulty in attracting highly qualified scientist to Madeira Island for long periods. In addition, the centre had to face the lack of continuity of some of their own researchers who are now returning again to the center. This should contribute to consolidating the centre around the existing personnel.

The panel appreciates the efforts that the centres making to overcome its difficulties and recognizes great dedication on the part of the researchers of the center, and is convinced that in the future they will change the course of the centre to fully benefit from the uniqueness of their study system. The centre needs to have an effective external advisory committee that would discuss closely with the researchers their programmes and would help them establish a few competitive research lines, in collaboration with external research centres. This committee should produce a yearly report to be filed with the report of the center.

It is necessary to establish a regular program of international short advanced courses to be given locally in modern fundamental and applied sciences relevant to the activities of the center, for the benefit of the graduate students being trained and to stimulate the research staff of the centre to be exposed to new concepts and technologies.

It is brought to the attention of the coordinator and group leaders that due to the rapid advances taking place in Biological Sciences, the ability to achieve and maintain excellence and competitiveness on an international stage is an increasing challenge; this is taken into account in the recommendations made in this assessment.

Programmatic Funding

The panel very strongly recommends programmatic funding in the total amount of 35 000 Euros to pay for the expenses of running the international intensive advanced courses recommended by the evaluation panel, over the period of the next three years. These courses should be programmed with the advice of the external advisory committee of the center.

UNIT: Centro de Investigação de Recursos Naturais (ID 172)

COORDINATOR: Nelson Simões

CLASSIFICATION: Good

The research activity of the centres falls into three different major themes with only partial possibility of collaboration. Nevertheless, this should not be considered as negative in this particular situation because it represents a possibility for optimizing the use of structures and facilities in isolated circumstances. The centre presented five research topics; however, we believe that these could be consolidated into three themes: 1. Epidemiology and Human Population Genetics; 2. Biological Control and 3. Biodiversity and Conservation.

The centre seems to be well on its way toward scientific depth, and clear enthusiasm of the coordinator and of the researchers of the unit is evident. The research has taken a good mechanist turn with studies emphasizing the opportunities offered by the insular conditions. We appreciated the increase in publication output, but on the average the productivity of the centre should be improved. The panel recommends that even more attention be paid to further exploiting the unique geography of the Azores, leading to questions that are not only of local, but also of international importance.

The unit should pay more attention to consolidation of its work into the three themes suggested above. A strategy should be adopted to further increase quality and quantity of publication output. The panel was positively impressed with the quality of the very positive leadership of the coordinator who is directing the centre toward high quality research under very difficult circumstances.

It is brought to the attention of the coordinator and group leaders that due to the rapid advances taking place in Biological Sciences, the ability to achieve and maintain excellence and competitiveness on an international stage is an increasing challenge; this is taken into account in the recommendations made in this assessment.

Programmatic Funding

The panel very strongly recommends funding for DNA sequencing facilities and for a technician in the total amount of 90 000 Euros. These facilities should be available for other groups in the island, and should provide services to other group for charge to cover its running expenses.

UNIT: Centro de Micologia (ID 282)

COORDINATOR: João Luis de Carvalho Baptista Ferreira

CLASSIFICATION: Poor

Research in the centres largely concerned with classical systematics of mycoflora, including both Iberian terrestrial and marine taxa, and also with some attention to human disease organisms.

The panel continues to be impressed by the dedication and enthusiasm of personnel within the unit and by the amount of effort put into community work and popularization of the subject area. However, a very poor publication rate in international journals is a serious weakness.

Very little effort has been made in establishing research programs capable of attracting young students.

Nothing seems to have come of our previous suggestions that attempts should be made to collaborate with other research groups, for example in the molecular area, using fungi as study organisms.

We doubt the long-term viability of the centre and, therefore, have concerns about the capacity to maintain the extensive fungal collection in the future, once the present members retire. This ought to be an important national resource and some consideration needs to be given to its protection by the University of Lisbon.

It is brought to the attention of the coordinator that, due to the rapid advances taking place in Biological Sciences, the ability to achieve and maintain excellence and competitiveness on an international stage is an increasing challenge; this is taken into account in this assessment.

Programmatic Funding

None

UNIT: Centro de Biologia Ambiental (ID 329)

COORDINATOR: Maria da Luz Mathias

CLASSIFICATION: Very Good

The centres now organized into three subunits; namely a) Functional Biology and Developmental Biology and b) Conservation Biology and c) Evolutionary Biology, covering important areas of basic biological sciences related to environmental biology areas. The panel was pleased that each of these areas is now lead by a coordinator, namely S. Thornsteinsdottir, M. J. J. Boavida and M. Coelho, respectively. The coordinators are responsible for coordinating the projects of these areas, which should lead to more fluid communication within and between the subunits. The panel members expect that this will generate even more cohesive activity of the center.

The panel was pleased to see that the publication output was very good in quantitative terms, and in some cases even reached excellent quality. The centres well on its way to excellence, but to reach that status need to reduce the number of objectives and deepen

selective scientific activities leading to strategic development of the centres an internationally recognized high-quality research unit. This can develop only under effective leadership at the level of coordination is of the centre and of its subunits. This will ensure sound training of the many young graduate students in the center, leading to continuity of the activities and enhancing the international reputation of the center. We agree with the perception of the scientific advisory committee that the centre needs to find a balance between its various activities so that it will maintain a high level of output and prestige without compromising the quality of the scientific work and training of students.

The panel recommends that the centre continue its restructuring with a vision of attaining more international recognition and hence developing excellence in all areas of its activities. In the ongoing physical restructuring of the faculty's infrastructure, the panel recommends that every effort should be made to avoid disruption of the group of the laboratory facilities. The Panel strongly supports the continuous operation of the field station.

The coordinator and group leaders should be aware that due to the rapid advances taking place in Biological Sciences, the ability to achieve and maintain excellence and competitiveness on an international stage is an increasing challenge; this is taken into account in the recommendations made in this assessment and should be considered in reorienting and optimizing the centre's activities, so that the centre concentrates more in the activities in which it feels it can be competitive internationally.

Programmatic Funding

The panel very strongly recommends allocation of 60 000 Euros to contribute for developing DNA sequencing facilities.

UNIT: Centro de Ecologia e Biologia Vegetal (ID 409)

COORDINATOR: Maria Amélia Martins-Loução

CLASSIFICATION: Good

The centre was created in 1998 as a result of a suggestion of the Biological Sciences panel. The long-term objectives of the Centro de Ecologia e Biologia Vegetal (CEBV) are

to contribute to the understanding and dynamics of the Mediterranean ecosystems. The emphasis is on system-based approaches driven by theoretical considerations on the relationship between structure and function of ecosystems.

In a previous evaluation, the panel had expressed concern that the centre did not appear to have a coherent theme, but consisted of individuals that had been recruited under an umbrella arising after previous interests. However, the panel was now pleased to see that , during the last triennial period, a big effort had been made to reach a good level of integration of the expertise of the various groups in the center. The need to focus and identify particular goals has been recognized by the center, and the panel believes that the focus on particular systems, such as the rehabilitation of a quarry and the changing ground water conditions in sand dune systems should bring good scientific returns.

The unit still requires some time to bring the different expertise together to credibly address cohesive themes, much of the activity of the centres descriptive and is still concerned largely with monitoring environmental conditions, physiological processes, and developing inventories of plant diversity with the hope of deriving causal relationships from these. However, as we have noted previously, causal analysis is notoriously difficult from such correlational approaches, and there is still little evidence that the centre has come to terms with a more experimental approach. The panel believes that the centre would profit from further advice from its external advisory committee.

The publication record of the centres good, but is concentrated on a few individuals. As for training of young researchers, there are a reasonable number of enthusiastic doctoral candidates doing work under the supervision of the more senior staff.

The centre has a good group that deserves continuing support, but it needs challenging to further develop a more international profile so that the group becomes more recognized internationally as a centre of ecosystem dynamics. In this regard, we draw attention to the recommendation of their own advisory committee suggesting that the group give emphasis to experiments and manipulations conducted to check specific hypotheses once basic, descriptive knowledge of systems is acquired.

The stable isotope laboratory is an important asset and has potential for developing future basic research and for a self-financing facility. However, the panel would council caution against overenthusiastic exploitation of the system for its own sake in the development of research themes which should not be technique driven. The panel was particularly impressed by the quality of the technical assistance provided to run the facilities.

It is brought to the attention of the coordinator and group leaders that due to the rapid advances taking place in Biological Sciences, the ability to achieve and maintain excellence and competitiveness on an international stage is an increasing challenge; this is taken into account in the evaluation and recommendations made in this assessment.

Programmatic Funding

The panel very strongly recommends allocation of 30 000 Euros to contribute for developing "biomonotoring" facilities.

UNIT: Centro de Investigação em Biodiversidade e Recursos Genéticos (ID 609)

COORDINATOR: Nuno Miguel Ferrand de Almeida

CLASSIFICATION: Very Good

The objective of the centres the study of biodiversity at the ecological and genetic level in both plants and animals. Some of the researchers now integrated in this centre were part of the Centro de Estudos de Ciência Animal. The research projects are clearly focused according to three main lines of research: assessment of molecular diversity in natural populations; assessment of biodiversity at the species and landscape levels; the use and characterization of plant and animal genetic resources.

The panel was impressed with the scientific content of the programs and the enthusiasm of the personnel. In general, the level of the scientific productivity in terms of quantity and quality of publications in international journals is very good, even if some differences can be detected in the output of individual members of the staff. The panel was impressed that the group wanted to move from the description of patterns of diversity to the understanding of ecological processes behind these.

The panel, therefore, recommends that this new centre be supported and that its members be encouraged to continue with the good scientific output that they have had to date. However, the panel is concerned that the centres just being initiated as a new unit and it is not clear what organizational problems the unit will face in the future.

It is brought to the attention of the coordinator and group leaders that due to the rapid advances taking place in Biological Sciences, the ability to achieve and maintain

excellence and competitiveness on an international stage is an increasing challenge; this is taken into account in this assessment.

Programmatic Funding

The panel very strongly recommends programmatic funding in amount of 30 000 Euros for technical and secretarial support.

UNIT: Centro de Macroecologia e Conservação (ID 651)

COORDINATOR: Miguel Bastos Araújo

CLASSIFICATION: this proposed new unit should be integrated as a subunit in a larger unit at the University of Évora. For various reasons pointed out in the text, it has no viability by itself.

The University of Évora presented three research units in the field of Ecology, of which this is one of them. The centre has a good view of the scientific approach on conservation ecology and addressed its projects according to serious basic questions. Nevertheless, the organization of the group does not seem adequate to justify a center. In particular, there are too few permanent members of the staff to guarantee adequate leadership and continuity as a center. It is recommended that the group be incorporated as a subunit of another center.

The proposal includes a larger number of publications some of which are impressive in quality. However, many of these are from external associates, and it was difficult for the panel to see how these would relate to future continuum activity of the unit at Évora. It is, therefore, difficult for the panel to evaluate the potential for developing an internationally recognized centre in the future, but the group together with highly qualified expertise and should be encouraged to integrate another research unit.

In order to optimize resources and scientific potential at the University of Évora, the evaluation panel recommends that, instead of there being three centres in Ecology, as currently proposed, that there be just one centre called, for example, "Centro de Ciências Ecológicas", composed of three sub-units, which could operate independently, but interactively. Two of the sub-units would result from the split of the "Centro de Ecologia

Aplicada", as is being proposed, one on "Macroecologia e Conservação" and the other on "Ecologia Química", both of which would focus on few specific themes. The third sub-unit could be on Mediterranean Ecosystems focusing on a few selected themes resulting from profound restructuring of the "Centro de Estudos de Ecossistemas Mediterrânicos", as suggested in the panel's report for this unit.

Therefore, it is recommended that the groups of "Macroecologia e Conservação" and "Ecologia Química", as proposed, could immediately integrate the new proposed center, as subunits. The subunit on "Ecossistemas Mediterrânicos" could eventually integrate the new proposed center, in a second phase, only after profound reformulation (and evaluation of the reformulation by the FCT) of the group which presently composes the "Centro de Estudos Ecossistemas Mediterrânicos", as suggested by the panel in the evaluation of this center.

It is brought to the attention of the coordinator and group leaders that due to the rapid advances taking place in Biological Sciences, the ability to achieve and maintain excellence and competitiveness on an international stage increasing challenge; this is taken into account in the recommendations made in this assessment.

Programmatic Funding

Programmatic funding may be recommended only in case the subunit is integrated in a new center, and after proper evaluation of the needs of the new unit.

UNIT: Centro de Ecologia Química (ID 723)

COORDINATOR: Luis Manuel Pais da Silva Dias

CLASSIFICATION: this proposed new unit should be integrated as a subunit in a larger unit at the University of Évora. For various reasons pointed out in the text, it has no viability by itself.

The University of Évora presented three research units in the field of Ecology, of which this is one of them. The "Centro de Ecologia Química" is proposed as a new centre that emerges out of a previous "Centro de Ecologia Aplicada". The new centre now proposed has two major research lines: one concerned with chemical signalling in animals and the

other concerned with signalling in plants. However, in the future it aims to focus on chemical signals in plant-animal interactions.

The panel is impressed with the aspirations, but was not entirely convinced that they would be better achieved by creating a new center. Moreover, the productivity in terms of publications over the past three-year period was not impressive; a small group of this size cannot be sustained as an independent center. It will be necessary to fixate at the University of Évora all researchers listed in the proposal, since some important elements (e.g. Professor Barata) presently are not in Évora. It is recommended that the group be incorporated as a subunit of another center.

In order to optimize resources and scientific potential at the University of Évora, the evaluation panel recommends that, instead of there being three centres in Ecology as currently proposed, there be just one center, called, for example, "Centro de Ciências Ecológicas", composed of three sub-units, which could operate independently, but interactively. Two of the sub-units would result from the split of the "Centro de Ecologia Aplicada", as is being proposed, one on "Macroecologia e Conservação" and the other on "Ecologia Química", both of which would focus on few specific themes. The third sub-unit could be on Mediterranean Ecosystems focusing on a few selected themes resulting from profound restructuring of the "Centro de Estudos de Ecossistemas Mediterrânicos", as suggested in the panel's report for this unit.

Therefore, it is recommended that the groups of "Macroecologia e Conservação" and "Ecologia Química", as proposed, could immediately integrate the new proposed center, as subunits. The subunit on "Ecossistemas Mediterrânicos" could eventually integrate the new proposed center, in a second phase, only after profound reformulation (and evaluation of the reformulation by the FCT) of the group which presently composes the "Centro de Estudos de Ecossistemas Mediterrânicos", as suggested by the panel in the evaluation of this center.

It is brought to the attention of the coordinator and group leaders that due to the rapid advances taking place in Biological Sciences, the ability to achieve and maintain excellence and competitiveness on an international stage is an increasing challenge; this is taken into account in the recommendations made in this assessment.

Programmatic Funding

Programmatic funding may be recommended only in case the subunit is integrated in a new center, and after proper evaluation of the needs of the new unit.

UNIT: Centro de Ecologia e Ambiente (ID 774)

COORDINATOR: Jorge Araújo

CLASSIFICATION: Fair

This proposal for a new centres scientifically constituted by selected research themes that were being developed at two research centre sat the University of Évora; the "Centro de Ecologia Aplicada" and "Centro de Estudos de Ecosistemas Mediterrânicos". Both centres will be extinct giving rise to the "Centro de Ecologia e Ambiente". These selected themes are now incorporated in the new centres subunits of the center, and should constitute well defined areas of research in Ecology and Environment. The subunits of the centre already defined and evaluated by the Evaluation Panel on Biological Sciences, and proposed to incorporate immediately the centres subunits, are: Macroecologia e Conservação (Coordinator: Miguel Araújo) and Ecologia Química (Coordinator: Luis Dias).

A third subunit that may be included at a later date, may result from a selected group of researchers in the general area of "Ecosistemas Mediterrânicos, including some members of the "Centro de Ecosistemas Mediterrânicos". This subunit has not yet been properly defined, and should be submitted to FCT for evaluation before it can integrate the new center. The proposal received for this subunit is equivalent to the "Centro de Estudos de Ecosistemas Mediterrânicos", in the absence of any restructuring, which does not correspond to the philosophy of the new center. Other subunits may be proposed to FCT by the coordinator of the Centro de Ecologia e Ambiente, on approval by the scientific council.

Subunit on "Macroecologia e Conservação": This subunit has a good view of the scientific approach on conservation ecology and addressed its projects according to a series of basic questions. It is still necessary to reduce further the number of questions being addressed. The proposal includes a large number of publications some of which are impressive in quality. However, many of these come from external associates, and it was a difficulty for the panel to evaluated their real potential for contributing to the future development of an internationally recognized centre at Évora. However, the group brings together highly qualified expertise, and collaboration with international groups, which should contribute to a solid "core" for this subunit at new center. Efforts should be made to

attract the external associates to Évora and at the same time maintain the international collaborations.

Subunit on Ecologia Química: This subunit has now two major research lines: one concerned with chemical signalling in animals and the other concerned with signalling in plants. However, in the future it aims to focus on chemical signals in plant-animal interactions. Members of this subunit have made important scientific contributions and have good scientific technology and expertise in collaboration with external researchers.

The panel was impressed with the aspirations, but the productivity in terms of publications by members at Évora, over the past three-year period, can be sustained only if elements which collaborate with the subunit become fixated at Évora, since some important elements.

The panel is convinced that the centre will attain high research quality and productivity now that its members have redefined some of its research lines previously being pursued and have developed a new philosophy to delegate responsibilities on younger research members by identifying subunit coordinators who will be research leaders within the internal structure of the center. This will also help ensuring the continuity of the center.

It is brought to the attention of the coordinator and subunit leaders that due to the rapid advances taking place in Biological Sciences the ability to achieve and maintain excellence and competitiveness on an international stage is an increasing challenge; this is taken into account in this assessment.

Programmatic Funding

The panel very strongly recommends programmatic funding in the total amount of 25 000 Euros as basic infrastructure funding for initial stages of the center.

2.2. Biochemistry/Cell Biology/Genetics

Panel II

Arsélio Pato de Carvalho (Coordinator)

Gordon Roberts

William Brammer

Jeremy Roberts

UNIT: Centro de Genética e Biologia Molecular (ID 132)

COORDINATOR: Maria Helena do Quental Pereira Paveia Pinto Teixeira

CLASSIFICATION: Fair

The unit has five action lines lead by enthusiastic group leaders covering a very broad range of genetics and molecular biology with very different levels of activity and productivity. The collection of action lines being pursued does not constitute a coherent centre with a common theme. There is little evidence of strong interaction between most of the different groups, and there remains a need for strong leadership. Only three of the five lines are performing at an appropriate level.

Lines lead by Mario Santos and Rogerio Tenreiro coexist well. The work of Mario Santos is of international quality, but with only modest productivity. Rogerio Tenreiro clearly has valuable skills and a wide range of collaborations. He has considerable enthusiasm and drive, but while his research is at the level of national excellence, it is unfocused. The work of Rui Gomes could reasonably be run alongside these two and it is of high quality. There is genuine potential in these three areas, but there is a great deal to do if this is to be converted into consistent international achievement.

The lines on human genetics and eukaryotic viruses are not well integrated, and will not easily compete internationally. The human genetic problems being tackled are important, but require major multifaceted approaches and are being actively pursued in other places in Europe and in the United States.

Too many members of the unit are unproductive; only four have published two or more papers during the assessment period. The group leaders are aware of this problem and of some of the problems pointed out above, and have expressed the desire to improve in the near future. This would be greatly facilitated if the centre takes into consideration the requirement of FCT to have an effective external advisory committee which would discuss with the leaders of the centre the problems being pursued and produce a yearly report on

the activities of the centre to be filed together with the report of the center, as required by the rules of the FCT.

A large number of PhD students are associated with the center, but there is little evidence of a well-organized central training program, which would ensure that graduate students are well equipped for competitive research careers.

It was brought to the attention of group leaders that due to the rapid advances taking place in Biological Sciences the ability to achieve and maintain excellence and competitiveness on an international stage is an increasing challenge; this is taken into account in this assessment.

Programmatic Funding

None

UNIT: Centro de Engenharia Biológica (ID 41)

COORDINATOR: João Daniel Correia Arrabaça

CLASSIFICATION: Good

The focus of the Centre's research is the response of plant cells to abiotic stress. Since the last assessment, the unit has made some progress in the use of molecular approaches to address their research interest. Further efforts in this direction are essential and may require additional support and training of some key staff, possibly through spending periods of time at specific centres of excellence, to obtain appropriate skills.

The centre has good leadership and strategies are in place to improve both the quantity and quality of publications, and to develop additional sources of research funds. The appointment of two new postdoctoral research workers with experience in molecular biology is one example of the ways that the centre has addressed its needs and this development is to be welcomed. The current research lines are now more well focused, but the group needs to frame clear hypotheses to pursue the research at a level that could be regarded as fully internationally competitive.

The centre has only three PhD students associated with it and further expansion of this group, and the postdoctoral community, may stimulate the speed with which new technologies are embraced.

It is brought to the attention of group leaders that, due to the rapid advances taking place in Biological Sciences, the ability to achieve excellence and competitiveness on an international stage is an increasing challenge; this is taken into account in this assessment.

Programmatic Funding

The panel very strongly recommends programmatic funding for the following equipment in the total amount of 35 000 Euros for the following equipment: Infra red gas analyzer, bench top centrifuge and two dimension electrophoresis.

UNIT: Centro de Biologia (ID 655)

COORDINATOR: Maria Manuela Sansonnetty Gonçalves Côrte Real

CLASSIFICATION: Very Good

The Centre has an effective programme of research, based on yeast biology and on pure and applied plant science. There is evidence of a significantly increased and growing coherence between the yeast and plant-based programmes. The ecological programme is incorporating modern molecular approaches.

The centre has been successful in focusing its work into coherent areas and in limiting the number of research strands to those that can be successfully pursued. This, and the overall organization of the center, reflects excellent leadership by the coordinator who presented a very convincing strategy for research development and for post graduate training. The work has reached a stage where a significant part of it is being published in high quality international journals and this trend should be continued across the breadth of the research unit driving centre towards "excellent".

An impressive range of postgraduate-training programmes is organized by the centre and made available to the centre's PhD and master students. Generic postgraduate training is being organized and provided by the Faculty. The centres training many PhD and master

students using high quality international teaching at an advanced level taking advantage of the excellent international collaborations of the members of the unit.

The centres reminded that an international advisory committee is essential and that a report by this committee should be filed with the report of the center.

It is brought to the attention of the coordinator and group leaders that, due to the rapid advances taking in biological Sciences, the ability of a research unit to achieve excellence and competitiveness in various areas simultaneously, on an international stage, is a great challenge. Nevertheless, the panel is convinced the unit is well on its way to accomplish this.

Programmatic Funding

The panel very strongly recommends programmatic funding for the following equipment in the total amount of 90 000 Euros for the following equipment: phosphoimager.

UNIT: Biologia do Desenvolvimento (ID 664)

COORDINATOR: Moises Mallo

CLASSIFICATION: Excellent (There remain substantial doubts about the legality of the Unit's coordinator to act in such capacity; in fact, he is paid by a Associated Laboratory and should be integrated in that Laboratory)

This Centre comprises a truly excellent grouping of developmental biologists of genuinely international calibre. They are publishing their work consistently in international journals of the highest impact. There is evident synergism between the individuals in the centre even though their research interests are focused on widely different developmental systems (*Drosophila*/mouse/*Arabidopsis*). The panel stressed the strategic importance of keeping this outstanding group together in the long term.

In addition to providing a high quality research environment, members of the group also run important national facilities for the scientific community.

The Centre has a substantial number of postgraduate students affiliated to a spectrum of Portuguese universities and these individuals receive an excellent training in developmental biology.

Programmatic Funding

None

UNIT: Centro de Recursos Microbiológicos - CREM (ID 457)

COORDINATOR: Isabel Spencer Martins

CLASSIFICATION: Very Good

This active and enthusiastic unit has recently been reorganized into four research lines, with a focus on yeast biology, bacterial and fungal pathogens.

A number of approaches, including molecular techniques, are being successfully employed to extend the understanding of yeast systematics and diversity. Modern molecular techniques are being used for the development of powerful diagnostic tools. These same approaches are being extended to the study of pathogenic fungi of commercial significance. Several effective international collaborations are in place. Synergism is developing between the well established and the new research lines.

Physiology has a particular emphasis on sugar transport. Several new transporters have been identified, their genes cloned and their regulation and specificity examined. Collaboration with protein biochemists in the neighbouring department, to take these discoveries forward, is beginning and holds out great promise.

The third line involves the use of molecular tools for the identification of Gram-positive bacteria. This has important practical applications in diagnosis, surveillance and epidemiology. The final line, involving a single individual, is concerned with the taxonomy of two genera of plant pathogenic fungi. The diseases caused by these pathogenic fungi have important significance to the agricultural industry.

The Centre has a vigorous community of postdoctoral scientist and generates well-trained PhD students.

The center, under the coordination of a very capable leader, has been conducting science and graduate training of international quality, and the organization and enthusiasm of the very capable members of the unit are impressive. The panel finds that this high competence and enthusiasm, does not appear to be reflected in a major number of publications in the highest impact journals. Attention should now be focused on developing a strategy to move the work on to a mechanistic level in order to achieve this goal and obtain an "excellent" rating in the future.

It is brought to the attention of the coordinator and group leaders that, due to the rapid advances taking place in Biological Sciences, the ability to achieve and maintain excellence and competitiveness on an international stage is an increasing challenge; this is taken into account in this assessment.

Programmatic Funding

The panel very strongly recommends programmatic funding in the amount of 90 000 Euros to contribute to the acquisition of the following equipment: HPLC; CHEF Electrophoresis system; Real-Time PCR; Refrigerated centrifuge; Hybridisation manifold.

UNIT: Centro de Biologia Celular (ID 482)

COORDINATOR: Edgar da Cruz e Silva

CLASSIFICATION: Good

The group, in general, is enthusiastic and able with clear ambitions for the future. If these can be realized, given the recent improvements in the provision of equipment and facilities, there is a prospect that the group will be capable of delivering internationally competitive research in Signal Transduction, to match the present excellence in Microbiology, by the next time the group is assessed.

Research in Microbial Genetics is of high quality; in particular the work of Manuel Santos is "excellent". It has been very productive at an international level, helped by maintaining strong links with overseas laboratories. The Signal Transduction line has been productive but is now showing promise and should shortly deliver work of high quality. Interaction with collaborating groups elsewhere will remain important for the timely development of

this line and for mechanistic investigations of the protein interactions influencing protein phosphorylation states.

Although the output of plant scientists within the Centres moderate, publication is in low ranking journals and the facilities, particularly for growing plant material under controlled conditions, are inadequate: the number of proposed research projects in this discipline is too great and a decision should be made as to which of these should be vigorously pursued based on their likelihood of generating data that are competitive on an international stage.

This debate, and developments in order research areas, would be facilitated through revision of the research activities by the external advisory committee to ensure international expertise of increased relevance to the activities of the Center. It should be noted that the unit should file a report by the external advisory committee together with the unit's report, as required by FCT.

The Centre has a lively group of postdoctoral scientist and a substantial postgraduate contingent. This latter community has grown steadily since the centre was established. The completion rate of PhD students has been poor during this period and the unit must focus considerable effort to ensure that postgraduates submit their thesis within four years of registration.

It is brought to the attention of group leaders that, due to the rapid advances taking place in Biological Sciences, the ability to achieve excellence and competitiveness on an international stage is an increasing challenge; this is taken into account in this assessment.

Programmatic Funding

The panel very strongly recommends programmatic funding in the amount of 45 000 Euros to complement pre-existing common equipment, particularly for purchasing a Multideck gel drier, Cyphergeren and Multidimensional chromatography.

