



Laboratoire de neurobiologie

Rapport Hcéres

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

Department for the evaluation of
research units

AERES report on unit:

Laboratoire de Neurobiologie

Under the supervision of the following
institutions and research bodies:

École Supérieure de Physique et de Chimie Industrielles

ESPCI ParisTech

Centre National de la Recherche Scientifique



February 2013



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

Research Units Department

President of AERES

Didier Houssin

Research Units Department

Department Head

Pierre Glaudes



Grading

Once the visits for the 2012-2013 evaluation campaign had been completed, the chairpersons of the expert committees, who met per disciplinary group, proceeded to attribute a score to the research units in their group (and, when necessary, for these units' in-house teams).

This score (A+, A, B, C) concerned each of the six criteria defined by the AERES.

NN (not-scored) attached to a criteria indicate that this one was not applicable to the particular case of this research unit or this team.

Criterion 1 - C1 : Scientific outputs and quality ;

Criterion 2 - C2 : Academic reputation and appeal ;

Criterion 3 - C3 : Interactions with the social, economic and cultural environment ;

Criterion 4 - C4 : Organisation and life of the institution (or of the team) ;

Criterion 5 - C5 : Involvement in training through research ;

Criterion 6 - C6 : Strategy and five-year plan.

With respect to this score, the research unit concerned by this report (and, when necessary, its in-house teams) received the following grades:

- Grading table of the unit: **Laboratoire de Neurobiologie**

| C1 | C2 | C3 | C4 | C5 | C6 |
|----|----|----|----|----|----|
| A+ | A | NN | A+ | A+ | A+ |

- Grading table of the team: **Neuronal Structure and Dynamics**

| C1 | C2 | C3 | C4 | C5 | C6 |
|----|----|----|----|----|----|
| A | A | NN | NN | A | A |

- Grading table of the team: **Sleep Neuronal Networks**

| C1 | C2 | C3 | C4 | C5 | C6 |
|----|----|----|----|----|----|
| NN | NN | NN | NN | A+ | A |

- Grading table of the team: **Genes and Dynamics of Memory Systems**

| C1 | C2 | C3 | C4 | C5 | C6 |
|----|----|----|----|----|----|
| A+ | A+ | NN | NN | A+ | A+ |

- Grading table of the team: **Genes Circuits Rhythms and Neuropathology**

| C1 | C2 | C3 | C4 | C5 | C6 |
|----|----|----|----|----|----|
| A+ | A | NN | NN | A+ | A+ |



- Grading table of the team: *Memory, Oscillations and Brain States*

| C1 | C2 | C3 | C4 | C5 | C6 |
|----|----|----|----|----|----|
| NN | NN | NN | NN | NN | A+ |



Evaluation report

| | |
|--|---|
| Unit name: | Laboratoire de Neurobiologie de l'ESPCI ParisTech |
| Unit acronym: | UMR 7637 |
| Label requested: | CNRS/ESPCI |
| Present no.: | |
| Name of Director (2012-2013): | Mr Thomas PRÉAT |
| Name of Project Leader (2014-2018): | Mr Thomas PRÉAT |

Expert committee members

| | |
|----------|---|
| Chair: | Mr Martin GIURFA, Université Toulouse 3, Université Paul Sabatier, Toulouse |
| Experts: | Mr Denis BURDAKOV, MRC National Institute for Medical Research, London, United Kingdom |
| | Mr PATRICK DOHERTY, King's College London, London, United Kingdom |
| | Ms Catherine FAIVRE-SARRAILH, Faculté de Médecine-Aix-Marseille Université, Marseille (Representative of CoNRS) |
| | Mr Bertram GERBER, Leibniz Institute for Neurobiology, Magdeburg, Germany |
| | Ms Angela GIANGRANDE, Institut de Génétique et de Biologie Moléculaire et Cellulaire, Strasbourg |
| | Mr Bruno POU CET, Université de Provence - Aix-Marseille 1, Marseille |



Scientific delegate representing the AERES:

Mr Patrick BLADER

Representative(s) of the unit's supervising institutions and bodies:

Ms Janine COSSY, ESPCI

Ms Natalie LERESCHE, INSB/CNRS



1 • Introduction

History and geographical location of the unit

The Laboratory of Neurobiology at the École Supérieure de Physique et de Chimie (ESPCI) was created in 1995. It was directed by M Jean ROSSIER from its origins until 2008. In 2009, M Serge BIRMAN, who was originally based at Marseille, took the direction of the research unit and undertook a series of changes in order to promote collegial leadership. A scientific council was created which, under the direction of M Serge. BIRMAN, managed to initiate a series of transformations to achieve a more integrated unit. In 2012, following the expansion of the unit at the ESPCI and facing the current AERES evaluation, the unit decided to nominate Thomas Préat as new director. Both the ESPCI and CNRS supported this change that took place in January 2012, thus anticipating the official end of M Serge BIRMAN's directorship (end of 2013).

The retirement of Jean Rossier in 2012 obliged the restructuration of his research team. Three researchers and one technician took the initiative of creating a junior team (T. Gallopin's team), which joined the three existing teams (M Thomas. PRÉAT's, M Serge. BIRMAN's & Mr Z. LENKEI's teams). A fifth junior team was then added with the arrival of Mr K. BENCHENANE).

The unit is located at the ESPCI Paris Tech, which provides a unique environment for a neurobiology laboratory in terms of the possibility of establishing gateways with the fields of physics, mathematics and engineering. Fundamental developments in the field of cellular imaging and microscopy, among others, are possible thanks to this interaction, facilitated by the availability to the unit of ESPCI students.

Management team

The unit is now directed by Mr Thomas. PRÉAT; Mr Serge. BIRMAN is deputy director until the end of 2013. From 2014 on, the official start of the new five-year research period of the unit, Mr Thomas. PRÉAT will be the only director of the unit, without an accompanying deputy director.

A scientific council composed of two members of each team (including the team leader) meets once a month to discuss and evaluate scientific and financial matters of the unit. A laboratory council including representatives of all staff categories meets three times a year in order to make proposals to the scientific council. Besides, in the last two years a reorganization council composed of all permanent researchers of the units has met once a month to ensure a smooth transition towards the new five-year period.



Unit workforce:

| Unit workforce | Number as at 30/06/2012 | Number as at 01/01/2014 | 2014-2018 Number of project producers |
|--|-------------------------|-------------------------|---------------------------------------|
| N1: Permanent professors and similar positions | 4 | 4 | 4 |
| N2: Permanent researchers from Institutions and similar positions | 8 | 9 | 8 |
| N3: Other permanent staff (without research duties) | 5 | 6 | 2 |
| N4: Other professors (Emeritus Professor, on-contract Professor, etc.) | - | - | - |
| N5: Other researchers from Institutions (Emeritus Research Director, Postdoctoral students, visitors, etc.) | 6 | 6 | 6 |
| N6: Other contractual staff (without research duties) | 3 | 2 | - |
| TOTAL N1 to N6 | 26 | 27 | 20 |
| Percentage of producers | <i>100 %</i> | | |

| Unit workforce | Number as at 30/06/2012 | Number as at 01/01/2014 |
|--|-------------------------|-------------------------|
| Doctoral students | 8 | |
| Theses defended | 9 | |
| Postdoctoral students having spent at least 12 months in the unit* | 9 | |
| Number of Research Supervisor Qualifications (HDR) taken | 2 | |
| Qualified research supervisors (with an HDR) or similar positions | 8 | 10 |



2 • Assessment of the unit

Strengths and opportunities

The unit presents a unique constellation of teams whose interaction is facilitated by the existence of real and potential collaborative projects based on common questions and technical needs. This constellation is articulated around two main pillars (PRÉAT'S and BIRMAN'S teams), which in terms of production, history and international visibility provide a solid structure on which the younger teams can rely, but also around the technical expertise of Lenkei's team. The questions addressed by the teams are situated within a common framework that refers to brain plasticity and neuromodulation, thus rendering the project of The Brain Plasticity Unit fully credible. A multiplicity of techniques from behavioral analyses to molecular and neurogenetic approaches, via in vivo and in vitro brain imaging and electrophysiological analyses, represents a unique richness in terms of available technical know-how that can be exploited by the various teams of the unit.

In parallel, the use of vertebrate (mainly rodent) and invertebrate models (*Drosophila*) allows comparative analyses of the generality or specificity of certain neural mechanisms (e.g. memory) and constitutes a particular strength of the unit. The fact that in all teams, even those more concerned by fundamental questions, projects oriented towards neurological and psychiatric questions (depression, schizophrenia, chronic neuropathic pain, Parkinson & Alzheimer diseases, etc.) are or will be developed constitutes an interesting opening and provides added-value to the global project of the unit. It has to be underlined, however, that the teams have historically focused on fundamental questions and that this strategy has precisely contributed to their prestige and success; more applied projects are welcome if they do not detract from the basic goals that have constituted the main force of the teams. The fact that the teams have been successful, despite the general financial situation, to obtain competitive grants for basic questions (e.g. ANR) shows the pathway to follow.

An additional strength of the unit is the coexistence of senior and young researchers sharing responsibilities in terms of team direction and who are expected to develop a collegial, interactive management of the unit. The fact that such developments are already under way is a positive feature of the unit. Finally, the implication of academic staff (ESPCI professorships) in teaching at different levels at the ESPCI is a positive element as it brings the unit closer to ESPCI students and other ESPCI laboratories. The appointment of new teaching staff both in 2012 and in 2013 is a positive element that should be underlined. Also, the ESPCI constitutes in itself a unique environment providing exceptional opportunities to the unit's teams: the interaction with physicists, mathematicians and engineering specialists allows cutting-edge developments for neurobiological studies at the single-cell level. The generous funding policies of ESPCI, which has been an important source of support for some of the teams of the unit, needs to be underlined as it is quite exceptional for French institutions.

Finally, an important strength of the unit is the international prestige that emanates from specific teams but that extends over the whole structure. In particular, the international visibility of the Pr eat's team, which is at the core of the unit, situates this team among the 5 % best of the world. It is clear that the unit as a whole benefits from this particular aura.



Weaknesses and threats

The weaknesses of the unit are related to its recent restructuration: on the one hand, the unit is still a young structure having been recently reorganised and with young teams just arriving. This means that, so far, international visibility is mainly generated by the teams of Mr Thomas PRÉAT and Mr Serge. BIRMAN. This fact, which was presented as an advantage for younger teams in the strengths, could become a weakness if it remains unchanged. The young teams need to boost their production and visibility in order to equilibrate the situation.

On the other hand, the youth of the structure has other consequences that need to be improved, for instance, in terms of the interactive dynamic across the unit, which has to be boosted. For instance, a more active role in terms of scientific animation, both internal and external, could be expected from all researchers of the unit, especially the senior ones. Periodical organization of journal clubs, guest seminars (national and international) and an active role in the organization of both national and international meetings in the teams' domains of expertise would be desirable. It is clear that the visibility of some researchers present at the unit constitutes a guarantee for the success of these endeavors.

A stimulating management strategy has to be applied in order to increase the motivation of the technical staff and to ensure, when possible, career progression. The fact that some technicians are either on short-term contracts, which will not necessarily be renewed, or have recently retired, creates a situation of uncertainty that conspires against the efficient development of research projects. Three teams are devoid of technical support but the priority is to back the *Drosophila* raising and food-facilities, given the mass of work that is associated to it and the fact that *Drosophila* teams are the elements ensuring brilliance and competitiveness at the international level. From that point of view, technical support for these teams at this level is absolutely mandatory.

Recommendations

The unit constitutes an excellent, reputed neurobiological laboratory in France, especially because of the exceptional international projection of one of its teams followed by that of a second team. Based on this prestige, the unit should further evolve in order to improve the competitiveness and visibility of the other teams, especially the younger ones. Interactions and supporting strategies - already under way - have to be boosted to this end in order to increase the amount of high-impact publications outside the two leading teams. The unit is encouraged to reinforce even more ongoing collaborations and exploration of cutting-edge techniques at cellular and molecular levels. The contribution of LENKEI'S team is crucial in this sense and should - as it is expected by the unit - go beyond collaborative technical developments. The perspectives presented by the unit in this respect are reassuring.

Increasing scientific animation (e.g. internal and external seminars, see above) and achieving stimulating management strategies for technical staff should be engaged in the short-term. Technical support, especially for the *Drosophila* facilities, which constitute one of the international hallmarks of the unit, has to be provided in an urgent way. It should be realized to what extent the achievements of the *Drosophila* teams are unique at the international level.



3 • Detailed assessments

Assessment of scientific quality and outputs

- Excellent, sometimes exceptional, scientific production but largely provided by two teams of the unit: one at the forefront of the international community of researchers working on *Drosophila* long-term memory, followed by the other working on mechanisms controlling neurotransmission in *Drosophila* whose international visibility is highly significant. Both teams address competitive questions in their respective fields, with a significant output in terms of scientific production.

- Young structure which has been recently reorganized, with young teams that have just been created and which need to expand either their scientific visibility or stabilize their existence in terms of permanent staff. The newer teams need more time to be objectively evaluated.

Assessment of the unit's academic reputation and appeal

- The unit's reputation and appeal is currently based largely on appreciation of the *Drosophila* teams, one of which is among the best 5% teams in the world in the competitive field of *Drosophila* learning and memory. Both teams are engaged in rich and productive international collaborative networks that boost their international brilliance.

- Some notoriety is also provided via the recruitment of an excellent young PI, who is expected to move from a one-man team situation to a more stabilized structure which could help boosting production.

- For the newer teams, more time will be necessary before an objective assessment of their reputation and appeal can be made.

Assessment of the unit's organisation and life

- The unit has just passed a reorganisation period due to the departure of a previous director; the transition phase is now for the most part finished with a new acting director.

- The transition phase was accompanied by a vast improvement and reorganisation of every-day life in the unit.

- As a consequence the unit puts itself in the position to attract an external excellent young team, as well as to promote another young team internally.

- Scientific animation may be intensified at several levels, in particular in the form of invited seminars and journal clubs.

- Specific management strategies may be implemented in order to promote and increase the motivation of technical staff.



Assessment of the unit's involvement in training through research

- The unit is involved in training through research via a series of enthusiastic doctoral and postdoctoral candidates spread among the teams. The activity at this level is standard and positive in terms of orientation and advising of students.

- Unit members who belong to the ESPCI teaching staff participate in several teaching activities at various levels, from undergraduate to masters. Their activity is important both in terms of engagement and strategically (see above); the number of hours taught is less than that of French universities.

Assessment of the five-year plan and strategy

- The unit exhibits a clear five-year plan for the future with well-defined scientific priorities and credible strategies to reach the proposed goals. Despite its relatively small size, both at the unit and team level, the structure has the potential to become a reference laboratory in the field of neurobiological studies in France.

- If the unit is already attractive based on the impact of *Drosophila* teams, stabilizing and boosting the activity of the other teams will render the structure even more attractive in the future. In certain cases, improving the productivity will be necessary and in other cases, redefining the spectrum of research topics will be necessary given that a multiplicity of diverse questions cannot be necessarily addressed in an efficient way by a unique researcher or a very small group of researchers.

- From this perspective, incorporating a 6th team, as mentioned by the unit director, may be an attractive goal as it may fulfill concrete needs in modelling and computational neurosciences. Yet, the appointment of such a team may not necessarily be important at the current stage. Straightening the existing teams, and appreciating where synergies really emerge and where not, should be the key elements for defining the potential interest of a 6th team.



4 • Team-by-team analysis

Team 1 : Neuronal Structure and Dynamics

Name of team leader: Mr Zolt LENKEI

Workforce

| Team workforce | Number as at 30/06/2012 | Number as at 01/01/2014 | 2014-2018 Number of project producers |
|---|-------------------------|-------------------------|---------------------------------------|
| N1: Permanent professors and similar positions | 1 | 1 | 1 |
| N2: Permanent EPST or EPIC researchers and similar positions | 1 | 1 | 1 |
| N3: Other permanent staff (without research duties) | - | - | - |
| N4: Other professors (PREM, ECC, etc.) | - | - | - |
| N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.) | 2 | 1 | 1 |
| N6: Other contractual staff (without research duties) | 1 | - | - |
| TOTAL N1 to N6 | 5 | 3 | 3 |

| Team workforce | Number as at 30/06/2012 | Number as at 01/01/2014 |
|---|-------------------------|-------------------------|
| Doctoral students | 2 | |
| Theses defended | 3 | |
| Postdoctoral students having spent at least 12 months in the unit | 1 | |
| Number of Research Supervisor Qualifications (HDR) taken | 2 | |
| Qualified research supervisors (with an HDR) or similar positions | 2 | 2 |



- Detailed assessments

Assessment of scientific quality and outputs:

The team's research is on neuronal G-Protein Coupled Receptors (GPCRs), with a focus on the CB1 cannabinoid receptor (CB1R), using both in vitro and in vivo approaches. It benefits from a strong connection with ESPCI engineers for both mathematical modeling and design of specific devices required for in vitro manipulations. Among its main achievements, this group has described sub-neuronal basal and ligand induced internalisation patterns of the CB1R using immuno-electron microscopy. Importantly this report of the region-specific differences in internalization and somato-dendritic localization of receptors is highly relevant with the cannabinoid effects that are dependent on neuronal networks. The group initiated a collaboration aimed at better understanding the potential deleterious effect of exposure to cannabis during adolescence, i.e. a critical period of structural maturation. Beyond its own production, the main asset of this team is its collaborative network. Indeed the team appears to have initiated collaborations with most of the other groups in the unit. This is important as this grouping contributes considerable expertise in terms of molecular and cellular neurobiology, cell culture, micro fluidics and live cell imaging to the unit.

Over the 2008-2012 period, the team published 13 papers in good journals with mid-range impact factors (Traffic, Cerebral Cortex, European Journal of Neuroscience), which is not unreasonable for a small group (two permanent researchers). The team's papers focused on the trafficking of GPCRs, especially the CB1 receptor, with a very important contribution on the patterns of receptor internalisation in the intact brain. Although this is a highly competitive area, there were new insights into the differences in internalisation in the various neuronal compartments and circuits. Four PhD students defended their dissertation between 2011 and 2013.

Assessment of the team's academic reputation and appeal.

The team leader has been invited to international conferences (e.g., FENS), attesting to his emerging reputation. A second researcher in the team has been involved in the organization of international meetings and is well "networked" in the pain field. ANR grant support has been obtained, thus establishing the ability of the team to raise funding. The team was able to attract several PhD students and post-docs during the past period. Both investigators work in very competitive areas and have made important contributions, however they have yet to emerge as the international leaders in their fields. Nonetheless this is a young team with a second staff scientist only arriving a year or two ago, and the potential synergies are clear.

Assesment of the team's organisation and life

The association with the newly arrived researcher seems to be very positive; one paper has been recently published with co-authorship. Her project seems to be distinct from the one of the PI and in line with her previous data concerning BDNF and pain sensitivity. This should not be a problem since this domain is interrelated with the study on cannabinoid effects and because she is a very productive researcher. The two permanent staff bring complementary skills to the team and there are clear opportunities for synergistic interactions. For example, cannabinoid signalling is emerging as an important regulator of pain with synaptic function being a point of integration worthy of detailed study.

Assessment of the team's involvement in training through research:

Several PhD students were successfully trained over the past years. The recently arrived staff member is an ESPCI assistant professor and in addition is strongly involved in mentoring 3rd year ESPCI students and M1 and M2 university students. Both permanent staff members are highly motivated in this area.



Assessment of the five-year plan and strategy

The multidisciplinary approach to characterize the mechanisms of pathway remodelling will rely to a great extent on the technical competences and facilities recently developed in the group and the unit. The plan is well thought out, but needs to be considered alongside a large body of work already published in this area. For example, cannabinoid receptors are known to rapidly regulate the actin based cytoskeleton with the first reports of this dating back almost 25 years, with a number of more recent studies showing that cannabinoid receptors modulate actin dynamics via activation and/or inhibition of the Rho-GTPase RhoA. Likewise, live cell imaging of migratory neuroblasts shows that eCB signalling regulates the retraction and extension of leading processes in a highly dynamic manner and CB1 agonists can both promote neurite extension and induce growth cone collapse.

A major part of the project is based on data showing that activation of CB1R induces a strong “contraction” of the leading process and growth cone collapse, particularly in situations where the CB1 receptor has been over expressed following transfection into hippocampal neurons (submitted article and data presented and discussed at the visit). This is elegant work that utilises excellent live cell imaging facilities and is combined with biophysical measurements. It substantiates the above reports on cannabinoid receptor dependent RhoA activation in migratory cells and growth cone collapse in primary neurons. It provides an excellent platform for a molecular dissection of the pathways that couple the activated CB1 receptor to the collapse response, but it is perhaps premature to use these observations in support of the hypothesis that cannabinoid receptors provide a general “inhibitory” tone for axonal growth given that activation of cannabinoid receptors can also promote axonal growth and cell migration.

The above findings have led the team leader to postulate that cannabinoid regulation of the “actin/myosin” cytoskeleton might underlie some of the effects of cannabis in the adult brain. This will be studied using imaging such as DTI, Resonance magnetic elastography and functional ultrasound. How this effect on acto-myosin contraction could be related with the role of cannabinoid in the development of psychotic pathology in conjunction with the classical synaptic modulator function is certainly a very ambitious project. Collaborations have been established for electrophysiology and imaging on hippocampal slices. Collaboration with clinicians is aimed at analyzing structural changes induced by cannabinoid in juvenile rats and its relation with schizophrenia-like behavioral changes. The main issue here will be one of spatial resolution and collaborations with groups using two-photon live imaging of dendritic spines might be an additional avenue that could be pursued.

In addition, projects have been initiated in interaction with the ESPCI *Drosophila* teams, based on the development of primary cultures of *Drosophila* neurons and glial cells. This will allow for genetic screens to identify modulators of cannabinoid-induced actin-myosin remodelling. Nonetheless, *Drosophila* does not express CB1/CB2 receptors, and despite the observation that *Drosophila* neurons are capable of responding to genetically introduced heterologous receptors careful consideration needs to be given as to the value of studying the receptors in this context. For example, the receptors could be expressed in mammalian cells and a candidate approached pursued in order to dissect how activation is coupled to activation of the small GTPases that regulate the cytoskeleton.



Conclusion

- Strengths and opportunities:

Great potential and excellent environment (both within the unit and at ESPCI).

- Weaknesses and threats:

Small group. May be difficult to be competitive in the long-run if too many research axes are pursued. Very competitive area - need to differentiate from the other groups working in this area.

- Recommendations:

Endocannabinoid signalling in polarised neurons is highly compartmentalised based on both the regulated localisation of the enzymes responsible for synthesis of 2-AG, and a “gating function” of MAG lipase, the enzyme that metabolises 2-AG. The team is well placed to lead the field on factors that govern both basal and stimulated CB1 receptor activation in neurons in vivo based on his outstanding Immuno electronmicroscopy work. If this could be adapted to looking at CB1 receptor cycling at synapses it would provide an excellent opportunity for direct collaborations with others in the unit who study synaptic plasticity. Collaboration with individuals who study spine dynamics would give extra power to the “Schizophrenia” studies.

The “global” activation of CB1 receptors with pharmacological tools might not mimic the more physiologically relevant activation that is governed by the localisation of DAGL and MAGL in mature polarised neurons. The grouping is well placed to utilise their micro fluidics models to lead on studies that look at the effects of “localised” activation of CB1 receptors on neuronal function.

A clear focus on a collaborative project within the team on CB1 receptor function in pain has the potential to become the lead of the field in this area. However, the group is small, and would benefit from more people at the postdoctoral level to maintain the different research goals.



Team 2 : Sleep Neuronal Networks

Name of team leader: Mr. Thierry GALLOPIN

Workforce

| Team workforce | Number as at 30/06/2012 | Number as at 01/01/2014 | 2014-2018 Number of project producers |
|---|--------------------------------|--------------------------------|--|
| N1: Permanent professors and similar positions | 2 | 1 | 1 |
| N2: Permanent EPST or EPIC researchers and similar positions | 2 | 2 | 2 |
| N3: Other permanent staff (without research duties) | 1 | 1 | 1 |
| N4: Other professors (PREM, ECC, etc.) | - | - | - |
| N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.) | 1 | 1 | 1 |
| N6: Other contractual staff (without research duties) | - | - | - |
| TOTAL N1 to N6 | 6 | 5 | 5 |

| Team workforce | Number as at 30/06/2012 | Number as at 01/01/2014 |
|---|--------------------------------|--------------------------------|
| Doctoral students | 1 | |
| Theses defended | 1 | |
| Postdoctoral students having spent at least 12 months in the unit | 1 | |
| Number of Research Supervisor Qualifications (HDR) taken | 0 | |
| Qualified research supervisors (with an HDR) or similar positions | 1 | 2 |



• Detailed assessments

Assessment of scientific quality and outputs

This team's research focuses on the mechanisms of slow wave sleep, and has a strong background in cellular physiology of neural circuits. The importance of slow-wave sleep and the mechanisms controlling it are a key unresolved biomedical question that may also be very relevant for human health issues due to the large number of people suffering from sleep disorders and associated complications such as metabolic disease and mental health disorders. Specifically, the team focuses on the function of the ventrolateral preoptic nucleus (VLPO) in the induction and maintenance of slow-wave sleep. This global question is proposed to be tackled through a variety of methodological approaches including electrophysiology, videomicroscopy, molecular biology, immunocytochemistry and neuropharmacology. The team will be headed by an associate professor and will also comprise 2 permanent researchers and two postdoctoral fellows. The team was assembled only recently, and so one can only tentatively assess its outputs as a homogeneous group. The individuals who compose it, however, have a satisfactory recent track record, with 7 articles for the PI published in good journals (one last author in Cerebral Cortex); and 7 and 12 published articles for the two permanent researchers, respectively.

The main feature of this team is that its members, in spite of having very different profiles and histories, have been able to design a very coherent project. Also, reading between the lines of the general reports, one can sense it must have taken the members quite a bit of energy to establish themselves as a group in a somewhat turbulent period for their institution. The effort required by the team members for reorienting their research was worthwhile since the team was awarded an ANR-JC grant on the project. They are thus able to "survive" and to raise funding, and furthermore, the group seems to be well integrated within ESPCI. An additional asset of the team is its collaborative network both within the unit itself and with research groups outside ESPCI.

Assessment of the team's academic reputation and appeal

Although there are few invitations yet to speak at international meetings for members of this young team, its members have recently been awarded a prize for the best poster at the European Sleep Research Society (a major international meeting the field). The poster presented their results, as an independent team, on new ways to regulate the VLPO sleep centre. This is promising evidence for potential international recognition; which should be nevertheless increased.

They have also been involved in the organization of scientific events at the local and national levels. It is likely that their output will greatly benefit from the synergy created by the new team. The team should become internationally appealing because the topic of cellular mechanism of sleep initiation is very timely in modern biology.

Assessment of the team's interaction with the social, economic and cultural environment

The team leader has created a popular blog on the topic of sleep, which is an excellent way to contribute to socioeconomic and cultural impact of the research topic. The blog is currently only in French, and in view of low international visibility of the group mentioned above, an English version may definitely help.

Assesment of the team's organisation and life

It is difficult to address this criteria concerning this recently "assembled" group. Members seem to enjoy a good atmosphere. The committee noted that the team went through a difficult time in the unit's recent history, with the retirement of its former leader and consequent major reorganization; the committee was impressed by how current team members dealt with these difficulties.



Assessment of the team's involvement in training through research

Two PhD students were successfully trained over the past years in co-supervision. In addition, the PI is directly involved in teaching at ESPCI as an assistant professor and has been strongly involved in mentoring 3rd year ESPCI students as well as Master 2 university students. The other two members of the group are also concerned with mentoring at M1 and M2 level as well as 3rd ESPCI year and tutoring biology at ESPCI.

Assessment of the five-year plan and strategy

The overall research question - mechanisms of slow-wave sleep - is definitely one of the "big" questions in biology. The plan seems to be to identify and characterize the cellular mechanisms of slow-wave-sleep, focusing on VLPO area, which is active during slow-wave-sleep. The details are well planned and the programme is likely to produce a lot of useful new data on properties of VLPO neurons.

However, it could be viewed as a weakness that there is too little a link with the actual analysis of sleep (i.e. behaviour). In particular, there is not yet direct proof that the cells that the team plans to focus on (VLPO LTS cells) are involved in sleep. It could be other VLPO cells other than those of the LTS (e.g. the fact that LTS cells are blocked by NA does not prove that they promote sleep, because wake-promoting orexin cells are also blocked by NA). Without the link between LTS cells and a physiological function, a lot of the planned work - multiparametric analyses, glucose-sensing, etc - will be difficult to relate to a specific brain function. To overcome this potential risk, it is quite important for the team to complement their detailed cellular approach with analysis of VLPO LTS cells long-range connectivity and/or behaviour. This could be achieved through collaboration with the other recently arrived ESPCI team that masters the in vivo techniques mentioned above.

Conclusion

- Strengths and opportunities:

Ambitious goal in an excellent environment (both within the unit and at ESPCI), demonstrated ability to raise funding, good background in the field, recent prize for best poster at international meeting suggest increasing visibility for the team.

- Weaknesses and threats:

The link between much of the proposed research programme (cellular-level) and the overall research aim (sleep) is very promising but at present only putative. Although the programme will undoubtedly produce useful data and the team is well-placed to contribute to the field, a threat is that their data may not have the best international impact, unless better direct links between studied cells and sleep and/or other brain areas is established.

- Recommendations:

This young promising group needs continuing support to give it more time to prove that future plans can be translated into good research outputs. Connections and collaborations need to be made with in vivo teams in the unit to ensure that work on specific cells is more directly connected to a brain function.



Team 3 : Genes and Dynamics of Memory Systems

Name of team leader: Mr Thomas PREAT

Workforce

| Team workforce | Number as at 30/06/2012 | Number as at 01/01/2014 | 2014-2018 Number of project producers |
|--|-------------------------|-------------------------|---------------------------------------|
| N1: Permanent professors and similar positions | - | 1 | - |
| N2: Permanent EPST or EPIC researchers and similar positions | 3 | 3 | 3 |
| N3: Other permanent staff (without research duties) | 2 | 2 | 1 |
| N4: Other professors (PREM, ECC, etc.) | - | - | - |
| N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.) | 2 | 3 | 3 |
| N6: Other contractual staff (without research duties) | 1 | 1 | - |
| TOTAL N1 to N6 | 8 | 10 | 7 |

| Team workforce | Number as at 30/06/2012 | Number as at 01/01/2014 |
|---|-------------------------|-------------------------|
| Doctoral students | 4 | |
| Theses defended | 5 | |
| Postdoctoral students having spent at least 12 months in the unit | 5 | |
| Number of Research Supervisor Qualifications (HDR) taken | - | |
| Qualified research supervisors (with an HDR) or similar positions | 3 | 3 |



• Detailed assessments

Assessment of scientific quality and outputs

The team has provided fundamental insights into the nature of long-term memory formation and retrieval using the *Drosophila* model. It is among the world-leading research teams in this fascinating and highly competitive field.

In particular, the discovery of how the establishment of long-term memory is gated constitutes a major international breakthrough. The very first analyses aimed at understanding the neural bases of memory retrieval and how it organizes behaviour were also almost equally ground breaking. Last, but not least, the team has contributed substantial findings for understanding the mechanistic relation between short- and long-term memory, as well as the molecular underpinnings of long-term memory.

These profound insights are adequately reflected in the team's exceptional publication success, (Nature, Science, 2 Nature Neuroscience, Neuron, PNAS, 2 Current Biology, J Neuroscience, etc.).

Assessment of the team's academic reputation and appeal

The team is acknowledged to be among the very best in the world in the field of the study of long-term memory. Its work is published in the most visible journals and the team's leader and staff are highly valued colleagues who are regularly invited as speakers and guest researchers by the international community (e.g. 23 invited lectures over the evaluation period, 11 abroad and 12 in France).

The scientific excellence of the team, combined with utmost attention to experimental detail and control, its leadership in combining behaviour and physiology, and an atmosphere that is equally friendly and demanding make this place attractive for the brightest minds interested in long-term memory at an international scale (10 post-docs were attracted, 6 from France and 4 from abroad).

Further witness to the international reputation is the intense collaboration with the Max Planck Institute of Neurobiology and the HHMI Janelia Farm. Given the international and strategic importance of Janelia Farm, the collaboration of the team with this institution highlights its international brilliance. Also, the nomination of the team leader to the EMBO board constitutes another clear sign of highest scientific reputation.

Assessment of the team's interaction with the social, economic and cultural environment

The interactions of the team with the broader public are deliberately selective and well-chosen, including Le Monde, Readers Digest, and France 24. Most importantly, however, the team communicates its results through the most-cited, most-read and most attended-to scientific journals in the world, such as Science and Nature.

Assessment of the team's organisation and life

The impression of the committee is very positive as far as team spirit and freedom of personal development is concerned. Communication within the group seems fluid. The team is deliberately medium-sized and highly focussed on its core scientific topic (mechanisms of long-term memory). The team has achieved a fruitful balance between an almost cloistered intensity of focus on the one hand, and successful outgoing activity in terms of scientific publications, integration into the world-wide forum of scientific events, and targeted activities into the public, on the other hand. The committee stresses that the combination of outstanding scientific productivity and high moral within the team is most remarkable, given the past history of the unit.

Assessment of the team's involvement in training through research

In the past 5 years the team has formed 10 PhD students and postdocs, all of which with a remarkable publication success. Given the excellent reputation of the team, the students are certainly among the "most wanted" in the job market: 9 now pursue a career in science, 4 in France and 5 abroad.

Given the proven attractiveness of the team for bright students, the visibility of the team for MSc students is high; from that perspective, the involvement of the team in MSc-level teaching is obviously well targeted and effective.



Assessment of the five-year plan and strategy

The committee is convinced that the team will continue to pursue world-class research in the field of studies on the mechanisms of long-term memory. The research strategy is well balanced between high-risk / high-payoff projects (e.g. imaging single-MB neurons during memory formation), and following up fundamental questions raised by their ongoing projects. The project to image single mushroom body (MB) neurons during learning is risky for technical reasons (development of a new microscopy-imaging method), and because the probability of any one of the MB neurons to be part of the odour-memory trace is low (2-10 %). However, the team has shown in the past that it can either work hard enough, or find smart ways, to make such a project a success. Indeed, the proposed development of a “trap” to mark those neurons about-to-establish a long-term memory trace is particularly exciting, and seems promising. Given the fundamental fascination underlying “catching in the act” in vivo a single neuron forming a long-term memory trace, the remaining risk is certainly justified.

The committee expresses the highest respect for the determination of the team to follow-up their ground breaking recent findings, aiming at a comprehensive understanding of the molecular cascades downstream of coincidence detection (including analyses as to where in the brain these cascades operate), of the differential organization of appetitive versus aversive long-term memory, of the role of DA neurons for memory consolidation, and of the molecular determinants for APPL function. The committee is particularly keen to see the circuits of memory retrieval unravelled; indeed the team is in an exceptionally good position for such a breakthrough thanks to the collaboration with researchers at the Max Planck Institute of Neurobiology and HHMI Janelia Farm.

The SWOT assessment of the team is appropriate, including in particular the request for support by an additional and skilled fly-technician. The committee is convinced that such support is essential to maintain the world-leading position of the team (see remarks about the unit as a whole); for example, the headway acquired by the team through his collaboration with the HHMI Janelia Farm which implies using their strains for transgene expression with an unprecedented specificity is at immediate risk if no such support is granted.



Conclusion

- Strengths and opportunities:

Research topic (mechanisms of long-term memory) fundamentally important; research clearly world-leading.

- Weaknesses and threats:

The team argued that additional expertise in the analysis of functional imaging data an/or in electrophysiology is desired. The committee agrees, and supports the existing and apparently realistic plan to hire an assistant professor in this field.

The committee warns that the world-leading position of the team is acutely and seriously threatened by insufficient qualified technical support in fly husbandry.

- Recommendations:

While the funding available to the team is generous, the committee urgently recommends that an additional a skilled technician for fly husbandry be provided. For example, the ongoing larger-scale behavioural analyses, using the spectacular collection of specifically-expressing transgenic fly strains offered by the collaboration with the HHMI Janelia Farm, cannot be pursued without such additional support. Loosing this cooperation poses an immediate and serious threat to the world-leadership of the team. The committee underscores once more that the team is clearly one of the “crown jewels” of neurobiological research in France. Granting an additional technician would be a most profitable investment, given what is at stake.

The team leader´s attention should be drawn to maintain the international composition of the team, and to directing some energy and resources towards a somewhat more structured and regular internal and external seminar program, an annual retreat, hosting workshops and/or focussed international conferences.



Team 4 : Genes Circuits Rhythms and Neuropathology

Name of team leader: Mr Serge BIRMAN

Workforce

| Team workforce | Number as at 30/06/2012 | Number as at 01/01/2014 | 2014-2018 Number of project producers |
|---|-------------------------|-------------------------|---------------------------------------|
| N1: Permanent professors and similar positions | 1 | 1 | 1 |
| N2: Permanent EPST or EPIC researchers and similar positions | 2 | 2 | 2 |
| N3: Other permanent staff (without research duties) | - | - | - |
| N4: Other professors (PREM, ECC, etc.) | - | - | - |
| N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.) | 1 | 1 | 1 |
| N6: Other contractual staff (without research duties) | - | - | - |
| TOTAL N1 to N6 | 4 | 4 | 4 |

| Team workforce | Number as at 30/06/2012 | Number as at 01/01/2014 |
|---|-------------------------|-------------------------|
| Doctoral students | 1 | |
| Theses defended | 1 | |
| Postdoctoral students having spent at least 12 months in the unit | 2 | |
| Number of Research Supervisor Qualifications (HDR) taken | - | |
| Qualified research supervisors (with an HDR) or similar positions | 2 | 2 |



• Detailed assessments

Assessment of scientific quality and outputs

The team is specialized in the cellular and molecular mechanisms controlling neurotransmission in *Drosophila* and has provided highly original contributions in the field of neural development and degeneration. Specifically: 1) the generation of a fly strain that lacks dopamine in the brain, which has made it possible to assess the role of dopaminergic signalling in several behaviours (sleep, arousal, locomotor activity and memory); 2) the connection between the dopaminergic system and the circadian clock and the role of specific neurotransmitters; 3) the use of the fly model to gain insights into the physiopathological mechanisms underlying human diseases such as Parkinson's, both familial and sporadic, and Huntington.

During the 2008-2012 period, the team has published 10 original articles with several papers in high impact factor journals (Nature Neuroscience, in collaboration; PNAS, Current Biology, Human Molecular Genetics, one of which in collaboration) and in very good specialized journals (J Comp Neurology, Neural Development, J Neurogenetics). Considering the small size of the group, the fact that it moved from Marseille in 2009 and that the PI was heavily involved with the direction and the reorganization of the Unit until end of 2011, this is a very good to excellent performance.

The skills and expertise of the team have now expanded with the arrival in 2011 of an expert in circadian rhythms who has a good publication record, including 2 papers in J Neuroscience as first and corresponding author.

Assessment of the team's academic reputation and appeal

The team is well recognized in the community and has established fruitful collaborations within and outside the unit. The team leader has contributed to the scientific community by organizing symposia in France and abroad and as an expert in reviewing panels (HDR, PhD, AERES, grants and papers). The team is part of a Labex initiative (Memolife). In addition to the longstanding interaction with groups in the USA, the team has established fruitful connections with other fly laboratories working on neurobiology in Japan, India and UK. The team has also actively interacted with the other *Drosophila* group at the ESPCI, which has led to shared publications and to the development of new tools.

Assessment of the team's interaction with the social, economic and cultural environment

The team participated to the diffusion of science for the general public being invited to radio broadcasts (3D France-inter) and ESPCI science bar.

Assessment of the team's organisation and life

The team is composed of staff with permanent position and young investigators (postdocs and PhD students). Its size favours interactions amongst the members of the group and the balance of permanent/non permanent scientists allows renewal while maintaining a critical mass. The recent arrival of a professor with complementary expertise and scientific perspectives in the field of circadian behaviour expands the group's portfolio. The team has currently no technical help: one technician worked in the team until 2009 (AI CNRS) and one left for personal reasons (IE CNRS, 2010-2011). The team leader has been able to attract funding through governmental and private agencies (ANR, FRM, AFM, Fondation de France, Neuropôle Francilien, Fondation Gilles de Gennes, Rotary Club, Fondation High Q), in addition to the support obtained from the ESPCI.



Assessment of the team's involvement in training through research

Over the last five years, the team leader has mentored three postdocs and has trained students, of which, 5 PhD and several undergraduates. In addition, the team has hosted five distinguished scientists from abroad, each for two to four weeks (five chairs Joliot of ESPCI ParisTech). This gives young scientists a further opportunity to learn and interact with more senior scientists. The team has also contributed to training by teaching medical students and by organizing a new Master 2 track. The committee feels that the team also benefits from the stimulating and coherent ESCPI environment. The other groups of the unit bring complementary expertise in very close research fields, which promote fruitful exchanges.

The two postdocs that have left the laboratory during the last five years published as first authors and in collaborative projects; they have continued their career as group leaders or have joined other groups in France or abroad. The students receive adequate training and publish as first authors. One PhD student defended in 2012. The team is currently composed of two students and one postdoc, in addition to the three permanent scientists including the team leader, the newly appointed professor and a CNRS researcher ('chargé de recherches') who recently joined the laboratory. The small number of young scientists likely reflects the fact that the team leader was deeply involved in reorganising the Unit (until 2011) and restoring a positive atmosphere.

Assessment of the five-year plan and strategy

The main goals represent the logical extension of the recent work, with a significant and well-considered new blend given by the presence of the new professor in the group. In particular, the team plans to identify elements of the neuronal circuitry involved in locomotion and circadian rhythms. This involves setting up new tools for calcium imaging and selective neuronal activation using thermosensitive channels, which will be done in collaboration with groups at the ESPCI. The circuitry linked to locomotion will be explored in pathological conditions as well (neurodegeneration). The team also aims at studying the connection between circadian rhythms and neurodegeneration as well as the role of glia in neurodegeneration. Finally, movement disorders will be analyzed with respect to several pathways (oxidative stress, homeobox, neurotransmitters), with a specific emphasis on the role of dopamine-associated diseases. While the connectivity studies on explants will certainly lead to important findings, those on primary cultures are less convincing. The team will extend the analysis to the larva, which has a simpler nervous system and plans to use the SING test, which may be supplemented with more fine-grained analyses of locomotion. Since locomotion is controlled by the circadian clock in the adult but reportedly not in larvae, the team also plans to scrutinize untested larval behaviours such as feeding and thermal preference, in the context of circadian modulation.

Overall, the plan is quite ambitious and dense. It is likely that the circuitry will only be partially disclosed and setting priorities will perhaps render the flow of the work smoother. Nevertheless, the team has already been able to follow different lines of research in parallel and has established numerous collaborations. In addition, the pathways of interest are highly connected and are within the field of the group expertise.



Conclusion

- Strengths and opportunities:

Solid group working in a very profitable environment. Good scientific production and original findings.

- Weaknesses and threats:

Lack of technical help. The committee have thoroughly discussed this issue with the team leader, the students, the postdocs, the permanent scientists as well as with the officers from the ESCPI and from the CNRS. The lack of a technician working for the fly community jeopardizes the work of the two *Drosophila* teams. Getting technical help for the fly facility is an absolute requirement for the development/continued success of the two groups. The committee acknowledges that the ESCPI has generously supported the fly teams with equipment and recurrent funding, however a salary for a technician is the most important issue to address now (see also general remarks about the unit).

There appears to be limited space for behavioral experiments in constant darkness.

Several students and postdocs have left in the recent past. Two students and one postdoc are working at the present time. The group should aim at hiring more young scientists. Again, the success of the group in this regard will likely depend on reasonable support of the fly facility.

- Recommendations:

The team is taking full advantage of the *Drosophila* model system to explore neural circuitries that are relevant to human pathologies and does so by actively collaborating with numerous groups within and outside the ESCPI. Despite the fact that appropriate research choices seem to be made, the committee recommends focusing on fewer aspects, given the size of the team. In particular, linking the work on dopamine to human pathologies seems a fruitful avenue, given the solid expertise of the team in this field.



Team 5 : Memory, Oscillations and Brain States

Name of team leader: Mr Karim BENCHENANE

Workforce

| Team workforce | Number as at 30/06/2012 | Number as at 01/01/2014 | 2014-2018 Number of project producers |
|---|-------------------------|-------------------------|---------------------------------------|
| N1: Permanent professors and similar positions | - | - | - |
| N2: Permanent EPST or EPIC researchers and similar positions | 1 | 1 | 1 |
| N3: Other permanent staff (without research duties) | - | - | - |
| N4: Other professors (PREM, ECC, etc.) | - | - | - |
| N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.) | - | - | - |
| N6: Other contractual staff (without research duties) | - | - | - |
| TOTAL N1 to N6 | 1 | 1 | 1 |

| Team workforce | Number as at 30/06/2012 | Number as at 01/01/2014 |
|---|-------------------------|-------------------------|
| Doctoral students | - | |
| Theses defended | - | |
| Postdoctoral students having spent at least 12 months in the unit | - | |
| Number of Research Supervisor Qualifications (HDR) taken | - | |
| Qualified research supervisors (with an HDR) or similar positions | - | 1 |



- Detailed assessments

Assessment of scientific quality and outputs

This very small group (one full time permanent researcher and two PhD students) recently arrived at the ESPCI (September 2012). Its research focuses on the relationship between the ability of the brain to store new information and the oscillatory activity observed during sleep. The main hypothesis is that high-frequency oscillations during sleep serve to reactivate memory traces of experiences acquired when awake, leading to consolidation. Using spatial memory and auditory processing, the team expects to demonstrate the peculiar role of different sleep stages (i.e., slow-wave sleep -- SWS, and rapid-eye movement REM -- sleep) for encoding different types of memory. The methodological approach relies on a combination of sophisticated techniques including electrophysiological high-density unit recording, optogenetics, pharmacology and precise behavioral characterization of various types of memory. Given the reliance of the project on powerful analytical tools and device interfaces to achieve time-locking of neural and behavioral events, the team will greatly benefit from the ESPCI environment which provides a unique source of up-to-date engineering. Among its recent achievements, the principal investigator has demonstrated the existence of cross-talk between the hippocampus and the medial prefrontal cortex (increased coherence in the theta) when the rat uncovers the rule to be learned. He also showed, for the first time, the causal relationship between memory consolidation and the sharp waves-ripples observed during SWS.

The PI has been publishing good papers for the last 10 years. Over the 2008-2012 period, the team published 9 experimental papers in top-tier peer-reviewed journals including two Nature Neuroscience (co-first author in one; 3rd of 5 authors in the other), one Neuron (1st author) and PNAS (2nd author), plus two review articles in excellent journals (Current Opinion in Neurobiology; Trends in Cognitive Science) and three book chapters. This recent work is very highly cited (three papers have over 100 citations in Google scholar) and this demonstrates the impact that this small group is having within a very competitive field.

Assessment of the team's academic reputation and appeal

With the above publication record, the PI can be viewed as an individual with great potential, and as a possible future leader in his field. He has been asked to produce key reviews and has been invited to numerous national and international meetings - so he is clearly establishing a very good academic reputation. He was awarded the "Prix de la Recherche" in 2011 and the AXA-French Academy of Science in 2010.

Assessment of the team's interaction with the social, economic and cultural environment

The main asset of this team, beyond the strong scientific potential of the PI, is its collaborative network both within the unit and at the ESPCI, and with several world-top research groups. The PI has raised enough money for setting his new lab at ESPCI. The collaborations with the people from ESPCI have already started. Finally, the PI is involved in teaching in various places in the Paris universities (Université Pierre et Marie Curie, Université Paris Descartes, Université Paris-Sud) and grandes écoles (ENS and EHESS in addition to ESPCI).

Assessment of the team's organisation and life

The PI joined the unit in September 2012, and this is a very positive move that suggests that the unit is doing well as it has attracted an outstanding young scientist. The PI has obtained several small grants and managed to establish a lab that is reasonably well equipped for his studies. He currently has 2 PhD students, but it is too early to judge on how well they will perform. There seems to be a good working atmosphere in this small group.



Assessment of the team's involvement in training through research

No PhD has been defended in the last period given the recent arrival of the team, although the PI has been closely associated with the work of a graduate student at College de France two years ago. Two PhD students are currently under the PI's supervision who will defend his Habilitation (HDR) rapidly. For the last two years, he has mentored two Master 1 students and three 3rd year engineer students.

Assessment of the five-year plan and strategy

The PI clearly masters the techniques that he will use to pursue his ambitious plans, and it is admirable that he has good preliminary results, for example demonstrating the ability to manipulate memory during sleep or showing the feasibility of using optogenetics as part of his "tool-kit". The PI is using "state-of-the art" methods and techniques to address the questions, and this should hopefully keep him competitive in the area. The PI is applying for a young researcher ANR grant.

Conclusion

- Strengths and opportunities:

This team has a great potential and benefits from an excellent environment (both within the unit and at ESPCI). There are also clear opportunities for synergistic interactions with the other lab heads in the Neurobiology lab. He has relatively limited resources and only two PhD students to work with - however, this will allow him to remain at the bench himself to drive the work forward. The PI also has an outstanding set of collaborators and the committee feels that he should continue to be highly productive over the next few years.

- Weaknesses and threats:

This is a small group led by a young scientist. The challenges are no different from those facing most young investigators at the start of their independent careers. The PI will clearly need to build his lab by recruiting one or more post-doctoral fellows, and to distinguish himself from his previous mentor who might have similar research interests. The obvious threat is the highly competitive nature of the field - but this is inevitable when one asks important questions.

- Recommendations:

This team has a strong potential but a small size. Therefore it should be strongly supported by the Neurobiology Lab and the ESPCI in order to assure its long term stability. Attempts should be made to hire more postdoctoral fellows or to attract other permanent scientists so as to secure its ambitious research goals.



5 • Conduct of the visit

Visit date:

Start: 19th of February 2013, at 8:30 am

End: 19th of February 2013, at 18:30 am

Visit site(s): Laboratoire de Neurobiologie

Institution: École Supérieure de Physique et de Chimie

Address : 10 rue Vauquelin, 75005 Paris, France.

Conduct or programme of visit:

The visit took place at the ESPCI, on the 19th of February 2013. After a general introduction by the AERES representative and the chairman, a 30 min general presentation of the unit by the future director was given in the presence of all of the group leaders and some additional personnel of the unit, followed by 30 min discussion. Each group leader presented the past activities and projects for 25 min followed by 25 min discussion in the presence of the team members and the director. The director and team members left the room 5 min before the end to allow a "private" discussion between the AERES committee members and each group leader. Then 5-10 minutes discussion was allowed between the AERES experts to discuss and evaluate the quality of the team on the 6 different aspects requested by the AERES. The committee was split into three groups each having a half-hour discussion with i) the students and post-doctoral fellows, ii) the researchers with permanent position, excluding the team leaders, and iii) the technicians and engineer staff. A half an hour exchange with the representatives of the ESPCI and CNRS took place before a closed-door meeting was held to qualify each team being evaluated. Following the meeting with ESPCI and CNRS representatives, the committee met with the unit director for half an hour.

A representative of the technical staff of CNRS (CoNRS25) was present on site during the visit. She attended the presentation and discussion of most teams, but did not participate in the discussion. She organized a general discussion with the Engineers and technicians, in preparation of the one with the AERES committee representatives.



6 • Statistics by field: SVE on 10/06/2013

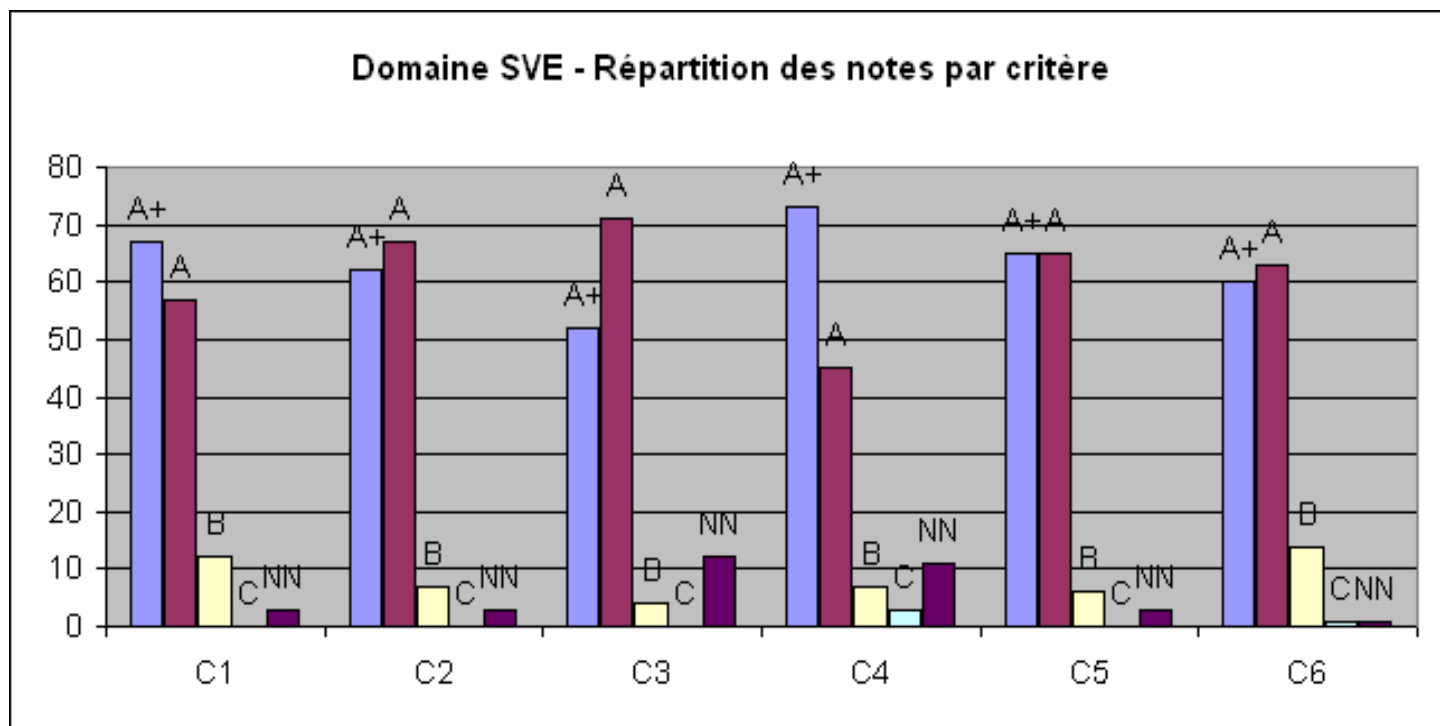
Grades

| Critères | C1 Qualité scientifique et production | C2 Rayonnement et attractivité académiques | C3 Relations avec l'environnement social, économique et culturel | C4 Organisation et vie de l'entité | C5 Implication dans la formation par la recherche | C6 Stratégie et projet à cinq ans |
|----------|---------------------------------------|--|--|------------------------------------|---|-----------------------------------|
| A+ | 67 | 62 | 52 | 73 | 65 | 60 |
| A | 57 | 67 | 71 | 45 | 65 | 63 |
| B | 12 | 7 | 4 | 7 | 6 | 14 |
| C | 0 | 0 | 0 | 3 | 0 | 1 |
| Non Noté | 3 | 3 | 12 | 11 | 3 | 1 |

Percentages

| Critères | C1 Qualité scientifique et production | C2 Rayonnement et attractivité académiques | C3 Relations avec l'environnement social, économique et culturel | C4 Organisation et vie de l'entité | C5 Implication dans la formation par la recherche | C6 Stratégie et projet à cinq ans |
|----------|---------------------------------------|--|--|------------------------------------|---|-----------------------------------|
| A+ | 48% | 45% | 37% | 53% | 47% | 43% |
| A | 41% | 48% | 51% | 32% | 47% | 45% |
| B | 9% | 5% | 3% | 5% | 4% | 10% |
| C | 0% | 0% | 0% | 2% | 0% | 1% |
| Non Noté | 2% | 2% | 9% | 8% | 2% | 1% |

Histogram





7 • Supervising bodies' general comments

Paris, April 17th 2013

Dear Colleagues,

Please find below our response to the AERES report.

*** Global appreciation of the Unit**

"A multiplicity of techniques from behavioral analyses to molecular and neurogenetic approaches, via in vivo and in vitro brain imaging and electrophysiological analyses, represents a unique richness in terms of available technical know-how that can be exploited by the various teams of the unit (...). The questions addressed by the teams are situated within a common framework that refers to brain plasticity and neuromodulation, thus rendering the project of the Brain Plasticity Unit fully credible (...). The unit exhibits a clear five-year plan for the future with well-defined scientific priorities and credible strategies to reach the proposed goals. Despite its relatively small size, both at the unit and team level, the structure has the potential to become a reference laboratory in the field of neurobiological studies in France".

We thank the AERES committee for its positive and much encouraging statements. The committee also raised a number of issues. Their advice will be used to further strengthen our scientific productivity and visibility. We wish to provide a short answer on three points concerning the Unit as a whole.

*** Scientific visibility**

" A more active role in terms of scientific animation, both internal and external, could be expected from all researchers of the unit, especially the senior ones. Periodical organization of journal clubs, guest seminars (national and international) and an active role in the organization of both national and international meetings in the teams' domains of expertise would be desirable. It is clear that the visibility of some researchers present at the unit constitutes a guarantee for the success of these endeavors."

Regular meetings are already taking place as teams have internal meetings on a weekly schedule, and each student or researcher has the opportunity to speak in front of the entire Unit once a year on average. However we do appreciate the committee's comments, and in particular the fact that we need to increase external visibility. Following the visit of the committee, several actions have been undertaken. First, PhD students and postdocs, now organize weekly research and bibliographic seminars between them. Second, external seminars will take place on a regular basis. Third, thematic workshops or meetings will be organized locally (two are planned).

A lot of energy has been devoted in the past few years to reshape the Neurobiology Unit in term of administration (establishment of collegial leadership, changes of Unit director in 2009 and 2012) and research (internal creation of a new team studying slow-wave sleep, external recruitment of a new team working on memory consolidation in rodent, recruitment of a new professor studying biological rhythm in *Drosophila*, development of an up-to-date rodent facility

etc.). Part of our energy will now be used to further promote national and international interactions.

*** Management of the technical staff**

"A stimulating management strategy has to be applied in order to increase the motivation of the technical staff and to ensure, when possible, career progression. The fact that some technicians are either on short-term contracts, which will not necessarily be renewed, or have recently retired, creates a situation of uncertainty that conspires against the efficient development of research projects. Three teams are devoid of technical support but the priority is to back the Drosophila raising and food-facilities, given the mass of work that is associated to it and the fact that Drosophila teams are the elements ensuring brilliance and competitiveness at the international level. From that point of view, technical support for these teams at this level is absolutely mandatory."

We are doing our best to promote career of the technical staff. Engineers or technicians who work in teams are fully integrated. Several of them—including two that unfortunately could not be present during the AERES visit—participate to the team meetings, sign publications etc. Technical agents working for common facilities are supervised by a researcher with whom they regularly discuss. The Unit strongly supports application for promotion at ESPCI or CNRS, but unfortunately opportunities are limited.

Regarding the situation of technical staff on short-term contract (CDD) we agree with the committee that the situation is not optimal, both for the staff and for the Unit which has limited financial resources for salaries. We thank the committee for its support, and we hope that indeed the two CNRS staff departures (one CNRS internal mobility and one retirement) will soon be replaced by at least one recruitment to sustain *Drosophila* research. More generally, the absence of technical support in 3 teams obviously makes it more difficult for them to achieve their scientific objectives.

*** Recruitment of a 6th Team**

"Incorporating a 6th team, as mentioned by the unit director, may be an attractive goal as it may fulfill concrete needs in modelling and computational neurosciences. Yet, the appointment of such a team may not necessarily be important at the current stage. Straightening (spelling: strengthening?) the existing teams, and appreciating where synergies really emerge and where not, should be the key elements for defining the potential interest of a 6th team".

Recruiting a 6th team is a long-standing goal, foreseen only for the end of the 2014-2018 term. Anyway the Unit does not currently have space to recruit a new team. Our priority is indeed to strengthen existing teams, and further develop scientific interactions.

Best regards,
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Director of the Neurobiology Unit