IBMP - Institut de biologie moléculaire des plantes

Rapport Hcéres

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

Research Units Department

AERES report on unit:

INSTITUT DE BIOLOGIE MOLECULAIRE DES PLANTES

IBMP

Under the supervision of the following institutions and research bodies:

CNRS

December 2011

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

Research Units Department

President of AERES

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Research Units Department

Department Head

Pierre Glaudes

Unit

Name of unit:	INSTITUT DE BIOLOGIE MOLECULAIRE DES PLANTES
Acronym of unit:	IBMP
Label requested:	UPR
Present no.:	UPR 2357
Name of Director (2009-2012):	Mr Pascal GENSCHIK
Name of project leader (2013-2017):	Ms Laurence DROUARD

Members of the committee of experts

Chair:	Mr Dirk INZE, Gent, Belgium
Experts:	Mr Guillaume BECARD, Toulouse (CNU representative)
	Mr Ralf BOCK, Postdam-Golm, Germany
	Mr François-Yves BOUGET, Banyuls-sur-mer
	Mr Jozsef BURGYAN, Gödöllö, Hungary
	Mr Jean-Marc DERAGON, Perpignan (CoNRS representative)
	Mr Björn HAMBERGER, Copenhagen, Denmark
	Claire REMACLE, Liège, Belgium
	Mr Christophe ROBAGLIA, Marseille
	Mr Norbert ROLLAND, Grenoble
	Mr Jan TRAAS, Lyon

Representatives present during the visit

Scientific Delegate representing AERES:

Mr Steven BALL

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

Mr Thierry GAUDE, CNRS

Mr Eric WESTHOF, University of Strasbourg

Report

1 • Introduction

Date and conduct of visit:

The review committee visited the IBMP in Strasbourg from Monday, December 12 to Wednesday, December 14, 2011. Presentations of the research projects of the different teams were made in the lecture room of the IBMP in sessions open to the whole of the unit. The program for the visit was organized with the delegate of the AERES, the committee president and the present Director of the IBMP. The organization of the visit was very satisfactory and overall, the presentations were of very good quality. At the onset of the first day, an overview of the Research Unit by the Director was given. Subsequently, scientific presentations were made department by department. The IBMP has four departments and after a short introduction of the Departments, each individual team leader presented his/her research. After each presentation, the review committee discussed with the presenting team leader. A strict time schedule was maintained in which all team leaders gave a 18 min presentation followed by 12 min questions. At the end of all presentations of one Department, the review committee discussed the relative merits of each Department team in a closed meeting. At the end of the on-site visit the evaluation of all team leaders was re-discussed. Additional meetings organized during these two days of visit facilitated further exchanges between the committee members and the different categories of the IBMP personnel, namely technicians/engineers, PhD students, staff scientists and directors. The evaluation committee also met with the vice-director for Research and Doctoral Training of University of Strasbourg (UdS) and the Scientific Director for Plant Science of the CNRS.

History and geographical location of the unit, and overall description of its field and activities:

The IBMP was created in 1988 and is located on two sites in Strasbourg: the main research building harboring about 80% of the personnel and additional space (two floors) in the Botanical Institute of UdS, hosting the remaining 20% of the personnel. The IBMP has a close association with UdS and approximately one third of the research staff is from the University (Professors and Assistant Professors). The IBMP is presently the largest CNRS Institute devoted to integrative research in plant biology. The IBMP has outstanding research in a number of areas including the study of the plant mitochondria and the mechanisms by which mitochondria communicate with nuclei; the analysis of plant-virus interactions; research on the biosynthesis of secondary metabolites; and the study of various molecular and cellular mechanisms governing plant development with emphasis on targeted proteolysis and cell cycle control; small RNAs and epigenetics. Much of the research uses the model plant Arabidopsis thaliana and only recently have other model systems, such as Brachypodium, been introduced. IBMP has several technology platforms including DNA sequencing and qPCR; proteomics; metabolomics; bioinformatics; protein purification and microscopy.

Unit workforce:

Workforce	Number on 06/30/2011	Number on 01/01/2013	2013-2017 Number of producers**
N1: Professors or assistant professors	8,015	11,1	18
N2: EPST or EPIC researchers	26,327	29,3	31
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff *on a permanent position	8,17	8,10	
N5: Engineers, technicians and administrative staff * on a non-permanent position	4,5		
N6: Postdoctoral students having spent at least 12 months in the unit	26,725		
N7: Doctoral students	26,355		
N8: PhD defended	28		
N9: Number of Habilitations to Direct Research (HDR) defended	1		
N10: People habilitated to direct research or similar	27	28	
TOTAL N1 to N7	**100**	**48,5**	**49**

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

Definition and downloading of criteria:

http://www.aeres-evaluation.fr/Evaluation/Evaluation-des-unites-de-recherche/Principes-d-evaluation.

2 • Assessment of the unit

Overall opinion on the unit:

The mission of the IBMP is to further explore plants in order to discover novel mechanisms in biology. The review committee unanimously found that the IBMP has remarkably well accomplished this mission. The IBMP is one of Europe's leading research centers in Plant Biology. Its scientific output is outstanding, in particular when the high average impact of the journals in which the IBMP researchers have published, is taken into account. Research performed by the IBMP is also characterized by a high level of innovation and originality. A number of the IBMP groups are world-class in their specific research areas. Internationally, the IBMP is in particular known for its work on small RNAs and gene silencing; plant-virus interactions; its unique expertise on cytochrome P450 enzymes and secondary metabolites; its high class work on the role of targeted proteolysis in plant development and its unique breadth of research on plant mitochondria and cell cycle control.

Strengths and opportunities:

- The IBMP has an excellent publication record, mainly characterized by the very high average impact factor of the journals in which research of the institute gets published. The committee would like to encourage this policy of high impact publishing as it further will contribute to the international visibility of the IBMP.

- The IBMP has an excellent staff consisting of very innovative and dynamic scientists and outstanding technicians and engineers.

- The IBMP is supported by very well appreciated technology platforms. Approximately 50% of the technicians/engineers work for these platforms. The team leaders and research staff expressed that the technology platforms operate very efficiently. Governance of the platforms is mainly done by the users.

- The IBMP unit is well balanced between research and education in order to form the next generation of top class scientists.

- In the coming years, several of the current group leaders will retire or leave the IBMP, thereby providing excellent opportunities to consolidate existing groups and if desired, to attract new outstanding young scientists.

- The IBMP has an excellent international reputation to whom graduate students and postdocs are attracted.

- The IBMP has a large number of national and international colloborations contributing extensively to knowledge transfer and strenghtening research directions for which the IBMP has no direct expertise.

- Technicians/engineers seem to be well motivated, however, there are more concerns with the PhD students and postdocs who would like to be more involved in the daily operation of the institute.

Weaknesses and risks:

- The IBMP has several groups with a sub-critical size. Such groups are too small to be competitive at the international level and thereby they miss opportunities to obtain funding inside and outside the French research community. The current director has attempted to rationalize the number of research teams but these efforts need to be pursued in the next five-year term.

- In general there is not sufficient funding for individual research groups, certainly not when compared to international standards. The risk is that the best teams will become frustrated and their top researchers might start to consider other positions abroad.

-Although several teams were very successful in obtaining international grant money, the review committee would like to see all groups making comparable efforts towards attracting foreign grants (e.g. EU, HFSP). Several researchers at the IBMP certainly have sufficient international reputation to take on a leading role in cooperative funding efforts, e.g. by initiating and leading an EU-FP constortium (rather than just depending on invitations to join one).

- Many groups are headed by researchers that worked previously in the IBMP. Whereas the committee members have no doubt on the excellent quality of these researchers, it is feared that this recruitment policy creates too much "in-breeding" and not enough input of novel approaches.

- There is a concern that the IBMP is not sufficiently prepared to implement cutting edge high-throughput technologies such as Next Generation Sequencing; automated plant phenotyping and high-level bio-informatics and systems biology. Too few groups have been using the power of these approaches and currently the hurdles to do so within the IBMP are too high.

- There is a concern that assistant professors and professors that are employed by the University of Strasbourg have a teaching load that is too heavy, leaving less time to perform research of the highest level. A correct balance between teaching and research has to be found. It is also suggested that the non-university staff members become more involved in teaching.

- The IBMP has to prepare for the likely event that research on Arabidopsis will receive less funding in favor of funding to work on crops.

- The number of internal collaborations between researchers present within the IBMP is subject to improvement.

- Nowadays interdisciplinary approaches increase the likelihood that papers will become published in top journals and the IBMP should further explore the in-house possibilities or seek for collaborations with other research groups in France or abroad.

- The IBMP members that work at the Botanical Institute feel less supported when compared to researchers that work in the main IBMP building. The extension of the existing main building is likely to solve this problem.

- The team leaders and permanent scientists are not sufficiently associated with the decision making process of the IBMP.

Recommendations:

- In general, most teams are, considering their relatively small size, involved in too many different projects and more reflections on which project to start or continue would be very helpful. Good science often starts with the question "What NOT to do?".

- The Institute has too little capacity in bio-informatics and data-mining and this rapidly evolving field needs to be strengthened. The institute also needs to develop a strategy (a data analysis pipeline) to implement Next Generation Sequencing (NGS) in their various research programs. The funding provided by LABEX provides a good opportunity to make rapid progress with the implementation of such a strategy.

- To set up structures in order to better capture the intellectual value of research performed at the IBMP. The IBMP, with its cutting edge research, has made a number of seminal discoveries with far reaching potential applications (e.g. in field of RNA silencing; virus control;…). However, the review committee has seen too little evidence that this value was converted in large industrial contracts or license incomes. The IBMP is encouraged to discuss with CNRS how such value capture can be achieved more efficiently. A local valorization office, working with different life science institutes in the Strasbourg area, would be prefered.

- There are ample opportunities to create more synergies in the IBMP, for example by devoting more efforts to various aspects of RNA silencing or to the involvement of proteolysis in various biological problems.

- The review committee is surprised that no female young team leaders were selected in recent years and recommends to take in consideration this gender issue.

- Although the IBMP is well-known internationally for its high quality research, no central thematic theme is presented. Such overarching theme, as seen for many other institutes, would help achieve international visibility.

- There is a clear lack of internal communication. More seminars by the IBMP team leaders and a system to introduce newcomers to the entire IBMP would help to solve this problem. Also an annual two days science retreat would be very helpful. It is also suggested that every team leader gives an official seminar every 1 to 2 years in order to introduce his/her research to the whole community.

- Every group or Department should be encouraged to have in addition its own annual brainstorm.

- There is need for a social room where people can meet and discuss casually.

- There is ample room to develop a more cooperative feeling for the IBMP. A yearly brainstorm meeting with the team leaders, preferentially outside the IBMP, would help to create a higher feeling of collegiality amongst the principial investigators. Such a meeting is also an excellent occasion to reflect together on the long-term strategy of the IBMP.

- The IBMP needs to strenghthen its communication with the public at large.

3 • Detailed assessments

Assessment of scientific quality and production:

The IBMP has an excellent publication record with an average number of 60-70 research articles annually in peer reviewed international journals. Most impressive is that the average impact factor (IF) is above 7.5 for the last five years. This high average impact factor is higher than the IF of the second best plant specific journal (PLANT JOURNAL, IF 6.9). The IBMP researchers have also published frequently in more general journals such as Cell, Science, Nature Genetics, Dev Cell, PNAS, PloS Genetics, EMBO Journal, Current Biology. Most teams have contributed to publications in high impact factor journals. The review board considers this steady high level output in terms of publications as highly impressive. There is no doubt that this is the main contributing factor to the excellent international reputation of the IBMP.

Below, we have made a non-comprehensive list of breakthroughs obtained by researchers of the IBMP:

- Detailed characterization of novel mechanisms of silencing suppressors interfering with the RISC effector of poleroviruses
- The role of TOR kinases in translational control
- Visualization of RNA trafficking in vivo
- The development of mathematical models that govern cell cycle progression in plants during mitosis and meiosis
- The development of an experimental system to study double fertilization in plants
- The development of a temperature inducible expression systems
- The molecular mechanism and pathways that regulate the activity of gamma-tubulin complexes
- The discovery of SCF-FBL17 as a main regulator of the cell cycle during male gametogenesis and in shoot and root meristems.
- The role of CRL3 MATH-BTB was highlighted in Abscisic acid signalling
- The demonstration that 21-NT siRNA are the mobile signal for gene silencing
- Major advances in understanding the biological role of P450 involved in the production of secundary metabolites
- Major contribution in the mechanisms of non-canonical polyadenylation/uridylation in plant genome expression
- The development of a ribozyme based strategy to knock-down mitochondrial gene expression
- The discovery of the first RNase P enzyme in plants and the demonstration that a PPR protein can catalyze this function
- Novel finding on cytoskeleton function and assembly

Assessment of the unit's integration into its environment:

The IBMP also filed 14 patents over the last five years. The review committee does not have enough information as to what extent these patents have created value for the IBMP. It was reported that the IBMP has/had cooperations with Bayer, Aventis, Syngenta, Goemar, Ball hortical, Adventa, SesVanderhave and Mane. However, it appears that most of these collaborations involve very few final returns for the IBMP. In general, the income from industry is considered too low, despite many attempts of the director to convince companies to enter in a collaboration with the IBMP. The review committee believes that a carefull patenting and technology transfer strategy has the potential to create substantial value for the IBMP. The review committee noticed that currently researchers experience many problems and unacceptable delays when dealing with the CNRS patenting office in Paris. The committee urges the CNRS to rethink its policies to ensure maximal protection of its intellectual property rights, as well to provide timely and efficient support of researchers in IP-related affairs.

It is interesting to notice that work on grapevine virus is performed in collaboration with INRA Colmar, an area of research that has a high valorization potential. To this end, an official collaboration (via an 'Unité sous Contrat') between CNRS and the INRA is considered and the review committee strongly endorses that such an agreement will be finalized.

Assessment of the research unit's reputation and drawing power:

Several IBMP members have a large international visibility and are considered leading scientists in their respective field. Several team leaders have received the CNRS Bronze medal; one team leader obtained the CNRS Silver medal, the prestigious EMBO gold medal, as well as the Bettancourt Prize: another obtained a prize of the Académie de Sciences. Many team leaders receive frequent invitations to give lectures at international conferences indicating the high level of scientific recognition of the research performed. During the last five years, over 200 invitations to talk at national and international symposia were counted. The high visibility of the IBMP members also facilitates attraction of international postdocs.

The IBMP's research is very well funded by CNRS and, when personnel is considered, also by UdS. Remarkably, when salaries of permanent members are excluded, approximately half of the research funds of the IBMP is derived from external sources both nationally as well as internationally. For the period 2005-2008, the IBMP was ranked second in the top list of institutes receiving most ANR "blancs" grants. In more recent years, ANR funding became more difficult to obtain. Some transnational funding (for instance 1 INTERREG project) has been obtained. Several IBMP projects obtained the LABEX status. Furthermore, the IBMP received substantial financial support from the EU: two ERC Starting grants; one Network of excellence; one Integrated EU Project; two KBBE projects and two Human Frontiers Programs. Nevertheless, not all groups are equally active or successful in attracting international grants and the review committee would like to encourage group leaders to become even more active at the international level, e.g by taking the initiative to coordinate an international project.

Almost all the IBMP members are very actively interacting with the scientific community. They are members of editorial boards (including the top ranked journals The Plant Cell and EMBO Journal) and they are often asked to review papers and to be part of various evaluation committees.

Assessment of the unit's governance and life:

The present director of the IMBP is Pascal Genschik, who works in close cooperation with an executive director. The Director has the final responsibility and also is the interface with the University of Strasbourg and the CNRS headquarters. The IBMP has four departments each headed by a Department Director. Currently, Arp Schnittger heads the department of Molecular Mechanisms of Phenotypic Plasticity; Laurence Drouard the department of Mitochondrial Biogenesis in the plant cell; Daniele Werck the department of Plant Metabolic Networks and Veronique Ziegler-Graff the department of Integrative Virology. Each Department has its own seminars (advertised to the entire department), but there are also institutional seminars for the entire institute. All PhD students have to present their work to the entire Institute. The four departments together currently host 19 research teams each led by one scientist. The IBMP has several decision making bodies. The scientific council is composed by the heads of the four Departments and advises the Director. In addition, an international Science Advisory Board (SAB) was installed that visits the Department about one year in advance of the AERES evaluation. The Department also has a Laboratory Council (Conseil de Laboratoire) that discusses important decisions of the Institute. The IBMP also has a Platform Committee that provides guidance to the Director on future technological developments.

The IBMP is well organized and its management is efficient. Collective discussions on ongoing projects/problems are organized through councils (management and scientific) that meet occasionally. These councils take collective decisions that are fully supported by members of the unit. The review committee would like to congratulate the acting director for his excellent leadership. However, the review committee noticed that communication within the IBMP can be significantly improved and it is suggested that the director develops a transparent strategy to involve the IBMP co-workers from all levels in the decision-making process. In addition, the director and team leaders should jointly develop a long term plan (5-10 years) to further develop IBMP as a top-institute in Plant Science

Currently, the IBMP is located on two sites, the main building (Rue du Général Zimmer) and space at the Botanical Institute of UdS. The Director succesfully took the initiative to enlarge the main building, the project is being called "Vegoia". The new extension will bring all the IBMP teams in a single building. It will also attract new teams, enlarge the plant growth facilities and create a novel and larger seminar room. The construction of the building will begin in 2012.

The IBMP also supports different levels of scientific animation. During the last five years, the IBMP has achieved an impressive list of national and international invited speakers. Proposals for invitations are made by either the teams individually or by the Scientific Council. Nevertheless, the review committee recommends that the IBMP becomes more active in communication with the public at large by e.g. having regular press releases of major findings; by having an "open-doors" day during which the public can visit the IBMP;… It is recommended that the IBMP coordinates its "service de communication" with other research centers in the Strasbourg area.

Assessment of the strategy and 5-year project:

During the last 4-year period, the IBMP was very well managed under the directorship of Pascal Genschik. The institute gained considerably more international visibility and can now be considered as one of France's and Europe's top institutes in Plant Sciences. The presence of several top class scientists definitely helped a lot to achieve this high visibility. The new director, Laurence Drouard, indicates that she will continue the policy that has been implemented by Pascal Genschik. The direction of the Department "Regulation and coordination of genome expression" (old name Mitochondrial Biogenesis) will be transferred from Laurence Drouard to Dominique Gagliardi. The new director has large international visibility and she is strongly supported by the IBMP. The review committee would like to congratulate the new director with this important responsibility and expresses the wish that under her leadership the name and fame of the IBMP will continue to grow.

The division of the IBMP in four departments is certainly an asset to keep the scientific focus and to simplify the management of the institute, but care has to be taken that each Department does not start to work too independently. It is in the interest of all research teams of the IBMP that the institute acts as one cohesive unit and when possible collaborates across all research departments. The future director's idea to organize a two-days internal IBMP seminar is an excellent tool to stimulate interaction between scientists. Furthermore an open but goal-oriented discussion policy of major directions to be taken can further help to create a more prominent cooperative IBMP spirit.

A number of research groups in the IBMP are too small to remain competitive at a time when international competition is rapidly increasing. The evaluation board therefore agrees with the vision of the new director, Laurence Drouard, that the number of teams has to be (slightly) reduced. In the next five year period, several team leaders will retire, thereby creating ample opportunities to reduce the number of teams and re-enforce existing top-class teams. It might also be possible to attract one or two additional teams that could join the IBMP.

Several technology platforms that guarantee the efficient use of equipment are installed. Examples are the production of proteins; qPCR, plant production platform;... About half of the technicians/engineers are employed in the different platforms. The management of every platform is different but involves the users of the different platforms. Each platform appears to work efficiently. Some of the platforms are shared with non-IBMP laboratories (e.g. UdS), who also contribute to their well-functioning. The technicians/engineers have good access to further advanced training.

The promotion and bonus policy of the technicians/engineers is within the IBMP not entirely transparent and could benefit from a more transparent communication strategy.

The evaluation board is concerned with the future of the Department Plant Metabolic Networks, in particular in the field of cytochrome P450 enzymes, in which they have a world-leading position. The review committee considers it of utmost importance that this expertise in maintained in France. However, it is currently unclear on how this research will be continued when the team leader retires. There is no clear contingency plan proposed. It is strongly advised that the IMBP discusses with members of the Department of Metabolic Networks to solve this future problem with the CNRS and/or UdS.

Assessment of the unit's involvement in training:

The IBMP has a close association with the University of Strasbourg and participates at various levels of education, at the L3, M1, M2 and PhD level. The IBMP is part of two doctoral schools: "Biologie végétale intégrative" and "Virologie". Approximately one third of the research staff of the IBMP is from the University of Strasbourg and is appointed as Professors or Assistant Professors. During the last 5 years, 38 PhD students started in the IBMP. It is advised that the IBMP closely monitors the output of the PhD students in term of publications.

The close interaction between the IBMP and the UdS is of mutual benefit for both partners. Clearly, the UdS much appreciates the high level involvement of the IBMP in teaching, while the IBMP is very pleased to host students and to provide them with a thorough training in order to form the next generation of top scientists. Scientists of the IBMP also are involved in some teaching activities and summer schools in other universities and research institutes mainly in France.

4 • Team-by-team analysis

Team 1: Viral Counter defence to RNA silencing and systemic movement

Team leader: Ms Véronique ZIEGLER-GRAFF

Workforce

Workforce	Number on 06/30/2011	Number on 01/01/2013	2013-2017 Number of producers**
N1: Professors or assistant professors	0,875	1	2
N2: EPST or EPIC researchers	1,125	1	1
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff * on a permanent position	0,75	0,7	
N5: Engineers, technicians and administrative staff * on a non-permanent position			
N6: Postdoctoral students having spent at least 12 months in the unit	1,175		
N7: Doctoral students	1,175		
N8: PhD defended	3		
N9: Number of Habilitations to Direct Research (HDR) defended			
N10: People habilitated to direct research or similar	3	3	
TOTAL N1 to N7	**5,10**	**2,7**	**3**

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

• Detailed assessments

Assessment of scientific quality and production:

The research group led by Veronique Ziegler–Graf is focusing on the characterisation and the mode of action of viral factors involved in plant-virus interaction. In particular, the group is interested in exploring the role of RNA silencing suppressor proteins (RSS) such as the P0 of poleroviruses and the p14 of BNYVV. In addition, the team studies the link between RNA silencing and long distance movement using genetic, biochemical and molecular biology approaches. The team identified several plant proteins interacting with the RSS proteins encoded by sugar beet infecting viruses (BWYV and BNYVV). The role of interactors in the RNA silencing suppression or in viral long distance movement is under investigation.

The group discovered a short sequence (RNA 3 coremin) at the 5' extremity of RNA3 of BNYVV and also confirmed its essential role for the expression of p25 protein and the systemic spread of the virus.

The group published 13 research articles and reviews and 3 book chapters, which is a good scientific achievement considering the group's size and the field of the research. The team also published a very good paper in a top journal (Current Biology in 2007), indicating the high quality research of the group. Unfortunately, such a high quality of published papers was not maintained since then. The average impact factor of the papers published by the team is below the IBMP average. The group has also two patents.

Assessment of the research team's integration into its environment:

The team developed a virus resistant sugar beet plant for a private company. The team was also very successful to obtain both national (ANR) and external EU funding between 2007-2011. The team collaborates with a number of internal and external groups.

Assessment of the research team's reputation and drawing power:

The team is well recognised internationally, which is demonstrated by participation of the team members at international meetings as invited speakers. The team actively participated in international (COST ACTION, European Network of Excellence) and national research networks. It also collaborates with foreign laboratories. It has published 4 joint papers.

Assessment of the strategy and 5-year project:

The proposed project for 2013-2017 is straightforward and continues the investigation of the two silencing suppressors P0 and P14. In particular, it includes the exploration of the molecular bases of the action of the two silencing suppressors. The group aims to investigate the molecular mechanism of P0-mediated AGO1 degradation, which is very interesting and poorly understood. Similarly, the molecular bases of phloem restriction of Poleroviruses are not known, therefore the identification of phloem specific plant proteins, which interact with viral factors, would be an important step to explore the mechanism of phloem restriction of this group of viruses. The proposed strategy is coherent with previous approaches used by the group. However, the actual size of the group is too small regarding to the number of proposed projects. The lack of the genome sequence for sugar beet is also a drawback. There is no indication of external funding for the next years.

Conclusion:

Overall opinion on the team

The research group of Veronique Ziegler–Graf has good scientific background. The scientific achievement of the team is good but not excellent in view of the size and funding of the group. The research is straightforward and dealing with both applied and basic questions. This activity is well illustrated by two patents of the team.

Strengths and opportunities

The group is successfully studying a still unexplored aspect of the very competitive RNA silencing field aiming to better understand the molecular bases of P0 and P14 silencing suppressors and the molecular bases of phloem restriction of Poleroviruses.

The group also discovered and characterized the 20 nts coremin sequence at the 5' extremity of RNA3 of BNYVV.

Weaknesses and risks:

The relative small size of the team is a risk in view of the proposed projects.

The lack of external funding for the next years might become a concern.

The committee noticed the lack of collaboration between two staff members of the team. There is no shared authorship for them among the listed articles published during the 4-year evaluation period.

Recommendation:

The team should make efforts to get funds for the next years.

The team should make efforts to enhance the integration of the group and develop a more focused project.

Team 2: Interactions between (para)retroviruses and host cells

Team leader: Ms Lyubov RYABOVA

Workforce

Workforce	**Number** on 06/30/2011	**Number** on 01/01/2013	2013-2017 **Number of producers****
N1: Professors or assistant professors		1	2
N2: EPST or EPIC researchers		1	2
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff * on a permanent position			
N5: Engineers, technicians and administrative staff * on a non-permanent position			
N6: Postdoctoral students having spent at least 12 months in the unit			
N7: Doctoral students			
N8: PhD defended			
N9: Number of Habilitations to Direct Research (HDR) defended			
N10: People habilitated to direct research or similar			
TOTAL N1 to N7		**2**	**4**

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

• Detailed assessments

Assessment of scientific quality and production:

Members of the "Interactions between (para)retroviruses and their hosts" team (1PR+1 DR+1MC+1IE) are studying the molecular process of viral infection and of translation reinitiation in plants. Their working model is the Cauliflower mosaic virus (CaMV), whose infection cycle provides an exceptional case of translation reinitiation. They made significant observations:

- They found that the RNA silencing suppressor activity of the viral TAV protein occurs in the nucleus.

- They demonstrated that the activation of reinitiation by TAV is dependent on the TOR/S6K1 signalling pathway.

- They discovered a novel plant factor, the RISP protein, interacting with TAV and enhancing its activity on reinitiation. They found that RISP was a downstream target of the TOR/S6K1 signalling pathway.

- They provided evidence that the cis-elements involved in the ribosomal shunt translation strategy might be conserved between plants and mammals.

Other interesting data have not been published yet.

The team has published 4 main research papers (3 EMBO J, 1 Nucleic Acids Research), 1 review paper (Plant Viruses) and 1 book chapter. One member gave seminars in 5 international conferences in France, Germany, USA and Italy. The team has also published several collaborative papers published in Biotechniques, Mol Plant-Microbe Interact and Nucleic Acids Research.

This scientific production, quantitatively, is not very high (ca 1 article/FTE/year), but the 4 main papers have been published in excellent journals (3 EMBO J, 1 Nucleic Acids Research).

One PhD student of the team got her diploma with no accepted publication.

Assessment of the research team's integration into its environment:

Two members of the team are faculty members teaching in Strasbourg University and can disseminate most recent knowledge on plant biology to many students. They have published a book directed toward a large audience on general plant virology written in French.

The team collaborates with several teams of the IBMP but also with other national and international colleagues. The team has been successful in getting two ANR grants and one ACI (CNRS). However, its basic research orientation has not led to any industrial contracts or patent application.

Assessment of the research team's reputation and drawing power:

A member of the team has been invited several times to international conferences. The team has been successful to attract young researchers (1 assistant professor, 2 post-docs and 3 PhD students). It collaborates with two American laboratories.

Assessment of the strategy and 5-year project:

The team will pursue its studies on how plants control RNA translation using a CaMV infection cycle as model: role of the plant factors RISP and TOR in plant translation, mechanisms of TOR activation of plant translation reinitiation in response to Auxin, mechanisms of CaMV 35S RNA nuclear export and role of alternative 35S RNA splicing in CaMV infection.

The expertise of the team and the arrival of an additional researcher give much credibility to the project. The project will also benefit from pertinent national and international collaborations and also from an ANR grant (2011-2015).

Conclusion:

Overall opinion on the team:

The team produces solid data published in high-ranking journals.

Strengths and opportunities:

The team has a well balanced staff composition (2 researchers, 2 faculty members, 1 engineer), a credible project and some financial support to launch the next contract.

The international research on TOR is extremely competitive but the team has original and promising entry points, in a virology context, to provide new insight in TOR biology.

Weaknesses and risks:

The research project of the team is very specialized and basic science oriented and as such may exclusively rely on public funds.

Recommendations:

The team should consider diversifying its objectives and find ways to translate some aspects of its work to industrial development.

Team 3: Macromolecular trafficking and intercellular communication in plants

Team leader: Mr Manfred HEINLEIN

Workforce

Workforce	**Number** on 06/30/2011	**Number** on 01/01/2013	2013-2017 **Number of producers****
N1: Professors or assistant professors	0,25		
N2: EPST or EPIC researchers	1,5	1	1
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff * on a permanent position	0,43		
N5: Engineers, technicians and administrative staff * on a non-permanent position			
N6: Postdoctoral students having spent at least 12 months in the unit	2,71		
N7: Doctoral students	1,81		
N8: PhD defended	4		
N9: Number of Habilitations to Direct Research (HDR) defended			
N10: People habilitated to direct research or similar	2		
TOTAL N1 to N7	**6,7**	**1**	**1**

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

• Detailed assessments

Assessment of scientific quality and production:

The team investigates the mechanisms of viral movement mediated by the Tobacco Mosaic Virus movement protein (MP), using a variety of cell biology approaches. The team leader has a long-standing international recognition in this field. Recently, the focus was made on the study the impact of the MP has on RNA silencing. Very important results were obtained showing that MP can interact with the cytoskeleton and with plasmodesmata. New cell biology approaches were developed. Publication records in this field are very good (Plant Journal, Plant Physiology) . A new role of MP in modifying small RNA populations and enhancing the spread of RNA silencing was demonstrated leading to an excellent publication (Plos Pathogens). The team leader is frequently invited at international meetings.

Assessment of the research team's integration into its environment:

The PI is also team leader in Basel and is teaching in the university of Basel. Although the integration of the two teams is good, teaching would certainly be better used in the University of Strasbourg. The external funding is clearly excellent ,both at the national and international level, incuding private company resources (EU, Syngenta, Human Frontier, ANR). The integration is very good within the institute (others teams of the virology department, RNA silencing group) and in the Strasbourg Campus for development of new cell biology tools (fluorescent RNA) and the innovative use of functionalized viral nanoparticles in biomedicine.

Assessment of the research team's reputation and drawing power:

Overall, the team has high international visibility and an excellent capacity to attract post-docs and students linked to the high success in competitive funding. The team participates in several international programs (Human Frontier, EU Cost, France Berkeley) and collaborates with many foreign laboratories. Many foreign postdocs were hired.

Assessment of the strategy and 5-year project:

The project includes both the continuation of research on the mechanisms of viral movement mediated by the MP and a new line of research concerning the role of the MP and viral infection on the movement of RNA silencing and its interplay between the MP protein and the 126K silencing suppressor. This includes also the role of viral sRNA in modification of host cell gene expression. This is a rather ambitious project that will require several students and post-docs. Given the small size of the team, external funding will be required. It seems that the understanding of the role of MP in viral movement is progressively losing momentum, possibly because of limits either technological or intrinsic to the system. This is attested by a slight decrease in publication impact in recent years. The development of new innovative technologies of "in vivo" RNA labelling will possibly give a fresh insight to this research. However, the interplay between viral movement/RNA silencing/host responses may be more rewarding in the future and will possibly lead to enhanced interactions with others IBMP teams.

Conclusion:

Strength and opportunities:

The team has an excellent international visibility in his field and has attracted an impressive number of external contracts. The cell biology knowledge will be rewarding in an emerging project that will strengthen the integration with the institute. Good interactions have been established with other UdS campus teams.

Weaknesses and risks:

Progress in the field will depend on the establishment of new technologies. Given the actual size of the team and depending on access to new grants the strategy must be carefully evaluated.

Team 4: Structural and molecular basis of virus-host interactions

Team leader: Mr Christophe RITZENTHALER

Workforce

Workforce	Number on 06/30/2011	Number on 01/01/2013	2013-2017 Number of producers**
N1: Professors or assistant professors		0,5	1
N2: EPST or EPIC researchers		0,5	1
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff * on a permanent position			
N5: Engineers, technicians and administrative staff * on a non-permanent position			
N6: Postdoctoral students having spent at least 12 months in the unit			
N7: Doctoral students			
N8: PhD defended			
N9: Number of Habilitations to Direct Research (HDR) defended			
N10: People habilitated to direct research or similar			
TOTAL N1 to N7		**1**	**2**

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

• Detailed assessments

Assessment of scientific quality and production:

Members of the "Structural and Molecular basis of virus-host interactions" team (1DR+1MC) are studying plant molecular factors involved in virus movement through plasmodesmata (Pd) and involved in viral RNA replication. They are also studying viral determinants required for nematode mediated transmission. Their working model is the Grapevine fanleaf virus (GFLV) which has the ability to also infect Arabidopsis.

They contributed to the discovery of a novel family of Pd-located proteins (PDLPs) interacting with the viral movement proteins (MPs) and involved in MP tubule formation. This is an important finding providing insights into the role of Pds in the movement mechanism of plant viruses within their hosts.

They identified a positively charged pocket at the surface of the viral coat protein that defines a key determinant for nematode-mediated virus transmission. This is an important contribution in the field providing a first structural insight into how a specific interaction can be established between a plant virus and its nematode vector.

They showed that the viral protein 2A, a protein required on cytoplasmic ER aggregates for GFLV RNA2 replication, can also be located in the nucleolus when associated to the protein 1A. This finding suggests that the A1/A2 complex might be needed for different processes depending on its subcellular localization.

These results have been published in 5 main research papers (2 PLoS Pathogens, 1 J Virol, 1 J Struct Biol, 1 J Plant Pathol) and in 1 review paper (Mol Plant Microbe Interact). They have been communicated in 2 international conferences in Italy and in Australia. The team has also published a collaborative paper (Plant Physiol).

Although this total number of papers may appear a little on the low side (0.9 article/FTE/year), this remains a very good production considering the scientific quality of the papers published in excellent journals, and the fact that the team was recently set-up (2010) and has no technical staff.

One PhD student of the team got her diploma with no accepted publication.

Assessment of the research team's integration into its environment:

One member of the team is a faculty member teaching in Strasbourg. The team has been successful in getting public funds from ANR and Région Alsace and in collaborating with other teams of Strasbourg outside of IBMP. The team is aware of the economical importance of its research, but has not got the opportunity to file any patent or to get industrial contracts. However the team has established strong collaborations with INRA colleagues of Colmar and is in the process of being recognised as a USC by INRA.

Assessment of the research team's reputation and drawing power:

The team has been successful in attracting young researchers (1 post-doc and 3 PhD students). It has established a strong collaboration with the John Innes Center (Norwich, UK). A member of the team has been invited to 2 international conferences.

Assessment of the strategy and 5-year project:

The team presents an interesting and well structured 5-year project divided in three independent axes of research (the same as in the previous contract). The project aims at further characterizing i) the protein complex driving GFLV through plasmodesmata, ii) the interaction between the 1A/2A complex and host proteins, and iii) the nematode receptor that specifically recognize GFLV. The experimental strategies using approaches of molecular biology, structural biochemistry and microscopy are well described. Some preliminary data have already been obtained and important collaborations have already been established.

One member of the team has had an experience coordinating a 4-year ANR project.

The main risk taken by the team is to achieve only part of its projects because of its small size (1.5 research FTE) and of the lack of technical support.

Conclusion:

Overall opinion on the team:

The team has contributed to important findings published in excellent journals in the field of virus movement in plants and nematode-mediated virus transmission.

Strengths and opportunities:

The team seems to follow interesting and original tracks with a good international leadership. Its GFLV model (often compared to the closely related ArMV) is excellent to further investigate how plant viruses are recognized by their nematode vectors and transported in plant tissue through plasmodesmata. Knowledge of more general significance on the biology of plasmodesmata should also be produced by the team.

Weaknesses and risks:

The main weakness of the team is its small size and the lack of permanent technical staff. The risk is to have developed an oversized project.

Recommendations:

If the economical impact of GFLV on grapevine industry is still considered by the team as the first justification of its research, the team should also consider developing relationship with industrial partners.

Team 5: Cell and development biology

Team leader: Mr Arp SCHNITTGER

Workforce

Workforce	**Number** on 06/30/2011	**Number** on 01/01/2013	2013-2017 **Number of producers****
N1: Professors or assistant professors			
N2: EPST or EPIC researchers	1	1	1
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff * on a permanent position	0,75	2	
N5: Engineers, technicians and administrative staff * on a non-permanent position			
N6: Postdoctoral students having spent at least 12 months in the unit	6		
N7: Doctoral students	6		
N8: PhD defended			
N9: Number of Habilitations to Direct Research (HDR) defended			
N10: People habilitated to direct research or similar			
TOTAL N1 to N7	**13,75**	**3**	**1**

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

• Detailed assessments

Assessment of scientific quality and production:

The team is currently composed of one DR2, one IE2 and 1 AI2, 4 post-docs and 5 PhD students (most of them close to their defence). At the beginning of the next 5-year period, a CR1 will have joined the group. The general topic is cell proliferation as a determinant of growth. Initially focused on trichome development, the group has turned its attention more to the reproductive phase, i.e. gametophytic and early seed development. In this context, the team uses molecular genetics, cell biology and biochemistry. Arabidopsis and, more recently, Brachypodium are used as model systems. Work over the last years has covered a wide range of topics, amongst the major results, the report mentions:

- A detailed transcriptomic analysis of gene expression during trichome development leading to the identification and functional characterization of novel regulators.

- Unexpected characteristics of the coordination between endosperm and embryo development, as well as the identification of regulators involved in this process.

- Work on epigenetic regulation, revealing an important role of polycomb regulatory complexes during different steps of seed maturation.

- Several genes involved in growth regulation, from transcription factors to cell wall related genes and cell cycle regulators.

- Gene and protein dynamics during cell proliferation and growth.

The group leader has an excellent reputation, and his group has produced 23 publications in peer reviewed journals over the last 5 years. This includes publications in major journals including Nature, P.N.A.S, PLoS Genetics and Plant Cell. Part of this work was performed before his arrival, but the group leader has been able to maintain his outstanding level after his move to Strasbourg.

Assessment of the research team's integration into its environment:

The group has maybe not (yet) developed a very active strategy toward promoting industrial applications or collaborations, but this is more than compensated by its ability to obtain external funding. Indeed, the excellence of the team leader has been recognized by several important funding agencies, we note that he has obtained prestigious grants such as the ERC-starting grant and CNRS-ATIP grant. He is involved in an interregional project.

Assessment of the research team's reputation and drawing power:

The group leader is very dynamic and has numerous collaborations, in and outside the institute, both national and international. He is regularly invited to conferences or to write reviews and has a clear international visibility. He has been awarded an EMBO YIP status since 2007 and, as indicated above, he has obtained very prestigious sources of funding.

Assessment of the strategy and 5-year project:

For the coming years, the group will continue its work on meiosis and seed development. Work on seed development will concern the coordination between embryo and endosperm development focusing on the cell cycle and epigenetic control. Modelling approaches start to be incorporated in the projects, which is an excellent development and should take the group towards more quantitative approaches.

Conclusion

This is a very strong group with an excellent level of external funding. It is led by a very creative and dynamic scientist and there is no doubt that it will continue to produce excellent science. Although the group should not experience any major problems in attracting new contracts, with both ATIP and ERC funds ending, there might be some concern around long-term perspectives. This has been recognized by the IBMP and CNRS and both technical staff and a young scientist have joined the group. The committee recommends a continuation of this strong support over the next period.

Team 6: Role of spindle assembly factors in cell cycle regulation and genome maintenance

Team leader: Ms Anne-Catherine SCHMIT

Workforce

Workforce	**Number** on 06/30/2011	**Number** on 01/01/2013	2013-2017 **Number of producers****
N1: Professors or assistant professors	1,25	1,5	3
N2: EPST or EPIC researchers	1,312	1,5	2
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff * on a permanent position			
N5: Engineers, technicians and administrative staff * on a non-permanent position			
N6: Postdoctoral students having spent at least 12 months in the unit			
N7: Doctoral students	1		
N8: PhD defended	2		
N9: Number of Habilitations to Direct Research (HDR) defended			
N10: People habilitated to direct research or similar	3		
TOTAL N1 to N7	**3,56**	**3**	**5**

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

• Detailed assessments

Assessment of scientific quality and production:

The team is currently composed of 1 professor, 2 associate professors, 2 permanent scientists (CR1) and 2 PhD students. The team is working on spindle formation and microtubule dynamics. In this context, Arabidopsis is used as a model system. Part of the work has focused on TPX2-homologues. These are proteins involved in spindle assembly in acentrosomal cells. Another aspect concerned a careful functional analysis of GIP proteins, associated with microtubule nucleation.

In particular in view of the high teaching load of the team and the involvement of one CR1 in directing the laboratory, the publication rate is very good. It has been involved in 16 publications over the last 4-year period. The team members are first and/or last authors on 5 of these articles. One paper in Plant Cell stands out and confirms the longstanding reputation of the team in plant cell biology.

Assessment of the research team's integration into its environment:

The team has taken great care in trying to promote their work through possible applications. Patents have been filed, and the team has made a substantial effort trying to exploit these patents. It should also be noted that they very actively contribute to the teaching and training of students. It is hard to evaluate the precise impact, but there is no doubt that this contributes to attracting students to the institute. Unfortunately, the group has not been able to obtain a satisfactory level of external funding, leaving them with just two PhD students. No clear explanation was given for this situation.

Assessment of the research team's reputation and drawing power:

The team has an excellent reputation in the field of plant cell biology and has active collaborations within and outside France. Nevertheless, its attractiveness seems to be limited at the moment. Only one participation in an international conference was mentioned in the report and, as indicated, no funding for post-docs has been obtained. This might be linked to the fact that the team is active in a relatively specialised field which is more realistic in terms of research strategy, but reduces somewhat its visibility.

Assessment of the strategy and 5-year project:

Future work will continue along the same line, attempting to establish an integrated view of the cascades in which GIP and TPX-like proteins act. In view of the means currently available, it is very pragmatic and realistic to propose such a well-focused programme. As a result, there is little doubt that the level of scientific production will be maintained in the coming years. However, it is not clear how viable and visible the topic is in the long run and the committee encourages the group to develop further certain ongoing collaborations within the IBMP.

Conclusion:

This is a group working on an interesting, well-defined topic, which has produced good science. The team seems to currently lack momentum. In particular it experiences severe problems in obtaining funding. This might be partially due to the high teaching load of a majority of the permanent team members. The committee noted that this teaching load exceeds the established standards and means might be sought to reduce this. In addition, with two permanent CNRS researchers, this does not entirely explain the current situation. During the coming funding period, it might be advisable to change the scope of the research carried out. In this context, the committee encourages the group to further develop their collaboration with other teams of the department. It seems that in particular the 'Cell and Developmental Biology' team would further benefit from such collaboration.

Team 7: Role of ubiquitin in cellular regulations

Team leader: Mr Pascal GENSCHIK

Workforce

Workforce	**Number** on 06/30/2011	**Number** on 01/01/2013	2013-2017 **Number of producers****
N1: Professors or assistant professors	0,68	1	2
N2: EPST or EPIC researchers	3,62	2	2
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff * on a permanent position	1,81	1	
N5: Engineers, technicians and administrative staff * on a non-permanent position	0,47		
N6: Postdoctoral students having spent at least 12 months in the unit	4,37		
N7: Doctoral students	2,31		
N8: PhD defended	2		
N9: Number of Habilitations to Direct Research (HDR) defended	1		
N10: People habilitated to direct research or similar	3		
TOTAL N1 to N7	**13,26**	**4**	**4**

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

• Detailed assessments

Assessment of scientific quality and production:

Major results were obtained and published in all topics of investigation:

1) The Anaphase promoting complex responsible for cyclin B degradation in mitosis, was found to be constitutively active in post-mitotic cells and developmental defects were found in APC/C mutants. The SCF FBL17 Fbox protein was shown to be a key regulator of cell cycle progression in male gametophytes.

2) The CULLIN3 protein was found to be a key regulator of ethylene synthesis and root development. The role of CRL3 MATH-BTB was highlighted in Abscisic acid signalling. Major results were also obtained on the stability of DELLA protein in response to GA signalling. DELLA contribution to cold acclimation was shown to involve the transcriptional activator CBF1. Finally DELLA appears to regulate plant growth and survival through the modulation of reactive oxygen species production.

3) The CULLIN4 E4 ligase was shown to repress gene expression through physical and functional interaction with the epigenetic regulatory Polycomb repressive complex2 protein.

4) Evidences support that the polerovirus P0 protein regulate RNA silencing during viral infection by destabilizing Argonaute1.

The group had and abundant production (24 publications) over the last 4 years in high impact factor journals including Developmental Cell, Current Biology, PloS Genetics, PNAS, EMBO J, Development, Plant Cell and Plant Journal.

Assessment of the research team's integration into its environment

The group has many internal (e.g with Ziegler Graff's group on the mechanism of Argonaute protein degradation during viral infection) as well as external collaborations at the national, european and cross border (INTERREG) levels. The excellence has been recognized by several important funding agencies including ANR (4) and EU projects (3) and a Labex. It should be noted that the team leader had a heavy administrative duty as the director of the IBMP.

Assessment of the research research team's reputation and drawing power

The team leader has an excellent reputation and is a world leader in the field of protein degradation in plants. He received the Gautheret Price of the french academy of science in 2011 and was invited at many national and international conferences on protein degradation and Plant Biology. He is an editor of the Plant Cell, the world leading journal in Plant Biology. The group was very efficient in attracting post-docs (6).

Assessment of the strategy and 5-year project:

For the coming years, the group proposes to pursue his successful work on various aspects of the cellular functions of culling-Ring ligases. Most of the proposed research axes are already funded and there are good chances that the research excellence will be maintained during the next period. An effort has been made to strengthen interactions between previous topics with, for example the emergence a novel research axis on the hormonal regulation of cell cycle regulators.

Conclusion:

This is a very productive group with a dynamic leader, displaying an excellent publication record in major journals and showing success in obtaining funds. Strong external collaborations are also pursued. There might be some concerns with decrease in funding and loss of senior staff members. If this should occur, it might turn out important to limit the number of topics and reinforce interactions between topics.

Team 8: Epigenetic mechanisms in signalling of plant development

Team leader: Mr Wen-Hui SHEN

Workforce

Workforce	**Number** on 06/30/2011	**Number** on 01/01/2013	2013-2017 **Number of producers****
N1: Professors or assistant professors	0,5	0,5	1
N2: EPST or EPIC researchers	1,31	2	2
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff * on a permanent position	0,31		
N5: Engineers, technicians and administrative staff * on a non-permanent position			
N6: Postdoctoral students having spent at least 12 months in the unit	1,29		
N7: Doctoral students	2,20		
N8: PhD defended	3		
N9: Number of Habilitations to Direct Research (HDR) defended			
N10: People habilitated to direct research or similar	1		
TOTAL N1 to N7	**5,61**	**2,5**	**3**

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

• Detailed assessments

Assessment of scientific quality and production

The team is working at the interface of epigenetic and transcriptional regulation. It seems to have found a niche in studying three families of proteins: Nucleosome assembly factors, SET domain histone methyl transferases and RING proteins involved in histone ubiquitylation. The principal approach is reverse genetics. Among the prominent results is the role of histone methylation in flowering time control and in sporophyte and gametophyte development. It is not a large team (2 researchers, 1 assistant professor, 1 engineer) and the production is regular and of very good to excellent quality (16 publications) some in high profile journals (Curr. Biol, Plant Cell, Mol Cell Biol). All team members are publishing.

Assessment of the research team's integration into its environment

2 ANR funded projects on the evaluation period, several fellowships (the team has a good connection to attract Chinese students and postdocs). No large international projects were obtained. One member of the team is assistant professor, however the implication of others members in teaching is low and may be improved.

Assessment of the research team's reputation and drawing power:

The team has a good capacity to attract post docs and students (3 postdocs and 5 PhD in 4 years) and a well established collaboration network in France, Europe and China with several co-publications.

Assessment of the strategy and 5-year project

The project is in continuity with the ongoing research. Emphasis will be made on protein biochemistry to understand mechanistic aspects of chromatin regulation, however integration of chromatin regulation with overall physiology and particularly signalling to chromatin is somewhat lacking.

Conclusion

The team has an excellent expertise in chromatin biology and good visibility. Important tools were established. The scientific production is excellent but gives an impression of a lack of focus probably owing to the, not so surprising, establishment that a wide range of phenotypes (flowering, pathogens, abiotic stress etc…) result from altered gene regulation which is caused by mutations that modify chromatin structure. In regard of the rather small size of the team, the team may think about moving from an essentially descriptive phenotypic analysis of chromatin mutants to a more mechanistic analysis linking chromatin structure to defined and chosen phenotypical outputs. The group leader may consider identifying genome wide substrates of the chromatin regulators under investigation, to ultimately identify the molecular mechanisms underlying the observed phenotypes.

Team 9: Mechanisms and roles of RNA silencing in eukaryotes

Team leader: Mr Patrice DUNOYER

Workforce

Workforce	**Number** on 06/30/2011	**Number** on 01/01/2013	2013-2017 **Number of producers****
N1: Professors or assistant professors	1	1	1
N2: EPST or EPIC researchers	2,92	3	3
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff * on a permanent position	1,6	1	
N5: Engineers, technicians and administrative staff * on a non-permanent position	3,6		
N6: Postdoctoral students having spent at least 12 months in the unit	4,9		
N7: Doctoral students	2,07		
N8: PhD defended	2		
N9: Number of Habilitations to Direct Research (HDR) defended			
N10: People habilitated to direct research or similar			
TOTAL N1 to N7	**16,09**	**5**	**4**

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

• Detailed assessments

Assessment of scientific quality and production:

This team studies the roles of RNA silencing in plants and animals. They have had very significant activities in several aspects of this vast domain of research, including the study of cell-to-cell spreading of RNA silencing, the mode of action of miRNAs and the link between RNA silencing and classical bacterial and viral defense mechanisms. In the study of the cell biology of silencing movement, the team made key contributions by demonstrating that siRNA duplexes (and not their precursors nor their single stranded AGO-bound versions) are the mobile entity in plants. They also discovered that stress-induced endogenous siRNAs, produced by all four DCLs, move from cell-to-cell and can induce in trans transcriptional and post-transcriptional silencing of targets. On the mode of action of miRNAs, the team used a very productive unbiased genetic screen to show that the action of most miRNAs involves a combination of endonucleolytic cleavage and translational repression. They further showed in plants and animals that a strong link exists between miRNA action and membrane-bound factors. Using a biochemical approach, they identified the protein partners of six of the ten AGO proteins. By focusing first on AG01 partners, they discovered that many of them form a translational repressor complex that allows AGO1 to bind to mRNAs without inducing their slicing. The team also made important contributions to decipher the role of RNA silencing pathways in plant innate immunity. They discovered that the miRNA pathway is one of the most upstream signaling components of the plant innate immune system and is down-regulated by the action of several bacterial proteins. They further observed that AGO1 is a prime target of bacterial and viral suppressors and that classical disease resistance (R) proteins are important for RISC complex assembly. The team also worked on the mode of action of viral suppressors of RNA silencing (VSR). They discovered that the developmental defects induced in plants constitutively expressing several VSRs are linked to the up-regulation of a single gene (ARF8). They also found that one VSR, P38, contains two AGO-binding GW motifs. GW motifs are typically found on several host proteins involved in the assembly and function of RISC. The hijacking of a GW motif by P38 allows this VSR to bind and quench AG01 activity. Finally, the team showed that a cellular GW-motif protein (SDE3) is likely to recruit AG01 and RDR6 on single-stranded RNA templates and facilitate the formation of double-stranded RNA substrates for DICER. The scientific contribution of this team in the reporting period (2008-2011) is exceptional. The main research projects of the team led to the publication of 12 articles in high impact journals (such as Sciences (3 times), Nature Genetics, Nature Cell Biology, EMBO Journal (2 times) and Genes and Development). In addition, the team published 10 collaborative papers, again in top ranking journals (such as Cell, Science and PNAS) and 16 reviews and book chapters. They also have generated one patent. This team is without any questions, one of the top international leaders in the field of RNA silencing at the moment.

Assessment of the research team's integration into its environment:

The team has very good interactions with four other teams in the Institute. They are also members of a recently created LABEX that includes two other teams of the Institute. They have a large number (more than 15) productive French and foreign collaborators, attested by their 10 collaborative papers during this time period. The team coordinated 2 ANR projects and participated in 2 others. They were also partner in 2 EU Integrated Projects. The former team leader is the holder of an ERC Starting Grant and the new team leader holds an ANR "jeunes chercheurs".

Assessment of the research team's reputation and drawing power:

The former team leader is an Editorial board member of the EMBO Journal, EMBO reports and Trends in Genetics. He is the Senior Editor of Silence, was the Senior Editor of Molecular Plant Pathology (2005-2008) and an external evaluator for many European and North American organizations. He is an elected permanent member of EMBO (2007), he obtained the FEBS Anniversary Prize (2007), the Silver Medal from CNRS (2007), the "Grand Prix de la Fondation Liliane Bettencourt pour les sciences du vivant" (2008), the "Grand Prix de la Fondation Louis D. Institut de France" (2009) and the EMBO Gold Medal (2009). He was invited as keynote/plenary speaker or session chairman in more than 70 international meeting between 2007 and 2011. He organized or co-organized several national and international meetings, including the International Keystone meeting on RNAi to be held in 2012. The challenge for the new team leader will be to gain visible independence and international reputation, pursue at least some own lines of research and start publishing independently of the former group leader in the near future.

Assessment of the strategy and 5-year project:

The team 5-year project is a sensible combination of follow-ups of former projects and of new projects. In the study of cell-to-cell mobility of RNA silencing, the team will map mutations from the previous genetic screen, but will also set up a new screen that will bypass the selection of dcl4 mutants and allow for the detection of movement components. They will also deliver by bombardment labeled siRNAs in cells of mature leaves and follow by confocal microscopy the movement of these small RNAs in wild type and several mutant plants. In the study of VSR, the team will focus on P15. They will analyze the IP/mass spectrometry data they obtained recently to characterize genetically and biochemically P15 interactors. In parallel, they will set up a new EMS mutagenesis using the SUC:SUL silencing system introgressed in P15 transgenic plants. The team will also pursue the work on the characterization of SDE3 and its involvement in transitivity. As new projects, using a genetic and a genomic approach they will study the contribution of the miRNA pathway to the process of tumor (crown gall disease cause by Agrobacterium) and callus formation in Arabidopsis. They will also study the crosstalk between TGS and PTGS RNA silencing using a collection of mutants and antibodies. Finally, they will study the link between DNA damage and RNA silencing especially the role of RNA silencing factors in DNA damage recognition. The different projects are very promising. It is however difficult to estimate the contribution, in terms of project management and leadership, of the new team leader, especially since the former team leader is involved in most of the team's projects. The degree of autonomy and the workforce directly under the supervision of the new team leader are therefore difficult to evaluate.

Conclusion

The team is a world leader in the field of plant RNA silencing and has several important collaborations and many research contracts. Team management may be complicated by its dual localization (Strasbourg and Zurich). Despite its world leader position and its capacity to generate important breakthroughs with high potential for applications, the team has generated a surprisingly low amount of patents. The team should invest more energy either in promoting industrial applications or collaborations or ensuring a more optimal protection of its intellectual property generated through its abundant and important production.

Team 10: Gibberellin control of plant development

Team leader: Mr Patrick ACHARD

Workforce

Workforce	**Number** on 06/30/2011	**Number** on 01/01/2013	2013-2017 **Number of producers****
N1: Professors or assistant professors			
N2: EPST or EPIC researchers		1	1
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff * on a permanent position			
N5: Engineers, technicians and administrative staff * on a non-permanent position			
N6: Postdoctoral students having spent at least 12 months in the unit			
N7: Doctoral students			
N8: PhD defended			
N9: Number of Habilitations to Direct Research (HDR) defended			
N10: People habilitated to direct research or similar			
TOTAL N1 to N7		**1**	**1**

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

• Detailed assessments

Assessment of scientific quality and production:

This group has just started its independent activities. The project emerged from work of the principal investigator while still in the team 7, where he identified interesting aspects of the GA pathway. This resulted in major publications in Plant Cell (2) and Current Biology (2). The PI was last corresponding author on an article, which appeared in Plant Cell this year. Therefore, the project is based on excellent grounds.

Assessment of the research team's integration into its environment:

Since the team is still at a very early stage, this aspect has not been evaluated.

Assessment of the research team's reputation and drawing power:

Although this aspect is difficult to assess, the team starts on a good basis. It is supported by one post-doc and two PhD students. Good relations with leading teams abroad have been established and the PI is aware of ongoing research in the main competing groups.

Assessment of the strategy and 5-year project:

The project has some very original aspects and is based on a solid corpus of recent work. The search for GA transport pathways is likely to provide the PI with a niche that will enable him to establish himself. GA signalling is still poorly understood, and there are many opportunities for original research. The team has identified a number of very interesting aspects that are worth studying, however, the PI should make sure to remain focused as long as his means remain limited.

Conclusion:

The PI is building his team on a very solid basis and has an excellent reputation in the field. There were also some concerns regarding the size of the group, currently having just one permanent scientist and not supported by a permanent technician. Although the field does not involve many groups, GA-signalling is a competitive field. It will be challenging for such a small team to remain focused while keeping an eye on upcoming opportunities. If the promising start is further confirmed, the institute should make sure that this young team obtains maximal support.

Team 11: Cytochromes P450 for biopolymers, signalling and adaptation

Team leader: Ms Danièle WERCK

Workforce

Workforce	**Number** on 06/30/2011	**Number** on 01/01/2013	2013-2017 **Number of producers****
N1: Professors or assistant professors	0,46	1,1	3
N2: EPST or EPIC researchers	2	3	3
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff * on a permanent position	0,65		
N5: Engineers, technicians and administrative staff * on a non-permanent position			
N6: Postdoctoral students having spent at least 12 months in the unit	2,55		
N7: Doctoral students	3,3		
N8: PhD defended	1		
N9: Number of Habilitations to Direct Research (HDR) defended			
N10: People habilitated to direct research or similar	3		
TOTAL N1 to N7	**8,96**	**4,1**	**6**

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

• Detailed assessments

Assessment of scientific quality and production:

Permanent people (less than 3 ETP), 14.5 postdoc years and about the equivalent number of PhD student years combined result in a total of 21 research publications over the last 5 years including published collaborative efforts (ten publications with key involvement of members of the team). The scientific impact of these publications is not reflected by the mere quantity. Instead, the work has been published in very high and top ranking journals and several break-through findings are now recognized by the field and have, consequently, opened new research directions. Key findings of the team address burning questions in the genetic underpinnings of chemical diversity of the plant specialized metabolism. Elegant work, published by the team in 2009 in Science demonstrated how neofunctionalisation of duplicated genes leads to the rapid emergence and evolution of novel pathways. Over the last five years the group has developed and made available for the community, tools for identification of P450s of the specialized metabolism (Plant Journal, 2011), functional prediction (BMC Plant Genomics, 2008) and medium-throughput testing of the encoded enzymes (Plant Journal, 2007). However, a clear strength of the team, as reflected by ten publications authored, or co-authored by the team is the elucidation of the catalytic biochemical functions of diverse enzymes of the cytochrome P450 family, across different P450 clans and the plant kingdom. Finally, and published just recently, the team took a stab at the yet unsolved question of multi-enzyme complexes, so called metabolons, anchored to the ER, and possibly only loosely associated through a P450 (FEBS J, 2011). Further research following this approach, but employing the nanodisk technology is in preparation or submitted. Taken together, the team clearly is internationally a major player within the field of research of plant P450s involved in specialized metabolism.

Assessment of the research team's integration into its environment:

Two patents were filed by the team, on an expression cassette for regulating seed-specific expression in plants and Expression cassettes for seed-enhanced expression in plants, both through Bayer Bioscience as primary applicant. It will be interesting to see whether, or how, a further industrial collaboration will be developed. The team leader has attracted an impressive volume of external funding (1,24 M € (2005-2012) and 513 k € (2010-2013)). This includes the international collaborative EU FP7 project with 423 k € for the team. Two thirds of the individual externally funded projects are collaborative efforts, a strong demonstration of the excellent integration of the research team.

Assessment of the research team's reputation and drawing power:

The international recognition of the team is primarily demonstrated through the strong leadership of D. Werck. Specifically, in the role of Guest Professor at the Jiao Tong University of Shanghai since 2009, as Member of Advisory Board Max Planck ICE Jena, the Peer Review College of the Danish Council for Strategic Research and of the Examinor College of Canada Research Chairs highlights a high degree of dedication for work in the scientific community. Within international programmes, in particular the series of Symposia on P450s and the Symposium on Cytochrome P450 biodiversity and Biotechnology the team's leader contributed substantially as member of the advisory boards in making these meetings a continuous success. Beyond this dedication, for the Arabidopsis book chapter on P450, D. Werck played the key role in coordination and steering the efforts of an international team of authors. The chapter has been coined "major update" by ASPB (Bak and coworkers, 2011, The Arabidopsis Book).

It is noteworthy to underline that as member of the team, F. Pinot acted as guest editor and contributed a review for a special issue of FEBS J.

The number of external, international collaborations is outstanding, with 23 partners from both academia and the industrial sector. The apparent exchange of knowledge and technology within this network is very likely a major contributing factor to the high level research of the team.

Assessment of the strategy and 5-year project:

- Ancient conserved pathway parallel lignin formation, CYP73: The suggested research is solidly embedded in strong collaborations and the competences of the partners involved appear highly complementary. The proposed use of modern model plant systems has many advantages as it relies on a broad range of tools that are developed, or are being developed within the collaborative programs. However, the evolution, or gain and loss in specific plant species could add an exciting component. For example, comparative genomics of the conserved gene(s) in plant lineages predating the split of mono- and dicotyledons could support a connection of the emergence of the novel pathway with an evolutionary advantage gained through chemical diversification.

- Metabolon characterisation. Research towards a solid proof for the formation of multienzyme complexes has been pursued for years. Novel tools (e.g. fluorophores) and modern techniques (as combinations of the mentioned FLIM/FRAP) are promising in increasing the experimental repertoire to address the question.

- Arabidopsis CYP76 and Iridoid pathway engineering: While the functional characterisation of the Arabidopsis CYP76 family had been approached more than 6 years ago, the small family doesn't seem to have lost its attractivity. The proposed functional characterisation of the family of enzymes, suggested to be involved in terpenoid metabolism, via reverse genetics will be a challenge due to the fact that one of the two sub-families is constituted of seven expressed and possibly functional redundant genes, four of which cluster on genomic level. Subtopic 4, the metabolic engineering of drug production in yeast and tobacco appears to lack integration in the context of the rest of the project. However, the topic is of general interest and follows an emerging biotechnological and highly applied route. There are some concerns about the use of tobacco as biotechnological host, such as high terpenoid background, limitation to transient expression if the biosynthetic route is not targeted to the plastids/trichomes.

Fatty acids oxidation in biosynthetic pathway of major polymeric surface lipids (cutin and suberin) in plants: About a fourth of all functionally characterised P450 subfamilies have been shown to be involved in fatty acid metabolism, highlighting the importance of this family of enzymes. In addition, the regio- and stereospecific oxygenation of aliphatic hydrocarbon chains remains challenging in organic chemistry. Potato and Arabidopsis are used as model plants to discover fatty acid hydroxylases with a function in suberin biosynthetic routes. Even though not an ideal experimental system, Arabidopsis will be used to study the cutin biosynthetic route, likely due to existing molecular biological tools and a P450 from that is involved in epoxydation of fatty acids and that is available to the researchers. A third project, in collaboration with two international labs is adressing questions in the biosynthetic route to fatty acid based biosynthesis of sporopollenin, an ancient pathway found in land plants and recently discovered by members of the team in external collaboration.

JA catabolic pathways: Members of the team have gained the first indication that P450s are involved in the turnover of the phytohormone JA. While the biosynthetic route to the active hormone is well studied, little is known about the degradation route, which has, for example in the field of abscisic acid research, been a major focus. The team is characterising the first candidate P450, active in the oxidation of JA-derivatives. Using this knowledge in combination with the powerful co-expression analysis in Arabidopsis may open the door to the discovery of additional members of the pathway and a whole new field in JA regulated responses.

Gibberellin catabolic pathways: The function of CYP715, identified through co-expression analysis as candidate for hormone metabolism, is explored through the typical reverse genetic approaches, combined with biochemical studies in collaboration with the team 10. This project appears as high-risk-high-benefit, with a combination of challenges in the detection of metabolites with a narrow temporal and spatial window of a putative function of the gene.

One PhD student currently appears in several projects. There is a risk of insufficient focus for a doctoral thesis.

Reliance and further development of existing tools has been supporting a steady output of scientific work, all based on well-established model plant species. At least some of the approaches (comparative genomics) hold a big potential, when applied to novel pathways in non-model plants.

Conclusion:

Overall opinion on the team:

The group is internationally a major actor within the field of research of plant P450s involved in specialized metabolism. They have had an excellent level of scientific production and an impressive volume of external funding.

Strengths and opportunities:

A total of 12 PhD (three of which have successfully defended their thesis) and Master level students were involved in the research of the team. This reflects with an excellent ratio to 11 post-docs employed over the same period of time a very high level of dedication towards primary training of students. Two PhD students and one postdoc are participating in industrial projects, giving the interested candidates the opportunity to gain valuable insights into research approaches outside academia. Together with general teaching activities, the team is very well integrated - and highly active with duties related to the University education.

Weaknesses and risks:

Minor weakness/chance: CYPedia is a relevant online resource and could be a powerful tool for research, however, while its last update was reported 2008 (BMC Plant Genomics, 2008), a lot of the information given at CYPedia dates back to 2006, lacking more recent content. An upcoming update was indicated.

Recommendations:

Especially in the research field evolving around Plant Metabolic Networks, analytical competences form the basis for future strong research. This is quite obvious for metabolomic components for the discovery of novel metabolites, where a most recent generation high-resolution qTOF-MS instrument could complement existing hardware, at a fraction of the cost of a FTICR-MS, but with acceptable accuracy and with much lower maintenance requirements than an orbitrap detector system. The PI is strongly encouraged to ensure recruitment of young but also senior scientists in the field to maintain the strong leadership of the IBMP.

Team 12: Biogenesis, Molecular enzymology and function of plant isoprenoids

Team leader: Mr Bilal CAMARA

Workforce

Workforce	**Number** on 06/30/2011	**Number** on 01/01/2013	2013-2017 **Number of producers****
N1: Professors or assistant professors	1	1,5	2
N2: EPST or EPIC researchers	1	1	1
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff * on a permanent position			
N5: Engineers, technicians and administrative staff * on a non-permanent position			
N6: Postdoctoral students having spent at least 12 months in the unit	0,5		
N7: Doctoral students	0,68		
N8: PhD defended	1		
N9: Number of Habilitations to Direct Research (HDR) defended			
N10: People habilitated to direct research or similar			
TOTAL N1 to N7	**3,18**	**2,5**	**3**

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

• Detailed assessments

Assessment of scientific quality and production

The research team works on plant isoprenoid biosynthesis and function. The project combines research on plastid and cytosolic pathways, metabolite transport and sequestration as well as gene characterization and regulation. The approach is original and combines genetic, biochemical, chemical and structural tools to elucidate the isoprenoid biosynthesis pathways of the plastid (carotenoids and prenyllipids) and cytosolic (sterols) metabolism in model systems such as Arabidopsis thaliana and solanaceous plants. During the period, the group was able to characterize the lycopene synthase and to elucidate the role of the dolichol phosphate mannose synthase (DPMSO1) (paper in Plant Cell). The team is of very good level and their research lead to papers in very high impact journals, involving all the lab members: 7 papers in high-impact journals (such as Plant Physiol or Plant Cell) and one book chapter as corresponding authors, one collaborative paper.

Assessment of the research team's integration into its environment:

The research applied potential was promoted by a patent in 2011. Two national fundings (2007 ANR NT05-3 44792 and 2009-2012 ANR NT09_467557) were obtained by the research team during the period. But overall, the integration of the research team into its environment is weak.

Assessment of the research team's reputation and drawing power:

The international recognition is rather low as exemplified by only one Invited speaker in international conference for two members of the team. Collaborations are mainly inside France, which is supported by one joint paper.

Assessment of the strategy and 5-year project:

The 2013-2017 project aims to investigate (1) plastid isoprenoid synthesis (2) the sterol C4-demethylase complex (3) the plasticity of key sterol biosynthesis enzymes, (4) the structural characterization of lycopene cyclases and (5) the identification of new key steps of the isoprenoid pathway regulating Arabidopsis development. This original number of points to be investigated was reduced at the oral presentation and only concerned 3 points: (1) cristallisation of lycopene synthase, (2) the role of the DPMSO1 enzyme in the sensitivity to ammonium, the modification of protein glycosylation, the stress pathology, and (3) the sterol pathway. Following these modifications, the feasibility appears better although it will be hard to achieve the project, taking into account that the group is small (only 4 people including the group leader) including 2 members with teaching duties. Otherwise, the plan is in line with the previous research and is original (e.g. first cristallization of lycopene synthase) although the limited resource of funding will probably represent a problem to achieve the goals.

Conclusion:

Overall opinion on the team:

The research team has a strong international record in the study of plant isoprenoid biosynthesis and function, using multidisciplinary approaches (genetic, biochemical and chemical approaches). For such a small team and taking into account that 2 members have a rather heavy teaching load, the research is of very good level. The work plan for the next 5 years is coherent.

Strength and opportunities:

The group has developped a multidisciplary approach for the study of plant isoprenoid biosynthesis and has an excellent publication record. The group has obtained a patent.
The group develops strong and valuable collaborations with other teams inside France and abroad (Germany).

Weaknesses and risks:

The group is small and includes 2 members with teaching duties. In addition, the head of the team and the CNRS member (DR) will retire soon. The number of Ph D students is low (only one).

The group would benefit to collaborate with other teams of the same department. In addition, there is no international funding.

Recommendation:

The group should try to attract more PhD students and should develop its ability to raise funds. The group should also plan the future of the team with the retirement of the group leader in the context of the whole department.

Team 13: Molecular regulation of prenyl lipids

Team leader: Mr Hubert SCHALLER

Workforce

Workforce	**Number** on 06/30/2011	**Number** on 01/01/2013	2013-2017 **Number of producers****
N1: Professors or assistant professors	1	1	1
N2: EPST or EPIC researchers	4,3	2,8	3
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff * on a permanent position	1	1	
N5: Engineers, technicians and administrative staff * on a non-permanent position	0,18		
N6: Postdoctoral students having spent at least 12 months in the unit	2,25		
N7: Doctoral students	1,26		
N8: PhD defended	2		
N9: Number of Habilitations to Direct Research (HDR) defended			
N10: People habilitated to direct research or similar	4		
TOTAL N1 to N7	**9,99**	**4,8**	**4** (-1 départ retraite)

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

• Detailed assessments

Assessment of scientific quality and production:

A total of 20 manuscripts authored by both team leaders, with nine of these authored directly by members of the team, were published over the period of the last five years. The scientific production in the last five years has been shifting from the past senior leader to the new team leader, who now increasingly contributes to the scientific output. Currently, there are 23 members involved in the research of the team, which has two main foci: biosynthesis, regulation and compartmentalisation of early precursors of the terpenoid metabolism and the biosynthesis and biological functions of triterpenopid sterols. Consistent with the high relevance of the research, major results are published in high-ranking cross disciplinary journals, or journals ranking top in the plant field. Key break-through studies describe (i) the characterisation of potential rate-limiting steps in the cytosolic MEV pathway, providing precursors for C-15 sesquiterpenes and C-30 triterpenoids and sterols that are involved in HMG.CoA metabolism, (ii) the subcellular localisation and cross-talk of the MEP and MEV pathways and (iii) the in vivo functional characterisation of the Arabidopsis oxidosqualene cyclase required for biosynthesis of cycloartenol. The majority of the research is driven by established experimental approaches and the development of new technology where required. Examples include membrane phosphoproteomics to demonstrate phosphorylation-mediated regulation of HMGR, GC-IRMS to analyse isoprenoids in transgenic Arabidopsis plants with deregulated MEV or MEP pathway genes, and MALDI-TOF/LC-MS-MS proteomic approaches to identify proteins accumulating to a different rate in DXR-inhibited E. coli. The major results achieved during the reporting period have a high significance also outside of the fundamental field of research. Metabolic engineering of the early isoprenoid biosynthetic routes is of vital importance in synthetic biology and biotechnology for the production of high-value and complex terpenes with pharmacological activities.

Assessment of the research team's integration into its environment:

It is not immediately obvious, why no patents were filed, as a number of findings do have a high potential for application. The research has, over the last six years, attracted Euro 1.34 M in external funding, about half of which involves collaborative projects. The awarded grants during this period are evenly distributed between the previous and the new team leader.

Assessment of the research team's reputation and drawing power:

The international recognition of the team is reflected by the roles fulfilled within the scientific community. The previous team leader is on the advisory editorial board and the editorial board of "Progress in Lipid Research" and "Frontiers in Plant Physiology". Both PIs have, over the last 5 years, delivered several invited lectures at international events and each authored at least one major book chapter in internationally recognised book series.

Five national external collaborations and six international partners and participation in five major externally funded collaborative research projects indicate a good focus and solid embedding in the community, very adequate for the size of the group.

Assessment of the strategy and 5-year project:

Prenyl pathway regulation: After the discovery of the main biosynthetic routes of the isoprenoid pathway, the regulation of the pathway represents one of the two major remaining scientific challengers (transport and the associated transporters being the other one). Consequently, the identification of so-called master switches, implicated by extensive co-regulation of the individual steps, is proposed by the team. A number of attempts have been made by other researchers and there is currently only one example published, demonstrating the complexity of the system. The initiated forward genetic screen of lines with reduced activity of key steps in the pathway has a number of advantages over a suppressor screen based on chemical inhibition. The application of the fluorescence-based high-throughput tools to screen a library of potential effectors of the crosstalk between the cytosolic and plastidic pathways has the potential to open up a whole field of new research, but could bear the risk that an inherent strict regulation limits the observable effects. These projects are both a logical continuation of the current research and state of the knowledge and, moreover, have equally high potential for basic and applied research.

The methods and concrete approaches in the project adressing protein prenylation in relation to accumulation of specialised metabolites of the terpenoid class are not inmediately obvious.

Membrane lipid homeostasis: Phospholipid sterol acyltransferase1, the major sterol ester forming enzyme in Arabidopsis, has been characterised biochemically and through mis-regulation in Arabidopsis. It was suggested that the enzyme plays a role in sterol catabolism and homeostasis and a lack of sterol esters in mutant plants was associated with early senescence. The causal connection between the mutation and the observed phenotype is still unclear and the biological function of sterol esters beyond a hypothesised role as storage or overflow pool currently remains unknown. It is suggested to study the subcellular localisation of PSAT1 and the physiological role of splice variants that were observed.

Homologues of human proteins implicated in intracellular transport of cholesterol were identified in Arabidopsis. The functions of the encoded genes are investigated through overexpression and in null-mutant lines and through localisation studies. A double knock-out displays strongly impaired development, which is used to argue that the genes play an important role.

Functional analysis of triterpenoid biosynthesis and function: The genes encoding triterpene synthases in Arabidopsis have been functionally characterised based on heterologous expression in yeast. In planta studies of the function are limited to few examples (e.g., in the tomato system, highly attractive to study cuticular triterpenoids). It is suggested to further characterise selected (the criteria are unclear) Arabidopsis triterpene synthases by altering their expression in Arabidopsis or through transient expression in Nicotiana leaves and analysis of potentially forming products. It is further suggested to analyse mutant phenotypes and correlate a potential phenotype with an ecological function..The analysis of the in vivo function of enzymes in a heterologous plant system, or through mis-expression in the model plant promises to substantiate current knowledge. Furthermore, this will allow to search for a biological role of the corresponding metabolites, which is of high relevance in the field.

E. lathyris triterpenoid biosynthesis: It is suggested to characterise triterpene biosynthetic genes from E. lathyris by expression studies and to evaluete their potential for industrial purposes.

Conclusion:

The suggested suppressor screen in Arabidopsis to identify key regulators, or regulatory mechanisms of the early isoprenoid biosynthetic routes is of high scientific and commercial interest and related approaches (using chemical inhibitors) have been in the focus of biotechnologically oriented research towards improving the flux through the pathway for production purposes.

The international visibility of the new team leader is expected to increase over the next period.

So far, research has been funded through ANR and CNRS. It seems worthwhile considering to join, or lead initiatives for EU applications. Also, in view of the applied potential of the research, industrial funding seems to be within reach.

The research has, and will likely yield metabolic components (enzymes, mechanisms and regulators) of pathways with very high commercial interest. Pending improvements of the CNRS/University infrastructure for technological transfer and patenting, it could be of interest to consider exploiting the findings within industrial applications and to file patent applications. In particular within the collaborative project involving E. lathyris, functionally characterised triterpenoid pathway genes have the potential to grant biotechnological access to highly complex C30 isoprenoids as lead molecules for semi-synthetic production of high-value bioactive and plant-based pharmaceuticals and fine chemicals.

Team 14: RNA degradation

Team leader: Mr Dominique GAGLIARDI

Workforce

Workforce	**Number** on 06/30/2011	**Number** on 01/01/2013	2013-2017 **Number of producers****
N1: Professors or assistant professors			
N2: EPST or EPIC researchers	2,31	2	2
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff * on a permanent position			
N5: Engineers, technicians and administrative staff * on a non-permanent position			
N6: Postdoctoral students having spent at least 12 months in the unit	0,18		
N7: Doctoral students	0,97		
N8: PhD defended	1		
N9: Number of Habilitations to Direct Research (HDR) defended			
N10: People habilitated to direct research or similar	1		
TOTAL N1 to N7	**3,46**	**2**	**2**

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

• Detailed assessments

Assessment of scientific quality and production:

The team's objective is to understand the roles of non-canonical poly(A) polymerases in plant genome expression as well as the link between uridylation and mRNA degradation/translation.

Until 2007 the group has studied RNA expression exclusively in plant mitochondria. The quality of the work was recognized by major publications and awards (CNRS Bronze medal to the team leader). Within the past 4 years the choice was made to focus on nuclear-encoded RNAs. This implied a transition period required for generating novel biological resources such as mutants or RNA substrates, a heavy task for this small team. Several results have been obtained

1) Plant exosomes have been characterized. Co-factors were shown to have specialized functions in plants.

2) The first demonstration in plants that the nuclear isoform of the RNAse D like protein, RRP6L is involved in the degradation of non-functional, non-coding RNA following polyadenylation.

3) A collection of more than twenty mutants exosome has been established and should be of high value for the project.

4) The characterization of non-canonical polyadenylation and uridylation has been initiated in Arabidopsis.

Although the major part of the group activity was dedicated to resource development in the past years, 2 publications were already published in good journals (Plant Journal and Mol Cell Biol) in addition to several reviews. Very importantly, a biological resource has been established and would be essential to the success of the project as well as to develop productive collaborations.

Assessment of the research team's integration into its environment:

Funding has been obtained and has been secured for the next period through ANR funding (2010-2013) as well as participation to the Labex NetRNA.

Assessment of the research team's reputation and drawing power:

Dominique GAGLIARDI is well recognized in the field of mRNA degradation in mitochondria and at the national level (CNRS Bronze Medal in 2007). He has been invited at several international meetings and was a plant representative at the Miteuro consortium. He was a coorganizer of a FEBS advanced lecture course. It is difficult to assess his visibility in the new research axis he is developping. However it is worth noting that he already collaborates with French leading teams in the field of RNA processing (ANR program).

Assessment of the strategy and 5-year project:

Once the biological resources have been established, the next period is expected to be productive with four objectives:

- Analyze the impact of polyadenylation on RNA degradation
- Determine the phosphorolytic activity of the core exosome
- Determine the role of uridylation in stress granules.
- Identify non canonical polyadenylation in mitochondria and plastids.

Overall the project is very original and ambitious and all the tools are available to reach the objectives.

Conclusion

After a transition period required for establishing biological material, the group should enter into a productive phase. The group leader should pay attention to optimize the work. Funding is secured for the coming years (ANR, Labex) and the recruitment of 2 post-doc and 1 PhD should allow reaching a critical mass. This team has a high potential and in a long term it would be important to reinforce the man power.

Team 16: Maintenance and expression of the plant mitochondrial genome

Team leader: Mr André DIETRICH

Workforce

Workforce	**Number** on 06/30/2011	**Number** on 01/01/2013	2013-2017 **Number of producers****
N1: Professors or assistant professors	0,5	0,5	1
N2: EPST or EPIC researchers	1	2	2
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff * on a permanent position	0,8	1,7	
N5: Engineers, technicians and administrative staff * on a non-permanent position			
N6: Postdoctoral students having spent at least 12 months in the unit	0,5		
N7: Doctoral students	1		
N8: PhD defended	3		
N9: Number of Habilitations to Direct Research (HDR) defended			
N10: People habilitated to direct research or similar	1		
TOTAL N1 to N7	**3,8**	**4,2**	**3**

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

• Detailed assessments

Assessment of scientific quality and production:

The group works on a variety of aspects surrounding mitochondrial genome stability, especially DNA recombination and repair. Concerning the impact of DNA recombination on structure, evolution and transmission of the Arabidopsis mitochondrial genome, the group made significant progress by identifying DNA repeats and genes involved in the substoichiometric shifting (SSS) phenomenon. Starting from a list of genes involved in mtDNA metabolism and using cell biological and genetic approaches, the team was able to identify genes involved in the regulation of homologous recombination and SSS control in Arabidopsis mitochondria. Using a collection of different Arabidopsis ecotypes, it also established a link between these genes and the evolution of new mtDNA conformations. The group also confirmed that several mutants triggering SSS are more sensitive to drugs that challenge the repair system for double-strand breaks suggesting that the corresponding genes have important functions in post-replicative repair of the mtDNA. In addition to this work on recombination and repair, the group seeks to develop methods for the uptake of nucleic acids (both DNA and RNA) into mitochondria in organello and in vivo and analyses the expression of such transfected nucleic acids. A particular highlight from the reporting period is the development of very promising-looking tools to interfere with mitochondrial gene expression at the RNA level by using chimeric ribozymes that can be specifically targeted to mitochondria in vitro and in vivo. The underlying strategies are clever and innovative and no comparable work is done anywhere else in the world. Proof-of-principle studies have been published on mitochondrial engineering with chimeric ribozymes as well as on in organello DNA uptake and recombination (both in Nucleic Acids Res.). The further development of these techniques is expected to result in a series of high-impact publications within the foreseeable future, especially if the methods can be used to routinely perform reverse genetics in plant mitochondria. In the absence of methods for stable transformation of the mitochondrial genome of higher plants, this would provide the plant mitochondrial community with extremely useful tools (that would be widely applicable to the study of mitochondrial genetics and physiology) and would win the team worldwide recognition.

The scientific productivity of the group put in relation to its size (8-9 people on average over the reporting period) is very good, including papers in general/high-impact journals, like Nucleic Acids Res. (4 publications) and Plant Cell and 2 co-authored papers in PNAS. In view of the promising progress made in method development, significant potential is seen that both quality and quantity of the scientific output can be further increased in the future.

Assessment of the research team's integration into its environment:

The group enjoys continued funding from ANR, but in view of the great potential of the technologies under development, it should be able to also successfully compete for funding at the international stage (EU, HFSP, etc.). This should be possible, especially because the group has already a number of international collaboration partners, among them some of the major players in the field. Moreover, the team leader has the required international standing to not just join research initiatives co-ordinated by others, but also forge successful consortia and lead them himself. The team 17 is listed as the only internal collaborator (no joint publications yet). As the tools developed by the Dietrich group should be of great interest to practically all other groups in the Mitochondrial Department at IBMP, it seems sensible to seek stronger interactions within the department and intensify efforts to exploit the methods for as many biological questions studied at IBMP as possible.

Assessment of the research team's reputation and drawing power:

The group is well visible internationally and the group leader is internationally recognized as an expert on plant mitochondrial genetics and molecular biology. Especially the recent progress with the development of methods for manipulating the genetic system of plant mitochondrial has stirred considerable interest within the community, as is also evident from invitations to international conferences. The group is strongly encouraged to use this momentum to secure additional funding to be able to fully explore the potential of the developed technologies and increase the critical mass by building up a somewhat larger research team. During the reporting period, the group has trained 4 PhDs and 5 MScs. Importantly, the three PhD students who finished during the reporting period, all have at least one first-author publication in respectable international journals. Considering the recent breakthroughs in technology development, the group should become even more attractive to students in the future.

Assessment of the strategy and 5-year project:

The Dietrich group will be significantly strengthened by its announced merging with a former independent group. In view of the related research interests of the two groups, this is a sensible move that should create strong synergies. The new research plan is a logical continuation of the current research activities of the two teams and, sensibly, capitalizes on the recent progress made with developing techniques for manipulating the genetic system of plant mitochondria in organello and in vivo. Applications in mitochondrial reverse genetics represent an obvious choice to demonstrate the utility of the new methods. the other team's experience with isolating factors involved in mitochondrial genome dynamics (especially, in the mitochondrial RRR system) expands both the research portfolio and the methodological spectrum of the group and offers the potential of isolating novel factors involved in mitochondrial genome stability in planta. The proposed analysis of DNA repair processes is an area, where combining the expertise of the two teams should be particularly fruitful. Overall, the research plan is strong, internationally competitive and, if rigorously put into practice, should result in a glut of high-impact publications.

Conclusion:

Overall opinion on the team:

This is a strong team, internationally recognized for its highly original research. The merging with another team offers great potential for future synergies.

Strengths and opportunities:

The group possesses a unique portfolio of techniques and tools to manipulate the plant mitochondrial genetic system and study mitochondrial genome dynamics in vivo and in vitro. This puts the group into a nearly unique position to solve major questions in mitochondrial genome biology and make highly significant contributions, especially to our understanding of RRR processes in plant mitochondria.

Weaknesses and risks:

There are no obvious weaknesses.

Recommendations:

A major challenge will be to secure continuous funding at the national level and, in addition, explore international funding opportunities more rigorously. Based on the recent methodological breakthroughs, interactions with other groups in the Mitochondrial Department at IBMP could be intensified.

Team 17: Metabolism and trafficking of RNAs within the plant cell

Team leader: Ms Laurence DROUARD

Workforce

Workforce	**Number** on 06/30/2011	**Number** on 01/01/2013	2013-2017 **Number of producers****
N1: Professors or assistant professors	0,5	0,5	1
N2: EPST or EPIC researchers =	1	1	1
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff * on a permanent position	0,07	0,7	
N5: Engineers, technicians and administrative staff * on a non-permanent position	0,25		
N6: Postdoctoral students having spent at least 12 months in the unit	0,3		
N7: Doctoral students	1,93		
N8: PhD defended	3		
N9: Number of Habilitations to Direct Research (HDR) defended			
N10: People habilitated to direct research or similar	2		
TOTAL N1 to N7	**4,05**	**2,2**	**2**

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

• Detailed assessments

Assessment of scientific quality and production:

This group works on two main aspects of macromolecules targeting and transport to plant organelles: i) Dual protein targeting to chloroplast and mitochondria, ii) import of RNAs into mitochondria. In addition, they are involved in new aspects of tRNA biology. Particular highlights from the reporting period are in-depth characterization of the process leading to RNA mitochondrial import, and the development of very promising tools to characterize the molecular actor involved in this process, the investigation of RNA or protein signals involved in dual targeting to plastids and mitochondria, several insights on tRNA maturation and aminoacylation, biogenesis of tRNAs in plants, and participation to various efforts aiming to provide accurate tRNA gene annotation and dedicated website to the scientific community.

During the reporting period (2007-june 2011), the work was of excellent scientific quality as indicated by a very good number of publications, 11 original papers and 4 review article were signed by members of the group as first and/or last (or, in one case, corresponding) authors of a total of 21 papers with collaborative articles for the evaluation period (i.e. 4 to 5 papers a year for two ETP). The scientific productivity of the group, put in relation to its size (2 permanent people and an average of 1 post-doc, 2 PhD and 1 master students a year over the reporting period), is thus excellent, with papers including Science (1), PNAS USA (2), Nucleic Acids Res (2), Plant J (1), J Biol Chem (1), representing journals with the highest IF and several review articles articles in high impact journals (TIBS, Int Rev Cell Mol Biol, RNA Biol…). Three theses were defended (2008, 2009, 2011), one is underway. It is at last important to note that this scientific production was performed while no technician was working in the group.

Assessment of the research team's integration into its environment:

During the reporting period, the group obtained funding from the ANR (2009-2012) and from a PAI (Belgium). It is important to note that members of the group also had a great success in attracting PhD students with selective fellowships of the French research ministry (4 fellowships, almost one PhD a year). This denotes an excellent ability to attract good students and skilled efforts to train Master students in order to guaranty their success during the selection procedure. The team is actively involved in teaching since one of the members is assistant Professor and the Pi is co-coordinating an educational high school program. The group is listed in the IBMP report as having active collaborations with 5 other groups from the institute (already resulted in joint publications with team 18. The group has a number of local, national and international collaborations and, in particular, their visibility in the national and international community is excellent. One PCT Patent was also published in 2010. The group also created a specific website (tRNA gene annotation) accessible to the scientific community.

Assessment of the research team's reputation and drawing power:

This group is well recognized as demonstrated by their ability to develop efficient collaboration with national and international experts in their field. Members of the team, not only the PI(s), were invited speakers in national and international conferences. The Pi is member of the editorial board of a Journal, was a member of an ANR selection committee and of the section 28 of the CoNRS. During the reporting period, the group has trained 4 PhDs and two postdocs and 6 Master students. Importantly, all four PhD students who integrated the group during the reporting period have published, with three of them having one to several first-author publications in very good (NAR, PNAS USA, Plant J…) international journals.

Assessment of the strategy and 5-year project

The proposed project is very original and has several parts, essentially in continuation with the work carried out in the previous period, but has been refocused on three main objectives: i) identifying mRNAs targeted to the surface of mitochondria and the cis-elements and trans-factors required for RNA targeting, ii) to get an inventory of the components of the tRNA import machinery in plant mitochondria and iii) to study the biology of tRNA within the plant cell (tRNA turnover, role of tRNA-derived fragments) and to develop a free accessible plant tRNA database. These future plans are well balanced between very feasible projects and more risky ones, are very interesting, and have good focus in adequation with the expertise of the group members. The group will be strengthened (3 permanent people) by the recruitment of a technician from the university.

Conclusion:

Overall opinion on the team:

The group is internationally recognized for its highly original research. They had an impressive level of scientific production for a group of this size. The group has a high potential to make further important contributions in its field.

Strengths and opportunities:

Overall this is a very good group that has an impressive track record and clear scientific plans on what they should do. The group appears to be well balanced with two experienced members working together with post-docs, PhD and Master students of the team on joint projects. The project is coherent, focused and the group has developed important tools for future work that now will be exploited.

Weaknesses and risks:

There are no obvious weaknesses based on past and present scientific activity and objectives. The only risk is that the PI is likely to take new responsibilities at the head of the institute and will have to combine these activities with the leadership of the group in the national and international context.

Recommendations:

The group is strongly encouraged to secure funding to be able to maintain its critical mass. As cited above, the main challenge will be to maintain continuous scientific production knowing that the Pi will probably spend a lot of her time dealing with her new responsibilities at the head of the institute. She is encouraged to delegate much of her actual administrative duties to optimize her time. The recent recruitment of one technician from the university will probably be helpful, but it will be essential to add additional support to this group to guarantee that it will maintain its excellent level of scientific production.

Team 18: Function of PPR Proteins

Team leader: Mr Philippe GIEGE

Workforce

Workforce	**Number** on 06/30/2011	**Number** on 01/01/2013	2013-2017 **Number of producers****
N1: Professors or assistant professors			
N2: EPST or EPIC researchers		1	1
N3: Other professors and researchers			
N4: Engineers, technicians and administrative staff * on a permanent position			
N5: Engineers, technicians and administrative staff * on a non-permanent position			
N6: Postdoctoral students having spent at least 12 months in the unit			
N7: Doctoral students			
N8: PhD defended			
N9: Number of Habilitations to Direct Research (HDR) defended			
N10: People habilitated to direct research or similar			
TOTAL N1 to N7		1	1

* **If** different, indicate corresponding FTEs in brackets.

** Number of producers in the 2008-2011 period who will be present in 2013-2017.

• Detailed assessments

Assessment of scientific quality and production:

The main scientific aims of this group are to perform a full scale characterization of protein-only RNases. During the reporting period (2007-june 2011), they were able to identify the first RNase P enzyme in plants and demonstrated that a PPR protein can catalyze this function. They also identified a crosstalk between mitochondria and the nucleus involving one of these PPR proteins. Finally, they showed that a subfamily of PPR proteins is associated to polysomes in mitochondria. The work was of excellent scientific quality and produced a good number of publications, 7 original papers were signed by the PI of the group as last author. 4 review article and 2 collaborative papers with colleagues from the IBMP were also produced during the same period. The scientific productivity of this group, put in relation to its size (1 permanent people, 1 post-doc, 2 PhD and one Master student), is thus excellent, with papers including Plant Cell (1), Nat Struc Mol Biol (1), Nucleic Acids Res (1), J Biol Chem (2), for the most important journals in the field. One these was defended (2011), one is underway (expected end in 2012).

Assessment of the research team's integration into its environment:

During the reporting period, the group obtained funding from two ANR (2007-2011 and 2011-2014) and from two other grants supporting international mobility (2009, 2011). It is important to note that the first ANR funding was a very selective ANR "Jeune Chercheur". This denotes a very good ability of the PI to attract very selective funding. The group is listed in the IBMP report as having active collaborations with the group of team 17 (with joint publications). The group has also a very good number of national and international collaborations.

Assessment of the research team's reputation and drawing power:

The PI of the group is well recognized as demonstrated by its invitation to 6 international and 2 national conferences since 2007. He also received 1 invitation for a review article in a peer-reviewed journal and for two book chapters. During the reporting period, he was also able to develop efficient collaboration with national and international experts in their field. The Pi is also member of the editorial board of a scientific journal (ISRN Molecular Biology). During the reporting period, the group has trained 2 PhDs and 4 Master students were also recruited. Importantly, the PhD student who integrated the group during the reporting period has published three articles as first-author in very good to excellent international journals including 1 paper in Plant Cell. Finally, the PI of the group was also advanced to the research director (DR2 CNRS) position.

Assessment of the strategy and 5-year project:

The proposed project is original, mostly in continuation with the work carried out in the previous period. Three main objectives have been identified: i) characterization of PPR proteins with RNase P activity, ii) Characterization of the PNM1 PPR proteins and of its regulatory role in the cross-talk between mitochondria and the nucleus and iii) to perform structure function analysis of PPR proteins, with the aim to gain a better understanding on their mode of action. Some of these future plans are risky, but this is taken into consideration and several alternatives are proposed.

Conclusion:

Overall opinion on the team:

The PI has produced very important and original data and is internationally recognized for its highly original research. He had an excellent level of scientific production for a group of this size, and should make further important contributions in its field.

Strengths and opportunities:

The project appears to be well balanced between feasible and more risky aspects. Funding from the ANR is already acquired for the next 3 years. The project is coherent and focused and the very original previous data will be perfectly exploited in the future work.

Weaknesses and risks:

The main weakness that could be deduced from the reading of the project would be the ability of the PI to deal with international competition in the PPR field. However, the PI was very convincing in demonstrating that he already developed fruitful collaborations with main national and international experts in the field and has identified its own original "niche".

Recommendations:

The group is strongly encouraged to secure additional funding to be able to increase its critical mass.

5 • Grading

Once the visits for the 2011-2012 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 four criteria defined by the AERES and was given along with an overall assessment.

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

Overall assessment of the unit "**IBMP** - Institut de Biologie Moléculaire des Plantes" :

Unité dont la production, le rayonnement et le projet sont excellents. L'organisation et l'animation sont très bonnes.

Grading table:

C1 Scientific quality and production.	**C2** Reputation and drawing power, integration into the environment.	**C3** Laboratory life and governance.	**C4** Strategy and scientific project.
A+	A+	A	A+

Overall assessment of the **team 1** "Viral Counter defence to RNA silencing and systemic movement" (DROUARD- ZIEGLER-GRAFF):

Équipe dont la production, le rayonnement et le projet sont très bons.

Grading table:

C1 Scientific quality and production.	**C2** Reputation and drawing power, integration into the environment.	**C3** Laboratory life and governance.	**C4** Strategy and scientific project.
A	A	-	A

Overall assessment of the **team 2** "Interactions between (para)retroviruses and host cells" (DROUARD-RYABOVA):

Équipe dont la production et le projet sont excellents. Le rayonnement est très bon.

Grading table:

C1 Scientific quality and production.	**C2** Reputation and drawing power, integration into the environment.	**C3** Laboratory life and governance.	**C4** Strategy and scientific project.
A+	A	-	A+

Overall assessment of the **team 3** "Macromolecular trafficking and intercellular communication in plants" (DROUARD-HEINLEIN):

Équipe dont la production et le projet sont très bons. Le rayonnement est excellent.

Grading table:

C1 Scientific quality and production.	C2 Reputation and drawing power, integration into the environment.	C3 Laboratory life and governance.	C4 Strategy and scientific project.
A	A+	-	A

Overall assessment of the **team 4** "Structural and molecular basis of virus-host interactions" (DROUARD-RITZENTHALER):

Équipe dont la production et le projet sont excellents. Le rayonnement est très bon.

Grading table:

C1 Scientific quality and production.	C2 Reputation and drawing power, integration into the environment.	C3 Laboratory life and governance.	C4 Strategy and scientific project.
A+	A	-	A+

Overall assessment of the **team 5** "Cell and development biology" (DROUARD-SCHNITTGER):

Excellente équipe à tous points de vue.

Grading table:

C1 Scientific quality and production.	C2 Reputation and drawing power, integration into the environment.	C3 Laboratory life and governance.	C4 Strategy and scientific project.
A+	A+	-	A+

Overall assessment of the **team 6** "Role of spindle assembly factors in cell cycle regulation and genome maintenance" (DROUARD-SCHMIT):

Équipe dont la production, le rayonnement et le projet sont très bons.

Grading table:

C1 Scientific quality and production.	**C2** Reputation and drawing power, integration into the environment.	**C3** Laboratory life and governance.	**C4** Strategy and scientific project.
A	A	-	A

Overall assessment of the **team 7** "Role of ubiquitin in cellular regulations" (DROUARD-GENSCHIK):

Excellente équipe à tous points de vue.

Grading table:

C1 Scientific quality and production.	**C2** Reputation and drawing power, integration into the environment.	**C3** Laboratory life and governance.	**C4** Strategy and scientific project.
A+	A+	-	A+

Overall assessment of the **team 8** "Epigenetic mechanisms in signalling of plant development" (DROUARD-SHEN) :

Équipe dont la production, le rayonnement et le projet sont très bons.

Grading table:

C1 Scientific quality and production.	**C2** Reputation and drawing power, integration into the environment.	**C3** Laboratory life and governance.	**C4** Strategy and scientific project.
A	A	-	A

Overall assessment of the **team 9** "Mechanisms and roles of RNA silencing in eukaryotes" (DROUARD-DUNOYER):

Excellente équipe à tous points de vue.

Grading table:

C1 Scientific quality and production.	**C2** Reputation and drawing power, integration into the environment.	**C3** Laboratory life and governance.	**C4** Strategy and scientific project.
A+	A+	-	A+

Overall assessment of the **team 10** "Gibberellin control of plant development" (DROUARD-ACHARD):

Équipe non notée pour la production et le rayonnement et dont le projet est très bon.

Grading table:

C1 Scientific quality and production.	**C2** Reputation and drawing power, integration into the environment.	**C3** Laboratory life and governance.	**C4** Strategy and scientific project.
NN	NN	-	A

Overall assessment of the **team 11** "Cytochromes P450 for biopolymers, signalling and adaptation" (DROUARD-WERCK):

Excellente équipe à tous points de vue.

Grading table:

C1 Scientific quality and production.	**C2** Reputation and drawing power, integration into the environment.	**C3** Laboratory life and governance.	**C4** Strategy and scientific project.
A+	A+	-	A+

Overall assessment of the **team 12** "Biogenesis, Molecular enzymology and function of plant isoprenoids" (DROUARD-CAMARA):

Équipe dont la production et le projet sont très bons. Le rayonnement est bon mais pourrait être amélioré.

Grading table:

C1 Scientific quality and production.	**C2** Reputation and drawing power, integration into the environment.	**C3** Laboratory life and governance.	**C4** Strategy and scientific project.
A	B	-	A

Overall assessment of the **team 13** "Molecular regulation of prenyl lipids" (DROUARD-SCHALLER):

Équipe dont la production, le rayonnement et le projet sont très bons.

Grading table:

C1 Scientific quality and production.	**C2** Reputation and drawing power, integration into the environment.	**C3** Laboratory life and governance.	**C4** Strategy and scientific project.
A	A	-	A

Overall assessment of the **team 14** "RNA degradation" (DROUARD-GAGLIARDI):

Équipe dont la production, le rayonnement et le projet sont très bons.

Grading table:

C1 Scientific quality and production.	**C2** Reputation and drawing power, integration into the environment.	**C3** Laboratory life and governance.	**C4** Strategy and scientific project.
A	A	-	A

Overall assessment of the **team 16** "Maintenance and expression of the plant mitochondrial genome" (DROUARD-DIETRICH):

Équipe dont la production et le rayonnement sont très bons. Le projet est excellent.

Grading table:

C1 Scientific quality and production.	**C2** Reputation and drawing power, integration into the environment.	**C3** Laboratory life and governance.	**C4** Strategy and scientific project.
A	A	-	A+

Overall assessment of the **team 17** "Metabolism and trafficking of RNAs within the plant cell" (DROUARD-DROUARD):

Excellente équipe à tous points de vue.

Grading table:

C1 Scientific quality and production.	**C2** Reputation and drawing power, integration into the environment.	**C3** Laboratory life and governance.	**C4** Strategy and scientific project.
A+	A+	-	A+

Overall assessment of the **team 18** "Function of PPR Proteins" (DROUARD-GIEGE) :

Équipe dont la production et le projet sont excellents. Le rayonnement est très bon.

Grading table:

C1 Scientific quality and production.	**C2** Reputation and drawing power, integration into the environment.	**C3** Laboratory life and governance.	**C4** Strategy and scientific project.
A+	A	-	A+

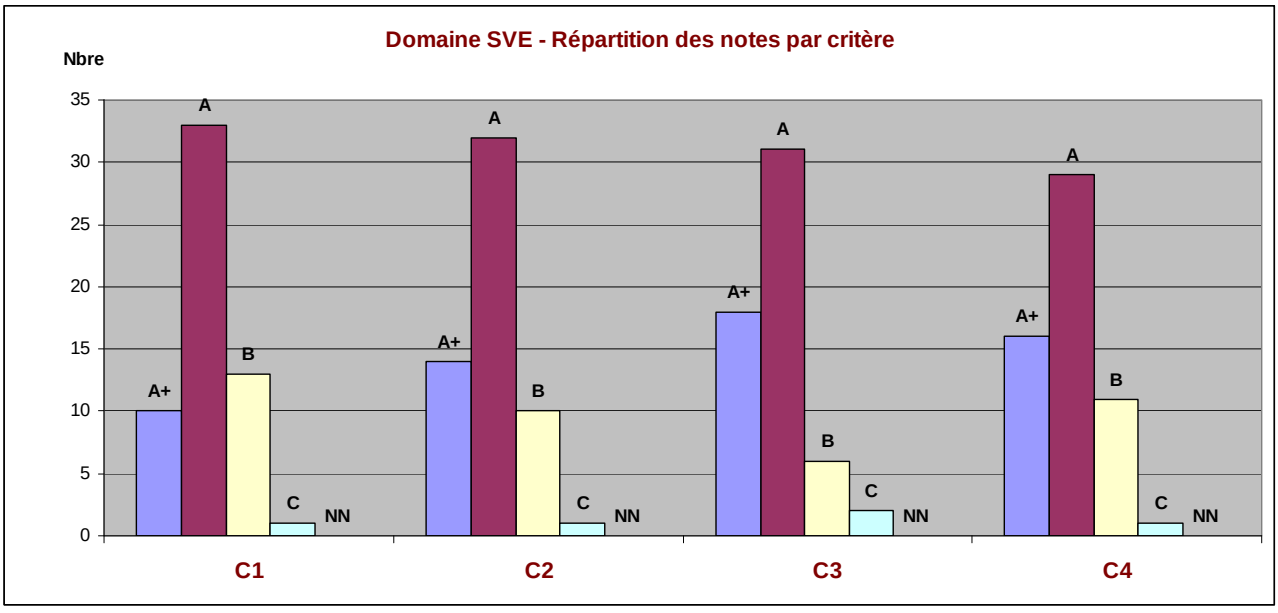
6 • Statistics per field

Notes

Critères	C1	C2	C3	C4
	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Gouvernance et vie du laboratoire	Stratégie et projet scientifique
A+	10	14	18	16
A	33	32	31	29
B	13	10	6	11
C	1	1	2	1
Non noté	-	-	-	-

Pourcentages

Critères	C1	C2	C3	C4
	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Gouvernance et vie du laboratoire	Stratégie et projet scientifique
A+	18%	25%	32%	28%
A	58%	56%	54%	51%
B	23%	18%	11%	19%
C	2%	2%	4%	2%
Non noté	-	-	-	-



UNIVERSITÉ DE STRASBOURG

Monsieur Pierre GLAUDES
Directeur de la Section des Unités de recherche
Agence d'évaluation de la recherche et de l'enseignement supérieur (AERES)
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Alain BERETZ
Président

Strasbourg, le 20 avril 2012

Objet : Rapport d'évaluation de l'UPR 2357 « Institut de biologie moléculaire des plantes » (réf. S2PUR130004491-RT)
Réf. : AB/EW/N° 2012-193

Affaire suivie par
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Direction de la recherche

Cher collègue,

Je vous remercie pour l'évaluation de l'unité propre de recherche « Institut de biologie moléculaire des plantes » (IBMP – UPR 2357) dirigée par Monsieur Pascal Genschik, puis par Madame Laurence Drouard à compter du 1er janvier 2013.

Vous trouverez ci-joint les réponses du porteur de projet concernant les erreurs factuelles et les remarques et appréciations du comité d'experts.

Je tiens à apporter les précisions suivantes.

- En matière de répartition des charges des enseignants entre enseignement et recherche, l'Université a mis en place plusieurs actions. Une mesure d'attractivité est ciblée sur les nouveaux maîtres de conférences : une décharge de service d'enseignement de six mois leur est accordée afin de faciliter leur insertion dans les unités de recherche. Cette décharge peut être utilisée dans les cinq années suivant leur recrutement. En outre, l'Université a mis en place un référentiel des activités des enseignants-chercheurs ciblant un certain nombre de responsabilités dans le domaine de la recherche qui permet une modulation des services.
- En ce qui concerne les personnels techniciens et ingénieurs, quelle que soit leur affectation, y compris au sein des unités propres du CNRS, tel l'IBMP, l'Université reste attentive à la carrière de ses personnels.

Je vous prie d'agréer, Cher Collègue, l'expression de mes sentiments distingués.

Alain BERETZ

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P.J. :

- **Une première partie corrigeant les erreurs factuelles**
- **Une seconde partie comprenant les observations de portée générale**

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Response of the Direction to the report of the AERES visiting committee of IBMP

First of all, we would like to address our special thanks to all members of the expert committee for their involvement and their excellent work in the evaluation of our institute. Their comments and suggestions will be very useful for the future of the IBMP.

We have appreciated the very positive evaluation of our institute by the review committee. The report also pointed out a few weaknesses. As the report is going to be made public, we feel it is necessary to correct a few misunderstandings or errors. Furthermore, since the AERES committee's visit (mid-December 2011), some points have evolved that are worth to be mentioned here.

Overall assessment

Funding

We are aware of the general problem of funding for individual research groups. The future Direction and all team leaders will continue to make efforts to attract international grants. We are also pursuing our efforts at the national level and since the AERES audit, we obtained a second LABEX called Mitocross that involves three teams (Teams 16, 17 and 18) of the IBMP. This will provide a 8 years funding and will reinforce in particular one of the young team (Team 18) created this year as well as the team of the next director (Team 17).

Size of team

We agree with the committee that most teams are relatively small in size. As mentioned in the report, the Direction will continue effort to reduce this number and decrease the number of different projects. Increasing team's size also relies on recruitment. As an example, one of the young team (Team 18) just created this year, will be considerably reinforced at the end of 2012 by one DR researcher of the IBMP who decided to join this young and dynamic group and by a CR recruitment. Our future scientific policy will aim at similar strategies to reinforce small sized but nevertheless excellent teams.

Valorization of the intellectual value

An important recommendation of the experts' committee (page 7) is "to set up structure to better capture the intellectual value of research performed at the IBMP". We fully agree with this comment. To this end, a CNRS engineer has been recruited in March 2012 and her task will be fully devoted to this valorization field.

Platform strategy

We acknowledge the lack of Next Generation Sequencing, currently outside the scope of the one-manned in-house sequencing facility. Projects requiring such technology readily can take advantage of existing facilities as external services, at a lower cost. The IBMP's BioImage facility has been significantly strengthened in the last 3 years, with the recruitment of new staff members and the increase in computing and storage capacity. In addition, to match the increasing needs in bio-informatics, an additional bio-informatics engineer position was requested from the CNRS (ranked 1 in the priority of the institute). The institute's management also strongly encourages current and future grant applications to include financial support for innovative technology and workforce to support and develop existing facilities.

Assessment of the unit's involvement in training

Page 11, bottom. It is written that the IBMP is part of two doctoral schools: "Biologie végétale integrative" and "Virologie". These are actually the master programs. As reported in our Activity Report on page 8, IBMP is only affiliated to one Doctoral School, the "Life and Health Doctoral School" (ED 414) at the University of Strasbourg.

Specific comments on groups

Team 1 – page 12- 14

1. Future external funding.

Team 1 just signed two new contracts of collaboration with their industrial partner for 3 years. Based on this fruitful collaboration, the company hires an engineer who is hosted by the IBMP to enhance their research goals.

2.Official Collaboration with INRA

The AERES Committee did not comment on the project of Team 1 to create an USC (Unité sous Contrat) with their collaborators from the INRA Centre in Colmar while the committee endorses such an agreement for the GFLV project (Team 4, page 21). We understand that the presentation of the USC by two teams was probably not clear to the committee. The idea is to create an USC with their colleagues in Colmar on two projects: one addressing the biology of GFLV and another on poleroviruses.

Considering the contracts Team 1 has with their industrial partner, poleroviruses and BNYVV have high valorization potentials that require functional transmission tests for which the collaboration with their colleagues in Colmar is crucial. All the studies on the biology of poleroviruses rely on their long-standing and efficient collaboration with the group of V. Brault at the INRA of Colmar. Some of the best papers of the team (aphid transmission related to the virus life cycle) arose from this collaboration.

3. Minor points

The "coremin" sequence is present at the 5′ end of the non-coding RNA deriving from RNA3 (and not at the 5′ end of RNA3).

Team 9 – page 31 – 33

1. Patents

On page 32, end of the first paragraph, it is written that Team 9 "generated one patent" and in the conclusion (page 33), the committee is surprised to see that the team "has generated such a low amount of patents, despite its capacity to generate important breakthroughs with high potential for applications". In fact, in the Activity Report (page 104), two additional patents were omitted and Team 9 would like to make the committee aware of that:

- Navarro, L, and Voinnet, O. (2007). Methods and composition for modulating the miRNA pathway. PBL.WO 200887562.
- Navarro, L, and Voinnet, O. (2007). Methods and composition for modulating the siRNA and RNA directed DNA methylation pathways. PBL. WO 200887561.

As a conclusion, Team 9, in addition to its strong world leader position in the field of plant RNA silencing, also had a strong policy in term of protection of its intellectual property.

2. Assessment of the research team's reputation – Assessment of the strategy

As written in the Activity report (page 101) and in the committee report (page 32), the former team leader, Olivier Voinnet, obtained an impressive list of honors and among them the silver medal from CNRS in 2007. What was omitted in the Activity report is that the new team leader, Patrice Dunoyer, also obtained the bronze medal of the CNRS in 2011. This supports the point that the new team leader already started to gain its own autonomy and leadership.

Strasbourg, le 3 avril 2012

Laurence Drouard