Research evaluation

EVALUATION REPORT OF THE UNIT

Neuro-PSI - Institut des neurosciences Paris Saclay

UNDER THE SUPERVISION OF THE FOLLOWING ESTABLISHMENTS AND ORGANISMS:

Université Paris Saclay

Centre national de la recherche scientifique - CNRS

EVALUATION CAMPAIGN 2024-2025

GROUP E

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High Council for evaluation of research and hignter education

In the name of the expert committee:

Philippe Marin, chairman of the committee

For the Hcéres:

Coralie Chevallier, 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.

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Mr Bernard Poulain, Directeur Adjoint Scientifique en charge des neurosciences et cognition, CNRS

CHARACTERISATION OF THE UNIT

- Name: Institut des neurosciences Paris Saclay
- Acronym: Neuro-PSI
- Label and number: UMR9197
- Number of teams: 25
- Composition of the executive team: Mr François Rouyer (director), Mr Alain Destexhe (deputy director) and Ms Muriel Perron (deputy director)

SCIENTIFIC PANELS OF THE UNIT

SVE Sciences du vivant et environnement
SVE5 Neurosciences et troubles du système nerveux

THEMES OF THE UNIT

The Paris-Saclay Institute of Neuroscience (NeuroPSI) is a multidisciplinary neuroscience Unit gathering around 260 people (including 66 tenured researchers/teachers and 52 tenured engineers/technicians) hosted in a single brand-new building of around 16,000 m^2. The general objective of NeuroPSI is to understand the anatomical organisation and operating principles of neural circuits that control behaviour in response to the environment, using a multiscale strategy based on a broad range of experimental approaches and animal models, combined with computational approaches. Within this general frame, NeuroPSI investigates *i)* how cellular interactions lead to functional neural circuits during brain development; *ii)* how evolution shapes the brain and creates cerebral diversity; *iii)* how neural circuits integrate different sensory modalities and how they integrate brain internal states and physiological information from the body and *iv)* how dysfunctions at the molecular, cellular, and circuit levels lead to brain pathologies. The NeuroPSI project is developed by 22 research teams (including one team created in June 2023) distributed in three scientific departments: the 'Development, Evolution, and Cell Signaling' (DECS, 7 teams), 'Cognitive & Network Neuroscience' (CNN, 8 Teams) and 'Integrative & Computational Neuroscience' (ICN, 7 Teams) departments. The DCES teams investigate the cellular and molecular mechanisms underlying the formation, maintenance, regeneration and function of the nervous system, and how these processes are shaped by evolution, using a variety of animal models (flies, mice, birds, amphibians and fish), at all life stages from embryonic stage to adulthood, and a combination of genetic and molecular approaches including imaging, genome editing and transgenesis, transcriptomics and in vivo functional analyses. The CNN teams explore acoustic communications, social interactions, memory, emotion, decision-making, as well as temporal control of behaviour from seconds to circadian scales, using a wide array of models and methods, from acoustic tagging in marine research to advanced imaging tools, high resolution monitoring of neural activities and behavioural analyses. The ICN teams investigate neurophysiological mechanisms and computational principles underlying various brain functions, such as perception, sensorimotor integrations, motor control, dynamics of internally-generated brain states (e.g. wakefulness, sleep) and learning. The Unit also hosts the Genomics group of the Translational Neuropsychiatry Team of the Institut Mondor de Recherche Biomédicale, as well as administrative/financial services, technical services and 6 platforms (animal facility, behaviour, imaging, histology, transcriptomics and data analysis).

HISTORIC AND GEOGRAPHICAL LOCATION OF THE UNIT

NeuroPSI was created in 2015 by the merging of the Paris-Sud Neuroscience Center (CNPS) located in Orsay and the Neurobiology & Development Unit (N&D) located in the CNRS campus in Gif-sur-Yvette. In 2020, NeuroPSI was joined by the Neuroscience, Information and Complexity Unit (UNIC), a multidisciplinary research Unit at the interface between Physics and Neuroscience, also located in the CNRS Campus in Gif-sur-Yvette. In September 2021, NeuroPSI research teams moved from Gif and Orsay to a new building adjacent to the brain imaging institute NeuroSpin, in the CEA Paris-Saclay campus and constructed thanks to funding by the "Investissements d'Avenir" program (PIA). The goal was to establish the largest complex for multidisciplinary and multi-scale research in Neuroscience in the south of Paris area and promote interactions between the two institutes. Several teams present the initial term (2015-2019) did not join the 2020-25 project for different reasons but were still present through the 2018-19 period. Several members of these teams joined other NeuroPSI teams at the beginning of the 2020-25 term. The number of scientific departments was reduced from 4 to 3 between the 2019 Hcéres report and the beginning of the 2020-25 project when the institute included 22 teams. A new team was created in July 2023 and joined the Integrative & Computational Neuroscience department.

RESEARCH ENVIRONMENT OF THE UNIT

NeuroPSI benefits from the outstanding scientific environment of the Paris-Saclay Campus with two major, globally recognized Universities (Université Paris-Saclay & the Polytechnic Institute of Paris), neighbouring research centers such as IDEEV and I2BC (affiliated with CNRS, CEA, Inserm, or INRAE), as well as prominent European high-tech

companies and innovative SMEs. NeuroPSI is the neuroscience cluster of the Université Paris-Saclay. NeuroPSI, NeuroSpin and several other laboratories including medical ones, are part of the so-called Interdisciplinary Object (OI) of the Université Paris-Saclay (BrainViews). This initiative is aimed at coordinating the actions of researchers in biology, physics and engineering who seek to combine their methods and scales of analysis to study the normal and pathologic brain to understand the neural bases of behaviour, and develop therapeutic tools. Several NeuroPSI teams were members of the steering committee or partners in the PIA-funded Paris-Saclay IDEX. The institute's building was funded through the PIA framework, and some of its facility equipment was supported by the Équipements de Recherche Mutualisés (ERM) program of the Idex Paris-Saclay. NeuroPSI teams also have access to cutting-edge technologies through various platforms at Université Paris-Saclay, such as nearby genomics and cell imaging facilities, as well as the TEFOR service Unit (aquatic models), which is a node of the national Celphedia infrastructure and a spinoff of NeuroPSI. NeuroPSI actively participates in the C-BRAINS regional network that promotes the development of technological platforms with shared protocols and services between the participating laboratories. The NeuroPSI director is a member of the executive committee of C-BRAINS and NeuroPSI teams contribute to the three C-BRAINS axes. NeuroPSI teams are also part of 6 GDR. At the international level, a NeuroPSI scientist is the founder and director of the European Institute of Theoretical Neuroscience (EITN) in the framework of the EU-funded Human Brain Project (HBP). The EITN, which is now located at NeuroPSI, aims at fostering theoretical neuroscience. Another NeuroPSI team is involved into a LIA (International Associated Laboratories) with the Marine Predator Research group (Macquarie University, Australia) to pool human and material resources in the field of social communication of marine mammals. In line with the translational potential of some of its projects, NeuroPSI has established collaborations with the clinics (e.g. CHU of Montpellier, Assistance Publique-Hôpitaux de Paris, etc.) and is part of two international consortia linking preclinical and clinical studies and involving clinicians from several prestigious hospitals in UK, Italy, Denmark, the Netherlands, Germany and Hungary. Finally, one NeuroPSI team is part of the Fédération Hospitalo-Universitaire (FHU) on Addiction And Psychiatry Transformation with Precision Medicine (ADAPT).

UNIT WORKFORCE: in physical persons at 31/12/2023

Catégories de personnel	Effectifs
Professeurs et assimilés	9
Maitres de conférences et assimilés	13
Directeurs de recherche et assimilés	23
Chargés de recherche et assimilés	13
Personnels d'appui à la recherche	49
Sous-total personnels permanents en activité	**107**
Enseignants-chercheurs et chercheurs non permanents et assimilés	22
Personnels d'appui non permanents	17
Post-doctorants	0
Doctorants	52
Sous-total personnels non permanents en activité	**91**
Total personnels	**198**

DISTRIBUTION OF THE UNIT'S PERMANENTS BY EMPLOYER: in physical persons at 31/12/2023. Non-tutorship employers are grouped under the heading "others".

Nom de l'employeur	EC	C	PAR
CNRS	0	31	38
U Paris Saclay	20	0	9
Autres	2	5	2
Total personnels	**22**	**36**	**49**

GLOBAL ASSESSMENT

NeuroPSI is a multidisciplinary neuroscience institute dedicated to understanding the anatomical organisation and operating principles of the neural circuits that underlie behaviour in response to the environment, that it investigates using a multi-scale strategy, from molecule to cell and circuit. The NeuroPSI teams have successfully tackled this timely question thanks to a wide range of sophisticated approaches, including genome editing and transgenesis, transcriptomics, imaging, *in vivo* functional analyses, behavioural and computational studies, which they apply to a variety of animal models (flies, mice, birds, amphibians and fish) unique in France and Europe. In less than a decade NeuroPSI has become a renown and attractive institute in the fields of comparative, evolutionary and integrative neuroscience thanks to the remarkable work of all its staff and its two successive directors, who should be congratulated on this undeniable success.

An important step in the short NeuroPSI life has been the move in the fall of 2021 of all its teams in a single brand-new building, where they benefit from a modern, high-capacity animal facility allowing housing of numerous species and located in close vicinity of a large-scale platform for behavioural studies, including studies in natural or near-natural environments. They also benefit from state-of-the-art imaging facilities offering a range of equipment for robust and precise investigation of the complexity of the brain, in numerous animal models ranging from Drosophila larvae to mice. Gathering all the teams in a single building certainly reinforced staff cohesion and the feeling of belonging to NeuroPSI.

This has also contributed to the impressive attractiveness of the Institute, as demonstrated by the recruitment of three talented young PIs (one was a recipient of an ERC Starting Grant, one was granted ATIP-Avenir team and one was granted FRM team), and four foreign permanent CNRS researchers, one full professor and one associate professor from the University Paris Saclay who all joined already existing NeuroPSI teams. Further, NeuroPSI successfully attracted two novel reputed teams in glial biology research previously hosted at the Laboratoire des Maladies Neurodégénératives in Fontenay-aux-Roses. NeuroPSI's international reputation is also illustrated by their numerous invited conferences (more than 240 during the reporting period including about 20 keynote lectures), their organisation of scientific events (around 100 meetings during the reporting period), their participation in numerous evaluation panels (ERC, ANR, Hcéres, CNRS, CNU), their participation (and responsibilities) in four "Groupements de recherche" (+ one under review), their prestigious awards (Nature award of Lifetime achievement on Mentoring in Science in 2022, CNRS bronze medal in 2023, etc.) and the numerous promotions obtained by researchers and ITA during the reporting period. NeuroPSI is also a major contributor to the EBRAINS European Research Infrastructure and one of its PIs is the founder and director of the European Institute of Theoretical Neurosciences (EITN), in the framework of the Human Brain Project (HBP). This highlights the leading position of the Institute in computational Neuroscience. Capitalizing on its original positioning and its visibility, NeuroPSI has been very successful in fund raising, with 137 research contracts and a total income of 27.6 M€ over the reporting period. These comprise 9 European contracts, 6 of them (including 2 ERC and 2 Horizon Europe projects) being awarded in 2023 and representing 6.1 M€, illustrating the growing power of the institute. NeuroPSI also stands out by its excellent scientific production, with around 500 articles published in peer-reviewed journals during the reporting period. These include more than 160 articles published in wide readership generalist journals, such as Nature (3), Science (1), Nat. Commun. (14), Sci. Adv. (6), PNAS (9), Elife (8), Curr. Biology (6), Cell Rep. (7) or high-ranked journals in the field of neuroscience such as Nature Rev. Neurosci. (3), Neuron (4) and Cereb. Cortex (6). Twelve of these papers are already cited more than 50 times. However, the number of publications involving several teams is somewhat modest (24 publications) in spite of the numerous inter-team collaborations. This can be explained by the young age of the institute, and will certainly improve following the move all the teams in a single building which greatly facilitates day-to-day scientific interactions.

Among the major scientific achievements of NeuroPSI, one can quote *i)* the characterization of neuronal circuits that link locomotor and respiratory centres and are responsible for respiratory upregulation during running (Nature Commun., 2023), *ii)* the demonstration of the role of astrocytes in closing the critical period for visual plasticity (Science 2021), *iii)* the demonstration that the awake cortex engages dedicated neuronal assemblies in response to sensory inputs, thanks to a combination of 2-photon imaging and computational analysis (Nat. Neurosci. 2022), *iv)* the identification of the neuronal network underlying competitive interactions and sequence transitions in Drosophila (Plos Genet., 2020), *v)* the identification of a snoRNA, that was named "jouvence", which increases lifespan and protects against the neurodegeneration in Drosophila (Nat. Commun., 2020), *vi)* the demonstration of the key role of the Hippo/Yap pathway as a central regulator of Müller glia reprogramming upon retinal injury (Cell Rep. 2019), *vii)* the identification of a causal gene for retinitis pigmentosa, which has significant implications for the diagnosis of retinal dystrophies (JCI Insights, 2023); *viii)* the description of ultra-early processes of developmental evolution, linked to spatio-temporal variations in gastrulation and even to genetic maternal effects (Elife, 2019), *ix)* the demonstration of a role for the HisCl1 histamine-gated chloride channel in circadian entrainment by light, by acting in a subset of photoreceptors (Nat. Commun, 2019; Nature, 2023), and *x)* the demonstration that sensory feedback must comply with the topographic organisation of the somatosensory cortex to be effective (Sci. Adv. 2023).

Finally, NeuroPSI has created 3 start-ups, established numerous partnerships with big pharmaceutical and biotech companies and filed 8 patents over the reporting period, but the fundings from the private sector (682 k€ over the reporting period) remain somewhat modest with respect of the valorisation potential of some of its research projects. NeuroPSI staffs are also very active in knowledge diffusion to the lay public, with a regular participation in various annual outreach events, the organisation of laboratory visits for schoolchildren, workshops or webinars for middle and high school teachers, and numerous interventions in various media.

In conclusion, NeuroPSI is a renowned neuroscience institute, that has reached a high level of maturity in less than a decade. It should capitalize on its exceptional infrastructures, its original positioning and its recent successes to define a scientific policy, which will enable it to further increase its visibility and scientific output in the coming years.

DETAILED EVALUATION OF THE UNIT

A - CONSIDERATION OF THE RECOMMENDATIONS IN THE PREVIOUS REPORT

1: 'Reinforce international visibility'
NeuroPSI has launched yearly Chen institute international conferences and two international calls to attract new group leaders, including from abroad, and developed technical platforms to provide teams with state-of-the-art equipment and attract talented young researchers.

2: 'Increase translational activities'
3 startups (Learning Robots, myWaves Technologies, HABS) were created and partnerships were developed with other startups (It'sBrain, Ninovax) during the reporting period. Eight patents were filed or extended internationally and financial supports from the SATT Paris-Saclay were obtained.

3: 'Recruitment of and actions toward foreign students and post-docs'
22% of the PhD students and 54% of the post-docs recruited were foreigners. Neuroscience teaching was introduced in the international master's programs created by NeuroPSI professors. An internship committee was created to gather CVs and applications, and help foreign students for their administrative tasks.

4: 'set-up a regular international seminar program'
73 seminars have been organized since the integration of the new building in Sept. 2021.

5: 'need for a senior academic staff committed to the graduate program to serve as Neuro-PSI PhD liaison/coordinator'
A NeuroPSI scientist participates in the thesis committees to provide internal advice and PhD students are associated with the scientific life of the institute (Unit's council, Happy Neuro Hour Club, "talent days" annual meetings, NeuroPSI – Chen institute conferences).

6: 'increase implication in outreach activities'
In addition to the strong public outreaching activity of its teams, NeuroPSI participates in the Brain awareness week in association with NeuroSPIN.

7: 'increase the amount of competitive grants and quality of publications'
Two ERC grants (1 starting, 1 consolidator), and H2020 collaborative grants were obtained over the reporting period and NeuroPSI teams published over 160 articles in high-standard journals.

8: 'Promote internal collaborations between NeuroPSI teams'
Teams from the three scientific departments are distributed throughout the three floors where team laboratories and offices are mixed with platforms and other common rooms to foster interactions. Institute seminars gather all teams every week and department meetings have been merged into a single NeuroPSI internal seminar series.

9: 'define a start-up package announced in advance to putative recruits'
An internal starting package of 200 k€ (over about 4 years) is offered to new comers, providing that they obtain an independent starting package (FRM young team, ERC starting, ANR JCJC, and ATIP), to demonstrate their capacity to obtain grants.

10: 'reassessment of technical resources among teams'
When teams were closed, their technical staff are directed to new teams. Allocating engineers' working time between a team and a platform is encouraged.

11: 'replace or parallel existing departments with research axes'
This is ongoing. Each team will have the possibility of being affiliated to more than one of the 4 axes to promote scientific interactions.

12: 'implement a strategic/steering committee" specifically to deal with the medium-term strategic issues'
A tighter strategic committee (7 instead of 12) gather the director, deputy directors, general secretary and department leader meets monthly to define the scientific policy of the Unit.

Overall, NeuroPSI followed most if not all recommendations of the previous committee.

B - EVALUATION AREAS

Guidelines for all areas of evaluation (1, 2, 3 and 4): Considering the references defined in the Unit's evaluation guidelines, the committee ensures that a distinction is made on the outstanding elements for strengths or weaknesses. Each point is documented by observable facts including the elements from the portfolio. The committee assesses if the Unit's results are consistent with its activity profile.

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

Assessment on the scientific objectives of the Unit

NeuroPSI has set-up a broad but well-defined scientific objective, which is to understand the principles of organisation and function of the neural circuits that control perception, behaviour and cognition. Its strengths rely on the application of a multidisciplinary and multiscale strategy combining genetic and molecular approaches, genome editing and transcriptomics with *in vivo* functional analyses and behavioural studies as well as computational analyses on a variety of animal models (flies, mice, birds, amphibians and fish), at all life stages from egg to adulthood and, for some studies, in their natural environment. All in all, this is an **excellent to outstanding** objective, that gives NeuroPSI an original profile at the national and international level.

Assessment on the Unit's resources

NeuroPSI benefits from a substantial recurrent funding from its institutions (>600 k€ per year). NeuroPSI also receives funding to cover the infrastructure cost of the new building (2.7 M€ in 2023). In addition, the NeuroPSI teams have been successful in obtaining fundings from various international and national agencies (a total of 27.6 M€ over the reporting period), with a significant increase in the annual income over the last two years. The modern premises and scientific infrastructures such as the animal facility, which allows the housing of numerous animal species, are strong assets. Regarding human resources, NeuroPSI is gathering all the expertise necessary to successfully carry out its research program, although it is suffering from the departure of a number of permanent technical staff, which has not been compensated by the arrival of new staff. Overall, the Unit's resources are **excellent to outstanding.**

Assessment on the functioning of the Unit

NeuroPSI is a young institute that has implemented a well-structured management system that allows an efficient decision-making regarding both daily issues and strategic questions and seems to be well-accepted by the staff. The Unit pays great attention on technical staff career advancement, mentoring of newly recruited PIs, researchers and students, gender equality, health and safety issues, scientific integrity and environmental risks. Several committees (ValorITA, EGO, green committee) in charge of some of these issues have been created, encouraging the participation of everyone in the quality of life in the Unit, that is also favoured by the regular organisation of scientific or convivial events. Overall, the functioning of the Unit is **excellent**.

1/ The Unit has set itself relevant scientific objectives.

Strengths and possibilities linked to the context

NeuroPSI has set up a large and ambitious project that is well-structured around a few key questions in the neuroscience field such as the cellular mechanisms underlying brain circuit shaping during brain development, how evolution shapes the brain and creates cerebral diversity among species, the integration of sensory information from the environment and physiological information from the body to generate and control behaviour and cognitive functions and how brain circuit dysfunction leads to pathological states. The strength of NeuroPSI relies on *i)* the combination of experimental and theoretical approaches, *ii)* the use of a wide range of species (flies, mice, birds, amphibians and fish), at all life stages, *iii)* its multiscale strategy combining molecular, genetic, genomic, electrophysiological, physiological and behavioural approaches and *iv)* the implementation of emerging topics or technologies, such as brain-body interface research, behavioural analysis in natural or near-natural environments, fine-tuning of neural and behavioural measures using cutting-edge technologies. Gathering such a wide expertise in Neuroscience within a single institute is somewhat unique in France and provides NeuroPSI a strong visibility at the national level but also at the international level, and makes the institute very attractive, as shown by the creation of new teams and the recruitment of new permanent researchers. Such a diversity of expertise and approaches also provides the opportunity for multidisciplinary collaborations within the institute, which is a strong asset for ambitious projects in the Neuroscience field. NeuroPSI is well structured in three departments with different and complementary objectives, which can favour collaboration between the teams belonging to each department.

Weaknesses and risks linked to the context

A risk inherent to a project as large as the one being implemented at NeuroPSI is the dispersion of the (sometimes of small) teams over several objectives, which could be detrimental to their competitiveness and visibility in the long term. The structuring of a large Unit such as NeuroPSI into three scientific departments certainly facilitates its scientific management and could encourage interdepartmental collaboration. However, the role of the departments in the elaboration of the scientific policy and in the scientific animation of the Unit remains somewhat vague. Moreover, such a structure could create barriers that limit the opportunities for collaboration between teams belonging to different departments.

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

All NeuroPSI teams are hosted in a single brand-new building optimized to their research work where they benefit from an outstanding environment favouring top science and scientific interactions. Regarding financial resources, NeuroPSI receives a substantial support from its institutions (average of 500 K€ and 120 K€ per year from CNRS and University Paris-Saclay, respectively) that has been stable over the reporting period but only represents 12% of the total NeuroPSI budget, the additional funding (around 4.6 M€ per year) being provided by research grants (137 over the reporting period). The infrastructure costs that have increased dramatically since the move to the new building are entirely covered by the CNRS. NeuroPSI offers six facilities that provide a significant portion of the technologies required to support its activity profile. These include a large platform for the study of animal behaviour. The purchase of equipment is made by funding secured by NeuroPSI, such as calls for proposals such an ERM. NeuroPSI researchers also have access to shared technological platforms/experimental infrastructures at the University Paris-Saclay.

Weaknesses and risks linked to the context

The move to the new building has been extremely time-consuming for NeuroPSI staff and detrimental to the Unit's scientific activity and the progress of its projects, especially as it was delayed by 3 years and coincided with the Covid 19 pandemic. The relocation of the animal facility from 3 sites has been particularly challenging, requiring the re-derivation of all mouse strains, a process that took several months (up to one year for some mouse lines). This move resulted in the postponement of student recruitment and of the organisation of calls for new team leaders. Another issue is the complexity of the new building which requires high level of maintenance expertise by qualified staff and a large part of its maintenance depends on the CEA's operating teams. Although the number of tenured researchers and technical staff is relatively well balanced (104 researchers vs. 95 technical staff), there was a large number of departures of technical staff due to retirements and external mobilities that were not entirely compensated by arrivals, leading to understaffing in some support services, such as the Infrastructure & Logistics service and platforms, like the animal facility.

Further outsourcing will be difficult to avoid. Struggling to replace these departures, the Unit is facing challenges in recruiting new staff to bolster its expertise, particularly in the fields of genomics and bioinformatics. In a competitive funding environment, the Unit's diversification of its technological offerings increases its financial needs and the risk of not being able to provide competitive services (e.g. transcriptomics).

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

NeuroPSI has set-up a committee called ValorITA, which assists engineers and technicians to prepare applications for external or internal competitive examinations, their oral presentations with unequivocal effectiveness (20 engineers/technicians promoted over the reporting period). NeuroPSI is currently implementing a mentoring program to assist new team leaders in navigating the French administration and providing advice on funding modalities, grant writing, and student recruitment. NeuroPSI complies with the rules of its supervising bodies in terms of good lab practices and scientific integrity, health and safety, animal use and welfare, data storage and protection and the use of IT and digital tools. The institute implemented the electronic laboratory notebook eLabFTW in 2022 and was one of the few laboratories that participated in the CNRS national test phase. NeuroPSI pays a particular attention on quality of life at work and received dedicated funding from the CNRS to organize annual festive events open to all staff members. It has created a gender equality EGO Committee, in charge of the follow-up of gender ratios for various staff categories and the implementation of actions to prevent discrimination within the institute. It has also created a Green Committee in charge of promoting sustainable and sober research as well as practices for reducing the environmental footprint of NeuroPSI staff in compliance with the instructions of the institute's supervisory bodies.

Weaknesses and risks linked to the context

The institute does not have an active gender policy and there is a higher proportion of men among the research directors/professors (67%) and team leaders (60%).

EVALUATION AREA 2: ATTRACTIVENESS

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 new building hosting all the research teams, facilities and teaching infrastructures of NeuroPSI creates the ideal conditions to spur collaborative and interactive work. The proximity to NeuroSpin also offers undeniable opportunities to exploit and explore new applications of advanced protocols of *in vivo* functional imaging. The high level of recruitment to strengthen the areas of neuro-metabolism, neural circuits and integrative neuroscience in different animal models, the multidisciplinary approaches and the scientific critical mass are major assets contributing to the high scientific reputation and attractiveness of the institute. NeuroPSI research is supported by six technical platforms (cross-species vivarium, behavioural phenotyping, imaging, histology, transcriptomics and data analysis platforms) that provide excellent services and cutting-edge expertise and knowledge. The vivarium, housing rodents, amphibians, fish and birds is an excellent resource for comparative studies of brain function and evolution. The well-equipped behavioural platform, with new 2-photon microscopy facilities, provides competitive environment for modern functional studies of neural circuits. NeuroPSI teams were awarded 137 research contracts with a total value of 27.6 M€ (~4.6 M€ per year). One third of this income was provided by 47 ANR grants and contracts with private associations contributed with ~5 M€. During the same

period, NeuroPSI obtained 9 European projects (including 2 ERC and 2 Horizon Europe projects) for a total funding of 10.5 M€.

The key roles played by NeuroPSI members in the Human Brain Project and EBRAINS have provided invaluable opportunities for establishing numerous scientific collaborations in Europe in this particular field. NeuroPSI has also been very successful in participating in European Doctorate Networks in the fields of functional and integrative Neuroscience (5 networks).

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

There is an imbalance in the funding capacity of the teams: the most prestigious and consistent funding has been obtained by teams belonging to the fields of computational and functional neuroscience. The organisation in departments, although acting as an intermediate decision-making body, may have limited the cross-fertilisation between the different teams. Only 32% of the team leaders are women, which calls for action to achieve a better gender balance in future recruitment. The Unit has established local technological services (such as imaging, animal facilities, and histology) that are best located within the Unit itself. At the same time, the PSI-CO platform is developing rare expertise of interest beyond the Unit. However, in a context of limited financial and human resources, the Unit does not appear to prioritise strengthening differentiating platforms or securing access to key local technologies that could enhance its attractiveness. Instead, it is focusing on developing platforms in technological areas already covered by other local units and where the Unit lacks strong expertise.

EVALUATION AREA 3: SCIENTIFIC PRODUCTION

Assessment on the scientific production of the Unit

According to the self-assessment document, the Unit published around 500 peer-reviewed articles between 2018 and 2023 which have all been referenced in HAL. There are a small number of other papers that were published by researchers who have since left the Unit. Many of the publications are in prestigious journals and have been well cited. Given that the Unit has 36 full-ime researchers and 22 staff with a half-time teaching load, this works out at approximately 1.8 articles per full-time equivalent per year. Globally, this level of scientific production is **excellent** despite wide variations between teams.

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 journals in which NeuroPSI publications are most numerous are Scientific Reports (19), Nature Communications (13), eLife (10), PLoS ONE (10), PNAS (9), Neuroscience (9), Journal of Neuroscience (9), Current Biology (7), Cell Reports (7), eNeuro(7) and Cerebral Cortex (6). Other high-profile journals include Neuron (3) and Glia (3). The list also includes smaller numbers of articles in generalist journals such as Nature (3) and Science (1). Several publications have received more than 100 citations, with more than 380 citations for an article in Nature in 2018 and a review in Neuron in 2019. Together, these different articles have already been cited more than 9,500 times. The international status of the Unit is demonstrated by the fact that over 128 publications involve collaborations with researchers in North America (USA, Canada and Mexico), 51 with Germany and 37 each for Switzerland and the UK. There were also 34 publications with countries in Asia, 33 with Africa, and 23 each with Oceania (Australia) and South America (Brazil, Chile…). About one third of the publications have at least one PhD as an author. Several research assistants have published papers as the first author.

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

The number of inter-team publications is rather low, representing less than 5% (24/501) of the total number of NeuroPSI publications. This situation will hopefully improve with the move of all the teams to the same building and the reorganisation of the departments into thematic axes, which will allow greater flexibility in scientific interactions. There is a strong imbalance in the scientific production of the different teams, both qualitatively and quantitatively. On average, the laboratory produces about 1.8 publications per full-time equivalent researcher per year (counting 0.5 for staff with a heavy teaching load). However, for several teams, especially those with relatively few members, this figure is significantly lower.

EVALUATION AREA 4: CONTRIBUTION OF RESEARCH ACTIVITIES TO SOCIETY

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

NeuroPSI's interactions with the economic world are excellent, as evidenced by the filing of 8 patents (at least one of which has been licensed) and the development of 17 pieces of software during the reporting period, the creation of a spin-off company in 2020 (still hosted at NeuroPSI), the emergence of two other start-ups, the possible hosting of a fourth one, and numerous partnerships with biotechs and large pharmaceutical companies. However, the funding from contracts with the private sector (682 k€ over the reporting period) could be higher given the numerous partnerships established. NeuroPSI's outreach activities are also substantial with the regular participation of the staff participation in various annual outreach events, the organisation of laboratory visits for schoolchildren, workshops or webinars for middle and high school teachers, and numerous interventions in various media. Overall, the integration of the Unit's research into society is **excellent**.

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

NeuroPSI strives to take advantage of the industrial and economic potential of its research through start-up creation, patent filing (8 during the reporting period) and establishment of partnerships with private companies. Regarding start-up creation and hosting, a research engineer of the Unit created in 2020 the 'Learning Robots' company that markets an educational robot called AlphAI designed to teach artificial intelligence (AI). Two other companies are emerging from a NeuroPSI team: *i)* the 'myWaves Technologies' company that aims at fabricating personalized music generated from the brain waves of the subject to help sleeping, and *ii)* the HABS (Human Augmented Brain Systems) company that exploits the potential of brain waves as a means of authentication. NeuroPSI also explores the possibility to host GEG Tech, a spin-off from the CNRS specialized in vectorology. Over the last six years, NeuroPSI teams have established partnerships with numerous biotechs and pharmaceutical companies including Oticon Medical, It's Brain, Nuvamid, Coave Therapeutics, Horama, Variant, Sanofi iAwards Europe, MSD Pharma France, MedinCell, and BIOEC, on research projects related to neuropsychological tests, endocrine disruptors, cochlear implants, and various pathologies such as diabetes, retinal neurodegenerative diseases and Duchenne muscular dystrophy. One team hosts staff from the private laboratory CERTO (Center for Eye Research and Therapy in Ophthalmology) of the association Retina France and from the biotech company Variant. One team trained a PhD supported by a Cifre fellowship. One team contributed to the development of 17 pieces of software available under open-source licenses. These include Neo, a Python package for electrophysiology and optophysiology data allowing researchers to implement processing, analysis and visualization of data in a consistent fashion across different data sources, thereby helping to make neuroscience a more connected and open community.

Regarding outreach activities, NeuroPSI participates in or organises various events (Brain Awareness Week, organized in collaboration with NeuroSPIN - around 350 visitors welcome at NeuroPSI -, Pint of Science, Curiositas Festival, Nuit Blanche des Chercheurs, Festival des sciences, Les Jeudi de la Recherche, Année de la biologie).

NeuroPSI also organises laboratory visits for schoolchildren and workshops or webinars for middle and high school teachers and its staff regularly participate in the Declics Collège initiative. NeuroPSI staff also present their work in various media channels, including national (Libération, Le Monde, Ouest France, Le Figaro, Science et Vie, Sciences, Sciences & Vie Junior, Pour la Science, etc.) and international (The Scientist, Science Presse New Scientist, etc.) written press as well as radio and television programs (France Culture, France television, RFI). Some NeuroPSI members contribute to various Art-Science projects and science exhibitions and have important responsibilities in associations dedicated to the dissemination of science to pupils, teachers or the general public, mostly in frame of initiatives of the University Paris-Saclay.

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

Although there is no major weakness in the contribution of NeuroPSI research activities to society, the funds raised through industrial contracts (or SATT) remain modest (682 k€ over the reporting period) with respect of the large number of partnerships established between the Unit and private companies.

ANALYSIS OF THE UNIT'S TRAJECTORY

NeuroPSI is a large, multidisciplinary institute created in 2015, which covers a broad range of neuroscience topics from neurodevelopment to behaviour, cognition and computational neuroscience and has become in less than 10 years a mature, respected and attractive institute. This success relies on the capacity of the institute to gather a critical mass of motivated and top-notch scientists who master a multitude of animal models and state-of-the-art technologies requiring a high technicity. The NeuroPSI director, its management team and the PIs must be congratulated for this. For the next term, the institute logically aims to keep this diversity of neuroscience questions and multidisciplinary approaches, but has identified several domains that need to be reinforced to further enhance NeuroPSI original positioning and attractiveness and bring the institute at the highest level of neuroscience: *i)*the development of behavioural analyses in conditions mimicking the natural environment and bridge studies in the laboratory and in the field to gain deeper insights into the complexities of animal behaviour. NeuroPSI has a number of assets to succeed in this area, but this will require the recruitment of new teams with expertise in behaviour analysis within semi-natural environments; *ii*) the association of behavioural analysis and functional imaging in vigil animals, taking advantage of the recent development of resolutive optical methods for experimentally recording or controlling the activity of neuronal ensembles. NeuroPSI will take advantage of the recent acquisition of an innovative bidirectional two-photon microscope that can be adapted to multiple species, enabling high-resolution imaging of neural activity coupled with optogenetic methods in awake animals during behaviour tasks; *iii)* the development of advanced single-cell molecular studies to correlate gene expression and the activity of neuronal networks. Reaching this objective will be highly challenging in a very competitive field, because the single cell transcriptomics platform still lacks critical equipment and expertise in bioinformatics. NeuroPSI aims to attract a new team with expertise in bioinformatics, but such a team would probably focus on its own projects rather than devoting time to analysing the single cell transcriptomic experiments carried out by the platform for other NeuroPSI teams; *iv)* the development of interactions with clinical teams. Such interactions already exist and must indeed be strengthened given the translational potential of some NeuroPSI research projects. These enhanced interactions with the clinics will certainly offer new opportunities of fundings for NeuroPSI teams. It is also consistent with the wish of NeuroPSI to affiliate one or several teams to Inserm (ERLs) which will facilitate the recruitment of Inserm researchers and give opportunities to receive Inserm funding and to be eligible for Inserm calls for research proposals. There will be a large reorganisation of NeuroPSI at the beginning of the next term: 4 teams will not be renewed and their staff will join other current teams; two new teams currently hosted at the Laboratoire des Maladies Neurodégénératives (LMN) in Fontenay-aux-Roses, will join NeuroPSI in summer of 2024 and will reinforce research on glial cells at NeuroPSI (3 teams are already working on this topics), and research on brain diseases and especially neurodegenerative disorders, which is one of the objectives of the institute (see above); a new team will emerge in 2026 from an existing team and will investigate the evolution of brain development and cognitive functions. Finally, three teams where the current PI is close to the retirement age limit will be reconducted with new team leaders. This new configuration which will lead to 22 teams and has been approved by the NeuroPSI scientific advisory board (SAB) in March 2024, is consistent with the overall objectives of NeuroPSI and is also endorsed by the committee.

NeuroPSI proposes to replace the 3 departments with 4 thematic axes: the Neurodevelopment, Aging & Repair (NAR), Behaviour & Cognition (B&C), Senses, Computations & Motor actions (SCM) and Brain states & Brain-Body Interactions (3B) scientific axes. These axes cover the major topics and expertise of the institute and will provide more flexibility than the previous organisation, because they will offer teams the possibility to be affiliated to several axes and to change their affiliation from one axis to another according to the evolution of their scientific projects. Further, the topics of the different axes can evolve according to the team' and institute's scientific orientations. There will be a scientific animation within each axis but the NeuroPSI management team must ensure that scientific animation at the axis level is well coordinated with that organized at the Institute level and avoid the multiplication of scientific events, detrimental to the attendance of a large number of staff at these events on the long term. The governance of NeuroPSI has proven its efficiency over the past years and will not markedly change with this novel organisation. The executive committee including the direction of Unit (director, deputy directors and general secretary) and the department leaders will be replaced by a scientific committee in charge of defining the scientific strategy of the Unit and gathering the direction, axes' leaders and a support staff representative of the technical platforms. The Hcéres committee recommends that the team leaders, who raise an important proportion of the institute's financial resources, are also regularly consulted on these key issues.

RECOMMENDATIONS TO THE UNIT

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

The committee recommends that NeuroPSI defines its strategy for the coming years through a collegial process involving all team leaders. This strategy should be based on the core strengths of the Unit, including integrative, comparative and computational neuroscience. Once this strategy has been defined, the Unit will need to appoint a future Director (from within or outside the Unit) who will have the scientific legitimacy to implement and support this strategy.

The committee endorses the replacement of the departments by research axes, which provide more flexibility and allow teams to belong to several axes, but recommends that the axis topics remain readable and coherent. The committee also recommends that the governance of NeuroPSI should involve the team leaders more closely in strategic decisions, such as the appointment of the future director.
NeuroPSI should focus on developing effective strategies to increase its participation in European scientific consortia and initiatives to enhance its international standing and success in European funding calls.

Recommendations regarding the Evaluation Area 2: Attractiveness

The committee recommends that NeuroPSI defines priorities in future calls for the recruitment of new teams. NeuroPSI should anticipate the future retirement of some of its PIs so that they do not result in a loss of key expertise for the institute. The committee recommends that NeuroPSI continues to offer a package to newly established teams, which a key component of its attractiveness. It also recommends that NeuroPSI PIs provide mentoring to the PIs of new teams. In this regard, the committee recommends that NeuroPSI continues to support requests of the leader of the "Recurrent circuit, learning and memory" Team for lighter teaching duties during the first years following the creation of the team. The committee also recommends that this team establishes close scientific interactions with the "Neural Circuits and Behaviour" team, given the similarities of the models and experimental approaches used by both teams. In the context of limited financial and human resources, the Unit should prioritise strengthening differentiating platforms such as the PSI-CO platform, or securing access to key local technologies rather than developing platforms in technological areas already covered by other local units and where the Unit still lacks strong expertise. Attracting a new team with expertise in bioinformatics, which will assist the other NeuroPSI in the interpretation of Single cell transcriptomics, will certainly be very challenging given the local scientific environment. The committee recommends that NeuroPSI pursues its efforts to equip the Transcriptomics platform for local sample preparation but that the teams are approaching other platforms with expertise in the analysis of transcriptomics data, especially single cell transcriptomics.

Recommendations regarding Evaluation Area 3: Scientific Production

Despite the consistent body of publications of the Unit, the articles in top-notch journals with maximal visibility and recognition mostly belong to the area of computational and functional neuroscience. A more balanced output between the different scientific areas of the Unit should be an important goal to be fulfilled in the next mandate. To further foster collaborations between the teams and multidisciplinary top-notch publications, the committee recommends that NeuroPSI organizes internal calls for the funding of collaborative projects between teams of different scientific axes.

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

The committee recommends that NeuroPSI makes better use of the valorisation potential of its research and its numerous partnerships with biotechs and large pharmaceutical companies to increase its fundraising from the private sector.

TEAM-BY-TEAM ASSESSMENT

Team 1: Acoustic Communications

Name of the supervisor: Ms Isabelle Charrier

THEMES OF THE TEAM

The "Acoustic Communications" Team focuses on acoustic communication in marine mammals and seabirds, taking advantage of technological advances (e.g. multi-sensor acoustic tags, CATS cams incorporating hydrophones, accelerometers, cameras, etc.) that allow studies to be conducted in the animals' natural environment. Recent highlights include descriptions of the foraging vocal repertoires of penguins and gannets and the functions of these calls, and a focus on acoustic communication in the context of mother-calf relationships in humpback whales. This is complemented by work on call individuality in pinnipeds, and the team's work also includes studies of female birdsong. In summary, the team is using high-tech approaches to describe hard-to-access vocal behaviour.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

"The scientific production should remain excellent in spite of one team member becoming emeritus". The scientific production has been significant in terms of quantity.

"Some predictions on the project could be made more explicit". This relates to the previous report, so cannot be assessed here, but the predictions in the current report are also not explicit. Overall, it is not clear that there is clear strategic planning of the project.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

Catégories de personnel	Effectifs
Professeurs et assimilés	1
Maitres de conférences et assimilés	2
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	1
Personnels d'appui à la recherche	1
Sous-total personnels permanents en activité	**6**
Enseignants-chercheurs et chercheurs non permanents et assimilés	1
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	2
Sous-total personnels non permanents en activité	**3**
Total personnels	**9**

EVALUATION

Overall assessment of the team

The team focuses on high-tech solutions to exploring acoustic communication in often hard-to-access wild systems, and their international reputation is strong (e.g. hosted MSCA fellowship). Their funding record is regular (e.g. partner on 4 ANRs) and supports their work, and they have an outstanding record of PhD supervision (16 during the period), many of whom have led publications. The quantity of publications is very good but currently lacks the step-change publications necessary to be more competitive on an international stage. Overall, the team is **very good-to-excellent**.

Strengths and possibilities linked to the context

The team is very strong in studying animal systems in the wild that are difficult to access, and this work is timely as it takes advantage of rapidly developing technology that makes difficult environments accessible. For example, studying the vocalisations of foraging seabirds while at sea is exceptionally challenging. To this end, the team has retained regular scientific output, in field-specific journals (e.g. Behavioural Ecology and Sociobiology) and sometimes more generalist ones (e.g. Proc Roy Soc B; Royal Society Open Science). They have maintained an external funding stream as partner on 4 ANR grants (totalling 275.4 k€) in addition to some international grants as lead (2; totalling k€150) that evidence international recognition. Their attractiveness is further demonstrated by the hosting of a Marie Sklodowska Curie Fellowship during the period, supporting a researcher who was offered a proleptic position, and by 3 plenary talk invitations at international conferences. The team leader has had Editor roles at two well-respected journals (PLoS ONE; Behavioural Ecology and Sociobiology) during the period. The team's commitment to training PhD researchers is outstanding, with 16 theses supervised during the period, some with international co-supervisors. Their contribution to teaching and academic responsibilities at Paris-Saclay University is also a fundamental component of their activity and any weaknesses described below should be set against that background. In terms of outreach and non-academic interactions, their activity is excellent, incorporating training for teachers, consulting for film companies and Art-Science Exhibitions.

Weaknesses and risks linked to the context

Although the team's technological prowess is impressive, and this type of data takes exceptionally long to collect, the final work does not always produce highly recognised publications in the journals that would support team members to build their scientific careers. This can compromise competitiveness in applying for international and national funding as PI, and the team's new external funding during the assessment period derives from work as a partner on ANR grants and smaller funding sources. Overall, it appears that there is great potential in the tools that the team uses but that potential has not (as yet) been fully capitalised on, partly because they are working on species for which even the basic natural history is challenging to explore. In terms of subject matter, the team is quite distinct within the institute which by nature means that isolation is a risk, although the team nonetheless has critical mass and external collaborations.

Analysis of the team's trajectory

In the upcoming period, the team plans to continue their technology-based work documenting the vocal repertoires of seabirds and marine mammals, but there are no specific predictions about new directions that the project could follow and so its potential is hard to assess. However, the team is planning to introduce an applied aspect to this work, to assess the impact of anthropogenic noise. It would be helpful to read the specific noise sources, species and potential mitigation pathways of interest. In terms of communication strategies, the team plan to introduce additional sensory modalities, which also has an applied aspect in helping to understand detection of prey. An interesting new direction involves a focus on syrinx anatomy. In this respect, it would have been helpful to read details of the planned collaborations and the key questions to be researched. Finally, the team plans to extend current work focusing on singing in female birds. Again, it would have been useful to read details of the planned collaboration here, since the lead researcher for this project has now left the team. The team has an ANR funding which extends to the beginning of the next contract (ANR DICWOC), but the funding allocated to the team is modest (30 k€).

RECOMMENDATIONS TO THE TEAM

We suggest that the team should review the strategic planning of their research, to capitalise upon the potential offered by their technological tools. This should outline the key, singular, advances in understanding of behaviour/ecology/ecophysiology that can be made within each sub-project, with a focus on what grants might support that question and why publications could be high impact. Thus, the committee repeats the recommendation of the previous assessment, to actively develop more explicit predictions within the project.

As a result of this overview, the committee hopes that the team should be able to publish its work in well-respected generalist journals, boosting the career prospects of its students and early career researchers.

As another result, the committee hopes that the team will be in a position to apply for more grants as lead.

The team should seek to ensure coherence and fit to the neuroscience remit of NeuroPSI by ensuring that the internal collaborations they have planned come to fruition.

Team 2: Astrocytes & Cognition

Name of the supervisor: Mr Glenn Dallerac

THEMES OF THE TEAM

The "Astrocytes & Cognition" Team has recently been established (starting in 2019). This team investigates the role of the astro-glial network in cerebral activities at different levels, including its contribution on dopaminergic regulation in the prefrontal cortex but also during the crucial developmental period. Importantly, their research also considers the consequences of a dysfunctional astro-glial network in pathophysiology.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

"Obtain substantial external grant should be sustained to ensure the feasibility of the project through the recruitment of post-doctoral fellow and/or technical staff".
The team has been consistently obtaining grants (total over 2 M€) to grow and sustain its activity over the last years, following the recommendation of the previous evaluation.

"The team should also strengthen its interaction with the existing teams within the institute to ensure the feasibility of the project."
The team has substantially evolved with the recruitment of several scientific and staff members (from 2 to 8 members), including two senior researchers, to add new perspective in its research themes, demonstrating an integrative and well-though dynamic since its creation.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

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

EVALUATION

Overall assessment of the team

Overall, this an **excellent** team that has been able to capitalise on its assets and benefit from the opportunities offered by the institute since its creation in 2019. The team has published about 30 publications, with some in outstanding journals, such as Science and PNAS as main contributing authors. The different members also secured a significant amount of funding for the coming years and attract permanent researchers and students within the institute to consolidate its activity. The scientific projects are diverse but the core identity of the team focusing on astro-glial network function is preserved.

Strengths and possibilities linked to the context

The team has been capitalising on its expertise on the role of astro-glial network on brain circuitry, a relatively new but very active field of research in the last two decades. In particular, the teams focus on the potential role of astrocytes in dopaminergic signalling in the prefrontal network and its potential functional implications on cognitive processes. These scientific objectives are very relevant in healthy but also pathological conditions and constitute a niche that the team can capitalise on. The three PIs have set up different projects around this theme, ingeniously combining their expertise. For example, social behaviour that has been shown to be affected in mouse model missing calcium channels (TPC) raised the idea to study in particular these TPCs of astro-glial cells. The different PIs are recognised as experts in the field with consistent and excellent level of publications (about 30 in the last years) and secured a significant amount of funding for the coming years (over 2 M€) to ensure the continuation of their different projects. These funding allowed the recruitment of several students on each project (3 post-docs, 4 PhD students) and set up collaborations within the institute. They also initiated several international collaborations for the need of the different projects. Last, their participation to teaching is significant with several hundreds of hours per year and some socio-economical valorisations have been accomplished (one patent). The team seems to have now reached a significant size with clear scientific objectives and be able to maintain and increase its scientific production in the coming years.

Weaknesses and risks linked to the context

The scientific field of the team is currently highly competitive and can be seen as a threat despite its obvious interest. Therefore, scientific objectives should be pursued with rigour in order to avoid dilution of resources and impact on the speed of achieving significant results. Furthermore, as some key members have recently joined the team, it is important to ensure that the scientific interaction is real and that the unique mix of expertise enables original projects to be pursued.

Analysis of the team's trajectory

The trajectory of teams focuses on the functional roles that astrocytes may have in normal but also pathological conditions. First the investigators propose to study the implication of astrocytes on monoamines regulation in the prefrontal cortex by assessing their participation in cognitive functions. Following this path of research, they also aim at challenging their implication in addictive behaviours which depends strongly on monoamine dynamics. Additionally, they propose to combine their expertise by initiating an original theme of research investigating the consequences of calcium channel deletions in astrocytes for the regulation of social behaviours, and by continuing to investigate the implication of Bergmann cells in cerebellar cortex to control motor and cognitive functions. Therefore, the trajectory of the team interestingly capitalizes on their recent findings and technical development.

RECOMMENDATIONS TO THE TEAM

The team has reached a steady and fully operational stage and should capitalise on it to produce significant scientific outputs. As proposed in the project, the complementary expertise of the PIs should be exploited so that the whole is greater than the sum of its parts. Even though the team has secured recurrent funding for the coming years, it should consider seeking international funding, especially thanks to the numerous collaborations they have established with several well-known foreign scientists.

Team 3: Memory, Emotion & Time

Name of the supervisor: Ms Valérie Doyère

THEMES OF THE TEAM

During this term, the main interest of the "Memory, Emotion & Time" team has been the neurocognitive bases of associative memory, with a special focus on the temporal component that controls the anticipatory aspect of behaviour, as well as the impact of emotion on these processes. The team focused on the link between brain areas such as the amygdala, the prefrontal cortex (PFC), the hippocampus and the striatum. The team has been using experimental, mainly in vivo, approaches (behavioural, pharmacological, molecular, electrophysiological techniques) in rats. The overall scientific strategy has consisted in developing behavioural paradigms to evaluate species- specific vs. cross-species mechanisms for learning and monitoring interval timing, in order to be able to record from, and manipulate, the neuronal networks underlying temporal processing, at different stages of learning and at different life stages - from post-natal development to adulthood.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The previous committee recommended to pursue the team's efforts to keep its high scientific inputs in this competitive field by publishing at the highest level, and to prioritize its objectives. The team was strongly encouraged to seek the recruitment of young scientists (or a transfer from another team or laboratory). These recommendations have been taken into account, as the team has kept publishing in high-profile journals, and has successfully recruited a new CNRS researcher in 2023.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maitres de conférences et assimilés	1
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	1
Personnels d'appui à la recherche	1
Sous-total personnels permanents en activité	**4**
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	2
Sous-total personnels non permanents en activité	**2**
Total personnels	**6**

EVALUATION

Overall assessment of the team

Overall, this is an **excellent** team. The team has published a good number of original publications (20) during this mandate in generalist (e.g. PNAS) and specialist journals (e.g. Cerebral Cortex). The capacity to raise funding has been very good, with about 1 M€ of financial support obtained from competitive funding including national (ANR, CNRS) and international (OPUS) grants. The team is highly recognized for its scientific leadership on interval timing, and its scientific reputation can be seen in the number of invitations, organisation of scientific events, and editorial responsibilities. The team has supervised 7 PhD students during the reference period, 5 postdocs have worked in the team, and some members of the team are highly involved in teaching activities.

Strengths and possibilities linked to the context

The team has a strong visibility on its main scientific question, and has developed a collaborative network at the national and international levels. Their expertise in *vivo* electrophysiology in rats together with refined behavioural paradigms is highly recognized, with the team leader involved as adjunct professor in NYU School of Medicine and assumes editorial responsibilities. For instance, using a sophisticated behavioral approach, they demonstrated for the first-time error monitoring abilities of rodents in evaluating self-generated timing, similarly to temporal metacognition in humans (PNAS, 2022, highlighted in Nature, 2023). They also demonstrated the impact of a modification of amygdala (using a lentiviral vector) during adolescence on the prefrontal cortex activity and fear processing in rats (Cerebral Cortex, 2022). The team leader is regularly invited abroad and organized key scientific events (FENS symposia, initiator of the NeuroPSI-Chen Institute conference,…). In the frame of the latter initiative, she organized the first NeuroPSI-Chen Institute Joint Conference on Brain, Behavior & Beyond that covered the entire spectrum of research done at NeuroPSI, in Saclay in 2023. They also collaborate with teams working on non-human primates and in humans, which allow to compare interval timing processes between species and provides opportunities for translational research.

Weaknesses and risks linked to the context

With the projected retirements of the PI and one researcher during the next mandate, there is a need to ensure the transfer of knowledge towards younger researchers, engineers and technicians. There is a lack of technician or engineer for performing the experiments. The team should also seek more technical support for the electronics needed for electrophysiology and behavioural setups.

Analysis of the team's trajectory

The team will have a new team leader who is a former postdoc of the team and recently obtained a permanent position at the CNRS. Hence, there will be a form of continuity in the team's questions revolving around timing. There will also be the addition of new questions, with a stronger focus on the monitoring of timing errors and the metacognitive processes underlying the confidence in timing estimations. This will provide the opportunity to strengthen the link with NeuroSPIN in the Paris-Saclay area. The strong network of national and international collaborations should also benefit the new leader, but defining his leadership role in these collaborative efforts will be key to standing out.

RECOMMENDATIONS TO THE TEAM

The team should seek further support in electronics and *in vivo* experiments (e.g. with a lab assistant) to strengthen the technical basis of the research.
The team should enhance partnerships within NeuroPSI, particularly in computational neuroscience, to link the electrophysiological data with the cognitive questions.
The team should increase the training of PhD students and engineers/technicians to transfer the current lab's expertise.

Team 4 (new team): Recurrent circuits, learning and memory

Name of the supervisor: Ms Claire Eschbach

THEMES OF THE TEAM

The "Recurrent Circuits, Learning and Memory" Team is a new team. During her postdoctoral research, the team leader developed multi-level approaches to study the functional organisation of the mushroom body (MB) in *Drosophila melanogaster* larvae with unprecedented detail. Her analysis revealed cases of convergent evolution in neural networks for adaptive behaviour, including the conserved role of dopaminergic neurons in providing teaching signals for memory updates, similar to the mammalian striatum. Since joining NeuroPSI in September 2022, she has expanded this work, investigating MB feedback loops hypothesized to update memory strength by gating further memory formation. This mechanism ensures memory reflects the value of choices, potentially shared with mammals.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Not relevant, newly recruited PI

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

Catégories de personnel	Effectifs
Professeurs et assimilés	
Maitres de conférences et assimilés	
Directeurs de recherche et assimilés	
Chargés de recherche et assimilés	
Personnels d'appui à la recherche	
Sous-total personnels permanents en activité	
Enseignants-chercheurs et chercheurs non permanents et assimilés	
Personnels d'appui non permanents	
Post-doctorants	
Doctorants	
Sous-total personnels non permanents en activité	
Total personnels	

EVALUATION

Analysis of the team's trajectory

The team's trajectory is highly promising and will address both fundamental and translational questions in neuroscience. Its innovative approaches and the strong expertise of its PI enable it to make significant contributions to the field. While still in the early stages of her independent career, the team leader demonstrates great potential, particularly as she continues to define a clear and impactful research niche within a competitive area. Strengthening collaborations within NeuroPSI and maintaining leadership roles in larger collaborative efforts will be critical to further establishing her position and enhancing her visibility. The PI has already secured notable funding, including a grant from the Fyssen Foundation (€30k) and an Atip-Avenir grant for equipment (CNRS/Inserm, €180k). However, the postdoc position remains unfilled, and the current workforce appears limited. To address this, she might consider training master's or PhD students as an effective strategy to build lab expertise and advance her research program and should take immediate steps to obtain her accreditation to supervise theses (HDR). With strategic focus and continued institutional support, the PI is well-positioned for significant scientific and career success.

Obtaining institutional support for a technician/engineer would enable the team to continue developing innovative methodologies.

RECOMMENDATIONS TO THE TEAM

Recommendations to the Team

1. **Focus on Genuine Findings**: The team should concentrate on key discoveries that define a clear and innovative niche within the competitive field. This will ensure long-term leadership and a strong scientific impact.
2. **Develop Student Training**: Training talented students should be prioritised as an efficient strategy to expand lab expertise. This could complement ongoing efforts to recruit postdoctoral researchers.
3. **Strengthen In-House Collaborations**: The team should enhance partnerships within NeuroPSI, particularly in areas such as computational neuroscience or other complementary fields. These collaborations can broaden methodological approaches and increase the overall research impact.
4. **Maintain Leadership in Collaborations**: The team should actively define and assert leadership roles in collaborative projects, particularly within the Drosophila research community. This will help ensure visibility and recognition for their contributions.
5. **Seek Institutional Support**: The team should continue to make use of NeuroPSI's infrastructure while actively seeking additional support for instrumentation and specialised methodologies. This will further strengthen the technical foundation of their research. Support by a lab assistant would be appropriate.
6. **Strengthen interactions with Team 6** or even consider merging with this team, given the strong technical and methodological overlaps.

Team 5: Neurobiology of Decision

Name of the supervisor: Ms Sylvie Granon

THEMES OF THE TEAM

Over the past 5 years, the "Neurobiology of Decision" Team has focused on decision-making mechanisms, in particular in the mice prefrontal cortex (PFC), in different environmental and pathological contexts. It investigated the adaptability and plasticity at both adulthood and during development when different environmental dimensions (reward, stress, sleep debt, pollution exposure) are manipulated. This approach allows to tease apart the contribution of different neurobiological systems (5HT, DA, Ach) and networks (amygdala) to the dynamics of the PFC and social behaviours. The same social and communication abilities are explored in mice models of psychiatric diseases (Autism, Schizophrenia), in link with specific pathophysiological hypotheses (oxytocin/ASD, DA/SCH). The team has a strong expertise in mice behavioural phenotyping using social and communication as well as decision-making tasks, leading to a large collaboration network.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

1) Improving the international visibility/attractivity through broad-impact publication and/or international grants. Improving the PhD supervision capacity.

Overall, the average level of publication remains mostly in good to very good specialised journal (Frontiers, Neuropharmacology) with a few high-impact publication (PNAS, Nat Rev Neurosci, Trans Psy) mostly in collaboration with external teams or from the work done by an Emeritus member of the team. All team members have now their HDR but the supervision capacity remains, and will remain low (2 HDR) given the retirement of team members. Grants are obtained from local (Region) and national (ANR) institutions.

2) Rebalanced leadership of projects among its members, taking into consideration the arrival of new members

Permanent staff remains sparse in 2024 (1 PR, 1 DR2, 1 MCU) and the team will continue reducing due to retirements. There is still no permanent technical staff. The reduction in team size is a risk factor as the number of (collaborative) projects are (and will be) increasing. It remains difficult to attribute a given project to a permanent team member.

3) Expand intramural collaboration and strengthening the technical staff/post-doc workforce to incorporate new technological approaches.

An effort was made to hire engineers on grants but with a high turn-over. Intramural collaborations have yielded to 7 co-publications (mostly with one team). The team has a strong potential to contribute to research axes (e.g. PFC and social communication topics are shared by many teams) and the development of the PSI-Co facility given the strong expertise in social cognition and complex environments in mice.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

Catégories de personnel	Effectifs
Professeurs et assimilés	1
Maitres de conférences et assimilés	1
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	0
Personnels d'appui à la recherche	0
Sous-total personnels permanents en activité	**3**
Enseignants-chercheurs et chercheurs non permanents et assimilés	2
Personnels d'appui non permanents	2
Post-doctorants	0
Doctorants	3
Sous-total personnels non permanents en activité	**7**
Total personnels	**10**

EVALUATION

Overall assessment of the team

The team has a strong reputation and a solid network of national collaborations. It has a solid expertise in phenotyping both decision-making and social/communication abilities in mice, at both behavioural and neurobiological levels. The team masters a broad spectrum of contextual (social and environmental) changes. The team, and all its members, are productive (publication, funding, PhD training). However, the theoretical framework on the role of PFC and the different ascending pathways (DA, 5-HT) must be better defined and pursued. Otherwise, there is a risk that the team's scientific agenda will increasingly be driven by external collaborations/ideas, sometimes with rather weak hypothesis (e.g. ASD, schizophrenia). This balance between internal/collaborative drives must be carefully rethought as it as consequences for obtaining more grant funding as principal investigators and not partners and for publishing in reputed journals as last authors. Overall, this is a **very good-to-excellent** team.

Strengths and possibilities linked to the context

The team has a solid reputation and a good scientific output concerning the role of PFC in the functional plasticity/adaptability in decision-making under uncertainties and communication/social interaction behaviours. These brain functions are modelled in mice by a set of innovative behavioural tasks, coupled with both molecular and neurophysiological approaches. The focus is on the role of the prefrontal cortex and various afferent systems (5HT, DA, Ach). The general approach aims to manipulate environmental factors (reward, stress, pollution) or molecular factors (knock-out models, pharmacology). One of the main outcomes is the identification of different phenotypes in decision-making performances that can be related, and manipulated to social interactions of individuals within large groups. Such a stratification of the animal groups is interesting and timely at international level. This can lead to interesting scientific questions and opportunities. Production is solid, with 37 articles in international journals, albeit of very variable quality (Nature Rev Neurosci, PNAS, Trans Psy, Cerebral Cortex but also Frontiers, Exp Brain Res, PlosOne…). Best publications are related to the scientific activity of the Emeritus member of the team. Most projects are carried out in collaboration with external teams. This dense collaborative network reflects the expertise and visibility of the team in the behavioural/neurobiological phenotyping of mouse complex behaviours under various environmental conditions. This network provides a regular inflow of funding with national (ANR) and industrial contracts.

Weaknesses and risks linked to the context

The team has a legacy and strong competences in the behavioural phenotyping of decision-making under uncertainty (Gambling task) and social/communication behaviours. This expertise is in line with the co-development of tools for automatic behavioural analysis and environment enrichment for mice breading. However, these competences and visibility present both opportunities and risks. Over the last period, 8 projects have been conducted with a diversity of questions/approaches and led to numerous publications on the empirical work. The team successfully maintains its main focus in interest (PFC and social cognition) but there is a risk of becoming a technological partner rather than a scientific leader on these questions with are both timely but also very competitive at the national and international levels. This risk of dispersion can already be measured by the broad range of mid-level publications and the fact that most of the large (ANR) resources were obtained as a partner rather than the leader. One negative impact is that team's PhD students have published mostly in mid-level journal as first authors (BBR, PlosOne). Another risk is that the team would have no longer time and resources to strengthen its own theoretical framework on the role of PFC in adaptive and, social behaviours. The reduction in the team size will further increase this risk of dispersion, with 8 projects in the future.

Analysis of the team's trajectory

The team will be reduced to two permanent researchers (1PR, 1MCF) with high teaching/administrative duties and 1 CNRS Emeritus. Still, the team envisions 7 research projects, grouped into 3 research axes. All of them are carried out in frame of national and international collaborations, 5 of them being already funded (ANR, Region). One important project, grounded on the team's expertise and visibility, is the identification of social profiles in large bred of mice along the group lifecycle. Such a behavioural profiling/stratification is linked to methodological development to enrich the behavioural approaches (mostly decision-making tasks) with molecular, structural MRI and functional imaging (miniscope and fiber photometry) as well as with physiological/behavioural markers of emotions. Such a deep-phenotyping is very interesting, timely at the international level and useful to assess the vulnerability and protective factors during environmental changes

and developmental threats. However, it is also very time- and resource-consuming for a small team with no permanent technical staff.

The overall strategy calls however for three remarks: *(i)* the team would need to strengthen its own theoretical framework about the role of PFC in behavioural plasticity/adaptability and not only investigating each problem independently as it appears, *(ii)* the number of parallel projects may be too large given the available supervision resources (1 PR, 1 MCF) and without a rapid reinforcement with other permanent staff, this extensive approach is risky and *(iii)* to avoid that the team becomes a state-of-the-art scientific and technological facility for main different partners/projects, a strategy should be elaborated within NeuroPSI and in particular with the PSI-CO facility. This would help the team better differentiate what belongs to its own scientific agenda and what is open to collaboration/services. Such a clarification of the scientific objectives of the team could help attract high-quality junior researchers and post-docs willing to build their own project within the team.

RECOMMENDATIONS TO THE TEAM

The team should target higher impact publications from its own scientific work, with both experimental and review papers. Previous high impact review articles were published by an Emeritus member of the team. Remaining members should pursue this effort. This would help securing more resources (e.g. ANR) as coordinator rather than partner and attracting high-profile junior researchers.

The team should better differentiate what is related to the development of open facilities/technologies and what is at the core of its scientific agenda. It should better delineate what is the theoretical perspective of the team, from the topics brought by external partners. This is important for the PhD students and postdocs who need to publish in higher impact journals and about their own, more theoretically-driven projects.

Team 6: Neural Circuits & Behaviour

Name of the supervisor: Ms Tihana Jovanic

THEMES OF THE TEAM

The "Neural circuits & behaviour" Team was established in 2019. It investigates how neural circuits in the *Drosophila melanogaster* mediate decision-making processes and action sequences in the context of normal and pathological conditions. Its approach aims at monitoring finely the neural circuit mechanisms underlying sensorimotor decisions during approach/escape types of behaviours.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

"Given the small size of the team and the fact that all projects are currently supported by one starting grant, the leader should consider to optimize the workforces and to prioritise her projects."
The team leader has been able to secure funding through different types of national and international grants (ANR, Équipe FRM, FRC, CRCNS). However, the time limitations of these grants are a hurdle to maintain reliable and consistent knowhow and technical skills in the team over the years.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maitres de conférences et assimilés	0
Directeurs de recherche et assimilés	0
Chargés de recherche et assimilés	1
Personnels d'appui à la recherche	1
Sous-total personnels permanents en activité	**2**
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	2
Post-doctorants	3
Doctorants	4
Sous-total personnels non permanents en activité	**9**
Total personnels	**11**

EVALUATION

Overall assessment of the team

Overall, this is an **excellent** promising team that has succeeded in establishing its activity over the last years and developed innovative tools to analyse drosophila larva's decision-making behaviour and characterise their underlying neural circuits. Ongoing studies are expected to be published soon and should confirm this positive dynamic. The development of machine learning algorithms to categorise behaviours has been a great strategical development to set strong experimental basis that can be exploited in the coming years. Scientific production has not been very high yet quantitatively but of very good quality and several studies are expected to be published soon in peer-reviewed journals. Even if this small team struggles to preserve the technical knowledge that they developed, the team leader has consistently obtained fundings to guarantee constant recruitment of students and postdocs.

Strengths and possibilities linked to the context

The "Neural circuits & behaviour team focuses on understanding how neural circuits in the fruit fly larva mediate decision-making processes and the sequencing of behaviours. By exploiting the well-mapped larva's nervous system, the team aims to uncover the neural mechanisms that allow animals to select appropriate behaviours in response to environmental cues and internal states. To achieve these goals, the team employs a combination of behavioural analysis, electron microscopy for neural circuit reconstruction, functional imaging of neuronal activity, and genetic tools available in *Drosophila*. This integrative approach allows them to dissect the neural substrates of sensorimotor decisions and action sequences with high precision. In particular, the team has performed remarkable work at analysing and categorising behavioural sequence using machine learning algorithms thanks to collaboration with experts in the domain. This work, essential for further analysing the underlying circuitry implicated in the different behaviours, has been published in an excellent review (Plos Genetics, 2020). Capitalising on these tools, the team has also identified essential pathways underlying mechanosensory responses when the sensory context is important, in particular during competitive interactions between approach/escape behaviours. These recent studies have been both submitted and deposited on preprint servers.

Their current projects are well funded thanks to competitive funding obtained by the PI (ANR, FRM, FRC) for a total income of around 1.5 M€, which enabled the hiring of postdocs (4), engineers (2) and PhD students (4) over the last years.

Last, the team has been involved in teaching (licence, master) and workshops for middle and high school teachers to help design multidisciplinary projects that include science materials in the classrooms.

Weaknesses and risks linked to the context

The team seems to struggle to consolidate a substantial number of permanent staff members to guarantee the continuity of technical development and knowledge. In line with that aspect, the team leader who is currently the only permanent researcher seems to be heavily loaded with administrative procedures. This is certainly a crucial aspect in such a complex integrative approach and should be carefully considered for the next mandate.

Analysis of the team's trajectory

The team will build on the former achievements by studying underlying circuits and mechanisms responsible for the modulation of decision-making in the context of different conditions, such as in defensive behaviours. They propose to first map the brain-wide circuitry implicated in sensorimotor decision by using electron microscopy, by investigating the connectivity of the previously identified neurons to premotor and motor areas during behaviours where the muscle activity will be carefully monitored. They also propose to modulate the activity of these circuits, either genetically or with computational modelling to characterize their role in decision-making under different states and physiological conditions. Last, they propose a very interesting new line of research investigating the biological basis of individuality, taking advantage of their experimental approach that allows them to study fine synaptic wiring in genetically identical subjects. All these projects are supported by already acquired fundings or currently submitted grant applications.

RECOMMENDATIONS TO THE TEAM

Overall, the team should continue to capitalise on the excellent experimental approach they have been developed over the last years. Fundings are secured until 2028 but a strategy should be defined to secure the technical and experimental skills beyond this date. An active search for an outstanding postdoctoral profile should be envisaged, focusing on critical skills to maximise the chances of obtaining a permanent position that meets these needs. Also, mutualisation with other teams of a permanent engineer/technician should be considered.

Another aspect that could be considered to optimize the production of the team is the collaboration with other teams working on common thematic, such as decisions making or individualisation processes, but with different species.

Given the strong technical and methodological overlaps, they might consider fusion with the "Recurrent circuits, learning and memory" team.

Team 7: Functional Brain Imaging & Behaviour

Name of the supervisor: Mr Jean-René Martin

THEMES OF THE TEAM

Over the past five years, the "Functional Brain Imaging & Behaviour" Team has focused on the snoRNA jouvence, demonstrating in *Drosophila* that its deletion shortens lifespan and causes neurodegeneration, while its overexpression extends lifespan and provides neuroprotection, probably via a gut-brain axis. Jouvence was identified as a pseudo-uridylation agent for rRNA, underscoring its role in critical cellular processes. The team also discovered snoRNAs sno-2 and sno-3, which have distinct expression patterns and potential roles in metabolism and neuroprotection. Using CRISPR/Cas9, they are characterizing these snoRNAs. Translational studies showed that jouvence reactivates proliferation in aged human fibroblasts and reduces glioblastoma viability when knocked down, revealing therapeutic potential in aging and cancer biology.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

They were able to publish one paper in a high-quality journal (Nature Communications) on the snoRNA project in 2020. With two PhD students, the workforce of the team remains limited.
Their international visibility still remains somewhat limited.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

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

EVALUATION

Overall assessment of the team

This is a **very good** team employing innovative approaches to address significant scientific questions with clear potential for impact. Their publication record is solid with respect to the modest team's size (5 publications, including one Nat Commun paper, and one submitted publication), though not exceptional, and their translational efforts are forward-thinking but still developing, requiring further refinement for impactful outcomes. The team currently includes two PhD students in addition to the PI, reflecting a limited workforce, and has secured four grants totalling €500k. They have filed one patent and created a start-up to exploit the translational potential of their results on snoRNAs.

Strengths and possibilities linked to the context

The team is engaged in addressing significant biological questions through the use of Drosophila genetics. The major scientific outcome of the team has been the identification and the characterization of a new small nucleolar RNA (snoRNA) that they named "*jouvence*". They showed that *jouvence* is involved in longevity and neurodegeneration in Drosophila. This led to a seminal publication in a high-impact journal (Nat Commun, 2020). They identified *jouvence* homolog in mouse and human, allowing them to hypothesise that it could induce similar effects in human. This prompted further translational studies in human cells which revealed that *jouvence* expression increases cell proliferation, whereas its knockdown (by siRNA or shRNA) decreases cell proliferation, and even leads to cell death, suggesting that its effect could potentially be used to kill cancer cells (e.g. Glioblastoma cells). Using transcriptomics, they showed that several genes involved in cell cycle (e.g. Cyclin B1, A2, P21, TP53, Myc and MKi67) are deregulated by jouvence knockdown. Collectively, these findings suggest that jouvence could represent a new therapeutic target to prevent the deleterious effect of aging, and, inversely, to treat various cancer types.

The identification of *jouvence* led to the filling of a European Patent (EP4114944A1) and the creation of a start-up (Ninovax).

The current projects investigate the roles of snoRNAs (*jouvence, sno2 and sno3*) in aging, neurodegeneration, and metabolism. Their application of CRISPR/Cas9 to is innovative and methodical, showcasing their focused approach. The extension of findings to mammalian and human models will exploit the strong translational potential of these of snoRNAs.

Fundings have been secured through various national sources (ANR, ARC, Idex Paris-Saclay), one of them extending to the end of the current contract.

The team leader is strongly involved in teaching (coordination of the Master "Modèles Invertébrés de Pathologies Humaines": 25 h/year, participation in the CNRS thematic school on snoRNAs) and has supervised 23 Bachelor or Master students. He gave five invited conferences at national and international meetings (ARC colloquium, European Symposium on Drosophila, Club Neurobiologie des Invertébrés) and universities (University of Padova, University of Birmingham). He chaired the 19th European Symposium on Drosophila Neurobiology (NeuroFly 2022, Saint-Malo, September 6-10, 2022, 400 international participants), a biennial international conference gathering neuroscientists worldwide and promoting interdisciplinary discussions on the latest research on the neurobiology of Drosophila.

Weaknesses and risks linked to the context

The team's impact could benefit from a broader scope and clearer articulation of their long-term goals. Their translational applications of the results on the snoRNA *jouvence*, though forward-thinking, are still in early stages, and their success depends on further refinement and strategic planning. To strengthen their position, the team should prioritise diversifying their research directions and increasing the visibility of their findings. These adjustments are critical for realising their full scientific and translational potential. The team's scientific output is quantitatively modest, with five publications as first or last authors, even though it includes one paper in a high-impact journal (Soule et al. Nat Commun, 11, 987, DOI: 10.1038/s41467-020-14784). Despite the quality of their research, the volume of publications and broader impact in their field do not yet align with the highest standards.

The workforce, currently including two PhD students, is notably limited, which could hinder the team's capacity to maintain momentum and pursue ambitious research objectives. Strategies to attract additional students and postdoctoral researchers, as well as to expand collaborations, are crucial for the team's growth.

While the team demonstrates promise in their translational trajectory, with innovative tools and relevant research questions, their ability to achieve broader recognition and greater impact will depend on addressing these challenges, particularly in workforce expansion, international visibility, and securing diverse funding sources.

Analysis of the team's trajectory

The team is not reconducted.

RECOMMENDATIONS TO THE TEAM

The team is not reconducted.

Team 8: Molecular Genetics of Circadian Rhythms

Name of the supervisor: Mr François Rouyer

THEMES OF THE TEAM

The "Molecular Genetics of Circadian Rhythms" team deciphers the molecular mechanisms involved in the coordination of the circadian neuronal network and its entrainment by various lighting cues to control daily functions in Drosophila. They use a number of molecular strategies to identify new genes and assess their function using targeted genetic manipulation. Their findings have the potential to better understand clock mechanisms in mammals. Their strategy has allowed publications in top-notch journals with high visibility and recognition.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Recommendations of the previous assessments were as follows:

1) Continue to focus on high-quality output

The team has indeed continued to publish in journals of large audience and high visibility (Nature, PNAS, Nat Comm, Current Biol) which attests of the high quality and impact of the team's research.

2) The team should exploit new opportunities for sharing its research to public

Link with the society has improved in terms of raising public awareness with articles in general press, participation in radio and TV programs, lectures in high schools, and as part of national actions.

3) The PI is encouraged to apply for ERC grant

There is no information on ERC application. However, the team was involved is a European training program (ITN CINCHRON) to investigate the clocks and their environmental adaptations in insects, and is part of a new Marie Curie doctoral network (INCITE) recently selected by EEC (2024-2028).

4) With the team leader becoming the director of the whole institute, other team members should take over responsibilities of the team leadership

This has been difficult due to the seniority of other researchers and engineers retiring in 2021, 2023, and 2024. However, the arrival of two new researchers (CR and Prof) with expertise in *Drosophila* photoreceptors should be beneficial to improve the team's workforce.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maitres de conférences et assimilés	1
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	1
Personnels d'appui à la recherche	1
Sous-total personnels permanents en activité	**4**
Enseignants-chercheurs et chercheurs non permanents et assimilés	1
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	5
Sous-total personnels non permanents en activité	**6**
Total personnels	**10**

EVALUATION

Overall assessment of the team

The team is internationally renowned for its expertise in deciphering the molecular mechanisms involved in the coordination of the circadian neuronal network and its entrainment by light cues in *Drosophila*. The quality and attractiveness of the research are undeniable, with data published in high-ranked journals, although this could be improved by a more rapid submission process. Funding for both research and training is excellent, and there are a large number of PhD students who are trained in chronobiological research. Overall, the team's research and training are **Excellent to Outstanding**.

Strengths and possibilities linked to the context

The team has revealed new molecular mechanisms involved in the coordination of the circadian neuronal network in *Drosophila*. They reported how different light intensities change the coupling between morning and evening oscillators; they discovered a new role of histamine in the synchronisation of rest-activity rhythms with the light-dark cycles and revealed that the control of mRNA poly(A) length of clock components regulates circadian rhythmicity. The team has an excellent international reputation attested by publication, funding and invitation to give conferences and seminars. Data are published in top ranking journals (Nature, PNAS, Nat Comm, Current Biol), which attests of the high quality and impact of the team's research. Funding has been particularly high with 5 ANRs (2 as coord.), 1 Équipe FRM, 1 CNRS MITI, for a total of 1,289 k€. There is an excellent training to research with 10 PhD students who were (7) or are (3) supervised; this high level of training reflects the team's participation in European training networks. Public outreach has been improved with participation in articles in general press, radio and TV programs, lectures in high schools, and various national actions. The team leader is also the Unit director, which involves a heavy load of scientific and administrative managements.

Weaknesses and risks linked to the context

Given the administrative load of the team leader, as NeuroPSI director, and the limited number of senior researchers in the team, there is a risk of a reduced scientific production and training by the team. There is a lack in last/first author publications in the last years (since 2019), which may be detrimental for PhD student visibility and future carrier. Further, as research in chronobiology is only carried out by this team, whose members (both researcher and staff) have retired or will retire before the end of the next contract, there is a risk of losing this scientific expertise within the Unit.

Analysis of the team's trajectory

The team's projects will continue on focusing on the complex function and role of the multi-oscillating neuronal network in *Drosophila*. They will notably 1/assess the role of two different subsets of DN1p neurons in the building of the sleep/wake cycle, 2/decipher the role of each of the six different rhodopsins, which in addition to Cry, participate in the circadian entrainment of sleep/wake activity and entrainment by low or high light intensity; 3/ continue the study of the role of poly(A) regulation by POP2 in circadian rhythmicity; 4/ analyse circadian rhythms in different flies collected from the wild. This very ambitious projects will certainly require increasing the scientific and technical force of the team.

Two researchers (one CR and one Prof) who are expert in neuronal identity in *Drosophila* photoreceptors will join the team at the beginning of the next mandate. They will develop projects on the maintenance of the functional identity of R8 photoreceptors and the genetic variants affecting their specification. However, there seems to be no common scientific project between these two sub-groups, notably in line with circadian rhythmicity, which is the theme of the future team.

RECOMMENDATIONS TO THE TEAM

The team should improve the valorisation of its research with a more rapid process of submission, which will also be beneficial for the future carrier of the PhD students.

The team will benefit from the arrival of two new members, but the team leader should avoid having two scientific lines operating in parallel, and instead try to develop some joint projects.

The team has a very well recognized expertise in molecular chronobiology, which is rare in France. However, the present and future (2028) retirement of researchers expert in chronobiology is a risk of losing this expertise in the Unit. Thus, the two researchers expert in the *Drosophila* visual system who will join the team in 2026 should introduce chronobiology concepts in their research projects, and collaborations with other teams working on the neurobiology in *Drosophila* (T. Jovanic and C. Eschbach) should be developed. The team is also encouraged to identify and recruit junior molecular chronobiologists.

Team 9: Cognition, Plasticity & Neuropathologies

Name of the supervisor: Mr Cyrille Vaillend

THEMES OF THE TEAM

During this term, the main interest of the "Cognition, Plasticity & Neuropathologies" Team was centred to better understand the underlying causes leading to neurodevelopmental dysfunctions in muscular dystrophy, Coffin-Lowry syndrome and PAK3-related intellectual disability. The team has exploited reliable mouse models of these diseases for assessing behavioural dysfunctions, molecular deficits and disease reversibility. They validated antisens oligonucleotide-based treatments for gene exon skipping to restore dystrophin function. The team was also engaged on assessing how metabolic and hormone changes can influence and worsen Alzheimer's disease progression in the mouse by longitudinal assessment of behavioural deficits, brain function alterations and biomarker profiling.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Recommendations of the previous assessments were as follows:

1) Organizing more international meetings:

- The team has organized some symposia in highly visible French and European congresses (International symposium "Neuropathologies"; Summer School in Neuroscience; International Congress of Myology. Symposium on "Retinal and brain involvement in Duchenne muscular dystrophy").

2) Increasing the contacts and collaborative work with private companies:

- This remains a priority for the team for the future mandate.

3) Expanding the societal interactions of the team and increasing the impact of its research in the non-academic world:

More efforts should be put in these activities given the high value of the team's research on neurodevelopmental diseases and their burden to families and society.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

Catégories de personnel	Effectifs
Professeurs et assimilés	1
Maitres de conférences et assimilés	1
Directeurs de recherche et assimilés	2
Chargés de recherche et assimilés	0
Personnels d'appui à la recherche	1
Sous-total personnels permanents en activité	**5**
Enseignants-chercheurs et chercheurs non permanents et assimilés	2
Personnels d'appui non permanents	1
Post-doctorants	0
Doctorants	5
Sous-total personnels non permanents en activité	**8**
Total personnels	**13**

EVALUATION

Overall assessment of the team

Overall, this is a **very good-to-excellent** team. The team has published a considerable number of original publications (40) during this mandate describing novel disease mechanisms in the pathologies of interest. However, the team lacks publications in top-notch journals with high visibility and recognition. The capacity to raise funding has been excellent, with about 1.7 M€ of financial support obtained from competitive calls, including 2 ANR, 1 AFM-Telethon and 1 EU-H2020 grants. The team has developed a high international standing for its work on the neurological comorbidities of muscular dystrophy creating strong synergies with leading research and clinical European groups on this disorder.

Strengths and possibilities linked to the context

The team is very competitive in the characterization of mouse models of neurodevelopmental disorders by the advanced expertise gained on multiple key methodological domains including mouse behaviour analysis, molecular/cellular studies and RNA/DNA therapeutics. The team is internationally recognized for its studies on the neurological deficits in muscular dystrophy. They have been successful to secure a good funding for the different projects obtaining very competitive grants in France and Europe. Their methodological and scientific expertise is well aligned with the general interests of many groups in the Institute, facilitating the opportunities of collaborations and synergies with the other teams of the Unit. The team has elaborated a wide range of expertise from molecular and cellular studies, advanced mouse behaviour assessments and RNA and gene therapeutics. As such, the team has leveraged on reliable mouse models to dissect novel disease mechanisms and behavioural dysfunctions for the human pathologies of interest. The group has supervised 13 PhD students during the reference period and some of its members are highly involved in teaching and training activities.

Weaknesses and risks linked to the context

Although different projects belong to the same broad field of neurodevelopmental disorders, the scientific common ground is not high with not many transversal activities that can merge the objectives of the team. In addition, given the limited size of the team, the multiple interests in different disorders might excessively spread the impact of its research creating some lack of focus. The scientific work on risk factors in Alzheimer's disease, although scientifically sound and valuable, is less related to the core activities of the team and requires important energies and efforts of the team. Thus, the investment on this research should be carefully weighted and planned for long-term sustainability.

Analysis of the team's trajectory

The team will exploit new therapeutic approaches to treat neurodevelopmental disorders in mice. This research direction is well appreciated since it will leverage on the new knowledge acquired by the investigators on the underlying disease mechanisms and the advanced methodologies to characterize anatomical, functional and behavioural correction of the disease manifestations. A fundamental aspect of this research is to understand the extent of disease reversibility at post-natal critical periods for these disorders. This is well tackled by the project on the Coffin-Lowry syndrome and might be more emphasized in the other projects. Some risk of research dispersion is also detectable in particular for the project on PAK3-related diseases where extensive electrophysiological studies and work with human iPSCs-derived organoids are planned. The load of work is extremely high for these activities which requires stable and committed collaborative partners to reach these ambitious goals. Very important is the continuous partnership planned with NeuroSPIN to exploit its unique technologies as for example the *in vivo* high-field functional MRI imaging. At least one grant coordinated by the PI (AFM Telethon, 637 k€) has been secured for the next mandate.

RECOMMENDATIONS TO THE TEAM

An additional strategic effort would be to find more common goals and methodological developments between the different projects in current development by the team.
The team will benefit to develop a clear priority list of its research projects to minimize the risk of dispersion. In addition, the establishment of strong collaborative international assets, as for the case of muscular dystrophy, will be fundamental to increase the chances to obtain sufficient funding and have enough research personnel.
The team might increase its general involvement in research dissemination and public engagement.
On a more general note, the current name of the team does not seem to highlight its actual research work. A change might be recommended to better reflect the current interests and activities of the team.

Team 10: Development & Evolution of the Neural Crest (DENC)

Name of the supervisor: Ms Sophie Creuzet

THEMES OF THE TEAM

The "Development & Evolution of the Neural Crest" Team is investigating the role of the cephalic neural crest (CNC) during head development, highlighting the close interaction between CNC cells and the brain and allowing a better understanding of brain abnormalities such as anencephaly. The team is also working on the role of pericytes as immunocompetent cells in intracerebral immune surveillance. Mechanisms by which meningeal CNC cells act in brain immunity are also being investigated.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Recommendations were to increase the quality of publication, to improve the team's contribution to scientific meeting, its external funding, and to attract high-quality senior researchers. The team did not consider higher impact journals but increased contributions to scientific meetings (7 between 2019 and 2022). The team leader has been invited to several scientific meetings and is involved in scientific event organisation, including a Gordon Research Conference and a summer school. In terms of funding, an Inserm-Model 3R funding (323 k€) was obtained in addition to the exceptional the Équipe FRM funding, and the team leader is partner of an ANR project. Finally, a new researcher has joined the team in 2024 and 3 PhD students have been recruited, but the critical mass of the team remains limited (2 people). Previous recommendation was also to focus on a specific topic to remain competitive. This concern remains and projects seem to be too ambitious compared to the size of the team, even though an international collaboration is mentioned for the future (ANR project).

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

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

EVALUATION

Overall assessment of the team

The team leader is international renowned. She was active in organizing scientific events, involved in teaching developmental biology, participated in knowledge disseminations and as PhD/HDR jury member. She is director of the GDR- DU -CNRS-2031- CREST-NET (50 labs). The team hosted 3 PhD students, 3 postdocs and 1 IE CNRS. The team explores original research fields such as embryonic perivascular cells and cephalic neural crest meningeal cells. It has a very good capacity to raise funding (Équipe FRM - 2018-2022- and Inserm-Model 3R) and a correct publication track (2 reviews, 1 book chapter, 1 article published in 2024 and others in preparation). Overall, the team is **very good**.

Strengths and possibilities linked to the context

The team leader has generated strong data on the role of the neural crest in the vertebrate brain ontogenesis and is now focusing on a promising EvoDevo project based on the annelid worm and the chicken, which aims to understand how vertebrate brain vesicles, centred on liquid-containing cavities, evolved from the invertebrate basal cord. As a director of the GDR- DU -CNRS-2031- CREST-NET, which links 50 laboratories, the team leader is gaining a visibility that should be useful for future collaborations.

Weaknesses and risks linked to the context

The size of the team is currently limited. Some articles are in preparation or deposited as preprints but not yet published. Published articles/reviews are not published in top journals. The end of the funding period is 2022 or 2023. The last PhD student defended her thesis in 2023.

Analysis of the team's trajectory

The team works on the cephalic neural crest (CNC) that generates skeletal tissues surrounding the developing forebrain and provides the prosencephalon with functional vasculature and meninges. Thanks to avian model, the team has shown that the CNC is strongly involved in embryonic brain immunity and vascular development and homeostasis. Coming projects including those of a researcher who will join the team in July 2024 aimed at identifying ancestral characteristics and signaling pathways present in bilateral ancestors and how they evolved into the complex structures observed in vertebrates. The role of DNA secretion by CNS cells in brain patterning and CNS development will be explored, as well as the neural crest cell lineages in invertebrates (annelid *Platynereis*) compared to chicken, and the role of neural and signaling environment changes underlying behavioural shifts in kin recognition. An international collaboration with a German lab is proposed (submitted ANR project).

RECOMMENDATIONS TO THE TEAM

It is recommended that the team leader focusses on her scientific projects and publishes data in higher impact journals. Due to the limited size of the team - despite the arrival of a new permanent researcher - the team leader should focus on specific topics involving the incoming researcher. Local and international collaborations are encouraged as well as recruiting new PhD students/postdocs.

Team 11: NeuroInfection & Immunity

Name of the supervisor: Mr Jean-Pierre Levraud

THEMES OF THE TEAM

The "NeuroInfection & Immunity" Team is leading research on neuro-immune interactions, in particular the role of innate immunity in CNS development using neuroinvasive viruses (Sindbis and HSV-1) in Zebrafish models developed by the team, which is closely linked to TEFOR.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

New team moving during the last 5 years. So, few recommendations were made:

1- pay attention to reinforce the scientific outputs of the research, besides the technological aspects which are already solid.

2- Maintain collaborations with external groups, to allow the best take off of the new lab.

3- Advisable to plan a validation of the results in mammalian models.

4- Reach an agreement between the Pasteur Institute and CNRS for the move of researchers to NeuroPSI.

It is notable that the team's move has been delayed of 2 years and that the team has unfortunately lost one member who passed in 2022.

Collaborations with external groups have been maintained and new collaborations have been established. These collaborations allowed to follow recommendation number 3 notably with Pr Kalinke in Germany. Efforts on the technological aspects of the project in order to deploy it to numerous applications and collaborations should soon be successful in terms of scientific results.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

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

EVALUATION

Overall assessment of the team

The team is overall **very good to excellent**. It is excellent in getting grants in 3 years (> 800 K€). A FRM grant obtained in 2023 by the PI confirms the outstanding interest of the team's research. The small group has developed remarkable tools, bank of mutants and methods to analyse *in vivo* the effect of mutations in BSL2 conditions. They now have a collection of transgenic and mutant zebrafish including type 1 interferon ko, to study thee effect on synaptogenesis. The publication rate is very good even though the number of published articles is quite low. The link with TEFOR offers outstanding possibilities of collaboration, but the attractiveness of the team remains to be improved with only one PhD student and one Postdoc trained during the reporting period.

Strengths and possibilities linked to the context

The strength of the model developed by the team as well as the synergy with TEFOR allow addressing numerous questions concerning viral infection of the CNS, neuroinflammation and effect on development in a quite short period. The transgenic menagerie opens up many possibilities for collaboration and future projects. They used it to link spontaneous locomotion to the differentiation of a subset of neuronal precursors into dopaminergic neurons concomitant to spontaneous telencephalic activity. They showed the role of a meningeal subpopulation of PDGFRB+ cells in a repair response. Their model of viral encephalitis in zebrafish is excellent for real time investigation of the role of immune cells in pathogenesis. The team benefits from a national recognition in neurovirology and is internationally recognised for its work in zebrafish model. While the team only shows a very good level of publication due to its high implication in the administration of TEFOR, this opens numerous perspectives for future publications. This is notably confirmed by the outstanding level of grant obtained with more than 800 k€ with 3 years including FRM team recognition as PI validating the potential of the team. The team's staffs are strongly involved in local committees and the management of animal, microscopy and single cell transcriptomics facilities.

Weaknesses and risks linked to the context

The major risk is the low number of teams working in virology in the institute, which makes the team poorly attractive for people expert in the field, and can be a limitation for the expansion of its scientific topics. In case collaborations are not anymore granted, a second risk may be the impossibility to confirm observations made in zebrafish in mammalian models.

Analysis of the team's trajectory

The proposed trajectory is excellent, in line with the former trajectory proposed. While it may lake sometimes a little bit ambition notably not to use more recent technologies of spatial transcriptomic, it is nevertheless more cautious taking into account the current size of the team, the 25% involvement of the PI in TEFOR and current grants. The possibility to validate observation for behaviour as well as some transposition for gene response to mammals relying almost exclusively on foreign collaboration may be a limitation in case of rupture in the coming grants. The team has chosen to focus on neurotoxicity screen of ISGs on neurons and astrocytes while the institute seems to develop axis on microglial cell studies which are among the most important cells producing and replying to IFN stimulation. While it sounds evident that the team cannot do everything, it could allow more interactions with the new teams of the institute to integrate such a cell type in their studies. While the team leader is internationally recognized, strategy for publication remains only very good. The models, the bank of mutants and TEFOR offer an excellent visibility for future collaborations. Attractiveness of the team remains to be improved with one foreign PhD student and one post doc. The strategy to stabilize the team and to attract more PhD students and permanent members is not very clear. The PI does not seem to wish to increase the size of the team and expects to have more time to dedicate to the team management for the next five years. While Interaction with TEFOR is of high interest, the team would really benefit from attracting more specialists in neurovirology notably.

RECOMMENDATIONS TO THE TEAM

The team needs absolutely to publish the accumulated results, to attract more researchers and PhD students to grow, and to stabilize the regularity of incoming results and grants.

The team should work more on the validation of some observation in mammals.

Team 12: Stem Cells & Neurogenesis in the Retina

Name of the supervisor: Ms Muriel Perron

THEMES OF THE TEAM

The "Stem Cells & Neurogenesis in the Retina" Team is a large structure combining a CNRS research team and a private ophthalmology center (CERTO). It develops a wide range of experimental approaches to investigate retinal degenerative diseases in both the frog and the mouse, which are complementary models for regenerative properties. They are also investigating the mechanisms that allow retinal stem cells to be maintained under physiological conditions. Much of the work attempts to find good models of retinal dysfunction that can be used to develop novel therapeutic techniques often involving gene therapy.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The previous report recommended that the team continues to produce highly competitive and impactful research on the neural stem cell biology to tackle both fundamental and therapeutic questions.

They have been very successful in pursuing this aim.

The panel also stressed that an effort must be put to attract post-docs for the next period.
In this respect the team has been only marginally successful in that only one postdoc was recruited during the evaluation period.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

Catégories de personnel	Effectifs
Professeurs et assimilés	2
Maitres de conférences et assimilés	2
Directeurs de recherche et assimilés	2
Chargés de recherche et assimilés	0
Personnels d'appui à la recherche	5
Sous-total personnels permanents en activité	**11**
Enseignants-chercheurs et chercheurs non permanents et assimilés	4
Personnels d'appui non permanents	1
Post-doctorants	0
Doctorants	4
Sous-total personnels non permanents en activité	**9**
Total personnels	**20**

EVALUATION

Overall assessment of the team

Team research findings are of very high quality and impactful (31 publications; half with a team member as first/last author). The team's international recognition is attested by collaborations with 4 foreign labs and about 30 invitations to international congresses, high capacity to raise funding from public and private sources (1.95 k€), intense training (8 PhD & 3 post-docs) and a strong involvement in teaching, steering body management, collective responsibilities, and contribution of research activities to society. Overall, the team's research and training activities are **Excellent to Outstanding**.

Strengths and possibilities linked to the context

The team's excellence and recognition are reflected by the fact that the team leader has received numerous prizes (Raymonde Destreicher Award from the French National Academy of Medicine (2023) & Award from the Fondation de France (2019)) and a PhD student obtained the 2019 L'Oréal-UNESCO Science Award. The team members have been invited to give conferences in a wide range of international meetings, with the team leader invited to give 20 talks, including 2 keynotes. The team has several active international collaborations (USA, Germany, Portugal), as well as national collaborations, confirmed through shared co-authorships. The team's publication record is excellent with findings published in 25 peer reviewed articles, 16 of which have a team member as first (of which a good % of early carrier researchers) or last authors. They made key publications in very renowned and impacting journals (JCI insight, Elife, Glia, Cell Reports). They also published the engineering of new retina tools in methodological articles. The team has made major contributions to understanding the mechanisms governing stem cell maintenance in the Xenopus retina. They have also investigated the causes of inter-species variability in retinal regenerative responses to injury, and in particular the differences between mammals and frogs (which have a remarkable capacity for regeneration) with the notable role of Muller cells in regenerative processes. The team has also a number of medically oriented projects, including mouse models of retinal diseases that include uveitic glaucoma and retinitis pigmentosa. They have set up a project using gene therapy. This research is done in close collaboration with the CERTO, a private lab involving the Retina France association that employs 5 research staff attached to the team. The team has collaborations with various Biotech companies including Coave Therapeutics, Horama and Variant, and has filed a patent in 2020 that covers the use of an AAV vector expressing the CRX factor for gene therapy. Team members are highly involved in training of early carrier researcher: 8 PhD students (4 still running) and 3 post-docs, of which 8 are from foreign countries. In addition, team members are strongly engaged in teaching duties and responsibilities mostly undertaken by 2 professors and 2 assistant-professors at UPSaclay. The team's ability to raise funding is excellent with projects funded from various sources, including foundations (retina, FRM, ARC), biotech companies, and public agencies (ANR) for a total of 1.95 K€, with team members as coordinator in all cases. Finally, team members participate in various research and University steering bodies (public as CoCNRS, Hcéres, ED, undergraduate/graduate programs and graduate school at UPSaclay; private as foundations) and are engaged in sharing their research on retina with the general public *via* publications and videos, and interventions in schools or public scientific events.

Weaknesses and risks linked to the context

One main weakness would be the lack of recent public (ANR/FRM) funding with two ones obtained for 2018-2020. Also, most of the current grants will end before the end of the current mandate, so future projects have not yet secured sufficient funding.

Analysis of the team's trajectory

Based on their previous findings, team objectives are to provide novel insight into fundamental research in neural stem cell biology in retina of different species, with the long-term goal of proposing therapeutic strategies, based on selective gene therapy and identification of neuroprotective molecules, for retina diseases such as retinitis pigmentosa and age-related macular degeneration. Their research will focus on Müller glia cells as they present a promising cellular reservoir for retinal disease treatment, and will test the hypothesis of a functional coupling between regeneration and inflammatory microenvironment. Although one grant from Retina France will secure some of the projects (until 2026), team members have to search for larger funding, possibly at the European level, given their excellent and recognized expertise in the field.

RECOMMENDATIONS TO THE TEAM

This is an Excellent to Outstanding team, which is encouraged to continue with its high quality and original research projects developed in the recent years.

Team members are encouraged to apply to national (ANR) and European (ERC) calls based on their project excellence and productive (inter)national collaborations.

Team 13: Development & Evolution of the Forebrain

Name of the supervisor: Ms Sylvie Retaux

THEMES OF THE TEAM

The "Development & Evolution of the Forebrain" Team investigates brain and behaviour evolution in vertebrates using *Astyanax mexicanus*, a model with river and cave morphs that diverged less than 20,000 years ago, enabling the study of rapid evolution. Combining developmental biology, genetics, behaviour, and fieldwork, they explore eye and brain development, highlighting gastrulation-stage disruptions involving genes like rx3 and otx2 and cis-regulatory changes. Behavioural research examines reduced anxiety and altered stress responses linked to MAO gene mutations. Studies on acoustic communication and olfactory adaptations reveal sensory organ morphology and neuron composition changes. Genomic analyses uncover sensory system evolution, vision gene loss, and speciation insights.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Previous recommendation: "At present and in terms of grants, the team has a reduced number of active national public grants which highly reduce the competitiveness of the team for future recruitments and research perspectives. The team has not received funding from European or international funding agencies."

Since then, the team has demonstrated success in securing national grants, which have provided important support for its research activities. However, despite this progress, the team has not yet succeeded in obtaining international grants, particularly from European funding bodies like ERC or other EU programs. Addressing this gap remains crucial for enhancing the team's global competitiveness and ensuring sustainable growth in funding and visibility.

Previous recommendation/concern: "Low reposition of PhD and post-doctoral students could dampen the team capacity to remain original and competitive in the field."

This concern remains relevant, as the team currently has a very low number of PhD students (one person). This limited workforce could critically impact the team's productivity and reduce opportunities for collaborations and knowledge exchange, which are essential for maintaining competitiveness and originality in their research domain. Efforts to recruit more PhD students and postdoctoral researchers should be prioritised to strengthen the team's capacity and long-term research potential.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maitres de conférences et assimilés	1
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	2
Personnels d'appui à la recherche	2
Sous-total personnels permanents en activité	**6**
Enseignants-chercheurs et chercheurs non permanents et assimilés	1
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	1
Sous-total personnels non permanents en activité	**2**
Total personnels	**8**

EVALUATION

Overall assessment of the team

This is an **excellent to outstanding** team, internationally recognized for its leadership in evo-devo research on *Astyanax mexicanus*. Their focus spans developmental processes, behavioural adaptations, and genomic changes, linking developmental mechanisms to evolutionary outcomes. Their scientific production is excellent, employing advanced methods like neurogenetics and comparative genomics, contributing to adaptation and speciation. Their capacity to secure funding is very good, and their focus enhances their ability to attract talented early-career scientists, ensuring continued prominence in the field.

Strengths and possibilities linked to the context

The team is internationally recognized for its contributions to evo-devo research, focusing on brain and behaviour evolution using *Astyanax mexicanus*. This model, with two morphs that diverged in less than 20,000 years, provides unique insights into adaptation and speciation. The team addresses diverse questions in developmental biology, neurogenetics, and behaviour, leveraging advanced methodologies like gene expression analyses, developmental manipulations, and field studies. The team demonstrates significant strengths in addressing a highly relevant and well-defined topic within evo-devo research, supported by a broad spectrum of questions and advanced methodologies. Their work provides deep insights into the links between developmental processes, behaviour, and evolution. The team has produced 34 peer-reviewed articles, 22 with team members as first authors and 24 as last authors, along with five reviews and five book chapters. Publications in top journals such as *Development* and *Nature Communications* highlight studies on eye morphogenesis, maternal effects during gastrulation, and behavioural traits linked to mutations like *MAO*. They also published in high-ranked journals (Development, eLife) in 2024. The team secured around k€900 funding through competitive grants, including ANR projects like CAVEMOM and EVONECTOME, and collaborations with INRAE, NeuroSpin, and conservation organisations in Mexico. This reflects their integration into international scientific networks and capacity for interdisciplinary work, with significant contributions to cavefish conservation biology. The team has trained five PhD students and hosted four postdoctoral researchers. Although the workforce has been limited, they recently strengthened their team with the addition of two permanent CNRS researchers, who bring expertise in neurogenetics and developmental biology. Team members have actively contributed to undergraduate and graduate education, providing training at leading French institutions. The team's societal contributions include outreach activities such as interviews, public science dissemination, and collaborations with conservation agencies. Their work on biodiversity and cavefish conservation demonstrates how fundamental research informs practical ecological applications.

Overall, the team's work represents an outstanding contribution to evolutionary and developmental biology.

Weaknesses and risks linked to the context

Challenges remain in expanding the workforce and attracting PhD students. Addressing these issues will be crucial for sustaining their productivity and broadening their scope.

A question arises: can their findings be extended to broader developmental contexts or generalised to address disease-related mechanisms? While their contributions are highly impactful in their current scope, exploring these broader applications could further enhance the translational relevance and significance of their research.

Analysis of the team's trajectory

The team remains on a very promising trajectory, having established itself as a leader in evo-devo research through its work on the unique *Astyanax mexicanus* model. Their innovative and multidisciplinary approach has provided significant insights into brain and behaviour evolution, linking developmental processes to adaptation and speciation. With a well-defined research focus and advanced methodologies, the team is well-positioned to broaden its impact by exploring generalisation of findings to other developmental and disease-related contexts. By expanding their translational potential, the team is poised to make even greater contributions to (evolutionary) developmental biology in the future. The team has an ANR funding which extends to the first years of the next contract (ANR EVONECTOME, 210 k€ allocated to the team).

RECOMMENDATIONS TO THE TEAM

To secure resources for ambitious projects, the team should consider applying for ERC funding, emphasizing its innovative focus, its translational potential, and the generalizability of its findings. A strong proposal that highlights these aspects will enhance the team's competitiveness and increase its chances of success.

The team should broaden its research impact by exploring how its findings, particularly those from *Astyanax mexicanus*, can address broader developmental and biomedical questions. This expanded focus would amplify the team's contribution to the field while opening new avenues for interdisciplinary research.

To sustain its momentum and capitalise on emerging research opportunities, the team should prioritise strategic recruitment to expand its workforce, particularly by bringing in skilled PhD students and postdoctoral researchers. This expansion will enhance the team's capacity to undertake cutting-edge projects and maintain leadership in its field.

The team would also benefit from establishing single-cell transcriptomics as a core capability. By taking a leading role in implementing this technique at the institute, the team could position itself at the forefront of high-resolution cellular analysis, creating new collaborative opportunities and enhancing its technical expertise.

Team 14: Signal Transduction & Developmental Neuropharmacology

Name of the supervisor: Mr Martial Ruat

THEMES OF THE TEAM

The overarching interest of the "Signal Transduction & Developmental Neuropharmacology" Team is to dissect the role of Shh signalling in adult brain homeostasis, injury and disease. The team has investigated the impact of Shh signaling in adult stem cell dynamics, neuronal circuitry formation and maintenance and in oligodendrocyte induction and differentiation. The team generated a non-canonical Smo receptor agonist, named GSA-10, which has become a pivotal research tool to manipulate Shh signalling in adult brain and displayed consistent remyelination activity in demyelinating disease animal models.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Recommendation: "The team needs to focus the project and ensure funding is obtained in that area, probably by staying in its domain of competence".

The team was only partially able to increase its funding and raise the visibility and impact of its research products. This is probably due to the relatively small size of the team which did not enable to put more efforts in grant writing and expand its research efforts.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

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

EVALUATION

Overall assessment of the team

Over this mandate the team has produced original studies on Shh signaling activation in astrocytes which was shown to reduce adiposity, improve glucose tolerance and prevent age-related insulin resistance. In addition, they have described a selective class of oligodendrocytes producing Shh and revealed its beneficial effects in promoting myelin regeneration in models of demyelinating diseases. The team had a regular scientific production over the last years continuing to explore Shh-dependent biological mechanisms in the adult brain. These studies are mostly published in specialistic journals indicating an incremental gaining of knowledge in the field. The team has lately struggled to obtain funding for its research activities which led to a reduction of the team size and a delay in reaching its scientific objectives. The team has made important efforts to develop research tools and methods with commercial value and developed excellent interactions with the private sector. The overall score of the team is **very good**.

Strengths and possibilities linked to the context

The team has a long-standing expertise and commitment in addressing the pleiotropic functions of Shh signalling in the healthy and diseased adult brain. Over the past 20 years, the team has provided a strong contribution to the understanding of Shh signalling in multiple biological contexts including adult neural stem cell maintenance, neuronal circuitry formation and functions, oligodendrocyte maturation and myelin production. In this view, the team has the merited to have started original investigations that led to identify new functions of this fundamental molecular signalling pathway in the adult brain. For its research, the team has developed multidisciplinary studies combining chemistry and *in vitro* assays to generate non-canonical Smoothened agonists that might have unique advantages as potential compounds for the treatment of demyelinating diseases. The PI had important administrative and scientific responsibilities in the Institute as deputy director of a department during the period 2018-2020.

Weaknesses and risks linked to the context

The team will not be renewed for the next mandate. Thus, it is superfluous to discuss any possible weakness that cannot be addressed in the future.

Analysis of the team's trajectory

The team will not be renewed for the next mandate.

RECOMMENDATIONS TO THE TEAM

The team will not be renewed for the next mandate.

Team 15: Molecular Neuroendocrinology of Food Intake

Name of the supervisor: Mr Mohammed Taouis

THEMES OF THE TEAM

The "Molecular Neuroendocrinology of Food Intake" Team is studying the mechanisms involved in the neuroinflammation of the medio-basal hypothalamus induced by high-fat diet, which promotes metabolic disorders. They previously revealed the role of resistin signaling in this phenomenon. During the last 5 years team members have focused on the early mechanisms involved in the hypothalamic inflammation in order to decipher whether resistin and other metabolic molecules (FGF21, adiponectin, ceramide) participate in the early events of the high fat diet-induced hypothalamic neuroinflammation, using molecular and integrative approaches (cell lines, WT or genetically modified mice).

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Recommendations of the previous assessments were as follows:

1) Enhance international visibility and attractiveness

International visibility will certainly be improved given the good publication record during the last years. The low number of conferences given at international congresses may be the consequence of high teaching duties and responsibilities of all team members.

2) Improve interaction with the society through outreach and dissemination programs

This issue is not discussed in the evaluation form

3) Given the heavy teaching duties, pay attention to maintain high quality research

Team members have had a good publication record, of which a majority with team members as last authors. Some of these publications are in high quality and visibility journals in the domain or metabolism and/or cellular regulations.

4) Avoid excessive project diversification.

The project has focussed on the cellular and molecular mechanisms involved in the high fat diet-induced hypothalamic inflammation associated with metabolic disorders.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

Catégories de personnel	Effectifs
Professeurs et assimilés	2
Maitres de conférences et assimilés	1
Directeurs de recherche et assimilés	0
Chargés de recherche et assimilés	0
Personnels d'appui à la recherche	3
Sous-total personnels permanents en activité	**6**
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	1
Sous-total personnels non permanents en activité	**1**
Total personnels	**7**

EVALUATION

Overall assessment of the team

The team has a renowned expertise in the molecular processes involved in neuro-inflammation and other metabolic disorders. Despite the PI's high teaching duties/responsibilities, the publication record is excellent, with papers in high quality and visible journals in metabolism and/or cellular regulations, of which some with local and national collaborations. The capacity to raise funding from public and private sources is very good (690.5 K€) with 2 recent ANR securing funding until 2027. Four PhD students were supervised in the last contract. Overall, the team's research and training activities are **Excellent**.

Strengths and possibilities linked to the context

Team members have continued their investigations on the mechanism involved in high fat diet (HFD)-induced-inflammation of the medio-basal hypothalamus by focussing on the early molecular events involving resistin signalling and potentially other metabolic molecules. Their main findings are 1) HFD triggers a rapid expression of resistin in tanycytes and POMC neurons, and selective KO of resistin or TLR4 (its receptor) indicate that this pathway is an early event in the HFD-induced hypothalamic gliosis and glucose intolerance; 2) Maternal resistin predisposes offspring to neuroinflammation; 3) Hypothalamic de novo synthesis of ceramide is involved in the resistin-induced hypothalamic gliosis and glucose intolerance; 4) HFD induces FGF21 expression in tanycytes and hypothalamus, and the hypothalamic FGF21 KO exacerbates the metabolic outcomes of HFD; 5) Adiponectin is expressed in hypothalamic neurons with a metabolic modulation. Altogether these data have highlighted a triple signalling network involving resistin, FGF21 and adiponectin, which appear involved in the regulation of diet-induced neuroinflammation. The publication record is excellent (28 original articles and 15 reviews) given the heavy teaching duties and responsibilities of the team's PIs. All team members, including engineers and PhD students, co-authored team publications (with 17 articles with one team member as last co-author). Due to their expertise in the molecular mechanisms involved in the central control of metabolic activity, they have numerous collaborations with other French laboratories in this research area which is attested by co-publications and co-fundings. As their findings may identify potential therapeutic tools for metabolic disorders, they are also engaged in collaboration with a private company (Sisley) in frame of a PhD research program (CRFRE). The team's ability to raise funding from scientific societies, foundations, private companies and public sources is very good. Of note two ANR coordinated by 2 team members were obtained recently for funding until 2027. Teaching activity is heavy as the team's PIs are professor or assistant professor with complete teaching duty. They are also involved in teaching responsibilities (various UE and co-responsibility of one master program).

Weaknesses and risks linked to the context

One main weakness is the heavy teaching duties and responsibilities of the team's PIs, which reduces the time dedicated to the bench work. Unfortunately, this is not compensated by a good attractiveness for early carrier researchers, which should be increased in the future. The team has a good national visibility but its international visibility may be improved by a larger participation in international congresses and international PhD programs. Finally, the team members do not seem to be engaged in raising awareness of their research topic among the public, although the question of the effects of a high-fat diet is an important societal issue.

Analysis of the team's trajectory

The team will further investigate the early events involved in the HFD-hypothalamic inflammation, which is known to be associated with several metabolic disorders. Based on their previous studies, they will investigate 1) the role of the resistin/TLR4/miR-155-5p on the HFD-induced hypothalamic inflammation using the newly developed miRSscope technique, targeted genetic deletion of miR-155-5p in tanycytes or microglia, and characterisation of miR-155-5p targets in these cells; 2) the functional links between resistin and FGF21/PPRa, ceramide and shh (newly identified metabolic molecules expressed in various hypothalamic cell types including tanycytes) on HFD-induced neuroinflammation and various metabolic outcomes; 3) the comparison of single hypothalamic cell transcriptome analysed from mice under various feeding regimes. Of note, some of these experiments will be performed in both male and female mice to disclose putative sex differences in the mechanisms investigated. These quite ambitious projects are financially secured with the two ANR grant recently obtained, but may require the recruitment of more workforce, notably post-docs and PhD students.

RECOMMENDATIONS TO THE TEAM

In order to fulfil the two main ambitious projects, new early carrier researchers, PhD students or postdocs should be recruited to help bench work, data analysis and paper writing.

Given the quality of research performed in the team, its members are encouraged to increase their international visibility through participation in and/or organisation of international meetings, PhD co-supervision, international grant applications.

As diet-induced metabolic disorders constitute an important societal issue to which the lay public should be sensitised to, team members including PhD students are encouraged to engage significant efforts in knowledge diffusion by participating in public conferences and science popularisation events.

Team 16: Neurogenetics of Drosophila

Name of the supervisor: Mr Daniel Vasiliauskas

THEMES OF THE TEAM

The "Neurogenetics of Drosophila" Team investigates colour photoreceptor (PR) differentiation and maintenance in *Drosophila*, focusing on how aging PRs sustain their functional identities as a fundamental question. Their work highlights the role of Rhodopsins and signalling pathways, such as Hippo and non-canonical Rh signalling, in maintaining mutually exclusive Rh5/Rh6 expression. They study natural genetic variation in PR fate and maintenance using DGRP fly lines, identifying rare variants affecting Rh5/Rh6 balance and novel genes like *nyx*. The *nyx* gene, essential for Rh5 expression in darkness, is linked to unexplored enzymatic pathways, potentially involving retinoid or steroid signalling, opening new avenues in PR biology and evolution.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The team was still very new at the last evaluation, and specific weaknesses had not been identified.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

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

EVALUATION

Overall assessment of the team

This is a **very good** team headed by a highly talented scientist with a compelling fundamental research agenda. The team's focus on Rhodopsin expression in *Drosophila* addresses important questions related to neuronal differentiation and the genetic underpinnings of brain function. While the team be critical to further enhance its scientific standing. Currently, the modest scientific output and the small size of the team limit its overall productivity and impact. However, the upcoming merger with another team presents an excellent opportunity to expand capacity and foster valuable collaborations. Looking ahead, the PI has the potential to lead a strong and dynamic team that can make significant contributions to the field.

Strengths and possibilities linked to the context

The team is internationally recognized for its work in Drosophila neurogenetics, particularly in Rhodopsin expression and photoreceptor neurons. Their research focuses on fundamental questions about neuronal subtype functional differences and the influence of genetic variation on brain development. Contributions such as their study on the HisC11 histamine receptor's role in photoreceptor synchronization (Nat. Commun., 2019) are valuable. The team secured an ANR grant (WILD_EYES; €324,471), demonstrating their ability to attract competitive funding. Members are actively engaged in NeuroPSI through committee work, seminar organisation, and reorganisation efforts, reflecting strong institutional involvement. However, their influence in national and international networks could be strengthened. The planned fusion with another team presents a promising opportunity to overcome the current limitations. This integration is expected to bolster workforce capacity, creating a larger and more dynamic team. Such an expansion could lead to enhanced productivity, including more impactful publications and an improved ability to secure additional funding. If the combined team effectively leverages its expanded resources, it could achieve greater visibility and influence in Drosophila neurogenetics, better positioning it to tackle its ambitious research objectives. Looking ahead, the PI has the potential to lead a strong and dynamic team, capitalising on the merger to build a cohesive and innovative research environment. With the right strategic direction and leadership, the PI can establish the team as a leader in the field, and make significant contributions to the advancement of knowledge in Drosophila neurogenetics. Success will depend on a clear vision, effective management of the integrated team, and a commitment to fostering collaboration and scientific excellence.

Weaknesses and risks linked to the context

The absence of first or last authorship from team members limits their visibility and leadership in the field. While all permanent members have contributed to publications, there is a clear need to improve both productivity and prominent authorship to enhance the team's overall impact.

With four invited talks, the team has achieved a modest level of recognition. Their supervision of one PhD student reflects a commitment to training but also underscores a limited capacity, likely due to resource constraints. Additionally, the absence of industry collaborations, patents, awards, and significant public outreach activities restricts their broader impact and visibility beyond academia.

The team benefits from strong local collaborations within NeuroPSI but has relatively limited national and international partnerships. While their work addresses important questions in neurogenetics, increasing publication leadership, building impactful collaborations, and engaging in outreach efforts are essential steps for broadening their influence.

Analysis of the team's trajectory

The team will not be reconducted.

RECOMMENDATIONS TO THE TEAM

The forthcoming merger with another group offers a great opportunity to overcome current limitations in staffing and scientific productivity. This expanded capacity and access to diverse expertise should be strategically used to enhance research outcomes and increase visibility.

The team should focus on boosting scientific productivity by concentrating on high-impact projects and taking more leadership roles in publications. Building stronger external collaborations, especially internationally and across disciplines, will help access new resources and foster innovation.

Recruitment and training efforts should be prioritized to expand the team and cultivate early-career researchers. Actively seeking competitive grants and establishing strategic partnerships will be crucial to secure sustainable funding.

Finally, by clearly defining research objectives and aligning them with the strengths of the larger team, the team will be able to fully exploit the potential benefits of the merger, strengthening both scientific output and overall impact.

Team 17: Homeostasis, Perception and States

Name of the supervisor: Mr Thierry Bal

THEMES OF THE TEAM

Using a mouse brain slice that spontaneously generates sleep-like oscillations in the claustrum, the "Homeostasis, Perception and States" Team is investigating the dynamics of claustro-cortical networks. Using different animal models, the team is analysing the homeostatic control of synaptic transmission at the neuromuscular junction. Horizontal interactions in the primary visual cortex are also studied, as well as slow waves in anaesthetised and sleeping cortical networks, both projects being carried out in a local collaboration.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Previous recommendations were as follow:

1) Scientific production and activities (criterion 1): It would be advisable to extend the collaborations of the team more at an international level, since most collaborations are with the "Computational Neuroscience" Team. Furthermore, as with any research team, a continued focus on high-profile publications seems essential.

Even if it is a basic research group, the team could invest in science communication to the general public (brain awareness week for example).

The team did not focus on international collaborations and high-profile publications. However, as recommended the team made efforts to be active in knowledge sharing.

2) Recommendations on the team's organisation and life (criterion 2): The team should try to balance the genders.

A female PhD student was recruited, which provided some gender balance.

3) Recommendations on scientific strategy and projects (criterion 3): The team could consider macaques as an alternative for the marmoset. A second recommendation would be to include causal manipulations of neural activity rather than merely descriptive and correlational techniques.

It was recommended to include causal manipulations of neural activity, which is likely to be included in the whole brain computational model (ANR CLAwaves).

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

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

EVALUATION

Overall assessment of the team

The team leader has a very good scientific reputation. He has developed an original *ex vivo* slice preparation allowing his team to discover oscillation in the claustrum likely involved in large-scale synchronization of the cortex during sleep. He then settled of a French Claustrum Network and the first French symposium about the claustrum. Several projects are developed in the team, one being linked to a terminating ANR (2017-2023) on the horizontal connectivity in primary visual cortex. The main funding comes from the local IDEX Paris-Saclay. Overall, the team is **very good**.

Strengths and possibilities linked to the context

The team (1 CNRS DR, 2 MCF, 1 PhD student, 1 CNRS IR and 1 CNRS CDI) has been involved in an ANR research project (Horizontal-V1, 335 k€ funding) dedicated to horizontal connectivity and prediction of coherence in contour and motion integration in primary visual cortex. Additional funding comes from IDEX Paris-Saclay (total 108 k€). The team has developed a remarkable scientific project highlighting the presence of claustro-cortical oscillations (collaboration with the Computational Neuroscience Team). This has led to an important publication for the scientific community (Nghiem *et al*, Cerebral Cortex 2020). Another ANR project - CLAwaves - coordinated by the team leader and dedicated to the role of claustro-cortical network oscillations in memory has been submitted. This project involves NeuroPSI and other national collaborations. It is the core project of a PhD student. The team leader is the initiator and coordinator of a French claustrum network, which has led to the first French symposium on claustrum to be held at the University of Strasbourg in 2023. The PhD student was invited to speak at this symposium. Other strong projects are currently underway, such as the homeostasis of synaptic transmission, and will be continued by another team due to the planned retirement of the team leader. All team members are involved in teaching. The team is active in knowledge transfer (team members teach at the University of Paris-Saclay and are involved in a few mediation events (e.g. Déclic, la Semaine du Cerveau) and evaluation committees (CNU, CoCNRS, referee of 2 PhD theses). A member of the team is part of the editorial board of INTELLECTICA since 2012. Two main scientific projects have been conducted in the team that are mainly the claustro-cortical project and the work on homeostasis of synaptic transmission. Thanks to an *ex vivo* mouse slice preparation, the team made the remarkable discovery that the claustrum produces a slow <1 Hz oscillation that is likely to be a pacemaker for sleep oscillations. Cellular mechanisms of claustrum oscillations are being investigated as claustrum interactions with cortical networks. Using the mouse neuromuscular junction and xenopus muscle cells, the team has identified two calcium signals that maintain efficient communication across the synapse (Ouanounou *et al.*, eLife 2016) and now examines in detail its mechanisms and roles in neuromuscular pathologies (Andersen-Tawil syndrome). Another project on the horizontal connectivity in the primary visual cortex has shown that axonal horizontal connections are crucial for perceptual binding of local and global visual information related to motion sequences (Le Bec *et al.*, PLos One 2022). Finally, an elegant study highlighted mechanism of block of Kir channels by external Cs^{+} and Ba^{2+} (Ouanounou *et al.*, Physiological Reports 2022).

Weaknesses and risks linked to the context

Even though projects conducted by the team members are important from a physiological point of view, few fundings have been obtained and collaborations have been local. In the CLAwaves ANR project, external collaborations are mentioned but the project is not secured. The scientific production is of excellent quality, but remains quantitatively limited (3 original articles including one Cerebral Cortex paper, one preprint (BioRxiv), and 5 book chapters over the reporting period). The team hosts a single PhD student.

Analysis of the team's trajectory

The team is not reconducted.

Team 18 (new team): Sensomotion

Name of the supervisor: Mr Guy Bouvier

THEMES OF THE TEAM

The "Sensomotion" Team is a newly created one that only started in the summer of 2023. The PI was recruited following an international call, and succeeded in obtaining an ERC Starting Grant which will run from 2024 to 2029. Two other funding requests (ANR JCJC and Atip-Avenir), which were successful in 2022, had to be rejected because of overlap with the ERC Starting Grant. The main aims of the team concern the investigation of how brain circuits form stable yet sufficiently plastic representation of the environment. The themes are a continuation of a research project initiated in Paris, France. More specifically, the project proposes to study how self-motion impacts sensory processing.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Since this is a new team that only started in the summer of 2023, there are no recommendations from a previous report.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

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

EVALUATION

Analysis of the team's trajectory

The trajectory of the team is well defined and directly related to the ERC project which provides strong guarantees for the viability of the project. The team uses some very sophisticated methodology for investigating neuronal activity in the visual system and the impact of vestibular stimulation. There is real potential for developing additional collaborations within the institute.

RECOMMENDATIONS TO THE TEAM

Currently, the research project targets the impact of vestibular information on processing in the visual system, with the aim of understanding the impact of self-motion on visual processing and behaviour. The committee suggests that it might be interesting to expand the analysis to include the impact of locomotor activity on visual processing, a topic that interests other teams within the institute. A comparison of the impact of vestibular and locomotor activity could be particularly interesting.

Team 19: Neuronal Circuits & Motor Control

Name of the supervisor: Mr Julien Bouvier

THEMES OF THE TEAM

Using genetic approaches, viral tracing, assessment of locomotor activity and kinematics, the "Neuronal Circuits & Motor Control" Team is investigating the functional and genetic organisation of the descending reticulospinal tract (RST), which tightly controls motor actions. This research is being carried out in physiological conditions, but also after spinal cord injury and in neurodegenerative diseases such as amyotrophic lateral sclerosis (ALS).

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

As recommended by the previous committee, the group leader raised important funding (ERC-CoG - project "ReticulOme" - 2 M€ for his team, FRM, 5 ANR). Two research engineers and 3 PhD students have been recruited. Additional post-docs will be recruited. Gender balance is respected in the recruitment. The work of the team is mainly based on the mouse model, but a project funded by an ANR should be based on data from ALS patients.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maitres de conférences et assimilés	0
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	0
Personnels d'appui à la recherche	1
Sous-total personnels permanents en activité	**2**
Enseignants-chercheurs et chercheurs non permanents et assimilés	1
Personnels d'appui non permanents	3
Post-doctorants	0
Doctorants	3
Sous-total personnels non permanents en activité	**7**
Total personnels	**9**

EVALUATION

Overall assessment of the team

The team is internationally recognised for the excellence of its work. The team has national and international collaborations and has received prestigious grants (ERC Consolidator Grant - 2M€ for the team, 5 ANR - 4 as coordinator and 1 as partner, and 1 FRM grant as coordinator). The scientific production is remarkable (Nature Communications, Cell Reports, Science Advances, eLife, Current Biology) thanks to the work of talented PhD students, post-docs, engineers/technicians. The team has now reached a respectable size with nine people. Overall, the team is **outstanding** with a truly remarkable level of funding.

Strengths and possibilities linked to the context

The team leader who obtained the Bronze medal of CNRS in 2022 has successfully secured important fundings (ANR, ERC Consolidator Grant) and developed its own research project on the location and identity of neurons interfacing respiratory and locomotor circuits. Its research is based on cutting-edge connectomic, optogenetic and video-tracking tools used on behaving mice. The team includes only two permanent people but has been able to gather talented and motivated members including 3 PhD students, 3 engineers and 1 postdoc. Obviously, its attractiveness is also outstanding. This assiduous drive combined to a high-level science led to remarkable publications in prestigious journals (Nature Communications, Cell Reports, Science Advances, eLife, Current Biology) and to an outstanding international reputation of the PI in his field (13 conferences). Projects, based on national and international collaborations, and secured by and ERC-CoG or different ANRs, aim at deciphering the organisation of the reticulospinal circuits and its relationship with motor cortex. The PI is strongly involved in organizing scientific events (2 international pre-FENS satellite symposiums in two years) and has numerous prestigious editorial responsibilities. This makes the team a renowned research group at the international level. Finally, the PI has taken local responsibilities: he is the coordinator of the local imaging platform and the local animal surgery lab. This makes him one of the leaders the institute can count on for the future years.

Weaknesses and risks linked to the context

Although the team leader is very active in jury committees (10 PhD Thesis committees between 2018 and 2024), his team is not strongly involved in teaching and knowledge diffusion. International collaborations can be reinforced and the team should make efforts to attract additional permanent scientists and clinicians.

Analysis of the team's trajectory

Thanks to elegant EMG recordings, cell-type specific trans-synaptic tracings and optogenetics applied to the mouse animal model, the team has shown that both the spinal locomotor CPG and supra-spinal MLR circuits interfere with the respiratory network and participate in upregulating breathing during running. His team identified the synaptic connectivity between central neuronal circuits allowing breathing adaptation when running (Hérent *et al*. eLife 2020, Hérent *et al.* Nature Com. 2023). The PI's team also deciphered the organisation of the brainstem reticular formation (RF), more particularly focusing on the gigantocellular reticular nucleus - V2aGRN neurons that depress locomotion. His work demonstrated that V2aGRN neurons are involved in the speed reduction and the displacement of the head, pointing out the granularity within a cardinal class of neurons (here V2a neurons) delineated by a single transcription factor (Usseglio *et al.* Current Biology, 2020, Schwenkgrub *et al.* Science Adv. 2020). Projects aim at deciphering the organisation and function of the reticulospinal circuits, their relationships with the spinal cord and motor cortex, in normal and pathological conditions (spinal cord injury and amyotrophic lateral sclerosis).

RECOMMENDATIONS TO THE TEAM

It is recommended that the team leader who is now a world-renowned scientist, attracts additional permanent scientists (lecturers, researchers and/or clinicians). This should help for intellectual emulation and support staff for administration.

The team should continue to secure grants and to recruit PhD students.

The team is encouraged to develop more international collaborations. The translational research linking the team's primary mouse model to human patients needs enhancement to better advance disease therapy.

The participation of the PI in national committees (e.g. CoNRS) is encouraged.

Team 20: Neuroinformatics

Name of the supervisor: Mr Andrew Davison

THEMES OF THE TEAM

The "Neuroinformatics" Team develops software tools and web services in three main areas: (1) data driven computational modelling and simulation, (2) FAIR-based data and code management, and (3) reproducible computational workflows. Much of this work has been done in the context of European projects related to the Human Brain Project, and more recently the eBRAINS initiative.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The previous Hcéres report recommended that the team profits more from collaboration with other experimental teams at NeuroPSI, which could lead them to publish more articles devoted to fundamental neuroscience research, and hopefully publish in higher level journals. They also recommended sharing PhD students. The lack of experimental collaborations remains a weakness for the team, but is not very surprising given the very small number of permanent researchers. Most team members are on short term contracts which would make finding the time to collaborate within the institute difficult.

The committee recommended that the team recruits more PhD students and participates in teaching. This does not appear to have had any effect, because no PhD students were trained during the evaluation period. The only student mentioned completed his thesis in 2018.

The committee also recommended that the team leader obtains his HDR, but again, this does not seem to have been effective. The team leader has done a very limited amount of teaching at the Masters level - around 4 hours a year, but this may have ended in 2023.

The committee also noted that a "more diversified funding basket would be very desirable for future sustainability". This is still very much an issue for the team.

The panel recommended increasing the number of women, but this was manifestly not possible, since all the staff members during the contract were male.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

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

EVALUATION

Overall assessment of the team

Overall, this is an **excellent** team. The team has been very active in developing a wide range of software APIs and web-services that have been important for Research communities at the international level. Its contribution to the PyNN software is major, establishing an innovative framework for computational model development, validation and comparison. The team has in particular ported the PyNN environment to neuromorphic hardware projects in UK and Germany. The other expertise is the development of tools to structure, validate and trace computational models within the HBP/eBRAINS facilities. The team has produced 14 research articles, some in top journals (PLOS Comp Biol, eLife) but, more importantly, 17 software/APIs/web-services. To do so, the team has secured more than 4 M€ of funding, hiring 16 post-docs or research engineers.

Strengths and possibilities linked to the context

A key element in the team's output has been the development of 17 pieces of software during the evaluation period. These include 5 iterations of the PyNN simulator for neural networks, Neo and Neo Viewer which are software library for analysing and visualising electrophysiological data. Some of the software systems developed by the Neuroinformatics team have been very useful for the research community. In particular, in collaboration with other Human Brain Project groups in Heidelberg and Manchester, the team has developed eBRAINS Neuromorphic Computing Services. With other partners in Olso, Jülich and Brussels, the team has co-developed a range of tools to structure, annotate and facilitate data acquisition and analysis with novel neurophysiological tools such as NeuroPixel probes. The team has pushed the efforts into sharing metadata and scientific knowledge, defining scientific ontogenies and distributing tools/services for better sharing these important pieces of information. These web-services are implemented within the eBRAINS infrastructures, funded by the EU. The team is strongly involved in the Human Brain Project (HBP) and the eBRAINS European large-scale projects. Through these projects, the team has obtained 4.2 M€, allowing the recruitment of 16 post-docs or research engineers. Beside the neuroinformatic objectives, the team has maintained, albeit at a lower rhythm, the development of computational models of mammal neuronal structures (e.g. area V1, CA1 hippocampus). The approach is data-driven, embedding many low-level signatures of neurons properties into the architecture. This approach is important but was clearly minored over the last years, maybe due to lack of dedicated resources. The team has a strong visibility at the national (GDR Computational Neurosciences) and international (HBP and INCF) levels. The visibility of the team is illustrated by the fact that the two team members have been invited to give a total of 22 talks. The team has published a total of 15 articles, including 10 with a team member as first or last author. The journals are generally specialist ones (PLOS Comp Biol, Frontiers in Neuroinformatics).

Weaknesses and risks linked to the context

Neuroinformatics is a rapidly evolving field at the international level and France faces the risk of being left behind in this field. The Team is among the few ones in France that develops these tools and norms. To do so, it relies on non-permanent staff, funded mostly through one single source, the HBP/eBRAINS large-scale project. Software development implies a long-term strategy for their constant evolution and their support. It is not evident that national funding will continue this effort. Moreover, it is more and more difficult to attract computer scientists and staff within the academics. The choice of mentoring mostly post-docs/engineers on temporary contracts may become more and more difficult. There is a need to re-orient the recruitment scheme towards PhD students, taking advantage of the excellent environment in Engineering Schools at the site. It is also important to secure the presence of permanent staff in computer sciences to ensure long-term sustainability of software development. In accordance with the aforementioned line of thinking, it is essential to consider other sources of national (ANR, IA initiatives, etc.) and international funding (non-eBRAINS projects, ANR-NSF) in order to become less dependent of eBRAINS. The development of semantic databases for better integrating neuroscience knowledge and metadata for simulation and model generation is both timely and important in the perspective of FAIR and Open-Science. It would however require integrating more and more AI-based technologies. There are competences for that at NeuroSPIN for brain imaging and there may be the potential for stronger collaborations and local structuration. This would require more leadership outside of the HBP network and may be within the GDR Computational Neurosciences under construction. Quicky defending the HDR is one first step to achieve those goals.

Analysis of the team's trajectory

The team has defined four aims for the next term. This is a lot given the limited staff (1 permanent researcher). The first Aim is in computational neuroscience, reinvigorating the development of a computational model of mammalian area V1 and extending it to higher cortical areas V2 and V4. Given its limited resources, the team proposes to target a more specific and novel target, as for instance the mentioned marmoset cortex where there is no competitor so far. Given the loss of the Emeritus member, a new collaborative network should be set to reach this objective. It is however a strategic decision to maintain system-drive computational efforts, in parallel to the neuroinformatics objectives. The three other aims are in Neuroinformatics, with a mixture of technological and educational approaches for developing and diffusing tools/APIs for standardisation of computational models in neurosciences and better structuring their validation and reproducibility workflow. The last objective is the development of APIs/web-services for semantic databases able to improve the integration between neurosciences knowledge, metadata and eLab-notebooks. This effort is timely and articulated with eBRAINS service development. It would however require very large resources and a long-term effort. It is indispensable to secure resources and collaborations outside of eBRAINS to maintain this effort. The team is well positioned to play an increasingly important role given that the trend in the research community is towards increased use of open-data and data-sharing. The team has a unique expertise in system/cellular neuroscience but must work in closer interaction/collaboration with the equivalent teams working on Brain Imaging, within or outside the HBP/eBRAINS initiatives. There may be some opportunities for developing a stronger strategy at the Saclay site, taking advantage of the local skills and the presence of top engineering schools. This would require a strong leadership from the team leader, outside of NeuroPSI and HBP/eBRAINS but he will be able to build on his experience within the INCF.

RECOMMENDATIONS TO THE TEAM

It will become increasingly important to recruit additional permanent research staff to maintain the team's key role. Relying on support staff with fixed term contracts is unlikely to guarantee the stability of the team on the long term. Given the loss of one of the two senior researchers, it will be even more vital to reinforce the team.

Many of the recommendations made by the previous Hcéres committee have not been followed. The PI must rapidly obtain an HDR and the team must recruit PhD students, in particular from the Computer Sciences program within the Engineering Schools at the Saclay site.

The team needs to extend its strategic network of collaboration at the national and international levels to secure more funding outside of the eBRAINS initiative or its still hypothetical national relays. Connections with teams working at macroscale levels (Brain imaging at NeuroSPIN, The Virtual brains…) should be included in the national initiative around IA and Heath.

It is necessary to strengthen the impact of the team's results within the NeuroPSI community, on which the education and implementation programs for the tools developed can be tested. The link between the data science platform and the teams needs to be carefully examined to distinguish the effort between technology development and software lifecycle maintenance/dissemination.

Team 21: Neural Code & Auditory Perception

Name of the supervisors: Ms Catherine Del Negro & Mr Jean-Marc Edeline

THEMES OF THE TEAM

The "Neural Code & Auditory Perception" Team uses avian and rodent models to explore the neural basis for production and perception of sounds. Recent rodent research highlights have included characterisation of noise/signal discrimination in different neural regions, and exploration of the role of corticofugal pathways in discrimination tasks. In avian models, the team has explored the neural encoding of complex signal structure, and multisensory integration processes (i.e. replacement of a lost sensory modality with another). The team has also made use of new lightweight implants to explore the detailed dynamics of cortico-basal ganglia circuits during singing and also during sleep.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

There were no significant recommendations from the previous report, except that (1) the scientific productivity should continue along the current trajectory, which has been achieved, and (2) the team should participate in e-learning. This has not been pursued, but with no significant detriment.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maitres de conférences et assimilés	1
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	1
Personnels d'appui à la recherche	1
Sous-total personnels permanents en activité	**4**
Enseignants-chercheurs et chercheurs non permanents et assimilés	2
Personnels d'appui non permanents	0
Post-doctorants	0
Doctorants	3
Sous-total personnels non permanents en activité	**5**
Total personnels	**9**

EVALUATION

Overall assessment of the team

The team had a very good to excellent scientific productivity during the assessment period (e.g. co-authored publication in Nature Communications; review article in Neuroscience & Biobehavioural Reviews). The two current team leaders will retire in the next period, and the transition to a new leader has been well planned. Funding is excellent, evidenced by multiple ANR grants including two as coordinator, alongside other mobility funding, and links to society are very good to excellent, based on ongoing research into cochlear implants that is strong but yet to be fully capitalised upon. Overall, this is an **excellent** team.

Strengths and possibilities linked to the context

The team has obtained several important scientific results over the last 5 years. They have identified how auditory sensitivity is maintained at different levels of the auditory pathway in rodents within an inverse hierarchy (the lower level the higher degree of sensitivity and resistance to noise). They also investigate neuronal encoding of birdsongs and in particular how sequences of auditory events can be encoded. They showed that learning of song production can be done using visual cues in deafened birds, opening the door for future research on adaptive changes and the role of the basal ganglia. These results on birds are the foundation for the team's evolution. From the perspective of scientific outputs, the team's performance has been very good to excellent during the period, including 32 publications, the majority (20/30) of which have a team member as senior author. Highlights include collaborative work exploring sensory substitution published in Nature Communications, alongside team-led work in rodents and songbirds in more field-specific journals (e.g. Journal of Neuroscience; Journal of Physiology). The publication rate is well balanced across the two PIs who do not have contractual teaching obligations. The team has a good record of securing funding to cover its work, including two ANR grants as coordinator and one as partner that will continue into the next period, a grant from the commercial sector (OTICOM medical; 264 K€) and smaller Anses funding (25-35 K€). The funding also evidences international attractiveness through support for international collaborations (BayFrance Mobility Fellowship; CNRS International Emergence Actions). The team has a strong training record, having hosted 10 PhD students during the period, some of whom have published first-author papers, and has also benefitted from two post-docs. The PIs have presented their work internationally, contribute to thesis and HDR committees, and are strongly committed to teaching. One PI is deputy head of Department.

Weaknesses and risks linked to the context

While the team is producing impressive work, the publications over this period do not evidence the type of perspective change that would be needed to secure European funding. Costs of maintaining two avian systems (zebrafish and canaries) threaten the potential to maintain both systems going forward under the current funding model. Links to society are in place through cochlear implant research but could be more developed.

Analysis of the team's trajectory

One team leader will continue to lead rodent research until his planned retirement in 2027, funded by a recently-started four-year ANR-funded project investigating how mice discriminate communication sounds in different background noise levels. The work aims to determine whether sound sequences predicting a target stimulus (CS+ and CS-) improve neural discrimination and performance in noisy environments. Electrophysiological recordings in awake mice, alongside comparative studies with humans and primates, will generate datasets for cross-species comparison. It will be critical to ensure that the work is fully completed and written up by the funding end date in order to ensure this work achieves its full potential.

The new team will continue current work with songbird models along two axes. Firstly, the ANR-funded project *nIrVAna* (2024-2028) aims to understand how vocal variability influences sensorimotor learning, focusing on song development in oscine birds. Collaborating with multiple researchers, the project will explore how variability in auditory inputs (song models) and motor outputs (vocal practice) impacts learning. Key objectives include examining the role of the basal ganglia-cortical circuit in processing this variability and driving motor exploration. Secondly, the team is scheduled to conclude the *SleepinBrainDyn* project in 2025. A current team member wishes to extend this research by examining the thalamic nucleus's role in linking the BG and cortex. This will require the implementation of inactivation studies and *in vivo* recordings. The objective is to determine whether vocal adaptation is contingent on intrinsic cortical dynamics or feedback from the entire CBGTh loop. The team plans to fund this research through applications to future ANR calls in collaboration with a researcher from Bordeaux Neurocampus. Finally, a longer-term plan involves the development of apparatus to record both singing and underlying neural signalling in free-living birds. This is ambitious and exciting in scope, but will require significant technological development.

RECOMMENDATIONS TO THE TEAM

Concurrent retirement of the two current team leaders will shrink the team substantially. We recommend a focus on recruitment in order to support the new team leader to maintain production levels, and also to introduce the new perspective that may be required to become competitive for European funding.

Team 22: Computational Neuroscience

Name of the supervisor: Mr Alain Destexhe

THEMES OF THE TEAM

During this term, the main interest of the "Computational Neuroscience" Team was centred on the use of computational modelling to better understand brain dynamics, from the integrative properties of neurons to brain states. The team has exploited his expertise in biophysical modelling at different levels of organisation: single cells, neuron-glia interactions, models of local field potential, mean-field models, up to collaborations on whole-brain models. The applications of such models ranged from understanding physiological questions such as the dynamics of cellular assemblies during wake and anaesthesia or visual cortical waves, to investigating pathological states. The collaborations with experimentalists also included the development of techniques to characterise the dynamics of physiological signals.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

It was recommended that the team should aim to publish papers in higher impact journals. The team should aim to reach a higher productivity by all its members, including post-docs. The number of PhD students could be increased. The team should recruit more PhD students to ensure the transfer of knowledge and compromise with the younger generation of researchers. It was also recommended that the research incorporates more ambitious questions on the current data obtained through the collaborations with several labs, to gain competitiveness at the international level. The team should be vigilant so that controversies do not happen too often.

All these recommendations have been taken into account, with the recruitment of PhD students and post-docs and publications in high impact journals.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

Catégories de personnel	Effectifs
Professeurs et assimilés	1
Maitres de conférences et assimilés	0
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	0
Personnels d'appui à la recherche	0
Sous-total personnels permanents en activité	**2**
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	1
Post-doctorants	0
Doctorants	3
Sous-total personnels non permanents en activité	**4**
Total personnels	**6**

EVALUATION

Overall assessment of the team

Overall, this is an **outstanding** team. The team has published a considerable number of original publications (52) in both generalist, top-level journals and specialist journals with the highest standards. The capacity to raise funding has been outstanding, with about 7 M€ of financial support. The team is highly recognised for its expertise on theoretical and computational models. The team has supervised 6 PhD students during the reference period, 17 postdocs have worked in the team, and members of the team are highly involved in teaching and collective activities.

Strengths and possibilities linked to the context

The team is very competitive in the theoretical characterization and computational study of brain states. The team is internationally recognized for its expertise on the computational modelling allowing to link the microscopic activity of single neurons to the macroscopic, brain-wide activity. For instance, combining 2-photon imaging and computational analysis, they identified the neuronal assemblies evoked by sounds in primary auditory cortex in awake and anesthetized mice. They showed that new assemblies specific to sounds appear in the awake animal when sounds are perceived, while under anesthesia, the cortex seems to replay assemblies that are already present in spontaneous activity (Nature Neuroscience, 2022). They have been successful to secure an outstanding funding from the EU (Human Brain Project, around 10 M€) that led them to organize 50 workshops. Their methodological and scientific expertise is well aligned with the general interests of many groups in the Institute facilitating the opportunities of collaborations and synergies with the other teams of the unit. They also developed two start-ups that leverage the group's knowledge on brain waves (with the team leader being involved as scientific advisor) to conceive innovative applications.

Weaknesses and risks linked to the context

The team still has only limited outreach activities with respect of its leadership in the scientific community. In line with its HBP funding, the team was very unbalanced in the preceding term, as it comprised many non-permanent post-doctoral researchers on short-term contracts.

Analysis of the team's trajectory

The current small size of the team (in terms of permanent researchers) will be offset by the arrival of three members from the "Homeostasis, Perception and States" Team. These new members are experimentalists, but as the two teams have already been collaborating, and this dual theoretical-experimental expertise will constitute a strength rather than a weakness. On top of continuing projects on brain states and development of mean-field models, the inclusion of projects on claustro-cortical networks and on synaptic homeostasis with the modelling projects should not be problematic. Collaborations within NeuroPSI and leadership in European collaborative efforts should ensure an enduring leadership. The team has shown its renewed ability to raise national (ANR) and European fundings (EU Flagera, VirtualBrainTwin, etc.).

RECOMMENDATIONS TO THE TEAM

With the arrival of many experimentalists and the planned retirement of the PI, the team should define a clear strategy if they want to continue theoretical neurosciences, e.g. by supporting postdoc applications to researcher positions and/or attracting researchers from outside.

Over the next 5 years, the team should find a solution to stabilise EITN in order to pursue its legacy on a long-term perspective.

Team 23: Sensori-motor Integration & Plasticity

Name of the supervisor: Mr Daniel Shulz

THEMES OF THE TEAM

The "Sensori-motor Integration & Plasticity" Team's research investigates sensory processing of tactile information and the generation of motor outputs in rodents. They use a range of methods, including electrophysiological recording and imaging, as well as optogenetic and behavioural methods. Key questions include the nature of information coding in the somatosensory cortex and in particular the processing of natural tactile stimuli, and the study of how sensorimotor loops can be optimised during motor control and the learning of motor skills.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The previous Hcéres committee encouraged the team to maintain their motivation and continue to publish with the greatest possible visibility. This should involve delivering seminars, participating in conferences and meetings abroad, and increasing public outreach. In this respect the team has been successful.

The committee noted that the team was proposing to strengthen the link with the Neuroinformatics team by the joint supervision of a PhD student. However, this does not seem to have been followed through, and indeed the Neuroinformatics team had no new PhD students and the main PI still does not have an HDR. This suggestion is therefore even more urgent.

It was also recommended that closer links with the Computational Neuroscience team should be encouraged, including co-supervision of students. This remains a desirable objective.

The committee had recommended taking advantages of some of the new options offered by NeuroPSI including the development of optogenetic methods, and this has been followed through. However, another recommendation to take advantage of a marmoset model has not been possible. Likewise, increased collaborations with NeuroSPIN could be an advantage, and this is also a topic that still needs to be promoted.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

Catégories de personnel	Effectifs
Professeurs et assimilés	0
Maitres de conférences et assimilés	0
Directeurs de recherche et assimilés	3
Chargés de recherche et assimilés	1
Personnels d'appui à la recherche	0
Sous-total personnels permanents en activité	**4**
Enseignants-chercheurs et chercheurs non permanents et assimilés	1
Personnels d'appui non permanents	1
Post-doctorants	0
Doctorants	7
Sous-total personnels non permanents en activité	**9**
Total personnels	**13**

EVALUATION

Overall assessment of the team

Overall, this is an **outstanding** team, with four permanent CNRS researchers, including a DRCE (who will retire in 2025), two DRs and one CR. They are well financed (with 1.625 M€ of funding during the evaluation period, including 6 ANR projects), and benefit from an impressive international visibility. The level of production is excellent, with a total of 14 articles in peer-reviewed journals, including a set of papers signed in position of responsibility published in top-level journals (Science Advances, Cell Reports, Nature Communications, PNAS) which corresponds to roughly 0.6 publications per year for each full-time researcher.

Strengths and possibilities linked to the context

The team includes 4 tenured researchers with solid scientific reputations and remarkable international visibility. The 14 peer-reviewed articles include 3 articles in Cell Reports, 2 each in J Neural Engineering, J Neurophysiology, Science Advances and Scientific Reports, and one each in Nature Communications, Neuroscience, Neurophotonics and PNAS. The papers have been cited over 145 times, with 5 papers receiving more than 10 citations each. All are open access. The level of finance is excellent, with a total of 6 ANR projects and a competitive "FRM Team" grant totalling 1.36 M€, as well as some other smaller funding sources that include 6 grants from Paris-Saclay. The team has a remarkable visibility, demonstrated by 20 invited lectures, including 11 outside France (Switzerland, Argentina, Spain, Italy and Germany). Notably, the current PI received the prestigious Nature Lifetime achievement award on Mentoring in Science in 2023. They participated in research steering bodies (GDR 2904 "NeuralNet », Section 25 of National CoNRS Committee, 2 Hcéres committees, steering committee of the French Brain-machine interface association CORTICO, steering committee of Lidex project iCODE "Control and Décision" etc.) and had numerous collective responsibilities (responsible for relationships of the French Société des Neurosciences with Latin America Neurosciences Societies. Direction of the Somatosensory Club, affiliated to the Société des Neurosciences. All four PIs are involved in teaching despite having CNRS positions. The team trained 4 PhD students who have defended between 2018-2023, and there are currently 7 ongoing PhD students. All the students that have defended their theses had at least one first-author paper. The team has an excellent reputation for contributions to society that include a Patent in 2021, the participation in the writing of a report on Neurotechnologies for the OPECST (Office parlementaire d'évaluation des choix scientifiques et technologiques), a small number of conferences in local Lycées, and 6 other items publicized by the UPSacaly Scoop-it Life Science Network.

Weaknesses and risks linked to the context

The team has not yet succeeded in obtaining International or European funding, with the exception of a small 12 k€ contract from the France-Berkeley fund in 2019. While the publications are of high quality, the number of papers could be higher given the presence of 4 full-time researchers with only limited teaching commitments, and excellent funding. It works out at roughly 0.6 publications per year per full-time researcher. It is likely that this relatively low level of production can be largely explained by the impact of the Covid pandemic coupled with the complexities created by the move to the new building. So far, there is not much evidence that the team has forged serious collaborations either with other teams at NeuroPSI, such as the Neuroinformatics and Computational Neuroscience teams, or with other local research teams at NeuroSPIN, for example.

Analysis of the team's trajectory

The team will have a new title "Touch & Move", which reflects the evolution of the research themes. Two new PI will be taking over from the current PI who reaches retirement age before the next five-year period. The team has some very interesting and novel research projects, including the development of the "closed-loop neuroscience" paradigm. They include detailed recordings of somatosensory cortical responses during active perception. For example, one study will examine activity while head-fixed mice perform a task that requires them to repeatedly touch an object with a single whisker to obtain reward. Another will use optical imaging to record cortical spatiotemporal dynamics in freely moving animals. Other projects will examine sensorimotor learning and its relevance to Brain-Machine Interfaces in tasks where mice have to learn to move a virtual prosthetic device. Finally, other projects are aimed at developing innovative neuroprosthetic devices. Project funding is guaranteed for the 1st years of the next contract (EU-H2020-MSCA-RISE, ANR PRC MOTORSENSE).

RECOMMENDATIONS TO THE TEAM

The committee encourages the team to continue the development of the innovative paradigms listed in the trajectory document which look very interesting.

It strongly recommends that the team tries to build collaborations with some of the other teams within NeuroPSI, in particular Neuroinformatics and Computational Neuroscience, although the overlap with teams working on auditory processing could also be encouraged.

While the scientific production is of high quality, the committee hopes that the output can be further improved in the future and that the visibility of the team's research will be maintained.

Team 24 (new team): Astrocyte signaling in health and neurodegenerative diseases

Name of the supervisor: Ms Carole Escartin

THEMES OF THE TEAM

The "Astrocyte Signaling in Health and Neurodegenerative Diseases" Team focuses on communication between astrocytes and neurons following different modulation mainly relying on Jak/Stat and NFkB pathways. Thanks to these studies, the team evaluates modulation of astrocytes reactivity and response and how they influence various behaviours and brain diseases.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

New team.

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

Catégories de personnel	Effectifs
Professeurs et assimilés	
Maitres de conférences et assimilés	
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	1
Personnels d'appui à la recherche	2
Sous-total personnels permanents en activité	**4**
Enseignants-chercheurs et chercheurs non permanents et assimilés	
Personnels d'appui non permanents	
Post-doctorants	2
Doctorants	3
Sous-total personnels non permanents en activité	**5**
Total personnels	**9**

EVALUATION

Analysis of the team's trajectory

The trajectory of this new team is excellent, and the future projects are already excellently granted. For the next five years the team, internationally recognized as outstanding for the quality of its work, aims at deciphering the astrocyte response to Stat and NFkB stimulation and how their reactivity influences their heterogeneity and neuronal signalling and thus various behaviours, including socio-sexual circuits as well as their deleterious effect in mouse models of neurodegenerative diseases. The idea is to decipher the Jak/Stat3 and NFkB pathways at the molecular level and their role in both behaviours, and neurodegenerative diseases by modulating the heterogeneity of astrocyte populations of different areas in the brain. Five projects are distributed between the two researchers of the team. It is not always clear whether grants are already obtained or not, like the FRM grant mentioned but not listed in attractiveness part. Notably, in the written document, axes 2 and 3 sound more uncertain and might depend on their funding by dedicated grants. However, FRM grant is already a mark for the excellent level of the team. Overall, the trajectory is very close to the other team that joined NeuroPSI (Team 25), but shows a strong complementarity with the objectives of that team. While a newly created team needs to diversify its objectives at the beginning to ensure the scientific interactions and grants entry, it may be difficult to ensure the good progress in each of the five topics over the next five years, especially in the last one where microglial cells that were not explored before are entering the studies in the context of therapeutics. In the oral presentation, the PI has chosen to finally restrict the team's trajectory to 3 axes not only showing the excellent management of the team, but also its high ability to autocorrect itself and focus on a few major questions.

In terms of human resources, the team's attractivity is already excellent (3 PhD students). Now the team expects to recruit two postdocs and two PhD students which will be necessary to perform the bench work and acquire data.

RECOMMENDATIONS TO THE TEAM

The committee recommends that the team opens more perspectives of collaboration with Team 25, which can bring metabolic approaches potentially leading to the identification of common pathways of interest involved in neurodegenerative diseases and behaviour.

It also recommends that the team better includes microglial cells in the analysis of intercellular communication and notably their response to astrocyte reactivity which could attract more researchers and/or collaborations.

Finally, it recommends that the team avoids dispersion that might be detrimental to its visibility and attractiveness on the long term.

Team 25 (new team): Metabolic interactions between neurons and astrocytes in health and diseases

Name of the supervisor: Mr Gilles Bonvento

THEMES OF THE TEAM

The "Metabolic Interactions between Neurons and Astrocytes in Health and Diseases" Team comes with a huge background of interactions between neurons and astrocytes notably through metabolites, metabokines and metabolic modulation mainly from astrocytes side on neurons. The idea is to reinforce the current strategy of the institute through studies of the role of glial cells in brain pathologies to develop translational research.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

New team

WORKFORCE OF THE TEAM: in physical persons at 31/12/2023

Catégories de personnel	Effectifs
Professeurs et assimilés	
Maitres de conférences et assimilés	1
Directeurs de recherche et assimilés	1
Chargés de recherche et assimilés	
Personnels d'appui à la recherche	2
Sous-total personnels permanents en activité	**4**
Enseignants-chercheurs et chercheurs non permanents et assimilés	
Personnels d'appui non permanents	
Post-doctorants	
Doctorants	2
Sous-total personnels non permanents en activité	**2**
Total personnels	**6**

EVALUATION

Analysis of the team's trajectory

The overall trajectory is excellent. The team is already internationally recognised for its excellent publications on metabolism, neurons and astrocytes (23 publications over the reporting period). For the next five years, the team aims at deciphering the molecular dialog between neurons and astrocytes at the metabolic and metabokinic levels since their modulation may lead to different stresses (redox or of signal transmission) and thus to pathologies. The focus will be mainly placed on the astrocyte side. The idea is that either diet or diseases, notably neurodegenerative diseases, may have or lead to a specific signature in the brain by affecting metabolism and subsequent reporters such as L-Lactate or L-Serine. The ultimate aim of the team is to better understand how astrocyte signalling and metabolism are interacting and notably how they integrate such interaction to allow the memory process. The team's trajectory is already well-organised with midterm goals divided in three potential impacts of the modulation of astrocyte signalling/metabolism: 1) age-related memory, 2) trajectory of cognitive decline and its prediction, 3) its exploitation as target or marker allowing prevention of neurodegenerative processes. All researches seem to be already funded.

The team remains quite small taking into account the future responsibilities of the PI and teaching duties of one permanent scientist. The attractiveness of the team is very good with 2 PhD students. More postdocs would ideally strengthen the bench work and ensure maintenance of the team's publication rate.

RECOMMENDATIONS TO THE TEAM

The committee recommends that the team opens more perspectives with other types of glial cells and microglial cells may be an interesting alternative to attract new researchers in the team and increase its size.

Based on the complementarity with the "Astrocyte Signaling in Health and Neurodegenerative Diseases" Team, it recommends that the team develops more interactions with that team (even though a few common projects have already emerged), since their common research axis is supposed to become a major topic of the institute.

CONDUCT OF THE INTERVIEWS

Dates

Start: 04 décembre 2024 à 08h30

End: 05 décembre 2024 à 18h00

Interview conducted: on-site

INTERVIEW SCHEDULE

December 3rd, 2024

Arrival of the committee and evening dinner (only committee members and Hcéres Scientific advisor)

December 4th, 2024

08:30-08:50	*Closed-door meeting of the committee*
08:50-09:00	*Presentation of the committee*
09:00-10:00	*Presentation of the Unit with major achievements and Project/trajectory by the* ***director****.* ***François Rouyer*** *(40' presentation + 20' discussion with the committee)*
10:00-10:25	*Presentation of* ***Team1****: Acoustic Communications.* ***PI: Isabelle Charrier*** *[15' presentation (Past/Project/trajectory) + 10' questions]*
10:25-10h45	*coffee break*
10:45-11:10	*Presentation of* ***Team 2****: Astrocytes & Cognition.* ***PI: Glenn Dallerac*** *[15' presentation (Past/Project/trajectory) + 10' questions]*
11:10-11:35	*Presentation of* ***Team 3****: Memory, Emotion & Time.* ***PI: Valérie Doyère [****10' (past) +* ***Tadeusz Kononowicz*** *(5' project/trajectory) + 10' questions]*
11:35-11h45	*Presentation of* ***Team 4 (new team)****: Recurrent circuits, learning and memory.* ***PI: Claire Eschbach*** *[5' presentation (Project/trajectory) + 5' questions]*
11:45-12:10	*Presentation of* ***Team 5****: Neurobiology of Decision Making.* ***PI: Sylvie Granon*** *[15' presentation (Past/Project/trajectory) + 10' questions]*
12:15-13:00	*Closed-door meeting of the committee*
13:00-14:00	*Lunch only the committee*
14:00-14:25	*Presentation of* ***Team 6****: Neural Circuits & Behaviour.* ***PI: Tihana Jovanic*** *[15' presentation (Past/Project/trajectory) + 10' questions]*
14:25-14:40	*Presentation of the* ***Team 7:*** *Functional Brain Imaging & Behaviour.* ***Jean-René Martin*** *[10' presentation (past) + 5' questions]*
14:40-15:05	*Presentation of* ***Team 8****: Molecular Genetics of Circadian Rhythms.* ***PI: François Rouyer*** *[15' presentation (Past/Project/trajectory) + 10' questions]*
15:05-15:30	*Presentation of* ***Team 9****: Cognition, Plasticity & Neuropathologies.* ***PI: Cyrille Vaillend*** *[15' presentation (Past/Project/trajectory) + 10' questions]*
15:30-15:40	*Presentation of* ***Team 24 (new team)****: Astrocyte signaling in health and neurodegenerative diseases.* ***P: Carole Escartin*** *[5' presentation (Project/trajectory) + 5' questions]*
15:40-16:10	*Coffee break*
16:10-16:35	*Presentation of* ***Team 10****: Development & Evolution of the Neural Crest (DENC).* ***PI: Sophie Creuzet*** *[15' presentation (Past/Project/trajectory) + 10' questions]*
16:35-17:00	*Presentation of* ***Team 11****: NeuroInfection & Immunity.* ***PI : Jean-Pierre Levraud****.* *[15' presentation (Past/Project/trajectory) + 10' questions]*
17:00-17:25	*Presentation of the* ***Team 12:*** *Stem Cells & Neurogenesis in the Retina.* ***Muriel Perron****.* *[15' presentation (Past/Project/trajectory) + 10' questions]*
17:25-17:50	*Presentation of* ***Team 13****: Development & Evolution of the Forebrain.* ***PI: Sylvie Retaux*** *[15' presentation (Past/Project/trajectory) + 10' questions]*

17:50-18:00	*Presentation of **Team 25 (new team)**: Metabolic interactions between neurons and astrocytes in health and diseases. **PI: Gilles Bonvento***
	[5' presentation (Project/trajectory) + 5' questions]
18:00-18:45	*Closed-door meeting of the committee*
20:00	*Dinner in town for the committee*

December 5th, 2023

08:30-08:45	*Presentation of **Team 14:** Signal Transduction & Developmental Neuropharmacology. **PI: Martial Ruat***
	[*10' presentation (Past) + 5' questions]*
08:45-09:10	*Presentation of **Team 15**: Molecular Neuroendocrinology of Food Intake. **PI: Mohammed Taouis***
	[*15' presentation (Past/Project/trajectory) + 10' questions]*
9:10-9:25	*Presentation of **Team 16:** Neurogenetics of Drosophila. **PI: Daniel Vasiliauskas***
	[10' presentation (Past) + 5' questions]
09:25-09:40	*Presentation of **Team 17**: Homeostasis, Perception and States. **PI: Thierry Bal [****10' presentation (Past) + 5' questions]*
9:40-09:50	*Presentation of **Team 18 (new team)**: Sensomotion. **PI: Guy Bouvier***
	[5' presentation (Project/trajectory) + 5' questions]
09:50-10:15	*Presentation of **Team 19**:* Neuronal Circuits & Motor Control. ***PI: Julien Bouvier***
	[15' presentation (Past/Project/trajectory) + 10' questions]
10:15-10:45	*Coffee break*
10:45-11:10	*Presentation of **Team 20**: Neuroinformatics. **PI: Andrew Davison***
	[15' presentation (Past/Project/trajectory) + 10' questions]
11:10-11:35	*Presentation of **Team 22**: Computational Neuroscience. **PI: Alain Destexhe***
	[15' presentation (Past/Project/trajectory) + 10' questions]
11:35-12:00	*Presentation of **Team 23**: Sensori-motor Integration & Plasticity. **PI: Daniel Shulz** (10' Past) + **Valérie Ego-Stengel- Isabelle Férézou** [5' Project/trajectory) + 10' questions]*
12:00-12:25	*Presentation of **Team 21**: Neural Code & Auditory Perception. **PI: Catherine Del Negro et Jean-Marc Edeline** (10' past) + **Nicolas Giret** [5' project/trajectory) + 10' questions] (recorded presentation)*
12:25-13:30	*Lunch only the committee*
13:30-14:30	*Closed-door meeting of the committee*
14:30-15:00	*Meeting with **engineers, technicians and administrative personnel (in French). (**Committee#1)*
	*Meeting with **scientists (Researchers and teacher-researchers)**, no team leaders, no lab director (Committee#2)*
15:00-15:30	*Meeting with **students** and **post-docs (**Committee#1)*
	*Meeting with **team leaders** (Committee#2)*
15:30-16:00	*Closed-door meeting of the committee with coffee break*
16:00-16:30	*Discussion with the **Unit director***
16:30-17:00	*Discussion with the **representative of the funding bodies***
17:00-17:30	*Closed-door meeting of the committee (Last Debriefing)*
17:30	*End of the visit*

GENERAL OBSERVATIONS OF THE SUPERVISORS

The institution responsible for submitting the application, which is also responsible for coordinating the response on behalf of all the research Unit's supervisors, did not submit any general observations.

The Hcéres' evaluation reports are available online:
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