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

Section des Unités de recherche

AERES report on the research unit
Groupe Mémoire et Plasticité Comportementale
From the
Université de Caen Basse-Normandie

December 2010



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et de l'enseignement supérieur

Section des Unités de recherche

AERES report on the research unit
Groupe Mémoire et Plasticité Comportementale
From the
Université de Caen Basse-Normandie

Le Président de l'AERES

Didier Houssin

Section des unités
de recherche

Le Directeur

Pierre Glorieux

December 2010



Research Unit

Name of the research unit : Groupe Mémoire et Plasticité Comportementale

Requested label : EA

N° in the case of renewal : EA 4259

Name of the director : Mr. Ludovic DICKEL

Members of the review committee

Committee chairman :

Mr. Wim E. CRUSIO, Université Bordeaux 2, Bordeaux

Other committee members :

Ms. Stéfania MACCARI, Université Lille 2, Lille

Mr. Ekrem DERE, University Düsseldorf, Germany

Mr. Gilles GHEUSI, Institut Pasteur, Paris

Mr. Michel PLOTKINE, Université Paris descartes, Paris, représentant du CNU

Observers

AERES scientific advisor :

Ms. Thérèse JAY

University, School and Research Organization representatives :

Mr. Pierre DENISE, Université de Caen Basse-Normandie



Report

1 • Introduction

- Date et déroulement de la visite : December 22th 2010

The visit took place on the afternoon of December 22nd, 2010. It started with two presentations followed by a general discussion by the previous and the proposed directors, who presented the report over the previous contract period and the project for the next one. This was followed by a discussion with the representative of the University of Caen Basse-Normandie. Next, the commission spoke with the students and postdoc currently present in the laboratory and, finally, with the technical and administrative personnel. The last part of the afternoon was reserved for a closed meeting of the committee during which the first conclusions of the visit were formulated.

- History and geographical localization of the research unit, and brief presentation of its field and scientific activities

The research unit "Groupe Mémoire et Plasticité comportementale" (GMPc) is localized at the University of Caen Basse-Normandie. It was established by the fusion of the EA3211 (Laboratoire de Physiologie du Comportement des Céphalopodes) and part of the EA3915 (Centre d'Etudes et de Recherche sur le Médicament de Normandie) in order to form a team with a clustered expertise in the fields of behavioral neuroscience, neuroethology and neuropsychopharmacology. This reorganisation resulted in a team of 10 enseignants/chercheurs with 4 full professors and 6 assistant professors (maîtres de conférences), with a total of 7 scientists having obtained the HDR. The unit is part of the UFR des Sciences Pharmaceutiques and the Institut de Biologie Fondamentale et Appliquée at the University of Caen Basse-Normandie. Furthermore, the unit is embedded into the IFR (Institut Fédératif de Recherches) and ICORE (Interactions Cellule-Organisme-Environnement, 2008-2011) and since 2009 they also benefit from the plateau technique du CURB (Centre Universitaire des Ressources Biologiques). The unit also participates in the marine station UCBN in Luc sur Mer and the CREC (Centre de Recherches en Environnement Côtier).

Currently the unit is split in 3 locations. Members of the unit work at facilities of the former CERMN (Centre d'Etudes et de Recherches sur le Médicament de Normandie) at the rue Vaubénard, at the GRP at the rue E. Zarifian, and finally at the Station Marine in Luc sur Mer.

In the past the team has developed a test battery to assess different types of memory including episodic-like, spatial, short-, and long-term memory. Another research line of the unit is the analysis of imprinting and embryonic learning and memory performance in cuttlefish. Still another research focus lies in the analysis and pharmacological treatment of memory deficits in the course of healthy aging and in the aim to identify behavioral- and or biomarkers to predict the risk for memory deficits in the course of aging. Finally another line of research is dedicated to the evaluation whether serotonin-related drugs might be able to ameliorate memory deficits in animal models of aging and schizophrenia.

The project has been streamlined and is organized appropriately along 2 main lines of research in the field of behavioral neuroscience. Each scientific topic will involve a multidisciplinary approach (neurobiology, neuropharmacology, genetics, behavior). These 2 main lines refer to i) the early determinants of behavior and brain plasticity and to ii) aging and the contribution of different sub-types of serotonergic receptors to cognitive impairments in senescent animals. To achieve their goals, complementary methodological approaches will be used. The cuttlefish and the mouse will serve as animal models. In addition, all members of the group are strongly involved in teaching activities.



- Management team

The group will be directed by Ludovic Dickel and two leaders of the projects A and B will serve as deputy-directors.

- Staff members (on the basis of the application file submitted to the AERES)

| | Past | Future |
|---|------|--------|
| N1: Number of researchers with teaching duties (Form 2.1 of the application file) | 11 | 10 |
| N2: Number of full time researchers from research organizations (Form 2.3 of the application file) | 0 | 0 |
| N3: Number of other researchers including postdoctoral fellows (Forms 2.2, 2.4 and 2.7 of the application file) | 1 | 1 |
| N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file) | 3 | 4 |
| N5: Number of engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file) | 2 | |
| N6: Number of Ph.D. students (Form 2.8 of the application file) | 5 | |
| N7: Number of staff members with a HDR or a similar grade | 5 | 7 |



2 • Overall appreciation on the research unit

- Summary

This group has a substantial expertise and background in experimental psychology, animal behavior, neurobiology, and neuropharmacology. Under the leadership of the past and future directors of the unit, the research program has been streamlined and has become much better focussed than was the case in the past. The project is realistic and the goals set are certainly attainable. If the expected results do indeed materialize, it may be expected that some of these results will be publishable in general, high-impact journals. The originality of the project is very high: not many groups investigate the perinatal phase and the cuttlefish is a unique model. The Unit is composed of enthusiastic members, an important quality to do research, however, the universities should take into account that for research at a high level, it is important to discharge people from too much teaching, especially a unit constituted only of teaching researchers ("enseignants-chercheurs").

- Strengths and opportunities

The GMPc has an excellent level of expertise in the different approaches and animal models used. A very strong point is the originality of the approach. Worldwide, few research groups use the cuttlefish as a model and even fewer integrate work on this model organism with work done on the mouse. In addition, the GMPc aims at deciphering a well-balanced combination of fundamental and clinical questions.

The investigation of imprinting, age-related learning, and memory mechanisms as well as episodic-like memory in cuttlefish is a very interesting and highly original research line and might be a distinctive and well-recognized feature of the unit in the future. If successful, the intended research on episodic-like memory in cuttlefish could provide important insights into the evolutionary origins of the episodic memory system and would help to solve the still ongoing controversy whether episodic memory is indeed uniquely human and why it has been developed by humans only.

The research focus on the pharmacological treatment of aging-induced memory impairments is an active area of research which is currently well recognized by the public, is well funded, and due to demographic and socio-economical factors will surely gain in importance in the future. Thus these lines of research as proposed in the current application are very appropriate and timely. The combination of fundamental and clinical approaches is another strong aspect of the project, offering the possibility to reinforce and expand existing contacts with the pharmaceutical industry.

The unit has a well-planned recruitment policy. It has been reinforced by an expert in the field of molecular biology (Dr. E. Paizanis joined the team in September 2009) and an assistant-ingénieur for biological techniques in October 2010. It is planned to recruit an additional enseignant-chercheur with expertise in molecular pharmacology and, if possible, electrophysiology, in the future. These additional staff members will broaden the methodological repertoire of the unit and will enable the unit to investigate neurobiological mechanisms underlying behavioral effects.

In the past contract period, the unit published 53 articles in excellent international journals (mean impact factor = 3.6). This is equivalent to an average of 1-2 articles per enseignant-chercheur and year. This high level of productivity and scientific performance is the more remarkable given the many teaching and administrative obligations of all team members. In addition, the international visibility of the unit is very high, as shown by regular invitations abroad.

The GMPc organizes a regular series of internal seminars and journal clubs, ensuring that all members of the unit are in regular contact, despite the divergent geographical locations.

In 2011 the unit will move to a new facility which will presumably provide more appropriate and better working conditions, which hopefully will help the realization of more sophisticated research projects and to expand collaborative work with the pharmaceutical industry.

At the academic level, the team seems well inserted in the local and national teaching institutions (master level), ensuring the ongoing recruitment of well-trained Ph.D. students.

In addition to the research activities, the unit has participated in teaching at different levels. Members of the unit were in charge of UEs and DUs. They were active in teaching at the levels of Licence and Masters professionnels at the universities of Caen and Rouen, as well as the IUT de Caen.



- **Weaknesses and threats**

Although the new facility that will become available in 2011 is a potential strength and a great opportunity to reinforce ties between the until now geographically-separated members of the team, the move is also a potential risk and should be carefully planned, in order to minimize down time and time loss.

The unit has been relatively successful in obtaining funding in the past 4 years (one ERANet and one ANR grant) and should be encouraged to continue these efforts.

Up till now, the unit has not succeeded in attracting foreign post-docs or research stays by colleagues from abroad of more than a very short duration.

- **Recommendations**

The unit should increase their admittedly already extensive efforts for raising external funds. Specifically, the unit should try to increase its participation in international consortia enabling it to compete for international (viz. European) grants.

A main focus should remain a close collaboration with industry to develop a new class of ligands (agonists and antagonists) of the 5HT receptors under investigation.

The unit should profit from its high international visibility to recruit foreign post-docs and to host more international researchers for shorter or longer stays.

The unit should have more time to do research correctly and competitively with other laboratories that have people doing research full time (i.e., the university is encouraged to reduce the administrative and teaching duties of the members of the unit).

- **Production results**

| | |
|---|------|
| A1: Number of permanent researchers with teaching duties (recorded in N1) who are active in research | 10 |
| A2: Number of permanent researchers without teaching duties (recorded in N2) who are active in research | 0 |
| A3: Ratio of members who are active in research among staff members $[(A1 + A2)/(N1 + N2)]$ | 100% |
| A4: Number of HDR granted during the past 4 years (Form 2.10 of the application file) | 3 |
| A5: Number of PhD granted during the past 4 years (Form 2.9 of the application file) | 5 |



3 • Specific comments

- **Appreciation on the results**

The main scientific contributions during the past 4 years are: (i) the development of behavioral paradigms to investigate episodic-like memory, spatial memory, long-term memory, and early learning in rodents (rat, mouse) and cephalopods (cuttlefish) (ii) the characterization of the neurobiological substrates supporting these different forms of memory (iii) the development of pharmacological and non-pharmacological approaches to investigate age-related memory disorders (iv) the development of tools to modulate the functional activity of some sub-types 5-HT receptors (5-HT4, 5-HT6 and 5-HT7).

The group has identified interesting topics. The results are well exploited and have already led to good publications in excellent journals. International collaborations have emerged from some results.

- **Appreciation on the impact, the attractiveness of the research unit and of the quality of its links with international, national and local partners**

The large participation in teaching at the local and national level increases the visibility of the team projects for future students. Despite the large teaching load of the unit, a significant effort should be made to recruit foreign post-docs.

During these last 4 years, the group has published over 50 peer reviewed publications, which is an excellent level of production, especially given the large teaching load of the members of the group. These articles appeared in international peer-reviewed scientific journals with a mean impact factor of 3.6, which is considerable for a group mainly involved in behavioral work.

The team has a number of excellent local, national and international collaborations. Local and national cooperations exist with the Cervoxy team and INSERM U919 unit in Caen with Dr. Bernaudin, Dr. Touzani and Pr. Dolfus (UMR6232, CI-NAPS, Cyceron) and with Drs. Simmler-Lackenbacher and Galli (UMR 7592 CNRS, Paris), as well as Dr. Billard (U894, Paris). Furthermore, cooperations exist with Pr. Schaal (Centre Européen des Sciences du Goût Dijon), Dr. Hausberger (UMR 6552 Ethos Rennes I), Dr. Bonnaud (UMR 7208 Muséum National d'Histoire Naturelle et Institut des Nanosciences UMPC, 7588, Paris). International collaborations exist with Dr. Burt (Univ. Oxford, Royaume-Uni), Pr. Chiao (National Tsing Hua University, Hsinchu, Taiwan), Dr. Reneman (Department of Radiology, Academic Medical Center, Amsterdam), Dr. Gsell (Biological Imaging Center, Imperial College, London), Pr. Lucassen (Swammerdam Institute for Life Sciences, Amsterdam) and Dr. Adriani (Istituto Superiore di Sanità, Rome). There are also international cooperations with scientists from the University of Millersville, USA and University of Okinawa, Japan to study embryonic learning and memory performance and with Dr. Hochner from the University of Jerusalem in Israël to perform electrophysiological studies. Especially these international collaborations have a great potential in terms of attracting high quality postdocs, and even researchers, in the future, as well as attracting external funding, and establishing high quality links with local as well as international groups.

- **Appreciation on the management and life of the research unit**

The existence of internal seminars series and journal clubs is a strong aspect of the life of the research group. It serves as key opportunities for junior researchers and students to gain experience and hone their presentation skills.

Unit meetings are held approximately 2 times a month. These meetings serve to maintain internal communication and discussions, which is otherwise difficult to do due to the geographic distance between the 3 different locations. Within these meetings, progress reports about currently performed experiments or proposals for novel projects are presented and discussed. There is also discussion about methodological issues and general issues and on topics important for the entire unit. Some of these meetings are dedicated to talks given by invited local and foreign scientists.



- **Appreciation on the scientific strategy and the project**

Overall this is a very strong research project aimed at the functional characterization of several forms of memory in cuttlefish and rodents. One of the primary themes is understanding the functional contribution of 5-HT to perinatal spatial and episodic-like memories, using basic and clinical approaches.

There is excellent integration and a sharing of competences.

- **Conclusion :**

- **Summary**

The group will be led by an established investigator who has already been successful as a team leader. This group appears to be able to carry out behavioral neuroscience research at the highest level. The different participants are well positioned within the group and their expertise and research methodologies are complementary.

- **Strengths and opportunities**

The group has very interesting experimental models, strong projects, and the required expertise to conduct them. The main strengths of the group lie in the strong behavioral and psychopharmacological background of its members, the complementarity of the scientific questions addressed, and the integration of neurobiological research with high-quality behavioral work.

- **Weaknesses and threats**

The number of PhD students is limited and more post-doctoral researchers would be advantageous for the further development and visibility of the unit.

Given the diverse interests of the group members, centrifugality could be a significant risk and should be continued to be guarded against. The track record of the unit in this respect gives confidence that this risk will remain limited.

- **Recommendations**

The project would benefit from some further tightening and a modest reduction of the number of planned subprojects. Furthermore, reducing time devoted to teaching and increasing time devoted to research for each individual should be a priority. Finally, the unit is encouraged to continue its considerable efforts in funding raising.

| Intitulé UR / équipe | C1 | C2 | C3 | C4 | Note globale |
|---|----------|----------|----------|----------|--------------|
| GRUPE MÉMOIRE ET PLASTICITE COMPORTEMENTALE (GMPC) | A | A | A | A | A |

C1 Qualité scientifique et production

C2 Rayonnement et attractivité, intégration dans l'environnement

C3 Gouvernance et vie du laboratoire

C4 Stratégie et projet scientifique



Statistiques de notes globales par domaines scientifiques (État au 06/05/2011)

Sciences du Vivant et Environnement

| Note globale | SVE1_LS1_LS2 | SVE1_LS3 | SVE1_LS4 | SVE1_LS5 | SVE1_LS6 | SVE1_LS7 | SVE2_LS3 * | SVE2_LS8 * | SVE2_LS9 * | Total |
|--------------|--------------|----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|
| A+ | 7 | 3 | 1 | 4 | 7 | 6 | | 2 | | 30 |
| A | 27 | 1 | 13 | 20 | 21 | 26 | 2 | 12 | 23 | 145 |
| B | 6 | 1 | 6 | 2 | 8 | 23 | 3 | 3 | 6 | 58 |
| C | 1 | | | | | 4 | | | | 5 |
| Non noté | 1 | | | | | | | | | 1 |
| Total | 42 | 5 | 20 | 26 | 36 | 59 | 5 | 17 | 29 | 239 |
| A+ | 16,7% | 60,0% | 5,0% | 15,4% | 19,4% | 10,2% | | 11,8% | | 12,6% |
| A | 64,3% | 20,0% | 65,0% | 76,9% | 58,3% | 44,1% | 40,0% | 70,6% | 79,3% | 60,7% |
| B | 14,3% | 20,0% | 30,0% | 7,7% | 22,2% | 39,0% | 60,0% | 17,6% | 20,7% | 24,3% |
| C | 2,4% | | | | | 6,8% | | | | 2,1% |
| Non noté | 2,4% | | | | | | | | | 0,4% |
| Total | 100,0% | 100,0% | 100,0% | 100,0% | 100,0% | 100,0% | 100,0% | 100,0% | 100,0% | 100,0% |

* les résultats SVE2 ne sont pas définitifs au 06/05/2011.

Intitulés des domaines scientifiques

Sciences du Vivant et Environnement

- SVE1 Biologie, santé
 - SVE1_LS1 Biologie moléculaire, Biologie structurale, Biochimie
 - SVE1_LS2 Génétique, Génomique, Bioinformatique, Biologie des systèmes
 - SVE1_LS3 Biologie cellulaire, Biologie du développement animal
 - SVE1_LS4 Physiologie, Physiopathologie, Endocrinologie
 - SVE1_LS5 Neurosciences
 - SVE1_LS6 Immunologie, Infectiologie
 - SVE1_LS7 Recherche clinique, Santé publique
- SVE2 Ecologie, environnement
 - SVE2_LS8 Evolution, Ecologie, Biologie de l'environnement
 - SVE2_LS9 Sciences et technologies du vivant, Biotechnologie
 - SVE2_LS3 Biologie cellulaire, Biologie du développement végétal

Caen, le 15/04/2011

La Présidente de l'Université de
Caen Basse-Normandie

à

Monsieur le Directeur
Section des Unités de Recherche
AERES

V/Réf. : Evaluation - S2UR120001216 - Groupe Mémoire et Plasticité comportementale (GMPc) - 0141408E

We are very grateful to the AERES committee for the expertise and the relevance of its recommendations about the project of research unit « Groupe Mémoire et Plasticité comportementale » for the next contract period 2012-2016.

As recommended in the report, the research group will keep on focusing on few but well defined research programs in a multidisciplinary approach. Among the programs mentioned in the project, priority will be given to those that will be granted and supported in recognized research and teaching networks.

Great efforts will be carried on increasing the number of PhD students and post-doc fellows in our laboratory in the frame of our present and future international research networks. With the helpful grant from the University of Caen Basse-Normandie, the GMPc already recruited from January 2011 a post-doctoral fellow from the University of Alaska Fairbanks USA (School of Fisheries and Oceanographic Sciences). In addition, substantial efforts will be made to expand collaborative work with the pharmaceutical industry.

This research policy will be led in accordance with the scientific priorities of the University of Caen Basse-Normandie, the Conseil Régional de Basse-Normandie, the french Ministry of Research, the European Union and foreign research agencies.

La Présidente de l'Université
de Caen Basse-Normandie,



Josette TRAVERT