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LEEC - Laboratoire d'éthologie expérimentale et comparée

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 d'Ethologie Expérimentale et Comparée
LEEC

Under the supervision of
the following institution:

Université Paris 13 - Paris-Nord



January 2013



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

Research Units Department

President of AERES

Didier Houssin

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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 received the following grades:

- Grading table of the unit: **Laboratoire d’Ethologie Expérimentale et Comparée**

C1	C2	C3	C4	C5	C6
A	A	A	A	A	B



Evaluation report

Unit name:	Laboratoire d'Ethologie Expérimentale et Comparée
Unit acronym:	LEEC
Label requested:	EA
Present no.:	EA 4443
Name of Director (2012-2013):	Mr Dominique FRESNEAU
Name of Project Leader (2014-2018):	Mr Helko G. RODEL

Expert committee members

Chair:	Mr Claudio LAZZARI, University of Tours
Experts:	Ms Martine HAUSBERGER, University of Rennes 1
	Mr Lars CHITTKA, University of London, UK
	Mr Manfred GAHR, Max-Planck-Institut, Seewiesen, Germany
	Mr Bernard THIERRY, IPHC-CNRS, Strasbourg
	Mr Nicolas MATHEVON, University of Saint-Etienne (representative of CNU)

Scientific delegate representing the AERES:

Mr Steven BALL

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

Mr Jean-Loup SALZMANN, Université Paris 13 - Paris-Nord



1 • Introduction

History and geographical location of the unit:

Established 34 years ago, the LEEC is a research centre associated to the University Paris 13, located on the university campus of Villetaneuse, in the building "C" of the Galilée Institute, at a distance of about 8 km North of Paris. The LEEC has been a CNRS-associated research unit in the past, but now is almost entirely composed by university affiliated research technical and administrative staff. The LEEC is one of the main research centres devoted to the study of animal behaviour in France and it is actively involved in education, training and scientific activities related to the development of ethology in the country. The laboratory is internationally reputed and a leading centre in the study of the social organisation of animals, the models being different species of insects and mammals. It is at present organized in two research teams, one devoted to the study of social insects and another to social ethology and cognition in mammals, each under the responsibility of a scientific leader. The LEEC possesses three technical platforms, for chemical ecology, genetics and behavioural physiology, respectively, each under the responsibility of one or two scientists and a technical assistant. Two animal facilities, one for insects and one for mammals are also under the responsibility of scientists and technical assistants. Three responsible persons and a secretary are devoted to the administration of training programs (Master degree). Delegates for hygiene and safety, informatics, administration and a consultant in statistics have been designated.

Management team:

The laboratory is headed by a director and an associate director. The associate director provides help and advice in administrative duties and management. The director is responsible for the unit, in terms of administrative and strategic decisions, and represents the unit at supervising administrative and scientific entities. Since June 2012 these positions are held by Mr Dominique FRESNEAU and Ms Patrizia d'ETTORRE as director and associate director, respectively. Both are full professors at the University of Paris 13, and are internationally recognized scientists. The project proposes to continue with this management organisation, but with a change of the responsible heads. The new director will be a German specialist on mammal's social ethology recruited as professor in 2011, Mr Helko G. RÖDEL. He will be accompanied by an experienced associate professor, Mr Christophe FERON as associate director.

Following the rules established by the University Paris 13 for its associated research units, there is no Laboratory Council. Instead, a General Assembly is organized twice a year and a management committee (director, deputy director, administrative and financial delegates, team leaders, ACMO and a delegate of non-permanent member) meets bimonthly. For the forthcoming period, a consultative board will be created, which will be composed by the directors, team leaders, the director of the psychophysiology department (teaching), and representatives of students and technical and administrative staff. This board will meet on a monthly basis and its function will be assisting the direction in decision-making.

AERES nomenclature:

SVE1_LS5 Neurobiologie, SVE2_LS8 Evolution, écologie, biologie des populations



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	13	14	13
N2: Permanent researchers from Institutions and similar positions	0	0	
N3: Other permanent staff (without research duties)	6	5	
N4: Other professors (Emeritus Professor, on-contract Professor, etc.)	1	1	
N5: Other researchers from Institutions (Emeritus Research Director, Postdoctoral students, visitors, etc.)	0	1	
N6: Other contractual staff (without research duties)	1	2	
TOTAL N1 to N6	21	23	13
Percentage of producers		92.9%	

Unit workforce	Number as at 30/06/2012	Number as at 01/01/2014
Doctoral students	11	
Theses defended	7	
Postdoctoral students having spent at least 12 months in the unit*	4	
Number of Research Supervisor Qualifications (HDR) taken	2	
Qualified research supervisors (with an HDR) or similar positions	6	6



2 • Assessment of the unit

Strengths and opportunities:

The main goal of the LEEC is to investigate functional patterns and mechanisms underlying social behaviour, analysing proximal as well as ultimate causes. Different approaches, including genetics, chemical ecology, behavioural physiology and psychobiology are integrated to analyse different levels of social organisation in diverse models, such as social insects, rodents, rabbits, dogs and humans. This diversity of approaches, conceptual frameworks and experimental models constitutes one of the strengths of the laboratory. In addition, it enhances the opportunities for establishing internal collaborations between experts with different background in order to analyse higher-level or transversal scientific questions.

The LEEC as a whole exhibits a good publication record, but the contribution of both teams is not equivalent. Subgroup ethology of social insects is the most productive one and has produced publications in top journals as for example *Current Biology*.

The laboratory is internationally recognized and its attractivity resulted in the recruitment of two recognized scientists as full professors in recent years and regular visits of foreign scientists that spend sabbaticals at the LEEC.

The laboratory maintains its own animal facilities and breeding stocks of insects (different species of ants and bumble bees) and mammals. An enclosure for European rabbits is planned.

The organization of a regional network in ethology, i.e., *Institut Francilien d'Éthologie* that includes leading institutions has been an important initiative that facilitates diffusion of activities and collaborations at the regional level. The president of the network and other members of the LEEC are part of the board.

The LEEC members maintain an important number of active collaborations with laboratories and scientists working in France and abroad. International research programs support some of these collaborations.

The laboratory is quite successful in obtaining national and international funding (ANR grants as coordinators, etc), as well as in establishing collaborative networks.

Collaborative work and agreements are established with the industrial sector. These kind of agreements and joint work are rare in the field.

Given that most members of the LEEC are affiliated to the university, a close link between research and teaching is maintained. Master programs are enriched by the research experience and students receive training in the laboratory.

An adequate following of master and PhD students is provided by the different members of the laboratory.

Weaknesses and threats:

There is a great heterogeneity in the quality of the scientific output between the previous subgroup on ethology of social insects and the one studying mammals and in terms of individual productivity. The laboratory wishes to be seen as a single unit with a common program is an attempt to solve this disparity. However, the large number of research projects as well as the official maintenance of the previous teams with two distinct team leaders is in contradiction with this goal. A unified research structure without separated teams will be the best to prepare a future unit organized around research lines.

The research project is mostly composed by a high number of small questions that represent for the most part the continuity of previous work. The specific areas of expertise on which the laboratory has acquired international reputation do not appear clearly visibly and are hidden by the diversity of subjects.

A problem repeatedly appearing into the report and during discussions is the need for more office and lab space. Several people share office rooms and the possibility to integrate new members and students becomes limited. The same restriction applies to animal facilities and experimental rooms, affecting the development of research programs.

The establishment of new animal models and the arrival of novel equipment result in an increasing need for technical assistance.



There is no full-time researcher in the laboratory. All members share their time between teaching and scientific research.

A minor additional problem is the absence on the university campus of other units working in biological research. Given the geographical situation of the laboratory, this does not represent an important issue.

Keeping wild animals and bringing them to the laboratory from the field and sometimes from a foreign country is a potential threat that necessitates specific measures for avoiding the introduction of pathogens or invading species.

Recommendations:

- 1) Incentivate a more even productivity across faculty members. A marked heterogeneity in the productivity of the LEEC members is observed. Measures should be taken in order to encourage less productive members to increase their publication record.
- 2) Focus on the most productive and original research lines. The research project of the unit is highly diversified in terms of questions to be analysed. The committee suggests to focus on the most promising research lines and on those in which the laboratory is leader. This attitude should increase the visibility of the unit at the international level and increase its attractiveness.
- 3) Organisation as a single team under the leadership of the director. The new project, characterized by many transversal subjects and multiple collaborations will be better managed by a single leader. An organisation as a single research group and technical and administrative instances (animal rearing, instrumental platforms, teaching organisation) keeping one or two responsible persons will be more efficient from a management point of view.
- 4) The succession of retired faculty staff should be in line with the objectives and strategies of the unit in terms of recruitment level (professor or assistant professor) and should not aim at filling the same position only.



3 • Detailed assessments

Assessment of scientific quality and outputs:

The LEEC has produced a significant number of publications in specialized international journals (87 in the period 2007-2012), averaging between 1.5 and 2 papers/researched/year, which is satisfactory for a laboratory composed of university staff. It should be noted, however, that the productivity is not uniform across the unit, since an heterogeneity is observed in terms of individual productivity (ranging from 0 to 8 papers per year) in the list of publications.

As mentioned above, the LEEC activities include different biological problematics and animal models. This diversity is represented in the diversity of journals on which its members publish their work. Most of them belong to the first quartile according to their impact factor, ranging between 1 and 4 in most cases. One paper deserved publication in *Current Biology*, but no other publication in top generalist journals is reported for the evaluated period.

Compared with the previous evaluation period, the LEEC experienced a slight increase in both productivity and journal impact factor. Although this may be partially due to a general increase in impact factors in the last years, an effort to target higher-ranking journals can be perceived. The average individual productivity has also increased, because of two facts: the arrival of highly productive new members, two professors and one as assistant professor, an unit d the effort of the least productive ones to increase their publication activity.

The LEEC while wishing to be judged as a single team can be subdivided in two subgroups:

1) The social insect subgroup at the LEEC is a nationally and indeed internationally leading centre in the field. This is evidenced by an (on average) good productivity in all the leading specialist journals. Expertise covers the entire range of the field, and includes state-of-the-art behavioural analyses (e.g. RFID technology), chemical ecology, molecular approaches, and socio-biology, and working with a wide variety of species (ants, bumblebees, honeybees, termites). There are good synergies between members of the team, as evidenced by multiple joint publications between faculty members of this subgroup and others. The social insect subgroup overall has produced several breakthroughs. For example the 2007 paper in *Current Biology* on the role of experience in generating division of labour in a unique clonal ant species received a lot of attention from researchers around the world. Also the work on rescue behaviour is unique and highly original.

The productivity of the social insect subgroup nevertheless appears somewhat varied. Clearly the recent recruitment of a leading researcher on insect chemical communication to the LEEC is a major success for this part of the unit, since this is an internationally recognised research star, and this is clearly reflected in productivity (both quantity of publications as well as papers in multidisciplinary journals (e.g. *Current Biology*, *Proceedings B* etc). There are 4 or so more researchers with good productivity (as evidenced by a good publication rate mostly in solid specialist journals), and a new termite researcher also has had a good number of publications. However, four researchers have between 0 and 4 papers over the entire review period, and even these are often not as lead authors, so it is not clear to what extent they were in the drivers' seat for the work.

2) As to the "social and cognitive behaviour in mammals" subgroup, there were numerous personal movements during the last five years, in particular 3 retirements (2 professors, 1 technical assistant) and 2 recruitments (professors). The consequences thereof is the presence of quite hererogeneous research subjects. The main topics being studied are personality traits in mice, the mating system of the mound building mouse, the behaviour of domestic mammals, and facial expressions in humans. Although the team is entitled "Social and cognitive behaviour in mammals", the cognitive part is reduced to the study of partner perception and recognition.

This subgroup is nevertess reponsible for publication of 31 articles in peer-reviewed journals and 3 in journals without review. This represents an annual output of about 1.5 publications per researcher. Such production includes the work of 8 doctoral students, and even if we keep in mind that all researchers are also teachers, this remains an average that could be improved. Moreover there is inequality in the production rate between team members. The impact factor of journals is average to good compared to the domain. Given the teaching load of faculties, the absence of full-time researchers from the CNRS in the team represents a limit to the research task force.

Assessment of the unit's academic reputation and appeal:

Established more than 30 years ago, the LEEC has a long tradition in the study of animal behaviour. It is a leading laboratory in France and a reference centre of international reputation. The diversity of expertise hosted by the LEEC and its extensive collaborative network make it unique at a national level and give it international visibility.



The LEEC's drawing power is clearly demonstrated by the recent addition of an internationally renowned scholar, and also by a number of sabbatical visitors of clear international calibre. The reputation is also documented by various esteem indicators for some of the team's members; e.g. membership on various editorial boards and funding panels. Clearly both the recent retirements were also of international calibre; it is hoped that they can continue to contribute to LEEC's reputation by working as emeritus professors. The international dimension of the unit is reinforced by the fact that different members of the LEEC are involved in important international programs, such as Capes-COFECUB, ECOS Nord, "*Ciências em fronteiras*", Marie-Curie actions and others.

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

The LEEC plays an active role in the diffusion of ethology in France. Within the wider environment, there appears to be good integration with the Institut Francilien d'Ethologie (IFE - of which one member of the LEEC is the president), and the National Research Group in Ethology (GDR), which was spearheaded by one of LEEC's former members. This shows that the LEEC is not only well integrated into the national research network in the field of ethology, but is actually taking charge of it. Through IFE, there seems to be a productive interaction with the Université Paris-Ouest/Nanterre-Défense. There are also viable international collaborations; for example, the USA/LEEC collaboration on rescue behaviour is clearly productive, as is the joint work between LEEC and Latin America (Brazil & Colombia), which has attracted significant funding. The projects for the coming review period all include external (national or international) partners, which will ensure that the right expertise is on board for all project components, and that there will be stimulating exchange with other schools of thought. The unit develops collaborative projects with industrial partners, in particular in the development of novel tools for pest control based on the biological knowledge of rodents and insects.

Assessment of the unit's organisation and life:

The project proposes to maintain the organisation in two research teams with the establishment of bridges in the form of joint projects and the association of some members to both teams. This is in line with the proposal of being considered as a unique laboratory. Even though the models and specific questions of the two subgroups seems to justify the maintenance of two research groups, the initiative to function as a whole is very positive and could evolve even further towards a single team under the leadership of the director. In the past it appears that the LEEC has operated a rather egalitarian structure, with all researchers having equal freedom and privileges, independently of productivity (and whether they are beneficiaries of PES). However, this can only be justified if ALL researchers use this freedom to drive independent and productive research projects. This is clearly not the case. It appears that although teaching and administrative duties are distributed equally across members of the centre, there are differences in publication output by more than a log unit. The leadership of the institution must take steps to incentivise research productivity. This could be by awarding extra lab space and resources (funding, PhD studentships) and fewer administrative and teaching duties to productive members, and taking away lab space and resources, and increasing teaching loads for members who fail to publish adequate numbers of publications. Alternatively, such researchers should be assigned essentially as permanent postdoctoral fellows or research technicians to teams of more productive researchers, and be expected to follow clear instructions of the research work that is expected of them. This will require a more hierarchical organisation of the LEEC than has previously been the case.

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

The LEEC is strongly involved in research training and education in ethology, in particular at the master level. The LEEC teaching initiative defines the first Master offering a full two years of training entirely dedicated to the study of animal behaviour, and with the particularity of offering two training programs, one focused on research and another on applied ethology. These master programs have a high reputation in France and also attract students from abroad. The master programme extends over two years, the first providing a general training in ethology and the second oriented either towards scientific research or applied ethology. The two year master's programme in ethology is clearly unique and a major asset. There is also significant PhD training, and PhD students are happy with the level of supervision and their degree of independence. The number of PhD students on the whole is moderate, but within the social insect subgroup the number seems much higher than that of the mammal subgroup, which is mirrored in research productivity. A good number of PhD students trained remain in science.



Assessment of the five-year plan and strategy:

The unit's scientific strategy for the coming period has been validated by the University Paris 13.

The scientific structuration into 23 projects organised into five themes, with the participation in most of them of members of the two teams can also be considered as a new strategy that encourages the emergence of innovative and integrated approaches potentially leading to the emergence of young scientific leaders.

The amount of projects and the diversity of questions compose an ambitious research program. The question arises about the possibility to reach all the objectives of the program, given the present problems of space and funding. In addition, the diversity of questions does not necessarily emphasize the main questions and strengths of the laboratory.

The detailed analysis of the 5-year project is given below in the theme by theme section following the detailed analysis of the teams.



4 • Theme-by-theme analysis

Theme 1:

Evolution and diversification of social species

Subgroup "ethology of social insects"

• Detailed assessments

The aim of this theme is the understanding of the adaptive processes leading to speciation in social insects. By combining different approaches (ethology, ecology, genetics, phylogeny, etc.) an integrative view should be obtained.

This Theme includes four projects:

Project 1: Biodiversity and speciation

The main objectives are: 1) to characterize the diversity in the groups studied using multidisciplinary studies (morphological and molecular phylogeny, chemistry and behaviour); 2) to synthesize these multidisciplinary arguments to reconstruct their evolutionary history, the phylogeography and understand their actual distribution; 3) to understand how ecological processes have led to the evolution of conserved diverse social regulation mechanisms, such as fertility signals or ritualized behaviour.

By focussing on two neotropical ant genera (*Pachycondyla* and *Ectatomma*) the studies on biodiversity, chemical taxonomy and sociobiology should provide a better understanding of the historical and ecological causes of species diversity and distribution of these ants.

Comments:

This is an interesting project and these two ant genera constitute interesting models for an integrative approach. Efforts should be done in order to put results on *Pachycondyla* and *Ectatomma* in a larger perspective, to reach a better understanding of evolutionary processes in other groups of social insects.

Project 2: Interspecific relationships

This project is focussed on the analysis of interspecific interactions in two systems: social parasites and slave-making ants, on the one hand and termites on the other. In each case, information about the specific interactions analysed should be obtained.

Comments:

Each system to be analysed will be treated independently and specific aspects will be studied in each case. As a consequence, no general principles or higher-level phenomena clearly emerge. It seems more like putting together projects that are not linked.

Life history traits and ecological constraints:

Project 3: Reproductive strategies in ants; Project 4: Social behaviour in bumble bees

These two projects propose the study of life history traits and ecology of different species of ants, termites and bumble bees. These models are classical in the laboratory and research will allow a better understanding of their biology. However, they will not be treated together for analysing a question, but in each case specific questions will be analysed.

Comments:

As in previous projects, an integrative and or comparative analysis would have been appreciated.



Conclusion:

- Overall opinion of the theme:

Even though a general framework is provided in each case, it is not always clear for the reader how each specific subject contributes to solve higher level biological problems, beyond a better knowledge of a given species or group.

- Strengths and opportunities:

The diversity of models and questions allows comparative analysis with a perspective of understanding higher-level questions of taxonomy, biodiversity or interspecific interactions.

- Weaknesses and threats:

The first risk is to excessively focus on specific questions that could render difficult the integration of the whole in a single theoretical frame. The second risk is that the strengths of the team appear diluted or hidden in the diversity of subjects.

- Recommendations:

To focus on those questions that proves better to exploit the potential and strengths of the team and those allowing a higher-level synthesis in terms of biological problematic.



Theme 2:

Living in a social environment: patterns, consequences and adaptations

Subgroup "Ethology of social insects" and subgroup "Ethology of mammals"

• Detailed assessments

This is a rather heterogeneous collection of experiments both concerning the research questions (10 projects with a total of at least 24 sub-projects) and animal models (5 mammalian, 1 bumble bee and at least 7 ant species). It is well appreciated that the interaction of members of the subgroup "ethology of social insects" and the subgroup "ethology of mammals" is intended which certainly helps to create a functional research unit. However, all members of both teams continue their so-far research projects. Since research time is limited, this strategy is very unlikely to work out, i.e. people shall just continue what they did in the past. Thus, the committee recommends evaluating the possibility that some of the research projects 7-14 be discontinued to focus on a few promising questions. Such questions could then be studied on both well-chosen (comparable) insect and mammalian models. By doing so, the research project would become truly comparative and collaborative and exploit the strength of the LEEC, i.e. combining ethologists with strong backgrounds in social behaviour of either insects or mammals in one group. Further, such focused concept would reduce the large number of different animal models that are currently used.

A further general criticism concerns the study of mechanisms. Although the research project suggests globally proximate works (many "how questions": How are reproductive conflicts expressed and regulated in animal societies? How do ecological processes influence the evolution of such social regulation mechanisms? How does the social environment of an individual, in particular during ontogeny, affect its health, reproduction and survival during later life?), there is little effort to really implement such proximate research.

A worrisome problem concerning several projects is the long-term financing of the "European rabbit field enclosure of the LEEC" and of two essential technical positions (one animal caretaker, one molecular lab technician).

Project 5: The early developmental environment

This project shall focus on the mechanisms and long-term-consequences of the early social environment in mammals, with particular focus on (1) paternal and (2) sibling effects. The animal models are the mound building mouse, the European rabbit, the Mexican cottontail, and domestic dogs. Further, (3) effects of early learning in ants are integrated in this project. These questions will be investigated in collaboration with several scientists from different international universities and involve researchers from both teams of the LEEC.

Comments/Conclusion:

The study of paternal behaviour and of the impact of siblings on life history and fitness under seminatural conditions is certainly very interesting. However, this project is a typical example of the above statements, i.e. the project is not truly comparative or truly interactive but each group member is following his one line of research. If this approach delivers an additional value compared to the past works of the involved project researchers needs to be seen. If the common denominator of project 5 is "early environment" then project on yellow-bellied marmots (now project 6) should be integrated here.

Project 6: Consequences of social stress and their modulation by the social environment

This project shall be on (1) how social instabilities, group structures and social bonds affect or buffer the animals' stress response. The studied phenotypes are resistance to endoparasites, reproductive performances and lifetime reproductive success (models: rabbits and yellow-bellied marmots). Further, (2) they aim on assessing emotional responses of mammals to social cues using heart rate transmitters and thermal cameras (models: mound building mouse and dogs).



Comments/Conclusion:

The work on long-term consequences of social stress by monitoring the individual social environment in seminatural environments is interesting. Unfortunately, the project description does not detail how this is done technically? Further, it remains unclear how the immunogenetic constitution of the animals is measured? Likewise, is their hormone lab for monitoring stress hormone levels? Further, the works on yellow-bellied marmots does not measure the same parameters as that on the European rabbit, which makes a direct comparison of both studies a problem. The use of heart rate transmitters and thermal cameras is certainly state of the art but the results shall be difficult to compare with the other projects of project 6. The various sub-projects are well anchored in international collaborations. The financing is, however, unclear.

Project 7: Age-dependent reproductive investment

The focus is on the influence of animals' social environment on age-dependent female reproduction of European rabbits and mound building mice.

Comments/Conclusion:

The researchers give no details about this experiment (e.g. what is the social environment?) and why these species are of interest relative to works on age-dependent reproduction carried out in other mammals. The long lifetime of rabbits would require long-term financial support.

Project 8: Parental care behaviour

Here they study (1) to what extent the degree of parental care depends on the level of care provided by the other parent, (2) whether parental care behaviour depends on the parent's temperamental trait, and (3) how decisions on parental investment are modulated by environmental (thermal) challenges (model: mound building mouse).

Comments/Conclusion:

This appears as a feasible project while the use of mathematical modeling for this project is unclear. What is a temperamental trait of mound building mice?

Project 9: Sexual motivation

Here the main goals are (1) to investigate to what extent sexual motivation and neophilia are causally associated in premature individuals, (2) how this association changes and develops along with adolescence in both genders, and (3) to monitor changes in the sexual motivation of adult males throughout their reproductive life in relation to their pair bond (model: mound building mouse).

Comments/Conclusion:

The importance of this project is unclear. Further, what is sexual motivation in this context? The project is not linked to the rest of the department.

Project10: Rescue behaviour and altruism

The aims are to (1) continue to examine chemical mechanisms of rescue behaviour, (2) how those mechanisms change over time, (3) to monitor individual differences in rescue behaviour, and (4) study the extent to which rescue behaviour is limited to particular individuals in a cast of ants.

Comments/Conclusion:

The global aim, to understand how this particular form of altruism fits in the pattern of helping behaviour is of general interest. The project is isolated from the rest of LEEC teams, although routed in national and international collaborations.



Project 11: Social recognition in ants

The main sub-projects are (1) field studies to strengthen the ecological relevance of fine-tuned social recognition mechanisms of ants, (2) a comparative approach of social recognition mechanisms between derived and primitive ant species, and (3) the investigation of bioamines as a neuroendocrine base of affiliative behaviours of ants.

Comments/Conclusion:

This project is of general interest and insects might indeed be underestimated what concerns their individuality. Thus interesting publications are expected from this work. Although the research time combines members of subgroup ethology of social insects and 2, the role of a neurogenesis specialist (subgroup "ethology of mammals") is unclear. Further, no effort is undertaken to conceptually compare this form of social recognition with social recognition of colony living mammals. Further, the financing of the project in particular for the planned mechanistic works is unclear. This project would be better placed in Theme 3.3. (Communication and cognition: from insects to mammals).

Project 12: Reproductive conflicts

The researchers study (1) reproductive conflicts and dominance hierarchies in ants and (2) worker reproduction and social behaviour in bumble bees.

Comments/Conclusion:

As stated, the study of conflicts and their resolution at the proximate and ultimate level allow better understanding of the evolution of sociality. How this is done on the proximate level remains unclear. The researchers mention the study of neurohormones and population characteristics (molecular /chemical features?) but are not very detailed about this. In consequence, it is difficult to estimate the quality of the expected data. Again, this project combines members of both teams but the role of the subgroup "ethology of mammals" member is very unclear.

Project 13: Task allocation among workers in eusocial insects

They investigate the influence of nutritional factors on the worker's response to larval stimuli.

Comments/Conclusion:

This works continues earlier projects that showed that workers of different ant sub-casts respond differently to chemical larval stimuli. Why not combine this approach with the mechanisms of working tasks of the mound building mouse (project 14) in order to really produce something new ?

Project 14: Specialization of working tasks in a small rodent

In continuation of previous works, the researchers shall (1) test if working tasks of mound building mice exist under seminatural conditions and (2) measure metabolic costs of different types of works.

Comments/Conclusion:

This is certainly a very interesting approach since working task specialization in mammals is little studied. As said for project 13, one wonders why this general problem of working tasks/casts is not studied in truly comparative way between insects and mammals. Further, wouldn't some mole species be the best mammalian (experimental) comparison to eusocial insects?



Theme 3:

Communication and cognition: from insects to mammals

Subgroup "Ethology of social insects" and "subgroup Ethology of mammals"

• Detailed assessments

This research theme aims to understand patterns and mechanisms of communication. The projects address questions regarding the capacity to collect and use information about individuals to behave efficiently in social contexts. These investigations are thus of primary importance in a laboratory dedicated to the understanding of social life.

Both research teams 1 and 2 are involved in the research theme since models range from social insects to mammals, including Humans. The proposed research is in line with the previous research conducted by the LEEC laboratory in the recent past. However, there are some reorientations and additions. All projects will be done with external national or international collaborators and will undoubtedly lead to high-impact publications.

Theme 3.3 is organized as five major projects (projects 15 to 19):

Project 15: Perception, learning and memory

Project 16: Parent-offspring interactions

Project 17: Body odours and partner choice

Project 18: Regulation and functional contribution of olfactory neurogenesis to maternal behaviour

Project 19: Body odours and linguistic processes

Project 15: Perception, learning and memory

This project will focus on 1) the role of learning and memory of odours of ants in predator-prey relationships, 2) ant rescue behaviour in different contexts, and 3) ant's detection and perception of chemical cues and signals. These questions will be investigated in collaboration with several well-known scientists from different universities.

Comments/Conclusion:

This project sounds promising and will potentially lead to new results regarding predator-prey interactions. Ant rescue behaviour has not been well studied up to now and sounds interesting as a model of social interactions/cooperation against a predation risk. The collaboration with a group at the Université of Toulouse has already been secured (PhD co-supervision) and this collaboration with a well-known laboratory in the field of behavioural neuroscience may be an excellent strategy to broaden the approach of the LEEC laboratory, from behaviour to brain.

Project 16: Parent-offspring interactions

This project focuses on parental care and offspring begging in ants and aims mainly to characterize chemicals involved during adults-offspring interaction in an ant species. Previous experiments performed by LEEC researchers showed that chemical communication is used by larvae to modulate the response of caregivers. However, it is still not known whether larvae are able to send honest signals, i.e., signals that reliably reflect their actual need.

Comments/Conclusion:

Research about parent-offspring interactions has been of primary interest in behavioural ecology and evolutionary biology for years. However and up to now, most studies investigate parent-offspring interactions on vertebrate models (birds, mammals). Social insects are of great interest because the presence of non-reproductive individuals participating in brood care makes parents(adult)/offspring relationships far more complex. This line of research is thus promising.



Projects 17 & 18 : Body odours and partner choice & Regulation and functional contribution of olfactory neurogenesis to maternal behaviour

These two projects aim to investigate questions about chemical communication in mammals. In project 17, the two investigators from the LEEC laboratory will study chemical communication in mice. This project is linked to project 23 (Improvement of pest control), and has been already funded. The aim of project 18 is to study neuronal developmental processes of chemical communication in mice. This project involves only one LEEC researcher but is reinforced by several national and international collaborations.

Comments/Conclusion:

To understand a communication process, it is important to consider both emitter's and receiver's sides. Indeed, one has to know which and how information is coded by emitted signals and how receivers decode/interpret the message. The present project sounds well built: it will be very interesting to know the information content of mice body odours as well as how prior experience and current stage of receiver affect information processing. Project 18 is characterized by a neuro-ethological approach. All involved researchers have a strong publications record and both projects are supported by external fundings. Both projects thus should lead to high-ranked publications in international journals.

Project 19: Body odours and linguistic processes

This project is new and sounds unusual. The idea is to explore the possible role of androstenes in the modulation of linguistic processes of Human beings.

Comments/Conclusion:

There is no information about the experiments that will take place and this project looks very exploratory. However, the leader of this project has an excellent scientific profile, with a great experience in building projects of international level. She has authored a large number of publications in high-ranked journals. She has also a great habit of building new collaborations and innovative projects. The committee thus encourages her in pursuing new lines of research like the present one.

Conclusion:

Most of the research projects of theme 3.3 are in the continuity of on-going research that has proven its interest and value. The current well established scientific and technical basis and the expertise available in the research group represents an important strength.

Compared to part 3.2., theme 3.3 is more focused by studying chemical communication in mammals and insects. Further, there is some more investment in experiments on proximate mechanisms (e.g. 3.3.2 and 3.3.3). However, the experiments are not really integrating mammal and insect researchers in common projects. May be this is not at all necessary but then one should not try to create such an impression (e.g., what is the role of the subgroup "ethology of mammals" member in Experiment 3.3.2?). One promising exception is the effort of by one high profile researcher to broaden into mammalian olfactory communication (project 17 and 19); particularly project 19 is a refreshing idea.

The quality of the expected data is somewhat difficult to judge due to the very brief technical and conceptual outlines. The committee wonders whether project 18 is leading edge (there are many groups that study neurogenesis of olfactory neurons with very advanced molecular techniques that allow control of neurogenesis in relation to behavioural tasks). There is also a large body of work on body odors and mate choice in mammals including humans.

The heterogeneity of questions and models could constitute a weakness. However, the multi-model approach is also a strength in a laboratory working on ethological questions. The LEEC laboratory is used to this approach, and this has been rewarding in the past. It should be also the case in the future.

Risks exist, specifically with the project 19 which addresses a new question with the Human model. However, the excellent scientific level of the principal investigator guarantees for addressing "high risk/high gain" research problems.

● Recommendations:

It will be important to secure fundings for projects 16 and 19.



Theme 4:

Consistent individual differences in behaviour

Subgroup "Ethology of social insects" and subgroup "Ethology of mammals"

• Detailed assessments

1) The project, which involves the two teams, deals with the general topics of "animal personalities" or "behavioural styles" which have received a growing interest in ethology in the last decade.

The originality of the project lies upon a strong emphasis on ontogeny, much less investigated in the scientific community up to now. The species involved on this aspect are mostly wild and domestic Mammals (mound building and striped mice, laboratory rats and domestic cats), for which it is proposed to develop test paradigms to define personality dimensions, and then to explore the effects of early experience (e.g. parental influences) on the development and stability of "personality" types. Moreover, the link between personality and cognitive biases (how a situation is perceived in terms of valence) will be explored with an emphasis on the impact of early experience in insects (subgroup ethology of social insects) and birds (collaboration with Paris 10).

Comments:

The insect part is already well developed with one of the senior researcher being involved in a Marie Curie action (Identity code), the project evokes grants applications on this topic at Ecos Nord and ANR, in collaboration with Mexican, North American and French colleagues. Two PhD students are already involved in the follow up of personality development in Mammals. Overall, the feasibility seems guaranteed and the group members involved have a good background that should ensure the success of the project. The project is original enough as literature data on the development of aiming at develop tests of personalities are numerous and hence this particular part seems less original.

2) The second part of this project is on fitness consequences of animal personalities. The ultimate aim of this study is understanding the evolution of animal personalities. The idea is to test the consequences of personality traits on different fitness correlated traits. The central aspect will be a long term study on European rabbits living in a large enclosure and individually marked. Four major aspects will be investigated: health (endoparasites, immunity), survival, social status and reproductive performance. Further aspects involve the mound building mice for which ongoing studies will be pursued on the role of individual differences in behavior on mate choice and reproductive success. The impact of personalities on responses to stress will also be examined. Finally the relation between personality traits and insects' foraging efficiency and learning behavior will be examined.

Comments:

The project on rabbits is based on the long experience of a recently recruited senior scientist who is well renowned and has already a large set of data on this topic. It requires however the building of the large exposure at short term. The projects proposed on the other species are also ongoing project for which results have already been obtained. It could have been interesting to be more precise about what is really new in this project as compared to the research previously performed. It is not indicated whether PhD students will be involved. This research requires an important human involvement.

Conclusion:

The project is of interest and by different aspects original. Its feasibility is guaranteed by both the project leaders' experience and the past studies. There could be more emphasis on what is really novel as compared to past studies. Nevertheless, it is not clear whether there will be enough "human forces" in a context where, apart from one investigator, most scientists involved are also involved in most other 20 projects, while no indication is given for some parts on the potential involvement of PhD students.

Two other aspects are 1) the real integration of the interteam work. There is ongoing work on insects, mice, and rabbits respectively. It is not clear in the project whether there will be more "co work" in the near future. 2) The status of one investigator who does not seem to have any professional status at the moment is intriguing? She is of course a potential major force in this work.



Theme 5: Practical applications

Subgroup "Ethology of social insects" and subgroup «Ethology of mammals»

• Detailed assessments

This is a joint project of both research teams aimed to put the different expertise to solving practical issues. It comprises the transfer of knowledge on different animals to management of wild (rodents) and domestic (dogs) species and applied research on pest control. The general concept is very appealing and the laboratory possesses the competences and experience required.

1) The first part of the project is centered on basics and improvement of animal welfare measures and involves two different activities:

- Improving house conditions in wild-type laboratory animals: The goal of this activity is developing structural elements to be integrated in standard cages for laboratory housing of wild-type rodents. Such animals show high stress level and anxiety when kept in laboratory with negative consequences for their health and reproductive physiology. Different elements are being tested, optimized for standard laboratory cages, which may help to ameliorate such negative effects in wild-type rodents kept in the laboratory.
- Group dynamics of dogs in animal shelters: Despite the close association of dogs to man, little is known about their social behaviour in the absence of humans. A generalized idea is that intraspecific aggressions might appear when kept together without humans, resulting in injuries and chronic stress. Other studies indicate that dogs housed in groups have better welfare and are easy to be adopted than animals housed individually. The goal of this on-going study is to better understand the social behaviour and group dynamics of abandoned dogs. These investigations should provide management recommendations on how to successfully keep dogs together in small groups.

Comments:

Both activities described are sound and represents an interesting transfer of ethological knowledge to provide animals with better conditions of confinement. Both activities are succinctly described, without providing methodological details. The second project on dogs is clear in its main question and goal, whereas the first one on rodents is less precise. Some methodological details would have been appreciated, such as how stress will be measured in each case, how the impact of improvements (rodents) or living in groups (dogs) will be evaluated, etc.

2) The second part of the project is aimed to integrate ethology in pest control. Two specific activities will be centred to termites and rodents' control, respectively in order to find more rational control methods with reduced environmental impact.

- Termite pest control: The aim of this activity is to develop integrated pest management and the use of synthetic pheromones or analogues for controlling termite populations. The idea is to test this strategy in termites by conducting a study to prevent termite sexuals to initiate colonies by using their sex pheromone and to reduce the infestation of termites by attracting workers to toxic baits thanks to their trail pheromone.
- Improvement of rodent pest control: The team collaborates with a consortium including two companies and an academic laboratory in order to develop an integrative approach of rodent pest control. Innovations include new anticoagulant molecules and control strategies based on the manipulation of rodent behaviour. The contribution of the LEEC will mainly be the improvement of baits based on the manipulation of the chemical communication system of rodents and their social transmission of information about diet. Additionally, a chronic mild stress paradigm will be adopted to evoke repellence.



Comments:

The goal of the first activity is to conduct applied research on the use of pheromones for controlling termite populations. The general idea is sound, convincing and in line with the expertise present in the unit, but the description is relatively superficial (e.g. pheromones are non-toxic, they work well in Lepidoptera and cockroaches, etc.). More specific details would have been appreciated such as if the chemical properties of the candidate molecules make them suitable for its use or how termites respond to them in a different context, etc. The second activity is well summarized and convincing. The association of scientist with private industry seems to be fruitful.



5 • Conduct of the visit

Visit date:

Start: January 11th 2013, 08:00

End: January 11th 2013, 17:30

Visit site: Laboratoire d'Ethologie Expérimentale et Comparée

Institution: Université Paris 13 - Paris-Nord

Address: 99 Av. J.B. Clément, 93430 Villetaneuse

Specific premises visited: short visit to animal facilities

Conduct or programme of visit:

- | | |
|---------------|--|
| 08:00 - 08:15 | Morning coffee meeting, welcome of the VC members and scientific delegate at the location of the unit (Seminar room) |
| 08:15 - 08:45 | General presentation by the present and future; direction of the unit |
| 08:45 - 09:15 | Questions and discussion |
| 09:15 - 09:35 | Presentation of the scientific report of Research Subgroup ethology of social insects "Ethology of social insects" |
| 09:35 - 09:50 | Questions and open discussion |
| 09:50 - 10:10 | Presentation of the scientific report of Research Subgroup ethology of mammals "Social and cognitive behaviour in mammals" |
| 10:10 - 10:30 | Questions and open discussion |
| 10:30 - 10:45 | Coffee break |
| 10:45 - 11:30 | Presentation of the unit's future scientific projects (Research Teams 1&2) by the project director (porteur de projet) |
| 11:30 - 12:00 | Questions and discussion |
| 12:00 - 12:15 | Visit of animal facilities (insects and rodents) |
| 12:15 - 14:00 | Lunch break and closed meeting of the committee |
| 14:00 - 14:45 | Meeting and discussion with the direction of the unit (present and future directors) |
| 14:45 - 15:15 | Meeting and interviews with PhD students and post docs of the unit |
| 15:15 - 15:45 | Meeting and discussion with university officials (tutelles) |
| 15:45 - 16:10 | Meeting and interviews with members of the unit's administrative and technical staff |
| 16:10 - 16:40 | Meeting and interviews with researchers (enseignants-chercheurs) of the unit |
| 16:40 - 17:30 | Final closed meeting of the committee |



6 • Statistiques par domaine : SVE au 10/06/2013

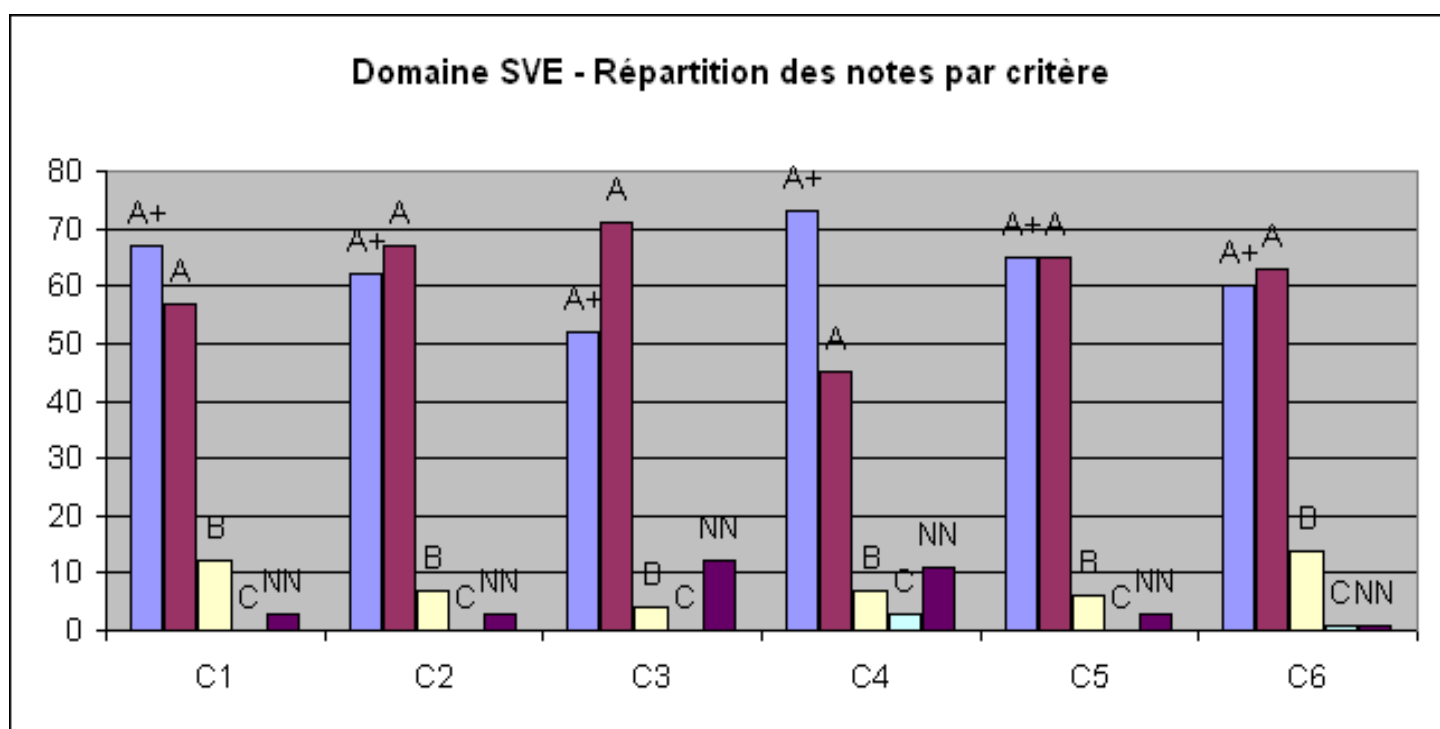
Notes

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

Pourcentages

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%

Domaine SVE - Répartition des notes par critère





7 • Supervising bodies' general comments

Villetaneuse, le 19 avril 2013

Le Président

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**Observations générales sur le rapport AERES
du Laboratoire d'Éthologie Expérimentale et Comparée
(LEEC, EA 4443)**

L'établissement tient d'abord à saluer la qualité du comité de visite et de son rapport, même si sa tonalité semble marquée par une vision 'anglo-saxonne' focalisée sur le quantitatif et le leadership et parfois mal adaptée à la situation française et à celle de cette unité en particulier.

L'université se réjouit de voir confirmés quelques points forts de ce laboratoire, en particulier dans les domaines de la formation par la recherche, de la qualité et la production scientifiques, de la reconnaissance académique et de l'interaction avec l'environnement social, économique et culturel. Elle se félicite également de voir appréciée et valorisée la politique volontariste des deux recrutements internationaux de professeurs.

Nous prenons acte des critiques constructives qui devront nourrir la poursuite des évolutions du laboratoire, notamment concernant la structuration de l'unité et de son projet. Néanmoins les recommandations concernant la gouvernance nous paraissent largement inappropriées et inadaptables à l'environnement des structures d'enseignement supérieur français.

Des réponses plus spécifiques du laboratoire, notamment sur les quatre grandes recommandations, sont données à la suite de ces observations générales.


Jean-Loup SALZMANN


Responses of the Laboratoire d'Ethologie Expérimentale et Comparée to the AERES report

The members of the Laboratoire d'Ethologie Expérimentale et Comparée would like to thank the committee for the constructive comments and suggestions. In the following, we will particularly respond to the general recommendations, as summarized on page 6 of the report.

First, the committee notes that a more even productivity among the researchers of our unit should be reached, although it is confirmed that the LEEC as a whole shows a good publication record. Measures are requested in order to encourage less productive unit members to increase their publication output. We agree with this notion, and the designated direction will strongly engage in implementing appropriate strategies in order to stimulate and increase publication activity.

One of these measures will be to improve the internal evaluation process of our research activities. Each researcher will report her/his annual scientific output and will present her/his involvement in projects of the LEEC once a year during a general meeting. This will not only serve to regularly inform about the development of the different research lines of our scientific project, but will expectantly lead to an increase of collaborations within the unit due to the exchange of ideas and resulting discussion during such meetings.

The direction will engage in directly stimulating and encouraging publication output. Researchers who will publish a certain minimum of articles per year will be provided with a small extra amount of funding associated with the supervision of master students. Furthermore, we will strongly encourage researchers with higher publication output to increase the number of collaborations within the LEEC. In doing so, we aim to homogenize the publication activities of the different researchers but also aim to increase the overall output of our unit.

Nevertheless, it should be noted here, that the administrative duties are not equally distributed but differ strongly among members of the LEEC. The resulting reduction in teaching does not always and fully compensate for time-consuming positions, e.g. related to organizational responsibilities related to teaching in License and Master. This is one of the sources for certain heterogeneities in publication activities and this cannot be easily resolved.

Second, the committee has concerns about the high diversity of proposed projects within our 5 major lines of research and recommends to focus on the most productive and original ones. It is also mentioned, that the high number of project objectives might be difficult to reach, given our strong restriction of space. We agree that a certain reduction of research projects could be beneficial for the overall success of our research program. As also indicated by the committee, a number of the described projects are continuations or follow-ups of existing research line mainly conducted during the last evaluation period, and some of them are about to end soon. We also agree that projects of minor scientific perspective, in particular when combined with a high necessary resource allocation of resources, will be reduced or terminated for the sake of more successful or promising ones. This process might expectantly and progressively reduce the diversity of our research program.

However, we also wanted to emphasize that a certain degree of diversity in scientific activities, and the freedom of starting new aspects of running projects constitutes an important basis of successful scientific activity. The freedom to develop and follow new ideas is also a fundamental aspect of scientific philosophy. In addition, a too strong and reductive focus only on currently successful research lines will entail a certain risk that potentially fruitful new lines of research are suppressed. Finding a proper balance between supporting new scientific aspects and keeping a moderate and

manageable diversity of interdisciplinary research projects, given our available resources, will be one of our main concerns during the next years.

Third, the committee evaluates our approach to working on a unified scientific project including several transversal lines between the two existing research teams (working on insects and mammals) as a positive development. It is recommended to go one step further and re-model our internal organization as a single research team under the leadership of the direction. Such a step could be an efficient strategy in order to successfully manage our interdisciplinary project during the next years. We plan to implement such a new internal structure, where we will connect the currently existing sub-structures of independently managed research teams to one single unit managed by the direction. This new structure will also imply a more centralized management of the budget for research activities and regular meetings of all researchers in order to discuss scientific and organizational aspects of ongoing projects. Two scientific advisors will optimize the communication between the direction and the different researchers of the unit. These positions will also help to effectively manage interdisciplinary projects making use of the different animal models of our unit.

Fourth, it is recommended, that the succession of retired faculty staff (professors and associate professors) should be in line with the objectives and strategies of the unit. This is clearly the strategy of the LEEC. We intend to open the position to candidates with a profile well suited to the integrative research program of our unit. We are fully aware that new recruitments will provide us a great chance to facilitate internal collaboration and thus the overall success of our research program, and we intend to make use of this chance.

In conclusion, we think that our modification of the internal organization together with our measures to activate the scientific output and internal collaborations in our unit will create a stimulating scientific environment, promoting the successful execution of our research program during the coming years. We are convinced that our strategies will efficiently improve the existing strength and expertise of the LEEC as a center in Ethology with national and international renown.

Villetaneuse, 17. April 2013

Heiko G. Rödel, Porteur de projet

Dominique Fresneau, Directeur du Laboratoire