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## **CMAEE - Contrôle des maladies animales exotiques et émergentes C15**

Rapport Hcéres

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

Section des Unités de recherche

AERES report on the research unit  
Contrôle des Maladies Animales Exotiques et  
Emergentes  
From the  
CIRAD  
INRA

Mai 2010



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From the  
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Le Président  
de l'AERES

Jean-François Dhainaut

Section des unités  
de recherche

Le Directeur

Pierre Glorieux

Mai 2010



# Research Unit

Name of the research unit: Contrôle des Maladies Animales Exotiques et Emergentes

Requested label: UR CIRAD, UR INRA

N° in the case of renewal: CIRAD (15) INRA (1309)

Name of the director : Mr. Dominique MARTINEZ

# Members of the review committee

## Chairperson:

Mr. Elena LEVASCHINA, CNRS, Strasbourg

## Other committee members :

Mr. Didier GUILLEMOT, Institut Pasteur, Paris

Mr. Didier LERECLUS, INRA, Guyancourt

Mr. Jean-Jacques LETESSON, Université de Namur, Belgique

Mr. Marco VIGNUZZI, Institut Pasteur, Paris

Committee members nominated by staff evaluation committees (CNU, CoNRS, INSERM and INRA CSS....)

# Observers

## AERES scientific advisor:

Ms. Claire POYART

## Research Organization representatives:

Mr. Thierry PINEAU (INRA)

Mr. Dominique BERRY (CIRAD)



# Report

## 1 • Introduction

- Date and conduct of the visit:

The expert committee visited the Laboratory on February 11 2010. The visit started with a presentation by the current head of the laboratory. Subsequently, each team presented its past activities and future projects. Experts also met, in separate committees, with representatives of: researchers with permanent positions, PhD students, postdoctoral fellows, engineers, and technicians and administrative assistants. The committee also met with representatives of the CIRAD and INRA. A final meeting was held with the director. The site visit ended with the closed-door meeting of the committee.

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

The unit operates on multiple sites. The main site is located in Montpellier on the Campus of Baillarguet. The two other sites are located in « La Guadeloupe » and in « La Réunion ». This research unit “Contrôle des maladies exotiques et émergentes » was created as an UMR CIRAD-INRA in January 2008 and has been under the directorship of Dominique Martinez for the past 4 years, and consisted of 7 teams. The scientific scopes of the research in the UMR deal with epidemiology, virology, vector transmission, emerging pathogens. This research is based on approaches that include molecular genetics, biochemistry, genomics and bioinformatics.

- Management team

Mr. D. Martinez and Mr. T. Lefrançois, are Director and Deputy Director of the Research Unit, respectively.

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	0	0
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	29	29
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	8	ND
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	25	ND
N5: Number of other engineers, technicians and administrative staff (Form 2.6 of the application file)	11	13
N6: Number of Ph.D. students (Form 2.7 of the application file)	17	9
N7: Number of staff members with a HDR or a similar grade	6	6



## 2 • Overall appreciation on the research unit

- Overall opinion

All the activities of the unit are in complete accordance with the missions defined by their funding agencies (INRA and CIRAD) and as such clearly contribute to the socio-economical development of the Southern countries. Their objective of improving animal health will obviously impact the productivity and will facilitate commercial exchanges of animal and animal products but will also have major effects on human health because of the control of zoonotic diseases.

The motivation of the researchers and of the students is impressive and the spirit of the team is very good.

Particularly excellent is the ability of the team to raise funds both through competitive grant application and through licensing of products derived from their research that is mostly application oriented (as opposed to fundamental).

Because of their “multisite” implantation (in Caribbean islands and in Indian ocean in addition to the Montpellier major location) and their involvement in sanitary surveys and access to field samples the research unit has a very dense collaborative international networking.

The insertion in the local translational network is also quite good (project Campus: biologie-santé et agro-environnement, Pôle vecteur et Maladies Emergentes, RTRS infectiopôle Sud et EUROBIOMED etc..)

- Strengths and opportunities

Appropriate for the CIRAD missions, the major strengths of the unit are the development of applied studies to provide tools for surveillance of infectious diseases and insect vectors that are involved in the disease transmission. The unit is at the cutting edge of technology development for diagnosis and surveillance kits that are used internationally and are adopted by a number of international organisations.

Unique possibility to access material from the Caribbean and Indian Ocean sites, which when properly exploited may provide unprecedented opportunities for research.

Significant national and international funding resources.

- Weaknesses and threats

This is not a fundamental research unit; therefore many research projects lack original questions and only target applied research. However given the expertise of the unit, the project at the interface of the applied-fundamental research should be better developed.

Insufficient involvement of postdoctoral researchers and low number of HDRs.

Low level of publications, many of which are published in the journals without peer-review. The quantity of publications dominates over quality.

- Recommendations to the head of the research unit

Improve the publishing policy and international visibility of the unit. In spite of excellent involvement in a number of international and European networks, the number of invitations to present data at international conferences is relatively modest.

Clearly identify strengths of the unit in selected areas of fundamental research, relevant for development of original tools for control of zoonotic diseases.

Attract postdoctoral researchers and improve the number of researchers with HDR.



- Data on the work produced :

A1: Number of permanent researchers with or without teaching duties (recorded in N1 and N2) who are active in research	29
A2: Number of other researchers (recorded in N3, N4 and N5) who are active in research	8
A3: Ratio of members who are active in research among permanent researchers $[(A1)/(N1 + N2)]$	1
A4: Number of HDR granted during the past 4 years	0
A5: Number of PhD granted during the past 4 years	9

### 3 • Specific comments on the research unit

- Appreciation on the results

The unit is mostly developing approaches for surveillance and control of zoonotic diseases in areas of disease transmission. Although it is not basic research, some areas are in the interface between the fundamental and applied research (e.g. vector population biology), and therefore should be strengthened from this point of view. The unit has sufficient manpower and financial resources to be involved in both aspects of research, especially given unique resources of the outstations. The overall quality of the applied research is good and it does impact socio-economical development in some Southern countries.

Most of publications are in the low-impact journals. This cannot be fully justified by the applied orientation of the research activities and can be significantly improved. The scientific communications are mostly at the level of posters or contributions to the annals of international meetings. Together with the improvements in the publishing policies and active participation in the meetings should bring more international visibility to the unit.

The unit pays a special attention to establishment of partnerships with at the national and international levels. Most of these partnerships are excellent and provide the missing expertise to the unit. However, in some cases partnerships lead to dispersal of the scientific tasks resulting in some opportunistic research.

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

There are not many prizes and distinctions awarded to the unit members and invitations to international conferences are very rare.

The unit was successful in recruiting a number of young French researchers, however, its international visibility can be and should be improved.

One of the strengths of the unit is its excellent capacity to raise funds, both through development and commercialization of diagnostic kits and through securing competitive funding.

The unit actively participates at international and national networks, both as a coordinator and as a partner.

- Appreciation on the strategy, governance and life of the research unit

The unit organization and the quality of governance is excellent, which is reflected by the exceptional enthusiasm of the researchers and technicians and their commitment to the work.

Given that the unit is mostly involved in the translational research, it is not taking up many risks or cutting edge projects. Nevertheless, the unit initiated and coordinates a local initiative on the establishment of vector pole, bringing together expertise of a number of research organisations and the university in the Montpellier region.



The unit is not directly involved in teaching activities in the sense of university training. However, an important part of the unit activities is dissemination of acquired knowledge and novel tools developed by the unit, as well as training of master and PhD students.

- **Appreciation on the project**

With the restrictions detailed in the team reports, the projects of the Unit are relevant and feasible during the next term of the unit life. Most of the projects concern the development of applied studies to provide tools for surveillance of infectious diseases and insect vectors that are involved in the disease transmission. Most are original though to different extents as detailed in the team reports but they could be slightly more ambitious.

#### 4 • Appreciation team by team

Team 1: Virology

Team leader : E. ALBINA

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

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	0	0
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	8	8
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	0	0
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	5	5
N5: Number of other engineers, technicians and administrative staff (Form 2.6 of the application file)	1	1
N6: Number of Ph.D. students (Form 2.7 of the application file)	2	3
N7: Number of staff members with a HDR or a similar grade	1	1

- **Appreciation on the results**

The overall goals of this research team are highly relevant to the field. Through their diagnostics and reference centers, belonging to numerous national and international surveillance programs, the team works to better characterize the ecology of a number of viruses and to identify what particularities of a given niche account for the presence of certain strains. The research efforts in optimizing and developing detection techniques (various PCR detection, filter paper sampling, etc.) have obvious relevance to improving sample collection and processing in the field. The goal to improve current, and to develop new, vaccines through generation of infectious clones, recombinant viruses, and rational attenuation of live viruses is also of high relevance to the field. The exploration of new antiviral approaches such as RNAi merited study and could constitute a future antiviral strategy. Although the research undertaken is indeed relevant, the approaches and techniques developed are not particularly original and may be reflected in the lower impact of publications. Since much of the work of this group involves diagnostics and genotyping, it is understandable that efforts would concentrate on improving conventional techniques. Although the originality of the work could be improved, the impact of the results they have obtained is significant. The improvements to detection techniques and sample collection, rendering them applicable to developing countries and





more difficult working conditions, could have significant impact in the field. Since the vaccine development is not yet advanced, it is unclear what the impact is at this point, although the potential is evident.

The team has been very productive, with 36 publications during the 2005-09 period. An effort should be made to target higher impact journals for at least some of the research. Almost all publications fall within the 1 to 3.6 impact factor range, although this is understandable for animal virus diagnostics research. The team's higher profile publications include 2 Journal of General Virology, 3 Vaccine, 2 Antiviral Research and 2 Virus Research papers. 2 other articles appeared in high profile Emerging Infectious Diseases journal and 1 in Plos Pathogens ; however, these papers were collaborations and not first or corresponding author papers.

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

The team has participated in many scientific communications, most of which have been locally held, or are part of a European consortium such as EPIZONE. Participation in truly international, wide audience conferences should be increased to improve the visibility of the Unit outside of the immediate field. The team has produced 5 Ph.D. theses in 5 years, on topics spanning the axes of research. A patent application has resulted from their work on RNAi.

The team, and the Unit as a whole, has a multitude of regional, national and international partnerships that run smoothly and successfully and is an obvious strength of the Unit.

The team has not received any prizes or distinctions. One invitation was extended to the International Congress of Veterinary Virology. Only two other invitations to a Brazilian national meeting and an EPIZONE meeting were cited. Increasing attendance to broad, international congresses and improving wide-audience visibility could help increase higher profile invitations.

The team seems to be able to recruit the required personnel, particularly through its extensive international network. They currently have 5 Ph.D. students of which 4 are international.

Significant competitive funding has been obtained by the Unit, the role of the team in this is not known. The team generates significant funding in the form of diagnostics and related services.

The team is an integral and successful part of numerous national and international networks : eg. INRA and AFSAA (national) and several European consortiums (MARKVAC, MEDREONET, EPIZONE), African networks (LABOVET) and world networks (OIE, FAO).

- **Appreciation on the strategy, governance and life of the research unit**

The virology team is a strong and important presence within the Unit. They have been successful in tying their research interests to the other teams of the Unit and in maintaining the overall dynamic.

The team's principal teaching activities involve training Ph.D. students within lab and other temporary interns. One team member participates in 9 hours of teaching per year at the graduate level. Only one HDR exists among the 8 researchers of the team. The relatively low number of HDRs in the Unit as a whole has been addressed in the report, and this team should encourage other members to obtain the degree.

- **Appreciation on the project**

Overall, the project does not give enough detail. It is difficult to assess the originality of the work proposed because the specifics of each research theme are not given. The proposed research on deeper characterization of Newcastle, PPR and PPA in Senegal and Madagascar does not indicate what hypotheses it intends to address and how specifically the viruses will be studied (in terms of time, geography, host ?). As written, the research seems to be a simple continuation of previous research. The diagnostic and sample collection efforts previously developed will also be a continued line of research. The development of an influenza detection kit could be an attractive product for industry. The development of DIVA vaccines would be useful, but again, not highly original. The reverse genetics system will be a useful tool to identify virulence determinants ; however, the project does not go into detail with hypotheses of what those determinants might be, nor specific information on how those hypotheses will be tested. Similarly, preliminary data on the rational attenuation of viruses through deletions is missing, as is a descriptive on what exactly will be done. The RNAi work proposed is not original (RNAi escape mutants of PPR). The constitutive expression of RNAi in pigs against PPA is more original and indeed risky and would definitely be a longer term project ; however, no preliminary data on RNAi against PPA is presented and the research steps leading to the longer term goal



are not described. The study of the role of vector competence in virus genotype diversity is an interesting and original project that could bring results of interest to a wider audience of biologists. Despite the lack of detail, the medium and long-term goals themselves are clear and fall within the research framework of the team and the Unit. There is some doubt as to whether all of this work can be carried out, given the level of work generated in previous years, but with the right collaborations, the projects should advance.

- **Conclusion**

The team has obvious expertise and a long history in the field. Although the work is not particularly original or cutting-edge at the level of basic science, their efforts are highly relevant, particularly in helping developing regions improve their surveillance techniques. The team's work on improving vaccines is also very relevant. The team has a clear strength in creating research networks and maintaining a balance between surveillance/diagnostics and more fundamental research. There is also a strong culture of bringing lab research towards industry. The team has a very good publication record in terms of number of papers and kinds of papers (general virology, vaccines, antivirals) produced. The team should try to use their models to answer some more general questions, which would render their work publishable in broader, higher impact journals.

## Team 2 : Vectors

Team leader: J. BOUYER

- **Staff members :**

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	0	0
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	6	6
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	0	0
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	3	3
N5: Number of other engineers, technicians and administrative staff (Form 2.6 of the application file)	0	0
N6: Number of Ph.D. students (Form 2.7 of the application file)	4	4
N7: Number of staff members with a HDR or a similar grade	1	1

- **Appreciation on the results**

This is a very young team, which was created in 2008 and is currently composed of mostly early stage researchers. Therefore the results presented in the report mostly reflect previous work outside the UMR. The team participates in different research topics of the Unit-vectors and their interactions with pathogens, hosts and ecosystems' and 'Monitoring, health networks and health hazards'. The research is highly relevant to the objectives of the Unit within the host organization.

The committee appreciated the remarkable level of expertise in systematic, taxonomy and phylo-geography of soft ticks and a number of insect species. The group developed tools for molecular genotyping, which provides means for barcoding of species. Interesting results were achieved in a concerted action in the fight against tsetse flies in Niayes, Senegal, and in Sideradougou region of Burkina Faso, which provide basis for design and implementation of vector control measures. Spectacular results were also obtained by examining feeding preferences of ticks and tsetse flies on cattle, which suggested a novel intervention active against both vectors. The results are of high quality and



already proved useful for design of novel intervention strategies, which in the nearest future should impact the sanitary levels of livestock. The species barcoding is important for vector surveillance and epidemiological surveys in the endemic areas. The impact of the obtained results is significant. The improvements to molecular barcoding, species identification and surveillance are of great importance for vector control programs. Novel interventions will significantly impact the infectious level of the livestock and improve the agricultural output of African countries. The cumulative scientific productivity of the team is very high, since 2005 the researchers published 53 publications and contributed 5 book chapters. This may negatively affect the level of individual publications that are predominantly published in the specialized low-impact factor journals. The team's high profile publications include 1 Lancet, 2 Emerging Infectious Diseases, 1 Molecular Ecology, and 1 PLoS Neglected Tropical Diseases. Researchers participated in many scientific communications, most of which were contributions to meeting proceedings.

The committee notes relatively few presentations at the international meetings. This can be and should be improved to increase the visibility of the team in field of vector research.

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

J. Bouyer was awarded a prize for his Thesis work by the French Society of Medical Entomology. Very few invitations to international conferences. The new team assembles very enthusiastic young stage researchers, it has 4 Ph.D. students of which 3 are international. The visibility of the group to attract post-doctoral researchers should be improved. Coordination of the Wellcome Trust project (see below). The team coordinated the Wellcome Trust Fragfly project (500,000 Eur/5 years), which included partners from CIRDES, IMT (Angers), Oxford University, Avia-GIS and University of Pretoria (<http://wt-fragfly.cirad.fr>). Participation in a series of networks, for instance FAO, IAEA, Pasteur Institut Network, etc.

- **Appreciation on the strategy, governance and life of the research unit**

The research group is dynamic and the governance is well appropriate to the specific structure (France-Caraïbe) of this team. It seems that the governance is well accepted by the different members of the team. Effort is taken in re-equilibrating the team structure as to provide additional expertise to projects involving the tse-tse flies and ticks via national and international collaborations. However, the option of recruiting postdoctoral researchers is not envisaged. The team participates in training of master (2) and PhD students (currently 4). Members of the team also contribute to teaching at master and PhD courses in universities of Thailand, Madagascar, France.

- **Appreciation on the project**

The overall project description is very brief and is divided in a number of selected questions. The proposed scientific approaches are difficult to evaluate, as they only indicate global approaches (e.g. experimentation in vivo, transmission assays in controlled conditions) and do not provide sufficient methodological information. The project is not divided into medium- or long-term components. The team possesses all necessary expertise to answer research questions, however the scientific synergy within the team is not well described and could be improved, so that the team does not appear as a collection of independent researchers. The team has a critical number of permanent researchers, which can be fortified by postdoctoral researchers. Instead, the team opted to perform a number of tasks in collaboration at local, national and international levels. This is apparently in accordance with the mission of CIRAD to establish long-term partnerships with the Southern countries but it seems appropriate to attract post-doctoral researchers (including specialists from the endemic countries). The originality of the work is determined by the impressive expertise of the team members in entomology and taxonomy of relevant vector species. New avenues into research of vector competence are promising, especially in the view of new insectary. However, what parameters will be examined is not very clear. This is not a high-risk research and is mostly oriented towards surveillance and providing solutions for vector control, which are in agreement with the CIRAD mission.

- **Conclusion**

The contribution of this team to the health and sanitary status in the endemic countries is very important and the first results are very promising. The team builds on its first successes to develop vector surveillance tools and intervention means with the purpose to block transmission of a diverse set of pathogens in livestock. The strength of the group is its high level of expertise and enthusiasm about the tasks. The team covers all major competences in the field of medical entomology and now extends its research program to studies in controlled conditions. The potential weakness of the group is fragmentation. Its 4 researchers are involved into research activities with at least 5 animals (ticks and insects). Therefore, not all tasks can be successfully performed. The team should better focus their



research questions and build on their expertise to become a group of reference in a chosen field. Only 1 researcher has HDR, the number of potential Thesis directors should be improved. The group should continue their line of research in taxonomy and surveillance of vectors in endemic countries. The new lines of research (e.g., vector competence) should be more focused. The team should improve their participation in the international meetings and attract post-doctoral researchers.

### Team 3 : Mycoplasmes

Team leader : F. THIAUCOURT

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

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	0	0
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	3	3
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	1	1
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	1	1
N5: Number of other engineers, technicians and administrative staff (Form 2.6 of the application file)	1	1
N6: Number of Ph.D. students (Form 2.7 of the application file)	2	0
N7: Number of staff members with a HDR or a similar grade	0	0

- Appreciation on the results

As far as their funding agencies promote finalized researches, formations and support to political and sanitary decisions dedicated to sustain the development of Southern countries, the activities of the Mycoplasma unit are highly relevant.

In fact they are for the OIE world reference laboratory for both the bovine (PPCB) and caprine (PPCC) « contagious pleuropneumonia». For the FAO they are mondial reference centre for the PPCB and regional reference centre for Africa and the Middle east for PPCC. They organize technical formation in Montpellier and contribute too the development of new optimized diagnostic approaches. They realize a lot of missions (around 78) abroad (and in reality this appears quite exaggerated because this means more than a mission per month between 2005 and 2009).

Because of their involvement in finalized research and in development the originality of their reseach is quite limited. Development of new serological diagnostic tools (competitive ELISA), molecular typing tools for epidemiological purpose (VNTR, SNP, MLSA) partly based on the genome data (*MmmLC* and *M. putrefaciens*) they contribute to obtain with the Genoscope and the INRA.

Considering their deep involvement in the formation and OIE or FAO decision centre the work of this team has a clear and significant impact on the development of Southern countries.

Considering the quality of the results, as far as scientific quality is concerned, this team has a medium impact and is known in his veterinary field but is not the best-known team. Outside the veterinary mycoplasma field, the team is probably not known.



As an illustration, during this five years period with the pubmed search on “Mycoplasma mycoides sub” I recover 58 publications 5 from the mycoplasma team 2 from the immunology unit but during the same period J. Frey (Veterinary Microbiology, Bern, Switzerland) co authored 13 on the 58 publications.

Twelve publications in peer-reviewed journals of medium to low impact factor (Mol Probes, Int J of systematic) reflect the lack of basic researches. Considering the 2 PhD students and the 4 scientists of this small team this is less than 1 publication per year per person.

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

Several invited conferences in international specialized or veterinary congress. Two PhD thesis coming from Southern countries, otherwise no particularly top-level scientist recruited. But with a lab mostly oriented towards finalized research and publishing in low impact journal, it is not easy to be attractive. The ability to raise funds, and to successfully apply for competitive funding, is as the rest of the Unit, performed rather well in raising funds either by collaboration with private company (Pourquier, IDEXX) to develop diagnostic kit or by being granted in research programs.

As far as the whole Research unit has some research antennas in Guadeloupe or La Réunion, there is a strong collaborative network established with Carribean or Indian Ocean countries and a clear worldwide recognition as reference centre by FAO and OIE. International collaborations have been elaborated with Nigeria and Cameroun to make an epidemiological survey by VNTR of the MmmSc strains.

- **Appreciation on the project**

Quite difficult to appreciate because instead of a real detailed project was described a short overview of what will be performed.

However, as mentioned in the « so called » project, the objectives of the research program and their realization will strongly be conditioned by the level of funding the team could receive for the study of the PPCB or PPCC.

In general the Immunology part of the project (dealing with the characterization of the immune response induced by the existing vaccines and the identification of the protective immune parameters) is much more credible than the functional genomic part.

This later part and particularly the part concerned with the identification of virulence factors is non convincing for several reasons : (i) the genome data by itself will not allow the identification of virulence factors (ii) the proteomic data illustrate only production of proteins in the tested conditions that are far from conditions encountered in the host diseased animal and as such cannot be correlated to the disrupted genes in the plasposons mutants (iii) the library of mutant is not intended to be screened for virulence genes by looking for attenuation but by looking disrupted genes potentially involved in virulence in other species (sic).

- **Conclusion**

The contribution of this team to the development of Southern countries is clearly high either by forming technicians or scientists from abroad but also by their expertise often used by the FAO or the OIE. The above missions restrict the research ability of the team on diagnostic development of kit or of molecular typing of mycoplasma strains. The incorporation of an experienced Immunologist inside the team constitutes a real opportunity to increase the fundamental research potential of this team while keeping with the research axis of the Unit and of the funding agencies. The creation of a library of plasposon mutants that could be useful in getting more fundamental data on the pathogenesis of these bacteria is a good step with regards to the forecasted perspectives. As it is true for the Unit, the topic « plasticity of the genome » will only lead to interesting results if a Bioinformatician is hired otherwise this will only make an accumulation of raw underexploited data. This team should incorporate more HDR, increase its attractiveness for PhD students.

In conclusion, the committee recommends to reinforce the fundamental aspects by asking more often “how does it work ? ” rather than “how can I use it for development ?” . This will make the team more attractive for PhD students and will also lead to publications of higher impact. The team has a big potential provided they are not too much over-crowded by “formations and missions”.



## TEAM 4: Quantitative epidemiology:

Team leader : R. LANCELOT

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

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	0	0
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	2	2
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	0	0
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	2	2
N5: Number of other engineers, technicians and administrative staff (Form 2.6 of the application file)	0	0
N6: Number of Ph.D. students (Form 2.7 of the application file)	4	4
N7: Number of staff members with a HDR or a similar grade	?	?

- Appreciation on the results

This team was recently created (January 2009) following recommendations of the last CIRAD evaluation of the unit. Its research activity mainly focuses the description of spatial distribution of vectors and mathematical modelling of vector borne animal diseases. I have no doubt with the very high scientific relevance of such an initiative, which is furthermore very consistent with the global epidemiological orientation of the unit project. Nevertheless, the modelling approaches remain very classical and their originality somewhat modest. Twenty publications were published in 2009 in peer-reviewed international journals. Except for one publication in Emerging Infectious Diseases (IF= 6.45) in which the team project leader was in second author position, the targeted journals are very specialized and have a modest international impact. No prizes, awards or invited international conferences are mentioned in the documents. 4 PhD students but no post-doc fellow are working within this team. There is no scientist from abroad. The leader of the team is the coordinator of a FP6 research program named EDEN (Emerging Vector-Borne Diseases in a Changing European Environment). Development of new R packages which become actually one of the standard software in the epidemiologist community.

- Appreciation on the strategy, governance and life of the research team

The team members are involved in several masters in France and in postgraduate courses organisation.

- Appreciation on the project

The specific scientific project of this team is not clearly identified. It is indeed very closely linked to the work dynamic of the other teams (in particular) those also developing epidemiological approaches such as the Caribbean team. The originality of the scientific project of this team is more due to the animal pathologies being addressed than the methodologies undertaken.

- Conclusion

Good classical project in mathematical modelling of infectious diseases without any very innovative perspectives. The relevance of emphasizing epidemiological research within this CIRAD/INRA research group is of high level, but we could recommend the team to try to be more original and creative. Furthermore, besides mathematical modelling the epidemiologists seem to be weakly or lately involved in the epidemiological investigation building. The committee suggests strengthening their presence early in design projects that have a size field. This might be to improve the perspective of epidemiology investigation of the whole research group who are still often limited to



monitoring ambitions, or take the risk of being insufficiently ambitious (for example in the design of intervention trials)

It is a very small team. Instead of promoting an epidemiological team, another option might be to gather human resources on more identified scientific challenges and to integrate epidemiology in addressing these challenges or to propose a stronger epidemiological team making it to play a role more significant in the development of epidemiological researches of the unit. Furthermore, the implication of the epidemiological team in the sampling design or its participation in drawing or coordinating investigations remains unclear. The Committee recommends to clearly identify the specific scientific challenges; to improve the originality of the epidemiological approaches even in the field of mathematical modelling; and to be involved at the early beginning of the project design.

## TEAM 5: Centre de Recherche et Veille Caraïbes

Team leader : T. Lefrançois

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	0	0
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	4	4
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	0	0
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	4	4
N5: Number of other engineers, technicians and administrative staff (Form 2.6 of the application file)	1	1
N6: Number of Ph.D. students (Form 2.7 of the application file)	2	0
N7: Number of staff members with a HDR or a similar grade	0	0

- Appreciation on the results

The genomic approaches used to study *Ehrlichia* diversity are highly relevant to the thematic. The sequencing of two strains and various analyses (transcriptomics, VNTR, MLST) provided information to characterize strain diversity and resulted in the development of diagnostic tools. The overall quality of the results is good with a significant impact, although strictly limited to this specific research field.

In addition to this research activity, the team has an important participation in various surveillance programs, specifically to survey and analyze the tick and west Nile virus populations in Caraïbes.

Considering the intrinsic technical difficulties of the research project, the number and the quality of the publications is correct. During the last five years, the team has published 12 articles on the *Ehrlichia* project and 15 on the surveillance activities. The best original publications of the team are in journals with impact factors ranging from 3 to 4: J. Bacteriol (2 papers), BMC Mol Biol (1), Vaccine (2); and a review in Trends Parasitol (IF ~5).

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

The team participates to a strong and stable partnership, notably the CaribVet network including 25 veterinary agencies in Caraïbes. The team had 4 PhD students and 1 or 2 post-docs during the last five years. The ability to raise funds, to successfully apply for competitive funding, and to participate to scientific and industrial clusters is



excellent. The participation to international or national scientific networks, existence of stable collaborations with foreign partners is excellent in the specific fields of competence (Ehrlichia and tick surveillance).

The studies on Ehrlichia strains led to a patent focusing on the characterization of target genes for strain-specific diagnostic. Diagnostic tools and vaccines were developed to improve the detection of Ehrlichia and to protect animal against this bacterium, respectively.

- **Appreciation on the strategy, governance and life of the research unit**

The research group is dynamic and the governance is well appropriate to the specific structure (France-Caraïbe) of this team. It seems that the governance is well accepted by the different members of the team. The involvement of the unit's members in teaching activities is low except the training of PhD students. However, there is a substantial activity in the local organization of researches, via the CariVet network.

- **Appreciation on the project**

The proposed scientific project is original and ambitious, but the feasibility of some points may be questionable.

Studies on Ehrlichia diversity are logical and should provide new insights on this aspect, with the aim to improve methods for strain detection.

Studies on the virulence of Ehrlichia and on the host-pathogen interactions are very interesting and have to be done. However, the methodology and the scientific approaches should be examined thoroughly for optimizing the feasibility of this ambitious project. In addition, the unit should be aware of the difficulty of the subject and should consider the necessity to create a strong scientific dynamic to develop such new approaches on Ehrlichia.

Studies on the dynamics of tick populations are necessary and well organized.

- **Conclusion**

This is a good team with a good balance between the different activities having excellent collaboration networks. The subject has a high socio-economical impact, representing a strong challenge at the scientific level. The study on Ehrlichia virulence is an ambitious project requiring specific and powerful tools and methods, which do not seem to be available. It results that the molecular and cellular approaches, which have to be developed, should be carefully examined. The committee recommends to define and to focus on the most important scientific question among the different potentially interesting projects emerging from the Ehrlichia thematic.





**TEAM 6:** Centre de Recherche et de Veille sur les maladies animales émergentes et zoonotiques dans l' Océan Indien

**Team leader :** E. Cardinale

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	0	0
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	2	2
N3: Number of other researchers including postdoctoral fellows (Form 2.2 and 2.4 of the application file)	2	2
N4: Number of engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	0	0
N5: Number of other engineers, technicians and administrative staff (Form 2.6 of the application file)	1	1
N6: Number of Ph.D. students (Form 2.7 of the application file)	0	0
N7: Number of staff members with a HDR or a similar grade	?	?

- Appreciation on the results

This is a small team which was created at the end of 2008 with the purpose to evaluate and to control health risks in the area of Indian Ocean especially after the Chikungunya outbreak in 2007. Currently the major results are related to setting local infrastructures and developing collaborations with other research structures at the area. A number of sera samples was collected from various animals and is being analysed. Nine articles in journals of the speciality have been published and have a modest international impact (IF 1.134 and 3.8). No prizes, awards or invited international conferences are mentioned in the documents. 2 PhD students but no post-doc fellow are working within this team.

- Appreciation on the strategy, governance and life of the research team

The committee was not able to get a clear picture of current strategy, governance and life of the research team as it appears too preliminary and not very well formulated.

- Appreciation on the project

The specific scientific project of this team is not clearly identified. It is mostly based on collaborative efforts with other teams of the unit and other research structures in the area.

- Conclusion

The project should be better formulated and address not only logistic but also research questions. The Committee felt that it was too preliminary to comment on the work of the team and suggests a partial evaluation of its activity by CIRAD in a two-year period if necessary.



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

Nom de l'équipe : VIROLOGY

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

Nom de l'équipe : VECTEURS

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



Nom de l'équipe : CENTRE DE RECHERCHE ET VEILLE OcéAN INDIEN

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

Nom de l'équipe : EPIDÉMIOLOGIE QUANTITATIVE

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

Nom de l'équipe : CENTRE DE RECHERCHE ET VEILLE CARAÏBES

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

Nom de l'équipe : MYCOPLASMES

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

Montpellier, le 19 avril 2010

Monsieur Jean-François Dhainaut  
Président de l'Aeres

*Copie :*  
Pierre Glorieux, directeur de la section des  
unités de recherche

Monsieur le Président,

Je vous adresse ci-joint la réponse de l'unité Contrôle des maladies animales exotiques et émergentes (CMAEE) suite à l'évaluation portée par le comité de visite missionné par l'Aeres.


J'approuve dans sa totalité cette réponse très précise.

L'unité CMAEE œuvre dans des conditions complexes et généralement difficiles, tant en termes d'accès au matériau biologique sur pied qui est son principal objet d'études, que de conduites de projets menés tant avec des scientifiques des pays du Sud que du Nord. Malgré ces difficultés contextuelles fortes, elle est désormais référent au niveau européen et au niveau international<sup>1</sup> et produit tant de la science<sup>2</sup> que des savoir-faire et des outils, que nous protégeons et/ou utilisons au mieux des intérêts des pays du Sud, de l'Europe et du Cirad, établissement français missionné pour conduire des recherches finalisées en coopération avec les pays du Sud, et notamment les plus pauvres d'entre eux.

Je pense que peu de laboratoires de biologie humaine disposent d'un vécu tant scientifique qu'opérationnel de même nature que cette unité et, dès lors, l'exigence portée par le comité de visite dans ces observations élogieuses toujours empreintes de réserves me paraît excessive.

Je vous saurais donc gré de porter une attention toute particulière à l'examen de cette unité au moment d'en finaliser les appréciations, et vous prie d'agréer, Monsieur le Président, mes salutations les plus signalées.

Le directeur général



Gérard Matheron

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<sup>1</sup> notamment auprès de l'OIE, l'Organisation Mondiale de la Santé Animale

<sup>2</sup> les données bibliométriques de cette unité sont de même rang que celles du département Santé Animale de l'Inra, évalué fin 2007



Response to the AERES report on the research unit from CIRAD and INRA

"Contrôle des Maladies Animales Exotiques et Emergentes"

(CMAEE)

14 April 2010

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The Direction and the personnel of the unit thank the visiting committee for its in-depth evaluation of the activities conducted during the past 2005-2009 period and of the proposed project for the next 4 years. The on-site visit gave the opportunity for useful discussions.

The evaluation committee underlines *"the complete accordance of the activities with the missions defined by the agencies"* CIRAD and INRA which are finalized research organizations. It recognizes that the *"activities clearly contribute to the socio-economical development of Southern countries"* (the main goal of research undertaken at CIRAD), that the unit is *"particularly excellent to raise competitive funds"* (important for INRA but compulsory at CIRAD due to its EPIC status) and has a *"very dense collaborative international networking"* (the basis of work at CIRAD). Since these points constitute 3 pillars of CIRAD activities, the unit very much appreciates the overall positive appreciation of the committee on those aspects.

The *"impressive motivation of the researchers and of the students, and the very good spirit of the team"* are highlighted and *"the unit organization and the quality of governance are considered excellent"*. The unit had a strong positive dynamic during the period that led to an almost 2 fold increase of staff members (scientists and technicians) by recruitment or mobility, and the creation of 3 additional "young teams" including one located overseas. Scientific and operational organization was a real challenge for the management team as well as at the individual level. At present, interactions and collaborations run smoothly between the various teams including interactions with overseas teams. The unit staff is therefore very pleased that their commitment is appreciated and recognized, and that the set up organization is supported.

It is also mentioned that the unit *"has unique possibility to access material from the Caribbean and the Indian Ocean which provide unprecedented opportunities for research"*. This further supports the operational organization put in place with two teams entirely

located overseas : one in the Caribbean and one in the Indian Ocean. They are centered on an overseas French Department which constitutes a technology platform with sophisticated laboratory and experimental facilities and they have a regional activity through animal health networks and observatories. The project of each overseas team was indeed organized in two kinds of activities : a field-oriented work on disease surveillance at regional level and a research work taking advantage of performing analytical capacities available in the French overseas departments, with a constant link and expected mutual benefit between both aspects.

- The Caribbean team activities and scientific results are considered “*well balanced and correct respectively, with strong and excellent partnership and significant impact*”. This confirms the validity of the approach consisting of developing sustainable health networks / observatories to conduct both research and disease surveillance. The work conducted on tick biology and modeling is a significant illustration. The unit will therefore continue its strategy of development of regional surveillance networks associated to research.
- The Indian Ocean team is very recent and small at the time of the evaluation. It has mainly focused its activity on the development of the regional network component which is now successfully operating. Investigations have been conducted to identify sanitary priorities. As mentioned by the committee it is reasonable not to evaluate the research component now since this aspect is just starting, with research questions needing further refinement. We aim at reaching the same quality in the research component as the Caribbean team during the 2011-2014 project with an appropriate support.

This epidemiology work is conducted in close collaboration with the epidemiology team in Montpellier, in particular for the design of surveys and experiments (including sampling frame), as well as methodological choices. This team in Montpellier is strongly involved in all field activities. Moreover, it develops state-of-the-art, team-specific research in spatial epidemiology and population dynamics or disease transmission models, relying on field data collected for this purpose

Interactions and collaborations between the different teams of the unit, and between Montpellier and overseas out-places is an essential component of the dynamic developed in order to be successful in our ambition of understanding disease dynamics by an integrated approach.

Besides these very positive comments, the committee has pointed out weaknesses and made recommendations for improvement. Some are fully relevant and others are more questioning for the unit.

- The main weakness pointed out by the committee refers to the fact that the unit is “*not a fundamental unit and mostly targets applied research, and therefore many projects lack original questions*”. Conducting finalized research is the essence of working at CIRAD. Therefore the unit is puzzled by this comment since applied research, socio-economical impact... have been well evaluated by the committee. This is in

contradiction with the first statement that the activities are “*in complete accordance with the missions defined by the agencies*”.

Associated to this comment in the same logic is the consideration of a “*low level of publication many of which are in the journals without peer-review*”. The statistics of the unit in peer reviewed journals is 1.39 publication/scientist/year or 1.72 publication/scientist/year if only publishing scientists (i.e. after removing person\*month devoted to reference diagnostic, expertise, networking and not assigned to research) are taken into account, with a mean IF of 2.35. These values fall into the range of statistics of the Animal Health Division of INRA which constitutes a referential as the main national agronomical research organization (EPST status without a mission of developing the Southern countries). This Division was evaluated in October 2007 by an international visiting committee and its publishing performances considered one of the best of similar targeted research organizations. In addition, regarding quality, 66% of publications fall into the first quartile of the Journal of Citation Report of the regarded subject categories. Some publications have a higher IF up to 5-6. This attests that in its scientific domains the unit has a production of significant quality, also bearing in mind that almost half of publications are co-publications with scientists from Southern countries which is in the mission of CIRAD but obviously an additional constraint.

Nevertheless, the unit completely agrees with the committee comment that the quality of publications can and should be improved in some domains. After its development phase during the 2005-2009 period, the unit has increased its potential to strengthen some research aspects at the interface between fundamental and applied research. This was foreseen during the period and already started in microbial genomics as recognized by the committee for example on the *Ehrlichia* model, *morbillivirus* or in vector biology. As mentioned in the 2011-2014 project document and discussed after the oral presentation during the visit, the main fields where significant developments are planned in the future project are : functional genomics of selected pathogens (*Ehrlichia*, *Mycoplasma*, *morbillivirus*) and interactions with target cells *in vitro*, evolution genomics of pathogens up to now mainly limited to analysis of genetic diversity, integration of epidemiological modeling and molecular epidemiology (avian pests, *Morbillivirus*) and biology of vectors with modeling of population and transmission dynamics.

The unit appreciates the encouragements of the committee to continue the genomic programs as well as its recommendations regarding the need to improve strategies on the *Mycoplasma* model and to optimize the approaches in the *Ehrlichia* model regarding the difficulty of the subjects. This will be fully taken into account. The unit also shares the opinion of the committee that a bio-informatician is necessary to optimally exploit the genomic data generated in the unit. A new INRA scientist with strong background in high-throughput genomics approaches and associated bio-informatics must join the unit in 2011 and will bring part of the response.

The low number of HDR will be increased. Although identified by the unit as a weakness the effort was limited during the 2005-2009 period due to over-activity of scientists that could not dedicate enough time to that. There is a potential of 9 new HDR already

today. As of the visit one HDR application has been transmitted to the University of Montpellier and 2 applications are almost completed. This has become a high priority.

Increasing the number of post-doc has strongly been advised by the committee to increase scientific production especially at the fundamental-applied interface. This is considered highly relevant, but will necessitate additional support from our organizations. The limited number of post-docs is mainly due to strong financial constraints in the domain of research for development as probably noticed by the committee. Each new post-doc has to be 100% funded by external resources. Despite "*the excellent capacity of the unit to raise funds*", the limit of scientists availability to write new applications (post-doc ANR, EU...) has been reached. The unit will nevertheless manage its priorities towards increasing the number of post-docs.

- Another point considered by the committee as necessitating significant improvement is the international visibility of the unit. This assertion is mainly based on participation to congress that would be mostly "*at the level of posters or contribution to annals of international congress*". We consider that if improvement of international visibility is necessary, the statement must be modulated. Indeed, half of the 130 participations (1.4 scientist/year) to congress during the 2005-2009 period were not posters but oral presentations including international congresses (EMOP, ESOVE, SOVE, AITVM, STVM, ISCTRC, ISVEE, ...), with a number of invited keynote presentations (EMOP, ESOVE, SOVE...). In addition, participation to congress is only a part of international visibility. The Unit has several world references (laboratory or collaborating Centre) in diagnostic and epidemiology with the corresponding experts resulting in a strong visibility. The unit is partner or coordinator of multiple international research networks with leading world teams on the domain. The unit has also organized international conferences. A forthcoming example is the international EDEN conference on emerging vector-borne diseases to be held in Montpellier in May 2010 organized by our unit with around 400 international scientists registered. Moreover, a new large-scale research European project on biology and control of human and animal vector-borne diseases has just been notified to the unit by the European Commission (DG-Research Health program). It involves 46 partners from 20 countries, with a 12 M€ European contribution). We will ensure general scientific coordination and lead one of the 5 scientific workpackages.

A poor international visibility and a low level of publications in its thematic domain would not have allowed the unit to be partner or coordinator of such a number of large international research projects and to be "*excellent to raise funds and secure competitive funding*". These statements appear somewhat contradictory.

Thus, although many statements of the committee are very positive and encouraging, the general feeling of the staff is that the evaluation was mainly based on a fundamental research point of view (academic publications preferentially made in multi-disciplinary high IF journals and participation to "world" congresses) which is not fully relevant for the evaluation of targeted research for the development of Southern countries and has to be completed by additional criteria. A set of indicators has been developed in the EREFIN document elaborated by the organizations of the LOLF 187 program (CIRAD, INRA, CEMAGREF, BRGM, IRD, IFREMER, and others including INSERM) and provided to AERES.

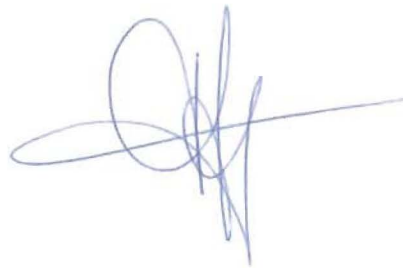


Three major group of activities are considered : (1) knowledge production, (2) building partnership, coordination of networks and infrastructures, (3) knowledge and resources dissemination (expertise, training...). Each activity is crossed with the target populations (researchers, socio-economic actors, public, students, citizens). The output is a table precisely defining a set of activities to examine in association with indicators for evaluation. Doing so, generic research is only one aspect of knowledge production besides operational research, innovation, production of knowledge and methods for decision making, training and education by research etc.... Using such a document as a basis to give a more balanced weight to the various indicators could have been of value for the evaluation of a unit not basically dedicated to generic and fundamental research.

In conclusion, the unit staff has very much appreciated the positive appreciations given in the report related to its mandatory missions and shares the view of the committee that the unit has to improve its academic excellence and has the potential to do so. We will make major effort in this sense taking into account the various comments. However, this should not be detrimental to our goal which remains to deliver research outputs with direct impact on development and targeted issues. Research for development implies a continuum of actions starting from identification of common priorities and agenda with the partners including those from Southern countries. Implementation ranges from field data collection in appropriate sampling design, up to experiments requiring sophisticated analytical methods and a degree of fundamental research. Finding the balance between the various activities in this continuum is a major concern of CIRAD units that we will continue to try to improve.

We again thank the evaluation committee for the work done and its advices.

Yours sincerely

A handwritten signature in blue ink, consisting of several overlapping loops and a long horizontal stroke extending to the right.

Dominique Martinez  
Head of Unit