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

Section des Unités de recherche

Evaluation report

Research unit

Centre de Neurosciences Paris-Sud

University Paris 11



April 2009



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Centre de Neurosciences Paris-Sud

University Paris 11



Le Président
de l'AERES

Jean-François Dhainaut

Section des unités
de recherche

Le Directeur

Pierre Glorieux

April 2009



Evaluation report)

The research unit :

Name of the research unit : Centre de Neurosciences Paris-Sud

Requested label : UMR

N° in case of renewal : UMR 8620

Head of the research unit : M. Serge LAROCHE

University or school :

University Paris 11

Other institutions and research organization:

CNRS

Dates of the visit :

12-13 February, 2009



Members of the visiting committee

Chairman of the committee :

M. Yadin DUDAI, The Weizmann Institute of Science, Rehovot, Israel

Other committee members :

M. Jacques EPELBAUM, Centre Paul Broca, Paris

M. Pierre JAISSON, Laboratoire d'Ethologie Expérimentale et Comparée, Paris

M. Leszek KACZMAREK, Nencki Institute, Warsaw, Poland

Ms Isabelle MANSUY, Brain Research Institute, University of Zurich, Switzerland

M. Randolph MENZEL, Freie Universität Berlin, Germany

M. Thomas PREAT, Ecole Supérieure Physique Chimie Industrielles, Paris

M. David REBY, University of Sussex, Brighton, England

Ms Françoise SCHENK, Institut de Psychologie, Lausanne, Switzerland

CNU, CoNRS, CSS INSERM, INRA, INRIA, IRD representatives :

M. Martin GIURFA, CoNRS representative

M. Jacques MICHEAU, CNU representative

Observers

AERES scientific representative :

M. Pierre-Hervé LUPPI

University or school representatives :

M. Christian CARROT, University Jean Monnet St. Etienne

M. Jacques BITTOUN, University Paris 11

M. Alexandre REVCOLEVSCHI, University Paris 11

M. Martin KREIS, University Paris 11

Research organization representatives :

M. Driss BOUSSAOUD, CNRS

M. Jean-Jacques GUILLMINOT, CNRS



Evaluation report

1 • Short presentation of the research unit

- Total number of lab members : 82 including
 - 20 researchers with teaching duties
 - 15 full time researchers
 - 15 postdoctoral fellows
 - 18 PhD students, all with a fellowship
 - 16 engineers, technicians and administrative assistants
- Number of HDR : 21, all of them being PhD students advisors
- Number of students who have obtained their PhD during the past 4 years : 23
- Number of lab members with a PEDR : 4
- Number of “publishing” lab members : 33 out of 35

2 • Preparation and execution of the visit

The program of the visit is below.

Day 1:

Time : from 09:00 to 09:30

Door-closed meeting : Committee members and AERES representative

Time : from 09:30 to 09:45

Door-closed meeting : Committee members, AERES representative, Lab director

Time : from 09:45 to 10:45

Presentation by the head of the lab : past activity and projects

Time : from 10:45 to 11:40

Team #1 : Processus Mnésiques: du Normal au Pathologique

Presentation by the leader of team #1 and team members : past activity and projects

Time : from 11:40 to 12:20

Team #2 : Neurobiologie des Fonctions Exécutives

Presentation by the leader of team #2 and team members : past activity and projects

Time : from 14:00 to 14:30

Team #3 : Neurobiologie de la Prise de Décision

Presentation by the leader of team #3 and team members : past activity and projects

Time : from 14:30 to 15:30

Team #4 : Mécanismes Cellulaires et Moléculaires de la Plasticité et de la Mémoire

Presentation by the leader of team #4 and team members : past activity and projects

Time : from 15:45 to 16:45

Team #5 : Neuroendocrinologie Moléculaire de la Prise Alimentaire

Presentation by the leader of team #5 and team members : past activity and projects



Time : from 16:45 to 17:25
Team #6 : Génétique des Fonctions Neuronales Intégrées
Presentation by the leader of team #6 and team members : past activity and projects

Time : from 17:25 to 18:25
Visit of the laboratory and free discussion of committee members with scientists

Time : from 18:25 to 19:25
Door-closed meeting : Committee members and AERES representative

Day 2:

Time : from 08:30 to 09:25
Team #7 : Plasticité Sensorielle, Code Neural et Perception Auditive
Presentation by the leader of team #7 and team members : past activity and projects

Time : from 09:25 to 10:20
Team #8 : Neuroéthologie Sensorielle
Presentation by the leader of team #8 and team members : past activity and projects

Time : from 10:40 to 11:40
Team #9 : Communications Acoustiques
Presentation by the leader of team #9 and team members : past activity and projects

Time : from 11:40 to 12:10
Visit of the platforms : Animal Facility, Centre for Electron Microscopy

In parallel : Time from 11:10 to 11:20
Meeting with engineers, technicians and administrative assistants

Time : from 14:00 to 14:30
Three meetings at the same time
Meeting with PhD students and postdoctoral fellows
Meeting with researchers with permanent position

Time : from 14:30 to 15:00
Door-closed meeting : Committee members, AERES representative, Lab director

Time : from 15:00 to 15:45
Door-closed meeting : Committee members, AERES representative, University and Research Organization representatives

Time : from 16:00 to 18:45
Door-closed meeting : Committee members and AERES representative

Time : from 18:45 to 19:00
Conclusions by the committee

3 • Overall appreciation of the activity of the research unit, of its links with local, national and international partners

Overall, the research unit Center de Neurosciences Paris-Sud comprises an internationally leading center of research on brain, plasticity and behavior. The research activities of the different units converge to culminate in an impressive contribution to the understanding of brain physiology and plasticity, neural bases of behavior and cognitive processes, inter-subject communication, as well as brain pathologies related to the aforementioned faculties. The evaluation committee was impressed by the past activities of most of the research groups and by the declaration of the global scientific policy and the guiding proposed plans of the center for the period 2009-2013. The committee was particularly impressed by the achievements and the leadership vision of the head of the unit as manifested in the written documents and in the oral presentations made by him in the course of the visit. Several additional research teams and individual investigators made on us a strong impression, as detailed below. We do have specific comments



and recommendations that might in our view promote improvements and render the unit even better. Yet all in all, the unit comprises in our view a cutting edge scientific research operation. The French scientific community should be proud indeed to count it among its members.

The nine scientific teams presented to the evaluation committee included:

- Team 1 : Memory processing from normal to pathology
- Team 2 : Neurobiological bases of executive functions
- Team 3 : Neurobiology of decision making
- Team 4 : Cellular and molecular mechanisms of plasticity and memory
- Team 5 : Molecular neuroendocrinology of food intake
- Team 6 : Genetics of integrated neuronal functions
- Team 7 : Sensory plasticity, neural code and auditory perception
- Team 8 : Sensory neuroethology
- Team 9 : Acoustic communication

In addition, two service platforms were presented : electron microscopy, and the rodents and transgenic mice facilities.

4 • Specific appreciation team by team and/or project by project

Team 1 : Memory processing from normal to pathology

The team leader investigates the mechanisms of pathologies of the nervous system and the processes involved in neurodegenerative and psychiatric diseases including schizophrenia, post-traumatic stress disorder (PTSD) and addiction. She uses experimental paradigms based on lesions in laboratory animals and pharmacological interventions to alter the function of target brain structures (e.g., mPFC and amygdala). In addition she employs neuropathological methods, ex-vivo and in-vivo brain imaging, and behavioral analyses. She recently teamed up with an expert clinician to also employ experimental neuropsychological tools and brain imaging (SPECT, fMRI, and quantitative EEG) in humans in an attempt to correlate cognitive impairments with specific brain areas.

The major neurobiological questions posed by this team are : a. The potential use of disruption of memory reactivation to obtain selective memory modulation in rat and in PTSD patients; b. The mechanisms of memory impairment in cognitive and psychiatric disorders such as schizophrenia, mood disorder, depression, anxiety and following drug treatment (anxiolytics, antipsychotics); c. Differential diagnosis of the above pathologies; and d. Function and dysfunction of selective cortical networks.

The research themes bear high clinical relevance and use a translational approach, aiming at applying knowledge gained in experimental animals to humans. This type of research has the potential to provide important data of both basic and clinical relevance.

The current team is composed, however, of only one permanent principal investigator and 3 clinicians, 2 postdocs, and 2 PhD students. This group size was recently reduced by the departure of a researcher. The projects proposed by the team appear too ambitious for the size of the team. Further, it is unclear whether the team currently has all the expertise required to successfully carry out the proposed projects and, although several national collaborations seem to contribute to the goal, the nature of these collaborations is also rather unclear. Hence all together the project is quite ambitious; it covers multiple aspects of cognitive functions, and plans to use multiple techniques in both animals and human. The issue could be partially remedied by refocusing. The mix of proposed studies on several pathologies and impairments in cognitive functions will be difficult to handle if the goals and the expected outcomes are not clearly defined.

In terms of teaching, the team significantly contributes to the university curriculum and trained 4 PhDs and several undergraduate students in the past 4 years. The team has also been active in fund raising and obtained several grants from public and private sources. More funds from clinically oriented organizations will clearly be needed in the future to carry out the project. This may not be easy considering the slim publication record of the team leader. Because translational approaches are very challenging, at least one major publication or communication proving the feasibility and efficiency of the collaboration between the team leader and the clinician is required. Therefore, the management of the team in terms of long-term



viability is questionable. One suggestion would be to merge Team 1 and Team 2 (see below), which share closely related interests, and hence to re-balance the animal and human approaches.

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
C	C	C	C	C

Team 2 : Neurobiological bases of executive functions

The research project of this team is based on the heuristic convergence of two complementary research lines in the domain of elementary learning and memory processes. The team leader has considerable expertise in the field of procedural learning and memory. She has been recently involved in a systematic analysis of the role in experience-dependent behavior of various brain structures including the striatum, subthalamic nuclei, cerebellar nuclei and the modulation by the amygdala of the nigro-striatal dopaminergic system. She combines thorough behavioral experimental designs with electrophysiological recording and selective brain lesions to dissect out the several stages of the development of automatization up to overtraining. Studying the combined involvement of emotional, motivational and computational parameters during the development of stimulus-response acquisition has also contributed to development of animal models of neurological deficits such as in Parkinson and Huntington diseases.

The co-leader of the team has been involved in studying the mechanisms of plasticity in the hippocampus and amygdala, both at the molecular and the behavioral levels. A long term collaboration with an international leader on emotional memory from New York University has led her to dissect out the consolidation mechanisms of fear memory, and later on, to start analyzing reconsolidation mechanisms and related processes and mechanisms of memory reactivation. This initiative has led to the creation of an internationally collaborative virtual laboratory focused on research of the aforementioned mechanisms. Recently, she has developed a new specialization in the analysis of temporal parameters in conditioning, which could enhance the understanding of procedural learning.

Both researchers in this team have contributed in supervising Ph.D. and M.Sc. students. They are also actively engaged in communication with the public and other research groups, in France and in the US. The recent ANR project MEMOTIME provides an active network of collaborations in France and the proposal of Laboratoire International Associé with NYU (see above) are likely to promote even further intense scientific collaborations.

This team is thus able to optimally combine two complementary lines of research in a promising and novel manner, characterizing the involvement of several brain structures in habit learning, a field that has also strong connections with human clinical research. These connections are presently actively engaged in the assessment of the animal models and in a collaboration for the development of re-education procedures following cerebellar surgery in children (e.g., following tumor ablation).

The relevant components of the ongoing research projects are: a. Tackling the relations between emotion and automatization, which should provide a more comprehensive approach to compensate for learning impairments; b. Assessing the development of temporal adjustments during acquisition of experience-dependent procedures; c. The role of the cerebellum in the development of habits and additional cognitive mechanisms; d. Detailing the early emotional deficits in the development of Huntington disease.

The team is complemented by three postdoctoral researchers (one CNRS and two positions from several external grants obtained by the team) and two doctoral students. The integration of this very coherent though relatively small team in the Centre de Neurosciences will clearly benefit their students, who will gain the opportunity to experience scientific exchanges and collaboration possibilities.



Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A	B	A	B	A+

Team 3 : Neurobiology of decision making

This team is centered upon its leader, who has only recently been appointed as professor in the University Paris-Sud 11. She did not yet have the possibility to develop a significant research team in her new place. The main topic of her work is focused on the neurobiology of decision making processes, with a special emphasis on the role of the cholinergic nicotinic system. Among other relevant findings, in her previous work she has shown that nicotinic receptors control the spontaneous activity of dopaminergic neurons in the ventral tegmental area and the release of dopamine in the nucleus accumbens. By targeting the b2 subunit of such receptors, she has been able to demonstrate that elemental plasticity impairment in b2 -/- mice is rescued after lentiviral re-expression of the missing gene in the ventral tegmental area.

She proposes an ambitious research program composed of several cutting-edge projects. Using a battery of state-of-the-art techniques ranging from specific brain lesions to the use of knockout mice, she aims at identifying neural circuits that in the mouse underlie the establishment of new social interactions and motivational switches, and control behavioral inhibition.

She has published her research work so far in high profile international journals; her publication record is rather impressive. However, most of the key papers are with her previous mentors. The committee encourages her to pursue her high-quality research and hopes that her new environment will favor the development of an integral research unit that will also involve students and young researchers. The committee also recommends that she increases the independent nature of her future scientific productivity and publications, while maintaining the same high standards that she has exhibited in the past.

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A	A	B	B	A

Team 4 : Cellular and molecular mechanisms of plasticity and memory

This team, headed by the unit head, is at the centre of the activities of the Center de Neuroscience Paris-Sud, not only with respect to the administration, scientific policy and global leadership, but also in intellectual terms. The questions addressed by this team range from molecular mechanisms of plasticity to behavior and cognition, and thus reflect impressively the wide range of topics of the activities of the Centre at large. The projects of this team are addressed at a remarkable level of sophistication and competence. The team leader is an internationally renowned, highly competitive and much appreciated scientific leader in the fields of scientific plasticity, learning and memory.

All together, this research group addresses five highly important and interesting issues in the fields of synaptic plasticity, memory consolidation and reconsolidation: a. Long-term potentiation and depression (LTP/LTD) and their relationship to cellular and particularly spine dynamics; b. Morphological remodeling of spines at the ultrastructural level; c. Molecular mechanisms of synaptic plasticity and particularly the role of transcription factors such as Zif 268 and Erg 2; d. Neurogenesis and its relationship to LTP and to



environmental enrichment; e. Mice models of human brain pathologies. This broad range of research topics is pursued using recently developed approaches like lentivirus transfection and RNAi methodology, as well as more traditional but challenging methods such as conditional transgenesis (in collaboration with other groups), together with an array of molecular biology techniques, electron microscopy, behavioral testing, and cellular physiology.

The publication record of this group is good. Most group members can devote all or at least most of their time to research. Five tenured investigators (including 2 with teaching duties) and 5 postdocs have published 36 research papers in 5 years, some of them in the highest profile journals. We feel that the group has still the potential to improve its publication profile. The group was also successful in raising funds and obtained 3 ANR grants, 3 Europeans contracts, and several other third-party grants.

The proposed research program for the forthcoming five years is a logical combination of continuation of ongoing work and innovation. The latter applies particularly to those projects that aim to bridge between the basic research on mouse models and human brain pathologies. These projects have the potential to allow this team to open new vistas in brain and behavioral neuroscience.

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A	A	A+	A	A

Team 5 : Molecular neuroendocrinology of food intake

This team is composed of two researchers with teaching duties (plus an open position), as well as five full time researchers (three of which will retire in the next four years), five technicians, and two graduate students. A major goal of this team is to contribute to the understanding of the phenomenon of leptin resistance that occurs in the vast majority of obese patients. The publication record is good (51 publications since 2004), particularly taking into account that this relatively new team has shifted its research objectives from a nutrition perspective to a neuroendocrine one.

A major finding of this group is that cross desensitization of leptin and insulin receptors can concur to the development of type II diabetes in obese subjects, as well as the demonstration that CNTF, produced in the hypothalamus, can decrease food intake in diet-induced obese mice. The mechanism underlying the latter phenomenon may involve one of the transduction pathways triggered by PTP1-B activation.

The team also engages in an epigenetic study in which high fat diet in the dams induce lower body weight in their pups, abolishes leptin-induced stat3 response in the hypothalamus and markedly activates astrocytes around blood vessels. A suggestion made is that local changes in the blood-brain barrier (BBB) may be involved in leptin resistance. It is noteworthy that this might provide an opportunity to unveil mechanisms of BBB in general.

An additional project involves further characterization of the aforementioned morpho-functional plasticity in the hypothalamus and in the hippocampus (in collaboration with Team 4 and with a laboratory in Holland). The team has also initiated (in collaboration with Team 6) a systematic survey of hypothalamic miRNA differentially expressed in WT and ob/ob mice. The preliminary results indicate that only one miRNA is selectively expressed in WT but not ob/ob mice while fine are only expressed in ob/ob but not WT mice. The functional relevance of this differential expression is now being elucidated.

Feasibility of this cutting edge project appears warranted by the team expertise and their collaborative array. One ANR "jeune chercheur" grant has been awarded to the young assistant researcher in 2007.



Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A	A	B	A+	A

Team 6 : Genetics of integrated neuronal functions

This team is led by a researcher coming from the CNRS UMR8080, who wishes to join the "centre de Neurosciences Paris-Sud". The team will be composed of 2 researchers with teaching duties, 1 CNRS permanent researcher, and 1 PhD student. This team was previously named "Signaling, Development and Cancer" and was part of Unit "Development and Evolution". The team had two main lines of research, the molecular study of ELAV family of RNA binding proteins, and the study of the multiple roles of the DOA kinase. It is proposed by the team that the study of those molecular pathways will be continued but with an emphasis on brain functions.

Hence the team proposes to: a. Continue their study of the ELAV and *fne* genes now focusing on their role in adult brain plasticity and memory. The goal of this research is to link post-transcriptional regulation with neuronal function; b. Study the *Drosophila* ortholog of *zif268*, a transcription factor that plays a major role in mammalian long-term memory; c. Analyze the role of DOA in aggression behavior in collaboration with the team of Dr. Mackay (North Carolina State University); and d. Analyze the implication of DOA in a molecular pathway linked to Ataxia Telangiectasia.

The researchers of this team have a very strong background in *Drosophila* molecular genetics studies. Their expertise, along with the strength of *Drosophila* sophisticated neurogenetics tools, should prove an important add-on for the Center. Several of the proposed projects are appealing, and in particular the study of the interaction of ELAV family with the *zif268* pathway in collaboration with other teams of the future unit. The team has done a real effort to adapt their questions to the more integrative vision underlying the new institute's project.

However, the publication record is rather disappointing. Although in the case of University staff low productivity can sometimes be attributed to heavy teaching loads, here the presence of CNRS staff devoid of teaching obligations raises serious questions about productivity. Moreover, there is a discrepancy between the small size of the team and the large number of ongoing and proposed projects.

The committee supports the joining of this team to the neuroscience Center, and particularly supports the use of *Drosophila* behavior as a functional readout in identification of the physiological role of molecular cascades. But this requires better focus than presented to us. The committee recommends that: a. Publications linked to past research of this team should be published without delay to facilitate effective transition toward the new research axes; b. The projects of the team should be focused, in particular in terms of the behaviors studied (courtship, phototaxy, locomotion, food intake, aggression... this together is clearly too much). In particular, if scientifically meaningful, it would be more efficient to study the ELAV, *fne* and DOA pathways using the same behavioral(s) output; c. The size of the team should be increased by recruiting additional students and at least one technician.

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
C	C	C	B	C



Team 7 : Sensory plasticity, neural code and auditory perception

The research by this relatively small team has impressed us as being original and important, both in terms of the questions asked and the methodologies used. This high quality is also reflected by a steady publication flow in leading journals, though some decline is noted in recent years in the citations of the research conducted by this team.

Each senior member of the team has a specific and characteristic line of research. Those are however complementary, thus allowing the members of the group to generate and maintain multiple interactions. The major lines of study are: a. Neural code of acoustic communication sounds; b. Thalamo-cortical plasticity after hearing loss and potential rehabilitation strategies; c. Neural bases of recognition of acoustic signals involved in communication. Notably, there is an interesting potential for broad appeal and applicable importance of the research in evaluating the impact of acoustic trauma on the functional properties of auditory cortex neurons. Similarly, of applied and timely importance is a study on effects of GSM 900 MHz electromagnetic fields on the central nervous system.

All the presentations made by the members of the group were good, and of high scientific standard, clearly providing prominent research questions along with their importance and approaches to solve them. Research proposals presented are also very interesting, and addressed with adequate technologies in the domain of auditory physiology. Questions concerning natural and environmental acoustic stimuli are of great importance; yet for the sake of collaboration within the proposed center, it would be even of more interest to address them in rodents. Similarly, the temporal code problem is important and the relevant research on this issue of high quality. Regrettably, in this area, the proposed interaction with the others teams in the new center, especially those studying rodents, may be largely improved. This should be amended, as there are obvious potential and attractive collaborations, which could also mitigate the risk involved in some of the projects. It is noteworthy, however, that links do exist with acoustic/ethology groups (Teams 8 & 9).

The team includes very promising young researchers, but a rather small number of PhD students. There is adequate level of national and international collaboration. The teaching load seems also to be significant.

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A	A	A	B	A

Team 8 : Sensory neuroethology

Team 8 is among those teams that are new in joining the reorganized Centre de Neurosciences Paris-Sud. In addition, it is the only one geographically distant from all the others. However, the active and fruitful collaborations of this team with Teams 7 and 9, which were previously members of the center, prove that the joining of Team 8 could be productive and effective. Currently Team 8 constitutes an "équipe d'accueil" of the Jean Monnet University in Saint-Etienne. It is much supported by the University, which has provided substantial grants at different levels (infrastructure, operational expenses and personal) during the last years. University Jean Monnet expressed its strong support for the project of inclusion in the Centre de Neurosciences Paris-Sud and has pledged to maintain significant supports in case of acceptance of the project. Considering the collaborative links with Orsay researchers (e.g., the leader of Team 8 was initially trained there), the strategy of University Jean Monnet appears to be pragmatic (keeping university staff of recognized quality) and is scientifically coherent. For the future Centre, the inclusion of this team will adequately provide the opportunity to build a coherent set of three interactive teams (Teams 7, 8 and 9) dedicated to auditory neurobiology at large. The topics of research will hence range from the physics of the signal, its perception and its processing, to the cognitive plasticity, culminating in the ethological output in its adaptive significance.

Team 8 includes five university professors (1 full + 4 associate), 2 postdoctoral fellows, 3 PhD students and 2 technicians. Their main scientific interest is in the study of the role of social and environmental contexts and of the life history on the neurophysiological, neuroendocrinological and cognitive processing of acoustical signals of individual-specific or species-specific importance. The team employs both laboratory and field approaches complementarily, and pays special attention to comparative ethology, using a variety



of models, including crocodiles, fish, zebra finch, laughing gull, and mammals.

The strengths of this team are many. First, the active leader is a junior member of the “Institut Universitaire de France”. A second asset is the successes in identifying complementary knowledge and putting forward collaborations worldwide (including next door, as illustrated by the fruitful collaboration with physicists of their own university to measure brain hemodynamic changes related to behaviour). The third strength is the global success in obtaining results that are received very positively by the international scientific community as demonstrated by papers published in high profile journals, some of them usually not keen to accept papers in the field of animal behavior (e. g. Current Biology, reporting the acoustic communication between new born crocodiles and their mother, PloSONE in 2008, Proc Roy. Soc. B in 2007 or JASA in 2005). This high publication profile is even more impressive considering that this team does not (yet) include any CNRS researcher. Furthermore, the quality of the involvement of several of the professors in training high school teachers (CAPES/Agrégation) has been recognized at a national level. The team also dedicates significant efforts to make their results known by the public.

To further enhance its success, Team 8 might wish to pay proper attention to the potential applicability of their findings. In addition, similarly to Team 9 (see below), researchers in this team should consider the possibility that the moment has arrived to try to extract and formulate general conclusions of theoretical importance from the plethora of their empirical data and models.

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A+	A	A+	A+	A+

Team 9 : Acoustic communication

Team 9 is composed of 3 University staff (one professor and two lecturers) and 2 CNRS Research staff. While clearly operating within the Evolutionary Biology theoretical framework, the team addresses a wide range of specific ecologically relevant hypotheses, including mother-young recognition, neighbor-stranger recognition, or the effect of social or physical environment on the evolution of acoustic signals. It also dedicates substantial efforts to understanding proximal mechanisms of behavior (e.g. sound production in insects, sound perception in anurans).

The team's very diverse studies are characterized by a successful 'opportunistic' approach, where the animal models are chosen for their potential to enable the efficient undertaking of specific fundamental and/or applied questions. The team has a very wide range of scientific collaborations within the proposed centre (in particular with Teams 7 and 8, see above), but also nationally and internationally. It has operated in field sites on virtually all continents and with collaborators with a wide range of expertise. The team has a strong presence at international conferences, including the organization of symposia on acoustic communication. Finally, the group shows a strong level of engagement with the industry, as illustrated by the contract with Airbus Industries on the development of acoustic deterrents. Such a successful partnership is said to be rather uncommon for this specific discipline.

However, given the potential of the issues tackled and the quality of the results, more effort could be allocated in targeting higher-ranking journals that appeal to a wider readership. Moreover, the experts on the panel suggest that Team 9 (with Team 8, see above) should consider initiating review articles or books focusing on their theoretical contributions to the field, for example on mother-young vocal individual recognition in vertebrates. The need to maintain a sufficient level of PhD student recruitment was also flagged. The publication record of some of the junior University staff appears slightly disappointing, though the successful completion of recent project on skylarks and the new project on wrens are expected to improve this situation. The laboratory infrastructure clearly needs substantial updating.

All together, the committee emphasizes that Team 9 (together with Team 8) clearly constitutes the most impacting group for Bioacoustics research in France (especially on wild vertebrate species), and one of the best worldwide. It is expected that this position will be consolidated by their project, which is well constructed, diverse and ambitious.



Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
B	B	A+	B	A

5 • Appreciation of resources and of the life of the research unit

The center contains 16 technical and administrative personnel : 2 INRA, 2 from the University of Saint-Etienne, 5 from University Paris Sud, 7 from CNRS. Due to an extensively dense visit program, only little time could be devoted in the site visit to this important aspect of the center.

Technical and support staff in the Paris-Sud site reported that they were not involved in the discussions on the program for the new center. The relevant staff at Saint-Etienne reported that they were involved in the process at their university. In general, it is noteworthy that the technical and support staff did not express concerns related to the scientific aspects of the new program, but did envisage technical problems, and feel that they were not approached so far on the relevant issues of concern. We deem such involvement highly advisable and potentially useful.

Among the problems raised by the technical staff at University Paris Sud were issues related to data processing capabilities, communication network in the building, shared equipment infrastructure, the workshops and their placement, and safety. These issues should be attended to.

No problems were raised concerning the staff currently operating the technical platforms, though it was noted that replacement should be considered ahead of time of retirement of key service providers (e.g., an engineer to retire in 3 years). However, the attention of the evaluation committee has been turned to the outdated, sometimes obsolete equipment.

The staff at the transgenic mice unit expressed concerns about the shortage of space and the lack of staff to aptly fulfill the expected needs of the new projects. In the context of animal facilities, a need is also foreseen for recruitment of an expert in cultivation of *Drosophila*.

The research projects proposed by the center imply technical competences that disappeared with the retirement of a key engineer in January 2009. This engineer, an outstanding CNRS engineer, had developed unique equipment. A replacement is required in the field of telemetry, acoustics and signal processing.

Safety issues were raised, particularly concerning the use of chemicals, availability of proper storage, ventilation and hoods, and issues related to electricity and safety lights.

The integration of the technical staff in publications of the center remains minimal. It is therefore recommended that the head of the center pays attention to this point and encourages, when applicable and justifiable, the inclusion of key technical personnel as co-authors in the resulting publications.

6 • Recommendations and advice

– Strong points :

The Center of Neuroscience Paris-Sud contains several top-notch expert teams on plasticity, brain and behavior, as detailed above. The integration of these teams within the proposed project will not only augment the capabilities and productivities of each of these teams but is also likely to synergize their activity, culminating in further originality and a unique signature on the international scientific arena. The



integration of units with extensive and sometimes unique expertise in ethology and communication with research programs on the cellular and circuit level is also a remarkable advantage, particularly in the long run. Particular advantages of specific teams within the Center are discussed in the corresponding evaluations in this document.

– Weak points :

Some of the teams are not yet properly integrated in the Center's global scientific goals and merit refocusing. This may apply particularly to those teams whose integration in the Center is stimulated by administrative incentives. Some of the teams do fit the global goals but need to re-evaluate their ability to carry the plethora of their proposed objectives, taking into account their size and resources. Careful recruitment of young scientific faculty members might remedy some of the aforementioned issues. Some of the teams would do better to enhance publication productivity or direct it to higher-profile journals, to reach a larger attentive audience. Other specific remarks are included in the relevant specific evaluations in this document.

A disadvantage which is clearly NOT the fault of the scientific teams but should be mentioned is lack of proper infrastructure for such an ambitious Center. This note, however, should be addressed at the administration of the University.

– Recommendations and concluding remarks :

As stated in the Introduction of this report, overall, the evaluation committee considers the research unit Center de Neurosciences Paris-Sud to be an internationally leading center of research on brain, plasticity and behavior. The activities of the different teams converge to make an impressive contribution to the understanding of brain physiology and plasticity, neural bases of behavior and cognitive processes, inter-subject communication, as well as related brain pathologies. The evaluation committee was impressed by the past activities of most of the research groups as well as by the declaration of the global scientific policy and the guiding proposed plans of the center for the period 2009-2013. We think that this is a cutting edge scientific research operation that should be supported by the relevant French administrative agencies.

All in all, the evaluation committee hence considers favorably the project proposed by the Center de Neurosciences Paris-Sud for 2009-2013 and strongly recommends its implementation. This should be pursued while taking into account the comments made above and the detailed quantitative evaluation in the relevant forms. In particular, we highly recommend that the University and CNRS pay the much required attention to the physical state of the facilities and infrastructure that the center will need in order to maintain and augment its position in the cutting edge of the competitive contemporary neuroscience research.

Note de l'unité	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A	A	A	B	A



20/04/09

M. Guy Courraze
Président de l'Université Paris-Sud XI
M. Bernard Bioulac
Directeur Scientifique adjoint, Institut des Sciences Biologiques, CNRS

Objet : Volet général de la réponse au rapport d'évaluation du Centre de Neurosciences Paris-Sud

Monsieur le Président, Monsieur le Directeur,

Nous avons reçu le rapport de l'AERES concernant l'évaluation du Centre de Neurosciences Paris-Sud (ex UMR 8620) qui a eu lieu les 12 et 13 février 2009 à Orsay. Je vous prie de bien vouloir trouver ci-joint, selon les instructions, le volet général de la réponse au rapport de l'AERES que nous souhaitons voir transmettre.

Je vous prie de croire, Monsieur le Président, Monsieur le Directeur, en l'expression de mes sentiments les meilleurs.

Serge Laroche



**Response to the report from the AERES visiting committee on the evaluation
of the Centre de Neurosciences Paris-Sud.**

Volet Général

We sincerely thank all members of the committee for the considerable effort made in making an in-depth and pertinent examination of our project within such stringent time limits. The report's highly positive and supportive evaluation and conclusions reinforces the enthusiasm of all personnel of the future Centre to engage into this challenging and collective project with the strongest dynamism and vitality. We are pleased that the committee perceived with acuteness the scientific challenge, synergetic value, originality and scientific opportunity of our project and judged it to be "an internationally leading centre of research on brain, plasticity and behaviour" comprising "cutting-edge scientific operation". Also highly reinforcing is the general judgement that the research developed by the teams is ambitious and challenging, an implicit appreciation of the risk-taking and innovative research project that we intend to implement.

We are pleased that the committee strongly recommended the implementation of the Centre de Neurosciences Paris-Sud, and are grateful for their strong support addressed to our University and CNRS administrations to improve the physical state of the facilities and infrastructure of the Centre, to rejuvenate the equipment and respond to the needs for key engineers and technicians, in order to "maintain and augment its (the Centre) position in the cutting edge of the competitive contemporary neuroscience research".

Altogether, we appreciate that the report was positive both in its laudatory statements and constructive advice/recommendations, for which we will make every effort to adhere, as detailed below.

Concerning the recruitment of scientific faculty members, this is indeed our policy. One professor and one Assistant professor will be recruited in October 2009 at University Paris-Sud, to join the Centre, and 3 candidates to CNRS/INSERM were presented this year. We hope that this active policy will be successful in the near future despite the constraints on the number of positions created in France in this difficult period.

Concerning discussions with the technical staff, we have had informal, as well as a formal general assembly to discuss the general guidelines for the new Centre, but we didn't wish to go into the organizational details before the evaluation of the project. We are now ready to plan this in detail. The participation of technical staff on publications will be encouraged.

Concerning individual teams, Teams 2, 4 and 5 thank the AERES committee for their evaluation of the projects and have no specific comments. Team 3, resulting from the nomination of the team leader as professor at University Paris-Sud in October 2008, wishes to add that the encouragement to pursue high-quality, independent research in this new environment is highly appreciated and that means for this are already ongoing with the award of a "Chaire d'Excellence" and, since the venue of the committee, of a new ANR awarded this month to the team leader. Specific comments from other teams are detailed below.

Team 1

Team 1 wishes to highlight that the committee's description of team 1 research activity is based on the summary of past research (including work by B. Delatour who is not part of the present project). The committee recommended a refocusing which in fact had been done in the proposed project, as the research developed by Team 1 is now mainly centered on memory reactivation processes and the hypothesis, to be examined both in rats and humans, that specific pathologies such as PTSD and relapse to drug addiction could be due to an alteration of these processes, due to the use of out of range positive and negative reinforcers (drug and trauma). The committee also queried the capacity of the team leader to ensure long-term viability of the team and her possibility to raise funds. Several points should be stressed: (i) The team leader has been promoted to "director of research" less than two years ago by CNRS on the basis of the present project; (ii) the present project has been granted a most prestigious clinically oriented fund (PHRC), in association with the clinicians (the project only started in early 2009 due to the time required to obtain approval of the ethics committee). Finally, an ANR grant has just been awarded to the team leader (09/04/09), while other ANR projects, which have been positively considered last year, are under review. As the CNRS, the clinical agency "Hôpitaux de Paris" and the ANR agreed to support and fund Team1's project, the CNPS extends its confidence to Team 1 in its ability to attain the objectives of its recently engaged new project that the committee generally judged to have "the potential to provide important data of both basic and clinical relevance".

Team 6

We appreciate the committee's consideration of the integration of our new team in the Centre as highly positive, and that its position within the guidelines of the Centre is an important add-on, despite a publication record from the past judged "rather disappointing". We would like to stress however that the CNRS scientist in particular has published regularly, including a single author paper in BMC Genomics last year. It might also be noted that three publications are already in press for 2009 from our small group. As recommended by the committee, we are attempting to publish our past research rapidly to facilitate transition to our new research axes, allowing us to concentrate on the most relevant projects. We regret that the committee was left with the misperception that the team intended to chase many different behaviors, which were cited only as examples for which our target molecular mechanisms might be involved. As explained, only the two most scientifically relevant behaviors will be analyzed: courtship behavior and aggression. We are of course attuned with the committee to recruit students on the new projects, and greatly appreciate the committee's support in the need to obtain a technician position.

Team 7

We thank the AERES committee for their interest in our work and their positive comments. Note that citations of our work did not decrease over the last years, but rather increased (source: ISI web of knowledge March 2009). As stressed by the committee, our team is engaged in several collaborations with teams 8 and 9. We feel that the choice of an animal model must be dictated by the scientific questions that are posed and in this respect the guinea pig is a particularly well-suited model. Collaborations with teams using rodents do already exist and will continue when appropriate.

Team 8

We thank the AERES committee for their evaluation of our team and projects and appreciate their strong support for our team joining the Centre de Neurosciences Paris-Sud, making with teams 7 and 9, as our intention was, a coherent set of three interactive teams dedicated to auditory neuroscience at large. The committee suggested that we increase our attention to the potential applicability of our findings and consider the possibility to formulate general conclusions of theoretical importance from our empirical data. We agree and in fact have already acted upon this, (1) via our long-range collaboration with physicists and via an activity in the

domain of Nature Conservation that will be further developed, and (2) by a recently accepted review article in Biological Reviews.

Team 9

We thank the AERES committee for their evaluation of our team and of our projects and appreciate that the committee considered that together with team 8 we constitute the most impacting group in Bioacoustic research in France and one of the best worldwide. We would like to comment on two specific points. PhD student recruitment: the team has always supervised an important number of PhD students (even considered as too many at the last evaluation committee). We are 2 HDR in the team and had 2 PhD students at the moment of the evaluation, 2 additional PhD students recently joined the team. To target high-ranking journals to appeal to a wider readership: we agree and will do so. Nevertheless we would like to point out that we have also published in higher-ranking journals "not keen to accept papers in the field of animal behavior" such as Plos One (2008), Proceeding B (2004), JASA (2006, 2007), Journal of Experimental Biology (2 in 2008).

Orsay, 19 April 2009



Serge Laroche
Directeur de l'UMR 8620