

EVALUATION REPORT OF THE UNIT
Bases génétiques et moléculaires des
interactions hôte-parasite

UNDER THE SUPERVISION OF THE
FOLLOWING ESTABLISHMENTS AND
ORGANISMS:

Institut Pasteur Paris,
Centre national de la recherche scientifique –
CNRS,
Institut national de la santé et de la recherche
médicale – Inserm

EVALUATION CAMPAIGN 2023-2024
GROUP D

Rapport publié le 26/04/2024



In the name of the expert committee¹ :

Moritz Treeck, Chairman of the committee

For the Hcéres² :

Stéphane Le Bouler, acting president

Pursuant to Articles R. 114-15 and R. 114-10 of the French Research Code, evaluation reports drawn up by 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

Chairperson: Mr Moritz Treeck, Gulbenkian Institute of Science, Portugal

Experts: Ms Magali Frugier, CNRS, Strasbourg
Mr Jean-Pierre Gangneux, Université Rennes 1
Ms Gabriele Pradel, RWTH Aachen University, Germany
Mr Olivier Reynard, INSERM, Lyon

HCÉRES REPRESENTATIVE

Ms Anne-Marie Di Guilmi

REPRESENTATIVES OF SUPERVISING INSTITUTIONS AND BODIES

Ms Patricia Renesto, ITMO 3I
Mr Yazdan Yazdanpanah, ITMO 3I
Mr Patrick TRIEUT-CUOT, Institut Pasteur

CHARACTERISATION OF THE UNIT

- Name: Bases génétiques et moléculaires des interactions hôte-parasite
- Acronym: BIHP
- Label and number: U1201
- Composition of the executive team: 3

SCIENTIFIC PANELS OF THE UNIT

SVE Sciences du vivant et environnement
SVE4 Immunité, infection et immunothérapie

THEMES OF THE UNIT

The BIHP unit is comprised of three teams (Scherf, Spaeth and Bastin teams, as of end of 2022), and each team comprises several subgroups. The BIHP research covers the biology of protozoan infections that affect human health. Three vector-borne pathogens lie at the centre of research, Plasmodium, Leishmania and Trypanosoma. The research includes in addition to cell culture-based work, the work with models and vectors with models and insectories allowing investigating all aspects of the complex life cycles of the protozoan parasites. Translational activities are pursued if basic research uncovers therapeutic entry points.

HISTORIC AND GEOGRAPHICAL LOCATION OF THE UNIT

The BIHP unit is located at the Pasteur Institute in the centre of Paris. It has been created in 2015 and has undergone successful renewal in 2020. The unit is embedded in the Department of Parasites and Insect Vectors.

RESEARCH ENVIRONMENT OF THE UNIT

The BIHP unit is competitively positioned to perform world-class research relating to all aspects of the vector-borne parasite biology. It has established insect facilities to enable the work on complex models and transmission models of infection.

The team leaders and group leaders are well embedded in the French science system and are internationally recognised investigators. This is supported by leading positions in consortia (French/EU), hosting of conferences and positions in commissions of international funding agencies (e.g. ERC commissions).

The intellectual environment at Pasteur Institute and the conditions for performing state-of-the art research is outstanding.

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

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maîtres de conférences et assimilés	0
Directeurs de recherche et assimilés	4
Chargés de recherche et assimilés	7
Personnels d'appui à la recherche	15
Sous-total personnels permanents en activité	26
Enseignants-chercheurs et chercheurs non permanents et assimilés	10
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	18
Sous-total personnels non permanents en activité	28
Total personnels	54

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

Nom de l'employeur	EC	C	PAR
INST PASTEUR PARIS	0	7	14
AUTRES	0	4	1
Total personnels	0	11	15

GLOBAL ASSESSMENT

The general performance of the BIHP unit is outstanding. The BIHP unit, situated at the Pasteur Institute, is dedicated to investigating the molecular and cellular interactions of major vector-borne protozoan parasites with human/mammalian hosts and insect vectors. Leveraging a combination of cell culture work, transmission experiments, and fieldwork, the unit conducts both fundamental and applied research, producing outstanding scientific contributions. Benefiting from exceptional resources and a stimulating intellectual environment within the Department of Parasite and Insect Vectors, BIHP accesses state-of-the-art facilities including pathogen-specific insectories. Its operational excellence is evident through a consistent track record of high-profile publications, successful funding acquisition, and consortia management. While, BIHP's scientific output and attractiveness are notable, there are areas for refinement in strategy, particularly concerning the emergence of new teams and clarifying group leaders' status. Challenges also arise from complex organisational dynamics, particularly regarding co-supervision by Inserm. Nevertheless, BIHP's strong reputation and successful track record attract talent and funding, positioning it as a global leader in parasitology research. The unit's engagement with the scientific community through meeting organisation, consortia management, and commission participation is very good and should be further developed. However, there is room for improvement in communicating scientific content to the general public and engaging in public and policy discussions.

DETAILED EVALUATION OF THE UNIT

A – CONSIDERATION OF THE RECOMMENDATIONS IN THE PREVIOUS REPORT

During the previous evaluation in 2019, there were recommendations made to the three teams: The main recommendation for the team of A. Scherf was to ensure that early career group leaders carry on the research activities of the team, particularly with regard to the upcoming retirement of the team head Arthur Scherf. This has been achieved by promoting three young researchers as group leaders. These groups have successfully attracted external funding and are likely to succeed the goal to sustain and broaden the research theme of the Scherf team.

The main recommendation for the team of G. Spaeth was to build a strong research program on the sand fly – Leishmania interaction. This has been achieved by establishing an insectory for the work with sand flies together with the Bastin team. In addition, an early career scientist has been recruited, who should provide expertise in sand fly genetics.

The main recommendation for the team of P. Bastin was to reinforce links between the Bastin and Rotureau teams. This has been achieved with several publications supporting this.

B – EVALUATION AREAS

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

Assessment on the scientific objectives of the unit

The scientific objectives of the BIHP unit are outstanding. The teams focus on the molecular and cellular aspects of the interactions of three major vector-borne protozoan parasites with their human/mammal host and the insect vector. They efficiently combine cell culture work, transmission experiments and field work in fundamental and applied research.

Assessment on the unit's resources

The resources of the BIHP unit are outstanding with the location at Pasteur Institute, the stimulating intellectual environment at the Department of Parasite and Insect Vectors and the access to the Pasteur Institute scientific platforms and facilities, notably the pathogen-specific insectory.

Assessment on the functioning of the unit

The assessment on the functioning of the unit is ranked as excellent to outstanding. The individual teams of the BIHP unit have produced important scientific contributions to the research field in the form of publications, funding acquisition and consortia management. The unit strategy for the emergence of new teams and young leaders should be clarified as well as group leaders status. The co-supervision by Inserm seems to make the organisation and the processes complex in terms of human resource management.

1/ The unit has set itself relevant scientific objectives.

Strengths and possibilities linked to the context

The BIHP unit is led by internationally renowned experts in the field of parasitology and has started to invest efforts to promote the emergence of a new generation of researchers. The three teams have complementary approaches to different types of protozoan parasites, including genomics, pathophysiology and drug discovery on Plasmodium (Scherf team), genomics and immune response to Leishmania (Spaeth team) and the molecular

cell biology of the trypanosomal flagellum (Bastin team). Collectively, the unit has covered a broad scientific spectrum from basic research to the identification of novel antiparasitic compounds. To meet its objectives of strengthening the parasitology theme at the Pasteur Institute, the unit has put strong efforts in grant applications (e.g. ERC, ANR) and recruitment of early career scientists, who act as group leaders and have implemented novel ideas (such as liver stage disease in malaria), and who shall strengthen the future ParasitInnov unit.

Weaknesses and risks linked to the context

Continuous investment in the insectary is key to capitalise on the efforts made in the past years to establish this transmission facility.

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 focus of the BIHP unit lies on the biology of protozoan parasites with particular emphasis on their interactions with the insect vectors and human/mammal hosts. To conduct the research projects the unit has access to critical facilities, in particular the insectary, but also the research environment of the Pasteur Institute. The unit is supported by the supervision bodies (Pasteur Institute, INSERM and CNRS) that have provided up to fourteen permanent researcher positions (currently 11) and up to 22 permanent positions of engineer and technician (currently 15). The three supervision bodies have also supported the unit with annual endowment of 300 to 400k€. The unit has raised 15,923 k€ during the evaluated period through application at ERC, ANR, FRM grants amongst other (total of 47 different fundings).

Weaknesses and risks linked to the context

One concern is the largely internal recruitment of group leaders that bears the risk that taking on new research areas is hard to bring about. As an example, the study of Leishmania parasite could deserve to identify more groups for the next mandate.

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

At present, the BIHP unit consists of 54 full-time employees, including 26 permanent employees, i.e. eleven permanent researchers and fifteen permanent engineers/technicians. The unit has been very successful in recruiting four new permanent researchers and is highly attractive for postdocs. The gender balance of the unit at the staff level is in favour of women (64/31 over the evaluation period).

The mentoring in place in the various teams has been successful as indicated by the careers of the postdocs and early career scientists who have left the unit.

The director of the unit, A. Scherf, is involved in the management of the Pasteur Institute, in particular as Vice-President of the Board of Directors of the Pasteur Institute and as a member of the Scientific Council of the Institute.

Weaknesses and risks linked to the context

A communicated problem for the personnel at the Pasteur institute (both pasteurian and INSERM personnel) lies in the clarification of human resources and administrative issues due to a lack of direct communication between INSERM and Pasteur since the departure of an INSERM administrative coordinator from the Pasteur campus.

EVALUATION AREA 2: ATTRACTIVENESS

Assessment on the attractiveness of the unit

The attractiveness of the BIHP unit is outstanding. The location of the unit at Pasteur Institute and its affiliation with the Department of Parasites and Insect Vectors provides a highly inspiring research environment. Furthermore, state-of-the-art equipment as well as insectories for work with pre-clinical models and insect vectors are available. BIHP is very successful in the acquisition of high impact third party funding, and has a strong publication output. BIHP and Pasteur Institute have a strong scientific reputation in Europe and worldwide.

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

All of the above statements apply.

- 1- The teams of BIHP have high reputations and are internationally well known. The excellent involvement of the three teams in the contributions to the scientific community involves meeting organisations (e.g. Parafrap), the management of consortia (e.g. Horizon 2020 consortia) and the participation in commissions (e.g. ERC commission).
- 2- The teams have been very successful in recruiting four early career scientists (1 CR INSERM and 3 Pasteur Institute), who shall ensure the continuation of the ongoing project as well as the develop of new research areas following ending of the BIHP.
- 3- The three supervision bodies have supported the unit with annual endowment of 300 to 400k€. The unit has raised 15,923 k€ during the evaluated period through application at ERC, ANR, FRM grants amongst other (total of 47 different fundings).
- 4- Due to its affiliation with Institut Pasteur and the Department of parasites and insect vectors, BIHP is equipped with state-of-the-art equipment as well as an insectory for infection experiments. In addition, the teams developed novel genetic tools and techniques to be used by other groups worldwide, identified inhibitors and filed patents.

The research potential is shared between the personnel with staff heading subgroups and acquiring own third-party funding. BIHP participates in the scientific education of 21 PhD and 26 postdoctoral students and in mentoring early career researchers to gain independency.

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

A key weakness appears to be the model to elevate early career researchers (ECRs) to the group leader status. The ECRs of Institute Pasteur need to apply for the group leader status, which will be granted for a period of two years and can be renewed. The committee sees key issues around this because:

- ECRs are not allowed to apply for a duration of more than two years. Setting up a lab with a new idea on such a short term is nearly impossible and likely results in incremental science, rather than approaching a big question. It is unclear what benefit this status provides other than a web site.
- The short intervals appear to put a significant element of stress onto ECRs with the pressure to publish and raise funding. The stress takes away mental capacity from the science they are supposed to do (and want to).
- It is worthwhile to think about the pressure especially in the context of female researchers, who at the stage of setting up a lab also are of an age where family planning is important and a certain level of stability is required.

There seems to be a lack of long-term career development for administrative staff beyond a certain point that is reached rather quickly (level 6). This can lead to frustration and a lack of motivation.

EVALUATION AREA 3: SCIENTIFIC PRODUCTION

Assessment on the scientific production of the unit

The scientific production of BIHP is excellent to outstanding at an international level. Over the evaluation period, the BIHP unit has made significant contributions in several areas of parasite science. The three teams differ slightly in their publication performance and further contributions to the scientific community (commission activities, consortia management, meeting organisation, etc.).

- 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

All of the above references apply and will be detailed for each team. Overall, the scientific production of the BIHP unit is of high quality as indicated by publication in high quality journals. The unit produced more than 100 publications between 2017–2022. This includes high-profile publications in journals like Nature communication, mBio, Cell Host Microbe PLoS Biology Nature, Nature Microbiology, Nature Communication and Nature Ecology and Evolution.

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

As discussed above, the three teams differ in their scientific production, including publication performance, and acquisition of third-party funding.

EVALUATION AREA 4: CONTRIBUTION OF RESEARCH ACTIVITIES TO SOCIETY

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

The contribution of the unit's research to the general and scientific community is very good to excellent. The communication of BIHP with the general community, e.g. the communication of scientific content with society as well as public and policy engagement, is expandable and should be considered.

- 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

While the three teams of BIHP are very active in the interaction with the scientific community, there is no documented detailed interaction with the general public.

The communication with the research community comprises various interactions. The Scherf team is committed to the dissemination of scientific knowledge and the stimulation of scientific debate through its involvement in the coordination of Labex Paraftrap, which aims to create solid links between actors in the field of parasitology in France. The team is also involved in the organisation of conferences, in particular EMBO workshops. Through its collaboration with the Pasteur Institute network, the team has established links with foreign teams in Cambodia and Madagascar. The Spaeth team has developed an international collaboration through

the 'Leisheid' consortium for scientific and personnel exchanges with several foreign teams within or outside the Pasteur Institute network, notably in China, Algeria, Tunisia, Brazil and Israel. The Bastin team has contact with African scientists due to a clinical trial in Africa.

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

As academic scientists, the team members have a task in the scientific communication with the society that they have not yet carried out on a large scale. Public engagement activities that promote direct contact between researchers and the public through engagement events should therefore be increased, e.g. via open door events, public debates, social media promotions. In addition, the involvement with local hospitals could be increased, possibly by supervising MD-PhD students to facilitate the bench-to-bedside and back strategy.

There is further no listed participation of the team members in French societies, e.g. of parasitology, or medical microbiology. Noteworthy, these societies have important duties in scientific education, proactive information of the society, and health-related recommendations. Hence, support for such societies, especially with regard to the great expertise that the teams would be desirable.

In addition, there is little evidence for policy engagement by the BIHP unit. Participation of the teams in science policy would help pave the way for the new generation of scientists.

ANALYSIS OF THE UNIT'S TRAJECTORY

The BIHP unit's recruitment and scientific context have broadened considerably in recent years, while maintaining a high level of international visibility. Since the last evaluation report, the unit has been reorganised and expanded. Three new teams have been created, including one led by an INSERM CR. The unit's new organisation should foster the emergence of cross-disciplinary research, which should be encouraged, and strengthened the research focus beyond the active phase of the three team heads. Obstacles include a lack of technical staff to support the platform's activities, the medium-term security of the group leaders (including the independent group leader status) and of a closer link with INSERM for administrative tasks. The interaction with the general society and the public engagement should be improved.

RECOMMENDATIONS TO THE UNIT

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

The committee recommends to maintain the outstanding level of resources as well as scientific production and contributions of the BIHP unit in the context of the establishment of the ParasitInnov unit.

The committee emphasises that the careers of the current group leaders need to be secured and strongly recommends to increase the timeframes for young internal group leaders from currently two to 4–5 years.

There should be a dedicated person of INSERM that deals with human resource questions at the Pasteur institute.

The career progression plans for technicians and administrative staff should be analysed and improved.

With regard to the plans to establish a new ParasitInnov INSERM unit, the committee recommends keeping an eye on a balance in gender and career age of team leaders. Female ERCs in particular should be allowed to participate in the unit with independent groups. Furthermore, attention should be paid to a balance in the variety of vector-borne pathogens in order to avoid an excess of groups working on malaria. In addition, the committee recommends to stress what the added value of the different groups and the synergy in their research represents when they are combined in a unit.

Recommendations regarding the Evaluation Area 2: Attractiveness

The committee recommends to mentor ERCs and group leaders to ensure continuous external funding success and to secure their future careers. The organisation of meeting and consortia and their engagement in the interaction with the scientific community should be continued and elaborated.

Recommendations regarding Evaluation Area 3: Scientific Production

The committee recommends to continue the high impact scientific productivity and scientific quality of the teams. It should be ensured that all teams perform innovative and groundbreaking science.

The committee further recommends capitalising more on the synergies between the teams in regard to joint projects, technical developments or overlapping aspects of the parasite biology.

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

The interactions of the team members with the general society as well as their public engagement activities need to be elaborated, e.g. by organising science events (Malaria day, Neglected Diseases day, etc.), by participating in scientific debates or by proactive information of the public via social media.

The committee further recommends that the contact of the team members with teaching societies and their policy engagement activities should be extended. Further, their interactions with the medical colleagues to seek synergies with clinical sciences should be improved.

TEAM-BY-TEAM OR THEME ASSESSMENT

Team 1: BIOLOGIE DES INTERACTIONS HÔTE PARASITE
 Name of the supervisor: Mr Artur Scherf

THEMES OF THE TEAM

The Scherf team focuses on the blood, liver and transmission stages of *Plasmodium* parasites, exploring how they cause disease and escape immunity at different stages. The team searches for new intervention strategies, particularly by targeting epigenetic mechanisms that regulate these processes. In addition to the group of A. Scherf, the team originally included groups headed by four young researchers, meanwhile one of them became independent PI at the Pasteur Institute.

Three groups particularly study epigenetic regulation of transcriptional control in *Plasmodium falciparum*, affecting multigene families important for immune evasion. Additionally, one group has established a pre-clinical model for *P. berghei* and a humanised model for *P. vivax* to study the hemato-immunological environment of these parasites. Another group studies the critical liver stage, including dormancy, in *P. falciparum* and *P. vivax*, on the transcriptional levels. The research topics of the various groups are state-of-the-art with internationally leading positions.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

It has been the main recommendation made to the Scherf team to mentor early career group leaders to maintain the research topics beyond the retirement of A. Scherf in December 2025. The requirements were successfully met. Two early career scientists of his team, meanwhile head their own independent groups funded by high impact third party funding, including ERC grants. Two more early career scientists received third-party funding to head their own projects within the Scherf group. The achievement of their independencies by the retirement of A. Scherf is recommended.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maîtres de conférences et assimilés	0
Directeurs de recherche et assimilés	2
Chargés de recherche et assimilés	3
Personnels d'appui à la recherche	8
Sous-total personnels permanents en activité	13
Enseignants-chercheurs et chercheurs non permanents et assimilés	5
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	8
Sous-total personnels non permanents en activité	13
Total personnels	26

EVALUATION

Overall assessment of the team

The overall assessment of the team is outstanding. A. Scherf's team consists of around 25 people. The team is extremely successful in acquiring third-party funding, with several ERC grants worth mentioning, as well as in publication performance with many publications in high-impact journals. Promising young scientists were regularly recruited from abroad and supported until they achieved scientific independence. In summary, the performance of A. Scherf's team can be described as very impressive.

Strengths and possibilities linked to the context

The strength of the team lies in the impressive scientific achievements described above as well as the unique characteristics of the scientific research focuses of the individual groups. This makes the Scherf team internationally competitive. In addition, the Scherf team form a highly successful platform for a new generation of malaria scientists, since the team has mentored highly successful early career scientists and has promoted their start as highly visible leaders of independent research groups.

In detail, the team of A. Scherf' consists of around 25 people and includes two subgroups. During the evaluation period, six PhD students defended their thesis during the evaluation period, with four of them being authors of publications in renowned international journals (mBio, Life Science Alliance, J. Infect. Dis., NAR and Nat. Commun). The team further recruited twelve post-docs, five of them left the team with at least one article between 2017 and 2022 (as first author in Open Research Europe, RNA Biol. or Nat. Microbiol.; as second author in mBio. or Elife; as third author in J. Med Chem.) or one patent.

The Scherf team members are authors of roughly 25 research articles, including nineteen as corresponding or last author (Nat. Commun., EMBO Report, PLoS Biol., Nat. Microbiol., Cell Reports), five reviews or book chapters and 4 patents. Of the nineteen publications originating directly from the laboratory, 7 were authored by group leaders. It should be noted that twelve research articles and one review article were not included in this analysis, as one of the CR researchers was either at MIT or the University of Lisbon at the time.

Funding this productivity relies on an excellent grant success with 4.2 million euros raised between 2017 and 2022. These include three ERC grants and 9 ANR grants were obtained, amongst which 7 are coordinated by the team. Four contracts were raised through PIA consortia, three of them are coordinated. The unique collaboration with a private company (Sanofi) is operated by a researcher of the team. Finally, the team coordinated three contracts raised through foundations (Fondation Pasteur Suisse, Institut Pasteur PTR, DARRI INNOV).

The team's recognition is illustrated by its participation as co-founder of the LabEx Parafrap and organiser of the Parafrap meetings in 2020 and 2022. The unit members take part in international scientific councils and committees (reviewer for EMBO fellowship applications, ERC grant evaluation panel member, FRM) and act on editorial board members of international journals (Cellular microbiology). A. Scherf was Director of the BIHP unit over the period.

Weaknesses and risks linked to the context

The team leader A. Scherf is a beacon of malaria research and a central and internationally visible figure at the BIHP and the Department of Parasites and Insect Vectors. Hence, ensuring continued visibility after the retirement of A. Scherf must be taken into account. In addition, A. Scherf's research focus, which represents a unique selling point in its depth, should be secured, e.g. by one of his group leader. Of note, the team's expertise and knowledge could be more often shared with the French health network (medical doctors, National reference centres, health authorities, health universities).

Analysis of the team's trajectory

Due to the retirement of A. Scherf, the team will not continue to consist in this composition. A new INSERM unit, ParasitInnov, is planned, and the groups who have meanwhile gained independency, will be integrated in the new unit.

RECOMMENDATIONS TO THE TEAM

It is recommended to ensure the independence of the outstanding group leaders of the A. Scherf team. However, to support their consolidation it would be desirable if A. Scherf remains a mentor for these group leaders.

Team 2: BIOLOGIE CELLULAIRE DES TRYPANOSOMES

Name of the supervisor: Mr Philippe Bastin

THEMES OF THE TEAM

The Bastin team is made up of two groups (P. Bastin and B. Rotureau) who focus their research on *Trypanosoma* biology. The Bastin group studies the cell biology of Trypanosomes, specifically the function of the flagellum, essential to the life of the parasite. Understanding this process can thus uncover novel therapeutic entry points. The team has made significant contributions to the fundamental understanding of (i) how transport occurs in the flagellum, (ii) how flagellum length is controlled and (iii) how the single flagellum can be assembled. Novel post-translational modifications have been identified with critical enzymes required for the process.

The scientific project of the Rotureau group focuses on the development cycle of the *Trypanosoma* parasite. Using single-cell RNA sequencing, the team has shown that parasite metabolism is extensively modified during transmission of the Trypanosome from tsetse flies to humans. It has also highlighted the presence of mobile and infectious forms of Trypanosome in the skin, leading to false diagnoses (work performed in Guinea). In this context, the group has developed (i) a diagnostic kit, and (ii) several tools (a skin-organoid model and a microfluidic platform) to detect and target skin parasites.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The previous report recommended that the Bastin and Rotureau groups work more closely together. In the report, the unit head states this has been achieved, which was demonstrated by a shared publication on the role of a flagellum-associated protein (Cell Microbiol. 2021). However, from the self-assessment report, it is less clear where the boundaries are and not much information is provided on the Rotureau group. Further, the fate of the Rotureau team following the ending of the BIHP unit is unclear.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maîtres de conférences et assimilés	0
Directeurs de recherche et assimilés	2
Chargés de recherche et assimilés	1
Personnels d'appui à la recherche	4
Sous-total personnels permanents en activité	7
Enseignants-chercheurs et chercheurs non permanents et assimilés	2
Personnels d'appui non permanents	0
Post-doctorants	2
Doctorants	3
Sous-total personnels non permanents en activité	7
Total personnels	13

EVALUATION

Overall assessment of the team

The overall assessment of the team is excellent to outstanding. Overall, both groups of the team (the groups of P. Bastin and B. Rotureau) have a strong standing and are well embedded in the research community, taking on leadership roles and acquiring external funding.

Strengths and possibilities linked to the context

The strengths of the Bastin team are the ability to perform cell biology at high standard, including work performed in the newly established insectory, and to have tight links to the field. This allows the researchers to investigate questions that can only be performed in a limited number of places worldwide. Within this team, B.

Rotureau acts as a unit director of Institut Pasteur in Guinea with tight collaborations with researchers in African countries.

The Bastin team supervised five PhD students (Bastin and Rotureau supervised three and two PhD, respectively) over the evaluation period. By December 2022, two of them had presented their thesis with at least 6 articles and reviews and two as first author (Current Biol. J. Cell Biol. J. Cell Microbiol. J. Cell Sci., Med. Sci. and Bioassays); the other three theses were still in progress. Of the seven post-docs recruited by the team, five have stayed for at least three years and published several articles each (they published as first author in Cell Microbiol., Infect. Genet. Evol. and PLoS Pathog.; as second author in EMBO J. and Infect. Genet. Evol.). Further, the Bastin team participated in the publication of more than 30 research articles, including fourteen as corresponding and/or last author and nine reviews or book chapters (PLoS Pathogen., Clin. Infect. Dis., Cell Microbio. I, Parasit. vectors, J. Cell Sci., Biol. Cell, J. Struct. Biol., Current Biol., Front. Cell Dev. Biol.).

The Bastin team had an excellent grant success with 2.3 million euros raised between 2017 and 2022. These include UE Bourse IF H2020. A total of eight ANR grants were obtained, all coordinated by the team. Two contracts were raised through PIA consortia, one as partner in the Labex IBEID and one PhD grant from the Labex ParaFrap. Finally, the team coordinated two contracts raised by the FRM.

The two group leaders were active in the organisation of national and international conferences (Future of Parasitology (2017), European Cilia Summer School (2021), Cilia, Glyconov meeting (2018) Trypanosomatids MeetingVI (2019), TrypaDerm Meeting (2019). During the evaluation period, the team was recognised through the FRM team label and the setting up of the LabEx IBEID. They received national prizes (Prix Deschiens de l'Académie de Médecine) and were awarded the Honorary Christoffel Plantin Prize. Of note, P. Bastin will be a key person in the new project of Pasteur Institute that aims to build a dedicated to vector-borne diseases centre. His experience in *Trypanosoma* and *Glossina* biology shall be essential for the success of this transversal project.

Weaknesses and risks linked to the context

The written report did not adequately reflect the position of Dr. Brice Rotureau presented in the interview. There was no mention of the Rotureau team in the future plans of the Department of Parasites and Insect Vectors, in particular, his potential role in the newly planned ParasitInnov unit in the written report. This posed a concern in the committee regarding the way the team is embedded in the unit. In the future, the visibility of the Rotureau team should be improved to support its independent status as a team.

In addition, as stated in the strength paragraph, performing field studies is highly rewarding and essential, but also bear intrinsic risk of failure due to unforeseen political instability. The potential risk for non-approval of ethics applications should be considered and potential alternatives looked at.

Analysis of the team's trajectory

The individual work of the Bastin team (flagella) and Rotureau team (skin) is to be continued and the joined effort in skin on a chip model and the diagnostics work through collaboration and mutualisation of expertise in cell biology and biology of vectors should be reinforced.

Given the bed-to-benchside-and-back strategy, the continuation of associated field work with basic laboratory research is to be expected. The committee encourages continuing the strong collaboration with IP in Africa and South America, two endemic areas for trypanosomiasis.

RECOMMENDATIONS TO THE TEAM

The committee recommends capitalising on the transmission platform and bring together the trypanosoma PIs at the Pasteur WITHOUT losing identify of each group. There is a significant chance to build a world-leading centre for *Trypanosoma* biology at the Pasteur Institute with the recently established insectory, which allows high-profile transmission work. Given the bed-to-benchside-and-back strategy, it would be good to continue to associate field work with basic laboratory research.

The committee recommends to the Bastin group to elaborate the collaborations, e.g. to other European partners and gain more international visibility. Furthermore, the independency of the Rotureau group should be guaranteed and B. Rotureau should gain more visibility, particular to secure *Trypanosoma* research beyond the active time of P. Bastin.

Team 3: PARASITOLOGIE MOLÉCULAIRE ET SIGNALISATION
 Name of the supervisor: Mr Gerald Spaeth

THEMES OF THE TEAM

The Spaeth team focuses on the molecular biology of *Leishmania* parasites, as well as on the interaction of the parasite with the mammalian host and with its insect vector, the sand fly. In particular, the Spaeth team investigates the complexity of *Leishmania* biology, from parasite signalling to understanding the entire *Leishmania*-macrophage interaction during the host's immune response. Using multidisciplinary approaches, the team is studying how *Leishmania* adapts and manipulates host immune responses, with the ultimate aim of developing new treatments targeting both the parasite evolution and host vulnerabilities. Four research axes have been defined. Two axes, i.e. *Leishmania* adaptation via experimental evolution and *Leishmania*-macrophage interaction are supervised by G. Spaeth together with group members. Furthermore, a senior researcher successfully heads a subgroup within the Spaeth team, who focuses on trans-signalling by ectokinases. In addition, an early career researcher has recently been recruited to the Spaeth team, who aims at establishing her own group working on *Leishmania*/sand fly interactions.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The main recommendation made to the Spaeth team was to establish a strong research program on the interaction between sand flies and *Leishmania* parasites. This goal has been achieved by establishing (together with the Bastin team) an insectory. In this context, an early career researcher who is specialised in sand fly genetics and who is currently trying to establish her own independent group has been affiliated with the group of G. Spaeth, and she may strengthen the sand fly focus of the team. The insectory has attracted major funding.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2022

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maîtres de conférences et assimilés	0
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	2
Personnels d'appui à la recherche	4
Sous-total personnels permanents en activité	7
Enseignants-chercheurs et chercheurs non permanents et assimilés	3
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	5
Sous-total personnels non permanents en activité	8
Total personnels	15

EVALUATION

Overall assessment of the team

The overall assessment of the team of G. Spaeth is excellent to outstanding. The team consists of around twenty people with a young scientist aiming at gaining independency as a group leader and a senior successfully heading her own subgroup. The team is very successful in acquiring third-party funding, especially with the recent granting of ERC Synergy funding. G. Spaeth previously acted as speaker and coordinator of a Horizon 2020 consortium. The publication performance of the team is very impressive with several publications in high-profile journals.

Strengths and possibilities linked to the context

The strength of the team lies in the unique selling point of the research themes, e.g. experimental evolution of adaptation, particularly considering that groups working with *Leishmania* worldwide are waning. Further, the

scientific achievements of the team are impressive with G. Spaeth being an internationally renowned expert in *Leishmania* biology.

The team of G. Spaeth consists of around twenty people with two researchers acting as group leaders. The team supervised eight PhD students between 2017 and 2022. Three of these defended their thesis with at least one first-author article (e.g. PNAS, Sci. Report, PLoS Pathogen). Further, the team recently recruited two postdocs with contracts in progress as of December 2022.

The Spaeth team has published more than 27 research articles, including eleven as corresponding and/or last author (Nature Ecol. Evol., Proc Natl Acad Sci U S A., Nucleic Acids Res., PLoS Pathog., Cell Rep., Front Immunol., Front.) and seven reviews and book chapters.

The Spaeth team is very successful in acquiring third-party funding, especially with the recent granting of ERC Synergy funding, and 1.3 million euros were raised between 2017 and 2022. These include, in addition to the ERC Synergy grant, two coordinated UE grants (H2020 LEISHIELD and MSCA PF SF-LEISHYB). Further, a total of four ANR grants were obtained, two of them are coordinated by the team. Two contracts were raised through PIA consortia, one as partner in the Labex IBEID and one PhD grant from the Labex Parafrap. Finally, the team coordinated one charity contract (Pasteur Weizmann).

G. Spaeth acts on the editorial board of NAR Genomics & Bioinformatics and has been recognised with a Chair of Excellence Institut Pasteur, Prix Georges Zemati, and Pris 'Tremplin' Recherche Franco-Africaine de l'Académie des Sciences. G. Spaeth further acted as speaker and coordinator of a Horizon 2020 consortium.

Weaknesses and risks linked to the context

The two group leaders only operate to a limited extent independently and have limited international visibility, which therefore needs to be promoted. One of the group leader is still at the beginning of her career; further needs increased mentoring in order to gain a foothold in science.

Analysis of the team's trajectory

It is expected that the Spaeth team will continue to work successfully on the biology of *Leishmania*, explore innovative new aspects and thus retain its unique selling point. The team shall become an integral and important part of the new INSERM unit ParasitInnov. However, the committee questions the team strategy which does not allow many new subgroups to emerge.

RECOMMENDATIONS TO THE TEAM

In order to ensure continued high-profile *Leishmania* research at Institute Pasteur, it is urgently necessary that new groups will be established and be supported to expand and become independent. To guarantee a successful career start of the young researcher, increased mentoring is recommended. The work on sand flies should be further expanded, for example, by acquiring additional scientists, and the future of the insectarium should be secured. The proportion of groups working on *Leishmania* in the newly planned INSERM unit ParasitInnov must be increased. The establishment of new international networks on *Leishmania* would be useful and support the visibility of the Spaeth team.

CONDUCT OF THE INTERVIEWS

Date

Start: 18 mars 2024 à 8 h

End: 18 mars 2024 à 19 h

Interview conducted: on-site or online

INTERVIEW SCHEDULE

8:15 a.m. – 8:30 a.m. Presentation of the HCÉRES evaluation process.

Introduction of the HCÉRES committee.

8:30 a.m. – 9 a.m. Presentation of the unit's organisation and its achievements. Artur SCHERF

- Auditions of the teams

9 a.m. – 9:45 a.m. Artur SCHERF

- Liliana MANCIO SILVA

Jessica BRYANT

10 a.m. – 10:45 a.m. Gerald SPAETH

Najma RACHIDI

Isabelle LOURADOUR

10:45 a.m. – 11 a.m. Break

11 a.m. – 11:45 a.m. Philippe BASTIN

Brice ROTUREAU

11:50 a.m. – 12:35 p.m. Presentation of the unit project, Chetan CHITNIS

12:40 p.m. – 1 p.m. Debriefing-1 committee

1 p.m. – 1:30 p.m. Lunch Break

2 p.m. – 2:30 p.m. Meeting with ITAs

2:35 p.m. – 3:05 p.m. Meeting with researchers

3:10 p.m. – 3:40 p.m. Meeting with postdocs/students.

3:45 p.m. – 4 p.m. Break

4 p.m. – 4:30 p.m. Meeting with institution representatives

4:30 p.m. – 4:45 p.m. Debriefing-3 committee

4:45 p.m. – 5:15 p.m. Meeting with the Unit direction

5:15 p.m. – 7 p.m. Redaction of the final report

7 p.m. End of the interview

PARTICULAR POINT TO BE MENTIONED

GENERAL OBSERVATIONS OF THE SUPERVISORS

The institution responsible for submitting the application, which is also responsible for coordinating the response for all the research unit's supervisory authorities, has not submitted any general comments

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



2 rue Albert Einstein
75013 Paris, France
T.33 (0)1 55 55 60 10

hceres.fr

 [@Hceres_](https://twitter.com/Hceres_)

 [Hcéres](https://www.youtube.com/Hceres)

