Research evaluation

EVALUATION REPORT OF THE UNIT

BIAM - Institut de Biosciences et Biotechnologies d'Aix-Marseille

UNDER THE SUPERVISION OF THE FOLLOWING ESTABLISHMENTS AND ORGANISMS:

Aix-Marseille Université - AMU

Centre national de la recherche scientifique - CNRS

Commissariat à l'énergie atomique et aux énergies alternatives - CEA

EVALUATION CAMPAIGN 2022-2023

GROUP C

Report published on September, 12 2023

High Council for evaluation of research and higher education

In the name of the expert committee[1] :

Christina Hazard, Chairwoman of the committee

For the Hcéres[2] :

Thierry Coulhon, President

Under the decree n° 2021-1536 of 29th November 2021:
[1] The evaluation reports "are signed by the chairperson of the expert committee". (Article 11, paragraph 2);
[2] The president of the Hcéres "countersigns the evaluation reports established by the expert committee and signed by their chairperson." (Article 8, paragraph 5).

This report is the result of the unit's evaluation by the expert committee, the composition of which is specified below. The appreciations it contains are the expression of the independent and collegial deliberation of this committee. The numbers in this report are the certified exact data extracted from the deposited files by the supervising body on behalf of the unit.

MEMBERS OF THE EXPERT COMMITTEE

Chairperson:	Ms Christina Hazard, École centrale de Lyon (supporting personnel)
Experts:	Mr Pierre Cardol, Université de Liège, Belgique Mr Alain Dobson, University College Cork, Ireland Ms Véronique Gruber, Université Paris Cité (representative of the CNU) Mr Nemo Peeters, INRAE, Castanet-Tolosan (representative of the CoNRS) Ms Daniele Werck, Professeur émérite, CNRS

HCÉRES REPRESENTATIVE

Mr Steven Ball

CHARACTERISATION OF THE UNIT

- Name: Institut de Biosciences et de Biotechnologies d'Aix-Marseille
- Acronym: BIAM
- Label and number: UMR7265
- Number of teams: 8
- Composition of the executive team: Mr David Pignol

SCIENTIFIC PANELS OF THE UNIT

SVE2 Productions végétales et animales (agronomie), biologie végétale et animale, biotechnologie et ingénierie des biosystèmes
SVE2_2 Biologie végétale fondamentale et appliquée et productions végétales

THEMES OF THE UNIT

The Bioscience and Biotechnology Institute of Aix-Marseille (BIAM) deploys multidisciplinary and multiscale approaches at the biology and chemistry interface to study the molecular mechanisms of the adaptation of model organisms (plants, algae and microorganisms) to their environmental resources and constrains. Its work focuses on 3 major and complementary research axes: 1) From photosynthesis to bioenergies; 2) Responses and acclimatation to environmental challenges; 3) From life principles to biomolecules and biomaterials.

BIAM is structured in 8 research teams dispatched on two sites (see below):
- Team 1: Energy and microalgae (EBM);
- Team 2: Interactions protein-metals (IPM);
- Team 3: Microbial ecology of the rhizosphere (LEMIRE);
- Team 4: Luminy Génétique et biophysique des plantes (LGPB) ;
- Team 5: Molecular and environmental microbiology (MEM);
- Team 6: Photosynthesis and environment (P&E);
- Team 7: Plant protective proteins (PPV);
- Team 8: Signalisation for plant adaptation to environment (SAVE).

HISTORIC AND GEOGRAPHICAL LOCATION OF THE UNIT

Most of the BIAM unit were historically located across six buildings enclosed within the Cadarache Center in the Cité des Énergies area in Saint-Paul-lez-Durance but were relocated in 2021 to a newly built building outside of the enclosure in this area. The Plant Genetics and Biophysics team (LGBP) is located 80 km away at the Faculty of Sciences of Luminy of the Aix-Marseille University (AMU) and since 2021 occupies optimized space within a newly renovated building.

RESEARCH ENVIRONMENT OF THE UNIT

BIAM depends of the CEA Fundamental research directorate (DRF), the CNRS Institute of biological sciences (INSB and sections 16, 20, 23, 29 and 30) and Aix-Marseille University (AMU). Within AMU, the staff hosted on the Luminy campus largely contributes to the teaching in plant science. On both Cadarache and Luminy sites, the unit's staff recently moved to brand new and optimized facilities. The new Cadrache building, implemented in the context of the "Cité des énergies" project was funded by the CEA, the French State, the PACA region (strategic activity "Energy transition-Energy efficiency"), the department, Aix-Marseille metropolis and the FEDER. Upgrading of the Luminy site was funded by the "Plan Campus".

On the "Cité des énergies" site, BIAM now shares the same campus as the CEA's Technological research directorate (DRT), which is expected to favor collaborative projects of technological developments in the field of bioenergy and environment. Along similar lines, BIAM is integrated in the national strategy of the CEA DRF via the dedicated programs "New technologies for energy" and "Fundamental research for life science", matching keywords of CNRS INSB and INEE. At the national level, it benefits from the CEA with the dedicated PhD thesis funding program FOCUS, and is strongly involved in the PEPR action FairCarboN. Members of BIAM are part of many scientific societies and research groups, such as the GDR Photosynthesis, Gis-BV, and French society of bioenergetics.

BIAM contributes to the structuration of PACA research via participation in the management and teaching (Plinus PhD program) of the IMB2 Institute (microbiology, bioenergy, and biotechnology), involvement in the "Institut méditerranéen pour la transition environnementale" (ITEM) and in the "Continental ecosystems and environmental risks" (ECCOREV) research federation. It is also involved in the Labex SERENADE (Safe(r)

ecodesign research and education applied to nanomaterial development) and BIAM benefits with 5 mutualised technical support platforms:
- PHYTOTEC: a plant experimentation platform on two sites (national platform);
- HELIOBIOTEC: algal physiology and lipidomics (EU platform);
- ZOOM: imaging;
- SALTO: radiological and chemical toxicity experimentation;
- PROTEINTEC: protein production and characterization.

UNIT WORKFORCE: in physical persons at 31/12/2021

Permanent personnel in active employment	
Professors and associate professors	3
Lecturer and associate lecturer	4
Senior scientist (Directeur de recherche, DR) and associate	4
Scientist (Chargé de recherche, CR) and associate	8
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	23
Research supporting personnel (PAR)	58
Subtotal permanent personnel in active employment	**100**
Non-permanent teacher-researchers, researchers and associates	2
Non-permanent research supporting personnel (PAR)	13
Post-docs	8
PhD Students	68
Subtotal non-permanent personnel	**91**
Total	**191**

DISTRIBUTION OF THE UNIT'S PERMANENTS BY EMPLOYER: NON-TUTORSHIP EMPLOYERS ARE GROUPED UNDER THE HEADING "OTHERS".

Employer	**EC**	**C**	**PAR**
CEA	0	23	43
CNRS	0	12	11
Aix-Marseille Université	7	0	4
Total	**7**	**35**	**58**

UNIT BUDGET

Recurrent budget excluding wage bill allocated by parent institutions (total over 6 years)	9 808
Own resources obtained from regional calls for projects (total over 6 years of sums obtained from AAP idex, i-site, CPER, territorial authorities, etc.)	1390
Own resources obtained from national calls for projects (total over 6 years of sums obtained on AAP ONR, PIA, ANR, FRM, INCa, etc.)	7 173
Own resources obtained from international call for projects (total over 6 years of sums obtained)	942

Own resources issued from the valorisation, transfer and industrial collaboration (total over 6 years of sums obtained through contracts, patents, service activities, services, etc.)	1 513
Total in euros (k€)	**20 826**

GLOBAL ASSESSMENT

For the BIAM unit, several major strengths in the 4 main assessment domains were identified, but with some associated weaknesses for consideration. Notably, the unit's infrastructure has improved through a new optimized building located on the site of the Cité des Sciences that houses all, but one, of the research teams along with additional space for hosting industrial projects or new teams. The LGBP (Plant Genetics and Biophysics) team has also moved to newly renovated space on the Luminy campus at AMU. A weakness is the geographical separation of the LGBP team from the rest of the unit, though this team has grown over the years and is well integrated into the unit. Thanks to active support of its supervising bodies, the unit is well staffed, although there are disparities between teams, and including that of the support staff for some teams. The restructuring of the technical platforms, with future plans for additional platforms, is greatly beneficial, but is lacking in a clear economic model for long-term sustainability. The establishment of a mechanism to fund transverse projects within the unit is promising, although constrained by budget limitation. The unit is highly successful in obtaining substantial external competitive funding at the national level, but EU and international grant funding could be improved upon.

The scientific objectives of the unit are relevant and original, include fundamental and applied research in excellent connection to societal challenges. BIAM is composed of 8 research teams, is highly multidisciplinary and covers a broad range of fields and topics. Approaches used include genetics, omics, physiology, cellular imaging, biochemistry and biophysics, and advanced technologies such as protein engineering, exploitation of microalgae and bacterial models, and genome editing via CRISPR-Cas9. Exceptional technical support in this respect is provided by seven collaborative platforms providing: plant cultivation in a fully controlled environment with phenotyping, controlled environment culture of micro algae and lipid analysis, protein production, purification and structural analysis, a lab for the use of radioisotope tracers or radionucleides, state-of-art instruments dedicated to imaging and for measurement of ion concentrations, bioinformatic and biostatistic support. Funding to support use and maintenance of this excellent equipment will be a challenge for the unit.

Efforts put into the functioning of the unit are considerable, involving participative management with several intermittent committees established, successful recruitment of new staff (14 recruitments verse 10 retirements), and with integrated gender parity. BIAM is highly attractive, owing to their distinguished scientific reputation, success with obtaining funding from diverse national, international and private sources, competitive recruitment initiatives, involvement in teaching at several universities, access to and integration of PhD students via dedicated recruitment programmes, and state-of-art technical platforms. Though improvements on recruitment of postdocs and visiting researchers could be made for some teams. Scientific production of the unit is impressive, particularly that of two teams, and includes well cited and high profile publications (10 WoS highly cited papers), co-authored with prestigious international partners and research that resulted in 13 patents. The international visibility of the unit is also attested by more than 60 invitations at national and international meetings, contribution to organization of 20 international meetings, and role of associate editors in many prestigious international journals. Though scientific production is unequally distributed between teams with respect to quantity and quality. BIAM's research activities significantly contribute to society through engagement with several small and large companies, active patents, and two startup spinoffs, but also through numerous outreach actions to the general public. Although, outreach is unequally shared between the different teams.

DETAILED EVALUATION OF THE UNIT

A - CONSIDERATION OF THE RECOMMENDATIONS IN THE PREVIOUS REPORT

The Hcéres committee recommended in early 2017 the implementation of an internal reflection to produce a more integrated scientific project for BIAM. The new integrated project is now declined into 3 complementary axes: (i) from photosynthesis to bioenergies, (ii) responses and acclimation to environmental challenges, (iii) from life principles to biomolecules and biomaterials. This new structure permits the integration of all BIAM research activities and the creation of new interfaces.

The Hcéres committee also pointed out the need to improve the functioning of BIAM by creating more synergy between the laboratories. An expert report on Socio-Professional and Psychological Outcomes was carried out and reinforced the need for a new, more supportive structure to pacify professional relationship issues and to deeply modify the functioning of the unit in order to improve the place of each employee. In this context, a new BIAM director was appointed by the supervisory bodies in February 2018. Thus, over the last few years, some fifteen people, of all statuses, have been repositioned and accompanied towards a new function and/or a new structure. The project for the construction of a new building within the "Cité des énergies" (now completed) represented a unique opportunity for the future of the unit and its development. The Luminy team has benefited over the same period from the rehabilitation of its premises via the national Plan Campus infrastructure program, allowing the whole unit on its two sites to work in new laboratories.

The improvement of transversality and mutualization within the unit corresponds to one of the major recommendations of the last Hcéres evaluation (see dedicated paragraph). An important effort has been made throughout the mandate to deploy more scientific interactions via the organization of Scientific Committees (CoS), working groups, a retreat of all the personnel, in order to generate a spirit of unity favorable to transversality (whether scientific, but also in terms of rules of life) for a common strategic action. Thus, beyond the numerous articles or ANR projects (four in total) involving several BIAM teams, a major effort has been made to increase scientific collaborations within the institute (with 46 articles out of 376, 12.2%, co-authored by 2 to 4 teams of the unit), either through the development of platforms or the recruitment of new scientists on projects interfacing with different research groups. Five projects have also been financed involving all 8 teams of the unit in its different research axes. Internal transversality has also been promoted beyond science, through the creation of thematic working groups.

B – EVALUATION AREAS

EVALUATION AREA 1: PROFILE, RESOURCES AND ORGANISATION OF THE UNIT

Assessment on the unit's resources

Overall, the resources of the unit are excellent. The transversality of the unit has improved. The establishment of a mechanism to fund transverse projects is an excellent initiative. Restructuring of the technical platforms is another important initiative, which will be further enhanced through two other platforms and a mutualised bioinformatics support. The overall research environment has improved with the new building which houses all the research teams and a "proof of concept" area for potential industrial projects or for future new teams. Initiatives are also underway to facilitate the pooling of biological resources. Grant funding is very good to excellent but there is room for improvement with respect to grant capture from regional, EU and international funding sources.

Assessment on the scientific objectives of the unit

The objectives of BIAM are fully relevant and original in their field, appropriate to produce high level knowledge in line with their research axes. They provide interesting responses to societal challenges and CEA goals centred around applications of the research. BIAM has established strong relationships with the private sector whenever the scientific objectives can form the basis for collaboration. Furthermore, two spinoffs startup were created, and several others are in different stages of maturation. Overall, their scientific objectives are excellent.

Assessment on the functioning of the unit

The functioning of the BIAM unit, a joint muti-site research unit, is excellent despite the two geographical locations. The creation of the new buildings in Cadarache and Luminy with shared platforms is very federative. BIAM direction is highly concerned about the working conditions of all employees. BIAM has improved the procedures and supported the creation of groups such as QWL and Padawans to favour relationships. A series of operating and safety charters are also available. Good efforts were made to improve the management of the unit, which is now functioning in a very effective fashion. Many intermittent committees have been created, and this has been beneficial to improve discussion between all unit members. The creation of the "Charge de mission scientifique" in particular is a very positive initiative that should be continued.

1/ The unit has resources that are suited to its activity profile and research environment.

Strengths and possibilities linked to the context

BIAM's facilities have been considerably upgraded during the last period, on both sites, and the unit currently benefits of optimal working conditions. The overall research environment has been dramatically improved through the construction of the new 8.000 m2 building which now houses all the research teams with common shared areas and a "proof of concept" area for potential industrial projects or for future recruitment of new teams. The cost of the new building (€20M) was predominantly paid for by regional funding (54%), with the majority of the remainder coming from two other sources, namely DRF (26%) and CEA (15%).

BIAM has demonstrated a strong capacity to funding through grants totaling €20.7M during the period. 51% of this funding came from ANR while region 13% and other national calls (11%) together with industrial contracts (9%) accounted for the majority of the remaining funding. Funding from the European Union makes up 7% of the overall funding. The annual running costs of the unit are predominantly paid for by CEA (1220K€/year) with CNRS (120K€/year) and AMU (60K€/year) making smaller contributions.

There has been a marked improvement in the transversality within the unit which has been achieved through various actions, most notably through the organisation of scientific committees and working groups and specifically through the establishment of a "pot commun" which has been used to establish transverse projects with good long term potential. This is an excellent initiative.

Restructuring of the 5 technical platforms which now function collaboratively is another important initiative (1. Plant cultivation - PHYTOTEC, Cadarache and AMU; 2. Microalgae cultivation and lipid analysis -HELIOBIOTEC; 3. production and characterisation of recombinant proteins - PROTEINTEC; 4. Imaging - ZOOM and 5. Experimentation in controlled areas - SALTO). These platforms will be further enhanced through the proposed creation of 2 other Analytical and Spectroscopy platforms together with a transverse bioinformatics cell.

Important initiatives are also underway to employ dedicated software to facilitate the pooling of biological resources.

Weaknesses and risks linked to the context

Care should be taken to ensure that the unit does not become overexposed from a funding standpoint to national funding. There is a clear need to diversify their funding streams by exploring the possibility of leveraging their european and international networks to target Horizon Europe funding, for example in themes such as Food, Bioeconomy, Natural Resources, Agriculture and Environment and in Energy.

While the platforms are very important to the overall functioning of the various teams within the unit, and are currently working in a very collegial fashion, the overall sustainability of some of these platforms will need to be carefully examined, with a view to potentially making them available as a service to outside parties, such as industrial or academic to help with their future running and maintenance costs.

2/ *The unit has set itself scientific objectives, including the forward-looking aspect of its policy.*

Strengths and possibilities linked to the context

BIAM's research environment allows it to meet its scientific objectives of producing fundamental knowledge around three axis in connection with various societal challenges. Mainly located on a CEA campus, in line with the scientific strategies of this entity (CEA basic research division NTE and RF-SDV, the PhD funding program CEA Focus).

BIAM is also well connected with CNRS (4 CNRS sections represented), and thanks to a secondary location, includes university (AMU) colleagues and facilities. This latter association represents the only plant science research laboratory at AMU, allowing BIAM to have privileged access to students.

BIAM has a central role as a plant and photosynthesis biology and microbiology research unit in the region (CPER investment, Regional Innovation strategy and strategic committee). BIAM is also part of some major national and international funding and networking tools (PEPR, GDR, LIA).

The three complementary research axes allow to gather all members of the BIAM unit, and fulfill the requirements of CEA, CNRS and AMU governing bodies, the three entities to which BIAM belongs.

To meet the scientific objectives, the BIAM director and its collective have set up a comprehensive and complementary set of committees out of which two seem in particular dedicated to scientific steering: the CMS "Chargé de mission Scientifique" and the strategic council. A scientific council gathering all the PIs is also an important collective in which various scientific information and opportunities can be discussed, and finally an external scientific board helps the unit and its direction with its scientific vision.

Without losing its focus on fundamental science, BIAM has established relationships of various nature (consultancy, ANR PRCE projects, PIA, CIFRE PhD fellowships) with different companies. Two startup companies have also spun-off of BIAM's research: "Biointrant", proposing probiotic stimulants for agriculture and "Adequabio", developing biological solutions for the treatment of polluted agriculture runoff.

Weaknesses and risks linked to the context

BIAM scientific objectives are ambitious and could be seen as too broad for a single research unit (ranging from fundamental microbiology to plant photosynthesis). A consequence of this research spread is that the three research axes are very broad and could be relevant to describe many other French plant science units.

The CNRS strength is spread over several sections (section 20 and 30 with 1 member, section 16 with 2 members, section 29 with 4 members and section 23 with 5 members), this might dilute the representativity and influence. Section 23 and 29 are the leading CNRS sections and could grow in importance in the future. Yet it is ackowledged that belonging to multiple sections can be a strategic advantage for the unit to avoid inter-team competition for recruitments.

A clear weakness is the geographical separation of the LGBP team from the rest of the unit. This AMU team has grown over the years and seems well integrated in the scope of the unit. One of its members is part of the CMS committee with an important role in the scientific advice to the director. Nonetheless the day-to-day effort for maintaining a strong bond could be difficult.

Many UN sustainable development goals are being put forward, and one could argue that some are less part of the research objectives than others (e.g. Zero hunger or good health and wellbeing).

Being at a level of low Technology Readiness Level (TRL) with fundamental science for knowledge as a main objective, it could be sometimes too much of a distraction to try and fit higher TRL when collaborating with private partners.

3/ The functioning of the unit complies with the regulations on human resources management, safety, the environment and the protection of scientific assets.

Strengths and possibilities linked to the context

The current structure of BIAM is the result of a process of transformation and co-construction that took place throughout the mandate. The permanent staff of the BIAM unit is divided into 40% men and 60% women. Taking into account all members (permanent and contractual) of the BIAM unit, the gender repartition is men 43% and women 57%, indicating relatively balanced gender parity. The team leader or co-leader gender parity is men 41% and women 59%. The BIAM unit well integrates the concept of gender parity in its recruitments.

The BIAM structure is dynamic with an active human resource management supported by the supervisor bodies. This is attested by 14 new recruitments despite about 10 retirements. Among them, 5 concern the management team and support, 2 are technical staff (an AMU tech. (Luminy team) and a CEA tech. (PhytoTec platform), a CNRS IR in charge of the ProteinTec platform, an engineer (biochemistry and responsible for the future Ionic platform in SAVE team), 5 researchers (4 CEA and 1 CNRS), a team leader replacing the BIAM director, and 2 young researchers (international call). 15 BIAM staff have remained in the unit and have seen their function or their assignment evolve.

The BIAM unit is aware of the working conditions of all its employees. To accompany the transformation of BIAM, prevention of psycho social risks (PSR) preoccupations was placed at the heart of its actions. A dedicated training and personalized coaching took place in 2020 for all employees and agents. The access to master 2 work-study course in psychology in 2021 was also offered.

The unit is concerned about motivation and development of its employees with the creation of the group "Quality of Life at Work" (QWL) for discussions between staff of all teams, the organization of an annual internal mobility campaign in 2020 and 2022 for the technical staff, the creation of the "Padawans" group (all BIAM PhD and post-doctoral students) involved in scientific mutual aid and in charge of scientific animation.

The BIAM unit improve the welcome procedures by holding meetings, providing booklets in addition of the unit's operating charter and the Cadarache Center's internal regulations. To facilitate exchanges between all employees and foreign students, training courses in English or French are proposed in-house.

The BIAM main concern is to ensure the safety of all its agents in each site, Luminy and Cadarache. A correspondent in charge of health and safety is present at Luminy. The Cadarache Center director delegates to a "chef d'installation" the responsability for the safety of personnel and visitors and environmental risk prevention. An EcoBiam group of volunteers is responsible for eco-actions.

For scientific integrity, a network of correspondents (CORIS) is present locally and traceability procedures are applied to laboratory notebooks. A person is also in charge of computer security systems (RSSI).

Weaknesses and risks linked to the context

The current direction has set up many committees. A weakness of such committee spread is the lack of clarity as to how the scientific objectives (as well as opportunities and strategy) are discussed. The role of the different committees (CMS, COPIL, COS and COSTRAT) should be precise to avoid overlapping functions and to create synergetic interactions.

Another concern is how the unit director can steer the unit in the right scientific direction, when he is mostly surrounded by a management/financial/building team. Some help should be brought to the unit director to allow him to preserve its scientific role and avoid isolation from bottom-up scientific issues, even if he can rely on the CMS which seems to play a major role in advice to the director.

EVALUATION AREA 2: ATTRACTIVENESS

Assessment on the attractiveness of the unit

The overall attractiveness of the unit is excellent. BIAM participates in international conferences, learned society committees, review panels and editorial boards, merit of their high scientific reputation. They have successfully raised national funds for research initiatives, although with less success in EU and international calls. They have an impressive integration policy for PhD students and good access to university students, and have successfully recruited several researchers during the period. Though improvements on recruitment of postdocs and visiting researchers could be improved. A key strength is also in their many collaborative platforms located within a new building.

1/ The unit has an attractive scientific reputation and contributes to the construction of the European research area.

Strengths and possibilities linked to the context

The unit is recognized for its dissemination of research through participation at national and international conferences (>60 invitations), receiving best poster and oral presentation awards (5 poster and 2 oral), and organization of international conferences ("Bioenergy: from photosynthesis to biotechnologies"; International Congress on Magnetotactic Bacteria) and participation on a significant number (25 in total) of organizational scientific committees of congresses (e.g. Gordon conference on Plant Lipids; International Conference on Microbial Ecotoxicity).

The scientific reputation is also demonstrated nationally though participation in five Hcéres evaluations by 3 members of staff, and 3 members serving on CNRS section 20 and 23 national committees, and 5 members on learned society committees/boards at the national (e.g. French Lipidomics Group; French Photosynthesis Society) and European level (e.g. European alliance for radioecology, euroFedLipid, Federation of European Societies of Plant Biology). Also, contributions to the EU research area is demonstrated through 3 H2020 research projects (TRANSAT; RadoNorm (coordinator); CAPITALISE) and 2 ANR PRCI projects (Biophyt; GROMA), of which they coordinate both. Furthermore, a reasonable number of PIs (11 in total, representing 7 of the 8 teams) are involved in editorial activities for reputable subject specific (e.g. *Plant Cell*; *Nanomaterials*) and general science journals (e.g. *Scientific Reports*; *mSphere*).

Weaknesses and risks linked to the context

Though the unit has 10 highly cited papers, there are not any WoS highly cited researchers, which would serve to further increase the scientific reputation of the unit.

There is a relatively low number of EU funded projects, and those that are coordinated by the unit and with a large amount of financing. Also, a lack of success in ITN, COFUND and COST actions, which would strengthen EU ties.

2/ The unit is attractive for the quality of its staff hosting policy.

Strengths and possibilities linked to the context

The unit implements an active policy to favour a good integration of doctoral students, whether in terms of working environment or personalised welcome of doctoral and post-doctoral students. The number of HDR in the unit is significant, with 34 HDR for a total of 64 CH/EC/IR (53% HDR), which allows it to ensure a good level of supervision capacity. The scientific dynamic of the unit is also attested by the achievement of 8 new HDR during the period. Over the period, 65 PhD students have been present, giving a theoretical supervision rate of 1.9 doc/HDR, which remains quite reasonable. Theses are doing well, with only 3 abandonments, an average PhD duration of 45 months and an average number of publications per PhD student of 2.4. During the period, BIAM was very active in the recruitment of PhD students and proposed doctoral contracts using its own financial resources (59% of the doctoral contracts). BIAM is also concerned about the future of the students. Among them, 12 have permanent contracts in the private sector whereas 9 became post-doctoral researchers. The 42 post-doctoral researchers have benefitted from the support of BIAM for the increase in their publication records, technical and soft skills and integration into the Padawan group for scientific and social sharings.

Over the period, the unit has been able to recruit 5 researchers, 4 CEA researchers including a team leader (e.g. group-leader at the Max Planck Institute) replacing the BIAM director (DU) in this function, and also 1 CNRS researcher recruited in section 16, demonstrating a good recruitment and renewal dynamic of the unit researchers. Two CEA positions in the fields of bioinformatics and plant biology are following a call for international mobility published in *Nature and Science* that led to 70 applications, attesting to the attractiveness of the BIAM unit. However, the policy of opening positions for recruitment is not within unit remit.

The unit is also attractive in welcoming researchers from outside in the framework of collaborative projects; 10 over the period: 2 French and 8 foreign (e.g. USA, Spain, Russia, Brazil), using various sources of funding.

During the period, 94.1% of the produced articles are in open access or deposited in open archives (HAL) or are visible as pre-prints (BioRxiv). Metadata of articles are often deposited with the journal or in open data banks. The unit is committed to a virtuous approach and complies with all the rules and values guaranteeing that they are honest and scientifically rigorous.

A strong point contributing to the attractiveness of the BIAM unit is their platforms, which are generally collaborative, and are intended to support academic and/or industrial partners. These platforms contribute to teaching programs for the students within the Plinus PhD-Program of the IM2B institute – Aix-Marseille University, creating a bridge between the two geographical sites - Luminy and Cadarache.

Weaknesses and risks linked to the context

During the period, only 25% of the PhD students were financed with a Ministry's doctoral contract whereas 59% were financed with BIAM's own resources, requiring a regular influx of contracts.

BIAM is composed of a reduced number of professors/associate professors (8 people) compared to the permanent researcher (41 people) and the planned recruitments concerning researchers. Most of the professors/associate professors are located within the LGBP group that is located on the Luminy Aix-Marseille campus. Such imbalance in favour of researchers could limit the attractiveness of the BIAM unit at the Cadarache site for students coming from the university.

The guest researchers are present in 4 teams (EBM, LEMIRE, MEM, SAVE) out of the 8, therefore one could question why the other teams are less attractive, even though the Covid period was of course detrimental to such mobility.

3/ The unit is attractive because of the recognition gained through its success in competitive calls for projects.

Strengths and possibilities linked to the context

During the mandate, BIAM has attracted very significant regional funds, dedicated to infrastructures and equipment, for a total of 13.96M€. In support of the construction of its new building, BIAM raised 11.2M€ from the CPER 2014-2020 (including FEDER, Région Sud, Métrople Aix-Marseille and CD13). It also raised 2.76M€ for the platform equipment from the CPER 2014-2020 and 2021-2027. The South region funded additional equipment for a total of 280K€. In addition, BIAM attracts indirect competitive funding from the Labex SERENADE and from the CEA for PhD and postdoc contracts (average 3/year). This amounts to around 330K€/y not managed by BIAM, but directly by AMU and the CEA, and not included in BIAM's running budget.

External competitive funding provides most of BIAM's running costs (20.69M€ in total, 3.45M€/y). BIAM as a whole is a very active and competitive fund raiser at the national level, an average amount of 2.1M€/y of its external national resources. ANR is a principal funding source, with 57 projects supported for all teams (except for the young team 7), 42 submitted as coordinator, for a total amount of 10.58K€. Other sources of national grants are mainly the CEA and the CNRS (via NEEDS, EC2CO, MITI and Eccorev actions), and to a lesser extend AMU's ITEM or IM2B institutes and Amidex foundation, CASDAR (Compte d'affection Spécial au Développement Agricole et Rural), GNIS (groupement interprofessionnel des semences), SEMAE (interprofessionelle des semences), la Fondation pour La Recherche Médicale, IBISBA and EDF, for a total of 2.22M€. At the international level, five multi-team EU RIA (research and innovation actions) H2020 were supported (out of 11 submitted); two for team 2, one each for teams 1, 5 and 6, two of them in BIAM coordination by teams 2 and 4. One EU MSCA (Marie Skłodowska-Curie Actions) and one H2020 Eurotalents post-doc were also granted, which amounts to a total EU funding of 1.42M€.

A real strength of BIAM resides in its valorization potential, resulting in significant funds (1.85 M€ on the period) obtained in the context of the PIA from ANR (DEMETERRES) and BPifrance (MOPAD) by the BIAM platforms and teams 2, 3 and 8. The most significant were obtained from the PIA-RSNR for the DEMETERRES bioremediation

project, coordinated by BIAM and associating other laboratories of DEN, IRSN, INRAE, and the companies Veolia and Orano. One of the aspects of this project was a novel concept for the valorization of contaminated areas. A consortium has been set-up to market this concept in the Fukushima area. It has to be noted that other industrial collaborations have also set the stage for ANR PRCE applications, three of which have been funded.

Overall, BIAM has excellent visibility in the private sector. R&D industrial contracts with small to very large companies on the period amount to 1.86M€, the most signicant with Orano, Total and Roullier under the lead of teams 1, 5 and 8.

Weaknesses and risks linked to the context

BIAM only marginally benefits from regional funds besides CPER and grants for infrastructure and equipment, which totalled €13.96M.

In spite of a large number of submissions to EU calls (36 of which 4 were ERC), success rate of BIAM remains quite low, which is surprising given the unit's scientific and technological potential. One of two H2020 projects provided very significant funds, but the overall total of €1.42 is a small percentage of the overall grant capture within the unit. BIAM does not seem more competitive or active in other international calls.

In spite of excellent visibility in the private sector, the most significant funding resulting from translational activity is indirect and obtained via the PIA.

On average, despite rather outstanding success at ANR, the overall external grant funding of BIAM represents a rather limited proportion of its running costs compared to other units (71 %).

4/ The unit is attractive for the quality of its major equipment and technological skills.

Strengths and possibilities linked to the context

The structuring of the technical platforms into shared platforms has been a major strategic action in the evolution of the unit, for the benefit of the operation of this equipment, which is often costly and requires strong technical expertise. Five new platforms operate in a collaborative mode and group together experiments on: (i) plant cultivation (PHYTOTEC Cad and Luminy), (ii) microalgae cultivation and lipid analysis (HELIOBIOTEC), (iii) production and characterization of recombinant proteins (PROTEINTEC), (iv) imaging (ZOOM), and (v) experimentation in controlled areas (SALTO). The creation of an analytical (IONOTEC) and spectroscopy (BIOPHYTEC) platform as well as a transverse bioinformatics cell (CBiB) will complete this structuring during 2022.

These platforms are also used for teaching purposes proposed in the framework of the Plinus Program of the IM2B. The functioning of the platforms is governed by a charter adapted to each of them and provided in appendix, and their follow-up is ensured by a dedicated steering committee integrating experienced and non-experienced users as well as a member of the management. Their budget is monitored via an operating account, with an internal incentive to involve and integrate the platforms in ANR funding applications. They all have trained staff with expertise in the field, either on a 100% basis (PhytoTec has the rank of a team and ProteinTec was created thanks to the recruitment of a CNRS IR), or via technical staff sharing their time between the platform and the research team projects to which they are attached.

Weaknesses and risks linked to the context

Following the reorganization of the unit, and the move into a new building, the organization has evolved in a very positive fashion. The dispersion on two sites nevertheless remains a weakness, with respect to researchers in BIAM at Luminy having access to equipment and in particular to the platforms of BIAM at Cadarache. Some of the platforms which house very unique facilities from a national perspective within France, lack visibility at the national level (e.g. ImaPlant in the PhytoTech platform).

EVALUATION AREA 3: SCIENTIFIC PRODUCTION

Assessment on the scientific production of the unit

BIAM is highly multidisciplinary, hence its science covers a broad range of fields and topics. The unit's production ranges from good (team 7) to outstanding (team 1 and 5), well cited, with leadership in some high profile publications (1 *Current Biology*, 2 *eLife*, 3 *PNAS*, 3 *Science*, 1 *Nature Plants*, 1 *Nature Microbiology*) exploiting well team complementarity. BIAM's activity provides decisive input to both fundamental and applied science, which resulted in ten patents. All teams contribute to BIAM's scientific production, but only partially in proportion to the available staff.

1/ The scientific production of the team meets quality criteria.

Strengths and possibilities linked to the context

The diversity of the fields covered by the unit is rather exceptional. It ranges from biochemistry, genetics, molecular biology, agriculture, biological sciences, immunology, microbiology, chemistry, physics, energy, and material science. Recent developments adding chemical engineering and material science. Most topics have high societal impact, allowing for high visibility publications.

Accordingly, BIAM is remarkably productive, both qualitatively and quantitatively, with 369 publications the most respected journals of the field (61.5 articles/y) and 24 book chapters over the period. Some articles are published in high visibility generalist journals, for example: 3 articles in *Science*, 6 in *PNAS*, 4 in *Nature Communication*, and 3 in *eLife*, and 5 of which BIAM is the leader. Many of the other publications appeared in top speciality journals in each field, for example: 3 in *Nature Plants*, 9 in *Plant Cell*, 11 in *New Phytologist*, 2 in *Nature Microbiology*, and 5 in the *ISME Journal*. Across the period the unit had 10 WoS highly cited papers. Three of the high-visibility articles are issued from an inter-team collaboration, which underscores the potential offered by BIAM's multidisciplinarity. Two of those report the discovery of a high resolution structure and detailed mechanism of an unusual light-driven fatty acid decarboxylase in the microalga *Chlorella variabilis* with high potential for engineered production of hydrocarbons (*Science*, 2017 and 2021; carried out by team 1, with teams 2 and 4). The third article reports the discovery of an operon in *Staphylococcus aureus* that encodes the different function required for the biosynthesis and trafficking of a broad-spectrum metallophore related to plant nicotianamine (staphylopine) involved in metal ions acquisition. Conservation of this operon in other pathogens highlights its importance of the process in infection (*Science*, 2016; carried out by team 5). An accepted article in *Nature* (team 1, 2022) is a decisive contribution to the understanding of photosynthesis energy transfer to the inorganic carbon transporter required for CO_2 concentration at the catalytic site of RubisCO, a process essential for microalgal photosynthesis in the aquatic environment. The importance of this discovery stems from the fact that microalgae account for about half of the global carbon fixation.

The overall number of citations is stable since 2018, with an average of 2354 citations per year. BIAM's production is original and decisive in both fundamental and applied sciences. A large proportion (63%) of BIAM's articles are co-authored with prestigious international partners. BIAM's work also translates into 13 patents covering most research topics of the unit, 10 with international extensions.

Weaknesses and risks linked to the context

BIAM's multidisciplinarity offers a quite huge potential for internal collaborations. Yet if cooperation between teams exist, as illustrated by 46 articles (12 %) involving 2 to 4 teams, some very successful, it remains limited.

2/ Scientific production is proportionate to the research potential of the unit and shared out between its personnel.

Strengths and possibilities linked to the context

Overall, the unit has excellent productivity with a total of 369 ranked articles (376 all inclusive) resulting on average of 61.5 articles per year. Of these, 63.5% contain unit members that are first or last/corresponding authors. Additionally, 24 book chapters have been published. All researchers of the unit have published, with an average of 5.2 articles per scientist per year (ranging from 3.7 to 7.4). Most all PhDs and postdocs published at least 1 paper.

Transversality between teams is demonstrated by 46 articles including authors from 2 to 4 different teams.

A good number of articles are published in the most respected general science journals (e.g. *Science* (3); *Nature* (1); *PNAS* (6)) and subject specific journals (e.g. *New Phytologist* (11); *ISME Journal* (5); *Environmental Science & Technology* (8)), attesting to the high quality of science produced by the unit.

The unit has successfully established productive international partnerships, with 63% of the publications co-authored by researchers from foreign universities (19 nationalities). This includes prestigious universities such as the Max Planck Institute (Germany), Duke University (USA), and University of Cambridge (UK).

Weaknesses and risks linked to the context

Scientific production is unequally distributed between teams (with a minimum of 17 and maximum of 97 articles), even when taking their respective sizes into account. When considering quantity and quality of publications we can see three tiers among the BIAM research teams:
- Team 1 and team 5 with many papers most of which have been published in very high quality and visibility journals including generalist and multidisciplinary journals;
- Team 3, 4 and 8 with many papers and some papers in high quality journals, but few in generalist journals;
- Team 2 and 7 with fewer papers and publications in the best quality journals;
- Team 6 is somewhat atypical with few papers yet including papers published in generalist multidisciplinary and highly respected journals.

Team sizes are quite different, but this isn't the sole explanation of the scientific production differences among BIAM teams. Nonetheless, team 2, 6 and 7 are the smallest teams, and team 6 have only one support staff.

3/ The scientific production of the unit complies with the principles of research integrity, ethics and open science.

Strengths and possibilities linked to the context

Systems are in place to ensure that staff are aware of scientific integrity. A network of Correspondents for Scientific Integrity (CORIS) has been appointed at the unit. Procedures have been implemented for actions involving awareness-raising with the possibility of reporting via the CORIS or directly to the Scientific Integrity Referent (RIS). Traceability procedure involving the data storage in laboratory notebooks are being developed with data traceability involving appropriate servers.

The PhD programme within the unit provides mandatory lessons on scientific ethics to all the students involved.

Articles are evaluated prior to publication for patentable material, while COPE recommendations are adhered to with respect to the authors of the published scientific material within the unit.

Weaknesses and risks linked to the context

Issues exist with respect to data management and storage that need to be addressed. The current apparent lack of a data management plan does not favour good practice in this respect.

EVALUATION AREA 4: CONTRIBUTION OF RESEARCH ACTIVITIES TO SOCIETY

Assessment on the inclusion of the unit's research in society

The quality of the unit's interactions with society is overall excellent. They have participated in educational workshops in schools and in holding Family-Friends Days at BIAM with visitors coming to the BIAM unit.

They have been involved in large contracts with industry and have created spin-off companies, involving the hiring of scientific staff which is a bonus to the region. Another spin off is planned involved in the products of hydrocarbons for cosmetic applications.

1/ The unit stands out by the quality of its non-academic interactions.

Strengths and possibilities linked to the context

The unit has interacted at a number of levels with over 30 companies in areas relating to the unit's scientific programmes. These involve one off contract, co-developments and longer term collaborative projects with industrial partners. The unit has received funds directly from industry to fund their research. A total of 15 industrial contracts have been secured by the unit during the period totalling €1.863M which constitutes 9% of the total funding acquired during the period. The largest of these contracts were from ORANO-MED (€ 373,202) and TOTAL (€348,700). In addition the unit has leveraged their industrial connections to obtain funding jointly with industry from national programmes. This is a significant strength of the unit.

Weaknesses and risks linked to the context

Some teams within the unit appear to have adopted the strategy of not patenting their research findings and making them freely available to the community. In that case interaction with industry predominantly involves consultancy. Translation of results in the area of flowering plant/crop model systems is somewhat limited due to current European GMO policies.

2/ The unit develops products for the socio-economic world.

Strengths and possibilities linked to the context

BIAM's research is very relevant to a number of societal issues and challenges and to a number of the UN's sustainable development goals. It addresses issues relating to the circular carbon economy, low-carbon energies and environmental monitoring coupled with remediation.

BIAM has contributed to the creation of two startup, Biointrant which is developing biostimulants for agriculture and Adequabio which is involved in developing treatments for phytosanitary effluents. Biointrant involved a licensing and collaboration agreement through the CNRS, while Adequabio involved a licensing and collaboration agreement through the CEA. A third startup Alcasun involving the production of pure and biosourced linear hydrocarbons for cosmetic application is planned.

Weaknesses and risks linked to the context

Translation to industry of results obtained on flowering plant/crop model systems is limited due to European GMO policies.

In regards to the photosynthesis measurement tools developed in the unit, the size of the market is small. The strategy of consultancy (rather than patenting) applied for the moment therefore seems adequate, but it relies on the expertise of a single PI.

3/ The unit shares its knowledge with the general public and takes part in debates in society.

Strengths and possibilities linked to the context

During the period, BIAM has realized several actions for sharing its knowledge with the general public and society. An important action of the unit is its active participation to the "Fête de la Sciences" or "Nuit Européenne des Chercheurs" involving all the teams.

Members of mainly EBM, LGBP and SAVE teams, contributed intensively with 51 outreach actions via public conferences (Académie des Sciences, Académie d'agriculture), articles in the written press as *Usine Nouvelle, Formule verte, RSE Magazine, Sciences et Avenir, 20 minutes, La Provence, Le Monde, Figaro*, radio and TV interviews in major national media such as RTL and Radio Ter. They also created 5 videos available online in Youtube (one being for the famous "C'est pas sorcier" channel).

Some teams, mainly EBM, IPM, MEM and PPV, are involved in dissemination of science to schools by organizing visits of BIAM laboratories and possibly workshops at elementary, junior or high schools. The BIAM direction and communication service is also involved in these outreach activities.

Weaknesses and risks linked to the context

Even if communication with the general public and society seems important for the BIAM unit, this activity is unequally shared between the different teams and mainly concerns colleagues from EBM, LGBP and SAVE teams.

C – RECOMMENDATIONS TO THE UNIT

Recommendations regarding the Evaluation Area 1: Profile, resources and organisation of the unit

The unit should continue its efforts to seek out solutions to ease personnel frustrations associated with the CEA intranet security system.

It is recommended to improve administrative transparency, through providing written guidelines for common procedures (e.g. hiring and ordering) to all personnel, and including a contact list for support on these matters. Also providing clear guidelines for staff promotions and through mobility options is recommended.

To ensure the development, expansion and optimising the utilisation of the platforms, it is suggested that a comprehensive long-term sustainable economic model be developed and put in place. Making some platforms open to the academic and private sector as a research service could bring in more funds and increase visibility and attractivity.

Promote PhD and non-permanent staff visibility through involvement in decisions that directly affect them (e.g. office space allocation), and also suggest providing more training opportunities in the doctoral courses for students on the Cadarache site.

Recommendations regarding the Evaluation Area 2: Attractiveness

BIAM should think of strategies that would provide more effective regional funding for research projects.

BIAM teams and management should implement strategies to attract future CNRS candidates.

More structured efforts should be invested in EU/international grant applications via upstream networking, coordination and preparation using all supports available from funding bodies. BIAM has many assets that should make it a valuable if not unavoidable partner for international projects (high technology tools and platforms). International/EU project coordination is time consuming but provides high visibility. BIAM could consider overlooked international funding sources like HSFP.

Strive to increase the visibility of the capacity of the platforms through advertisement to appropriate end users to build-up a user-base.

Recommendations regarding Evaluation Area 3: Scientific Production

Pluridisciplinarity is a major strength of BIAM. It is a key to high profile publications. Keep intensifying inter-team collaborations to fully exploit this potential to the benefit of all members of the unit. Among all the fruitful collaborations, half of papers published in the best available journals originate from collaborations between 3 or more BIAM teams, strongly indicating that complementary competences exist and should be stimulated. This observation could also be linked to the fact that several teams harbor highly technical and specific competence around service platforms. More inter-team collaborations could be fostered using unit level incentives tools, like internal calls of proposal for small starter-grant inter-team projects or co-supervised PhD students.

Recommendations regarding Evaluation Area 4: Contribution of Research Activities to Society

Encourage all teams to more actively share their knowledge with the general public, if possible by following the lead of EBM, LGBP and SAVE teams. Develop communication programmes towards the general public based on strategic discussions within the BIAM unit.

TEAM-BY-TEAM ASSESSMENT

Team 1: Bioenergy and Microalgae (EBM)

Name of the supervisors: Ms Yonghua Li-Beisson & Mr Fred Beisson

THEMES OF THE TEAM

Team 1 contributes to shape the "From phosynthesis to bioenergies" theme of BIAM. Using microalgae, mainly *Chlamydomonas reinhardtii* but also more recently the heterokont *Nannochloropsis sp*. as models, team 1 studies the molecular mechanisms of the conversion of sunlight energy into chemical energy contained in storage compounds such as lipids and starch. EBM's work has both fundamental and biotechnological objectives. Its fundamental objectives are to identify the main players in key pathways of energy conversion and storage, and to determine their metabolic and physiological functions. On the biotechnological side, EBM aims at boosting biomass and lipid production, and at the production of valuable fatty acids (e.g. alkenes). EBM's research is organized in three transversal and inter-related themes: pathways and regulation of photosynthetic electron transport in relation to CO_2 capture and hydrogen production; energetics and molecular mecanisms of triacylglycerol synthesis and storage; the mechanism, role in photosynthetic membranes and biotechnological applications of fatty acid photodecarboxylase. The team set-up and manages the European platform of lipdomics HelioBiotec.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

One threat is the apparent overlap of the general research line of the lab, namely bioenergy from microalgae, with the research line of other French laboratories. One may suggest to clearly define the priority in terms of future research development, and maybe increase the cooperation at national and international level on the most promising research themes. There is also maybe a room for more interactions between the different research lines (e.g. the impact of fatty acid accumulation on the capacity to produce hydrogen).

EBM has obviously found its own and original research topics largely based on unique technical capacity and complementarity of the team members. Its three research lines are now clearly overlapping and well integrated.

Exposure to international conferences could be improved for some young permanent members. Because the team has an excellent international reputation with number of collaborations, and because their fundamental researches are oriented towards production of biofuels in microalgae, one would expect more than one participation to a European research program.

The outstanding publication score and originality of BIAM's work, organisation of two international meetings and involvement in scientific committees of international meetings in the last years has greatly boosted member's visibility and invitation to international meetings (15 keynote speaker invitations for all members of the team).

Members are encouraged to contribute to outreach events and to contribute to dissemination of results to a broad audience at the national level.

BIAM's contribution to outreach activities was quite significant over the period, with conferences for the general public, 4 videos on YouTube, papers for children, 5-10 actions per year of science dissemination (local, national or European events, school workshops).

A higher degree of implication in teaching and management of PhD program could help to contribute to the attractiveness of the team.

Tenured BIAM's members (none of which is teaching staff) have largely contributed to the teaching at AMU, Polytech Marseille and Nice university at the licence 3 and master 1 and 2 (Bioenergy and microalgae program) levels (for an average of 84 hours/year in total).

The panel would like to point out the crucial need for a better integration of the projects at the laboratory level to consolidate the laboratory project.

This team has been striving to fill this request, with obvious success.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	0
Lecturer and associate lecturer	0
Senior scientist (Directeur de recherche, DR) and associate	1
Scientist (Chargé de recherche, CR) and associate	0
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	4
Research supporting personnel (PAR)	7
Subtotal permanent personnel in active employment	**12**
Non-permanent teacher-researchers, researchers and associates	1
Non-permanent research supporting personnel (PAR)	3
Post-docs	2
PhD Students	11
Subtotal non-permanent personnel	**17**
Total	**29**

EVALUATION

Overall assessment of the team

EBM develops very original research aimed at understanding the molecular mechanisms of the conversion of sunlight energy into chemical energy, well in line with BIAM's and societal priorities. The team has an outstanding scientific output with >5 articles in major generalist journals (e.g., *Science* and *PNAS*), 5 as leader. Its exceptional visibility is confirmed by an impressive number of collaborations with prestigious international partners, invitations as keynote speakers in many international conferences (15) and invitations in major international laboratories and workshops (25). Its staff members contribute to the editorial and advisory boards of major plant journals such as *The Plant Cell* and *New Phytologist*. EBM stems as a driving force of BIAM via internal collaborations.

EBM has excellent contribution to the society including collaboration with a major industrial partner (Total) and a world patent that may lead to a start-up. The team actively contributes to teaching (AMU, Polytech Marseille, U. Nice) and information/education of the general public from children to national academies.

Strengths and possibilities linked to the context

EBM's research is highly original, has high societal relevance and perfectly fits in the "from photosynthesis to bioenergies" axis of BIAM. During the evaluated period EBM has revealed and characterized the first photoenzyme in lipid metabolism and novel lipid droplet turnover enzymes; uncovered novel communication between chloroplasts and peroxysomes, and energy sources driving CO_2 concentration mechanisms in algae.

EBM has restructured its research in three strong transversal research themes, each involving several senior researchers of the team. Those are well-thought for bridging its different research topics, optimizing staff multidisciplinarity, complementaries and potential synergies. The integration of four additional researchers in the team opens new possibilities to reinforce these lines and to expand its goal to integrative approaches to understand CO_2 and nutrient capture and utilization in a changing environment.

EBM has a remarkable visibility in the research community as demonstrated by 75 publications (44 as leader) in international journals (2.9 papers/researcher/year), six in top ranking generalist journals. Two of those report the discovery, high resolution structure and detailed mechanism of an unusual light-driven fatty acid decarboxylase in the microalga *Chlorella variabilis* with high potential for engineered production of hydrocarbons (*Science*, 2017 and 2021). An accepted article in Nature is a decisive contribution to the understanding of photosynthesis energy transfer to the inorganic carbon transporter required for CO_2 concentration at the catalytic site of RubisCO, a process essential for microalgal photosynthesis in aquatic environment. The importance of this discovery stems from the fact that microalgae account for about half of the global carbon fixation. EBM's high visibility is further confirmed by a strong international collaborative network (4 visiting senior scientists, 6 visiting students), 15 invitations as keynote speakers in international conferences (including prestigious Gordon conference, International symposium on plant lipids), more than 25 invited presentations in major international academic institutions (Max Plank Golm, Danforth center, Beijing university) and international workshops. The members of the team are involved in editorial board of international scientific journals, including the prestigious *Plant Cell* and in the advisory board of one of the other best plant journals, *New Phytologist*.

EBM is well integrated in BIAM and is one of its driving forces, 14 of its publications are co-authored by other member of BIAM, including the most prestigious ones.

The team is very attractive. It recently recruited four researcher (three via internal mobility) and has been training a quite significant set of young non-permanent members (7 postdocs, 10 PhD students, 5 other non-permanent staff members, in addition to short-term students). PhD students and postdocs get an excellent return, on average nearly 4 papers/person.

The team set up and manages the European (IBISBA labelled) platform of lipidomics HelioBiotec including a large set of high-tech instruments for high-throughput screening and characterization of microalgae strains, and lipidomic analyses that largely contributed to the team's major publications and funding. The platform was recently upgraded with a GC-MS with thermodesorption, an additional incubator, a fluorescence imaging camera and an UPLC orbitrap MS/MS apparatus improving its analytical performance. Partly based on this technical asset, EBM has been able to secure 2.52M€ of competitive funding during the period (on average 419K€/y) provide by ANR (8 funded projects), EU H2020 (17.4 K€ support for platform), and 12 other proposals funded by the CEA, IM2B of AMU, IBISBA and the South region.

EBM has secured a solid partnership with an industrial actor (Total) fully supporting a postdoctoral researcher (with an overall funding of close to 350K€). The industrial project aiming at improving lipid productivity in microalgae is fully in line with the team's priorities and competencies. The discovery of fatty-acid decarboxylase has led to the filing of a world patent and its exploitation for light-driven hydrocarbon production by a startup is currently being explored.

EBM's members actively participated to teaching at AMU, PolyTech Marseille and University of Nice at the license and master level for a total of 84 h/y. They gave conferences for the general public (e.g. Académie d'agriculture Paris, Académie des Sciences), made 4 videos, papers for children, participated to 5-10 outreach activities/y.

Weaknesses and risks linked to the context

Despite the team's high visibility and European platform, EBM has not been able to secure major European or other international funding. The team has also not been able to secure additional private funding.

The maintenance of the HelioBiotech platform is relying on the funding of EBM and many of its instruments are now over 10 years old. Maintenance cost and replacement become major issues.

The team is kind of a victim of its success, with a large number of visitors and side activities which can lead to loss of focus on main research.

RECOMMENDATIONS TO THE TEAM

The team has all the required visibility and research topics to be competitive and successful with respect to international grant applications (EU, HSFP). The committee supports efforts in this direction. The team leader seems a potential candidate for ERC funding.

The team is encouraged to pursue efforts to extend its industrial partnerships and developments, including startup creation.

The committee recommends to anticipate the platform tools obsolescence and ageing, with planning of regional fund applications and discussion with supervising bodies.

With the team's new staff, EBM has to be careful to maintain focus on its main research lines and to avoid dispersion.

Team 2: Interactions Protein – Metal (IPM)

Name of the supervisors: Ms Catherine Berthomieu & Ms Virginie Chapon

THEMES OF THE TEAM

The research focus of IPM involves gaining a better mechanistic understanding of environmental nuclear toxicity and in structure-function relationships in proteins involved in catalysis or bioenergetics. The team is targeting naturally occurring radionuclides as well as tritiated dusts and have recently begun to work on the biological role of rare earths elements. They are employing multidisciplinary approaches including molecular biology, molecular microbial ecology, biochemistry and biophysics.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The scientific effort on deciphering mechanism of radionucleides interaction with specific proteins should be pursued.

Such efforts have been pursued as for example illustrated by the Gallois et al. article in *ISME J* on the UipA uranium binding protein published in 2021, or the development of a calmodulin-based uranium biosensor (patent EP2981555A1, 2016), engineering of novel calmodulin variant for selective uptake of other radionucleides, and the integration of an ANR programme aimed at continuous evolution for changing proteins' metal selectivity (BiobrickEvolver).

The role of uranium perturbation on Iron homeostasis should also be elucidated.

This has not been addressed to any great extent. A special effort of manpower on bioremediation axis 1 should be done to gain competitiveness. The arrival of the two new members should help for that.

Furthermore, the technical expertise of ESI MS spectrometry should be developed in house and outside.

A new CE-ICP-MS approach to measure the thermodynamic constants of protein-Pu was developed.

The panel suggests the use of popular tools for gaining reputation: be pro-active for conference invitation, practice lobbying for project leadership. The international visibility needs to be increased (as illustrated by few invitations to high rated conferences). International visibility needs to be increased.

The members of the team have intensified their networking and have been pro-active in the setup of EU H2020 projects (some of them funded) and participated to working groups of the European radioecology alliance. One of the members of the team is involved in the board of directors of this alliance. The team has proposed abstract for selected talks in several international meetings and 13 were selected. Staff members were invited for one plenary lecture in Japan and 7 presentations in other international meetings. They also gave oral presentations in 14 national meetings. Increased international collaborations have led to common publications.

The committee recommends maintaining long-term collaborations (or partnership) with private companies which will consolidate the projects.

IPM maintains a long term (since 2003) collaboration with EDF on the toxicological aspects of 60Co3O4 particles. A follow-up project for 2023-2025 is in discussion. Yet this partnership is not very rewarding in terms of funding.

Limited teaching opportunities. Reinforce the contact with AMU for teaching, an asset to be attractive for students.

Since 2019, team members increased their teaching at AMU with participation to a one week module of master 2 on bioenergy and bioremediation. One of its member also participated to a one week module of the Master MIF "microbiolgie intégrative et fondamentale". Since 2019, one of the team members gives M2 lectures (3h/y) in Nimes and Pau. An Amidex funding of the team involves some teaching.

The panel would like to point out the crucial need for a better integration of the projects at the laboratory level to consolidate the laboratory project.

Based on its technical competencies and original methodologies in ESI/MS or FTIR difference spectroscopy, IPM has developed collaborations with teams 1, 3, 4, 5 and 8, contributing to various IAM's projects, for example to the study of the fatty acid decarboxylase (team 1 coordinated ANR SNAPSHOTS project), and to several transversal publications, some of which with high visibility (Sorrigé et *al. Science*, 2021; Ghssein *et al. Science*,

2016). IPM activities fit in axes B and C of IAM's project, yet have limited overlap with the activities of the other teams outside of the transversal axis "Structure-properties relationships in proteins".

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	0
Lecturer and associate lecturer	0
Senior scientist (Directeur de recherche, DR) and associate	0
Scientist (Chargé de recherche, CR) and associate	0
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	3
Research supporting personnel (PAR)	5
Subtotal permanent personnel in active employment	**8**
Non-permanent teacher-researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	2
Post-docs	0
PhD Students	6
Subtotal non-permanent personnel	**8**
Total	**16**

EVALUATION

Overall assessment of the team

IPM develops very original research in the field of radionucleide monitoring, toxicity and remediation. It possesses rare technical expertise to study structure/properties relationships in proteins and protein/ligand (metal) interactions. This translates into excellent visibility and capacity to collaborate with other teams of BIAM, nationally (ANR collaborative projects) and internationally (two H2020 projects). The scientific production of IPM is very good to excellent and includes two collaborative Science articles with team 1. Translational activity of IPM is very good, based on high societal relevance for norming of dose tolerance, radionucleide monitoring (patented) and bioremediation, involving industrial partners. Yet industrial partnerships are not well funded. The team has to develop further outreach activities, which are currently still sparse.

Strengths and possibilities linked to the context

The research line and competencies developed by IPM on radionucleide monitoring, toxicity and remediation are highly original and rarely tackled by the scientific community. If the team's approaches are mainly mechanistic with a strong focus on protein-metal interactions, IPM's work also has significant societal outputs as norms or biosensor development.

IPM possesses original and rare technical expertise in ESI/MS or FTIR difference spectroscopy to study structure-properties relationships in proteins and protein-ligand interactions. This is a strong asset for internal and external collaborations, with potential to translate into high visibility publications.

The relevance to societal challenges of the team's research is reinforced by the currently changing national and international policy with regard to nuclear energy.

This translates into high visibility for the team in the international nuclear toxicology community, as demonstrated by participation in two European H2020 projects in the period: TRANSAT dedicated to tritium management and toxicity in fission and fusion facilities (with WP coordination), and Radonorm aimed at managing radon exposure and norming exposure situations. This visibility is further confirmed by IPM's involvement in the starting HORIZON-EURATOM 2021 TITANS project. Besides significant publications, such European programme provide dose tolerance evaluations/recommendations for populations and workers in dismantling plants.

The societal relevance of IPM's priorities also provides quite significant support to the team's work via the TOXNUC programme of the CEA. Overall, external funding of the team amounts to 1.48M€ for the mandate (88K€/y/full-time scientist) via 6 ANR collaborative projects, CNRS, AMU, DRF, ECCOREV, and PIA DEMETERRES-funded projects. Some of this funding is involves non-academic partners such as Veolia and Orano (via the DEMETERRES PIA), or EDF.

The scientific reputation of the team is also reflected in their participation as members of scientific committees such as the Scientific Committee of the CNRS Thematic Action MicrobiEn and membership of the Board of Directors of the European Alliance for Radioecology. In addition, team members have been involved in co-organising international conferences such as the 1st International Conference on Microbial Ecotoxicology. With respect to interdisciplinary and collaborative interactions, they collaborate with chemists, bioinformaticians and cell biologists.

IPM's scientific production is very good/excellent, with 42 articles (2.5/y/researcher), 19 as leader (45 %), 13 co-authored with members of other teams of BIAM (31%). 62% of these publications are among the most visible and respected journals in the field including high quality international journals such as *Science* (2), *ISME J., Dalton Trans., Chemistry A-European J., J. Phys. Chem. Lett., Env. Sci. Technol., Arch. Toxicol., and Part. Fiber Toxicol*. To be highlighted: an *ISME J.* article reporting the discovery and characterization of an uranium- and iron-binding membrane protein involved in bacterial uranium tolerance and providing the bases for the future development of an original sensing system in environmental bacteria. To be mentioned also, two *Science* papers, one as co-leader with team 1 on the mechanism of fatty acid decarboxylase. All researchers, postdocs and PhD students have contributed to publications (at least two publications at the defense). Eight publications of IPM have been selected by CEA as highlights over the period.

The capacity of the team to answer societal demand from a practical point of view is illustrated by the filing of one active patent, protecting a proof-of-concept calmodulin-based uranium biodetector that was designed and expressed in Arabidopsis. This concept is now being transferred to zebrafish for uranium detection in aquatic environments. IPM is, in addition, involved in two collaborative projects with Veolia and Orano and with EDF, aiming one at Cs sequestration/extraction (PIA DEMETERRES), the other at managing the toxicity of 60Co3O4 particles. A member of IPM was member of ANSES "Comité d'experts spécialisés" for 4 years. The team contributes to the master teaching at AMU, and universities of Nîmes and Pau (one week sessions or 3h/y). The team hosts middle and high school students in the laboratory.

Weaknesses and risks linked to the context

Given the team's limited size, there is a risk of dispersion if shifting priorities to rare-earth elements in a context of potentially moving energetic policy.

The societal relevance of the team's topics could lead to more high visibility publications.

The team did not attract self-funded postdocs.

In spite of competence in norming of dose tolerance, radionucleide monitoring and bioremediation, the team does not seem to raise significant private funding to support such activities (e.g. the long-standing collaboration with EDF only generated a support of 35K€).

There is little information provided regarding interactions with social actors, such as international bodies, political personalities, public administrations, consumer associations and patient associations.

Outreach activities involving the general public are very limited. In general, IPM seems to encounter some difficulties to combine fundamental research with time-consuming translational and outreach activities.

RECOMMENDATIONS TO THE TEAM

Renewed interest in nuclear energy might be currently shedding a new light on the team's priorities and should considerably reinforce the team's position. Care should be taken however to avoid dispersion in this novel context.

The team might better exploit the societal relevance and originality of its work by aiming to publish in higher visibility journals. In this respect the expert committee recommends that the team continue the recent trend of targeting publications in multidisciplinary journals to increase the citations and visibility of the research work.

The committee suggests to weight the financial and practical advantages (critical staff mass, know-how building/maintenance, equipment) versus time/energy cost when fostering industrial partnerships.

The originality of the research topics of IPM deserves dissemination and attraction of a new generation of researchers via teaching participation at AMU. The team is encouraged to pursue its efforts in this direction.

International meetings could be an opportunity to strive for international postdoc attraction.

The expert committee recommends that the team should attempt to contribute more actively to outreach activity including interacting with the general public within society.

Team 3: Microbial Ecology of the Rhizosphere (LEMiRE)

Name of the supervisors: Ms Wafa Achouak & Ms Catherine Santaella

THEMES OF THE TEAM

The research focus of the team involves soil-plant-microbiota interactions focusing on root exudates and their recruitment of microbiota, function and carbon storage in soils. In addition, they focus on the potential role of phytobeneficial bacteria in improving plant tolerances to both biotic and abiotic stresses. They also focus on adaptive mechanisms of these phytobeneficial bacteria such as small regulatory RNAs, two component systems (TCS) and outer membrane vesicles (OMVs) and their role in plant-bacteria interactions.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The team should be careful in developing new topics given the human forces.

This has been addressed with additional funding being acquired including from non-academic sources to implement the new research topics.

There are probably means to increase selectivity of media for publications.

The team continues to target publication outlets that they feel will reach the broadest target communities.

Priority may be given to the coordination of international and/or national programs and better communication at the international level to increase attractiveness, in particular of new researchers, as the small size of the team may rapidly become a threat.

New researchers have been recruited and international collaborations have been initiated involving co-publishing of research outputs. The team currently consists of 3 researchers, 3 engineers, 2 technicians, 6 PhD and 1 master student.

More attention should be paid to the training capacity and environment within the team.

This has not been addressed to any great extent.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	0
Lecturer and associate lecturer	0
Senior scientist (Directeur de recherche, DR) and associate	2
Scientist (Chargé de recherche, CR) and associate	1
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	1
Research supporting personnel (PAR)	3
Subtotal permanent personnel in active employment	**7**
Non-permanent teacher-researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	0
Post-docs	1
PhD Students	12
Subtotal non-permanent personnel	**13**

Total	**20**

EVALUATION

Overall assessment of the team

The team continues to work on soil-plant-microbiota interactions by employing multidisciplinary approaches to study the role of host-associated microbiota in mediating interactions between the host and its biotic/abiotic environment and the adaptive strategies of bacteria to the host plant and the environment. LEMiRE continues to perform original relevant research and to make important contributions to the field. The scientific quality of the work is very good to excellent and is of an international standard. The team has successfully funded their research through national and non-academic/private sources, and have produced a high number of publications per researcher and other outputs of significant worth (spin-off company, patent, genetic databases).

Strengths and possibilities linked to the context

The team are following three main research areas: i) Root exudates and how they shape microbiota structure and function; ii) phytobeneficial bacteria that improve plant growth and health and; iii) adaptive strategies of phytobeneficial bacteria.

They have reported some novel findings including data that demonstrate the importance of the genetic traits of cereals on microbial diversity, the physical characteristics of soil and with carbon sequestration in soil. They have demonstrated that inoculation of non-legume EPS producing Rhizobium strains can improve plant tolerance to drought by modifying the microbiota on their roots and in the rhizosphere. They also demonstrated how fine-tuning of Rsm sRNAs expression and stability can help to optimize the survival of a beneficial plant root-associated strain in nutrient-poor environments.

They are very well established scientifically in the field of plant microbe interactions which is reflected in their participation in a number of ongoing research projects with funding being obtained from national sources (2 ANR grants, total of 407K€; coordinator) and non-academic entities/private companies (BpiFrance, GNIS/SEMAE, CASDAR; total of 983K€).

The team also contributes to the national and international research areas through the organization of scientific meetings (1 national, 4th Environmental Genomics Meeting in Marseilles; 1 international, first International Conference on Holobionts in Paris), serving on scientific committees of meetings (e.g. International Conference Sustainable Agriculture: Tools and Innovations; 4th International Congress: Microbial Biotechnology for Development) and participation on editorial boards (Microbiology; 1 member) or in journal special issues (2 members).

The total number of publications is excellent (70 articles), 33 as lead author and 37 as co-authors, together with 7 book chapters. All researchers are publishing, with an average of 27 articles per person during this period and PhDs/postdocs producing on average 2 articles per person. The interdisciplinary approaches being employed by the team are reflected in the diverse range of journals in which they publish. Some of these papers have been well cited in the literature such as *Avellan et al*., 2017 (71 citations), and with >300 citations of articles published since 2016. The collaborative nature of their research is reflected in the fact that 16 papers have been published with international research teams from Brazil, USA, Morocco and Germany. The strategy of the team to "prioritize publications in journals that reach the broadest target community" is appropriate for this field of research. Importantly a number of papers have been co-authored with other BIAM teams, which reflects how well established this team is within the overall research unit.

The contribution of the team's research activities is excellent. They have undertaken meaningful and very productive activities involving non-academic entities/private companies. For example, through the project MOPAD with partners Limagrain, Biovitis, LabGem Genoscope; through the project DIETETIC with partners Limagrain, Genective, Proteus and LaBGeM Genoscope; through ENHaNCE with BIA-INRAE, CEREGE and financed through CASDAR with partners CERIENCE and IPS2 Saclay. Non-academic partners (Biointrant, ARD company and InVivo) have funded or partly funded doctoral students in the team.

A spin-out company BioIntrant has been established from the team which employs novel approaches to increase the efficiency of bacteria for biostimulant and biocontrol applications. The team has also developed

two databases (P2CS and P2TF), as well as a web server (P2RP) dedicated to the prediction of regulatory proteins in prokaryotes, and has filed a patent involving a protein that functions as a pesticide.

The team actively engages with society in general, for example, with participation in the "Fête de la Science".

Weaknesses and risks linked to the context

There is a lack of EU funded projects, and the acquisition of which would help the group to strengthen EU networks and scientific research in the EU area.

The small size of the team with only 3 researchers, and 1 postdoc, could be a potential weakness from a future sustainability standpoint.

RECOMMENDATIONS TO THE TEAM

It is recommended that the team where possible target publications in highly respected multidisciplinary journals to increase the citations and visibility of their research work.

The team could take advantage of the JGI Community Science Program calls for large-scale genomic projects.

The team should target future EU funding programs to help strengthen their EU networks and the quality of their research outputs.

It is recommended that the team attempts to recruit additional researchers, and postdocs, to enhance its potential future sustainability.

Team 4: LGBP (Luminy Génétique et Biophysique des Plantes)

Name of the supervisors: Mr Stefano Caffarri (since September 2021; previously Mr Christophe Robaglia), Mr Ben Field and Mr Benoît Menand

THEMES OF THE TEAM

The LGBP team is focused on a continuum of research linking photosynthesis to stress adaptation and growth control in green plants. Three main research axes are developed: (i) architecture and dynamics of the photosynthetic machinery, (ii) plastid integration and evolution and (iii) cytosolic and nuclear regulation of stress responses and growth.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The previous committee recommended trying to increase involvement in European projects.

This is addressed as collaborations (resulting in publications) that have been established at the international level: CNR Biophysics (Milan, Italy), Groningen University (The Netherlands) and Heinrich-Heine University (Germany).

The previous committee recommended trying to engage more in outreach activities and/or with non-academic partners.

This is partially addressed as a CNRS patent on the improvement of nutrient use efficiency in plants by modulating ppGpp levels has been deposited.

The previous committee recommended trying to keep up the good output of papers from the PhD students. The teaching involvement on undergraduate levels is super-optimal. It is very good to engage a lot in teaching, but it seems for this team as if the teaching load may limit the research output.

This is addressed. The team has published 41 articles (and provides link to 4 additional preprints) in international peer-reviewed journals, 31 as leader, 14 in collaboration (7 with other BIAM teams). All students contributed to the scientific production of the team with an average of 1 publication per PhD/postdoc per year.

The previous panel pointed out the crucial need for a better integration of the projects at the laboratory level to consolidate the laboratory project.

This is addressed. The team's research integrates the axes "From photosynthesis to bioenergies" and "Response and acclimation to environmental challenges" of the BIAM project.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	3
Lecturer and associate lecturer	3
Senior scientist (Directeur de recherche, DR) and associate	0
Scientist (Chargé de recherche, CR) and associate	2
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	1
Research supporting personnel (PAR)	5
Subtotal permanent personnel in active employment	**14**
Non-permanent teacher-researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	2

Post-docs	0
PhD Students	11
Subtotal non-permanent personnel	**13**
Total	**27**

EVALUATION

Overall assessment of the team

As LGBP is located on the AMU campus, it plays a crucial role in establishing strong links between structures of the 2 geographical sites. The team is excellent at raising national funds, but should make better use of EU funding and industrial opportunities. Although its publication record is excellent, the team could aim for more publications in general journals. The team leads Plant Science teaching at AMU. Dissemination towards society, especially public debate, is very good, however interaction with private companies is absent.

Strengths and possibilities linked to the context

The LGBP team has grown over the years and includes both CNRS and AMU personnel. The division of the research in three axes that are complementary and sufficiently independent is a good achievement. One could point out that axes are driven by three talented researchers that take part together in the direction of this group (head and 2 deputy). Judging from the BIAM collaborative output, it is interesting to notice that LGBP does not suffer from the distance to effectively collaborate with the BIAM core unit in Cadarache (team 4 involved in 13 collaborative papers, on the same level of collaborative papers as other BIAM teams). One can notice a privileged link with team 8 (SAVE) with 6 out of a total of 13 LGBP collaborative papers. An important strength for the team is that one of its deputy directors is present in the important CMS committee, advising the director of the unit for scientific decisions.

A notable strength of LGBP is its central position as the plant lab on the Luminy campus, likely providing a direct influx of motivated students. We can image one of LGBP's informal roles within BIAM is to share this influx with the Cadarache colleagues.

Weaknesses and risks linked to the context

A clear weakness that probably needs to be addressed on a daily basis, is the geographic distance with Cadarache. This probably hinders some scientific exchange (although video meetings probably avoid a lot of car trips between the two sites). One could be more concerned for the access to facilities (technological platforms), luckily LGBP has its own plant growth facilities. It is also likely that this team is benefitting less from the research administration team of BIAM central CEA location.

Of course being associated with the university comes with its teaching load, leading to some personnel being less productive in their research output. It is essential for each involved individual and the team on the whole to find the best equilibrium between these two time consuming activities.

Although LGBP team does produce significant and impactful research, it is noticeable that there is a lack of publications in generalist journals.

RECOMMENDATIONS TO THE TEAM

The team should improve its leadership position in general scientific journals.

The team should try to diversify its funding. It should increase international funding and set up contracts with industrial partners in the field of biofuels and green chemistry in direct connection with climate change, since its research activity makes it possible to integrate these fields.

The team could strive to attract more applicants for postdoctoral fellowships and visiting professors.

In order to enable non-publishing teacher-researchers to invest in research, and researchers could contribute to teaching.

One could suggest to continue to partner with the mentioned international collaborators, but also internally with BIAM teams, as there are clear common themes around photosynthesis, plastids and redox.

Team 5: Molecular and Environmental Microbiology (MEM)

Name of the supervisors: Mr David Pignol (2016-18); Mr Damien Faivre, with Ms Laurence Blanchard & Mr Pascal Arnoux as assistants (2018-22)

THEMES OF THE TEAM

The research focus of the Molecular and Environmental team is on three main areas, namely: i) radiation-resistant bacteria and their responses and adaptation mechanisms to radiation and oxidative stress, ii) bio-mineralisation by micro-organisms, focusing on fundamental studies together with biotechnological applications in health and environmental industry, and iii) metal uptake and the study of metalloproteins in bacteria. The team are employing multidisciplinary approaches including molecular biology, chemistry, genomics, microbiology enzymology, structural biology, biochemistry and biophysics.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The panel would like to point out the crucial need for a better integration of the projects at the laboratory level.

This should be addressed in the future with the consolidation of the three foci through a new team and restructuring of the MEM into a new MEM team focusing on biomineralization and a BEAMM team focusing on environmental studies of magnetotactic bacteria.

The LBC should pursue a strategy to rapidly transfer their fundamental results into biotechnological developments in contact with industry. Participation to the diffusion of scientific knowledge should be improved.

This has been addressed through a grant "Bioengineering of magnetosomes with Herceptin antibody and Pb-binding chelators" involving the pharmaceutical company OrganoMed with a team member. The new MEM team also has team members that will have a stronger focus on biotechnology application of the results produced by the team. They have also been addressed through the involvement of the team in the ADEQUABIO startup.

To increase the impact in training through research the LBC members should be encouraged to increase their investment in teaching and young members to defend their HDR.

Now that two new teams have been created, only one HDR is present in team BEAMM (1 out of 3 personnel that could be HDR), the new MEM team is less fragile as 4 out of 5 of the researchers have their HDR.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	0
Lecturer and associate lecturer	1
Senior scientist (Directeur de recherche, DR) and associate	0
Scientist (Chargé de recherche, CR) and associate	3
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	5
Research supporting personnel (PAR)	6
Subtotal permanent personnel in active employment	**15**
Non-permanent teacher-researchers, researchers and associates	1
Non-permanent research supporting personnel (PAR)	1
Post-docs	4
PhD Students	12

Subtotal non-permanent personnel	**18**
Total	**33**

EVALUATION

Overall assessment of the team

The team continues to work on issues of radiation-resistant bacteria and their responses and adaptation mechanisms to radiation and oxidative stress; bio-mineralisation by micro-organisms together with metal uptake and the study of metalloproteins in bacteria. The team has made significant contributions to the field and continues to perform very original and relevant research. The scientific quality of the work is excellent in general with outstanding aspects dealing with magnotactic bacteria and symbiosis of the latter with protists. The team is of a very high international standard in this field of molecular and environmental research. The team displays high potential with respect to translational research.

Strengths and possibilities linked to the context

The team has reported some novel exciting findings including a mutualistic symbiosis between protists and ectosymbiotic anaerobic sulfate-reducing chemolitho-autotrophic bacteria biomineralizing ferrimagnetic nonaparticles. They have identified that the peptidase function of the metalloprotease IrrE is activated by increased availability of zinc after stress, demonstrating for the first time the role of zinc as a secondary messenger in redox signalling in prokaryotes. They have also identified nicotinamine-like metallophores involved in zinc uptake in *Staphylococcus aureus* and *Pseudomonas aeruginosa* and are currently evaluating the diversity, regulation and evolution of these metallophores in different bacterial systems.

The total number of publications is excellent (97), 59 as lead author and 11 as co-author. Some of these papers have been published in high respected journals in the respective research field, including *Science*, *Nature Communication*, *Nature Microbiology*, *PNAS* and *ISME J*. The impact of the work being undertaken by the team is reflected not only in the citations of some of their recent publications for example *Bente et al.*, (2020) Elife has already received 15 citations, while *Sorigue et al.*, (2021) *Science* has received 37 citations.

The team is very well established scientifically in their field which is reflected in their participation in a number of ongoing research projects with funding being obtained at both local and national level, these include BIAM transversal projects. With respect to interdisciplinary and collaborative interactions, the team collaborates with groups whose expertise includes chemistry, materials science, physics and biophysics among others. This involves interactions with different teams within BIAM, and national groups including Paris Saclay, IMM Marseille, INRAE Jouy-en-Josas, together with many international collaborators.

The team has obtained a substantial and impressive level of funding (425 K€/year) from a variety of funding sources (although mostly from national agencies), to undertake their research activities. The team have been involved with a start-up company, Adequabio, which is developing methods to treat phytosanitary products of effluent treatment.

The team participates in actions and presentations at local schools. They have also participated in actions involving the public, including Journée famille-amis CEA, Fête de la science, and Nuit européenne des chercheurs.

Weaknesses and risks linked to the context

European funding is quite limited, and attractiveness to foreign PhD and postdoctoral researchers is lacking. There is also a lack of visibility of the team at an international level in larger consortia.

RECOMMENDATIONS TO THE TEAM

The expert committee recommends that the team significantly increases their attractiveness for PhD and postdocs and their networking at an international level.

The expert committee recommends that the team attempts whenever possible to target publications in the top multidisciplinary journals to increase the citations and visibility of the research work.

The expert committee recommends that, following restructuring of the MEM into a new MEM team focusing on biomineralization and a BEAMM team focusing on environmental studies of magnetotactic bacteria, the area of bacterial radioresistance involving a well-established research line on *D. deserti* within the team for many years not be neglected in the future. The new BEAMM team will be the smaller of the two new teams, and the committee strongly suggest its members to pass their HDR as soon as possible to have more than one HDR in the team.

Team 6: Photosynthesis and Environment (P&E)

Name of the supervisors: Mr Jean Alric & Ms Xenie Johnson

THEMES OF THE TEAM

The P & E team ambitions to determine the potential and limitations of photosynthesis, identifying the factors controlling photosynthesis efficiency in response to environment and its acclimation to changing light and CO_2 in plants and microalgae. Its ultimate goals are to improve phytosynthesis and to find solutions to mitigate climate change. This is tackled at the molecular, plastidial, cellular, organismal and canopy scale. It includes development of experimental and modelling approaches to assess photosynthetic performance. To this end, the team has developed non-invasive phenotyping tools, state-of-art equipment, including instrumented growth chambers (ImaPlant in the PhytoTech platform). Oriented towards basic knowledge, their research topic meets potential interests in agronomy, ecology, plant breeding, bioenergy or green biotechnologies.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Not applicable as the teams have been reshaped since 2017, with the P&E team as a newly created team.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	0
Lecturer and associate lecturer	0
Senior scientist (Directeur de recherche, DR) and associate	1
Scientist (Chargé de recherche, CR) and associate	1
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	1
Research supporting personnel (PAR)	1
Subtotal permanent personnel in active employment	**4**
Non-permanent teacher-researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	1
Post-docs	0
PhD Students	4
Subtotal non-permanent personnel	**5**
Total	**9**

EVALUATION

Overall assessment of the team

Led by two mid-career dynamic scientists, the rather young Photosynthesis & Environment team (P&E) is committed to fundamental research on the regulation of solar energy capture and reduction of atmospheric CO_2 by plants and microalga. To this end, the team has promoted sophisticated instrumentation and original technical approaches, basis for extended collaborations from internal to international, as a key member of the large and well-funded H2020 CAPITALISE project. The scientific production and visibility of P&E is very good with excellent aspects in well-established speciality journals, occasionally high visibility generalist ones (1 article in *PNAS*). Yet, so far P&E did not succeed in translating its findings and technical advances into industrial collaborations and developments beyond consulting activity. The public outreach is at a good level.

Strengths and possibilities linked to the context

P&E holds unique technical expertise and instruments dedicated to the biophysics of proteins and non-invasive evaluation of photosynthesis. With the relocation of the laboratory in a new building the team is implementing a novel platform with recruitment of a CNRS support IR to share this expertise with the national and international community. As the P&E team is of rather small size this is a very significant strength and a basis for many collaborations with other teams of BIAM, including co-publications or grant sharing with teams 7 (PPV), 4 (LGBP), 2 (EBM), and 8 (SAVE) in the last 5 years. P&E also collaborates strongly with CEA Tech Région Sud with co-supervision of 2 PhD students. Moreover, this technical expertise in the measurements of photosynthesis, added to strong international networking, has resulted in a partnership as WP leader in the European H2020 large scale project CAPITALISE (2021-2025) with very significant funding for the team (554K€).

P&E members have developed a method for the random mutagenesis of targeted gene fragments in the chloroplast genome using error-prone PCR published in "breakthrough technologies" [*Plant Physiol*, 2018]. This constitutes a promising tool in a long-term research perspective, as demonstrated by the recent identitication of APE1 thylakoid protein involved in the remodeling of Photosystem II [BioRxiv, 2020].

The P&E members publish continuously high- or excellent quality non-incremental research papers, in total 21 publications over the period (i.e. 1.16 article/researcher/y; 12 as leader, 8 with other members of BIAM). One of the papers appeared in a high visibility multidisciplinary international journal (*PNAS*), most others in the best speciality journals in their field (1 *Plant Cell*, 2 *New* Phytol., 4 *Plant Physiol*., 2 *J. Exp. Bot*., a review in *Curr. Op. Plant Biol*.). They have identified the long-supposed activation site for the Stt7 protein kinase on the cytochrome *b6f* complex [*PNAS*, 2017]. They reexamined the relationship between carbonic anhydrase activity and isotopic equilibration of 18O between CO_2 and water during leaf photosynthesis for both C3 and C4 plants [*Plant Physiol*, 2018]. These various contributions reflect their expertise in the field of photosynthesis.

Further illustrating P&E's technical strength, one of its members is a consultant for an US-based R&D company of instruments dedicated to photosynthesis (LI-COR-Biosciences). Another member is leader of the national GdR2104 "Integrative biology for CO_2 capture" involved in the PEPR FairCarboN.

Weaknesses and risks linked to the context

The different research lines may not seem well interconnected. The P&E team is strongly relying on protein science expertise from team 5 (MEM) and 2 (IPM). Although strong collaboration is a strength, this may also limit the autonomy of the team in the future.

The team may reinforce its publication activity in fundamental research versus technical development (even if this is a real strength of the team).

Implementation of an open platform for extended exploitation of the team's instruments would require additional technical and funding support.

The team does not seem very attractive for postdocs.

The team has very limited interaction with the non-academic world and does not protect its technical developments, when they represent significant advances that can be implemented in commercial products.

P&E has limited outreach activity if any.

RECOMMENDATIONS TO THE TEAM

The committee recommends team 6 to reinforce its autonomous fundamental research activity, possibly via recruitment of junior researcher(s) to fully valorize its technical expertise. This might include a better integration of its research lines to optimize the synergies.

P&E is encouraged to pursue its efforts to structure a technical platform managed by a dedicated support personnel. This would save more time for the team's member's fundamental research, enhance technical developments and help secure funding for equipment maintenance and renewal.

The team is advised to reinforce interactions with private partners and to seek better protection and/or exploitation of its technical advances.

The committee recommends P&E to increase outreach and teaching activities.

Team 7: Plant Protective Proteins (PPV)

Name of the supervisors: Mr Pascal Rey & Ms Dominique Rumeau

THEMES OF THE TEAM

The PPV team research is focused on the preservation of photosynthetic machinery in mesophyll cells, which are the cells in plants responsible for photosynthesis. They explored the function of plant lipocalins in the protection of the photosynthetic apparatus and the participation of thiol reductases in plastidial redox homeostasis. Lipocalins, a family of small proteins that can bind small hydrophobic molecules, were found to protect against oxidative damage from environmental stressors, preventing the accumulation of fatty acid hydroperoxides and lipid peroxidation chain reactions initiated by reactive oxygen species (ROS). Thiol reductases, such as thioredoxins and peroxiredoxins, were also found to regulate the redox status of partner proteins and play a crucial role in maintaining redox homeostasis in chloroplasts. Their research also examines the role of plastidial thioredoxins and their targets in the regulation of plastidial metabolism and the impact of altered thioredoxin function on photosynthetic efficiency. The findings of the research may be useful in developing strategies to improve photosynthetic efficiency and protect plants against oxidative damage.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Not relevant as team 7 was not evaluated as such in the previous report.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	0
Lecturer and associate lecturer	0
Senior scientist (Directeur de recherche, DR) and associate	0
Scientist (Chargé de recherche, CR) and associate	1
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	2
Research supporting personnel (PAR)	2
Subtotal permanent personnel in active employment	**5**
Non-permanent teacher-researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	0
Post-docs	0
PhD Students	1
Subtotal non-permanent personnel	**1**
Total	**6**

EVALUATION

Overall assessment of the team

Much of the work of the PPV team is devoted to deciphering the mechanisms related to reactive oxygen species and redox homeostasis, which is a major determinant of proper cellular metabolism. This experienced team relies on a few internal (BIAM), national and international collaborations. Team PPV has a good scientific production (0.94 articles/researcher/year) in plant science journals (*Plant Cell, J. Exp. Bot., Plant Cell Env.*) but suffered in the evaluated period from a lack of funding. Two private partnerships led to investment in human resources (PhD and technician). As the team will close soon with retirement of its three permanent researchers, the care taken by the team to transmit their knowledge and ressources to the community is commendable.

Strengths and possibilities linked to the context

The PPV team comprises experienced researchers with a long career. Their scientific production is based on sound theoretical and methodological foundations. They published 17 papers in international peer-reviewed journals (0.94 articles/reseracher/y), 9 as lead author, in good speciality journals such as *J. Exp. Bot.* (1), *Plat Cell Env*. (3), 1 article in *Plant Cell* not as leader. The team works on two main research lines: preservation of photosynthetic machinery and signalization in stomatal functioning. They demonstrated a link between lipocalins and qH, a slowly reversible form of non-photochemical energy quenching (NPQ), a mechanism by which photosynthetic organisms harmlessly dissipate excess absorbed light energy (*Plant Cell*, 2018). They also showed that expression of human lipocalin (APOD) in *A. thaliana* could partially compensate for the lack of plastidial lipocalin (*Plant Physiol. Biochem.*, 2020). In the continuity of other publications, they proposed that the abundant 2-CysPRX peroxiredoxin enzyme, considered as a major plastidial regulatory hub, plays a role of oxidant buffer maintaining proper redox regulation in concert with diverse TRX types depending on physiological context (*J. Exp. Bot*., 2019). In this respect they provided data that strongly support the contribution of thiol redox switches (2-CysPRXs or GRXs) in the signaling network regulating guard cell movements, and highlight the involvement of redox signals originating from plastids in stomatal functioning (*Plant Cell Env*., 2021). Part of the scientific production of the PPV team was the result of collaborations with internationally recognized colleagues in other institutions or was co-authored with members of other BIAM teams. The team is involved in collaborative research projects with two French industrial partners.

Weaknesses and risks linked to the context

The risk for this team comprising researchers at the end of their career was undoubtedly to experience less motivation, particularly in the context of major restructuring and relocation of the BIAM institute which took place during the period evaluated. It is clear that this has not been the case.

Another risk for the coming period is to see the knowledge and expertise acquired by senior researchers disappear when they retire within two years.

RECOMMENDATIONS TO THE TEAM

PPV is a small team, with three of its leaders close to retirement age. The committee understands that the trajectory is to close this team in the near future. The committee would like to recommend to the PPV collective to finalise which-ever worthy scientific results either by trying to publish them before effectively closing the team or transferring knowledge and material to collaborators, preferably to BIAM collaborators, but other French collaborators could also be interested (e.g. by plant lines). This will allow others to pursue their research and to valorize the investments of the team.

Team 8: Signalisation in relation to Adaptation of plants to their Environnement (SAVE)

Name of the supervisors: Mr Laurent Nussaume & Ms Nathalie Leonhardt

THEMES OF THE TEAM

The SAVE team research activities are focused on the importance of phosphorus (P) nutrition and more generally on ion homeostasis in plants. Four themes are developed: "Root-soil ion exchanges" deals with the characterization of transporters (AHA1 family) and regulations controlling STOP1 activities; "Pi uptake" deals with mechanisms controlling Pi flux; "Root architecture modifications" deals with the effect of signalling molecules derived from the oxidation of beta-carotene on root architecture regulation; "Pi homeostasis" deals with identification of plant biomarkers for revealing bioavailable Pi present in soils, and characterization of the transcriptional repression driven by Pi supply (MS2 RNA labelling system with microfluidics).

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Recommendation: more synergisms between the different axes.

This is addressed. One of the PI's is involved in the 4 research themes and brings a transversal view for the team's project.

Recommendation: diversify funding sources, secure new ANR, attract young scientists, update the website.

This is at least partly addressed. SAVE obtained 2 CEA, 10 ANR, 1 PIA contracts, and 1 H2020 Erotalent. A total of 17 young scientists joined SAVE (6 post-doctoral and 11 PhD students) corresponding to 2.8 persons per year. A junior scientist was recruited.

The website has been updated.

Recommendation: collaborate with industrials and communicate more with the public/schools.

These points are addressed. SAVE has developed multiple collaborations with industry (5 direct funded contracts and 1 PIA). They are also involved in the ANR-PRCE project (ULTIM project on phosphate perception using real-time transcription imaging). Twelve public communications (press releases, 2 articles, 1 radio RTL, 1 TV, 2 YouTube, 1 social debate) related to phytoremediation and drought stress are listed.

Recommendation: take a larger part into teaching.

Limited action. Teaching participation mainly at Aix-Marseille University (around 40 h/year).

Recommendation: consolidate the lab project and integrate expertises.

This is addressed. SAVE research is integrated into 2 BIAM axes, "From photosynthesis to bioenergies" and "Response and acclimation to environmental challenges", and can benefit from BIAM expertises.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	0
Lecturer and associate lecturer	0
Senior scientist (Directeur de recherche, DR) and associate	0
Scientist (Chargé de recherche, CR) and associate	0
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	6
Research supporting personnel (PAR)	8

Subtotal permanent personnel in active employment	**14**
Non-permanent teacher-researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	1
Post-docs	1
PhD Students	11
Subtotal non-permanent personnel	**13**
Total	**27**

EVALUATION

Overall assessment of the team

SAVE develops original competencies in the field of mineral nutrition, ion signalling, cell biology and photooxidative stress, supported by cutting-edge technolology in cell biology. It has excellent visibility in its fields as shown by highly successful competitive fund raising and international partnerships (China, Japan), numerous invitations to give oral presentation at international conferences and seminars at international institutions around the world. The team's scientific production is excellent with 61 publications (49% as leader), with articles in high visibility generalist and speciality journals such as *Nat. Commun*. or *Nat. Plants*. The team is remarkably effective regarding transfer activity, collaborating with 7 industrial partners, which resulted in two patents and strong financial support. Its contributions to outreach activities could be diversified.

Strengths and possibilities linked to the context

SAVE is a strong team that holds original competencies in the field of mineral nutrition, ion signalling, cell biology and photooxidative stress, supported by the recent development of cutting edge technolology in cell biology with the implementation of transcription and radioisotope imaging. The team recently extended its expertise with the recruitment of a specialist of inositol pyrophosphate (competence unique in France).

SAVE is attractive: the team recruited 2 tenured scientists, 2 engineers and 1technician and trained 10 PhD students and post-docs. It has high international visibility in its field. This is underscored by a large number of invitations for oral presentations in international congresses all around the world (on average 4-5/y; some prestigious and with broad audiences, such as International Botanical Congress, Gordon Conferences, International Congress on Biophysics of Photosynthesis). SAVE's excellent visibility is also evident by numerous invitations to give seminars in many national and international institutes and universities (Japan, Switzerland, Germany, Taiwan, Spain, Italy and more). SAVE actively participates to the French/Japanese networking and join programs. It contributes the Hcéres evaluations and to the CN23 of the CNRS national committee.

The team has fostered a very large set of collaborations with high-profile national and international academic and private partners, resulting in many national and (less) international competitive grants (10 ANR, 1 PIA (DEMETERRES), 2 CEA, 1 European H2020 Eurotalent funded projects) providing at total of 3.3 M€ during the evaluated period, i.e. 91.6 k€/researcher/y. To be mentioned also, 1 EMBO fellowship and one intensive Chinese partnership with Tsinghua University that further attest to SAVE's international visibility.

The scientific production of the team is excellent with 61 articles on the period (average 2.2/tenured researcher/y), 30 as leader (49%) and 22 as first author (22%). Articles are published in high visibility journal, some generalists (*PNAS, eLife, Development, Nat. Com.* (2), *Cur. Biol.* (2)), or among the best in their field (e.g. *Nat. Plants* (2), *Nat. Microbiol., Plant Cell* (5), *New Phytol.* (2), *Mol. Plant* (2), *Plant Phys.* (8), *Plant J.* (6)). Among the best ones, one can cite a last-generation RNA imaging system, combined with microfluidics, to visualize transcriptional regulation in living plants that will benefit future studies of signalling processes (*Nat. Plants*, 2021). Another is the discovery of a transcription factor STOP1 and of its direct target ALMT1 (a malate channel) forming a signalling pathway of low Pi availability, identifying exuded malate as an unexpected apoplastic inhibitor of root cell wall expansion (*Nat. Commun*., 2017). All PhD students are publishing (average 2 publications/student).

SAVE has intensive translational activity involving multiple industrial partners such as Orano and Veolia (mainly via the PIA DEMETERRES), Roullier, Biogemma, Vilmorin on various topics in its field of competence (phosphate

nutrition, markers of phosphate deficiency, bioremediation, anti-oxidants, drought tolerance) that provided the team with significant funding (748 k€ not taking into account the PIA DEMETERRES already listed above). This transfer activity has led to two patents on the evaluated period (one on control of stomatal closure and the other on apocarotenoid-promoted drought tolerance). Tools for the scientific community have been implemented: a database SeedUsoon for seed inventory management and a robot for plant root phenotyping. The team contributed to broad audience dissemination activities and to AMU licence and master teaching (average 20-30 h/y).

Weaknesses and risks linked to the context

SAVE is losing very significant expertise and attractivity with the retirement a senior researcher and the internal BIAM mobility of three others (2 senior and 1 recent recruit).

Implementation of transcription imaging is still limited by lack of fast imaging system.

In spite of high international visibility and attractivity, besides bilateral partnerships the team did not succeed to collect substantial international funding involving multiple partners.

RECOMMENDATIONS TO THE TEAM

SAVE has to take the opportunity of upcoming position openings to compensate loss of expertise and recruit novel competencies required to ensure success of its next term projects.

The team's networks and visibility should be exploited to foster EU or HSFP-funded international collaborations.

SAVE is encouraged to keep striving to acquire the fast imaging system necessary for critical experiments.

Outreach activities could be diversified with (communications in the media, social networks, videos and more).

CONDUCT OF THE INTERVIEWS

Dates

Start: December 15th of 2022 à 8.30 am

End: December 16th of 2022 à 6 pm

Interview conducted online

INTERVIEW SCHEDULE

December 15th of 2022

08:30 – 08:45	Presentation of the evaluation process and of the committee to the unit
08:45 – 09:25	General presentation of the BIAM (presentation 20 min + questions 20 min)
09:25 – 09:55	Team 2 (IPM) (presentation 15 min + questions 15 min)
09:55 – 10:25	Team 3 (LEMiRE) (presentation 15 min + questions 15 min)
10:25 – 10:40	Break
10:40 – 11:15	Team 5 (MEM) (presentation 20 min + questions 15 min)
11:15 – 11:45	Team 7 (PPV) (presentation 15 min + questions 15 min)
11:45 – 12:30	Hcéres committee debriefing
12:30 – 13:30	Lunch
13:30 – 14:00	Team 1 (EBM) (presentation 15 min + questions 15 min)
14:00 – 14:35	Team 4 (LGBP) (presentation 20 min + questions 15 min)
14:35 – 15:05	Team 6 (P&E) (presentation 15 min + questions 15 min)
15:05 – 15:40	Team 8 (SAVE) (presentation 20 min + questions 15 min)
15:40 – 15:55	Break
15:55 – 16:40	Hcéres committee debriefing
16:40 – 17:45	The platforms (Phytotec/Heliobiotec/ProteinTec/ZoOM) (presentation 40 min, questions 15 min)
17:45 – 18:30	Hcéres committee debriefing and report editing

December 16th of 2022

08:30 – 08:55	Discussion with technicians and engineers
08:55 – 09:20	Discussion with students and non-permanent staff
09:20 – 09:45	Discussion with scientists (without team leaders and deputies)
09:45 – 10:10	Discussion with team leaders and deputies
10:10 – 10:30	Discussion with "chargé de mission scientifique"
10:30 – 12:00	Hcéres committee debriefing and report editing
12:00 – 13:00	Lunch
13:00 – 13:30	Discussion with the governing bodies
13:30 – 14:30	Discussion with the direction of BIAM
14:30 – 18:00	Hcéres committee debriefing and report editing

GENERAL OBSERVATIONS OF THE SUPERVISORS

Le Président de l'université

au

Département d'Évaluation de la recherche - Hcéres

Objet : Observations de l'unité relatives au rapport d'évaluation des experts Hcéres
N/Réf. : VPR/LS/AMS/CM – 23-06

Dossier suivi par : Cécile Merle
Tél : 04 13 94 95 90
cecile.merle@univ-amu.fr

Vos réf :
DER-PUR230023493 - BIAM - Institut de biosciences et biotechnologies d'Aix-Marseille

Marseille, le jeudi 15 juin 2023

Madame, Monsieur,

Je fais suite à votre mail du 23/05/2023 dans lequel vous me communiquiez le rapport d'évaluation Hcéres de l'Unité de Recherche BIAM - Institut de biosciences et biotechnologies d'Aix-Marseille.

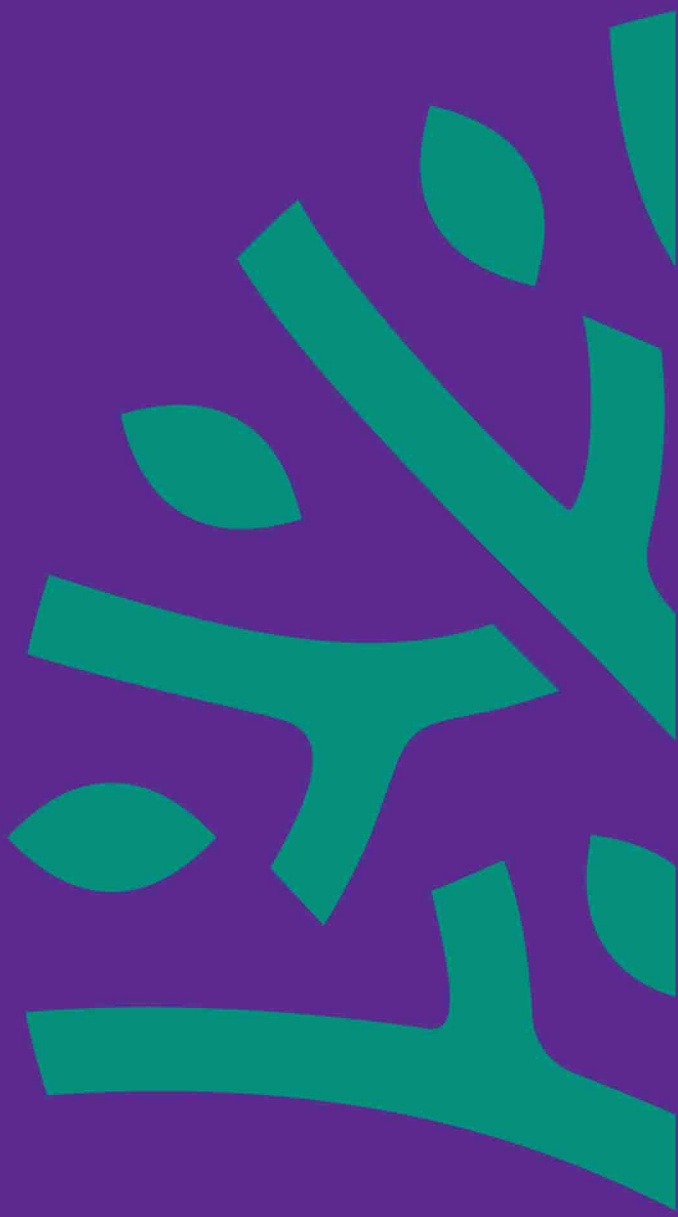
Comme demandé dans ledit mail, je vous indique que les tutelles du BIAM, Aix-Marseille Université, le CEA et le CNRS, n'ont pas d'observation à formuler.

Vous souhaitant bonne réception des présentes,

Je vous prie de croire, Madame, Monsieur, l'expression de mes respectueuses salutations.

Eric BERTON

The Hcéres' evaluation reports are available online:
www.hceres.fr
Evaluation of Universities and Schools
Evaluation of research units
Evaluation of the academic formations
Evaluation of the national research organisms
Evaluation and International accreditation



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