

EVALUATION REPORT OF THE UNIT

LBBM - Laboratoire de Biodiversité et Biotechnologies
Microbiennes

UNDER THE SUPERVISION OF THE FOLLOWING ESTABLISHMENTS AND ORGANISMS:

Sorbonne Université

Centre national de la recherche scientifique - CNRS

Université de Perpignan Via Domitia - UPVD

EVALUATION CAMPAIGN 2023-2024
GROUP D

Report published on February, 26 2024



In the name of the expert committee :

Patrick Linder, chairman of the committee

For the Hcéres :

Stéphane Le Bouler, acting president

In accordance with articles R. 114-15 and R. 114-10 of the Research Code, the evaluation reports drawn up by the expert committees are signed by the chairmen of these committees and countersigned by the president of Hcéres.

To make the document easier to read, the names used in this report to designate functions, professions or responsibilities (expert, researcher, teacher-researcher, professor, lecturer, engineer, technician, director, doctoral student, etc.) are used in a generic sense and have a neutral value.

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

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Mr Gilles Pinay, CNRS-INEE

CHARACTERISATION OF THE UNIT

Name: Laboratoire de Biodiversité et Biotechnologies Microbiennes

Acronym: LBBM

Label and number: USR3579

Composition of the executive team: Mr Marcelino Suzuki (directeur) & Mr Didier Stien (directeur adjoint)

SCIENTIFIC PANELS OF THE UNIT

SVE Sciences du vivant et environnement

SVE4 Immunité, infection et immunothérapie

THEMES OF THE UNIT

The research of the unit is organised in three thematic axes: 1) Microbial biodiversity and chemodiversity; 2) Chemical contaminations: detection, impact and biodegradation; 3) Ecology of pathogens. Using state-of-the-art interdisciplinary approaches, the activities led by the unit aim at deciphering the impact of the environment on the interaction of (micro)-organisms, and the effect of microbial communities on biodegradation and biofouling.

HISTORIC AND GEOGRAPHICAL LOCATION OF THE UNIT

In 2010, the team "Microbiologie/Écologie microbienne" belonging to the UMR7621-Laboratoire d'Océanographie Biologique de Banyuls-sur-Mer has been divided in two teams: the Laboratoire de Biodiversité et Biotechnologies Microbiennes" (LBBM) and the Équipe Mixte de Recherche" (EMR) Pierre Fabre. In 2014 both teams became associated into the independant unit USR3579-LBBM, extended in 2017 by the joining of the associated team "Biocapteur-Analyse-Environnement" from the University of Perpignan and renamed UAR3579 in 2021. The EMR Pierre Fabre is still embedded into the unit, resulting from a 20 years collaboration with the pharmaceutical laboratory Pierre Fabre.

The unit is located in Bâtiment C of the Observatoire Océanologique de Banyuls (OOB) and in bâtiment S of the University of Perpignan.

RESEARCH ENVIRONMENT OF THE UNIT

The unit UAR3579 is part of the Observatoire Océanologique de Banyuls (OOB). It is a research unit affiliated to the supervisory bodies Sorbonne University (SU) and CNRS. The University of Perpignan Via Dominitia (UPVD) acting as a secondary supervision body during the mandate become fully involved at the end of the period.

The team occupies a surface of 345 m² in a new building dedicated for research on the site of Banyuls, including notably a BSL2 laboratory and cell culture rooms among one in which the temperature is controlled. On the site of Perpignan, the unit occupies 180 m² with dedicated research laboratories for analytical chemistry and molecular biology.

In Banyuls, staff members are mostly affiliated to SU and CNRS, whereas the members at Perpignan are mainly from UPVD. At Banyuls the team is part of the FR 3724 OOB, whereas at Perpignan the team is part of the FR 2044 Energy and Environment.

UNIT WORKFORCE: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	5
Maîtres de conférences et assimilés	5
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	4
Personnels d'appui à la recherche	10
Sous-total personnels permanents en activité	25
Enseignants-chercheurs et chercheurs non permanents et assimilés	0

Personnels d'appui non permanents	5
Post-doctorants	1
Doctorants	13
Sous-total personnels non permanents en activité	19
Total personnels	44

DISTRIBUTION OF THE UNIT'S PERMANENTS BY EMPLOYER: in physical persons at 31/12/2022. Non-tutorship employers are grouped under the heading "others".

Nom de l'employeur	EC	C	PAR
UPVD	6	0	3
Sorbonne Université	4	0	2
CNRS	0	2	3
Autres	0	3	2
Total personnels	10	5	10

GLOBAL ASSESSMENT

The global performance of the LBBM Unit is excellent to outstanding.

The unit performs state-of-the-art interdisciplinary work on important societal questions of ecotoxicology as well as identifying new substances of importance (e.g., antibiotics, antibiofouling). The field of analysis of organism-(micro)-organism interactions and their influence on biofouling or their sensitivity to pollutants reaches from marine to terrestrial environments. The research in the unit is organized around three themes. Staff members participate in one, two, or all of the three themes, allowing cross-feeding and multiple internal interactions, leading to a highly interdisciplinary research activity (microbiology, ecology, chemistry).

The unit interacts successfully with other units of the OOB and plays a major role as driver and user of the platforms Bio2Mar, BioPic and of the service of aquariology.

The unit has a long-standing interaction (over 20 years) with the pharmaceutical and cosmetics company Pierre Fabre, but also successfully established fruitful interactions with other industries and regional authorities. These connections provide a comfortable and recurrent budget that allows the unit to efficiently manage challenges raised by infrastructure (equipment) maintenance and to provide relevant research programs to address fundamental scientific questions as well as ecotoxicological issues. This positioning makes the unit particularly proficient to assist regional agencies in the decision-taking and establishment of regulations. A recent example is the identification of some UV-filters in solar creams that are harmful to the environment. Consequently, the unit made a major contribution to help industry and at the same time to protect the environment.

In conclusion, the scientific objectives and the way they are managed are excellent to outstanding, allowing the unit to perform a large diversity of interdisciplinary projects including microbiology, molecular biology, analytical chemistry, and biochemistry leading to an excellent publication record.

DETAILED EVALUATION OF THE UNIT

A - CONSIDERATION OF THE RECOMMENDATIONS IN THE PREVIOUS REPORT

- The unit should increase its level of public outreach activities

The unit has a WEB-page that lists a number of activities (radio, television, news-papers -national and international) and reports a number of participations at science fairs and public seminars.

- The unit needs to exploit their web site to strengthen the visibility

The WEB site lists many different items, from publications, including recent ones, to research activities and public outreach. It is mostly updated although some information is still missing, e.g. "Médiation scientifique"

- The unit needs to put more efforts to exploit all available opportunities to recruit more PhD students.

Grants were obtained from the "Région Occitanie". The unit hosted 13 graduate students the 31/12/2022, 17 graduate students have defended their thesis during the period. The possibility of obtaining more Cifre grants remains to be further explored.

- The unit needs to involve all levels of staff in the orientation of the scientific themes.

The unit is still establishing a document on internal rules. Weekly meetings with all the staff on site and monthly intersites meetings are organized. Efforts are made to involve technical staff in project coordination (e.g., Émergence SU; ANR Amalia).

- The unit needs to continue to strengthen interactions with other units within the "Observatoire Océanologique". The federation constitutes an opportunity in this respect.

The unit participates through the platforms with other entities in the Observatoire. Interaction with the unit BIOM resulted in several publications. On the Perpignan site, collaborations with CRIOBE and PROMES teams are well developed and other have been initiated with IHPE and CEFREM.

- The unit needs to further improve the career development opportunities of the technical staff, by providing them with greater responsibilities.

Requests from the technical staff are seriously considered by the unit direction and adequate actions were undertaken. However, the final decision mainly relies on the Fédération de Recherche FR3724 (FR3724) and the concerned supervision bodies.

- The unit needs to clarify conditions whereby technical staff can be recognized for their scientific inputs in publications.

Technical staff members involved in the projects are associated to the publications.

- The unit needs to ensure a greater participation by all levels of staff in activities that will strengthen the further development of interactions between the LBBM and the BAE (Biocapteur Analyse Environnement, Perpignan) theme, such as seminars and joint workshops.

This item still needs to be improved.

- Formal structures need to be put in place with respect to the dissemination of information relating to the decision-making process to all levels of staff within the unit.

- The current Directorate Committee lacks representation of different levels of staff; this negatively impacts on the overall transparency of the decision-making processes and needs to be resolved.

Due to the relatively small size of the unit, most of the duties and activities related to unit organization, human resources are taken in charge by the director of the unit, discussed and submitted to a vote during general assemblies of the unit held twice a year. Career development depends on a shared service of the Observatoire.

- Formal structures need to be put in place for the overall strategic scientific management of the five- year project now and in the future. This will ensure the realignment of the scientific objectives where necessary and the further development of the research themes within the overall time frame of the project.

Meetings of the unit direction will be organized in a regular timing.

The "Conseil d'Unité" and the formalization of the internal rules document needs rapidly to be set up to help the management of the unit during the next period. The direction should consider establishing an "Extended Directory Board" to include the persons responsible for the three thematic axes for scientific decisions.

- Greater efforts need to be made to further internationalize the unit from the perspective of both collaborations and grant capture. EU funded ITNs would provide an opportunity in this respect, which would further facilitate attracting PhD students.

The unit has submitted projects to Horizon2020 and Interreg (SUDOE, MED).

- LBBM needs to establish a mission statement articulating its core purpose and focus while taking into account the future integration of the BEA team.

The integration of the teams based on Perpignan is now finalized, reinforced by the approval of UPVD as an official supervision body.

B - EVALUATION AREAS

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

Assessment on the scientific objectives of the unit

The scientific objectives are excellent to outstanding, aimed at understanding the influence of the environment on biological interactions and the effect of microbial communities on biodegradation and biofouling, using a large panel of interdisciplinary approaches. The third research axis will be ended and replaced by a new theme.

Assessment on the unit's resources

The unit has outstanding resources through its long-standing interactions with industries and by obtaining highly competitive grants.

Assessment on the functioning of the unit

The functioning of the unit is excellent. Due to its relatively small size, the director of the unit is in good contact with the staff and common decisions are taken by a general assembly. The unit is providing important support to the platforms, which in turn provide the unit with state-of-the-art techniques and research support.

1 / The unit has set itself relevant scientific objectives.

Strengths and possibilities linked to the context

The objectives of the unit are innovative and oriented towards questions of environment, species evolution, interaction of organisms in the context of environmental changes (climate, pollutants, etc.). The unit uses interdisciplinary approaches that allow the obtention of diverse grants from industry, the region, or research financing bodies (see below).

The main questions addressed are:

1. Describe fundamentals of intra- and inter- species microbial interactions, molecular characterization of the signaling network, with an emphasis on the structuration of aquatic microbial communities to decipher how these biofilms are formed and to discover how to prevent their occurrence.
2. Understand the effects of chemical and biological contaminants in the aquatic environment, and characterizing their degradation. Develop highly sensitive detection methods of such contaminants.
3. Describe the microbial biodiversity and identify biotechnological relevant substances produced by the identified microorganisms.
4. Provide services for the region and industry on toxicological and environmental questions.

To undertake these investigations, the research is built around 3 axes: 1) microbial biodiversity and chemodiversity, 2) chemical contaminants: detection, their impact and their (bio-)degradation, 3) ecology of pathogens.

The scientific objectives and the way they are managed are outstanding, allowing the unit to perform a large diversity of interdisciplinary projects including microbiology, molecular biology, analytical chemistry, and biochemistry leading to an excellent publication record. Altogether, the research objectives are timely and highly relevant to social challenges such as ecotoxicology, research for new antibiotics, biodegradation and biofouling.

Weaknesses and risks linked to the context

Scientific objectives of the theme 3 were not reached as expected. Despite success in pre-maturation projects led by this theme, it will not be pursued during the next period (2025-2029).

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

Strengths and possibilities linked to the context

The unit has very close interactions with the Observatory (OBB) at Banyuls (FR3724) and the research federation « Energy and Environment, FR2044) at Perpignan, offering important opportunities for collaborative projects. The unit benefits from microbiology BSL2 laboratories and cleaning facilities. The platforms provide a variety of state-of-the-art equipment such as microscopy (optical and electron microscopy) and cytometry/cell sorter managed by the platform BioPIC; the marine biology techniques, analytical chemistry and biotechnology skills are run by the platform Bio2mar. An aquariology service offers the opportunity to maintain marine organisms in controlled culture conditions. Chromatographical techniques are supplied in Perpignan site. Altogether the settlement – with the major investment of the unit LBBM– of these different platforms provides an excellent research environment. Through its activity, the unit has established a large strain collection of microbial organisms, which represents an invaluable resource in discovering substances for biotechnological or biomedical research.

Weaknesses and risks linked to the context

One of the main weaknesses and challenges is the separation of the unit on two distant sites.

3/ The unit's practices comply with the rules and directives laid down by its supervisory bodies in terms of human resources management, safety, environment, ethical protocols and protection of data and scientific heritage.

Strengths and possibilities linked to the context

The director of the unit on the site of Banyuls and the person responsible for human resources at the site of Perpignan take care of human resources issues. A staff member is in charge of security questions to present the security rules to the new personnel and to keep updated the safety documents in collaboration with the unit direction. The unit has mandated a person in charge of the "formation continue". Of note, all the requests originating by the staff during the period could be fulfilled.

Due to the small size of the unit, no official nominations for people in charge of equality/discrimination nor ecological transition could be achieved, but members of the unit participate in such instances at the level of the OOB. Two persons are in charge of the communication and two others of the informatic system.

Weekly and monthly meetings are planned to cope with organizational questions on Banyuls and Perpignan sites, respectively.

Strain collections are duplicated, stored in 2 separate freezers located in different buildings. Laboratory books are conserved by the technical personnel or by the persons in charge of students or postdocs supervising.

Informatic data are encrypted and conserved in partitions. Centralised sequence data are backed-up 3 times per week and stored on external discs for long term storage. Three servers are available.

A group in charge of defining rules for recycling has been established.

Access to the platforms is defined by the respective responsible persons and rapid access is allowed after appropriate training.

Weaknesses and risks linked to the context

The fact that many duties of human resources, web site, problem managing, etc., are managed by the director of the unit can present a problem as it may result in overcharging the director and in delays, e.g., updating the website.

A data management plan, as it is established in the unit for ANR projects, should be established.

The WEB-page of the laboratory, mainly maintained by the director of the unit, needs to be refreshed. Ideally, a person in charge, other than the director of the unit could be designated.

Many researchers are Maîtres de Conférences or Professors that have a heavy teaching load that impacts research activity.

The "Conseil d'Unité" and the formalization of the internal rules document needs to be set up as soon as possible in order to ease the management of the unit during the next period. An extended Conseil de Direction including all three research axes should be created.

The information on security and hygiene given to new persons arriving in the unit should be formalized and the document should be signed prior to the person is allowed to access the laboratory space. The unit should consider regular (every year for example) refreshment sessions on security questions for all members.

The physical separation of the unit between the sites of Banyuls and Perpignan is not ideal.

EVALUATION AREA 2: ATTRACTIVENESS

Assessment on the attractiveness of the unit

The attractiveness of the unit is excellent. The unit is very active in interacting with industries and regional agencies. The presence of the platforms and the Biodiversarium makes the unit very attractive and provide an excellent working environment.

- 1/ The unit has an attractive scientific reputation and is part of the European research area.*
- 2/ The unit is attractive because for the quality of its staff support policy.*
- 3/ The unit is attractive through its success in competitive calls for projects.*
- 4/ The unit is attractive for the quality of its major equipment and technical skills.*

Strengths and possibilities linked to the context for the four references above

The unit has a national and international reputation. Senior members of the unit are in charge of economic interactions at SU and are representative of SU in the doctoral school ED227, scientific advisor in the platform Bio2Mar, member of the "Conseil de Faculté des Sciences et Ingénierie" of SU, member of the scientific office of UPVD and contact person for scientific integrity. Members of the unit are also editors at peer-reviewed journals, such as *Frontiers in Microbiology*. Organization of meetings contribute to the scientific reputation of the unit, at the national (Perspectives Days CNRS-INEE) and international levels (Ecotoxicomic 2022, Montpellier; XXIV Transfrontier Meeting on Sensors and Biosensors 2019). The participation to congresses such as "Third International AFERP STOLON Symposium (2018)" also acts in the visibility enlargement of the unit.

The unit, through its large collection of micro-organisms, is part of the European Marine Biological Resource Centre (EMBRC), which is now a European research infrastructure.

During the evaluation period, 17 graduate students have defended their thesis, 3 post-docs were hosted, the unit also attracted an invited American professor and a scientist by a Marie-Curie fellowship. The unit has a large number of graduate students financed through IDEX SU (ED227), the University of Perpignan, and every year through a "allocation doctorale de la région Occitanie".

The unit is growing and with the exception of retirements, no departures occurred during the evaluation period. Particular care is given to people who belong to the unit and to the platforms as these persons are administered by two different supervising bodies (unit and Fédération de Recherche), which might be problematic regarding some issues (promotions, formations, etc...). However, from a scientific point of view, this position is positive since they are well integrated in the projects of the unit, rather than only executing a service function. The mean age is 53 years and although not urgent, the unit will need to plan the maintenance of the know-how.

The unit has applied to 90 projects to funding bodies such as ANR, Région Occitanie, industry, and the supervising bodies with a success rate of 30% (26 projects financed). At the national level, 7 ANR were financed (6 ANR as coordinators, 818 k€ for the unit), 1 ANR as partner (106 k€ for the unit). A total of 5 European grants were obtained: MSCA SquidVibrio (212 k€); INTERREG POCTEFA FOODYPLAST, (184 k€); INTERREG SUDOE INNOVEC'EAU (316 k€); INTERREG POCTEFA TESTACOS (165 k€); INTERREG SUDOE RED VALUE (99 k€). The ratio of two financed projects per full time researcher is excellent in view of the teaching responsibilities of some members of the unit. The unit has participated in the context of a PIA, at the submission of a proposal PEPR (financed project AtlaSEA) for the sequencing of thousands of marine eukaryotic organisms. 2 PIA grants were obtained during the period (EPIQS, LUPIN).

Overheads on all grants, including those from industry, are used for common consumables, new instruments, further education, publication and meeting costs. They correspond to 4% of the unit budget at the Banyuls site and 5 to 10% concerning the UPVD budget. Decisions on how to use these resources is taken in a collegial manner after consultation of the direction of the unit.

The collaboration with industry, notably Pierre Fabre, provides important resources (up to 50%). It is largely supported by the presence of the platforms and their very close interaction with the unit. Overall, the fundraising is excellent to outstanding.

The unit, associated to the "Federation de Recherche FR3724, played a major role in the establishment of the platform Bio2Mar. Founded in 2010, this structure was financed by several regional, national and European resources (Région Languedoc Roussillon, Pierre Fabre, Universities, CNRS,...). This platform offers instruments to study marine development, biotechnology and analytical chemistry, instruments necessary for high-throughput sequencing. Although the instruments belonging to Bio2Mar are renewed by requests to PIA and CPER, the unit actively contributes financially to the maintenance of the platform and is one of the major users. The platform BioPIC is dedicated to microscopy, cytometry and cell sorting. The instruments were purchased thanks to contracts and several regional financial requests (PIA, CPER). The unit has also access to platforms at UPVD, including Bio-Environnement, offering instrumentations and know-how on NGS.

The unit benefits from services provided by the aquariology facility and the network REMIMED (Reseau Marin Instrumenté en MEDiterranée) that cope with environmental data management, maintaining submarine cable for in situ experimentations, oceanographic instruments, and Oceanographic buoys. Finally, the unit has access to a cleaning and sterilizations facilities.

Weaknesses and risks linked to the context for the four references above

The number of post-docs should be increased.

EVALUATION AREA 3: SCIENTIFIC PRODUCTION

Assessment on the scientific production of the unit

The overall scientific production is excellent. The unit published 220 publications including reviews and editorials, 111 publications were signed as first and/or last author.

- 1/ The scientific production of the unit meets quality criteria.*
- 2/ The unit's scientific production is proportionate to its research potential and properly shared out between its personnel.*
- 3/ The scientific production of the unit complies with the principles of research integrity, ethics and open science. It complies with the directives applicable in this field.*

Strengths and possibilities linked to the context for the three references above

The unit published 220 manuscripts, including 21 reviews and editorials. The majority of the publications were in journals related to the specificity of the unit's activities. Five publications were in Scientific Reports, 11 in Frontiers in Microbiology or Frontiers in Marine Sciences. One report resulting from a collaboration with a previous PhD student and cosigned by one member of the unit was published in Nature Microbiology. A total of 111 publications were signed as first and/or last author by members unit and 36 publications were authorshipped by PhD students.

The publications are distributed as follows.

- Microbial biodiversity and chemodiversity: 100 publications, including 15 on the isolation and description of new microorganisms, analysis of the environmental microbiome; 54 publications on the characterization of new molecules isolated from organisms; 10 publications on the role of secondary metabolites in symbioses; 18 publications on bacterial interactions (biofilm, quorum sensing, fouling).
- Contaminants and their detection: 99 publications of which 68 were signed as first, last and/or corresponding author, 28 of these were signed by PhD students.
- Ecology of pathogens: 10 publications, of which 9 were signed as first, last, and/or corresponding author. 3 of them were signed by a PhD student as first author.

In general, technical staff are included in the authorships and sometimes signed as first or last authors. The unit favors open access publications. For corresponding authors or when 3 or more authors are from the unit, financial help can be provided for publication costs.

Weaknesses and risks linked to the context for the three references above

As explained in the self-evaluation report, research theme 3 has far less publications than the other 2 themes. This is explained by difficulties encountered during the pandemic lockdown, the low staff volume and difficulties in the research program. The PI of this theme will leave the unit for the next mandate.

EVALUATION AREA 4: CONTRIBUTION OF RESEARCH ACTIVITIES TO SOCIETY

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

The overall assessment of the unit is outstanding.

The unit has established extensive non-academic collaborations and carries on long-standing partnership with the company Pierre Fabre. The unit provides to the society outstanding research data in respect to ecotoxicology, and has an excellent to outstanding activity in divulgation of research data.

- 1/ The unit stands out for the quality and the amount of its interactions with the non-academic world.*
- 2/ The unit develops products for the cultural, economic and social world.*
- 3/ The unit shares its knowledge with the general public and takes part in debates in society.*

Strengths and possibilities linked to the context for the three references above

The activities and research interests of the unit produce know-how on microbial biodiversity and modalities of microorganism interactions in the context of environmental and health issues. The unit has established contacts with different non-academic partners such as the Languedoc Roussillon & Occitanie Region, Fondation pour la Recherche Médicale, Réserve Naturelle Nationale de la forêt de la Massane, Conservatoire National du saumon sauvage, Fondation Hermés, etc. In addition to national networking, the unit developed international interactions, like with the Université Laval in Québec (projet Coopinter). The LBBM unit actively takes part in STAMAR, the new structure set up in 2020 that consolidate the 3 "Station Marine" supervised by Sorbonne Université, including the sites of Banuyls-sur-Mer, Villefranche-sur-Mer and Roscoff. The unit participates in the expert committee « CES, Substances chimiques covered by the regulations REACH et CLP » and leads the team work « Récifs coralliens » de l'ANSES. The unit has obtained many contracts from the region (DuMaCoBio, not leading unit, 54 k€ for the unit; ARPE COCOTA, 50 k€; CAPT'AVENIR- CHERCHEUR D'AVENIR, 98 k€; CAPT 3D, 99 k€) and associations (MILIPAT, 24 k€) and industry (18 contracts, 2 961 k€).

The unit has a strong link with the socio-economic world, as exemplified by the 20 years of collaboration with the laboratories Pierre Fabre, leading to the creation of the EMR (équipe mixte de recherche) in which 4 full-time positions are financed by Pierre Fabre company. The main objectives stemmed by the connections with the industrial world aim to identify substances produced by microorganisms displaying potential pharmaceutical properties, characterize the degradation process of cosmetic products (notably UV filters present in sun creams) and evaluate their effects on the marine ecosystem environment. The latter has been largely cited in the national and international newspapers. Several French companies (TERREAL, A-Corros and Corrhom, Olgram) specialized in corrosion, photovoltaïque, water management are partners in projects that aim to isolate substances active against biofouling. This resulted in several projects and grants (ANR AMALIA, MALICA, PHYTOMICs & SECIL et fundings PFDC & TERREAL; project H2020 INFRAIA & Assemble +) as well as the prematuration project PAINTBIO (ecoresponsible painting that inhibit biofilm formation by interfering with quorum sensing systems). Other activities are in relation with waste-water treatment and water management (Suez Eau France, Véolia environnement, EDF, Métropoles, Société BIOUV, SATMAR) to develop immune-sensors for pesticides. These projects finance graduate students (Cifre) and projects to develop systems to measure the viability of organisms in zooplankton et phytoplankton. These methods have been tested in Norway and are now recognized by the International Maritime Organization. Another "prematuration" project on the detection of pathogens is under evaluation by SATT_LUtech with a declaration of economic interests (PATHOSENS).

The unit communicates with the large public on different channels such as newspapers, television and radio, science fairs. Around 40 such activities are listed. The unit is involved in vulgarization activities through expositions at the "Biodiversarium" (public aquarium managed by the OOB), participation at meetings, science fair and "forum des métiers".

Weaknesses and risks linked to the context for the three references above

In view of the many industrial contacts, the number of Cifre students could be increased. Links could be developed with Water agencies. The reactivity to a variety of calls from the region, associations and others bodies might present a risk of a loss of focus.

ANALYSIS OF THE UNIT'S TRAJECTORY

During the next contract, the unit will be directed by the actual co-director assisted by 2 deputy directors, affiliated to the University of Perpignan and to Sorbonne University. It is foreseen to rapidly establish a laboratory rule of procedure and a "Conseil de laboratoire" to respond to previous recommendations.

The global research activity will remain similar with a strong tendency for "applied fundamental" research in collaboration with industry (Pierre Fabre, and more recently BioUV ou Terreal), rather than a more hypothesis driven research activity. The thematic will change as follows:

The past research themes were:

Theme 1: Microbial biodiversity and chemodiversity

Theme 2. Emerging contaminants: Detection, impact and biodegradation

Theme 3. Pathogen Ecology

For the next period, the research axes will be redefined as follows:

Axe 1: Fundamental principles of microbial interactions

Axe 2: Environment and Ecotoxicology

Axe 3: Evolutionary and environmental genomics of phytoplankton

The former Theme 3 will be discontinued in the context of LBBM. The new axis 3 " Génomique évolutive et environnementale du phytoplancton " will mainly be supported by 4 permanent members (Chercheurs and Enseignants-Chercheurs) who have recently joined the unit.

The three axes are perfectly complementary in studying the continuum from land to sea. The study fields are the influence of climate change on the forest, the detection and influence of pollutants on the seaside, the interactions between different species of pollutants, the phytoplankton and its evolution, biofilm formation and biofouling on the offshore wind-turbines and the impact of human activity in deep areas of the sea.

The integration of a new team (GenoPhy) with a more evolutionary research axis is a great opportunity to complement the present activities of elucidating the impact of anthropic activities and climate change on the biodiversity and the evolution organism-to-organism interactions. Particular attention has to be given to a smooth integration of this team in the existing unit, which is used to a very harmonious interaction mode and close interactions of the research directions.

RECOMMENDATIONS TO THE UNIT

Recommendations regarding the Evaluation Area 1: Profile, Resources and Organisation of the Unit

The unit needs to rapidly establish a laboratory rule of procedure and a "Conseil de laboratoire". To integrate the 3 research themes in decisions on scientific questions, an extended « Bureau de direction élargi » including the responsible persons from the research axes should be created with responsibilities that should be clearly defined. In harmony with the two previous research axes, the new research axis should also be led by 2 people, ideally also by a woman and a man. For this, the interdisciplinary aspect and the interaction with the other axes will be extremely important in designing the persons.

Newcomers to the unit need to obtain safety instructions (already in place) and need to sign the safety document before obtaining access to the institute. Regular (every year) safety meetings should be organized to update communication.

Regular meetings between PhD students and post-docs, inter-site and intra OOB, should be organized to create a corporate feeling.

To harmonize continuous formation, interactions amongst the students etc., a close interaction of the two doctoral schools (ED 305 and ED 227) is needed.

The harmonization of career development of the different categories of personnel (CDI versus fonctionnaires) (index-linking at the same time, possibility of a salary increased and transparent for all, bonuses...) should be taken into consideration.

Technical support for the new research axis is required to maintain the algae strain collections.

The person in charge of the human resources of the unit belongs at present to the FR. This situation needs to be clarified to simplify the management of the human resources: and this person should be affiliated to the unit.

Recommendations regarding the Evaluation Area 2: Attractiveness

Although the motivation of graduate students to foresee their future varies from person to person, it is in some cases necessary to stimulate their motivation to organize their future employment. Plans should be taken to hire more postdocs.

It might be interesting for the unit to contact national agencies, such as "Agence de l'Eau" (www.eaurmc.fr) to even more diffuse the large know-how of the unit on ecology, evolution and pollutants.

Recommendations regarding Evaluation Area 3: Scientific Production

The scientific production is excellent, although published in many cases in very specialized journals. To increase the visibility, more generalist journals should be targeted. One or a few timely reviews in generalist journals should be encouraged.

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

The unit has an excellent track of communication with the large public. One recommendation would be to increase this activity to even more sensitize the general public on highly important environmental issues.

CONDUCT OF THE INTERVIEWS

Dates

Start: 27 November 2023 at 08:00

End: 28 November 2023 at 18:00

Interview conducted: on-site

INTERVIEW SCHEDULE

Dimanche 26 novembre 2023

20h00 Dîner comité

Lundi 27 novembre 2023

8h30 – 8h35 Session publique (comité + membres de l'unité + direction + tutelles)

8h35 – 8h40 **Déroulé de la visite Hcéres.** Anne Marie Di Guilmi

8h45 – 10h30 **Présentation des membres du comité.** Patrick Linder

Bilan des activités de l'unité. Marcelino Suzuki

Fonctionnement de l'unité : 15 min présentation + 10 min questions

Bilan thème 1 : 15 min présentation + 10 min questions

Bilan thème 2 : 15 min présentation + 10 min questions

Bilan thème 3 : 15 min présentation + 10 min questions

10h30 – 11h00 *Pause-café*

11h00 – 11h15 **Introduction de la trajectoire.** Didier Stien, porteur du projet 2025-2029

10 min présentation + 5 min questions

11h20 – 11h35 **Axe - Bases fondamentales des interactions Microbiennes (BIM)**

Raphael Lami, MC Sorbonne Université. 10 min présentation, 5 min questions

11h40 – 11h55 **Axe - Environnement et Ecotoxicologies (E2)**

Christophe Calvayrac, MC Université de Perpignan. 10 min présentation, 5 min questions

12h00 – 12h30 **Axe - Genomique évolutive environnementale du phytoplankton (GENOPHY)**

Gwenaël Piganeau, DR CNRS. 10 min présentation, 5 min questions

Entretien 15 min avec le comité

12h30 – 13h00 **Discussion interne comité**

13h00 – 14h00 *Déjeuner Comité*

14h30 – 15h15 **Réunion avec catégorie de personnel ITA**

15h30 – 16h15 **Réunion avec catégorie de personnel chercheurs et enseignants-chercheurs**

16h30 – 17h15 **Réunion avec étudiants et post-docs**

17h15 – 18h00 **Discussion interne comité**

20h00 *Dîner comité*

Mardi 28 novembre 2023

8h30 – 9h30 **Visite des plateformes :** Bio2Mar, BioPIC

9h45 – 10h30 **Réunion avec les représentants des tutelles**

10h30 – 11h00 *Pause-café*

11h00 – 11h30 **Discussion interne comité**

11h30 – 12h30 **Réunion avec les directions actuelle et future**

13h00 – 14h00 *Déjeuner*

14h00 – 17h00 **Rédaction du rapport**

17h00 *Fin de la visite*

20h00 *Dîner comité*

GENERAL OBSERVATIONS OF THE SUPERVISORS

Marie-Aude Vitrani
Vice-Présidente Vie institutionnelle et démarche
participative
Sorbonne Université

à

Monsieur Eric Saint-Aman
Directeur du Département d'évaluation de la recherche
HCERES – Haut conseil de l'évaluation de la recherche
et de l'enseignement supérieur
2 rue Albert Einstein
75013 Paris

Paris, le 26 janvier 2024

Objet : Rapport d'évaluation LBBM - Laboratoire de biodiversité et biotechnologies microbiennes

Cher Collègue,

Sorbonne Université vous remercie ainsi que tous les membres du comité HCERES pour le travail d'expertise réalisé sur l'unité de recherche « LBBM ».

Sorbonne Université n'a aucune observation de portée générale à formuler sur le rapport d'évaluation transmis.

Je vous prie d'agréer, Cher Collègue, l'expression de mes cordiales salutations

Marie-Aude Vitrani
Vice-Présidente Vie institutionnelle
et démarche participative



The Hcéres' evaluation reports are available online:
www.hceres.fr

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