



RESEARCH CENTER

FIELD

Digital Health, Biology and Earth

Activity Report 2018

Section Highlights of the Team

Edition: 2019-03-07

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ABS Project-Team (section vide)

BEAGLE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

We had several remarkable publications in 2018, including 3 in the highest standard journals and 2 best paper awards.

Cui Y, Yang Y, Ni Z, Dong Y, Cai G, Foncelle A, Ma S, Sang K, Tang S, Li Y, Shen Y, Berry H, Wu S and Hu H (2018). Astroglial-Kir4.1 in Lateral Habenula Drives Neuronal Bursts to Mediate Depression. *Nature* 554:323-327 [15]

Davin AA, Tannier E, Williams TA, Boussau B, Daubin V, Szollosi GJ (2018) Gene transfers can date the tree of life, *Nature ecology and evolution*, vol. 2 pp.904-909. [16]

Berta Verd, Erik Clark, Karl R Wotton, Hilde Janssens, Eva Jiménez-Guri, Anton Crombach, Johannes Jaeger (2018) A damped oscillator imposes temporal order on posterior gap gene expression in *Drosophila* *PLoS biology* 16 (2), e2003174 [35]

5.1.1. Awards

BEST PAPERS AWARDS :

[28]

V. F. LIARD, D. P. PARSONS, J. ROUZAUD-CORNABAS, G. BESLON. *The Complexity Ratchet: Stronger than selection, weaker than robustness*, in "ALIFE 2018 - the 2018 conference on artificial Life", Tokyo, Japan, July 2018, p. 1-8 [DOI : 10.1162/ISAL_A_00051], <https://hal.archives-ouvertes.fr/hal-01882628>

[26]

S. PEIGNIER, C. RIGOTTI, A. ROSSI, G. BESLON. *Weight-based search to find clusters around medians in subspaces*, in "SAC 2018 - ACM Symposium On Applied Computing", Pau, France, Proceedings of the 33rd ACM Symposium On Applied Computing, April 2018, p. 1-10, <https://hal.archives-ouvertes.fr/hal-01869974>

BIGS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- BIGS organised the annual meeting of the European Network of Business and Industrial Statistics (ENBIS), 150 participants, 3 days of conference (3-5 september) plus 3 tutorials.
- Romain Azaïs and Florian Bouguet edited a book “Statistical Inference for Piecewise-deterministic Markov Processes” [33]. The idea for this book stemmed from a workshop organized in Nancy in the 2016-17 winter. Two chapters [48] [31] have been co-authored by one or more BIGS members.
- T. Bastogne created of a new start-up specialized on the automatic analysis of cardiac signals from cells up to patients.

BONSAI Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

The team was actively involved in the organization of the international conference RECOMB in Paris (April 2018), that was attended by more than 800 people.

4.1.1. Awards

First place at the metagenomics assembly challenge organized by the company Mosaic DNANexus:
<https://www.businesswire.com/news/home/20180620005408/en/DNANexus-Powered-Mosaic-Microbiome-Platform-Announces-Winners-Community>

CAPSID Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Isaure Chauvot de Beauchêne has obtained H2020 funding for two international PhD students under the MSCA-ITN programme. The project will study protein/RNA interactions, and will start on 01/01/2019.

DYLISS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The main novelty of the year is the publication associated with software AuReMe for metabolic network reconstruction in Plos Computational Biology [12], and the development of Miscoto, a tool to design synthetic microbial communities [14], presented at the ECCB conference.

ERABLE Project-Team (section vide)

GENSCALE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Our new tool, Carnac-LR, dedicated to the clustering of third generation sequencing data, has been published in the high impact journal *Nucleic Acid Research* (NAR) [16].

5.1.1. Awards

BEST PAPERS AWARDS :

[26]

S. FRANCOIS, R. ANDONOV, D. LAVENIER, H. DJIDJEV. *Global optimization approach for circular and chloroplast genome assembly*, in "BICoB 2018 - 10th International Conference on Bioinformatics and Computational Biology", Las Vegas, United States, March 2018, p. 1-11 [DOI : 10.1101/231324], <https://hal.inria.fr/hal-01666830>

IBIS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

Two new projects with participation from IBIS started this year: the ANR project RIBECO and the IXXI project MuSE (Section 7.2). The web application WellInverter was made available through the new cloud of the French Institute of Bioinformatics (IFB) (Section 5.2). A publication summarizing several conference contributions on the stochastic modeling and inference of gene regulatory networks was published in the main control journal *Automatica* this year [16].

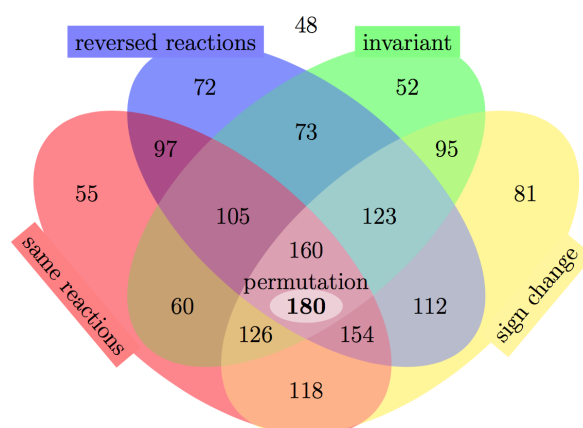
LIFEWARE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- **Multistationarity Analysis in CRNs**

The non-existence of multiple steady states in very large chemical reaction networks, out of reach of symbolic computation methods, can be predicted by a remarkably fast graph rewriting algorithm, based on Soliman 2013's theorem⁰. Study published in the *Journal of Theoretical Biology* [1] (graphical abstract in Fig. 1).



Number of models for which multistationarity can be ruled out by using original Thomas's positive circuit condition and Soliman's label conditions respectively among the 506 curated reaction models of BioModels.

Figure 1. Graphical abstract of [1].

- **Distinguishing resistance from resilience to prolong antibiotic potency**

Biomedical engineers at Duke University, in collaboration with Grégory Batt and Virgile Andréani, have shown experimentally that there is more than one flavor of antibiotic resistance and that it could – and should – be taken advantage of to keep first-line antibiotics in our medical arsenal. While an individual bacterium can be resistant to antibiotics, resilience only arises within a community. This happens when bacterial cells produce enough beta-lactamases to degrade the antibiotics, but not enough to save themselves from the initial onslaught. As some cells die and release more and more of the enzyme, the population as a whole eventually rids their environment of the antibiotic. Study published in *Science Advances* [6].

- **Biochemical Programs in Synthetic Cell-like Microreactors**

⁰Sylvain Soliman. A stronger necessary condition for the multistationarity of chemical reaction networks. *Bulletin of Mathematical Biology*, 75(11):2289–2303, 2013.

Researchers at Lab. CNRS-ALCEDIAG Sys2Diag in Montpellier, in collaboration with François Fages, have shown that an algorithm for the differential diagnosis of diabetes can be specified by three Boolean circuits and robustly implemented with real enzymes encapsulated in artificial vesicles that become fluorescent according to 5 different forms of diabetes. The robustness of the circuit was optimized in BIOCHAM by optimizing the initial concentrations of the enzymes with respect to a behavior specification in quantitative temporal logic. The protocells built with a microfluidic device were validated on a cohort of patients' urines from Montpellier's Hospital. Study published in *Molecular Systems Biology* [3] (see Fig. 2).



Figure 2. Artistic illustration by Courbet in cover page of *Molecular Systems Biology* [3].

5.1.1. Awards

- **La Recherche magazine 2019 Award - mention Information Sciences**

The article⁶ “Strong Turing Completeness of Continuous Chemical Reaction Networks and Compilation of Mixed Analog-Digital Programs” by F. Fages, G. Le Guludec, O. Bournez and A. Pouly, presented and awarded Best Paper at CMSB’17 last year has received the 2019 Award of magazine “La Recherche” - in Information Sciences.

MORPHEME Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

Emmanuel Soubies won the Phd Prize of the GdR MIA (Mathématiques de l'Imagerie et de ses Applications)

MOSAIC Team

4. Highlights of the Year

4.1. Highlights of the Year

The year 2018 was marked by the following events:

- **Creation of the team.** The team MOSAIC started in January 2018 at the Inria Grenoble Rhône-Alpes Research Center and is part of the laboratoire de reproduction des plantes (RDP research unit) at ENS de Lyon campus. Romain Azaïs joined the team in March 2018 and Guillaume Cerutti was hired as an Inria research engineer in September 2018.
- **Edition of *Statistical Inference for Piecewise-deterministic Markov Processes*.** Piecewise-deterministic Markov processes form a class of stochastic models with a sizeable scope of applications. Such processes are defined by a deterministic motion punctuated by random jumps at random times, and offer simple yet challenging models to study. The issue of statistical estimation of the parameters ruling the jump mechanism is far from trivial. Responding to new developments in the field as well as to current research interests and needs, the book “Statistical Inference for Piecewise-deterministic Markov Processes” edited by Romain Azaïs and Florian Bouguet [10] gathers 7 chapters by different authors on the topic. The idea for this book stemmed from a workshop organized in Nancy in the 2016-17 winter.
- **Invited talk at the Jacques Monod conference in Roscoff.** Christophe Godin was invited in Sep 2018 at the prestigious Jacques Monod series of international conferences in Roscoff, France, to present an overview of the current research on phyllotaxis. The talk was entitled *Phyllotaxis at the era of molecular and computational biology: the revival of an old enigma* and prepared with Teva Vernoux.
- **First prototype of the software platform Gnomon.** A first, fully functional, prototype of the Gnomon software platform, dedicated to the modeling and simulation of plant and animal morphogenesis, was developed during a series of intensive coding sessions in Lyon and Sophia-Antipolis. This new concept of platform dedicated to the study of morphogenesis was presented in November 2018 to a panel of modelers and biologists at the RDP lab, who will contribute next year to the further testing and refining the platform. This prototype is a clear milestone and results from a strong collaboration between the Inria software engineering group from Sophia-Antipolis (who provides the software architecture kernel - DTK) and the Mosaic team and is supported by Inria (Action de Développement Technologique, ADT).

PLEIADE Team

5. Highlights of the Year

5.1. Highlights of the Year

Pascal Durrens was promoted this year to the new grade of *Chargé de Recherche Hors Classe* of the CNRS.

SERPICO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The joint project team Serpico (Inria, CNRS-INSB, Institut Curie, UPMC, PSL Research University) is officially created in 2018.

The Serpico team will be the organizer of the 7th International Conference on “Quantitative BioImaging” (QBI) in January 2019 (300 attendees) in Rennes.

Bertha Mayela Toledo Acosta defended her PhD thesis in 2018.

ARAMIS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- The team has been awarded a “Fondation pour la Recherche sur la maladie d’Alzheimer” research grant.

5.1.1. Awards

- Ninon Burgos received the Galileo Galilei Award 2017, best publication in the European Journal of Medical Physics - Physica Medica in 2017, for the paper ‘Evaluation of a multi-atlas CT synthesis approach for MRI-only radiotherapy treatment planning’.
- S. Durrleman successfully defended his "habilitation à diriger des Recherches" from Sorbonne University
- F. De Vico Fallani received the Young Investigator award from Complex Systems Society (CSS)
- Stéphane Epelbaum was awarded the Joel Ménard prize from the “Fondation Alzheimer”.

ATHENA Project-Team (section vide)

BIOVISION Project-Team (section vide)

CAMIN Team

4. Highlights of the Year

4.1. Highlights of the Year

- The startup NEURINNOV was created in November 2018, David Andreu and David Guiraud will leave CAMIN team to join the company. A first research collaboration was established between CAMIN and Neurinnov as part of the Isite MUSE, through the Spin Stim project. The Spin Stim project focuses on severe impairments of vesico-sphincteric functions. It is a deep partnership based on the implementation of Neurinnov staff directly in the research unit.
- François Bonnetblanc was laureat of the French Scholars Lecture Series 2018 – Peter Wall Institute of Advanced Studies - University of British Columbia / Embassy of France in Canada, (<https://pwias.ubc.ca/program/french-scholars-lecture-series>) and laureat of the TOR Program 2018 between France and Sweden, (<https://www.institutfrançais-suede.com/tout-sur-tor/>).
- Benoît Sijobert was finalist of the Handitech Trophy (<https://www.lahanditech.fr/>), presenting a project related to his Phd work in CAMIN team, among 156 projects awarding inclusive technologies.
- Wafa Tigra got the 2017 IFRATH⁰ PhD thesis price on October 2018.
- Ana Claudia Lopes (UnB, Brazil) presented the paper « Quadriceps electrical stimulation to assist sitting pivot transfer by a person with paraplegia » at IFESS conference 2018 and won the Vodovnik Award student paper competition (2nd position). This work was done within the context of CACAO associate team.

⁰Institut Fédératif de Recherche sur les Aides Techniques pour les personnes Handicapées

EPIONE Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

- Xavier Pennec received an ERC advanced grant on geometric statistics for life sciences.
- Shuman Jia ranked 2nd in the AI Data Challenge organized by the French Society of Radiology.
- Shuman Jia earned 2nd prize at the Pierre Lafitte PhD competition.
- Fanny Orlhac was awarded for the L'Oréal-UNESCO grant for women in science 2018.
- Wen Wei received a travel award at the MICCAI conference.
- Wen Wei received a travel award from the SFRMBM (french society of magnetic resonance in biology and medicine) for the Joint Annual Meeting ISMRM-ESMRMB 2018.
- Nina Miolane received the second prize (special mention) for the AFRIF (french association for shape interpretation and recognition) PhD prize for her PhD entitled "Geometric Statistics for Computational Anatomy" realized in the context of the associated team GeomStats under the direction of Xavier Pennec (Inria Sophia Antipolis) and Susan Holmes (Stanford University).

GALEN-POST Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

The work on graph-based text categorization by F. Malliaros et al. [39] has received the best paper award at the 12th NAACL-HLT Workshop on Graph-Based Natural Language Processing (TextGraphs), held in New Orleans, Louisiana in June 2018.

Riza Alp Güler obtained the 2nd place at Prix du Doctorant for the Doctoral School STIC of Univ. Paris Saclay.

M. Papadomanolaki and M. Vakalopoulou got the 2nd place at the Earth Observation Challenge organised by Digital Globe and ESA for the project UrbanMonitor: Mapping Changes in Urban Environments towards Resilient Cities and Urban Sustainability. <http://blog.digitalglobe.com/news/earth-observation-challenge-the-three-winners/>

A. Pirayre whose PhD thesis was advised by J.-C. Pesquet received the Yves Chauvin PhD award (IFPEN).

Our M.Sc. program in Data Sciences and Business Analytics (with ESSEC Business School) was ranked 4th worldwide in the QS World University Rankings.

MATHNEURO Team (section vide)

MIMESIS Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Stéphane Cotin received the Inria – French Académie des Sciences – Dassault Systèmes Innovation Award. The committee underlined the professional experience of Stéphane Cotin at the cutting edge of research into numerical simulation. "*Stéphane Cotin is leading the MIMESIS team, working in close collaboration with IHU Strasbourg since its creation in 2014. Besides the development of SOFA, the team is mainly dedicated to real-time simulation in operating theaters. Its flagship projects include the development of 3D models that are to be projected on the livers of patients having a tumour removed, or the development of highly realistic virtual images that would improve interventional radiology techniques by limiting exposure to X-rays.*"

Andrea Mendizabal received the Student Travel Award at MICCAI 2018 Granada. Spotlight presentation on the paper *A Combined Simulation & Machine Learning Approach for Image-based Force Classification during Robotized Intravitreal Injections*.

Fanny Morin and Yinoussa Adagolodjo received their PhD with awards respectively in October 2017 and September 2018.

MNEMOSYNE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

We published this year an important article [3], together with neuroscientist colleagues in our laboratory. We are particularly proud of this paper because it illustrates a very fruitful cooperation between modeling and experimental analysis, particularly allowing to revisit current views about a dogma in neuroscience, concerning the place where habits are learned and their role in cognition.

NEUROSYS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

BEST POSTER AWARD

Amélie Aussel, Laure Burhy and colleagues obtained the Best student poster award at the 27th Annual Computational Neuroscience Meeting CNS*2018 (Seattle, US) [7].

FEATURED ARTICLE

The journal article by L. Bougrain and colleagues, *A review of classification algorithms for EEG-based brain–computer interfaces: a 10 year update*, has been identified as a Featured article i.e. a recent article of high-interest across the entire IOP content (containing more than 70 science journal titles including *Journal of Neural Engineering*) [4].

PARIETAL Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Pierre Ablin got a best student paper award at the LVA-ICA conference for his paper [34].
- First PhD prize from STIC doctoral school for Tom Dupré la Tour.

VISAGES Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. *New permanent team members*

- Julie Coloigner was recruited as CNRS Researcher, starting from October 2018.
- Michael Kain was recruited as Research Engineer, starting from December 2018.

5.1.2. *New MRI at the Neuroinfo platform*

A new 3T Siemens Prisma MRI scanner was installed at the Neuroinfo platform in February 2018. An official ceremony was organised with all the funders in November 2018.

5.1.3. *First neuroscience hackathon in Rennes*

We organized the first hackathon in the Visages team, April 25-26 as part of the international event Brainhack Global 2018.

5.1.4. *Award*

Best paper award by the French Institute of Psychiatry for our communication at its annual Forum .

BEST PAPERS AWARDS :

[50]

J. COLOIGNER, J.-M. BATAIL, I. COROUGE, D. DRAPIER, C. BARILLOT. *White matter connectivity analysis in patients suffering from depression*, September 2018, 1, 2018 - 7ème Forum de l'Institut de Psychiatrie, Poster, <https://hal.archives-ouvertes.fr/hal-01890087>

AIRSEA Project-Team (section vide)

ANGE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Human resources

A major event in the year was new positions of J. Sainte-Marie (Détachement at Inria, 2 years position) and of Y. Penel (Advanced Research Position, 3 years position). Two new students have started a PhD (Liudi Lu and Nelly Boulos Al Makary).

Evaluation of the team

This year, the team went through the first evaluation since its creation. The report was very positive, as this excerpt shows:

The activity of the team in modeling and mathematical and numerical analysis has lead to significant contributions in various areas. In particular, we mention the study of models that can reproduce specific 'dispersive effects,' observed in nature, or the review of several multi-physics models that incorporate the coupling of heterogeneous systems. The theoretical analysis of the models has often led to the proposal of new algorithmic developments and new numerical techniques and, in general, it has resulted in a significant advancement of scientific knowledge.

Scientific activities There has been major achievements within the team in the framework of dispersive models.

As detailed in Section 10.1, members of the team were involved in the organisation of a substantial number of scientific events, either in the framework of national initiatives or due to the expertise in the field. Members are particularly involved in the mathematical community.

5.1.1. Awards

- Léa Boittin received the award of the best presentation at GDR-EGRIN summer school in June,
- Léa Boittin was rewarded by Best Phd Student Poster Award, at CMWR XXII, Saint-Malo,
- Janelle Hammond received a post-doctoral grant from DIM Math Innov 2018.

CASTOR Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Jacques Blum has received the "Grand Prix de la Ville de Nice".
- Blaise Faugeras and Holger Heumann have been nominated as ITER Scientist Fellows.

COFFEE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Stéphane Junca received an invitation at the LMA (Laboratory of Mechanics and Acoustics, Marseille, France), 6 months, from February to July 2018.
- Florent Berthelin had a Inria delegation from January to June 2018 to work with teams ACUMES and TOSCA. In particular he worked with P. Goatin on models for traffic flows.

FLUMINANCE Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

Best thesis award 2018 Applied and Industrial Mathematics Society - Group for the Advancement of Engineering Numerical Methods (SMAI-GAMNI) <http://smai.emath.fr/spip.php?article165> Valentin Resseguier "Mixing and fluid dynamics under location uncertainty" <https://tel.archives-ouvertes.fr/tel-01504524/document>

LEMON Team

5. Highlights of the Year

5.1. Highlights of the Year

- Undoubtedly the most important highlight is the "go" decision of Inria's Project Committee for the creation of the LEMON team. This decision was made at the end of 2018 and the team will officially exist as "Equipe Projet" as of 2019.
- 3 new members joined the team in 2018: Fatima Palacios Rodrigouez (funding source: Inria) started a PostDoc as of November 2018. Joao Guilherme Caldas Steinstraesser (funding source: Inria) and Joseph Luis Kahn Casapia (funding sources: ANR/Inria) started their PhD in October and November this year.
- The publication of the depth-dependent porosity model [4] is the result of a three year, joint research effort carried out by the team. With Vincent Guinot , Carole Delenne and Antoine Rousseau from LEMON and Olivier Boutron from Tour du Valat as co-authors, this publication is emblematic of the team's activities in the field of porosity model development.

MAGIQUE-3D Project-Team (section vide)

SERENA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Alexandre Ern co-edited with Daniele Di Pietro (Montpellier) and Luca Formaggia (Milano) a book on Numerical Methods for PDEs, SEMA SIMAI Springer Series, Vol. 15, Springer, 2018. ISBN 978-3-319-94675-7.

Many new results of the **ERC GATIPOR** project in the **ERC GATIPOR Gallery**.

STEPP Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

The STEEP research team has initiated in 2016 a series of conferences-debates entitled “Understanding & Acting” (« Comprendre et agir ») that examines sustainability issues in order to help researchers and citizens to increase their awareness of the various issues at stake in order to initiate relevant individual and collective actions. The presentations are captured on video and then made directly accessible on the YouTube Channel “Comprendre et Agir”. At the end of 2018 the YouTube channel reached more than **150,000 views with a rate of integral viewings remaining at above 25%**. This rate is quite important since the YouTube videos of the conferences last between 35 and 45 minutes. Our Youtube channel now has more than 2000 subscribers.

TONUS Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Boundary conditions for kinetic relaxation methods

We have provided a new rigorous analysis for the stability of boundary conditions in kinetic relaxation methods. This analysis allows us to design stable and high order boundary conditions for this kind of schemes. This will lead to many practical applications in the future years.

5.1.2. Electromagnetic simulation on large computer

Bruno Weber has been able to run the CLAC software, jointly developed with the AxesSim company, for simulating a Bluetooth antenna interaction with a full human body. The computations were done on the supercomputer PizDaint, which is 5th at the "Top 500" ranking.

BIOCORE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- A graph theoretical tool for analysis of the coupling between two Boolean networks. This tool generalizes the asymptotic graph (previously developed in [96] and [78]), by adding a quantitative dimension through the computation of relative probabilities. This tool is used for coupling two biological networks and predicting the possible attractors or asymptotic behaviors of the full system. The outcome of the probabilistic asymptotic graph is the set of attractors the full system, each attractor with an associated probability. This work was published in the journal *Frontiers in Physiology* [22].
- A study that predicts the evolution of phytoplankton biodiversity with global warming. After calibration of our models with experimental data on growth of various species of the microalgae *Micromonas*, we have shown that the pattern of temperature response is strongly related to the site where cells were isolated. With this approach, we proved that the oceanwide diversity of *Micromonas* species is very similar to the oceanwide diversity of the phytoplankton. Using Adaptive Dynamics theory to understand how temperature drives evolution in microalgae, we could then predict the evolution of this biodiversity in a warming ocean and show that phytoplankton must be able to adapt within 1000 generations to avoid a drastic reduction in biodiversity. This work was published in the *ISME* journal [23].

CARMEN Project-Team (section vide)

DRACULA Project-Team (section vide)

M3DISIM Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

During the 8th World Congress of Biomechanics in Dublin, Martin Genet received the Young Investigator Award from the Francophone Society of Biomechanics for his talk on “A continuum relaxed growth framework for controlling growth-induced residual stresses in living tissues”.

MAMBA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

We welcome a new team member, Nastassia Pouradier-Duteil, junior research scientist since September 2018.

We welcome Ayman Moussa in delegation since September 2018; he defended his habilitation thesis on December 13th.

Marie Doumic finished her two-year sabbatical stay in September 2018.

Jean Clairambault is emeritus DR since March 2018.

5.1.1. Awards

In December 5, 2017, Benoit Perthame has been elected at the Académie des Sciences, and was received in the Académie on May 28, 2018.

Christian Schmeiser, associate member of Mamba through the associated team MaMoCeMa with the university of Vienna, being the laureate of the "chaire d'excellence" of the FSMP, is for six months in Paris (september 2018 to february 2019).

MONC Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- S. Benzekry was nominated expert within the scientific board of the national multi-thematic institute (ITMO) Cancer of the French alliance for health sciences (AVIESAN).
- In collaboration with the experimental team of the SMARTc unit of the Center of Cancer Research of Marseille (CCRM), we published the results of a four-years long study for optimizing the sequence and schedule of antiangiogenic-cytotoxics combinations in the treatment of non-small cell lung cancer [7]. With the objective to determine an optimal interval between the administration of the two types of drugs (currently administered concomitantly in the clinic), we validated a research strategy that consisted in three steps: 1) Initial experiments, 2) Calibration and refinement of a mathematical model adapted to the data and 3) experimental validation of the predictions of the calibrated model (superiority of a 3 days time interval).

NUMED Project-Team (section vide)

REO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Chloé Audebert was awarded the AMIES PhD prize 2018 for her PhD thesis under the supervision of J.-F. Gerbeau and I. Vignon Clementel, in the framework of a collaboration with the SME company Fluoptics and with clinicians from Hôpital Paul Brousse (E. Vibert PUPH, Inserm 1193).

SISTM Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Launch of the Graduate's School Digital Public Health (PI: R Thiebaut) including the Master of Public Health Data Sciences
- Launch of the IMI project EBOVAC3 in which R Thiebaut is leader of the workpackage "Modelling". Concomitantly, we have obtained the first results of the modelling of the response to the Ebola vaccine developed with Janssen company (submitted to Journal of Virology).
- A new step of the work on IL-7 therapy in HIV infected patients has been achieved through the optimization of the administration of the injections. Approaches from statistical modelling and control theory demonstrated the feasibility of reducing the administration of IL-7 while improving its efficacy.
- The project on the automatic recognition of cell populations through high dimensional cytometry data has reached a successful stage with two important publications. It is now applied to clinical trial datasets available through the Vaccine Research Institute.
- The data warehouse system developed through the EHVA European consortium is settled in its version 1.0 and will be used for the storage of all SISTM datasets as well as to implement the software developed for the analysis of immunological data.
- Funding of the EDCTP Prevac-UP in which M Prague is leader of the workpackage "System vaccinology approach". The aim is to develop an integrative analysis of all immunological data generated to understand antibodies response to Ebola vaccination.
- Funding of the Franco-Sino INSERM project on NiPAH virus in which M Prague is leader of the workpackage "Modeling, biostatistics and bioinformatics". The aim of this workpackage is to conduct state of the art quantitative analyses of effects of therapeutic and vaccine strategies, as well as providing a framework to bridge results from in vitro to in vivo and between different animal models.
- Marta Avalos undertook a 6-month research visit to Data61 (CSIRO, Canberra, Australia) in 2017. This collaboration has reached a successful stage with one publication in NeurIPS 2018.

XPOP Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Version 1.0 of the SPIX software was available in November 2018.