BVME - Biologie végétale et microbiologie environnementale

Rapport Hcéres

agence d'évaluation de la recherche
et de l'enseignement supérieur

Section des Unités de recherche

AERES report on the research unit

Environmental Plant Biology and Microbiology

From the

Aix-Marseille 2 University

CEA

CNRS

December 2010

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Le Président de l'AERES

Didier Houssin

Section des unités de recherche

Le Directeur

Pierre Glorieux

December 2010

Research Unit

Name of the research unit : Environmental Plant Biology and Microbiology (BVME)

Requested label: UMR CNRS, UMR CEA

N° in the case of renewal : 6191

Name of the director : Mr Thierry HEULIN

Members of the review committee

Committee chairman:

Mr Jean-Pierre JACQUOT, IAM, Nancy

Other committee members:

Mr Andreas WEBER, Heinrich-Heine University, Duesseldorf, Germany

Mr Michel GOLDSCHMIDT-CLERMONT, University of Geneve, Switzerland

Mr Peter DOERNER, University of Edinburgh, Scotland, UK

Ms Chantal ASTIER, CGM, Gif-sur-Yvette (CNU)

Mr Michel LEBRUN, LSTM, Montpellier

Mr Pierre CAPY, LEGS, Gif-sur-Yvette (CoNRS)

Mr Denis FAURE, ISV, Gif-sur-Yvette

Mr Fabrice RAPPAPORT, IBPC, Paris

Mr Norbert ROLLAND, IRSTV, Grenoble

Mr Stéphane MENAGE, IRTSV, Grenoble

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Observers

AERES scientific advisor:

Mr Steven BALL

University, School and Research Organization representatives :

Mr Pierre CHIAPPETTA, Aix-Marseille University - AM 2

Mr Gilles BLOCH, CEA, DSV

Ms Martine HOSSAERT, CNRS, InEE

Report

Le Comité de visite AERES de l'UMR 6191 (BVME Environmental Plant Biology and Microbiology), s'associant au communiqué du Conseil de l'AERES sur l'usage de la notation en date du 14 octobre 2010, rappelle que la note globale donnée au laboratoire ne doit pas être utilisée sans les notes détaillées, les arguments et les rapports qui l'accompagnent et la fondent, et souligne que cette note n'a pas vocation à se substituer aux considérations qui la motivent et à être utilisée de manière automatique comme unique critère de décision.

1 • Introduction

- Date and execution of the visit

The visit of UMR 6191 (BVME Environmental Plant Biology and Microbiology) took place on December 20-21 in Cadarache. The visiting committee also met on the 22nd in Aix en Provence for the preparation of the final report. BVME depends on three research organizations, "Commissariat à l'Energie Atomique et aux Energies Alternatives" (CEA), "Centre National de la Recherche Scientifique" (CNRS) primarily via "Institut Ecologie et Environnement" (InEE) and secondarily via « Institut des Sciences Biologiques » (InSB), and finally the University of Aix-Marseille. The visit started with a presentation by the director of the UMR, Thierry HEULIN, in which he detailed the performance of the structure in terms of articles, patents, number of PhDs obtained, number of PhD students of post docs trained. He also made an overview of the projected reorganization of the lab (one group leader replaced), appointment of a new deputy director, Catherine BERTHOMIEU All the groups have then presented their own achievements and projects in ca 60 min each, discussion included. The committee has then paid a visit to the technical facility ran by GRAP.(Groupe de Recherches Appliquées en Phytotechnologies) Subsequent meetings were held with the staff, first with the technical staff, second with the PhD students and post docs, then with the researchers and finally with the group leaders. A final meeting was held with the director in the presence of the projected deputy director.

- History and geographical localization of the research unit, and brief presentation of its field and scientific activities

BVME is located on two different spots, most of the teams and the GRAP platform being in Cadarache in the CEA center, only one group being at Luminy in Marseille. The committee did not visit the Luminy facility because of time constraints. Nearly all of the meetings were held near the lab headquarters on the Cadarache center, including a brief visit of GRAP. Except for the meeting with the technical staff, all discussions were in English, three of the Committee members being foreigners (2 Germans, one Swiss).

- Management team

Currently, the management team is headed by the director with the help of technical assistants in charge of the staff and financial management. The director is also helped by a "Conseil d'UMR" and a "Conseil de Service". These two bodies get together several times a year and in principle their minutes shoud be transmitted to the staff via their representatives. A "conseil de direction" also takes place every month essentially to discuss scientific but also practical matters. The group leaders are part of this structure and, as such, are supposed to redirect the information discussed in this body to the staff members.

- Staff members (on the basis of the application file submitted to the AERES)

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	6	6
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	36	35
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	15	17
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	59	59
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	9	
N6: Number of Ph.D. students (Form 2.7 of the application file)	22	
N7: Number of staff members with a HDR or a similar grade	25	33

Past: Present at December 31, 2010

Future : 2011-2015 (cf. Doc « Project »)

2 • Overall appreciation on the research unit

- Summary

As the name of the laboratory indicates, BVME operates in the fields of Photosynthesis, Bioenergy, Environmental constraints and Molecular Toxicology. The laboratory has been very active scientifically with the production of 228 articles in international Journals with peer review over 4 years. The average impact factor of these papers is around 5. For nearly 40 permanent researchers and University Professors and Maitres de Conférences this can be considered a very good ratio. The laboratory has been very efficient at attracting grants (many ANR) and is well recognized internationally. Grants represent currently nearly 60% of the overall funding of the structure. BVME participates actively to several rather applied projects (biofuels, hydrogen production, identification of bacterial strains able to detoxify uranium and pollutants, just to name a few). Some patents (at least 7) in relation with these hot topics have been produced. BVME has been quite attractive for recruiting young promising researchers and the median age of the staff is around 40 years. Mainly via its University group, the lab is also significantly involved in teaching. The project of BVME includes the same number of groups than in the previous term, but some reorganization is proposed which is emphasized by the creation of two scientific axes and the appointment of a deputy director that should take over as principal manager.

- Strengths and opportunities

The staff is relatively young. Scientific production is good to excellent. The unit assumes leadership in energy and environmental programs. GRAP defines a unique tool for the French and international community and as such, it should be absolutely preserved.

- Weaknesses and threats

There is room for a significant improvement of the management, at the head of the Unit as well as at the head of the groups levels. EC programs are not sufficiently explored. A stronger attention should be paid to the publication

of the Students and post docs. There is a large disparity in terms of technical manpower between the CEA groups and the University laboratory.

- Recommendations

The group leaders and the director are encouraged to explore better management solutions. Applying for EC funding is also encouraged. The Luminy lab should be reinforced in terms of technical staff. Several groups have expressed some interest in the study of lipids and their oxidation forms, this might form the basis of transversal programs between the groups.

- Production results

The results are good to very good with an average of ca 1.5 papers per year per researcher in journals with a good impact factor (median value ca 5). There are very few non-publishing scientists (ca 3 to 4). When possible they should be encouraged to resume their scientific activities. A detailed description of the scientific activities and projects is described below. Some papers are of the highest quality and ground breaking.

A1: Number of permanent researchers with teaching duties (recorded in N1) who are active in research	5
A2: Number of permanent researchers without teaching duties (recorded in N2) who are active in research	34
A3: Ratio of members who are active in research among staff members [(A1 + A2)/(N1 + N2)]	0.93
A4: Number of HDR granted during the past 4 years	6
A5: Number of PhD granted during the past 4 years	23

3 • Specific comments

- Appreciation on the results

In the fields of bioenergy, photosynthesis, enrironmental microbiology notably the groups of Cadarache and Luminy have produced a work of high quality well recognized internationally and nationally. Some programs are rather beginning and consequently they have not reached the maturity of others and they have reduced visibility at this point. Nevertheless it is expected that the groups concerned should be able to reach the same scientific output as the others with a bit more time to organize themselves.

As already stated the number and quality of publications are very satisfactory. There are a high number of congress communications indicating good international participation of the group. 23 PhD and 6 HDR have been granted which is reasonable with respect to the size of the UMR.

- Appreciation on the impact, the attractiveness of the research unit and of the quality of its links with international, national and local partners

BVME collaborates with a large number of French and international laboratories. These collaborations have resulted in very good joint publications. More than 60 invitations to international conferences and symposia are reported. No outstanding scientific award is mentioned. There are ups and downs in the ability to recruit high-level scientists, post-docs and students. The most notable recruitment was a famous professor working in the Luminy group who left quite recently to go back to Italy. On the other hand, the same group has recently recruited young high flying researchers from abroad. Additionally, there are a number of high quality foreign researchers fully integrated in the CEA groups. Most students and post docs seem to be French. The Research Unit as a whole proved to be excellent in

obtaining both ANR grants and specific CEA programs (bioenergy, hydrogen, biofuels etc…). The success with EC programs is more limited and compensated by cooperations with foreign countries notably China, Japan, USA. Applications derived from the research carried-out in the Unit has led tp the establishment some important partnerships essentially at the regional level. Cooperation with the Marcoule labs is important in this respect.

- Appreciation on the management and life of the research unit

This is indeed a weak point for this research unit. We will detail below the points of concerns as they appeared during the closed meetings that were organized between the committee and students, post-docs, and different categories of staff.

The technical staff praised the facilities including the greenhouse and technical equipment. Some of them have complained however about the lack of transparent criteria leading to their classification as technical assistants while they feel that they should belong to the researcher staff (this problem concerns only the CEA staff). Additionally, it has become quickly apparent that a significant number was highly dissatisfied with their direct management (ie group leaders) and even with the way the director of the structure and the Human resources manager handle the staff problems. Some staff members were so dissatisfied by the situation that they have, filed for sick leave. These problems have been definitely very acute in one research group and certainly also present in at least another one. Otherwise, it seems that the situation is fully satisfactory in many other groups.

The student and post doc group also praised the technical facilities and equipment. They feel however that the restrictions imposed by CEA on the working schedule do not facilitate their research (they cannot work during the week-end, and in the evening they need the presence of a permanent researcher to be allowed to stay later). In connection with this point, it was outlined that several PhDs left without a publication and so did a significant number of post docs. This was actually rather hotly debated by some staff members who disagreed with this presentation. Another point raised concerned the lack of seminars organized by the students and post docs themselves.

The researchers were also deeply divided concerning their interactions with the group leaders and the chairman of the structure. In the groups where there are no or few relational problems, no strong concerns were expressed, but on the contrary those from the dysfunctional group(s) expressed strong reservations concerning the management as a whole.

The meeting with the group leaders also showed a split concerning the way the management should be carried out. In the absence of alternative solutions, most group leaders expressed support for the current director and the proposed deputy director. Yet, this matter is far from being consensual. On the other hand, no credible alternative has been proposed. Still, the split between the group leaders is worrisome since it may weaken the structure. Among the sticky points is the choice of InEE as the primary CNRS link which seemed far from consensual, as a substantial part of the staff would have preferred to be linked to InSB. Another point of contention is the organization of the structure along two main axes which has been launched to increase the synergies between the different groups but is felt, in some instances, as paving the way for a split.

During the meeting with the director and the proposed deputy director, the committee has relayed the concerns of the staff to the managers. In fact the director was fully aware of this difficult situation and his answers were quite documented and elaborate. He has especially pointed out that many staff members were allowed to change groups (17 overall in the last 4 years), indicating that, in his view, this is proof that he has not only heard but also taken into account the staff unhappiness, when necessary. The Committee has acknowledged that the replacement of one group leader by a more consensual colleague is a step in the right direction. Nevertheless it has encouraged the current director to “mend the fences” by organizing as quickly as possible a meeting with all the UMR staff members which should be an opportunity to explain his managing policy and start the supervision of the structure under new auspices.

In addition, the scientific and management committees which are essential components of the operational management should authentically serve as relays to explain to the entire staff the decision making process and the policy of the executive director. In any case the committee has noted that the proposed deputy director was praised by nearly all the staff and, in addition, it was very favorably impressed by her personality and poise. It was felt that this is humanely a very good choice and a rather consensual one in the present situation. One concern is the situation of the group of the deputy director which has been launched recently and might suffer from this additional assignment to its leader. The director is fully aware of this problem, and he intends to reinforce this group in order to keep it scientifically operational. Overall, the committee feels that the new proposed leadership is the best possible

in the current divided situation but it also urges the group leaders to engage in a more integrated path necessary to make the present structure durable. This is all the more desirable as, as will be detailed below, the quality of the scientific production of the different groups in the structure has been, during the past term, very good to excellent.

The very important contribution to teaching from the University group has been single-out during these interviews, but many CEA researchers are also teaching to some extent. The ties between CEA researchers and teaching should be reinforced to help attract more students to the Cadarache center.

The meeting with the representatives of the CEA, CNRS (InEE) and of the Aix-Marseille University has allowed the committee to explore the feeling of these organisms towards UMR 6191. All of them have expressed support within their current financial possibilities which are downsized. The committee has pointed out that there is a large discrepancy between the number of technical staff of the CEA groups and those of the University group. It has specifically indicated that the University of Aix-Marseille should provide more technical assistance to the University group in the form of at least one engineer position (Ingénieur d'Etudes). The vice President of the Aix-Marseille University has indicated that this sounded like a reasonable demand in the present situation of the group which has recently recruited several young promising researchers. Another option that has been discussed was the possibility to transfer some of the technical CEA agents to the Luminy campus. The CEA representative has indicated that this option is indeed technically feasible.

- Appreciation on the scientific strategy and the project

The projects have been well rated for all groups (see below), some of them can be considered cutting-edge although this point is particularly difficult to assess. Efforts have been made at structuring the whole project along two axes, this has been already discussed (see above). So far the contracts have not been shared and there is no indication that the individual resources of the groups will be put together in the future, although this might be a way to reinforce the "team spirit" between the groups.

4 • Appreciation team by team

- Laboratory of Plant Molecular Ecophysiology (LEMP)
- Team leader : Mr Michel HAVAUX
- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	1	1
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	4	4
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	2	2
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	3.7	3.7
N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	1	
N6: Number of Ph.D. students (Form 2.7 of the application file)	3	
N7: Number of staff members with a HDR or a similar grade	3	4

Past: Present at December 31, 2010

Future : 2011-2015 (cf. Doc « Project »)

- Appreciation on the results

This team is composed of 4 full time researchers (2 DR-CEA and 2 CR1-CNRS) and 1 researcher with scientific teaching duties (MdC-Univ. Avignon), 3 postdocs (CEA and 2 ANR), 1 PhD student (CNRS-CEA) and 3 full time technicians with permanent positions (CEA: 2TS and 1 laborantin) and 1 CDD-ANR. 1 full time researcher (Scientist eq. DR, CEA) and 1 technician (TP-CEA) have left the lab in 2009 and 2010, respectively.

The research activities of this group are centered on the photosynthetic responses of plants to environmental constraints. Focus is given to the regulation of photosynthesis and stress: in particular, oxidative stress and photoprotection. They investigate major regulatory processes that modulate photosynthesis efficiency to reveal and characterize antioxidant mechanisms that protect plants against the production of reactive oxygen species (ROS). Their experimental strategy is multidisciplinary and combines molecular genetics, biochemistry and biophysics. An important characteristic of studies on photosynthesis is the development of non-invasive biophysical tools to investigate in vivo photosynthesis at work from the molecular level to the plant scale. The development of these tools, at the best level, is central in this team in which a large spectrum of specific techniques is currently used. The team is highly collaborative and interactive both within the laboratory and with external groups in the 4 axes, i) alternative photosynthetic electron pathway and redox control, ii) CO2 supply and gas exchange, iii) photoprotection and chloroplast membranes and iv) functions of chloroplastic thiol reductases.

During the last four years, the work was of high scientific quality as indicated by a good number of publications, 41 for the evaluation period (i.e. 10 per year) and 15/41 were signed by members of the group as first and/or last authors. These papers were most often published in high impact factor journals, including the best specialist journals, such as Plant Cell, Plant Physiology, Plant Journal, Planta…, but also Journal of Biological Chemistry, Trends Plant Science and good cell biology journals such as EMBO J and in the general interest journal Proc. Natl Acad Sci. USA.

Three theses were defended (2007, 2009, 2010), one is underway. However, surprisingly, there is no publication from the last thesis work.

- Appreciation on the impact, the attractiveness of the team and of the quality of its links with international, national and local partners

This group has been successful in attracting PhD students (3 theses presented in the current contract and 1 PhD underway), and postdocs (7 postdocs during the evaluation period and 4 underway). There are many short contracts, research students and visiting scientists working regularly in the team. They have also been successful in attracting funding from regional, national, European and international sources. They have a lot of international and national collaborations and in particular their visibility in the national and international community is good. Several members of the team, not only the PI(s), were invited speakers in national and international conferences. The group has extensive technical expertise in the area of the photosynthetic responses of plants to environmental constraints.

- Appreciation on the scientific strategy and the project

In 2009 the group was composed of 11 members (5 scientists, 2 engineers, 4 technicians, 3 post-doc, 1 PhD students), all fully dedicated to research. The group appears to be well balanced with several experienced members working together with younger members of the team on joint projects. The team has been very well established as an expert in the field of photosynthesis and non-invasive methodology, that have been applied in various projects of connected academic research fields including the IBISA Platform of the unit (IMAPLANT) and on-going regional projects of Ecophysiology. In the next contract, there will be a new PI as indicated in the title of the project.

The proposed project has two parts in continuation with the work carried out in the previous period, but has been refocused on two main objectives : i) to investigate major regulatory processes that modulate photosynthetic efficiency, ii) to reveal and characterize antioxidant mechanisms that protect plant against the production of ROS.

- Conclusion

Overall this is a very good group that has an impressive track record and clear scientific plans on what they should do and what is expected from them. The questions asked are very interesting and need multidisciplinary approaches which are well developed in the group. The future plans have good focus and are well adapted to existing facilities and funding.

- Laboratory of Plant Genetics and Biophysics (LGBP)
- Team leader : Mr Christophe ROBAGLIA
- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	5	5
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	3	3
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	1	2
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	3	3
N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	1	
N6: Number of Ph.D. students (Form 2.7 of the application file)	6	
N7: Number of staff members with a HDR or a similar grade	3	5

Past: Present at December 31, 2010

Future : 2011-2015 (cf. Doc «Project»)

- Appreciation on the results

The research activities of the laboratory can be grouped in two major axes. The first delt with the structure and function of the photosynthetic complexes, with a particular focus on oxidative stress and dissipation of excess light energy. A strong point and originality of this research is its positioning at the crossroads of biophysics (FTIR, carotenoid spectrosocopy at nanosecond resolution) and biochemistry (complex purification, reconstitution), with a further contribution from imaging by electron microscopy to determine the structure of supramolecular complexes. The results are of high quality and have a strong international visibility.

The second major axis delt with translational regulation, with a focus on growth regulation and stress responses. Post-transcriptional regulation is an area that has been somewhat neglected in the past but its fundamental importance in many processes is gaining recognition. The laboratory has made undoubtedly significant contributions in this field with analysis of translational responses to abiotic and biotic stress, and of the contribution of translational regulation to RNA silencing by miRNA.

In total the Laboratory has published 38 papers in peer reviewed journals, among these 18 with members of the laboratory as leading scientist. In both of its major fields, the laboratory has published 3 papers in very good to good pluridisciplinary journals (EMBO J, EMBO Rep, J Biol Chem) and 3 in the best specialized plant journals (Plant Cell, Plant Phys, Plant J), together with a review in TIPS. This is as an excellent publication record considering the heavy teaching duties of the authors. The lab has benefited from its implantation in the campus of Luminy with a strong output of PhD thesis (8)

- Appreciation on the impact, the attractiveness of the team and of the quality of its links with international, national and local partners

Despite the departure of two researchers to Italy, the Laboratory has impressively maintained its attractivenes with the recruitment of 3 young researchers (2 CNRS and 1 Assistant professor) together with the mobility of one CEA researcher who joined the lab. The lab has also been remarkably successful in terms of grant application with, as PI, 1 ANR grant, 3 ANR Jeune Chercheur, and 1 grant in the frame of the EGIDE program, and, as partner, 1 FP7 European

grant and 3 ANR grants. The international visibility of the Lab members has yet to be improved and many of their scientific achievements deserve presentation in front of an international audience.

- Appreciation on the scientific strategy and the project

Major changes in the staff have led to a partial reorientation of the research poject, which has two main components. The first is to investigate light acclimation and photoprotection. Despite the departure of two colleagues, the two principal researchers working on this project have all the skills and expertise to fruitfully lead this project which aims at studying the changes of the structure and function of the photosystems in response to changes in light. The second axis sees a reorientation which logically results from the rejuvenation of the team. Post-transcriptional regulation of translation and growth will be a common theme for the continuation of work on the TOR pathway and for the development of a new project on the role of ppGpp in the chloroplast. Research initiated on the TOR pathway with Arabidopsis will be extended to Physcomitrella to exploit reverse genetics (homologous recombination) using the know-how of one member who recently joined the team. The ppGpp project is original and innovative. Promising results have been obtained with inducible expression of a bacterial gene targeted to the plastid for ppGpp overproduction. The team is aware that these two axes go along different lines but is willing to exploit the possible overlaps and bridges between the two. The recent increase in size of the group together with the new research projects being launched calls for additional technical support.

- Recommendations

The rejuvenation of the team together with its successful grant application provides a strong momentum to its research project. In this context the laboratory needs and deserves additional technical support. In addition, the research project will strongly benefit from the input of bioinformatic approaches recently developped within the UMR. Ways to promote a collaboration with the different laboratories and profit from their expertise should be considered.

- Laboratory of Membrane Transporters and cell Signalling (LEMS)
- Team leader : Mr Alain VAVASSEUR
- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	0	0
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	4.5	4.5
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	7	1
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	3	3
N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	3	2
N6: Number of Ph.D. students (Form 2.7 of the application file)	5	3
N7: Number of staff members with a HDR or a similar grade	4	4

Past: Present at December 31, 2010

Future : 2011-2015 (cf. Doc «Project»)

- Appreciation on the results

The LEMS group conducts original and internationally highly visible work on the role of membrane transport and membrane energization in regulating the aperture of guard cells in plants. The group has established unique and novel tools for manipulating the membrane potential of guard cells and is applying these tools to identify the factors controlling the response of stomata to different environmental cues. This work has led to a sizable number of high impact publications, including journals such as PNAS, Plant J, EMBO J, and J Biol Chem. Several of these publications have been achieved in collaboration with a number of other labs and mostly as contributing, not as lead or senior authors. The latter point is not seen as critical though, since the complexity of the questions addressed requires interdisciplinary collaborations and much of the high-impact work would not have been possible without the group's contribution. The LEMS group further studies metal-transporting ATPases and ABC transporters. Again, this work has led to a number of nice and highly visible publications (including Plant Physiol and J Biol Chem). Group members have been invited to co-author a review in Trends in Plant Sciences and they have filed one patent application. The high visibility of the group is further demonstrated through a significant number of invitations to national and international conferences and to institutional seminars. This not only includes the group leader but also the more junior group members. Overall, 34 publications with an average impact factor of > 5.0 were published between 2006 and 2009 and four additional publications have been listed for the year 2010.

- Appreciation on the impact, the attractiveness of the team and of the quality of its links with international, national and local partners

The group has very strong and long-term international and national collaborations, specifically with the labs of Julian Schroeder at UC San Diego, Enrico Martinoia at Zurich, Helene Barbier-Brygoo at Gif, and Norbert Rolland at Grenoble. All of these collaborations are documented through multiple high-impact publications. The group is currently coordinating two ANR projects and contributing to one additional ANR project. Over the past five years, the group attracted 6 PhD students and 8 postdocs, all of them French nationals. The group strongly interacts with local partners, as demonstrated by multiple joint publications with the LBDP, LEMP and LB3M groups.

- Appreciation on the scientific strategy and the project

The proposed project, still focusing on the role of membrane transporters in response to abiotic stresses, is oriented along two research axes: (i) Molecular actors involved in guard cell signal transduction and (ii) ABC proteins and heavy metal ATPases.

The planned work on guard cell signal transduction is based on solid previous work and builds on several local and national/international collaborations. The goal is to find out how different signals relevant to guard cell aperture (i.e., CO2, light …) are perceived, distinguished, and translated into an opening or closure of the guard cells. The specific focus is on anion transport and energization of the guard cell plasma membrane by H+-pumping ATPases but also on the identification of guard cell oxylipin receptors to probe their function in guard cell signalling. A combination of biochemistry, physiology, and genetics will be used to tackle these challenges. This project is already supported for the next 2-3 years by two ANR projects. Based on the PIs previous record track, it is highly likely that the planned work will lead to very interesting results that can be published in high-impact journals.

The planned work on metal transporting ATPases and ABC transporters also builds on solid previous work and a long-term track record of the PI in this field. However, the group is rather small and one of the expert researchers in the ABC-transporter field will be only 50% available in the next funding period. It is hence suggested to either allocate the existing resources towards the guard cell project to further strengthen this axis and make best use of the existing momentum or to identify (recruit) additional manpower to support this second research project.

- Conclusion

  – Summary :

This can be considered a strong group with an international recognition in the field of membrane transport, in particular with respect to guard cells and integration of environmental cues with control of stomatal aperture. The group has a high potential to make further important contributions in this field.

  – Strengths and opportunities :

The role of membrane transporters, channels and proton pumps in control of stomatal aperture and integration of environmental cues defines an original and worthy topic of exploration. Together with LEMP, this group has a unique opportunity for integrating membrane physiology to whole plant physiology. The group will be lead by a highly motivated and successful young researcher.

  – Weaknesses and threats :

The group is probably too small to tackle two different research axes, such as role of membrane transport in controlling stomatal aperture and ecotoxicology (i.e., role of metal transporting ABC transporters). This second topic is further weakened since the leading scientist is taking on additional administrative responsibilities.

  – Recommendations :

The work on control of stomatal aperture should be further strengthened by focusing the group resources on this topic. Integratation with the local photosynthesis/plant physiology groups should be more developed to generate a cohesive link between molecular mechanisms and whole plant physiology.

- Laboratory of Plant Development Biology (LBDP)
- Team leader : Mr Laurent NUSSAURE
- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	0	0
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	5	4
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	3	4
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	6	6
N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	1	
N6: Number of Ph.D. students (Form 2.7 of the application file)	5	
N7: Number of staff members with a HDR or a similar grade	3	3

Past: Present at December 31, 2010

Future : 2011-2015 (cf. Doc «Project»)

- Appreciation on the results

In 2002, the group re-focused its activity on phosphate homeostasis in plants. Due to a strong and exclusive focus on this area, the team has made very impressive advances that are internationally well recognized. Their research is very original and is on path to provide major breakthroughs in the field. The team has developed some powerful tools (chemical genetics, reporter lines, imaging tools) that have the potential to result in outstanding publications in the near future. The team can therefore operate from a strong position to drive its own research forward while choosing to collaborate if desired.

The team has published 31 papers of high average impact, its researchers have been invited 11 times to speak at international congresses and 27 times for departmental seminars.

- Appreciation on the impact, the attractiveness of the team and of the quality of its links with international, national and local partners

The team has a strong international profile, and has recently been able to attract new staff that has been trained abroad in very high profile labs. Researchers have also met with success with funding and are involved in international collaborations.

- Appreciation on the scientific strategy and the project

The research questions for the next 4 years are well and clearly stated, they are feasible, and relevant. These are cutting-edge projects that should put the group in an internationally leading position within the next 4 years. The interactions within the team as well as the complementarity of individual projects appear very strong.

- Conclusion

  - Summary :

This team operates at an advanced international level, is very productive and all elements are in place for a successful follow up.

  - Strengths and opportunities :

The group is coherent, focused and has developed important tools for future work, that now need to be exploited.

  - Recommendations :

Keep working on your projects, emphasize your own originality and collaborate only when necessary.

- Laboratory of Bioenergetics and Biotechnology of Bacteria and Microalgae (LB3M)
- Team Leader : Mr Gilles PELTIER
- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	0	0
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	5	5
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	2	2
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	9.4	9.4
N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	0	
N6: Number of Ph.D. students (Form 2.7 of the application file)	3	
N7: Number of staff members with a HDR or a similar grade	3	5

Past: Present at December 31, 2010

Future : 2011-2015 (cf. Doc «Project»)

- Appreciation on the results

This group has been renewed during the last four years, 50% of the permanent staff having been recruited since 2006. The staff now reaches a total of 21 persons. New research projects and new experimental approaches have been initiated since 2006 and previous projects related to heavy metal and transport have been stopped. The research project conducted during the evaluated period has followed two main axes which both are the trademark of the laboratory's senior scientists.

Engineering of hydrogenases with the aim to improve their tolerance to O2

The first axis is essentially a collaborative project launched in the framework of research grants involving members of the LB3M as partners. Several hydrogenases differing by their sensitivity to oxygen have been functionally

characterized. A prominent achievement has been the engineering of a O2 sensitive hydrogenase in which the channel allowing gas diffusion and the active site have been the target of mutagenesis leading to a significant decrease in sensitivity.

Use of the metabolic flexibility to reach a time –based separation of H2 and O2 production

The laboratory members have a longstanding expertise in the study of electron transfer pathways alternative to the photosynthetic electron transfer chain. One of the actors of this alternative pathway is a NADPH quinone oxidoreductase which has been fully characterized by LB3M. Under conditions where PSII is inactivated, this enzyme, Nda2, is the entry point of electrons into the quinone pool and thereby contributes to the light-activated electron transfer from starch to hydrogenase. This has been elegantly evidenced, in collaboration, by the study of H2 production in strains showing reduced expression levels of Nda2 and in strains deficient in starch synthesis.

The lab also contributed to the characterization of a genetic switch, designed by JD Rochaix, to shut-down PSII in nutrient replete conditions thereby avoiding the widely resorted sulphur deprivation

With a total of 32 publications in peer reviewed international journals and 2 patents, the scientific production of the laboratory during the evaluated period is good. Among these, 8 involve members of the laboratory as leading scientist (either 1st or last author): Febs J, Febs Lett, Plant Cell environ, 2 Plant Cell Physiol, JBC, Int J Hydrogen Energ … The lab members have also contributed to 3 PNAS and 1 JACS as partners. It should be noted that despite this good scientific production, the publication record of the post-docs who worked in this lab is scarce (2 with no publication, 1 with one publication as 5th author out of 10, 1 with one publication as second author out of 8).

- Appreciation on the impact, the attractiveness of the team and of the quality of its links with international, national and local partners

The laboratory members have been remarkably successful in fund raising, 3 ANR grants as PI, 3 ANR grants as partners, 1 Marie Curie Reintegration grant, 1 FP6 and FP7 projects as partners, and one Contrat de Plan Etat Région to launch the HélioBiotec platform. Their involvement in national as well as international projects related to hydrogen bio-production clearly makes the laboratory members internationally recognized leaders in this field, as also witnessed by their invitations to international conferences. The laboratory has also been impressively attractive, since two senior scientists (1CEA and 1 CNRS) and 4 engineers/technicians were recruited recently.

- Appreciation on the scientific strategy and the project

The project relies on the impressive momentum provided by the arrival of two senior scientists, experts in lipids, as well as by the launching of the HélioBiotec platform which is now fully equipped with state of the art techniques. It will also benefit from the recent identification, in the laboratory, of two very interesting Chlamydomonas mutants, one being affected in the cyclic electron flow and the other one in starch degradation, which will certainly importantly contribute to the understanding of the interplay between the different metabolic pathways. The project also involves an axis devoted to lipids. Carbon storage in the form of lipids clearly goes along the lines of the main scientific concern of the laboratory. The question as to whether this also applies to the study of the extracellular lipids needs to be addressed. More specifically, despite the recognized expertise of the PI, this axis may suffer from the lack of scientific integration within the local or national networks.

- Conclusion :

During this past term LB3M has been strongly strengthened in terms of funds, manpower and technical support. This has allowed it to launch an ambitious strategy which, based on the preliminary results recently obtained and on the strong networks of collaboration which have been established. This should yield important breakthroughs.

- Laboratory of Microbial Ecology of the Rhizosphere and extreme Environment (LEMiRE)
- Team leader : Ms Wafa Achouak
- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	0	0
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	5	5
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	5	1
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	3	3
N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	2	2
N6: Number of Ph.D. students (Form 2.7 of the application file)	4	3
N7: Number of staff members with a HDR or a similar grade	5	5

Past: Present at December 31, 2010

Future : 2011-2015 (cf. Doc «Project»)

- Appreciation on the results

The team produced original and well-published data on the adaptive response of soil bacteria to environmental fluctuations and stresses including plant-root environment, toxic substances (cadmium), and desert conditions. LEMiRE develops integrative (from gene and non coding RNA to cell and community), multidisciplinary (genetics, biochemistry, ecology, bioinformatics), and innovative (DNA-SIP, RNA-SIP, and genomics) approaches. Three major data have to be highlighted: (1) evidence of how bacterial communities are linked to the uptake of root exudates from four different plant species (ISME J 2008); (2) evidence for two completely different adaptive mechanisms against Cadmium in Pseudomonas brassicacearum variants (Env Microbiol 2007); (3) discovery of the genomic and functional properties in Deinococcus deserti facing desert condition and radiation tolerance (Plos Genet 2009). Additionaly, two engineers developed bioinformatic tools for analysis of the genomes (Genobrower).

LEMiRE has produced 35 good to excellent papers in the scientific fields of Microbiology (PloS Pathogen, Mol Microbiol, Environ Microbiol), Genetics (PloS Genet), Ecology (ISME J), and Environmental sciences (Environ Sci Technol). Three papers were rated by the Faculty of 1000. Additional achievements were 7 book chapters, 22 invited conferences at national and international congresses, 4 PhD, 1 HDR, and 2 patents.

The team leader developped stable interactions with national and international laboratories, such as ANR-partners and EU consortium allowing co-publications of papers in which LEMiRE appeared as leader or partner. In UMR6191, LEMiRE and 2 other teams, LIPM and LBC, are developing two transversal projects on genomics (bioinformatics) and structural biology. LEMiRE has developped stable isotope probing (SIP) approach using the local GRAP platform.

- Appreciation on the impact, the attractiveness of the team and of the quality of its links with international, national and local partners

Members of the labs were invited to 22 conferences, including 6 invitations at international conferences with one as a key-note speaker. The team recruited 6 post-docs and 7 PhDs which is a high level of attractivity. The team gained fundings from the inter-organism national program “Toxicologie nucleaire environnementale” (2004-2007), the

national program “Ecosphère Continental et Côtière” (2007-2009), the INSU call “Sciences de la Terre INTERVIE”, ANR (5 projects between 2007 and 2012), and 2 European calls : a collaborative projects FP7 on Nanomaterials related environmental pollution and health hazards (2009-2011) and FP6 NEST on biofilms (2004-2007). At a regional level, the team belongs to the federative structure (FR ECCOREV dedicated to “Continental Ecosystems and Environmental risks”). The team is also involved in a national GDR called “Biohydrogène” and an international GDRI on nanoenvironment. FP6-network on biofilms offered the opportunity to co-publish 4 papers with the foreign partners, while another collaboration with a team in Scotland allowed the publication of one F1000-awarded paper. In addition, one patent concerning plant defence elicitors was valorised by a contract with a private company (Agro-Recherche and Development).

- ## Appreciation on the scientific strategy and the project

The project of this lab will be the continuation of previous work, with a focus on gene regulatory mechanisms in bacteria facing environmental challenges: presence of plant pollutants (Cadmium) and desert condition. Especially, the team has started to investigate (1) the role of ncRNA in the adaptative response to plants and pollutants using Pseudomonas brassicasearum as a bacterial model; and (2) the regulation of functions such as desiccation, radiation tolerance and the extensive DNA repair using Deinococcus deserti as model. The CEA scientist (HDR), who was recently recruited (2004) was in charge of this second topic. The project appeared feasable since the genome of the model strains involved is already available, as well as genetics and bioinformatic tools. Moreover, the preliminary data presented to the AERES visiting committee are promising. Most of the team ressources come from contracts such as ANR Deinoccocus (until 2011), and potential responses to calls during the next years. The remaining part is provided by the UMR (CNRS and CEA fundings).

Investigation of the role of ncRNA in adaptative response of bacteria is clearly positionned in a novel scientific field which is developing rapidly because the genomic tools are now avalaible. The team will have opportunity to reach a good position at both national and international levels in this quickly moving area. However, in the Deinococcus model, investigation of the mechanisms that are involved in extreme tolerance to radiation, UV, dessication, and other DNA damaging condition is extremely important for understanding the adaptive response of living cells on Earth. The data acquired on two bacterial models would be generalized at the population and community levels using the appropriate metagenomic tools developped by the team.

- ## Conclusion

  - ### Summary :

The team is solid (9 ETP) and productive in good to excellent journals in the field of environmental and molecular microbiology. The team uses up-dated technologies (SIP-RNA and SIP-DNA) and approaches (genomics), and valorizes the competencies of all members. The team is well-connected at the local, national and international networks.

  - ### Strengths and opportunities :

The main strength of this group is the multidisciplinary character of researchers (CNRS from sections 29 “Biodiversité, évolution et adaptations biologiques” and 16 “Chimie du vivant et pour le vivant”) and engineers with competence in microbiology, ecology, bioinformatics, biochemistry and genetics. The presence of two engineers in bioinformatics is a strong opportunity for developing the project on ncRNA, as well as national and international collaborations on genomics and metagenomics. The GRAP platform is well used by the team for innovative approaches using isotopes.

  - ### Weaknesses and threats :

The excellent expertise of the team in microbial ecology should be better advertized internationally.

  - ### Recommendations :

It is recommended to increase valorization of LEMiRE’s expertise in microbial ecology at an international level, and to develop transversal projects based on bioinformatics with other teams of the UMR6191.

- Laboratory of Protein Metal Interactions (LIPM)
- Team leader : Ms Catherine BERTHOMIEU
- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	0	0
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	4	4
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	3	3
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	3	3
N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	1	
N6: Number of Ph.D. students (Form 2.7 of the application file)	2	
N7: Number of staff members with a HDR or a similar grade	1	2

Past: Present at December 31, 2010

Future : 2011-2015 (cf. Doc «Project»)

* One researcher is presently working in another CEA laboratory in Marcoule.

- Appreciation on the results

The project of the LIPM team/laboratory deals with metal toxicology with special emphasis on uranium, a strategic project for the Life Science Division (DSV) of the CEA. The objectives of the team are to understand metal metabolism (involving response to stress) from cellular level to molecular level, using technical approaches based on mass spectrometry and IR spectroscopy. The research projects are divided into two topics. The first one concerns the search for cell biodiversity observed in uranyl enriched soils (one polluted, near Tchernobyl, and one natural, in France). Using DGGE techniques, bacterial species were detected, revealing a large diversity. A second project implicates the response of E. coli to UrO2 stress at the protein level revealing the influence of Zn proteins involved in pyrimidine and/or urea cycles. This has suggested the use of protein "platforms" for Ur binding such as calmodulin or a kinase PknD. An important task of this team was to decipher enzymatic redox mechanisms thanks to IR coupled to electrochemistry and associated to mass spectrometry.

The original research is totally relevant to the CEA research objectives, i.e. nuclear environmental toxicology. The team was created in 2006 on an ambitious project implicating cell biology and molecular aspects of biological events induced by uranium stress (only few laboratories in the world are implicated in this research field). The report shows an imbalance between both research aspects based on scientific outputs (in terms of publications principally). This feeling comes from the fact that the activity on biodiversity is a new activity in the laboratory that only recently provided original data. The research production is thus mainly supported by the work of the group leader, based on in-house collaborations (LBC) and on national and international collaborations. The scientific outputs are in the expected range for such a small team, with 24 publications and 5 book chapters (IF close to 4.3), including 2 PNAS. It should be mentioned that most of the papers are collaborating projects implicating only one or two members of the team. We also noted the training of 3 PhDs and 6 post docs (this reveals a good success rate in obtaining research contracts and demonstrates the attractiveness of the group) but with only few validated by publications. As mentioned in the report by the director of the team, it is clear that there is a deficit in teaching duties, also denoted by the lack of university members within the team.

- Appreciation on the impact, the attractiveness of the team and of the quality of its links with international, national and local partners

The team, as expected from its scale, mainly relies on the activity of the group leader. Her expertise is rewarded through her participation into evaluation panels (for the ANR, for example), and also in PhDs and organizing committees. Another proof of international visibility is the invited conference of the group leader at the ICBIC, the most important conference in bioinorganic chemistry. The success in raising funds is good since 6 grants have been obtained (2 from CEA, 3 from CNRS, 1 from ANR).

- Appreciation on the scientific strategy and the project

The project for the next four years will address environmental issues linked to nuclear toxicology, in direct connection to the precedent research plan, but in a more focused matter. In addition to the already mentioned projects on uranium speciation in bacteria and protein targets, a new approach for metallomic has been engaged and preliminary results are very encouraging. Moreover, the research aspect on uranium speciation will be more directed into the search for protein targets, some already known, via in-house collaborations but also national and international collaborations. When compared to previous results, the project seems now mature and should then give a good guarantee of success.

- Conclusion

– Summary :

The projects are devoted to uranium speciation in bacteria, implicating the understanding of this mechanism from cell diversity to molecular level. The team is known also for its expertise in IR coupled to electrochemistry and MS as well. The outcome of the research team is at the scale of the team and mainly centered on the group leader activity.

– Strengths and opportunities :

The strength of the team mostly relies on the group leader expertise and its international recognition. The size of the team is adequate and and there is a good ratio between scientists and engineers and techicians. This aspect is quite unique in France and seems to be adapted to CEA strategies. Accordingly, the publication production is perhaps under the expected level. The CEA implication, via its financial supports, should garantee the durability of the projects. Despite little University contacts, three PhD students have been hired, illustating the attractiveness of the team projects. Moreover, the impact of these projects should be of interest for private companies.

– Weaknesses and threats :

The team had four years to stabilize the visibility of the group. As it is, the coordination between all the projects needs to be reinforced to favor a group stability over the next five years term. The possible loss of financial support by the CEA could be a threat on this specific research. Finally, the appointment of the group leader as deputy director may cause a new difficulty to the group activity. Clear collaborative projects between the researchers of the group should be set up in order to strengthen the global research project of the group, and to help the group leader to deal with her new function as a deputy head of the Laboratory.

– Recommendations :

The group leader should continue to reinforce the dynamism of the group by interactive projects and integrate her new appointment progressively.

- Laboratory of Cell Bioenergetics (LBC)
- Team leader : Mr David PIGNOL
- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	0	0
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	4.8	3.8
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	0	2
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	6.9	6.9
N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	1	
N6: Number of Ph.D. students (Form 2.7 of the application file)	4	
N7: Number of staff members with a HDR or a similar grade	3	4

Past: Present at December 31, 2010

Future : 2011-2015 (cf. Doc «Project»)

* in 2012 retirement of one senior scientist

- Appreciation on the results

LBC has produced important and original results on its main theme of bacterial phytochromes involved in the control of photosystems expression by light and redox conditions of the environment. A strong and sustained collaboration with the IRD and UMR LSTM on the photosynthetic, nod factors-devoid Rhizobium ORS 278, has been particularly fruitful (9 shared publications, including 1 Science and 1 EMBO J.). The second main theme of the LBC addresses the questions of the speciation of metals: transport and reduction of selenate oxyanions and the chelation of metals by phytochelatins and nicotianamine. The X-ray structure has allowed to follow the iterative substrate translocation in the catalytic chamber of the enzyme leading to nicotianamine synthesis, which is a particularly original result (PNAS). LBC has set up multidisciplinary approaches from genetic to crystallographic methods, with a special emphasis in the field of biochemistry and structural biology where the group is a recognized reference and has developed numerous collaborative projects. The laboratory is deeply engaged in combining fundamental approaches and applications in the field of metal biosensors and bioremediation.

The production of LBC is abundant and at an excellent level: 32 (until Januray 2010) publications in good to excellent journals on the work primarily produced by the team, among which: 1 Science, 1 EMBO J., 1 J. Am. Chem. Soc., 1 Plant Cell, 1 PNAS. In addition, the LBC contributed to: 6 book chapters and one patent concerning a metallophore derived from nicotianamine have been deposited. Four PhD Thesis have been defended (plus one in early 2011).

- Appreciation on the impact, the attractiveness of the team and of the quality of its links with international, national and local partners

Members of the LBC have given 5 invited seminars and 11 conferences at national and international meetings. The team has been attractive and recruited 5 post-docs and 6 PhDs.

The laboratory has been highly dynamic in getting research contracts and has been involved in 6 national research contracts, and has established an international Franco-Chinese laboratory on magnetotactic bacteria. The team also establishes various academic national and international collaborations.

The LBC has developed fruitful collaborations within the UMR6191 and the teams LEMIRE, LIPM, LEMS, for bioinformatic and structural biology, at the national level with different institutions (Universities, CNRS, IRD, INRA, Museum), supported by six grants from CEA, ANR, three of them being coordinated by LBC members, and internationally, mostly through the stable "open laboratory" with China devoted to magnetotactic bacteria which has been granted "Laboratoire International Associé".

The technology of metal bacterial bioluminescent sensors developed through a grant NRBC of CEA has been transferred for valorization to a local private company (AP2E) in charge of its development.

- Appreciation on the scientific strategy and the project

The project of the LBC has been established on the basis of the acquired expertise. It has been focused on the emerging field of magnetotactic bacteria that enable to gather both the experience in the sensing and control of bacteria to environmental conditions (light, redox, metals) and explore the new original area of magnetosome formation from both an academic standpoint and also from an applied science standpoint in the field of nanobiology (a CEA application has been already deposited). The laboratory will focuss on two major areas, the setting up of the photosynthetic and magnetotactic apparatus and the adaptation of bacteria to metallic stress. The project appeared highly original and the team displayed the experience to tackle this new exciting program with all the experience needed: genomic and bioinformatic, access to biodiversity of magnetotatic bacteria, biochemistry and structural biology. The preliminary data presented and published are highly promising to establish rapidly LBC as a leading group in the field of magnetotactic bacteria.

Team resources will come from UMR support, and from existing contracts (Photomol Energy, International Laboratory) as well as from the potential successes to calls during the next years. So far, 3 PhDs will be engaged in these projects.

Investigation of the mechanisms of membrane differentiation and arrangement in magnetotactic, photosynthetic bacteria as well as the tolerance to high concentration of metals is clearly positionned in a novel emerging scientific field. The LBC has the opportunity to take a leading position at both national and international level in the area of study of magnetotactic bacteria owing to the expertise and collaborations it has developed. Moreover, the biotechnological applications of magnetosomes ("magnetic liposomes") in the field of nanobiology are of high potential interest.

- Conclusion

The team is solid (13 permanent positions) and productive in excellent journals both of specialized and of broad audience. The team uses and develops up-dated technologies in multidisciplinary approaches. It is well-connected and recognized at local, national and international levels. It has focussed on a new and original project that capitalizes on the expertise gained in the laboratory.

LBC has developed a multidisciplinary approach involving expertise mainly in genetic, genomic, bioinformatic, biochemistry and structural biology. It has a strong commitment in the transfer of academic research to application, in frame with the CEA policy.

The retirement of two major scientists in the field of photosynthesis is weakening the group. Nevertheless, this situation has been well anticipated and the project has been re-directed to the field of study of magnetotactic bacteria that ensures a federative approach for all the remaining members of the team in frame with the existing expertise. The effort of the group towards an increased visibility is also encouraged.

LBC is an efficient, dynamic and creative laboratory which deserves a strong support from the UMR 6191 enabling it to advance rapidly with its original project.

- GRAP – Groupe de Recherches appliquées en Phytotechnologies

The GRAP (Groupe de Recherches appliquées en Phytotechnologies) is a platform dedicated to the culture of plants in environmentally controlled conditions. It contains 27 growth units, some of them classified S2 (GMOs) and two in the Salto facilities dedicated to experiments with toxic or radioactive elements. GRAP is run by 4 CEA

Engineers plus 5 CEA technicians. Their mission is to maintain the equipment but they also participate to some research projects (overall they are involved in 11 papers and leaders in one of them which is more technically oriented). The equipment ran by GRAP is world class with an IBISA label and absolutely essential for the research groups of Cadarache. In addition, it is widely used by other groups in France contracting with the research groups of BVME. Interesting developments are the possibility to double label biological samples with 15N and 13C and also the possibility of producing highly C13-enriched plant material. The traceability, monitoring and efficient management of the platform are remarkable. Overall, the functioning of GRAP is exemplary, and this tool should be absolutely preserved. This is detailed in the project for the next contract, one the major objectives being the implementation of the IMAPLANT project with a more realistic simulation of climate variations and the set up of an integrated automatic imaging system.

Notation

Intitulé UR / équipe	C1	C2	C3	C4	Note globale
BVME-BIOLOGIE VÉGÉTALE ET MICROBIOLOGIE ENVIRONNEMENTALES	**A**	**A+**	**B**	**A**	**A**
LEMIRE-LABORATORY OF MICROBIAL ECOLOGY OF THE RHIZOSPHERE AND EXTREME ENVIRONMENT [HEULIN-ACHOUAK]	A+	A	Non noté	A	A
LIPM-LABORATORY OF PROTEIN METAL INTERACTION [HEULIN-BERTHOMIEU]	B	A	Non noté	A	A
GRAP-GROUPE DE RECHERCHES APPLIQUÉES EN PHYTOTECHNOLOGIES [HEULIN-GIBIAT]	Non noté	Non noté	Non noté	Non noté	Non noté
LEMP-LABORATORY OF PLANT MOLECULAR ECOPHYSIOLOGY [HEULIN-HAVAUX]	A	A+	Non noté	A	A
LBDP-LABORATORY OF PLANT DEVELOPMENT BIOLOGY [HEULIN-NUSSAUME]	A+	A+	Non noté	A+	A+
LB3M-LABORATORY OF BIOENERGETICS AND BIOTECHNOLOGY OF BACTERIA AND MICROALGAE [HEULIN-PELTIER]	A	A+	Non noté	A	A
LBC-LABORATORY OF CELL BIOENERGETICS [HEULIN-PIGNOL]	A+	A+	Non noté	A+	A+
LGBP- LABORATORY OF PLANT GENETICS AND BIOPHYSICS [HEULIN-ROBAGLIA]	A+	A	Non noté	A+	A+
LEMS-LABORATORY OF MEMBRANE TRANSPORTERS AND CELL SIGNALLING [HEULIN-VAVASSEUR]	A	A	Non noté	B	A

C1 - Qualité scientifique et production

C2 - Rayonnement et attractivité, intégration dans l'environnement

C3 - Gouvernance et vie du laboratoire

C4 - Stratégie et projet scientifique

Statistiques de notes globales par domaines scientifiques

(État au 06/05/2011)*

Sciences du Vivant et Environnement

Note globale	SVE1_LS1_LS2	SVE1_LS3	SVE1_LS4	SVE1_LS5	SVE1_LS6	SVE1_LS7	SVE2 _LS3 *	SVE2_LS8 *	SVE2_LS9 *	Total
A+	7	3	1	4	7	6		2		30
A	27	1	13	20	21	26	2	12	23	145
B	6	1	6	2	8	23	3	3	6	58
C	1					4				5
Non noté	1									1
Total	42	5	20	26	36	59	5	17	29	239
A+	16,7%	60,0%	5,0%	15,4%	19,4%	10,2%		11,8%		12,6%
A	64,3%	20,0%	65,0%	76,9%	58,3%	44,1%	40,0%	70,6%	79,3%	60,7%
B	14,3%	20,0%	30,0%	7,7%	22,2%	39,0%	60,0%	17,6%	20,7%	24,3%
C	2,4%					6,8%				2,1%
Non noté	2,4%									0,4%
Total	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%

* les résultats SVE2 ne sont pas définitifs au 06/05/2011

Intitulés des domaines scientifiques

Sciences du Vivant et Environnement

SVE1 Biologie, santé

SVE1_LS1 - Biologie moléculaire, Biologie structurale, Biochimie

SVE1_LS2 - Génétique, Génomique, Bioinformatique, Biologie des systèmes

SVE1_LS3 - Biologie cellulaire, Biologie du développement animal

SVE1_LS4 - Physiologie, Physiopathologie, Endocrinologie

SVE1_LS5 - Neurosciences

SVE1_LS6 - Immunologie, Infectiologie

SVE2 Ecologie, environnement

SVE1_LS7 - Recherche clinique, Santé publique

SVE2_LS8 - Evolution, Ecologie, Biologie de l'environnement

SVE2_LS9 - Sciences et technologies du vivant, Biotechnologie