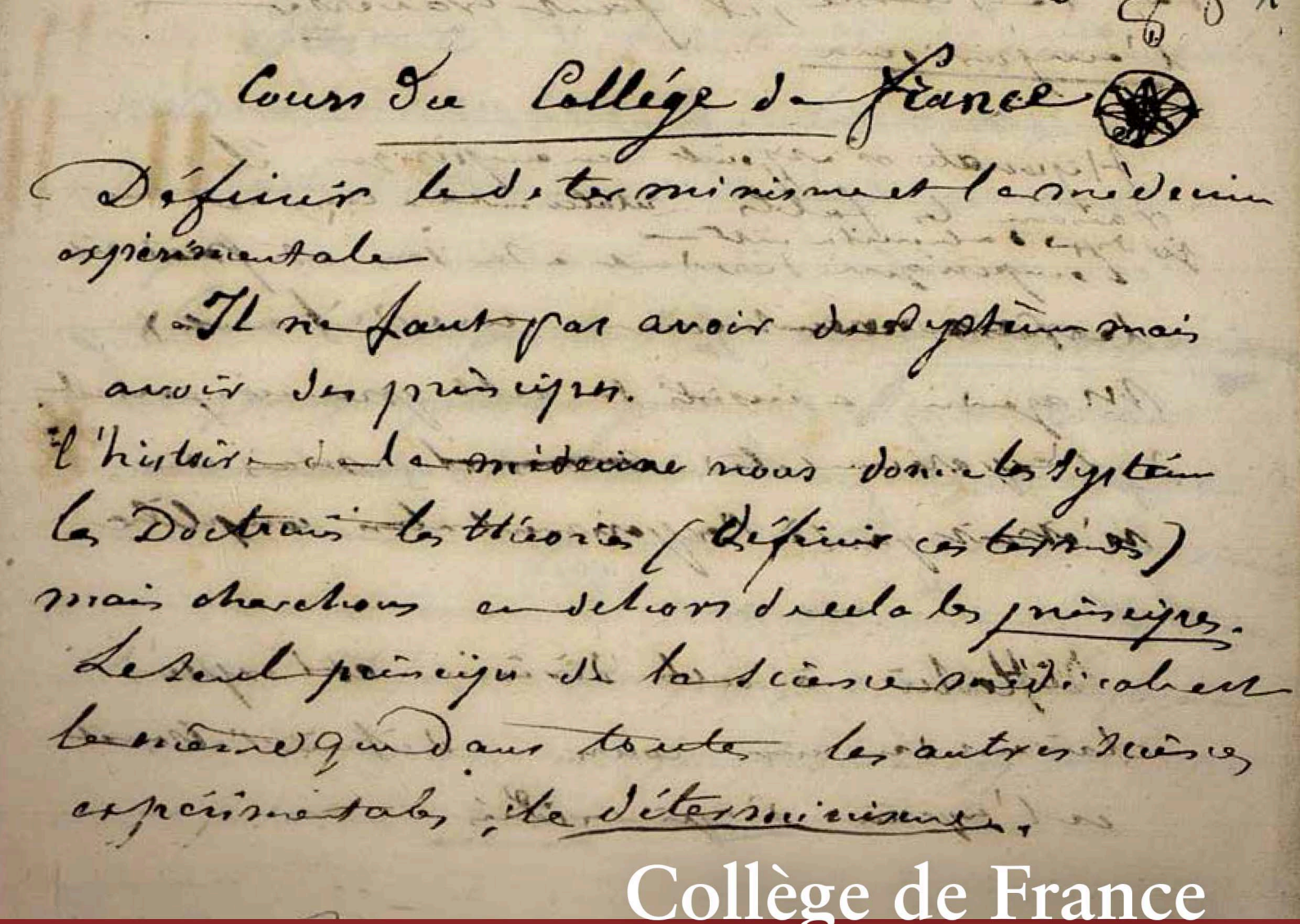

Collège de France Newsletter

8

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Published annually since the 2005/2006 academic year, the English-language *Collège de France Newsletter* (formerly *The Letter of the Collège de France*) is an anthology of translated articles selected from the two or three yearly issues of *La Lettre du Collège de France*, which was launched in January 2001. Both the French and English publications mirror the life of the institution, its inaugural lectures, lectures and seminars, and include information and announcements relating to the Collège de France's Chairs and professors: interviews with professors, in-depth analyses of current debates, reviews of the institution's and its professors' publications and activities, as well as institutional fact-sheets.

The *Collège de France Newsletter* is but one of the means through which the Collège de France disseminates teaching and research throughout the world. It is also available on www.college-de-france.fr. Most articles included in this issue were first published in nos. 36 and 37 (Academic year 2012/2013). ■

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INAUGURAL LECTURES

ANNUAL CHAIRS

OFFICIAL VISIT

CHAIRS

Reflections on Science and Democracy

Unquestionable scientific and technological advances have played a crucial role in improving humanity's living conditions, especially over the last century – be it longer life-spans, the control of epidemics, the development of agriculture to feed a global population that has been growing exponentially for a long time, or the extraordinary evolution of means of transport, communication and information.

Yet, despite these developments – and despite researchers' constant endeavour to provide new solutions to the challenges of the future – responding to climate change, developing new energy technology and new therapeutics –, more than ever, science arouses the public's suspicion, if not its mistrust.

This stems largely from a lack of understanding of the scientific approach. Citizens seem to suspect scientists of trying to exert some kind of influence or pressure on society. Yet the aim of science is to establish facts and to describe phenomena which, in turn, allow for other facts to be foreseen or understood, thereby gradually expanding the field of knowledge and our means of acting on the world. Once this knowledge and these means have been recognized, it is not up to scientists but to society and the politicians representing it in a democracy to decide what to do with them.

For these decisions to be informed, it is nevertheless essential that the information provided by scientific activity should be taken into account. This requires that scientific culture be shared better, and that the citizens of a democracy understand that scientific facts are established objectively, following an approach which has been tried and tested through experimentation and observation, rather than resulting from the subjective opinions of scientists driven by ulterior motives. If citizens and their representatives are to participate more rationally and efficiently in political choices that are increasingly characterized by their scientific and technological content – energy, environment, health –, they need to be given the tools to understand this scientific approach. In this regard, the education system, from primary school onwards, must familiarize students better with the scientific approach, which gives us the freedom of choice, provided that the choice is as fully informed as possible.

Scientists themselves must also be honest about their doubts, and ask society for more time and resources to carry out their work when the state of knowledge on a given question has not yet provided satisfactory answers. This is especially important in fields such as environmental studies, medicine and energy. Such caution should echo our societies' growing demands for protection and security. Cautious attitudes can impede scientific progress when they are excessive, but they can also facilitate them when they lead to intelligent and appropriate normative policies.

Finally, it is crucial for the media, be it radio, television or the press, to contribute more fully to the debate. By arousing less fear and devoting more time to scientific culture and information, they could convey a vigilant but more positive view of science. When positions on an issue diverge, science must be presented and supported with justified arguments, rather than being staged as a show consisting of sterile fight-debates. A high-quality presentation of science in the media is required if public debate on technological issues is to be more informed and not limited, as is all too often the case, to highlighting ill-founded or unfounded opinions.

This year, the autumn symposium "Science and Democracy", organized by the Collège de France, was devoted to these problems and particularly to the analysis of the increasingly conflictual relationships between science and society. We chose to illustrate this general idea, which is often presented and discussed to the point of seeming "commonplace", through the analysis of highly concrete and topical issues. For instance, how should a democratic society address the problems of renewable energy and the replacement of fossil fuels with less polluting forms of energy, or the associated problem of global warming, or that of gene therapy, using what science teaches us as rationally as possible, so as to optimize society's response to the challenges it faces?

Over the course of the two-day symposium, scientists, historians, jurists and politicians shared their points of view on the relations between science and democracy. This issue of the *Collège de France Newsletter* provides an overview of the symposium by publishing several excerpts from the papers presented. I will simply mention here the opening and concluding addresses. The former was delivered by Steven Chu, Physics Nobel Prize Laureate and Energy Secretary during President Obama's first term. He discussed his experience as a scientist faced with the political world and how, in the United States, he sought to take up the challenge raised by climate change and the need for renewable energy sources. The last paper, by Professor Pierre Rosanvallon, addressed the crucial issue of managing long-term problems through democracy. There is an irreconcilable opposition between the short timescale of democratic election cycles and the much longer one needed to take into account issues like climate change or new energy consumption habits. Successfully adapting political and scientific cycles to such different paces of change is one of the major challenges facing our modern societies, in France and throughout the rest of the world. ■

Prof. Serge HAROCHE
Quantum Physics,
Administrateur of the Collège de France

Prof. Alain Supiot

The Social State and Globalization: A Legal Analysis of Forms of Solidarity

It is easy to recognize that injustice breeds violence. But this is where difficulties begin. Difficulties of two types, theoretical and political, which Aristotle had already neatly distinguished and prioritized:

"It is extremely difficult", he wrote in *Politics*, "to discover the truth about equality and justice. Nonetheless to do so is easier than to dissuade those who are in a position to manipulate it to their own advantage; for it is always the deprived who seek equality and justice, while those in power do not give it a thought". Even assuming that this political obstacle were lifted, one could not hope to uncover the rules of fair distribution of goods and positions by merely observing the facts. Contrary to the biological metaphor which is as old as it is misleading, regulation does not have the same meaning when applied to a living organism as it does when applied to a human society. In medicine, as Georges Canguilhem pointed out, it is easy to agree on what is good: health; the issue is defining what is bad: diseases and their causes. In society it is, on the contrary, easy to agree on the ills to avert – misery, lying or violence – but defining an ideal order is more complex. While the norm of an organism's functioning is identifiable in its very existence, to exist and subsist a society must set this norm outside of itself. While Hans Kelsen perfectly grasped the externality of the fundamental norm, this led him to the dead-ends of a purely formalist theory of law, blind to the values that fuel it and the facts that it governs. How can we escape this dead-end without falling into that of a scientism which claims that with the observation of the *is*, lies the answer to the question of the *ought*?

However different they may be, these two dead-ends result from the same positivist repression, which Pierre Legendre's work brought to light very well: the repression of Western modernity's own dogmatic foundations. His work marked a turning point in legal thought, of a magnitude that was to become apparent only with time. For it will take us time to recognize that in the West, like anywhere else, the institution of people and society is based on indemonstrable premises, which are the product of trust and not that of calculation. It will also take time to exploit fully the heuristics of the concept of dogmatic industrial spaces, which is fundamental to understanding the institutional underpinnings of globalization. These decisive discoveries, as well as the filial friendship I developed with their author, have profoundly influenced my academic career.

While I am far too indebted to you, dear Pierre Legendre, even to hope to settle this debt one day, it is fitting for me to acknowledge it publically here in this forum.

An old metaphor represents Justice as the mother of laws. It is the origin that our orphan humanity posits, without ever being able to return to it. In the terms of the doorkeeper of the first gate of the Law – in the only passage of *The Trial* that Kafka published in his lifetime – it is not possible to *enter* the Law, to access what its ultimate reason would be. Were we to go through this first door, an infinity of other ones would continue to separate us from it, just as an undefined series of axioms, added one after the other, could not save a formal system from that irreducible share of the incomputable. Of course, since Montesquieu, we know that the spirit of laws is linked to the characteristics of the environment in which each society is embedded, and that it therefore necessarily differs from one place and from one era to the next. But this is not an automatic causal link, for different representations of duty can emerge in the same environment. Science is powerless when it comes to founding a legal order. The principles on which such an order is based are asserted and celebrated, but neither demonstrated nor demonstrable.

The Chair's title – "The Social State and Globalization: A Legal Analysis of Forms of Solidarity" – refers both to an object and to a method. While it is rather long, it is so because this object cannot be confined within the safe and recognized boundaries of a "branch" of law, and because understanding it involves thinking of law as a tool for the analysis of societies, not only as an established system of rules. The social state shows us both the frame of the forms of solidarity which have profoundly transformed our ways of living together over the last century, and the interplay of powerful forces undermining this institutional structure and threatening to bring it down. These are the forces that will need to be understood, along with their predictable impact. ■

Excerpts from the Inaugural Lecture
22 November 2012

Source: La lettre, *no. 36, May 2013*

- Inaugural Lecture published by Éditions Fayard and online at www.books.openedition.org/cdf/2241 in French, and at www.books.openedition.org/cdf/3085 in English.
- The video of the Inaugural Lecture is available online at www.college-de-france.fr, on the professor's page.

Prof. Alain SUPIOT
The Social State and Globalization:
A Legal Analysis of Forms
of Solidarity

Prof. Gérard Berry

The Informatics of Time and Events

The new Chair of Informatics "Algorithms, Machines and Languages", which I have the honour of holding is the first permanent Chair of Informatics at the Collège de France.

It follows on from the introduction of informatics in the Liliane Bettencourt Chair of Technological Innovation and subsequently the creation of the Chair of Informatics and Digital Sciences, in which I had the honour of taking part. The creation of a permanent Chair is great news for my community, as it is the highest accolade that can be paid to the autonomous discipline that computer science has become.

Informatics is comprised of five main subdomains: the interfaces through which information from the real world is digitized and acted upon, the now countless digitized data, the algorithms with which these data are conceptually manipulated, the languages that allow for these algorithms to be formally specified and written in the form of executable programs, and the machines which execute these programs. I chose this title for the Chair as I have focused primarily on the last three domains and their numerous interactions.

In the first few years, I intend to devote my lectures and my research to the informatics of time and events, which is crucial in many domains of application: the real-time control of transport systems, industrial systems and a wide variety of cyber-physical systems; electronic systems on chips replacing the single-function circuits of the twentieth century; computer-based simulators of complex physical or industrial systems; the orchestration of web services to build new applications by composing existing services; musical composition and interpretation mixing human musicians and computers.

Surprisingly, classical informatics makes virtually no mention of time and only manages events using programming primitives which, to say the least, are rustic and lack clear semantics. Since the eighties, French research, which is at the forefront of this domain, has been developing new programming languages called synchronous languages, which are mathematically well defined and understood, adapt well to the above-mentioned domains and are very successful industrially. But applications are developing rapidly, and extensive research still needs to be carried out to extend these languages' initial principles to richer situations like multi-clock circuits, geographically distributed control systems, or the correct coordination of the independent simulators of parts of systems to build their global simulators.

I will first show that while spoken language is pleasantly embellished, it is by no means adequate for talking about time precisely, with its "time that flies" on the one hand and its "long years" on the other. I will also show that the everyday identification of time with mathematics' real line is too limited for informatics applications. These applications require that we consider time at different levels of abstraction by linking particular events and durations through the notion of the thickness of the instant, which is crucial to understanding the functioning of electronic circuits and real-time programs. I will generalize the processing of physical time expressed in seconds to that of multiform times brought about by the repetition of a given event, thereby unifying expressions like "in ten seconds", "in ten steps" or "the tenth time pressing a button". I will show that these notions can be beneficially incorporated into programming languages that are both perfectly mathematically defined and efficiently implementable through their translation into standard software codes or electronic circuits. I will discuss the still poorly understood relationship between continuous time and discrete time, which are key for properly simulating complex systems. Finally, I will consider how to reason about time- and event-handling programs using temporal logics or other mathematical formalisms, and how formally to prove their correction – another domain where France is at the forefront of research. ■

Excerpts from the Inaugural Lecture
28 March 2013

Source: La lettre, *no. 36, May 2013*

- Inaugural Lecture published by Éditions Fayard and online at www.books.openedition.org/cdf/3297.
- The video of the Inaugural Lecture is available online at www.college-de-france.fr, on the professor's page.

Prof. Gérard BERRY
Algorithms, Machines and Languages

Prof. Jean Dalibard

Atoms and Radiation

At the start of the seventeenth century, German astronomer Johannes Kepler sought to understand a mysterious phenomenon: comet tails, celestial objects claimed to have supernatural properties, always point away from the Sun.

When a comet goes towards the Sun, it resembles hair floating in the wind. But when the comet moves away from the Sun, the tail comes before the nucleus, which seems counter-intuitive. Kepler sought to explain this phenomenon with the following proposition: "A comet's tail is formed by matter that the Sun's rays chase through their impulses outside the comet's body".[1] At the end of the same century, Dutch physicist Nicolas Hartsoeker, a member of our Académie des sciences, wrote in his *Principes de physique*[2]: "Commuters are adamant that the Danube is far slower in the morning when the Sun's rays counter its course than in the afternoon when they aid it".

Of these two scientists, Kepler was at least partially right; Hartsoeker, was only describing an optical illusion. But the two scholars had the intuition of a phenomenon that plays a crucial role in today's physics: light, and electromagnetic radiation more generally, can act on the atoms and molecules that make up matter.

The two words that make up the title of this Chair, *atoms* and *radiation*, represent the core of the physical world with which we are familiar. Light is both a channel for information on our environment and a means of controlling it. It serves as an information channel for astronomers, for instance, who are able to deduce a star's age from its colour. As a means for action, light can locally provide a determined quantity of energy, as the cutting of materials with lasers illustrates.

Matter and radiation are closely linked in the progression of knowledge. Advances in our modelling of the movement of particles and in that of light have gone hand in hand. Thus, in the seventeenth century, Fermat explained the laws of light reflection and refraction – previously set out by Descartes and Snell – thanks to his principle: "Nature always acts through the shortest and simplest paths". One hundred years later, Maupertuis', Lagrange's and Euler's extension of Fermat's idea to mechanics gave rise to the principle of least action, which is still highly significant today. At the turn of the twentieth century, the study of the light emitted by an oven allowed Max Planck to lay the foundations of what was to become quantum physics, by providing in particular an explanation of the stability of matter. Fifty years later, Willis Lamb's highly precise measurements of the structure of atoms led to the development of quantum electrodynamics, the now universally accepted model for describing radiation.

Quantum electrodynamics is an extraordinarily precise theory: despite increasingly stringent tests, it has never been called into question. Its success even raises a crucial question: on a fundamental level, are there still any open problems in the science of atoms and light? In other words, have optics and atomic physics not become technologies at the service of other disciplines?

I would here like to provide a few answers which prove the full vitality of this research field. We owe this vitality to a device, the *laser*, which actually refers to a considerable variety of tools. It can represent a light-beam sent to reflect on the moon in order to measure the moon's distance from the earth, a light source injected into an optical fibre as a medium for information, or a train of short and intense pulses used to probe chemical reaction dynamics or to initiate the fusion of atomic nuclei.

This presentation will focus on one of the most spectacular and paradoxical applications of laser, namely the cooling of atom gases. While laser is traditionally associated with the idea of heat, it can also be used to reduce substantially the random movement of a gas' particles and thus to obtain a virtually perfect order, less than a millionth of a degree above absolute zero. The quantum matter thas is produced in this way exhibits radically different properties from those of the fluids or solids we encounter in daily life. Interest in this quantum matter extends far beyond the scope of atomic physics specialists. Physicists of condensed matter, chemists, mathematicians and astrophysicists all use it as a source of illustrations and research questions regarding phenomena related to their discipline. ■

Excerpts from the Inaugural Lecture
18 April 2013

Source: La lettre, *no. 37, December 2013*

(1) Johannes Kepler, *De cometis libelli tres. I. Astronomicus… II. Physicus… III. Astrologicus…*, *Augustae Vindelicorum*, Augsbourg, 1619; translation by H. Flaugergues in the *Journal de physique, de chimie et d'histoire naturelle*, vol. LXXXV, September 1817, p. 193-216.
(2) Nicolas Hartsoeker, *Principes de physique*, published in Paris by Jean Anisson, Head of the Imprimerie royale, 1696.

- **Inaugural Lecture published by Éditions Fayard and online at www.books.openedition.org/cdf/3301.**
- **The video of the Inaugural Lecture is available online at www.college-de-france.fr, on the professor's page.**

Prof. Jean DALIBARD
Atoms and Radiation

Prof. Edith Heard

Epigenetics and Cellular Memory

In the late 1980s and early 1990s, we witnessed a revival of the term "epigenetics", which also took on new meaning. The semantic shift stemmed from the realization that certain changes in gene expression are transmitted through multiple cell divisions, even across generations in certain cases, without changes in the DNA sequence itself.

As early as 1971, Eduardo Scarano showed that it was the processes of modification rather than mutation of the DNA sequence that explained this stable transmission of the genes' particular states of activity. Such modifications were demonstrated shortly afterwards, in particular the methylation of one of the four DNA bases, cytosine. Furthermore, it very quickly appeared that this methylation is transmitted via cell division and is significantly often associated with a stable gene silencing. In 1994, the Australian geneticist Robin Holliday proposed that epigenetics be redefined as the study of changes in gene expression transmissible through cell division, even across generations, without changes in the DNA sequence. This led to the idea that "epigenetic" modifications were transmissible or even heritable regulatory signals that were added to the information carried by the DNA sequence.

In 1961, the British mouse geneticist Mary Lyon, noted that female mammals, who have two X chromosomes, unlike males with only one X and a Y chromosome, show unusual "mosaic" phenotypes of the coat-colour. Where do these female-specific mosaic phenotypes come from? Lyon suggested that they resulted from random inactivation of one of the two X chromosomes in each of the early embryo cells, followed by the stable transmission, that is, the memorization, of this silent state during the successive cell divisions. When the two X chromosomes carry different forms of the same gene, controlling for example coat-colour, the random inactivation of one of these two chromosomes and the clonal expansion of the cells thus produced results, in the adult individual, in a juxtaposition of patches of cells, each with a different phenotype. Lyon thus posited, that the "sex chromosome" identified by the cytologist Murray Barr in the nucleus of the female cells corresponds to the inactive X.

In 1975, Art Riggs proposed that the inactivation of the X and its stable transmission through cell divisions was based on the methylation of DNA. This hypothesis was supported by the findings that the regulatory regions situated near the genes are indeed methylated on the inactive X. Other researchers subsequently discovered that this methylation is faithfully reproduced after replication of the DNA, via specific enzymes known as "maintenance" DNA methyltransferases. Better still, these enzymatic activities can be blocked by drugs and this can lead to reactivation of some of the genes carried by the inactive X chromosome.

Another example of unexpected heredity in mammals is the "parental imprint". In 1986, two embryologists, Davor Solter and Azim Surani, each carried out seminal work in nuclear transplantation in the ovocytes of mice. The aim was to obtain embryos carrying two genomes of maternal origin (gynogenotes) or two genomes of paternal origin (androgenotes). In both cases, they found an early embryonic lethality, even though the maternal and paternal genomes carried the same genetic information. Here again, it was rapidly found that DNA methylation is instrumental in the functional non-equivalence of genomes of maternal and paternal origin. This differential methylation is established in the germinal lineage of the parents and is transmitted to their offspring, which maintain it.

These two striking examples illustrate an essential point of the processes of epigenetic memorization linked to development: in mammals the inactivation of the X as a parental imprint is erased with each generation. This reprogramming, or *tabula rasa*, is indispensable for a new life cycle to begin. ■

Excerpts from the Inaugural Lecture
13 December 2012

Source: La lettre, *no. 36, May 2013*

- **Inaugural Lecture published by Éditions Fayard and online at www.books.openedition.org/cdf/2252**
- **The video of the Inaugural Lecture is available online at www.college-de-france.fr, on the professor's page.**

Prof. Edith HEARD
Epigenetics
and Cellular Memory

KNOWLEDGE AGAINST POVERTY
2012/2013

Dominique Kerouedan

The Geopolitics of Global Health

The international community readily recognizes that maternal health has received little political and financial attention, despite the United Nations Secretary General Ban Ki Moon making it a priority at the G8 Summit in Muskoka.[1]

From my experience in the field, I know that pregnant women are among the patients receiving the worst care, and are subjected to attitudes which anthropologists Jean-Pierre Olivier de Sardan[2] and Yannick Jaffré call "La Médecine inhospitalière" ("inhospitable medicine").[3]

Yet does maternity not take us to the heart of the philosophical questions, which makes humans an integral part of life itself and of the world? Is the disregard, sometimes until the death of the mother and of the child, not a reflection of societies' degree of tolerance to women more generally? It seems that we do not grant all humans the same value. Reading Jean-Pierre Derriennic's book on civil wars, Pierre Hassner was stunned to discover "the different value given by the major powers to the life of their nationals and to those of other humans, particularly in the Third World".[4]

Be it in the field or at the international political level, it is difficult to maintain an independent stance when we analyse the situation or comment on it. Diplomatic immunity seems to induce intellectual immunity, which anesthetizes the curious and scientific mind, dialogue based on experience, in short, critical thinking, which Henri Bergson argued was "conducive to inspiring responsible behaviours".[5] Were we allowed to think differently, here and over there, we would save decades. Whatever the global challenges, the future of humanity depends on men's and women's *ideas*, and on the rise of strategic minds.

The innovative, dematerialized ways of financing development do away with human relations. The realities of poor persons, let us face it, have become abstractions in Western capitals. Thus, globalization goes hand in hand with a paradoxical movement of expansion of the world which both distances humans from one another and dilutes them in the sphere of knowledge, as technology brings them closer in time through digital screens. Behind the sea of anonyms, do we distinguish faces, individual journeys, people like us?

Caption: *Santé rurale*, Idrissa Diarra, Abidjan, ARR

Freedom and sovereignty are our most powerful weapons to oppose the industrial alcohol, food lobbies, and drug traffickers, to which we are otherwise toys. As Yvan Illich tells us, what constitutes each individual's health is precisely their "personal autonomy"[6], a rather remote proposition from the omerta that is often still imposed on the patient's "singular dialogue" with their doctor. In the face of the powerlessness sometimes inflicted upon us by men and women insensitive to what they know about the risks of becoming infected with a deadly virus or sinking into addiction, it takes time to understand, thanks to Foucault's argument about spirituality, that: "the truth is not given to the subject by a simple act of knowledge", rather "the subject must become other than itself to have the right to access the truth". ■

Excerpts from the Inaugural Lecture
14 February 2013

Source: La lettre, *no. 36, May 2013*

(1) United Nations Secretary General, *Global Strategy for Women's and Children's Health*, September 2010.
(2) J.-P. Olivier de Sardan, "La sage-femme et le douanier : cultures professionnelles locales et culture bureaucratique privatisée en Afrique de l'Ouest", in M. Raffinot and F. Roubaud (eds), *Les fonctionnaires du Sud entre deux eaux : sacrifiés ou protégés ?*, Autrepart 2001 (20) p. 61-73.
(3) Y. Jaffré and J.-P. Olivier de Sardan, *Une médecine inhospitalière. Les difficiles relations entre soignants et soignés dans cinq capitales d'Afrique de l'Ouest*, Karthala, Paris, 2003.
(4) J.-P. Derriennic, *Les guerres civiles*, Presses de Sciences Po, 2011.
(5) Henri Bergson was the first chairman of an international commission for cooperation between universities, academics, researchers and scientists, founded on the idea that education allows people to develop a critical mind that is conducive to inspiring responsible behaviours (which was to become the UNESCO).
(6) I. Illich, *Medical Nemesis: the Expropriation of Health*. Calder & Boyars, 1975.

- **Inaugural Lecture published by Éditions Fayard and online at www.books.openedition.org/cdf/2288.**
- **The video of the Inaugural Lecture is available online at www.college-de-france.fr, on the professor's page.**

Dominique KEROUEDAN
Dominique Kerouedan is a medical doctor specialized in international health cooperation and development policies, and has been a lecturer at Sciences Po since 2006. She is the founder of and Scientific Adviser of the Concentration in Global Health at the Paris School of International Affairs of Sciences Po.

Tony Cragg

Sculpture and Language

Using material for thinking is not as unusual as one may imagine. We all have had the experience of wanting to write down an idea, a thought or an emotion but when we come to write it down we sit there with pencil and paper or, if you prefer, keyboard and screen, trying out words and phrases until we find the right sentences to express our thoughts, to then discover that what we have written is more expressive and meaningful than our original thought.

This is poetry or what ancient Greeks called *poesis* – the process of creation using material to reflect our thoughts and give form to our ideas. Our ability to read material is so highly developed when we look at each other, in an instant we receive information that enables us to establish age, sex, health, mental state, mood, disposition, history and that provides a basis to speculate about our subject's character and thoughts. We are receptive to the slightest change of form; a smile, a grimace, a nuance of muscular tension, especially on the face of someone we know, will instantaneously change what we are thinking about that person. Why else would we still be fascinated with a smile in a painting dating from 600 hundred years ago?

When the material changes, our mind is changed. When I change material, the latter changes my mind and often enough I feel that it becomes unclear which one of us is leading. But then why should things be different in my studio than in the larger universe? We see things by being able to see the light that is reflected from their surfaces and our brains distinguish between things by giving them colours and textures. But there is an enormous psychological pressure to see beyond the surfaces of things, to penetrate them in order to find out what energies and forces cause the surface that we can see. We want to find out what is going on behind the scenery of the face, what is the figure beneath the garments, what are the powers and vital energies of the being or thing in front of us. Not just the figure but everything we see is the result of its internal structure and all forms have energetic causes, these internal causes are often more important than their external appearance and we have an urgent need to know the hidden structures of materials, their energies and properties.

Sculpture is a discipline that occupies itself with the valence of surfaces and forms. There is a general impression that sculpture has developed slowly as a form of expression, perhaps due to all the talk about statues that gives a static impression of it and makes out of it a frozen reality. Nothing could be further from the truth. Over the last hundred and fifty years there have been rapid and radical developments in terms of the materials, techniques, form, scope and content of sculpture.

Before the beginning of the modern era, sculpture in Europe was mainly influenced by the Greco-Roman tradition. Sculptures looked realistic but the ideas were often abstract and never just a blank copy of nature. They transported the notions and ideals of physical prowess, fertility, beauty, intelligence, compassion, justice and morals. Baroque sculptures defined themselves through their vibrant energetic forms and the sense that all material manifestations are driven by waves of energy emulating from a supreme force. Influenced by Freud's ideas, Auguste Rodin's sculptures express the exterior forms of human beings not just as a result of their anatomy but of their mental states, passions and emotions. This heralded the decisive development that sculptors in Europe no longer felt it necessary to rely on the underlying anatomical structure of the figure as the sole cause and source of anthropomorphic forms. This development was encouraged and enhanced by the importation of sculptures from other cultures into Europe at the end of the nineteenth century. Abstract notions like evolution, movement, relativity and structural geometry took over the role of the underlying causality of form in the work of Picasso, Brancusi and Tatlin. By the beginning of the twentieth century, the forms, structures and functions of industrially produced objects had invaded the environment, playing an increasingly important role and having an ever greater effect on human lives.

Such a major and violent material development could not be ignored and it inevitably became a resource for sculpture. Marcel Duchamp was among the artists that realised its importance and his work had a major impact on art and sculpture making. From Duchamps' *Fountain*, to Andy Warhol's *Campbell Soup Cans*, Dan Flavin's fluorescent tubes, Joseph Beuys' rabbit foot, and Damien Hirst' pickled shark, artists have exploited the fact that there were strategies for changing the language associated with an object. In doing so, they have effectively transformed them without having to change them physically. In this way objects can become carriers of artistic meanings and content. ■

Excerpts from the Inaugural Lecture
24 octobre 2013

Source: La lettre, *no. 37, December 2013*

- Inaugural Lecture will be published by Éditions Fayard.
- The video of the Inaugural Lecture is available online at www.college-de-france.fr, on the professor's page.
- The Musée d'Art moderne de Saint-Étienne presented Tony Cragg's work from 14 Septembre to 5 January 2014.

Tony CRAGG
Rector, Sculptor Kunstakademie Düsseldorf. Visiting Professor for the Annual Chair of Artistic Creation 2013/2014.

TECHNOLOGICAL INNOVATION – LILIANE BETTENCOURT
2012/2013

Yves Bréchet

The Science of Materials: from Materials Discovered by Chance to Made-to-Measure Materials

Historians have customarily named the different ages of humanity after the materials that prevailed at the time: the Stone Age, the Copper Age, the Bronze Age, the Iron Age, etc.

The nineteenth century can be seen as the Steel Age, the twentieth century as the Age of Polymers and then Silicon. This habit is telling: the successive stages of our material civilizations are facilitated by the development of materials and energy resources.

While the materials used by human beings have continuously evolved, this has happened at very different speeds over the course of history, and has accelerated considerably in recent decades. In pre-historical times, around 50,000 BCE, the only materials our ancestors used were natural ones, be they mineral or organic. The choice of materials was essentially limited by their proximity. Later, say around 50 BCE, the diversity of available materials had grown substantially. The Romans had excellent knowledge of ceramics and glass, they used both stone and mortar, and their work with metals, silver, gold, tin, lead, bronze and planished iron demonstrated good empirical knowledge of metallurgy, albeit not as great as that found much earlier in Far Eastern civilizations. Between the Roman Empire and the end of the Middle Ages, the world of materials evolved relatively little. While the engineers of the Middle Ages learnt to use civil engineering materials, as witnessed in the powerful religious architecture of the time, they did so with local raw materials: limestone in Reims, volcanic stone in Clermont-Ferrand and wood in Norway. The nineteenth century was unquestionably the century of metals, particularly ferrous materials. Cast iron and steel allowed for bridges, ships, trains and later cars to be built. The industrial revolution was as much that of steel as it was that of the steam engine. The twentieth century saw two revolutions: metals and ceramics, which prevailed. Artificial polymers emerged, made from petroleum, with the fascinating variability of their properties, and the capacity to "build" matter on an atomic level, by playing with the arrangement of the chains. The second revolution of the twentieth century was the forceful appearance of functional materials, in much smaller quantities, but with very high added values. The electrical energy revolution was made possible by materials that already existed. The microelectronics revolution required the manufacturing of very pure silicon, and the optic fibre revolution could not have occurred without the ability to use highly pure glasses with a gradient index.

The historical trend I have just outlined reflects not only the evolution of available materials, but also that of the way humans relate to materials, successively moving from the "materials discovered by chance" to the "optimized material", then "competition between optimized materials" and finally the "construction of made-to-measure materials". This trend, which will be the common theme of these lectures, also reflects the shift from know-how to a science, then to a body of sciences, called the "engineering sciences".

This is effectively technological innovation. Today, we are faced with what some have called "the hyper-choice of materials". There are about 100,000 materials available to engineers, with a wide variety of processes to apply them. Every day new materials are discovered, though only a limited number of them make it out the laboratory. A material is rarely used for a single property, but for a combination of properties, and for its possibilities of implementation. And despite the variety of materials available, in each domain of application, a limited number of families prevail: in the building industry, glasses, steels and concretes; in the car industry, steels, aluminium alloys and polymer composites; and in microelectronics, silicon remains the largely prevalent semi-conductor. But innovation is far more here than the extension of a catalogue of options. The three pillars of the modern science of materials, the optimization of materials, that of choices between materials, and finally the design of made-to-measure materials, constitute a profound evolution of the way we use matter. ■

Excerpts from the Inaugural Lecture
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• The video of the Inaugural Lecture is available online at www.college-de-france.fr, on the professor's page.
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Yves BRÉCHET
Professor at Grenoble-INP, associate professor at McMaster (Canada) and Jiaotong (China). High Commissioner for Atomic Energy and member of the Académie des sciences.

Anny Cazenave

Studying the Earth and the Environment from Space

We are all used to see images of the Earth's atmosphere taken by meteorological satellites.

These images, along with many other observations collected from space, from the ground and within the atmosphere itself, are used to feed models with which meteorologists are able to forecast the weather. Whereas meteorological maps are well known to the public, fewer people know that many other domains relating to the Earth's environment also benefit from satellites' constant monitoring. For example, ocean observations from space have now reached a degree of maturity such that, like in meteorology, it is possible to forecast the state of the ocean several days ahead. Space observations also contribute to monitoring climate change by quantifying global warming, continental ice melting and sea level rise. The monitoring of the global water cycle, land use and land use change, deforestation, agricultural crops and natural disasters also increasingly rely on space observations. Finally, satellite data are crucial for the study of the solid Earth, its gravity and magnetic field, its rotation and crustal deformations, particularly in seismic regions.

The Earth is a complex system, the different components of which (from the innermost part of the globe to its surface envelopes) interact on a broad range of spatial and temporal scales. To describe the global nature of the phenomena concerned, satellites are irreplaceable tools. Their advantages are well known: they offer a global view and a fine spatial resolution. The observations cover regions that are difficult to access, and are carried out virtually continuously or often repeatedly. The measurements are well calibrated and rapidly accessible.

It is clear that the knowledge acquired over the last few decades thanks to satellites has contributed to changing our outlook on the planet and its environment. It also provides us with a synoptic vision of the global changes affecting the system under the effect of natural phenomena and anthropic pressure, with a wide variety of consequences on human societies. With the progress expected from technology, this is only the dawn of deeper knowledge of the planet. But beyond that, space observations – observations combined with the modelling of the phenomena more generally – also contribute to optimizing the management of some of our vital resources, like water or agricultural ones. The data collected help to validate forecasting the models put at the service of society and decision makers. Their ultimate goal is to manage Planet Earth better, so as to meet the requirements of sustainable development, in other words the preservation of the balances between societal needs, the maintenance of ecosystems and economic efficiency.

This series of lectures will present the current state of knowledge in several domains of the Earth sciences for which space plays an important role: the field of gravity, the rotation and deformations of the Earth, the oceans, the ice sheets and the climate, the global water cycle. We will also discuss certain applications that relate more specifically to the domain of the environment, such as monitoring major disasters, changes in land use, the state of crops and food security, and finally, water resources. ■

Excerpts from the Inaugural Lecture
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- This Chair is funded by Total.

Anny CAZENAVE
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François Hollande at the Collège de France

MONDAY 4 FEBRUARY 2013

FRANÇOIS HOLLANDE AT THE COLLÈGE DE FRANCE 4 FEBRUARY 2013

On 4 February 2013, the Collège de France had the honour of hosting French President François Hollande.

Following the *Administrateur*'s opening address, the French President delivered a twenty-minute speech in the Marguerite de Navarre lecture-theatre. In a tribute to Professor Serge Haroche, 2012 Physics Nobel Prize Laureate, François Hollande reaffirmed his support for the Collège de France's research missions. He also presented the Higher Education and Research Bill, and outlined its two objectives: first, student success, which requires that questions of orientation and specialization be re-valorized; and second, that disciplines, programmes, and institutions be entirely de-compartmentalized.

Earlier in the day, François Hollande had visited the École normale supérieure's Kastler Brossel laboratory in the rue d'Ulm, where he met Serge Haroche's research team, including young PhD candidates associated to his programme. As of January 2014, this laboratory will become part of the Physics Institute, which is to be housed in the new renovated building at the Marcelin-Berthelot site, scheduled for inauguration in the spring of 2014. One of the priorities of the Physics Institute will be to welcome resident research teams. To this end, it plans on creating a project centre to host junior physics researchers in prime conditions. On the same day, 4 February 2013, the Collège de France and the CNRS, represented by Mr Alain Fuchs, signed an agreement in support of this project. ■

From left to right: François Weil (Recteur of the Académie de Paris), François Hollande, President of the French Republic, Antoine Georges (Condensed Matter Physics), Serge Haroche (*Administrateur* of the Collège de France, Quantum Physics) and John Scheid (Vice-*Administrateur* of the Collège de France, Religion, Institutions and Society in Ancient Rome) in front of the Physics Institute's building.

FRANÇOIS HOLLANDE
AT THE COLLÈGE DE FRANCE
4 FEBRUARY 2013

Serge Haroche's Speech

Mr President,

Your visit to the Collège de France today is symbolic. Our country's oldest academic institution, created by Francis I, has survived throughout all the country's regimes. For nearly five centuries now, it has remained under the protection of the head of state, who formerly appointed its Lecteurs royaux (Royal Lecturers) and who, to this day, continues to appoint by decree the professors elected by our Faculty. We value this direct link with the highest authority of the state, which has ensured our freedom and the perpetuation of our institution through the upheavals that have marked the history of higher education in our country.

And, lest we forget, we are reminded of this link at least three Sundays a year, when we deliberate and vote under the gaze of Francis I, Henry IV and Louis XIV, whose portraits adorn the walls of our assembly hall. Our mission has not changed since the creation of our institution: it is to teach research and knowledge in the making in every area of the exact sciences and the humanities, even, and especially, when they do not belong to the fields that are traditionally taught at university. Thus, we are conscious of defending invaluable ideals that have been deeply entrenched in our country's knowledge and culture. The Collège de France, a historical and singular institution that is attached to its traditions and intent on preserving its independence, and that is far from being locked away in an ivory tower, is nevertheless concerned with the organization of French academe and research.

While the College of France does not deliver degrees as such, it cares about the situation of the students and researchers who freely attend its lectures. It feels responsible for the dissemination of research and culture, the values of which can survive only if the conditions conducive to their development are met. This means that we are concerned about the changes that are currently taking place on the academic scene. The fact that the concluding sessions of the Assises de l'enseignement supérieur et de la recherche were held in this very place bears witness to our involvement in the reflection accompanying this transformation process. The Collège de France's participation in the Paris Science et Lettres (PSL) federation also attests to its desire to take part in current developments in research and higher education, without curbing its independence in any way or foregoing the special link with the state that I have just mentioned.

Mr President, you have expressed the wish to combine your visit to the Collège de France with a visit to the École normale supérieure's Kastler Brossel laboratory. I am grateful for this, as I also see this as a powerful sign of the strong ties that exist between these two institutions, in which I have spent my entire career. It is in this laboratory, on the other side of the Pantheon, that I have carried out my research for close to forty years. Along with my longstanding colleagues, whom you have met, we welcome brilliant and motivated students as well as visitors from around the world. In an atmosphere highly conducive to fundamental research, created in this exceptional place by my masters Alfred Kastler, Jean Brossel and Claude Cohen-Tannoudji, the work I have carried out with this team has led me to the Collège de France and, ultimately, to receiving the distinction that is the very reason for your visit today.The adventure goes on.

You have just seen the new building that will house the new Collège de France's physics and chemistry laboratories, alongside its biology laboratories. The three Chairs of experimental physics, slated to move into this building, will remain affiliated to the École normale, the Université Paris VI, and to the CNRS. We have high hopes for this renaissance of physics in our midst, and for the creation of the project centre that will support and welcome young researchers, who will thus be able to begin their career in a particularly favourable environment. And while on the subject of our projects, I will add that the Collège de France does not confine projects of this nature to the exact sciences. Its ambition is also to bring together the libraries and t eams of different Chairs and to organize a great Institute of Civilizations at the Cardinal Lemoine site, which we hope soon to start renovating extensively, thereby bringing to completion the Grands Travaux endeavour launched under François Mitterrand's Presidency.

Mr President, we know that we can count on your support to bring these projects to fruition. Your presence here today symbolizes this support. It underscores the special ties between the Collège de France and the head of state, as well as our country's commitment to research and higher education, which you have constantly reiterated since coming into office. For this, my colleagues and I are very grateful, and we now have the honour and pleasure of listening to you. ■

François Hollande's Speech

Mrs Minister, Mr Administrateur,
Ladies and Gentlemen Professors,

I do not know who is most impressed, Serge Haroche or myself: he to receive me here at the Collège de France, of which my functions make me the protector; or me to be here in this lecture-theatre where so many illustrious figures have imparted learning and knowledge. There is, undoubtedly, no greater honour for a country than to see one of its citizens receive the Nobel Prize. Serge Haroche, you gave us the opportunity to feel this pride a few months ago. This distinction lauded your qualities as a researcher, the scope of your discoveries, and the prestige of your laboratory since, as you pointed out, Alfred Kastler and Mr Cohen-Tannoudji – who is here with us today – received this highest of distinctions before you. But this prize also honoured exceptional teaching. Indeed, you have worked in four major institutions. The École normale supérieure: we were there just a few minutes ago and you showed me your laboratory. I was surprised at how small and antiquated the premises were, and I imagine that there was a specific intention behind this tour! I then came across this unlikely, unbelievable, unreal machine of yours that has turned your research into so many discoveries. The second institution is the CNRS, and I would like to take this opportunity to salute its leaders. Then, the Université Pierre et Marie Curie. As you know, on what is called the President of the Republic's inauguration day, I paid tribute to Marie Curie to symbolize my presidency's strong support of research. Finally, the Collège de France, where we stand today. The Collège de France, of which I am the protector, was created in 1530 by Francis I, to foster open and free teaching, unbound by restrictive principles. Nearly five centuries later, this Collège has remained loyal to that spirit. As I have said, it decides on the title of its Chairs freely, unaffected by the division between scientific disciplines, which puts it at the forefront of the very definition and creation of new disciplines.

This place of excellence is exceptional in that it is open to everyone: every citizen can be proud to know that they too can become one of the Collège de France's students. Strictly speaking, the Collège does not have students. Anyone who wishes to learn can simply walk in; everyone is welcome. Will they understand everything that is taught here? No one knows, since no one checks: there are no exams. But this is the most beautiful symbol that can ever be offered: that of science made available to all. The Nobel Prize awarded to you reminds us of this obvious fact, this essential condition: the prestige of a nation, the scope of its influence and its performance are indissolubly linked to our higher education and our research.

Investing in knowledge, especially in times of scarce financial resources, means preparing the France of tomorrow. That is why, no matter how harsh the times, I have decided to ring-fence the higher education and research budget in 2013. I would like you to consider what this represents, not so much for decision-makers, but for our country. At a time when every ministry and administration is forced to make sacrifices, I made sure that this priority was respected. This will translate into a number of decisions, including an annual increase of 1,000 positions in higher education. One other ministry can boast the same type of action, as it shares the same vocation, and that is national education. Furthermore, research will be one of the first sectors to receive the *investissements d'avenir* (Investments for the Future) drawn from the "Grand Emprunt" or "Great Loan" launched by my predecessor, and I have asked for the accelerated implementation of the programmes defined within this framework, because we must move ahead at a stronger and faster pace.

A number of changes are however expected in return for this financial support. Not because some kind of negotiation or demand are involved, but because we need to evolve. This is why I proposed a law on higher education and research. The bill, currently being drafted and in its final stage following the recent Assises de la recherche, has two objectives. The first is student success, and the key to this is avoiding premature specialization. We must help all our students build their own personal agenda by giving them a choice of orientation in their undergraduate studies. The same goes for bachelor's degrees, since we want these studies to lead to real jobs. Better results in the first three years of higher education will lead to increased numbers of Master's students. The idea is that every student who puts their trust in a university by enrolling in it should be able to achieve their goal after completing the curriculum. The bill's second objective is to de-compartmentalize not only disciplines and curriculae, but also institutions. The French ▶

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▶ academic landscape is a reflection of France itself; it is abundant, fragmented and diverse. While this diversity contributes to the richness of our country, it also results in our institutions being too isolated at times, and in the maintenance of overly complex systems of inter-institutional collaboration. It seems to me that we cannot carry on like this. We cannot keep on adding structures to structures, strata to strata: here too, we must simplify. Hence we propose to group universities together into intellectual hubs that would be more widely known and respected, in order to attract funding in line with that of our global competition.

One of our challenges with this bill will therefore be to facilitate the creation of such hubs, grouping together without merging – which is certainly not the intention – our *grandes écoles* and our universities. The various regions share this vision. It must garner even further support from our local governments, whom I commend for their commitment towards the university system. The bill will offer new legal tools for organizing this convergence while respecting diversity. Coherence will be crucial to the state itself, as it will contract with these institutions, centres, hubs or groups, as well as with each individual entity. The purpose of this de-compartmentalization is also to strengthen the ties between university and research. Serge Haroche is the very symbol of this connection. Research organizations will also take part in these academic groups and in their governing bodies. Creating such ties and building bridges will allow faculty, staff and students working on a project to move to another one; to move from one university, from one discipline, and from one curriculum to another.

I would also like to stress that our country needs more engineers dedicated to research and innovation. Such projects can already be found in Paris, Saclay and Grenoble, and they must be encouraged to grow. Here, I wish to applaud the initiative taken by engineering schools to increase their percentage of post-graduate students. I encourage business schools to adopt the same approach. France lacks marketing, production management and business management PhDs. When it comes to tax planning and management, we have everything we need, but this cannot be our only expertise! I urge businesses to acknowledge the importance of researchers' and academics' work, and the value of the degrees that are awarded. It is inconceivable that, in this great country of ours, those with the highest degree in higher education – the PhDs – receive so little recognition on the job market. Doctoral studies are still perceived as a specialization whose sole prospects are in academia. We forget that this is also formal professional training. It is in our companies' interests to hire PhDs and, incidentally, let me point out that the research tax credit should be an obvious incentive. However, the state itself must set the example. We cannot dictate that companies hire more PhDs if the state does not do so itself. Our recruitment system for senior officials in the public service involves entrance exams that are ill-suited to researchers. I, for one, have gone through a number of recruitment sessions – I don't mean in terms of political elections, but at university, to enter the public service. Yet I often came across graduates of the École normale supérieure, but never across PhDs. Here again, we need to facilitate access to careers in public office for PhD holders, as do our European neighbours.

The idea behind this reform is to give our universities an edge in the intellectual competition that is unfolding on the global scene, as we all here know. It will be based on a specific asset that has long been the subject of endless discussions and false dichotomies, that is, on autonomy. I shall remind you that Edgar Faure had this principle adopted nearly 50 years ago. This is not where the risk of division lies. He had it adopted in the wake of events that had considerably shaken the country. Autonomy means bringing together decisions relating to national strategy, which must be steered by the state, and local agendas, defined by the institutions themselves. Autonomy means trust: the trust that is granted to presidents or heads of institutions, their economic, social and cultural partners, and especially academics, staff and even students. Autonomy means honouring diversity among situations and projects. This autonomy must combine efficiency and collegiality. The former, because institutions and their advisory boards must be able to make important decisions, and the latter, because higher education and research cannot advance without mobilizing professors, staff and students alike. Existing internal university electoral mechanisms will be amended accordingly. In certain conditions, prominent economic and social figures will also play a role in the universities' decision-making process.

I would like to conclude this speech, which is a tribute not only to Serge Haroche but also, more broadly, to the academic and research worlds. Globalization is all around us; it applies to everyone, everywhere. It is also a reality for universities. I am not talking about the controversial rankings that sometimes fail to reflect reality; we should not obsess over these. I am talking about the globalization of performance and of results. I am also talking about the globalization of research. We can see that emerging countries such as India and Brazil, for example, are now developing considerable means for their research systems. Ten years ago, China had only five million students. It now has 30 million, with 60 million foreseen in 2020, and also gives priority to research. We need to rise to this challenge. First by allowing French students to spend time studying abroad – as you did, Serge Haroche. I understand that you were a post-doctoral scholar at Stanford and that you taught at Harvard and Yale. We must also provide foreign students with the opportunity to study in France. We have revoked a decree that limited foreign students' access to employment, which in fact was hampering this mobility. I would also like a number of flaws in our hosting system to be remedied, as we should never lose an opportunity to host a promising foreign researcher or student. You introduced me to one of your researchers from Ukraine who chose to come to France. I do not wish to use this purposefully, but he told me about the red tape involved in getting hold of required documents, when in fact his time should be devoted to his research. In the same spirit, within the framework of teaching agreements with foreign universities or of European

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programmes, we must be able to offer courses in languages other than French. Not that I don't want to defend French – we have even reintroduced a ministry of Francophone affairs – but we must also allow Chinese, Indian or American students who do not necessarily speak our language well, to enrol in our universities, become familiar with our culture, learn our language better, and eventually spread it abroad. By the same token, offering programmes in foreign languages in France will also broaden the scope of our own students' opportunities, both in our universities and in our *grandes écoles*.

Finally, I would like to stress a major point: the appeal of French research. We must help young French researchers to pursue their careers in France by giving them an easier start and providing them with prospects of funding for their work and for international exchanges, thus allowing them to believe that research in France will allow them to succeed. For research does not only concern researchers; it is not simply the domain of university education or a ministry's responsibility: research is the lever of France's recovery. This is our only wager for success, and we have a chance to win it through effort mustered together. Fundamental research, in particular, is not just a source of pride for our country when one of our own researchers receives a Nobel Prize. It is also a key to our future. Fundamental research requires patience, time and the desire to explore without being sure of the outcome, without knowing what "applications" will be served. This research also implies consistency, as you have attested to here. True discoveries reward years, decades, sometimes a lifetime or even several lifetimes of effort. The greatest discoveries were made through these processes, these trials and errors.

Progress is a journey forward, which also implies passing down knowledge from generation to generation. Your laboratory, Serge Haroche, is a prime example of this. Researchers share their knowledge and methods with one another. Research is an endless story, both of legacy and overcoming, of continuity and transgression, for there must be breaking points. We must also be able to take stock of what has previously been done. Nothing is ever complete. We must be able to pass the baton, train our youth and, here too, you have shown the way. That is why higher education and research cannot be separated. Thanks to them, our country moves forward, our economy improves, diseases are fought more effectively, our environment is better protected, and the societies that make up our world can be analyzed and understood more fully. This is why your own alliance is remarkable, since your wife is a researcher in sociology.

I would like to end on this last note. Science must remain France's vocation. We must remain a great scientific nation, which means leading many more young people than we now do towards scientific fields of study and, within these fields, attracting even more students towards scientific research. This is not a matter of believing in science; science is not a religion. Science is the stuff of advances, observations and experiments, which are irrefutable.

With this fine notion of science in mind, with the noble idea of progress and of remarkable knowledge imparted to others, the great values I have evoked honour the distinction bestowed upon Serge Haroche. Thank you. ■

Source: La lettre, *no. 36, May 2013*

ATOMS AND RADIATION
ERC SYNERGY GRANT 2012

"Ultracold Quantum Matter" Project (UQUAM)

In 2012, the European Research Council (ERC) launched a call for proposals, named Synergy, with the aim of promoting collaborative research between European research groups. Our team, which is currently working on Bose-Einstein condensates at the Kastler Brossel Laboratory, is part of the fortunate eleven winning consortiums, with a theme that may seem a little mysterious: ultra-cold quantum matter.

The starting point of this project is the interaction between light and matter. This interaction has always been crucial to understanding our environment. Quantum physics, which successfully describes the microscopic world, developed thanks to the analysis of the light emitted and absorbed by an assembly of atoms or molecules. But only for the last 20 years or so have we known how to manipulate and control individual quantum systems, an atom or a photon, the elementary grain of light. This very progress earned our *Administrateur* Serge Haroche and David Wineland the 2012 Physics Nobel Prize.

In a visionary text written in the eighties, the physicist Richard Feynman explained the full value of having the same control, but for a large number of particles. The artificial matter thus produced could allow us to address some major questions, both fundamental and practical, which currently remain unanswered. Let me mention two: with a better understanding of the phenomenon of supra-conductivity, could we design materials that transport electricity without any loss, for everyday applications? By using quantum concepts wisely, could we develop new memories that could store much larger quantities of information than our current hard drives?

Why do these quantum systems with a large number of particles present such a challenge? We know how the particles interact with one another, and we have no difficulty of principle to describe the behaviour of small groups. However, quantum complexity makes it extremely difficult to describe a large assembly. Consider a chain of 100 spins, in other words 100 microscopic magnets which can exist in two configurations, with the north pole on top or at the bottom. Merely writing the general quantum state of this chain would require a computer larger than all those currently operational. And doing calculations on this quantum state seems even more unrealistic…

Feynman proposed another approach, quantum simulation, which is at the heart of our Synergy project. It is founded on the universality of quantum physics; two seemingly different systems can be described through a similar formalism if they share certain parameters: for example, the ratio of the interaction energy and the temperature, or their geometry (linear, plane or voluminal). Our quantum system model is formed of an assembly of ultra-cold atoms, trapped in a light wave. These cold atoms are prepared using mechanisms identified by Claude Cohen-Tannoudji in particular (professor at the Collège de France and 1997 Physics Nobel Prize Laureate). They are produced at a temperature only a few billionths of a degree above absolute zero. Using light beams, the atoms are organized into "landscapes" which simulate other environments: periodic to model the electrons of a crystal, or disorganized to study propagation in a random environment. By forming an alignment of a hundred atoms, the chain of spins described above can thus be simulated. The system is left to evolve freely for a given amount of time and its final state is measured. Nature does the calculation for us, and the above-mentioned universality ensures that the result obtained for our atoms is also valid for the system modelled.

Our consortium selected for the Synergy project is comprised of two teams of theoretical physicists, led by Peter Zoller in Innsbruck and Ehud Altman at the Weizmann Institute in Israel, and of two teams of experimentalists, that of Immanuel Bloch in Munich and ours, which will soon be moving into the Physics Institute of the Collège de France. We could not hope for better support than the help we have received from the ERC, which will very soon allow us to begin these new experiments in this entirely renovated building. ■

Prof. Jean DALIBARD

Source: La lettre, *no. 36, May 2013*

Prof. Jean DALIBARD
Atoms and Radiation

Nanostructured Porous Quartz Films for Electronics: Another Success for Soft Chemistry

Until now, it has been very difficult to purify and to nanostructure quartz, one of the crystalline phases of silica, and the second most abundant mineral in the world.

Researchers from the Laboratoire de chimie de la matière condensée de Paris (CNRS/Collège de France/UPMC) have achieved an exceptional feat, in collaboration with the Barcelona Institute of Materials Science and the Institut Laue-Langevin in Grenoble: through a simple process, they have obtained a quartz film on a silicon substrate with crucial characteristics for micro-electronics. Why use quartz in this domain? For its piezoelectric properties, that is to say, the capacity to produce an electric charge under the effect of a mechanical constraint. This soft chemistry work is paving the way for huge reductions in the manufacturing cost of quartz films for electronics, and to their exploitation in new applications in that field. It was published in the journal *Science* on 17 May 2013.

Quartz, a mineral species composed of silica (SiO_2), is one of the most abundant minerals in the world. In electronics, it is valued for the piezoelectric properties of one of its conformations (α-quartz). This property, discovered in 1880 by the Curie brothers, enables it to be electrically polarized by a mechanical constraint and, conversely, to be deformed when subjected to an electric field. Piezoelectricity has a wide range of applications both in industry and in everyday life, from the ordinary gas lighter to piezoelectric resonators, pressure sensors and accelerometers, piezoelectric actuators and motors, microgenerators, piezoelectric transformers, filters in electronics, etc. Though it is abundant, natural quartz is neither sufficiently pure nor of a sufficiently high quality to be integrated into electronic devices. The quartz films currently used are increasingly often obtained by slicing synthetic quartz produced at high temperatures and pressures.

One of the areas of expertise of the Hybrid Materials and Nanomaterials Chemistry Team (Chimie des matériaux hybrides et des nanomatériaux - MHN) headed by Clément Sanchez is hybridizing soft chemistry, which draws inspiration from living forms to synthesize original multiscale and multifunctional materials for use in the fields of energy, the environment, nanomedicine, and modern micro-optics and microelectronics. One of this team's recent noteworthy achievements has been the development of new meso-textured quartz coatings, which represents a challenge that until recently seemed out of reach for the European, Japanese and US teams working on these themes.

This research, which is operationally very simple even though it involves particularly complex reaction mechanisms, performed an entirely original feat under these temperature and pressure conditions: the use of amorphous silica to produce α-quartz (and not the crystalline phases of non-piezoelectric silica) crystallized symmetrically in relation to its silicon substrate – epitaxially grown quartz to be more precise. This property, added to the porosity that can be controlled from the scale of the micron to that of several tens of nanometers, allows us to increase substantially the surface accessible to molecules, so as to develop ultra-accurate sensors for example. These piezoelectric materials developed through a delicate combination of soft chemistry with texturing agents and thermal treatment are cheaper, more easily integrated on microelectronics' existing silica platforms, and offer more original textures than conventional quartz.

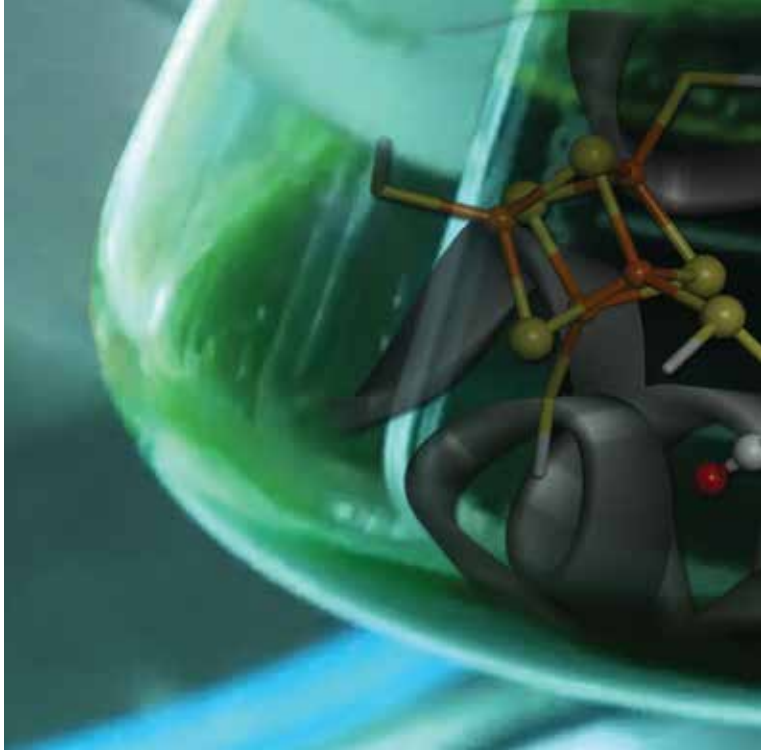
The specificities of epitaxial meso- or macro-porous piezoelectric quartz open up a highly promising field of research and applications. The most obvious expectations concern both the development of intelligent sensors through sound wave modulation and modern microelectronics (developing processes for micro-electromechanics). ■

Prof. Clément SANCHEZ/CNRS

Source: La lettre, *no. 37, December 2013*

- The MHN team has filed over 60 patents on these themes (see http://www.labos.upmc.fr/lcmcp/?q=node/595).
- This work was published in the journal *Science*: A. Carretero-Genevrier, M. Gich, L. Picas, J. Gazquez, G.-L. Drisko, C. Boissiere, D. Grosso, J. Rodriguez-Carvajal, C. Sanchez, *Science*, 17 May 2013.

Prof. Clément SANCHEZ
Chemistry of Hybrid Materials



Developing Two New Cobalt-Based Materials

Researchers from the CEA, the CNRS, the Collège de France and the University of Grenoble have developed two new cobalt-based materials to replace platinum, a rare and expensive metal, for the production of hydrogen from water (electrolysis).

The first one can function in aqueous solutions at neutral pH. The second one is the first catalytic material ever created that is "switchable". [1] Both are based on non-noble metals, and can be used in the two key chemical reactions of water electrolysis: the reduction of water into hydrogen and its oxidation into oxygen.

As renewable energies (sun, wind, etc.) are primary energy sources that are unevenly distributed across the world, and intermittently available, it is crucial to develop technologies for storing the energy produced. While the production of hydrogen through water electrolysis offers a promising solution, it currently requires catalysts containing "noble" metals like platinum. The scarcity and cost of these metals impede the long-term economic development of the hydrogen industry.

Bio-inspired chemistry is based on chemical processes found in certain living organisms. These organisms have enzymatic systems called hydrogenases, which exclusively use cheap metals that are abundant in nature, allowing for hydrogen to be used as a source of energy or to be produced using water. For several years now, researchers have been drawing inspiration from these enzymes to develop new molecular catalysts, without platinum, using cheap metals found in abundance in nature (like iron, nickel, cobalt or manganese).

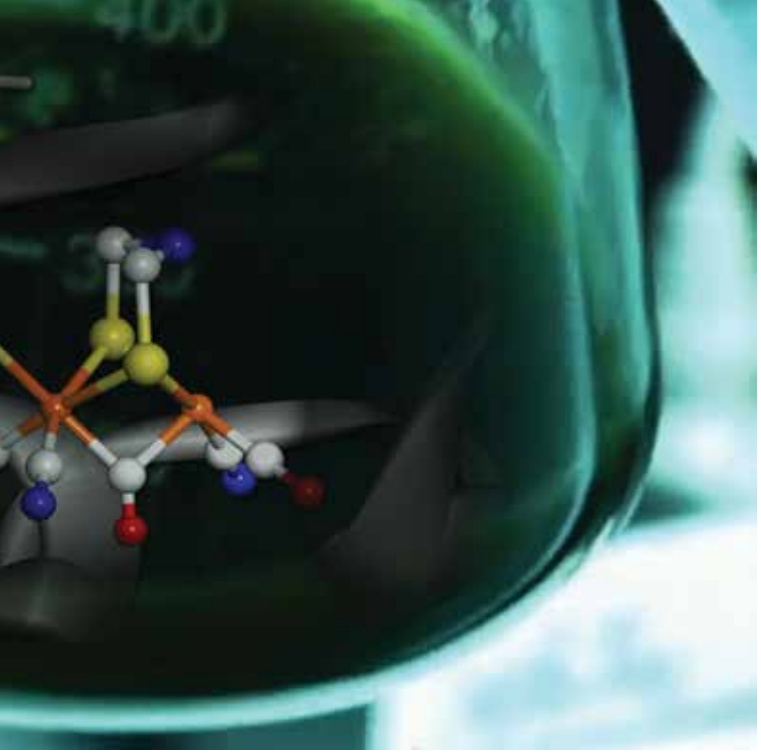
In order to be usable in technological devices, these synthetic catalysts must, like platinum, be fixed in very large quantities on electrodes that offer a large available surface. In 2009, these same researchers managed to immobilize one of these bio-inspired catalysts, which is nickel-based, on carbon nanotubes. This material, however, is active only in highly acidic environments. Using the same approach as in 2009, but developing a new bio-inspired cobalt-based catalyst, the same teams have just reached a new stage by obtaining a material that is able to function in aqueous solutions at neutral pH, which is more appropriate for technological developments. The catalytic activity obtained has proved to be extremely stable in the long term, with the attachement to the nanotubes greatly increasing the robustness of the catalyst.

In parallel, the researchers have gone further and developed another material, also cobalt-based. It is comprised of cobalt nanoparticles coated with a cobalt oxo-phosphate layer. This material, which functions in water at neutral pH, is remarkable as it exists in two forms between which it can switch, one which catalyzes the production of hydrogen (H_2) while the other catalyzes the production of oxygen (O_2) from water. This is the first "switchable" or "Janus" catalytic material without noble metals. These new cobalt-based materials could serve to develop stable and cheap technologies for the production of hydrogen as a "solution" for the storage of renewable energies. The researchers are currently working on integrating them into a global artificial photosynthesis system which, upon direct exposure to solar irradiation, would produce hydrogen directly from water. ■

Source: La lettre, *no. 36, May 2013*

(1) This material can reversibly transform from one chemical form into another, with each form corresponding to a specific catalytic activity.

- These results were published in the journals *Nature Chemistry* and *Nature Materials*.
- References: E. S. Andreiadis, P.-A. Jacques, P. D. Tran, A. Leyris, M. Chavarot-Kerlidou, B. Jousselme, M. Matheron, J. Pécaut, S. Palacin, M. Fontecave, V. Artero, "Molecular Engineering of a Cobalt-Based Electrocatalytic Nano-Material for H2 Evolution under Fully Aqueous Conditions", *Nature Chemistry*, no. 5, 48-53 (2013). http://dx.doi.org/10.1038/ NCHEM.1481
- S. Cobo, J. Heidkamp, P.-A. Jacques, J. Fize, V. Fourmond, L. Guetaz, B. Jousselme, R. Salazar, V. Ivanova, H. Dau, S. Palacin, M. Fontecave, V. Artero, "A Janus Cobalt-Based Catalytic Material for Electro-Splitting of Water", *Nature Materials*, no. 11 (2012) 802. http://dx.doi.org/10.1038/ nmat3385



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Hydrogen Technology

A New Process to Exploit Enzymes as Catalysts

Through a multidisciplinary approach combining bio-inspired synthesis chemistry and protein chemistry, researchers from the Collège de France,

the CEA, the CNRS and the Université Joseph-Fourier, in collaboration with Bochum University and the Max Planck Institute in Mülheim, have developed a simple and effective reagent to activate hydrogenases. These metalloenzymes are currently being studied for their use as catalysts in hydrogen production processes (water electrolysis) and fuel cells.

The future use of renewable energy, whether solar or wind, diluted and intermittent, is partly contingent on our ability to develop new energy storage technology. One of the most promising strategies consists first in converting these renewable energies into electric energy, and from there, into fuel such as hydrogen. This can be done highly efficiently (with yields of about 80%) in electrolysers that break water down into hydrogen and oxygen. The reactions triggered during water electrolysis are complex and require efficient catalysts. These are currently made of noble metals such as platinum, which are expensive and relatively scarce, and therefore must absolutely be replaced in order to achieve sustainable development in the hydrogen industry. But with what should we replace them?

Once again, nature is showing us the way. We now know that certain microorganisms are able to use their metabolism's electrons to reduce water to hydrogen or, conversely, to use hydrogen as a source of energy to fuel their metabolism. To do so, they do not use platinum as a catalyst but rather nickel and iron-based metalloenzymes called hydrogenases, which have remarkable catalytic properties. Following this discovery, these enzymes are now considered as suitable alternatives to platinum for use as catalysts in bio-electrolysers and biofuel cells.

Unfortunately, these enzymes' active sites are complex and their biosynthesis requires specific biological machinery that is still not fully understood and characterized, and that functions efficiently only *in cellulo*. The production of active hydrogenases is thus a serious impediment to their biotechnological exploitation.

This constraint has just been lifted in an original and elegant way, by the discovery of the following process. Researchers have developed a reagent that is capable, *in vitro* and highly efficiently, of transforming an inactive hydrogenase (called an apo-hydrogenase, that is, one which lacks an active site) obtained through very simple biotechnological processes, into a totally active hydrogenase. This reagent is a hybrid assembly combining a biomimetic synthetic complex of a small cluster of iron, which is a close analogue of the active site, with a protein that stabilizes it. What is remarkable is that the hybrid has the capacity to react with the apo-hydrogenase by transferring the biomimetic synthetic part to it. The structure of this part is sufficiently similar to the natural active site to confer its natural catalytic power to the enzyme that is thereby reconstituted.

This hydrogenase activation reaction opens up tremendous perspectives. It affords new answers to very fundamental questions concerning the effect of the protein's environment on the active site's reactivity. In terms of applications, it opens up the possibility of easily exploring the biodiversity of hydrogenases, with a view to identifying the most efficient and stable enzyme for technological applications. Finally, owing to its capacity to synthesize analogues of diverse active sites, it allows chemists to "invent" new, artificial hydrogenases. These are all potential new catalysts for fuel cells or for hydrogen production from renewable energy. ■

Prof. Marc FONTECAVE

Source: La lettre, *no. 37, December 2013*

- This text was published in the journal *Nature*: G. Berggren, A. Adamska, C. Lambertz, T. Simmons, J. Esselborn, M. Atta, S. Gambarelli, J.-M. Mouesca, E. Reijerse, W. Lubitz, T. Happe, V. Artero, M. Fontecave, Biomimetic Assembly and Activation of [FeFe]hydrogenases, *Nature*, 499, 66-69 (04 July 2013).
- Image caption: An artist's impression showing the active site of a [FeFe]-hydrogenase taken from a green micro-algae (the iron, sulphur, nitrogen, carbon and oxygen atoms are represented in orange, yellow, blue, grey and red respectively).

Prof. Marc FONTECAVE
Chemistry of Biological Processes

THE SOCIAL STATE AND GLOBALIZATION:
A LEGAL ANALYSIS OF FORMS OF SOLIDARITY
SYMPOSIUM 5 AND 6 JUNE 2013

The Avatars of Solidarity

Solidarity, an ancient notion drawn from Roman liability law, has gained currency since the end of the nineteenth century, especially in sociological and political language.

It partly owes its success to the fact that it is presented as a pure technique which, unlike fraternity, is rid of any mythical reference to a common paternity. This is why solidarity could provide a basis for the nascent sociology and the construction of the social State.

From a legal perspective, the principle of solidarity was consecrated by the Charter of Fundamental Rights of the European Union that was adopted in 2000. This charter, now as legally binding as the Treaties are, innovated by adding solidarity to the otherwise unsurprising list of principles (dignity, freedom, equality, citizenship, justice). In fact, this is not an absolute novelty since the African Charter on Human and Peoples' Rights was the first, on 27 June 1981, to recognize solidarity as a fundamental legal principle, a source of duties for both individuals and States. The consecration of the principle of solidarity at EU level attests that there was an ambition to establish a new understanding of solidarity at this level, which could be informed by the diversity of cultures rather than by seeking to subject them to the domination from any one of them.

This imperative applies *a fortiori* at the international level. Through the ease it affords and the risks to which it gives rise, technological development links together all the States of the world and makes them objectively solidary. Not one of them can think of itself as shielded from epidemics, poverty, environmental disasters, fanaticism or the surges of violence affecting the others. And they all face worsening inequality and the disintegration of social ties, forcing them to rethink their solidarity systems. This applies equally to countries of the "North", which must deal with these systems' financial crisis, as to those of the "South", which must invent new mechanisms of solidarity, as Brazil, China and India are doing for instance, to tackle the tensions and risks spawned by economic development.

The aim of the symposium organized on 5 and 6 June 2013 at the Collège de France was to revisit the idea of solidarity, looking at its different historical, linguistic, geographic and institutional dimensions. To this end, three different perspectives were articulated. First, a genealogical perspective allowed us to follow the development of the idea of solidarity, in legal, theological, sociological and biological terms. Second, through a philological perspective we considered the translatability of this Western concept into other systems of thought. Finally, the contemporary legal perspective shed light on the implementation of the idea of solidarity in the positive law of the countries associated with these different systems.

The symposium's contribution was first to highlight the various dimensions of the principle of solidarity and the multiple combinations afforded by this diversity: the emotional dimension of compassion, the sacrificial dimension of abnegation, the commutative dimension of reciprocity, the cooperative dimension of action, the objective dimension of interdependence, and the institutional

Prof. Alain SUPIOT
The Social State and Globalization: A Legal Analysis of Forms of Solidarity

Coupe on monobloc base, Sénégal, ARR

dimension of redistribution. Solidarity can therefore be seen as much as a principle of responsibility, as one of action or of organization. A second contribution was to identify the main issues that are raised by the implementation of this principle in the contemporary world. This actualization gives rise to multiple tensions: between equality and hierarchy, reciprocity and assistance, universalism and exclusion, monetization and the feeling of belonging. These points of tension are all points from which to observe the evolution of solidarity systems. The ability of these systems to control them is a good indicator of their lastingness. Finally, the papers shed light on the emergence of the idea of environmental solidarity and on the application of the solidarity concept in liability law, which has become current again. ■

Prof. Alain SUPIOT

Source: La lettre, *no. 37, December 2013*

The papers are available online at www.college-de-france, on the professor's page, and will be published during the course of 2014.

Prof. Édouard Bard

The Alfred Wegener Medal

The European Geosciences Union (EGU) has honoured Édouard Bard with the highest distinction, making him an honorary member and awarding him the 2013 Alfred Wegener Medal.

The ceremony took place on 10 April 2013, as part of the EGU's annual general assembly which brought together over 11,000 scientists in Vienna. Other French researchers had received the Wegener Medal in the past, notably climatologist Gérard Mégie, as well as two Collège de France professors, Barbara Romanowicz and Xavier Le Pichon. Édouard Bard's citation was presented by André Berger, emeritus professor and senior researcher at the Université Catholique de Louvain, honorary member and former president of the EGU and of the former European Geophysical Society. The following is an excerpt from his speech:

"Édouard Bard has been a pioneer in the use of accelerator mass spectrometry, which makes it possible to measure radiocarbon directly on samples of very small size. This technique, first developed in the 1980s, enabled him to quantify the penetration of thermonuclear radiocarbon in the ocean, and thus to monitor and understand the natural sequestration of anthropogenic carbon dioxide. Édouard Bard is also renowned for his research on sea levels. Using mass spectrometry to measure the isotopes of uranium and thorium in corals, he reconstructed sea level variations over the last glacial cycles in fine detail. His studies of corals around Barbados and Tahiti are being used to model the current and past geophysical response to eustatic changes. One of his main research findings has also been sudden variations in sea levels at rates that have sometimes exceeded several meters per century, which is much faster than the rise foreseen for the coming century. Édouard Bard and his colleagues at the CEREGE in Aix-en-Provence have convinced the Integrated Ocean Drilling Program (IODP) to perform new drilling off the coast of Tahiti, and they have recently complemented the initial studies based on cores drilled from the modern barrier reef." ■

Source: La lettre, *no. 37, December 2013*

Édouard Bard's speech is available on the European Geosciences Union website: www.egu.eu.

Prof. Édouard BARD
Climate and Ocean Evolution

EUROPEAN COMMISSION
HUMAN BRAIN PROJECT

Profs Stanislas Dehaene and Jean-Pierre Changeux

Human Brain Project

The *Human Brain Project* wins the competition of the largest European science fund and includes two Collège de France professors: Stanislas Dehaene (Experimental Cognitive Psychology) and Jean-Pierre Changeux (Cellular Communications).

The European Commission officially selected the Human Brain Project (HBP) as one of its two Future and Emerging Technologies (FET) Flagship projects. The HBP brings together scientists from across the continent around one of the greatest challenges facing contemporary science: understanding the human brain.

The aim of the HBP is to gather all current knowledge on the human brain so as to reconstruct it piece by piece in computer models and simulations. These models will open new perspectives to further our understanding of the brain and of neurological diseases. The aim is also to develop innovative technologies in computer science and robotics. On Monday 28 January 2013, the European Commission confirmed its support for this approach by announcing that it had selected the HBP as one of the two projects funded by its new FET Flagship Programme.

The Human Brain Project, federating over 80 European and international research institutions, is scheduled to last ten years (2013-23) and to cost an estimated 1.19 billion Euros. The project will also involve several leading North American and Japanese partners. It will be coordinated by the École polytechnique fédérale de Lausanne (EPFL) in Switzerland, and by the neurobiologist Henry Markram, with co-directors Karlheinz Meier of the University of Heidelberg and Richard Frackowiak of the Centre hospitalier universitaire Vaudois (CHUV) and the University of Lausanne (UNIL). France coordinates three sections of the project: theory of neuronal networks (Alain Destexhe, CNRS), cognitive neurosciences (Stanislas Dehaene, Collège de France, INSERM, CEA), and ethical aspects (Jean-Pierre Changeux, Collège de France, Institut Pasteur).

The “bottom-up” component of the project is designed to characterize the arrangement and the integration in functional circuits of all the components of the brain. The project draws to a large extent on the field of integrative and computational cellular neurosciences, which are well represented in France, especially in the Ile-de-France area (CNRS-UNIC, ENS, Paris V, Institut Pasteur, INRIA). The “top-down” component of the project aims to shed light on the neuronal circuits underlying cognitive functions, based on sophisticated experiments in cognitive neuropsychology and cerebral imagery, completed by mathematical modelling. The recognition of objects and actions, self-awareness and awareness of the body, decision making, and spatial navigation are all functions that will be analyzed by means of cerebral imagery and that will be reproduced in simulations. Particular attention is paid to the as yet unsolved question of what is peculiar to the human species: language, symbols, representation of other minds, and the appearance of new areas in the prefrontal cortex.

© Poupon C., Mangin J.-F. et coll., NeuroSpin CEA.

High-resolution functional mapping of the human brain will be carried out in tandem with that of the main fascicles of fibres that enable these modules to communicate. The project seeks to develop a model of the appearance of these structures during cerebral development. Here too, with the CEA, INSERM, INRIA, the CNRS and the NeuroSpin facilities, France will play a leading role. The multi-scale maps of the brain inferred from these data will be shared with the international community with a view to developing a common frame of reference for research on the structure and the functioning of the brain.

As regards theory, the HBP will set up the European Institute for Theoretical Neuroscience (EITN), which will be located in the Paris area, due to the strong theoretical and mathematical community there. This Institute will be designed to become a hub for the diverse theoretical approaches proposed to explain the dynamics of the brain, the emergence of consciousness, and cognitive processes. It is expected that, from the first phase of the project, it will play a key part in research on the mechanisms of neuronal encoding, which is closely linked to the experimental data and numeric simulations, and in the establishment of these mechanisms in "neuromorphic" circuits (specialized chips for the simulation of neurons and of their connections). It is hoped that the neuromorphic simulation will eventually strengthen relations between the translational teams of the CEA-LETI in France and of the German (BrainScales-Heidelberg and Dresde) and British (SpiNNaker) facilities of the HBP. The HBP must be seen as an ongoing process of iteration and interdisciplinary integration, the ultimate convergence of which is expected to afford an integrated understanding of the mechanisms and principles of the brain's functioning.

Advances in knowledge on the brain and its applications to medicine, information technology and robotics raise thorny ethical questions that will be dealt with by a specialized "Ethics and Society" section of the HBP. The function of this section will also be to inform the public and launch a citizen's debate.

The choice of the Human Brain Project as a FET Flagship project is the fruit of a long process of preparation and rigorous evaluation carried out over a period of more than three years by a team of independent scientists chosen by the European Commission. In the past months, the various partners have negotiated a detailed agreement with the Commission on the two-and-a-half-year inception phase (from 2013 to mid-2016). The project has started at the end of 2013. ■

Source: La lettre, *no. 36, May 2013*

The illustration opposite shows a map of neural networks in a volunteer from the CONNECT/Archi database (FP7 CONNECT European project), using the Connectomist software developed by Cyril Poupon, Jean-François Mangin and their collaborators at the CEA NeuroSpin (see Guevara *et al.*, NeuroImage 2011 and 2012). One of the objectives of the Human Brain Project is to create detailed and multimodal atlases of the human brain.

Prof. Stanislas DEHAENE
Experimental Cognitive Psychology
Prof. Jean-Pierre CHANGEUX
Emeritus Professor, Cellular Communications (1976-2006)

"We can't undo what our parents have given us in terms of our genes"

The Epigenetics professor and Royal Society fellow explains why she is concerned about too much faith invested in her field

When something isn't working, Edith Heard is the kind of person who will try to fix it. And at the top of her list might well be the reputation of her subject – epigenetics. At a recent science festival, James Watson, outspoken co-discoverer of the structure of DNA, publicly blasted the fashionable research field, pronouncing that "epigenetics is used for a lot of crap". That might not be her choice of language, but – perhaps surprisingly, having dedicated her career to epigenetics – Heard would, to some extent, agree. "I get the feeling that people want to believe epigenetics is going to solve our genetic problems, that we can somehow undo what our parents have given us in terms of our genes," she says. "I think that's a fallacy." Heard is head of genetics and developmental biology at the Institut Curie in Paris, and if she is concerned about the hype surrounding her subject it may be because she has seen it propelled into the limelight from obscurity during the course of her career. When Heard was at university, she had never heard of it. "Epigenetics was not on the agenda."

Growing up in London, it wasn't until she began her degree in natural sciences at Cambridge in the mid-80s that Heard's attention turned to biology. This was a time when great leaps were being made in molecular biology, in particular our understanding of early development, and how embryos form and are controlled by genes. "I really felt there was a buzz… it was one of these scientific revolutions that people talk about," she says.

Encouraged by her apparent talent for biology, and by the need to do "something useful" with her science, Heard went on to do a PhD in cancer research at the Imperial Cancer Research Fund in London. It was here that she got her first glimpse of epigenetics in action. "I realised that cancer cells are a mess… DNA wasn't enough to explain all the changes that occur."

It is this idea that is now beginning to capture the imagination of the press and the public. Epigenetics – the idea that persistent changes can occur to genes without altering the actual sequence of DNA – has become not only a buzzword, but also an antidote to the genetic determinism of the early twenty-first century. Back then, thanks largely to the efforts of the Human Genome Project, DNA came to be seen as the "blueprint for life". Epigenetics, on the other hand, offers the tantalising hope that our genetic code is more of a rough guide that we can revisit later and amend, for example by switching certain genes on or off.

While this is certainly true – and scientists such as Heard are only just beginning to truly understand the mechanisms involved – much has been made of the idea that such changes can be caused by the environment and passed on to subsequent generations. Too much, Heard says. "People are going around saying that any environmental influence that can change your gene expression pattern we can call epigenetic. And from that people are saying that what you eat and drink, or what you breathe, will actually influence not just you but maybe even your children and grandchildren." This may happen in plants, and in some other organisms, but in humans, Heard says, "there is no good evidence that this can be heritable across several generations. It's overhyped".

Her desire to witness the true processes of epigenetics in part led Heard to Paris, along with some more personal reasons – it wasn't just biology that had grabbed her attention at Cambridge; she had also fallen in love with a French PhD student. By happy coincidence, Paris was also home to the Pasteur Institute, and one of the main labs trying to solve the riddle of one of the most fundamental manifestations of epigenetics – X chromosome inactivation.

First discovered by British scientist Mary Lyon in 1961, X-inactivation is the process by which one of a woman's X chromosomes is shut down during development, because they have two of them, whereas men have just one. This is essential to survival, and is perhaps one of the clearest examples of epigenetics – the genes are all still there, intact, in the right order, but half of them are unnecessary. They are switched off, and this change persists from one cell division to the next. "No one really understood how it worked," says Heard, "so that's what I spent the next nine years in Paris doing."

Specifically, she wanted to find out what causes one X chromosome to be switched off and one to stay on, even though they share the same cell nucleus. She wondered whether their positioning in the nucleus was related to these epigenetic changes. "I realised we were never going to work out what was going on unless we could actually look inside individual cells."

She needed to catch epigenetics in the act. Having set up her own lab in Paris, Heard set about devising new techniques to image the DNA using fluorescent dyes. The efforts paid off. Within just a few months, "it was obvious that there were amazing things happening that we hadn't conceived of". Now she could see for the first time exactly when and where X-inactivation was happening, which led to some huge breakthroughs. One of them was the discovery that X chromosome inactivation happens not once, but twice, during development – first in all cells designated to building the placenta, then again in some cells sent off to build the embryo. "I remember almost feeling dizzy thinking, I can't believe this is actually the way it happens."

The finding has big implications for stem-cell research, much of which focuses on reverting cells that have already been designated a function back to their naive, embryonic state. "It was incredible because it showed this plasticity. You can take a cell that has made all sorts of decisions, stable decisions you would think, and yet it can undo them all in a couple of cell cycles."

Understanding the intricate processes behind epigenetics also offers hope for treating diseases, most notably cancer. In this respect, Heard believes her field deserves some of the hype, as there is scope to change the action of our genes, especially when they go awry in tumour formation, through the use of epigenetic drugs. "Now the big question in cancer is how much of the change is epigenetic?"

Yet Heard points out that even epigenetic changes are likely to have a genetic trigger in the first place. "Even our epigenetic changes are genetically driven. The code of genetics is the code. It's the only code." But now with epigenetics, "people are hoping we can pray our way out of faulty genes".

So how does Heard expect to fix this problem? She hopes her recent elections to professor of the Collège de France and Royal Society Fellowship might help. The French role is particularly important, she says, as she has to give nine public lectures on her subject a year. "It's our duty as scientists to pass on the right messages. I don't want to say epigenetics isn't exciting … [but] there's a gap between the fact and the fantasy. Now the facts are having to catch up." ■

Catherine DE LANGE

Source: The Observer, *Sunday 23 June 2013*

Prof. Edith HEARD
Epigenetics
and Cellular Memory

The Collège de France and the Académie Française

Since the founding of the Collège de France, 48 of its professors, from a broad spectrum of disciplines, have been elected to the Académie française. Since the beginning of the twentieth century, 20 professors have become "Immortels":

PHYSICS AND CHEMISTRY

- **1900: Marcelin BERTHELOT** (Organic Chemistry) elected to Seat 40
- **1934: Maurice DE BROGLIE** (General and Experimental Physics) to Seat 37
- **1966: Louis LEPRINCE-RINGUET** (Nuclear Physics) to Seat 35

LIFE SCIENCES

- **1944: André SIEGFRIED** (Economic and Political Geography) to Seat 29
- **1971: Étienne WOLFF** (Experimental Embryology) to Seat 24
- **1996: François JACOB** (Cellular Genetics) to Seat 38

HUMAN SCIENCES

- **1914: Henri BERGSON** (Greek and Latin Philosophy, then Modern Philosophy) to Seat 7
- **1945: Édouard LE ROY** (Modern Philosophy) to Seat 7
- **1973: Claude LÉVI-STRAUSS** (Social Anthropology) to Seat 29

HISTORY AND LITERATURE

- **1920: Joseph BÉDIER** (French Language and Literature of the Middle Ages) to Seat 31
- **1924: Camille JULLIAN** (National History and Antiquities) to Seat 10
- **1925: Paul VALÉRY** (Poetics) to Seat 38
- **1940: Paul HAZARD** (History of Comparative Literature of Southern Europe and Latin America) to Seat 11
- **1960: René HUYGHE** (Psychology of the Plastic Arts) to Seat 5
- **1978: Georges DUMÉZIL** (Indo-European Civilization) to Seat 40
- **1984: Fernand BRAUDEL** (History of Modern Civilization) to Seat 15
- **1987: Georges DUBY** (History of Medieval Societies) to Seat 26
- **1988: Jacqueline DE ROMILLY** (Greece and the Formation of Moral and Political Thought) to Seat 7
- **1995: Marc FUMAROLI** (Rhetoric and Society in Europe – Sixteenth-Seventeenth centuries) to Seat 6

On 21 February 2013, Michael Edwards OBE, Emeritus Professor of The Study of Literary Creation in the English Language, was elected to Jean Dutourd's seat (Seat 31).

The Institut de France from the Louvre Museum, facing the Pont des Arts. © Nitot

Being British at the Académie française

Judging by the positive response of the Académie française and the media, the French are pleased to have a British member of the Académie.

This is profoundly reassuring at a time when the English-speaking world is seen – and rightly so – as a threat to French culture and to the integrity of the French language. But I had the good fortune of being drawn to everything French from my first contact and to be as awed by Racine as I was by Shakespeare, by Paris as by London, and by Chambord as by Hampton Court. I have two countries and two languages, and, as I have often told, when I decided to write primarily in a language that I had learned, French became a "mother" tongue that gave birth to a new being within me.

If I am indeed, as Pierre Assouline put it in his "Petite supplique à l'Académie française", "the most French Englishman and the most English Frenchman", I would like, in these difficult times, to contribute to the Académie the joint and comparative knowledge of our two ways of interpreting and experiencing reality, and especially an intimate awareness of British culture, which is both neighbouring and different. And I would like to show what English can offer French: above all, continuous inventiveness and attentive openness to foreign languages. In the Elizabethan age, the greatest period for English, writers drew from some fifty other languages and invented many new words that have survived. Why, in French, can we not say *inimportant* or *promiscueux*, words that derive regularly from Latin sources? (*Unimportant* and *promiscuous* are common in English.) Why have we lost *ascendre* (archaic) and especially *improfondeur* and (if it existed) *improfond*, when we lack a simple translation for *shallowness* and *shallow*? (In England I would talk about words that English lacks.)

I am pleased to find, among my predecessors in Seat 31, Antoine Furetière, whose dictionary published in 1690 contained numerous neologisms. I am also pleased to know that the presence of poetry at the Académie will be strengthened. I was probably not elected primarily as a poet, but the fact that I write poetry in both French and English serves as a source for everything I write. My work, which brings together philosophy, theology, reflection on art and music, and what I call literary speculation, seeks its unity in a poetic way of living and thinking. It was by way of a fortunate coincidence that, a few months before my election, I published successively *Le Rire de Molière* and a volume of poems, *Paris aubaine*.

I acknowledge the fact that this election owes much to the Collège de France. The many books that I have written since I joined the Collège benefited from the stimulating micro-climate of our institution and the required originality that spurs us constantly to come up with new ideas. And if the first Academician to mention a possibility that I had never thought of was François Cheng, who murmured to me one day: "Pity that you're not at the Académie", it was Jacqueline de Romilly who, with an enthusiasm that both surprised and moved me, pleaded for me among her fellow members. Marc Fumaroli was at the head of those who then supported me, and I am deeply grateful to him. It is satisfying also to find, among the other occupants of my seat, Joseph Bédier, the great medievalist, Professor at the Collège de France and *Administrateur* from 1929 to 1936.

My election to the Académie means that I have definitively been accepted by France. Being the first British member of the Académie and of the Collège – two prestigious and above all unique institutions – is something of a dream. Seen from the distant England of my youth, the Académie française was the home of Valéry, Claudel, Mauriac, the very place of the distant unattainable. I find myself in the seat of Cocteau, Edmond Rostand, Sieyès, Condillac, and I remind myself that to enter the Collège de France we climb the stairs between Dante and Ronsard, and we walk past Claude Bernard and Champollion. But I will end with a statement made by Jean Dutourd, whom I have "replaced" at the Académie, which I discovered recently and may quote in my inaugural speech. With its inversion of a received idea, it corresponds so well to my own view of the comedy of life. Literature, he wrote, is not made for barbarian times: "The barbarians don't want to see the other side of the world, which is joyful; only its appearance, which is tragic." ■

Prof. Michael EDWARDS

Source: La lettre, *no. 36, May 2013*

Prof. Michael EDWARDS
The Study of Literary Creation
in the English Language
(2002-2008)

THE HEBREW BIBLE
AND ITS CONTEXTS
SYMPOSIUM 24 AND 25 APRIL 2013

Divine Anger and Repentance

The interdisciplinary symposium "Divine Anger and Repentance" was organized by the Chair of The Hebrew Bible and its Contexts on 24 and 25 April 2013.

Upon Professor Thomas Römer's invitation, the idea was once again to bring together around a common theme Biblicists, Assyriologists, and specialists of Egypt, Greece, Ancient Rome, and of the Arab world. Divine anger is a theme shared by all ancient civilizations, and which still lives on in many current religious discourses. It implies the existence of an original offence that aroused divine anger, which then manifests itself in the misfortunes and the disasters arising over the course of individuals' or societies' existence.

Anger and politics

Several papers discussed the war and destructions attributed to divine anger. The destruction of Jerusalem by neo-Babylonian troops in 587 BCE was extensively associated with the theme of divine anger. According to certain biblical texts, Jerusalem was destroyed following its people's disobedience and not as a result of its enemy's might, which was but a tool in the hands of the divinity. This motive was widespread in the Ancient Near East and the theme of anger, and perhaps even its appeasement, was also found among the powerful. Thus the acknowledgement of the failure of the many Assyrian attempts to subjugate the king of Tyre, whose city was naturally protected by the sea, was accompanied by the mention of the Assyrian divinity's leniency. But the theme of divine anger is not only a theological explanation; it also provides rulers with a governance tool. The link between misfortunes endured and a potential offence allowed the dominant classes to brandish divine anger as a threat weighing on offenders, thereby constituting a means of dissuasion.

Disease, the result of divine anger

Disease constitutes another expression of divine anger addressed in this symposium. The plague epidemics, which decimated both the East and the West during the Middle Ages, were interpreted as the consequence of divine wrath. Historical sources from the Mamluk era reveal that measures were taken for the moral purification of society, as well as for the eradication of privileges and social injustices, in the hope of stopping the epidemics. In both Ancient Egypt and the Hebrew Bible, skin diseases presented the particularity of manifesting divine wrath directly on the offenders' skin, and through this physical stigma, it denied them access to the sacred space, or even to society.

Challenging anger

This representation of the world was however not adopted by everyone, and several documents stemming from sources of wisdom (such as the book of Qoheleth in the Hebrew Bible, or Ludlul bēl nēmeqi, *The Dialogue of Pessimism and The Babylonian Theodicy* in Mesopotamia) present a different outlook. These texts all challenged the connection so easily made between misfortune and offence, as misfortune could also affect the righteous.

The agents of anger

The theme of anger also raises other questions. Unlike belief systems including a plethora of divinities, monotheism came up against the difficulty of accounting for a single divinity that is responsible both for the creation and its destruction, humans' fortune and misfortune. The difficulty raised by the theodicy was already found in the texts of the Hebrew Bible which tried, in some places, to personify divine anger so as to distinguish it from Yahveh. This trend became more pronounced during the Hellenistic era, as attested by the figure of *Mastema* in the book of Jubilees.

Sistine Chapel, Michel-Ange, detail, ARR

Do the gods or does God change their/his mind?

This symposium also provided an opportunity to address the question of divine repentance. While it is widely accepted that the gods get angry, can they also repent? As was noted during the symposium, the notion of divine repentance had strong moral connotations and was closely linked to the rise of Christianity at the beginning of our era. It is therefore not surprising that there is scant evidence of it in the different earlier traditions. While the gods did not repent, they could however change their minds, feel regret, display leniency or be appeased. The penitential psalms, copies of which were newly discovered in Mari and presented during this symposium for the first time, testify to this idea. The aim of these psalms was to defer the unpredictable anger of the mighty by seducing them, appealing to their pity and reminding them of their duty. In Ancient Greece, the appeasement of anger was personified by the maternal figure of the nurturing goddess Demeter, who was incensed by the disappearance of her daughter Persephone. She was ultimately appeased, which put an end to the famines brought on by her pain. Finally, the theme of divine repentance may also have been used by ancient scribes and storytellers to justify certain theological developments. The prophet Jonas, whose prophecy was not fulfilled, bears witness to a god who went back on his decision in response to the penance of the inhabitants of Niniveh. Divine anger was therefore not irremediable. ■

Micaël BÜRKI (ATER)

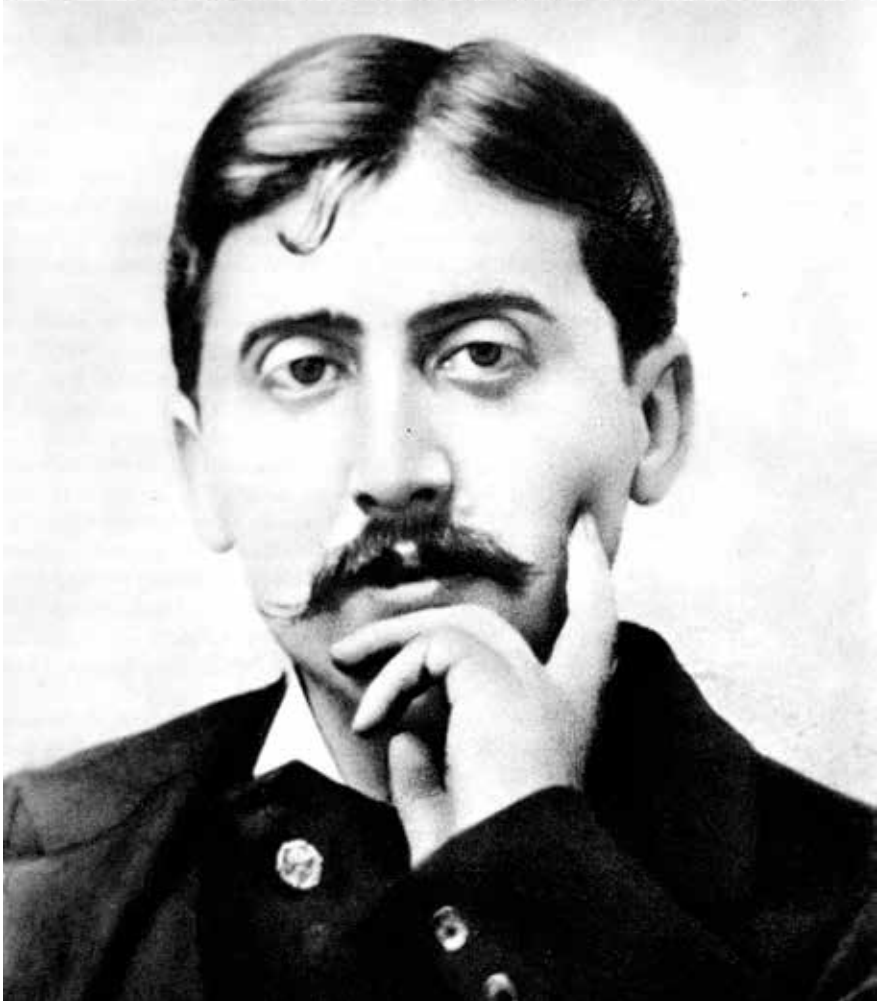
Source: La lettre, *no. 37, December 2013*

- The symposium proceedings will be published in the collection "Orbis Biblicis et Orientalis", Academic Press Fribourg, Van den Hoeck & Ruprech, Göttingen.
- See UMR 7192 News "Proche Orient-Caucase : langues, archéologie, cultures" at www.digitorient.com

Papers from the Symposium are available at www.college-de-france.fr, on Prof. Römer's page

- Defeat, a Consequence of Divine Wrath: the Theology of History at Alep according to the Mari Royal Archives, Dominique Charpin
- "You Have Lifted the Furious Weapons of Ashur" The Ire of Ashur's Impossible Repentance? Ideology and Realpolitik in the Assyrian Empire, Lionel Marti
- A Vat Overflowing with Blood as the End of History? The Wrath of God in Isaiah 63.1-6, Daniele Garrone
- Wrath and (non) Repentance of the God Yhwh in the Book of the Prophet Zechariah, Hervé Gonzalez
- "Wrath – Repentance" versus "Sin – Punishment", Hans Peter Mathys
- Are the Wrath and Repentance of Elohim Relevant Issues for the Book of Kohelet?, Jean-François Landolt
- The Agents of Divine Wrath, Grace and Repentance in Ezekiel 14.12-23 and Gilgamesh XI, 181-204, Daniel Bodi
- Divine Wrath and Repentance in the Flood, Stéphanie Anthonioz
- Mastema, Yhwh's "Henchdemon" in the Book of Jubilees, David Hamidovic
- Prevention is Better than Subjection: the Use of Laws in Numbers 5-6, Micaël Bürki
- Divine Wrath and Punishment in Ancient Egypt: the Question of Skin Diseases, Youri Volokhine
- The Plague, a Manifestation of Divine Wrath in Late Mamluk Sources (872-923/1468-1517), Bernadette Martel-Thoumian
- The Wrath of God and the Wrath of Moses in Numbers 11.4-34, Olivier Artus
- Turning away Divine Wrath in Numbers 25, Jürg Hutzli
- The Remarkable Absence of Divine Wrath in the Priestly Account (Pg), Albert de Pury
- The Righteous Sufferer, a Victim of Divine Wrath. A Theme in Mesopotamian Literature, Nele Ziegler
- Divine Retribution at Ugarit: "The Righteous Sufferer" and Other Compositions of Wisdom, Yoram Cohen
- Gods who Get Angry but Know Nothing of Repentance. The Roman Case, John Scheid
- The Mother of the Gods. Wrath and Repentance, Philippe Borgeaud
- Jerusalem and the Wrath of Yhwh. A few Remarks Based on the Ezekiel Collection (TM and LXX), Christophe Nihan
- Can Yhwh Change his Mind?, Thomas Römer
- God, between Firmness and Repentance in Genesis 2-4, Michaëla Bauks
- From Literature to Practice: Protestations of Innocence when Facing the Wrath of one's God, according to the Mari Texts, Michaël Guichard
- Between Pardon and Repentance in Mesopotamia, Jean-Marie Durand

Prof. Thomas RÖMER
The Hebrew Bible and its Contexts



Caption: Marcel Proust in 1900, ARR

"Remembering Proust"

One hundred years ago, Marcel Proust published *Swann's Way*, the first volume of his magnum opus *In Search of Lost Time*. What effect did this novel have on the history of literature?

ANTOINE COMPAGNON *In Search of Lost Time* is a 3000 page novel spanning seven volumes, three of which were published posthumously. Written in the first person, it retraces the life and memories of the narrator, a member of the early 20th century Parisian elite, who dreams of becoming a writer. The work is a far-ranging reflection on identity, writing, art, and memory. Rigorously crafted in both its form and style and spurning the formulas of the conventional novel, *Swann's Way* is among the great works of literature that mark readers forever. This is why, a full century after its publication, it continues to captivate literary researchers.

The "madeleine moment" in the opening of the novel has become part of the collective memory...

A.C. Indeed, readers were especially struck by Combray, the first section of the novel, in which the narrator recalls his childhood. In a sense, Combray recounts a perverse childhood, exactly as described by Freud, who was one of the author's contemporaries. Yet this is not in reference to the 'unconscious,' a term that Proust did not use, but about the strong presence of sexuality, dreams, desire, and corporeal matters. Already on the third page, there is a scene that suggests onanism. Proust also reverses the techniques of the traditional French novel. Starting with the very first line, he eliminates any attempt at character presentation and leads us directly into the bed of his narrator, who then takes "30 pages to wake up", as one reviewer complained. The madeleine episode comes shortly after: the flavour of the pastry brings back a flood of vivid memories of his childhood in Combray. Then, little by little, his desires emerge, both sexual and that of being a writer, and these become the unifying thread of the first 150 pages.

Is literary analysis essential for understanding the work's compositional sophistication?

A.C. Right after its publication, many readers called it "offhand, unstructured writing – just memories, idle musings, etc." Yet insightful readers like Jacques Rivière, then secretary general of *La Nouvelle Revue Française*, a reputable literary review, understood that on the contrary, the novel's composition was meticulous. "Nothing is there by chance," Proust famously said. A given incident takes place at a given moment because it will have repercussions a thousand pages later, in an entirely different part of the novel. But this dimension is not discerned immediately, except by the most astute readers. Only in the last volume, *Time Regained*, is the key to the novel finally revealed.

And what is that key?

A.C. With its 3000 pages, *In Search of Lost Time* is a novel on the inability to write. The narrator wants to write and occasionally succumbs to moments of rapture, like the madeleine episode and others. These moments of rapture are triggered by an involuntary memory, when a sensation in the present (e.g., tasting the madeleine) gives him an immaculate recollection of past events. In *Time Regained*, several successive episodes of involuntary memory lead the narrator to a revelation: this collision of two sensations, past and present, allows him to break free from human temporality and reach a level of transcendence. These moments, these epiphanies, are also the key to art, to the power of fiction. Proust presents an esthetic theory: metaphor, the conjoining of two terms, makes it possible to retrieve a fragment of time in its pure state. The entire *Search* leads to this revelation in *Time Regained*.

Yet in the autumn of 1912, when Proust was looking for a publisher for *Swann's Way*, no one would take it. Why?

A.C. Between November 1912 and February 1913, three publishers, Fasquelle, the NRF, and Ollendorff, all rejected the novel. One important factor was the condition of the manuscript itself: it was massive, with nearly 900 pages, and its format was extremely complex, with typed pages from several different periods interspersed with handwritten additions. Put simply, it was difficult to read. Furthermore, Proust had announced his intention to write a second volume of similar length, but in which he would talk about homosexuality – enough to scare off any publisher of the time. Ultimately, he was forced to fund his own publication with publisher Bernard Grasset, who accepted the manuscript without reading it.

How did the public react to the novel when it was released?

A.C. Contrary to popular belief, it was a success as soon as it was published, in November 1913. Backed by good press coverage, it sold nearly 3000 copies in eight months – strong sales for a novel published just before World War I broke out in August 1914. In January of that year, French writer André Gide wrote to Proust personally to tell him that rejecting his manuscript was the biggest mistake that the NRF had ever made. In a twist of fate, the publication that Proust had dreamed of since he was a teenager coincided with a personal tragedy: his secretary chauffeur Agostinelli, for whom he felt a great passion, left the author's household on December 1.

Outside of France, success came even faster…

A.C. Indeed, the book enjoyed immediate acclaim. In London, the Times Literary Supplement devoted an article to *Swann's Way* in December 1913, and the critics hailed it as a highly original and important work. An English translation by Scottish writer Scott Moncrieff appeared in 1922. In Italy as well, a press article in January 1914 hailed that the book was destined to be a classic in 30 to 50 years. And in Germany, by the 1920s, the most respected critics were writing about Proust. In fact, from the outset, he was much better understood outside France than in his own country.

What were the reasons for this discrepancy?

A.C. In France, at the time of the Dreyfus affair,[1] the prejudices regarding his private life, particularly the image of a snobbish, homosexual, Jewish author, were all obstacles to a wider readership, which was not the case in Britain, Germany, or the US. The delay in true literary recognition was exacerbated by Proust's death in 1922. Everyone who knew him published their personal anecdotes and correspondence with the writer. In 1962, when France's biggest literary TV show, called *Portrait Souvenir*, devoted a broadcast to him, we still hadn't progressed beyond this stage: guests included his friends, but not a single critic. He never received this type of treatment in other countries.

Is Proust a universal author?

A.C. *In Search of Lost Time* has been translated into all European languages, as well as Chinese, Korean, or Japanese, for example. He is an author that any good publisher anywhere in the world needs to have in their catalogue. Moreover, France is not the only country planning events to mark the centenary this year. I hosted a seminar in which I invited personalities from a wide range of fields to talk about how the novel has affected their lives. For example, mathematician and CNRS Gold medalist Alain Connes, geologist Xavier Le Pichon, and historian Pierre Nora, all spoke about how reading Proust influenced the course of their lives. That's what literature is supposed to do. So yes, in this sense, Marcel Proust is part of a universal heritage. ■

Interview by Alexandra DEJEAN

Source: CNRS International Magazine, *no. 31, October 2013*

(1) The Dreyfus affair is a major political scandal that broke out in France in 1894, when Alfred Dreyfus, a captain of Jewish descent in the French army, was wrongly accused of treason. The scandal lasted until 1906, when he was exonerated and reinstated as a major of the French army.

See Antoine Compagnon's 2012/2013 seminar "Proust in 1913" at www.college-de-france.fr, on the professor's page.

Prof. Antoine COMPAGNON
Modern and Contemporary French Literature: History, Criticism, Theory

METAPHYSICS AND PHILOSOPHY OF KNOWLEDGE
SYMPOSIUM JANUARY 2013

Wild Mood Swings, 2009-2010 © Tim Noble & Sue Webster. Images courtesy of the artists.

Philosophical Aspects of Form

On 17 and 18 January, Professor Claudine Tiercelin, Chair of Metaphysics and Philosophy of Knowledge, organized a seminar on philosophical aspects of the concept of form, a concept which has given rise to many questions since at least as early as the opposition between Plato's *eidos* and Aristotle's *morphe*.

Whether form is understood as separate from worldly beings or as immanent to substance, it is traditionally distinguished from matter by philosophers. And just as the sciences do not easily lend themselves to the singular, so too is matter ill-suited to discourse and theory. Hence, most of the time, form bears the bulk of the theoretical load: it must account for the ideality of essences, the reality of properties, the unity of substance, individuation, and the unification of the diversity of perception, without forgetting the rigour of demonstrations and the beauty of appearances. The seminar was devoted to clarifying these problems, in their metaphysical and scientific dimensions – questioning the relevance of the concept of form in biology, the role of dispositions in contemporary physics, the power of mathematical and logical formalism or the scope of Aristotelian hylomorphism – and to tracing the phenomenality of form from its roots in *Gestaltpsychologie* to cognitive science and aesthetic perception. Do self-organization and complexity render the idea of form obsolete? Are forms in the world structures, dispositions? What constitutes the strength of a line of reasoning which seems evident to us solely by virtue of its formalism? What does it mean to (re)cognize a form, to appreciate it, to find it beautiful? Does form has precedence over content? Does it play a role in structuring our experience?

After Claudine Tiercelin opened the seminar, Jean-Marie Chevalier (Collège de France) considered the extent to which logic affords an intellection of the world by virtue of a homology of logical and metaphysical forms. Amirouche Moktefi (IRIST) then explained how and why many formal languages elaborated throughout the nineteenth century were subsequently gradually abandoned. Benoit Gaultier (Collège de France) presented and discussed Peirce and Wittgenstein's theory that any mathematical demonstration necessarily has an iconic dimension. Sandrine Darsel (AHP Nancy) ended the first afternoon of the seminar by discussing the need to grasp such a thing as a musical form in order to understand adequately a piece of music. The next morning was devoted to the metaphysics and philosophy of science, with presentations by Michael Esfeld (Université de Lausanne), who rigorously defended the idea that the laws of nature are its form, and Anouk Barberousse (Université de Lille 1), who considered the richness of the concept of organic form in biology, particularly through d'Arcy Thompson's and Stuart Kauffman's perspectives. The seminar resumed for a second afternoon with Alain de Libera's paper (EPHE), devoted to the important distinction between assistant and inherent forms in the work of medieval philosophers and theologians. Guillaume Fréchette (Université de Salzbourg) then defended the existence of an Austrian phenomenological tradition, exemplified by Ehrenfels and Meinong in particular, which holds the nature of the qualities of form as one of its key concerns. Jérôme Dokic (EHESS) closed this second day by identifying the properties thanks to which, in perception, a form is meaningful from a cognitive point of view and can therefore be called a "good form".

The seminar *Philosophical Aspects of Form* should thus have enabled the Collège de France's audience to become familiar with current research on these particularly stimulating issues. This is especially true for students preparing their *agrégation* in philosophy, since form was precisely one of the topics of the 2013 examination. ■

Benoit GAULTIER (ATER)/Jean-Marie CHEVALIER (MCF)

Source: La lettre, *no. 36, May 2013*

Videos of papers delivered at the seminar are available on www.college-de-france.fr, on the professor's page.

Prof. Claudine TIERCELIN
Metaphysics and Philosophy of Knowledge

Cognitive Sciences and Education

How do education and schooling change a child's brain? Can recent advances in the cognitive sciences on the mechanisms of learning contribute to improving our school system?

For the past few years, the Direction générale de l'enseignement ccolaire (DGESCO) has been showing a keen interest in these questions. On 20 November 2012 the Ministry of National Education, in partnership with the Collège de France Chair of Experimental Cognitive Psychology, organized a symposium on "Cognitive Sciences and Education". Several hundred national education inspectors, teachers, practitioners and researchers came together in the Marguerite de Navarre lecture-theatre to examine jointly the scope of the cognitive sciences and the possibility of transposing some of their results to the field of education.

Better knowledge of the psychological and cognitive functioning of pupils is essential for teachers if they are to adapt their teaching and create optimal learning conditions. Professor Dehaene has recorded some of the main principles of learning, determined by the cognitive sciences, which would be immediately applicable in classrooms. Before attending school, children have a vast range of early intuition, especially in language and mathematics, which serves as a foundation for subsequent learning. Their brains have a sophisticated learning algorithm, some of the most essential components of which are attention, active engagement, reward, error detection, automatization, and sleep. Each of these resources complies with constraints that teachers do not always adequately recognize.

Franck Ramus, senior researcher at the CNRS, discussed the learning difficulties of children, as well as their origins. The example of developmental dyslexia shows how the understanding of pathology can help to modify the teaching of reading for all children. Patrick Lemaire, professor at the CNRS Laboratory of Cognitive Psychology (Aix-Marseille), then delivered a talk on the mechanisms of memory. He explained how our mnesic system has generic resources in limited quantities (cognitive control, attention, inhibition, strategies, etc.), and is divided into relatively independent components (working memory, long-term memory, and their respective subsystems). Joëlle Proust, senior researcher at the Institut Jean-Nicod (CNRS/ENS Paris) described a learning skill that is all too often overlooked: metacognition, that is, the ability to self-evaluate. Metacognition sometimes functions in a predictive mode (could I solve this problem? in how much time?) and at other times in a retrospective mode (have I perceived this correctly? have I not made a mistake?). Liliane Sprenger-Charolles, senior researcher at the CNRS, then presented the reams of scientific knowledge that we now have on learning to read. The next speaker, Michel Fayol, professor at the Laboratory of Social and Cognitive Psychology (Clermont-Ferrand), delivered a paper on the learning of French spelling. He proposed practical methods, some of which have already been tested in classroom settings. Manuela Piazza, researcher at INSERM, then described an essential element of the core of mathematics: "the taste for numbers and how to acquire it". Her synthesis of recent discoveries in cognitive neuroscience showed that, from early childhood, human beings are equipped with a set of calculation skills that enable them to perform complex mental operations intuitively and spontaneously. Finally, Pascal Huguet, senior researcher at the CNRS (Université Aix-Marseille) discussed a difficulty found primarily in the teaching of mathematics: gender stereotypes. Several stereotypes, whose influence on behaviour can be identified fairly early in the course of cognitive development, are ultimately an impediment to girls' and women's pursuance of scientific and technical studies and careers. Research has not only contributed to invalidating the hypothesis of male superiority in the domains considered (mathematics, visual-spatial abilities, reasoning) but has also shed new light on the fact that girls and women tend not to opt for science and technology.

These talks, followed by intense discussions and, the next day, by DGESCO internal synthesis meetings, provided only a partial picture of cognitive sciences' potential contribution to the reform of teachers' training. ■

Prof. Stanislas DEHAENE

Source: La lettre, *no. 36, May 2013*

A young reader preparing for a functional MRI brain scan at the NeuroSpin centre, ARR

Videos of papers delivered at the seminar are available on www.college-de-france.fr, on the professor's page.

Prof. Stanislas DEHAENE
Experimental Cognitive Psychology

KNOWLEDGE AGAINST POVERTY
SYMPOSIUM 17 AND 18 JUNE 2013

Foreign Policy and Global Health Diplomacy

Introduction by Dominique Kerouedan (excerpts)

Health is a matter of foreign policy and diplomacy insofar as, in international relations, it has become a parameter of power, security, peace and trade, even a vehicle of geopolitical or ideological positions for States that seek to gain importance on the world stage.

Since we live in a globalized world, where means of transport carry microbes along with people, health has become a global concern. In the wake of the Second World War, the creation of the United Nations' reference institution for health, the World Health Organization, laid the cornerstone of "world" health. More recently, three major factors have given rise to *global health*.

The first is historical: in 1997, the US Institute of Medicine drew attention to the fact that "the nations of the world have too much in common for health to be considered a national issue".

The second movement is institutional. OECD countries, unable to honour their commitment to devote 0.7% of their GDP to development aid, have sought other sources of funding for cooperation. They have created innovative financing mechanisms based on new global health governance. Finally the third movement, initiated by academics, is the emergence of a genealogical and chronological definition of global health.

The aim of this symposium was primarily to investigate the political commitment to ensure that health is discussed at the highest decision-making levels, as well as in the private, industrial and philanthropic sectors. The symposium focused on French-speaking Africa and countries at war, more specifically Mali and Syria. ■

Dominique KEROUEDAN

Source: La lettre, *no. 37, December 2013*

The video of Laurent Fabius's speech and the programme of this symposium, along with all the speeches, are available at www.college-de-france.fr, on the professor's page.

Dominique KEROUEDAN
Visiting Professor, for the Annual Chair of Knowledge Against Poverty, 2012/2013

Opening Address by the Minister of Foreign Affairs Laurent Fabius (excerpts)

© ARR

While health may seem to be unrelated to foreign policy, that is not actually so. The primary mission of diplomacy is to prevent war and to seek peace. As war is the leading cause of humanitarian and health-related tragedies, the alliance between doctors and diplomats is in a sense natural. It is no coincidence that the Red Cross, the first international non-governmental organization in the world, was founded to provide health assistance in times of armed conflict. The same close links exist with other missions of our diplomacy, for instance in the fight against climate change or the preservation of water resources, which are at the heart of many international negotiations in which we are engaged. In a way, diplomacy is the principal preventive medicine! If the necessary decisions are not made, climate change or water shortages will have drastic consequences on health in many regions. France is set to host the 2015 global climate conference, where a decision regarding the new agreement on greenhouse gas reductions will have to be reached.

Close links therefore exist between health and foreign policy, and health is at the heart of France's foreign policy. In his book *Plague and Cholera*, which won the 2012 Femina Prize, novelist Patrick Deville paid tribute to the Pasteurian epic and to physician-biologists who over a century ago roamed the world to study viruses and find new treatments. We owe the creation of the remarkable network of Instituts Pasteur – 30 institutions in 27 countries – to their vision and drive. The Paris' Institut Pasteur was founded in 1887. One hundred and twenty years later, it is just as dynamic as it was at the time of its foundation.

These forerunners' success probably explains our country's significant know-how in all areas of public health: infectious diseases, treatments, prevention, surveillance, research, and health services. Our excellence is recognized; in addition to the Institut Pasteur, I have in mind the Collège de France, the CNRS, and the Institut Curie, as well as many other institutions. The names of our researchers have become well known, for example Françoise Barré Sinoussi, 2008 Medicine Nobel Prize Laureate and President of the International AIDS Society in 2012. French NGOs are present throughout the world. Our pharmaceutical industry is a global leader. We are also actively engaged at the highest level around crucial issues such as access to medicine and vaccines, the fight against the three major pandemics (Aids, tuberculosis and malaria), innovative funding, and universal health coverage. Owing to this engagement, France is a major international player in the field of health, and intends to remain so. ■

Laurent FABIUS

Source: La lettre, *no. 37, December 2013*

SUSTAINABLE DEVELOPMENT – ENVIRONMENT, ENERGY AND SOCIETY
SYMPOSIUM 10 AND 11 JUNE 2013

Rising Sea Levels and Coastal Impacts

Rising sea levels are a serious threat for many low-lying, often highly populated coastal regions of the world.

Tide gauge observations indicate that the sea level rose by about 18 centimetres over the course of the twentieth century. In the past two decades, altimetry satellite observations have shown that this rise has accelerated to an average rate of three millimetres per year. Through their global coverage of the oceans, satellites have moreover revealed that the sea does not rise uniformly: certain regions like the western tropical Pacific have recorded an annual increase of close to ten millimetres. The sea level is rising as a result of the warming and thus the expansion of the oceans, along with the melting of continental ice: two major effects of global warming linked to greenhouse gas emissions. As shown by the fifth report of the IPCC (Intergovernmental Panel on Climate Change) released in September 2013, a steeper rise in sea level is foreseen over the course of the twenty-first century, as global warming is expected to continue in the coming decades. The most recent projections, based on increasingly accurate modelling of the climate system, suggest that by 2100 the average rise in sea level will range between 40 and 75 centimetres, depending on the different global warming scenarios. Values of up to a meter should not be ruled out. As is currently the case, the sea will not rise uniformly. Climate models indicate a higher than average rise in the Arctic Ocean due to increased freshwater inflows caused by the melting of Arctic sea ice and the Greenland ice sheet, and the increase in Siberian river runoff.

These climatic factors will be compounded by other effects, linked to the deformation of ocean basins resulting from the redistribution of ice and water masses caused by continental ice melting. In tropical regions, these phenomena amplify the average rise in global sea levels by 30 to 40%. Finally, on more local scales, other non-climatic factors can also increase the rise in sea levels. This is the case, for example, with the sinking of the ground linked to natural phenomena (the load of sediments accumulated in large river deltas) or to human activities (exploiting underground water and/or oil resources). Being able to predict, as precisely as possible, the extent to which the sea will rise in the future as a result of all the factors listed above, at the global, regional and local level, is a considerable challenge for the climate research community. While many studies suggest that in past decades coastal erosion – a phenomenon widely observed worldwide – was caused by the combination of human activities and natural phenomena rather than rising sea levels, the expected future rise in sea level is likely to become an aggravating factor, if not a dominant one in certain coastal regions of the world. "Models" of the evolution and vulnerability of coastal areas in response to climatic and anthropogenic forcings are now proving to be essential tools for decision making in town and country planning and adaptation to climate change.

The aim of this symposium was to bring together climate science researchers, coastal evolution experts and coastal planning specialists to discuss the impacts of climate change in coastal regions and particularly the rise in sea levels. Several climate science experts reviewed current scientific knowledge on the present and future rise in sea levels, stressing the significance of regional variability. Some researchers also discussed local phenomena producing movements of subsidence of the Earth's crust (and therefore a relative rise in sea levels). They presented the different mechanisms underpinning the evolution of coastal areas, along with the causes of coastal erosion during the twentieth century. The symposium furthermore addressed in detail the economic and societal consequences of future rising sea levels, as well as the possible ways of adapting to these changes. Foreign colleagues described the strategies of adaptation to rising sea levels and climate change in general advocated in their countries, for example in the Netherlands and in Canada (Québec). Finally, several French experts presented the French coastal environment and the challenges of adaptation to climate change in mainland France's coastal regions. ■

Anny CAZENAVE

Source: La lettre, *no. 37, December 2013*

- Recommendations for future research and the development of observing systems were suggested to conclude the symposium.
- A "white paper" should be published shortly (in electronic format).
- The videos of all the papers of the symposium are available at www.college-de-france.fr, on the professor's page.

Anny CAZENAVE
Visiting professor for the Annual Chair of Sustainable Development – Environment, Energy and Society, 2012/2013

Science and Democracy

AUTUMN SYMPOSIUM

The Autumn Symposium of the Collège de France, organized by a scientific committee comprised of Professors Jean Dalibard, Pierre Rosanvallon, Alain Prochiantz, Alain Supiot and Dominique Kerouedan, was held on 17 and 18 October 2013. Its aim was to analyse the intense and sometimes conflictual relations between science and societies, and to set an essential short- and long-term goal: ensuring a better sharing of scientific culture, and that the suspicions it arouses should lead to informed debates about it rather than clashes. The five sessions offered over the two days successively addressed the following issues: science, expertise and public opinion; knowledge, politics and democracy in countries of the global South; innovation, research freedom and society's choices; scientific debates and political decisions on issues of climate change; and finally, science and politics with regard to institutions.

There is a long list of areas in which scientists' claims no longer go unchallenged: GMOs, shale gas, nuclear energy, climate change, stem cell research, efficacy of drugs. Admittedly, uncertainties and controversies do exist within the scientific field itself, in several domains. However, more problematically and far more broadly, the notion of expertise is increasingly being discredited in society at large, and tends to be understood only in relation to the undifferentiated field of opinions. The structural indeterminacy introduced by broad interpretations of the concept of precaution also plays a part here, as it amounts to making all technological decisions a matter of insurmountable uncertainty. The fact that the notion of authority is being undermined in a democratic world underpinned by the principle of accountability and by the equality of all voices is another factor at play. Nothing is more urgent now than resolving this deadlock in the opposition between uncertainty, on the one hand, and relativism, on the other. We must bring science into democracy, and simultaneously make the structures and rules of the scientific world better known. This is the only way to restore the image of science in the public's mind. ■

Image caption: Image Science and Analysis Laboratory, NASA-Johnson Space Center

Autumn Symposium

Scientific Temporality, Political Temporality

Democracies struggle to think in the long term. Why is this a problem?

If the concern for the long-term future in democracy is so fundamental, it is because, in many respects, we are faced with challenges that are entirely unprecedented in human history, – global warming is perhaps the most spectacular example. This is not merely a matter of honest and responsible management of the planet, as those in charge of the large public forest domains, for example, had envisaged. What we need to take into consideration is the issue of a world that can be fundamentally altered for future generations. The climate shows us that scientific knowledge calls for a radically different perspective on the long-term future. In a way, scientific knowledge is alarming. In their own way, scientists are whistleblowers, and they must be taken very seriously. How? By starting to think about the types of institution, education and public deliberation that integrate the concern for the long-term future more fully into citizens' everyday lives.

How can we integrate a long-term vision into our societies?

In most countries, this question started to become a matter of concern by the late nineteenth century. The first answer was to argue that the bias towards short-term priorities was ultimately due to the fact that people elected their representatives on impulse and with respect to short-term interest. There should therefore be other elected representatives who focus on the future and on long-term interests. This echoes similar proposals that were made at one stage, to create second chambers and to transform the role of the Senate so that it represented future generations, while the Chambre des Députés would still have to represent the current generation. We can now see, however, that this vision was rather narrow. The issue of integrating the long term into democracy can also be tackled outside the electoral world. Other paths can be explored; these are the ones I am studying. A first option would simply consist in giving the long-term future greater weight in our calculations. Long-term and short-term interests could be articulated more effectively if more value were attributed to the former. Yet the long-term future does not currently have a value. We do not integrate it into our way of calculating. Why not change our way of calculating, our reasoning, one could ask; for if we fail to value the future, generations to come will pay the price of a seriously deteriorated present. Democracy does not simply mean thinking about immediate decisions. It means building a collective history, which is also a form of humanity, and humanity is a figure that exists over time, not only a figure of the present. ■

Transcription of the interview with Prof. Pierre ROSANVALLON

Source: La lettre, *no. 37, December 2013*

- Prof. Rosanvallon's full paper is available at http://www.college-de-france.fr/site/en-colloque-2013/symposium-2013-10-18-16h30.htm.
- Listen to the 4-minute interviews with Serge Haroche, Steven Chu, Marc Fontecave, Alain Prochiantz, Dominique Pestre, Jean Jouzel and Yves Bréchet are available on www.college-de-france.fr.

Prof. Pierre ROSANVALLON
Modern and Contemporary History of Politics

SCIENCE AND DEMOCRACY
17 AND 18 OCTOBER 2013

Dr Chu Goes to Washington

Why Is it Important for Scientists to Take Part in Government?

For the opening of its Autumn Symposium, the Collège de France had the pleasure of welcoming Steven Chu, former US Secretary of Energy.

Steven Chu started his career at the Bell laboratories, an extraordinary breeding ground for young scientists, several of whom were subsequently awarded a Nobel Prize. In 1997, he himself received the Physics Nobel Prize, along with two other researchers: Claude Cohen-Tannoudji, Professor at the Collège de France, and William D. Phillips of the National Institute of Standards and Technology in Gaithersburg (United States). Steven Chu was awarded this prize for his discovery of atom cooling and trapping methods using laser beams. The changes in the order of magnitude of the temperatures that can be reached with these methods were used to build atomic clocks of unprecedented precision. Professor Chu subsequently broadened his research to biology, applying methods developed during his physics research to the manipulation of biological molecules such as DNA strands. With this very broad expertise, in 2008 he accepted the position of Secretary of Energy that US President Barack Obama offered to him. In 2012, he returned to a strictly scientific activity, and currently holds a double Chair in biology and physics at Stanford University in California.

In his talk at the Collège de France, Steven Chu shared an all too rare experience: that of an active scientist in the highest echelons of the State, faced with political decisions on sensitive topics such as energy renewal and global warming. Convinced of the crucial contribution a scientist can make at the highest governmental level, he presented three cases on which he was personally involved: the explosion of the Deepwater Horizon platform in the Gulf of Mexico in 2010, the Fukushima nuclear accident in 2011, and the Hanford nuclear site. The latter example is particularly striking. Formerly a plutonium production site, Hanford is currently the largest nuclear waste storage site in the United States. During discussions with engineers at the site, Professor Chu realized that the storage method needed to be totally redesigned. These three examples clearly showed that scientific expertise positively complements engineering skills, and that it brings up issues that otherwise would not necessarily have been raised. But if scientists are to be able to provide effective support, it is imperative that they be given important political positions. Had he not been Secretary of Energy, Professor Chu would certainly never have been able to order the overhaul of waste treatment on the Hanford site.

The professor concluded his speech by discussing climate change and commenting on the role of time in relation to science and democracy. Drawing a seemingly surprising analogy between the dangers of tobacco and global warming, Steven Chu emphasized the long-term nature of the changes induced, which democratic decision-making processes struggle to grasp. Following the rise of the tobacco industry it took twenty years to become aware of the concomitant development of lung cancers, and it will take at least 50 years, perhaps even a century, to take full stock of the consequences of global warming. Oceans, which cover most of the Earth's surface, are comprised of naturally cold lower layers, which need a long time to mix with the upper layers. These upper layers are the first to be affected by global warming. For all of these sensitive questions regarding our planet today and tomorrow, Steven Chu stressed how crucial it is for governments to take cognizance of scientists' expertise – irrespective of their energy or climate policy. For science is the ally, not the enemy, of democracy. ■

Source: La lettre, *no. 37, December 2013*

Listen to the full paper at www.college-de-france.fr/site/en-colloque-2013/symposium-2013-10-17-09h20.htm, along with a 4-minute interview on the topic "Taking the Scientific Word to the Highest Level of the State".

Steven CHU
Physics Nobel Prize Laureate, former US Secretary of Energy. Professor of Physics and Molecular & Cellular Physiology, and William R. Kenan, Jr., Professor of Humanities and Sciences, Department of Physics, Stanford University

The City of Science, Science in the City

What is the purpose of science? There are generally two answers to this question: first, science is said to produce new knowledge, and second, to serve society.

Hence, it is thought that the production of new knowledge must serve society, thus linking research and development. Yet, this is a very vague answer, which overlooks the problems that development can pose to fundamental research and the time that these interactions can take from beginning to end (for it then precedes fundamental research rather than the other way around). The issue of time is obviously crucial, as the time of knowledge and the unexpected course it can often take only rarely match the sense of urgency and the impatience that ensue from it (a course which surprises inventors themselves, and which is expressed in the famous "how did I find this?").

Setting aside for the moment the issue of industrial competitiveness to look at agriculture or medicine, we find that the urgency of feeding or of healing is always present, and always recognized. Those of a certain age will have heard of Ivan Michurin and Trofim Lysenko who, in the name of science for the people, destroyed Soviet genetics, which at the time was a world leader, and who criticized bourgeois geneticists because they apparently had nothing better to do than "count flies' hairs" (*sic*). Nikolai Vavilov, a renowned agronomist and geneticist, and member of the Supreme Soviet from 1931 to 1940, was arrested in 1940 for defending genetics – the bourgeois science that it was said to be. He died in prison in 1943. Such madness, which had disastrous repercussions on agriculture in addition to its impact on science, can obviously only occur in a totalitarian regime. It should nevertheless alert us to be wary of decision makers enjoining scientists to respond to social urgency. Long ago, surely longer than you can remember, I spoke of "rampant Lysenkism" regarding this constant incentive, through programmes addressing societal questions, to rally scholars around major causes, whether they be national (or European), industrial or humanitarian.

Numerous counter examples illustrate the fact that the most promising recent discoveries in medicine were made in a spirit of pure cognitive curiosity. Transposons and genome instability were discovered by Barbara McClintocks, who studied the variety of colours of the maize grains on a single ear; the RNA interference phenomenon was identified by Richard Jorgensen through experiments on the colour of petunia petals; neural stem cells in adults were discovered by Fernando Nottebohm who studied birdsong; and as we saw yesterday, iPS, which, with stem cells, lead to regenerative medicine and offer new medicine screening tools, and which are linked to a fundamental question in biology, raised by August Weismann in the nineteenth century.

Which Alzheimer or Cancer Plan would have decided to fund a project on petunia petals? And I could also facetiously ask in turn about the number of funded projects on such plans that have yielded little or no results.

Yet it is not the people who do not understand, the people who are easy to blame despite populism. Rather, it is the social and political elite that has largely divorced itself from science. Although not uniformly enacted across the world, this divorce, to which I will revert below, is unfortunately pronounced in France. To avoid any ambiguity, I would like to point out here that I am eminently in favour of the development of "translational" science. I have no issue whatsoever with the term "applied", provided that it does not commit us to choosing between the one or the other – the cognitive or the applied – but rather includes them both, with the possibility of switching from the one to the other if need be, or simply because we feel like it. ■

Excerpts from Prof. Alain PROCHIANTZ's paper

Source: La lettre, *no. 37, December 2013*

Listen to the full paper at www.college-de-france.fr/site/colloque-2013/symposium-2013-10-18-16h00.htm

Prof. Alain PROCHIANTZ
Morphogenetic Processes

SCIENCE AND DEMOCRACY
17 AND 18 OCTOBER 2013

The Terms of Scientific Debate and the Issue of its Reception

The theme of global warming has a special status in the environmental debates that animates political and social life, particularly in France.

Our aim during this symposium is to understand the difficulties and deadlocks faced by our country, and others, with respect to the relations between science, technology and society, the role of scientific progress in economic and social development, the way the media and the political sphere tackle this issue, and finally, the democratic dialogue between the various actors involved: citizens, politicians, scientific experts, etc. We are clearly faced with a paradoxical situation in which citizens are more than ever hoping that scientists will resolve major societal problems – for example regarding health or the development of new energy technology for the large-scale exploitation of renewable energy sources –, yet at the same time they are increasingly seeing science exclusively as a source of tragedy. When medicine is associated at once with the Mediator affair, all the benefits of pharmaceutical research are forgotten. When chemistry is essentially perceived as a source of pollution, everything our quality of life owes to chemical industry products, to molecules, polymers and various materials, is overlooked. And when nuclear energy is exclusively seen as a source of potential disaster, no thought is given to the fact that every day the switch, which affords us the comfort of heating and lighting, is linked to a nuclear power plant, at a relatively competitive energy cost, with a lower impact in terms of greenhouse gas emissions. This paradox is what makes scientific debate so tense, and the necessary political arbitration so difficult. Journalists generally make things worse, as they obviously place far too much emphasis on immediate news and disasters, as well as on consensus, leaving little room for dissident voices to be heard. Virtually none of the environmental questions – nuclear energy, genetically modified organisms (GMOs), shale gas, and even climate change – are safe from these deadlocks. In my view, this situation is due to the exacerbated confrontation between two currently polarized ideologies dominating modern societies. The first is liberal ideology, which organizes society according to the demands of the market, risks and competition, prioritizing short-term action with quick returns on investment. The second is the new environmental ideology that Dominique Pestre, who spoke at this symposium, calls "the ideology of sustainable development" in his latest book.[1]

This ideology, which began to emerge 50 years ago with the early debates on nuclear power and the Club of Rome report, calls for a society that is respectful of the environment, collectively devising solutions to society's problems, based on the principles of both precaution and long-term interests, and asserting unconditionally that "the ecological crisis is the major determining factor of our collective well-being". This ideology draws on new values that are widely shared by citizens of the world, even if politically they do not always translate into electoral terms, both in France and elsewhere. These values can be summed up as respect for the environment, a relatively recent and, in a way, revolutionary concept. They also include a growing awareness of the fact that the consequences of our current actions will be felt much later and will essentially affect future generations. These values are shared so strongly that anyone who gives the impression of not adhering to them and of prioritizing the satisfaction of very short-term interests without taking long-term impacts

From left to right: Jean Jouzel, Marc Fontecave and Jean Dalibard

into account will be excluded from the debate. Finally, these are values of precaution, which are so important to citizens with growing expectations of protection and security, and therefore of precautionary attitudes, which unfortunately sometimes lead to excessive caution but also to necessary normative policies.

Unfortunately, like any ideology, it also breeds a number of dogmatic ideas, against which it is increasingly difficult to voice opposition. We need, however, to fight steadfastly the gloomy outlooks that systematically pit humans, science and technology, on the one hand, against nature on the other, mostly envisaging the former solely as sources of destruction of the latter.

Hence, wherever possible, let us stress that it is not science that generates problems, but the need to feed, heat and transport seven billion people currently living on the planet and ten billion in the future. In particular, energy consumption is expected to double over the next 40 years, if only to meet the demand of over a billion human beings in China, India and Africa, currently faced with dire energy needs. This goal cannot be reached without continuous scientific and technological development, controlled through proper evaluation of the potential risks raised by new technologies. ■

Excerpts from Prof. Marc FONTECAVE's paper

Source: La lettre, *no. 37, December 2013*

(1) D. Pestre, *À contre-science*, Seuil, 2013.

- Listen to the full paper at www.college-de-france.fr/site/colloque-2013/symposium-2013-10-18-09h10.htm.
- The symposiums papers will be published by Odile Jacob in 2014.

The Autumn Symposium's papers are available online

- **Opening Address**
  Serge Haroche
- **Energy and Climate Change Challenges and Opportunities: Dr Chu Goes to Washington. Review of a former US Secretary of Energy's Experience.**
  Steven Chu
- **A Comparative Study of Explorations and Exploitations in the World**
  Bernard Tardieu
- **Media, Scientific and Political Taboos, etc. A Strange Era**
  Anne-Yvonne le Dain
- **Knowledge, Politics and Democracy in Countries of the South**
  Dominique Kerouedan
- **Perspectives from Africa: Science, Politics and Democracy**
  Francis Akindès
- **The Experience of the FACTS Initiative, the Role of NGOs**
  Philippe Kourilsky
- **Innovation, Freedom of Research and Societal Choices: the Example of Regenerative Medicine**
  Alain Prochiantz
- **Who is Afraid of Research and Innovation? Freedom of Research and Socially Robust Knowledge**
  Helga Nowotny
- **Regeneration, Stem Cells and Regenerative Medicine**
  Nicole Le Douarin
- **Scientific Debates and Political Decision-Making: the Case of Climate Change**
  Jean Dalibard
- **The Terms of the Scientific Debate and the Problem of its Reception**
  Jean Jouzel and Marc Fontecave
- **Issues Surrounding the Long-Term Economic Management of Problems**
  Roger Guesnerie
- **Economic Actors, Civil Society and Political Decision-Making**
  Dominique Pestre
- **Science and Politics: the Question of Institutions**
  Pierre Rosanvallon
- **Making Decisions Differently. Reflections Based on Citizen Conferences**
  Yves Sintomer
- **What Scientific Journalists Can Do and What They Actually Do**
  Hervé Morin
- **The City of Science, Science in the City**
  Alain Prochiantz
- **Democracy and Managing the Long-Term Future**
  Pierre Rosanvallon

Prof. Marc FONTECAVE
Chemistry of Biological Processes

VISITING PROFESSORS
KONRAD VÖSSING
MAY-JUNE 2013

The Vandals in North Africa – Heirs or Precipitators of the Decline of the *Romanitas*?

Since the publication, in 1955, of Christian Courtois' outstanding work, researchers have paid little attention to the Vandals. During the past few decades, however, things have been changing, despite the fact that there is still no monograph on the subject available in French. Historical clichés such as the "barbarian invasions" and the "end of the antique world" have moreover revived scientific interest and have led to new approaches to the topic.

The Vandals play an important part within this context. While historians of that period at times use the key concepts of decline and of abrupt endings, and at times those of continuity and transformation, some are now claiming that the Vandals should be considered not as the gravediggers of the *romanitas*, but rather as their "heirs". According to these researchers, the Vandals formed an integral part of the traditional military organization, specific to the later Roman era, which was founded on groups of *gentes* (called the *foederati*). However, do these approaches do justice to the specificities of the Vandals, and are they consistent with historical sources? It is therefore worth considering this period from a new perspective, focused on the relations between Vandals and Romans and on the "barbarian" *regnum Vandalorum* that the conquerors of 429 AD were able to establish in Africa, at the heart of the Roman Empire, and to defend for a hundred years, in spite of all the resistance against it.

The four lectures, in turn, presented the Vandals as invaders, as (more or less fervent) Christians of the Arian confession, as patrons of the arts, and as defenders of their kingdom.

Two fundamental problems concerning King Genseric (428-477 AD) were highlighted. On the one hand, we wondered how the most prominent of the six Vandal kings of Africa managed not only to conquer the region, but also to settle there long enough to establish a kingdom that was consolidated and recognized by the Emperor of Constantinople. However, relations with the Empire also had another aspect. Contrary to a current research trend, Genseric was presented here as a king who had certainly grown up within the Empire, but who had also challenged it and even destroyed the material and political foundations of power throughout the Western empire.

The image of Huneric as the "persecutor king" (477-484 AD), which has taken root in the minds of people since the Middle Ages, was replaced in its historical context, in conformity with the principal source, Victor of Vita's *Histoire des persécutions*. What part did Arianism and the Arian Church play in the kingdom of the Vandals? Why did Huneric choose to confront the Catholic Church in 482 AD, and what were the results and consequences of this? Indeed, Huneric's policy based on a political motivation (concretely: his son's succession) and not on a religious one led the Vandal regnum into a dangerous impasse, by binding the destiny of the State with that of the Arian Church in Africa.

In the currently prevailing view, in conscious or unconscious reaction to the non-historical key word "vandalism", a cultural and scientific centre existed at the court of the Vandals from the reign of Thrasamund (496-523 AD) at the latest, and even sometimes from Huneric's reign. As a worthy continuator and heir of the Roman Empire, the king would have played the part of a patron of the arts, like any sovereign of late Antiquity. Sources attesting another version of the facts were emphasized. While they certainly attest that there were literary circles in Carthage, they also show that the Vandal elite and king had very little to do with them. This situation did not evolve until Hilderic's reign (423-430 AD).

The fall of the Vandals was closely linked to the change in political direction of Hilderic, the penultimate king of Africa, who moved away from earlier principles of autonomy and self-sufficiency – from a political, religious and cultural point of view –, to be

Genseric Sacking Rome, Karl Briullov, ARR

closer to the Empire and to the emperor. This policy was met with strong resistance, particularly as Hilderic failed to vanquish the Moors. Gelimer's coup d'état in 532 AD brought about the intervention of Emperor Justinian (who presented himself as Hilderic's protector) and the invasion of Belisarius. Justinian's short but effective campaign brought to light the military weaknesses of the Vandal kingdom, which was still basking in the glory of Genseric. It also revealed how little the Vandal's power was entrenched in Africa, despite a hundred years of reign.

As when one looks into a convergent mirror, the Vandal catastrophe shows the profound difficulties that Gothic kingdoms were encountering elsewhere. However, these took on a more precise and radical form with the Vandals. They would be robbed of their specificity, one could even say their "tragic" specificity, if one made them first into slightly subordinate auxiliary troops, and then "local" Romans integrated into the empire. In reality, after Belisarius' victory and after years of hard learning, it was the Byzantines who became the heirs of Roman Africa, and in a more intense and long-lasting way than the Vandals. ■

Konrad VÖSSING

Source: La lettre, *no. 37, December 2013*

- The Faculty invited Mr Konrad Vössing upon Prof. John Scheid's proposal.
- The videos of the lectures are available at www.college-de-france.fr, on Prof. John Scheid's page.

Konrad VÖSSING
Professor, Institute für Geschichtswissenschaft, University of Bonn (Germany)

VISITING PROFESSORS
JESPER SVENBRO
FEBRUARY 2012

Hamóthen, Contingency and Progression in Poetic Creation

In response to an invitation to give four lectures within the framework of an ongoing research on artistic creation,

I comparatively explored representations of poetic creation in Ancient Greek and modern poetry, under the heading "ἀμόθεν. Contingency and Progression in Poetic Creation". As I wished to show the articulation between Contingency and Progression, I started out from the adverb ἀμόθεν, meaning "from any point", in the tenth line of the first book of the *Odyssey* – the "point" in question being, in all the traditional themes specific to the *Return of Ulysses*, one which the Muse chooses for the bard who has asked for her assistance. It is the Muse's choice which is to guide the composition of our *Odyssey*, hitherto an "open case" which might have unfolded differently, without the traditional theme of the *Return of Ulysses* being contradicted.

A few twentieth-century French poems were introduced in order to provide a perspective on the open field where the Muse intervenes and on the blank page of the modern poet, especially Desnos, Ponge, or even Apollinaire with "Le Musicien de Saint-Merry". The latter relates the journey of a blind flute player in the Beaubourg area, a journey spurred on not by a religious authority, like Homer's Muse, but by what Apollinaire calls the "joy of wandering", thereby situating his endeavour under the sign of Contingency and demonstrating a solid faith in creative fate.

We examined "Bread" and more briefly "The Cycle of Seasons" by Francis Ponge who, while being true to Mallarmé's poetry, remained open to the randomness of the French dictionary. The first of these poems describes the making of bread, which is an allegorical figure of the poem in the process of being written or, more precisely, of the bread taking shape in the oven. This is a self-shaping observed by the poet, who thus does not occupy the position of the "creator", but who, following Apollinaire and Desnos's example, has become the observer of a creative process that the poet does not control. Ponge's "The Cycle of Seasons" was studied for the language act that it depicts: "It will fall into place as it can! However, in reality, it falls into place."

I thereafter sought to delve deeper into the relation between the concept of the pathway and creation. I discussed the *Homeric Hymn to Hermes*, studied by Norman O. Brown (1947) and Laurence Kahn (1978), as a narrative mapping Greece, from Olympus to Arcadia. From Ancient Rome, I turned my attention to twentieth-century capitalism and, in Walter Benjamin's vein, to the world of Parisian arcades, the shrines of triumphant capitalism. In this world, under Lautréamont's pen, sprang one of the most famous images of the surrealist "chance encounter", which here expresses beauty: "As beautiful as the chance encounter of a sewing machine and an umbrella on an operating table". The image originates from Rue Vivienne, as that is precisely where the "handsome" young man was, not far from Lautréamont's own address: 15 Rue Vivienne. While the "chance encounter" placed Lautréamont on the side of Contingency, it is perhaps even more surprising to find him associated with the theme of Progression. This is nevertheless confirmed by rereading the first sentence of the *Chants de Maldoror*. The author considers that a path cuts right across the *Chants*, one that is warned against by the Old Crane, who shows no less caution than Asunção's Diomedes. At the beginning of the *Odyssey*, it is for the bard to "choose", with the help of the Muse, whereas at the beginning of the *Chants*, it is up to the reader to do so, assisted by the Old Crane – in order to avoid the dangers of a distant point of arrival.

Turning to the Greeks, I looked at the figure of the crane, in order to situate Lautréamont's cranes better. It seemed especially clear to me that the Old Crane, with its "old bald neck whose falling feathers have measured three generations of cranes", was modeled on the Homeric hero γερήνιος Νέστωρ, "Nestor the Gerenian", an epithet meaning "of Gerenia", since Nestor, raised in Gerenia, was said to have reigned over three generations of men. Lautréamont undoubtedly understood the epithet as referring to the crane, γέρανος (rather than to the small city), thus meaning "of-the-crane", especially since Nestor epitomized "caution". But the Old Crane wished to spare the reader from the misfortune threatening him or her at the end of their journey through the *Chants*. On the other hand, the reader who defies the Old Crane's warnings will arrive at *Chant 6* and at the scene with the young man "as beautiful as the chance encounter", in an urban landscape very similar to the one explored by Apollinaire's blind flute player.

To conclude, I read the translation of a long poem, "Hermès βουκόλος", which I wrote in 1988. The poem depicts quite a few of the elements found in the four lectures, thus assembled in the account of the Theft of Apollo's Cattle by the young Hermes, god of the revival of metaphor and signatory of the first *Surrealist Manifesto*. Hermes led his herd to the very edge of Desnos' deep precipice by appropriating a sentence already cited from Ponge's "Cycle des saisons", before being caught up by a furious Reader who is none other than Apollo, asking for his stolen cattle back. The four lectures thus unfolded as the scholia in the margins of this poem on poetic creation, the "cattle theft" from which they arose. ■

Jesper SVENBRO

Source: La lettre, *no. 36, May 2013*

- The Faculty invited Mr Jesper Svenbro upon Profs John Scheid and Antoine Compagnon's proposal.
- The videos of the lectures are available at www.college-de-france.fr, on Prof. John Scheid's pages.

Jesper SVENBRO
Jesper Svenbro, Honorary Research Director, CNRS. Member of the Swedish Academy

Manuscript 4055, folio 157v, beginning of the Widēwdād 9

VISITING PROFESSORS
ALBERTO CANTERA
MAY-JUNE 2013

The Zoroastrian Long Liturgy

The long liturgy is the archetypal ritual of the Mazdean community and is very likely the foundation of its identity.

This complex ceremony has many variants: Yasna, Yašt ī Wisperad, Widēwdād or even Wištāsp Yašt. Yet, only the daily liturgy has been published in full; the others have been published only in parts. Unfortunately, the latter do not allow us to reconstruct the liturgy in all of its variety as it was celebrated from the thirteenth to the seventeenth century. Moreover, the liturgical manuscripts include ritual instructions that have never been published (e.g. in Pehlevi, Pāzand or Gujarati), even though they are essential for understanding the ceremony.

These gaps can be explained by looking into the history of Avestan texts and studies, which developed from the second half of the nineteenth century. Spiegel and Westergaard, who were the first editors of the Avesta, did not consider the Avestan texts to be liturgical texts. The original manuscripts were therefore considered to be exegetical manuscripts that included a Pehlevi translation. Their analysis overturned the original situation, as it showed that the original manuscripts were in fact the liturgical texts from which the exegetical excerpts had come. The only complete text the exegetical texts present is the one for the daily liturgy. As for the rest of the variants, the exegetical texts include only the sections that needed a translation because they did not appear in the daily liturgy. These are the fragments which are included in modern editions.

According to late nineteenth-century authors, such as Darmesteter and Geldner, the situation was more complicated: when the Pehlevi texts describing the Great Sasanian Avesta were published, they brought to light the fact that the Avestan texts that we have today are not identical to the Great Sasanian Avesta. The extant texts were recognized to be the recitatives of a liturgy that already existed during the Sasanian era. However, this discovery had no bearing on Geldner's edition, as it came about when the latter was virtually completed. During the twentieth century, until Jean Kellens' 1998 article in the *Journal Asiatique*, this fact was ignored and the ritual use of the Avestan texts of the long liturgy was considered to be of secondary interest. Nevertheless, the antiquity of the long liturgy has been established.

Kellens has recently shown that the conceptual backbone of the long liturgy was already present in the Yašt or the Hādōxt Nask. An analysis of ritual instructions in the Avestan language of the Nērangestān has allowed us to show that the Avestan recitative of the long liturgy existed prior to the Sasanian era, at a time when some were still capable of writing texts in Younger Avestan. Moreover, the intercalation ceremonies also belonged to the older time period, and they developed a central aspect of the long liturgy: the sacrifice and the following journey of the priest's soul in the hereafter allowed it to meet with the divinity and afforded it the means to communicate the long liturgy to the sacrificial community.

The long liturgy's recitative is not a late collection of the texts that were saved from the disintegration of the Great Avesta. This liturgy was a living ceremony which existed in a very similar form to that represented in the manuscripts long before the Sasanian era, but which continued to evolve since the time when it was composed and first set in writing, in all probability during the Sasanian Empire or shortly thereafter. It is not only the ritual that has evolved, but also the linguistic form of the Avestan recitative. It has reached us in a south-western variant which was fixed a few centuries after the beginning of the Sasanian era. After that, however, the recitation of the Avestan texts continued to change: there are clear differences between the Iranian and the Indian recitations. The manuscripts, which were designed as guides for learning how to perform the ritual correctly, are not the more or less exact copies of a Sasanian or later original, but reflect the variants of the long liturgy as they were celebrated at the time that the manuscripts were produced. Today, editors have to choose the temporal horizon of their edition and simultaneously show the synchronic and diachronic variety of rituals in the long liturgy. ■

Alberto CANTERA

Source: La lettre, *no. 37, December 2013*

- The Faculty invited Mr Alberto Cantera upon Prof. Jean Kellens' proposal.
- The videos of the lectures are available at www.college-de-france.fr, on Prof. Jean Kellens' page.
- Over the past few years, Mr Alberto Cantera has digitalized over 150 Avestan manuscripts, a fair number of which have been published on his website: Avestan Digital Archive (http://ada.usal.es)

Alberto CANTERA
Professor in the Department of Classical and Indo-European Philology, University of Salamanca (Spain)

VISITING PROFESSORS
VASCO GRAÇA MOURA
FEBRUARY 2013

The Correspondence between Saint-John Perse and Calouste Gulbenkian
(1948-1954)

Calouste Gulbenkian shortly before 1900

Vasco Graça Moura is one of the greatest Portuguese writers of our time. He is the author of a poetic work, partially translated into French, which is considerable in terms both of size and importance. He is also the author of narratives, novels, essays, and translations of Dante, Shakespeare, Villon and Rilke. Since joining the Carnation Revolution, he has also become a leading public figure. He has held important posts: he was twice a cabinet minister and was a long-serving member of the European Parliament. Today, he is Director of the prestigious Cultural Centre of Belém.

Like Saint-John Perse, Vasco Graça Moura is at once a poet and a participant in his country's political life. Among other posts, he was Director of Services of the Gulbenkian Foundation, and thus in a particularly good position to edit the correspondence between Saint-John Perse and Calouste Gulbenkian.[1] It is to this correspondence that he dedicated the lecture which he gave at the Collège de France on 21 February 2013, after having given a talk the evening before on "Self-Allusion in the Work of a sixteenth-century Portuguese Poet: Luis de Camões" within the framework of Michel Zink's seminar in relation to his lecture series entitled "What is the Poet's Name?".

It was in Paris, where Gulbenkian lived from 1920 and where he built a superb mansion on the Avenue Iena, that he became friends with the diplomat Alexis Léger (Saint-John Perse). However, apart from a brief exchange in 1946, they did not engage in a regular correspondence until 1948, that is to say, after the war and the period during which the former General Secretary of the French Ministry of Foreign Affairs lived in exile in America, an exile which he deliberately prolonged, as he chose not to return to France when it was liberated. It is only through Léger's expressions of gratitude that we understand that Gulbenkian helped the writer's mother during the war.

Gulbenkian also supported Saint-John Perse himself. In 1948, when financial necessities were about to force him to accept a post as a lecturer in provincial America – a perspective which horrified him –, the financier offered him a regular and fairly substantial salary, which he tactfully presented as payment for analytical reports on the international situation that the writer was to send him periodically. The correspondence, which largely consists of this kind of informal report, is therefore more that of Alexis Léger than that of Saint-John Perse. Amongst clear and often penetrating considerations on the political and economic strategies of the great powers during those years when the world was entering the Cold War, only a few brilliant, laconic and grandiose statements, a few confidences and a few lines dedicated to the account of a journey or the description of nature allow the voice of the poet to be heard or guessed.

Saint-John Perse was the obliged party and Gulbenkian the benefactor. It is easier to make a good impression in the latter position than in the former. The diplomat's long letters betray a certain affectation. Those written by the oil tycoon, which are less numerous, shorter and typewritten, seem more natural, and convey spontaneous warmth and genuine admiration.

When one reads this correspondence and listens to Vasco Graça Moura's attractive presentation of it, one reaches the conclusion that Saint-John Perse was decidedly a disconcerting man. The stubborn grudge he bore against the Général de Gaulle and Paul Reynaud is no surprise. What is more unexpected is, for example, the discovery that he was so very preoccupied with his health and the risks that the climate, the bad air and various infections might make him run. One would not have suspected him to be a hypochondriac. Allowing these small details to be revealed, however, is precisely the point of publishing such correspondence. ■

Prof. Michel ZINK

Source: La lettre, *no. 36, May 2013*

(1) *Saint-John Perse, Calouste Gulbenkian. Correspondance, 1946-1954*, Text established, annotated and presented by Vasco Graça Moura, Paris, Gallimard, 2013, Cahiers Saint-John Perse 21, p. 335.

The Faculty invited Mr Vasco Graça Moura upon Prof. Michel Zink's proposal.

Vasco GRAÇA MOURA
Writer, President of the Belém Cultural Centre Foundation, Lisbon

Unearthing The Chinese Classics

At the beginning of the twentieth century, the status of the Chinese Classics was precarious, with many intellectuals regarding them as the root of modern China's problems.

These intellectuals advocated burying the Classics along with the rest of the past. However, the Classics have not been so easy to kill; moreover, they will not stay buried. Now, more than one hundred years later, the Classics continue quite literally to come up out of China's soil.

Throughout the modern period, China's engagement with the Classics has proceeded with the writing brush of the scholar in one hand and the spade of the archaeologist in the other. Two discoveries of ancient texts in particular first attracted the attention of scholars and layman alike. One still represents the earliest writing from China; these are the oracle-bone inscriptions of Shang China, the oldest of which date to about 1200 BC. The other, records written on strips of wood, were found in the desert sands of Central Asia, and date from the beginning of the common era. The millennium or so between these two dates was the classical age in China, the time during which the Classics were first composed and copied onto the various writing mediums of the time.

In these Collège de France lectures, I explored how archaeology has influenced the study of the Chinese Classics over the last century or more. I focused on the first three of the Classics, the *Yijing* or *Classic of Changes*, the *Shujing* or *Classic of Documents* and the *Shijing* or *Classic of Poetry*, and took up as well one non-canonical classic, the *Daodejing* or *Classic of the Way and Virtue*. In the first lecture, I showed how Shang oracle-bone inscriptions inspired a radical rethinking of how the *Classic of Changes* may have been composed. The Shang oracle bones mark the beginning of this story, but certainly not its end. Just the last four decades have brought a steady stream of other discoveries, beginning with the second-century BC Mawangdui silk manuscript of the text, and continuing more recently with three other manuscripts all written on bamboo strips: those of the Shanghai Museum, and from Wangjiatai and Fuyang. In addition to these manuscripts of and related to the *Yijing*, there have been numerous other discoveries of divination records, including oracle bones from the Zhou dynasty, that provide precious information about how this classic was first used.

In my second lecture, I surveyed the transmission of the *Classic of Documents* from the Qin "burning of the books" in 213 BC, through the partial reconstitution of twenty-eight chapters of the text about 165 BC, until a new text with sixteen additional chapters was presented at court in the early fourth century AD. I then discussed doubts that scholars raised about these additional chapters, referred to as the *Guwen* or Ancient Text version of the text, beginning already in the Song dynasty (960-1279). The demonstration of the spurious nature of these Ancient Text chapters during the Qing dynasty (1644-1911) has long been regarded as the crowning glory of the Chinese scholarly tradition. Finally, in just the last three years, archaeological evidence has surfaced in the form of fourth century BC bamboo-strip manuscripts proving beyond doubt that the Ancient Text chapters are indeed forgeries.

The third lecture explored the *Classic of Poetry*. Recent archaeological evidence shows that this was the most frequently quoted of all Chinese classics in antiquity. As in the case of the *Classic of Changes*, various kinds of manuscripts either of or related to the Poetry have surfaced in recent decades. The first of these was excavated in 1977 from a Han tomb at Fuyang, Anhui dated to 165 BC, while the most recent to appear was published only in December 2012. This evidence shows that the *Classic of Poetry* was in wide circulation throughout the last centuries BC, but it has not yet succeeded in demonstrating how the *Poetry* was composed, or even how it was transmitted in antiquity.

The final lecture turned to the non-canonical *Classic of the Way and Virtue*, regarded as the fountainhead of the Daoist tradition. Throughout much of the twentieth century, the date and nature of this text have been the most vigorously debated topics in Chinese textual scholarship, with some scholars upholding the traditional sixth century BC date, while other scholars argue for a date of composition as late as the third or even second century BC. I again surveyed recently discovered manuscripts related to this text, beginning with the Mawangdui manuscripts of 168 BC (excavated in 1973), and focused especially on the Guodian manuscripts discovered in 1993. I also introduced a manuscript just published (March 2013) by Peking University. Although this manuscript does not resolve the long debates about the text, it does provide a new way to authenticate ancient manuscripts. In these lectures I showed how these new manuscripts have renewed the claim that the Chinese Classics – the oldest texts in the long Chinese literary tradition – have on the attention of Chinese scholars everywhere. ■

Edward L. SHAUGHNESSY

Source: La lettre, *no. 37, December 2013*

- The Faculty invited Mr Edward L. Shaughnessy, upon Anne Cheng's proposal.
- The videos of the lectures are available at www.college-de-france.fr, on Prof. Anne Cheng's page.

Edward L. SHAUGHNESSY
Lorraine J. and Herrlee G. Creel Distinguished Service Professor in Early Chinese Studies, Department of East Asian Languages Department, University of Chicago

VISITING PROFESSORS
BOB BECKING
DECEMBER 2013

Paleoclimatology and Ancient Israel Two Examples: David and the Exile

History is (wo)man-made. There are, however, some constraints to human actions. Climate, for instance, constitutes a clear boundary of what can be done.

In my presentation, I have discussed the interaction between topics like demography, technology, landscape, politics and climate in Iron Age Israel/Palestine (± 1200 – 331 BCE).

Climate in the Holocene – from the last ice age until the present – has not been constant but subject to change, after a general global warming around 10,000 BCE. Warmer and colder, dryer and wetter periods, however, have left their traces, which are now visible thanks to the GISP II-project in Greenland. My question was: how have these oscillations influenced human behaviour and the flow of history.

In the Hebrew Bible, King David is portrayed as an intriguing and paradoxical figure. The depiction of this king is colourful and multi-dimensional. In Samuel and 1 Kings' narratives, the reader meets a character in flesh and blood. Recently Steven McKenzie, Baruch Halpern, John van Seters and Joe Blenkinsopp have published "lives of David". While I appreciate much of this work, I have, however, first and foremost concentrated on the existing evidence. Not every *narratio* on David would be adequate. Not every appropriation of this king – be it verbal or pictorial – can be deemed to be successful.

Landscape: Ancient Israel/Palestine was a hilly area, that contained various and differing zones. The mountainous core of Judah was blessed with soil which was, as such, fertile.

Climate: the first half of the tenth century BCE was a period of global cooling at an even greater magnitude than we experience today. The lowering of the average temperature in a subtropical climate implied an increase in rainfall. This can also be deduced from the fact that the sea water level in the Dead Sea was rising during that period. By implication, an increase of rainwater combined with the improved technology in the construction of terraces led to the presence of more water for agriculture and allowed for a better harvest.

Demographic Developments in Iron IIA: Paula, based on a variety of excavations and their interpretation, indicates that there was a population increase in the area of Judah in Iron IIA. The climate change mentioned above could have been instrumental in this development: improvement of terrace building apiculture at *Tēl Reḥōv*, fish bones in Jerusalem.

Epigraphic evidence: The Tel Dan-inscription excavated 20 years ago, gives evidence of the historicity of David as a ruler, but not of all the details in the stories. The epigraphic evidence from the tenth century BCE can be related to a period of demographic growth. Population growth, upcoming trade and the beginning of literacy were signs of the time. They were not orchestrated by a central state. They can be seen as elements of a *histoire conjoncturelle*: These developments required a stronger administration to defend the economic interests that came out of them. Therefore, the "Kingdom of David" could be better construed as an "ethnic entity that would become a nation" or be seen as a patrimonial society.

The period of the Babylonian Exile coincides with a period of global warming of an even greater magnitude than the one we experience today, which was followed by a drastic decline of temperature in the early Persian Period. That is, the 'forced migration' to Babylon and the 'exilic period' coincided with a process of rapid warming, while the period of 'return from exile' up to the time of the mission of Ezra in 398 BCE was characterized by a likewise rapid decrease in temperature.

To understand the impact of climate change on the history of the Exile, it should be noted that the culture of Ancient Mesopotamia heavily depended on agriculture. In *Climatic Change, Agriculture, and Settlement* (1978), Martin Parry has convincingly shown the interconnections between climate change and agriculture. There were large urban areas where trade was of great importance. During the Iron Age, agriculture in Mesopotamia was made possible thanks to the yearly flooding of the Euphrates and Tigris rivers. The floods came in late spring or early summer when the ice in the northern and north-western mountains was melting. The age-old system of irrigation distributed the water over the fields. These evidences tally with the available demographic data. After a minor decline just before 500 BCE, the population of Mesopotamia increased steadily and heavily from 480 BCE onward.

The course of human history is by no means solely dependent on climate-related events. In any culture, technological developments too are of great importance to cope with reality. Cornelia Wunsch hinted at the importance of the improvement of the cedar plough that turned out to be instrumental in improving agriculture in Mesopotamia from the Neo-Babylonian period onward. This feature only underscores my assumptions. ■

Bob BECKING

- The Faculty invited Mr Bob Becking upon Prof. Thomas Römer's proposal.
- The videos of the lectures are available on www.college-de-france.fr, on Prof. Thomas Römer's page.

Bob BECKING
Professor for Old Testament Study, Faculty of Theology, Utrecht University (Netherlands)

How Hearing Happens

In addition to possessing the classical senses of vision, hearing, touch, smell, and taste, humans respond to a variety of other stimuli.

For example, the vestibular apparatus of the internal ear provides continuous feedback about linear and angular accelerations and allows us to maintain an upright posture. Pressure receptors in our vascular systems and osmoreceptors in our brains help maintain a constant blood volume. Other species employ still more exotic sensory modalities. Many migratory species, especially birds, can orient themselves by reference to the earth's magnetic field. Pit vipers and boas use thermal imaging to strike warm mammalian prey; bats and cetaceans employ sonar to locate respectively insects and fishes. Despite the wide variety of physical stimuli to which various senses are responsive, there are consistent principles in their operation. A sensory response commences with an antenna, an apparatus for accumulating sensory energy and concentrating it at the receptor cells. In the key step of sensory transduction, the physical stimulus engenders an electrical response that represents the magnitude, duration, and other properties of the input. Most responses are then amplified to assure that their sizes exceed those of any noise sources. Many sensory systems use tuning to enhance responsiveness to stimuli at behaviourally important frequencies and to suppress those at less significant frequencies. In some instances, a sensory receptor bears an axon along which information flows into the central nervous system; in other cases the receptor must forward information across a chemical synapse to excite the nerve fiber. In either event the final step in a peripheral sensory response is the encoding of relevant information in the firing pattern of an afferent nerve fiber.

How the ear's works work: The operation of cochlear hair cells

Human hearing is extraordinary in its technical specifications. We can perceive frequencies as great as 20 kHz and discriminate between different tones with a precision of 0.2%. At the acoustical threshold, the inner ear responds to vibrations of only ± 0.3 nm, an atomic dimension. Finally, our auditory system can register sound-pressure levels from 0 dB to 120 dB, representing a millionfold range in amplitude and a trillionfold range in power. The defining feature of a hair cell is its mechanoreceptive organelle, the hair bundle. Extending less than 1 µm to more than 100 µm from the flattened apical surface, the bundle comprises from a dozen to over 300 cylindrical protrusions called stereocilia. Each stereocilium consists of a core of parallel actin filaments that are cross-linked into a rigid fascicle. The streocilia are not of equal size, but display a monotonic decrease in length from one edge to another so that the bundle's top edge is beveled like a hypodermic needle. When the top of a hair bundle is displaced during stimulation, the adjacent stereocilia shear with respect to one another. This movement is communicated to a tip link, a fine filament comprising four cadherin molecules that extends from the tip of each short stereocilium to the side of the longest adjacent one. Each tip link probably contacts a pair of mechanically sensitive ion channels whose opening initiates the hair cell's electrical response.

Making an effort to listen: The active process of the cochlea

Uniquely among sensory receptors the hair cell is not a passive recipient of stimuli, but instead uses an active process to enhance its inputs. The active process amplifies mechanical stimuli by as much as a thousandfold, thus greatly increasing our sensitivity to weak sounds. When this process fails, we become hard of hearing. Amplification is accompanied by frequency tuning, which restricts each hair cell's response to a narrow frequency band. If the active process deteriorates, we grow less sensitive to subtle differences in frequency and therefore suffer a diminished ability to discriminate sound sources. Finally, the active process produces a compressive nonlinearity that renders the ear sensitive to sounds over an astonishing trillionfold range in power. By enhancing weak stimuli and suppressing strong ones, this feature allows us to enjoy an instrumental soloist as comfortably as a full orchestra one hundred times as loud.

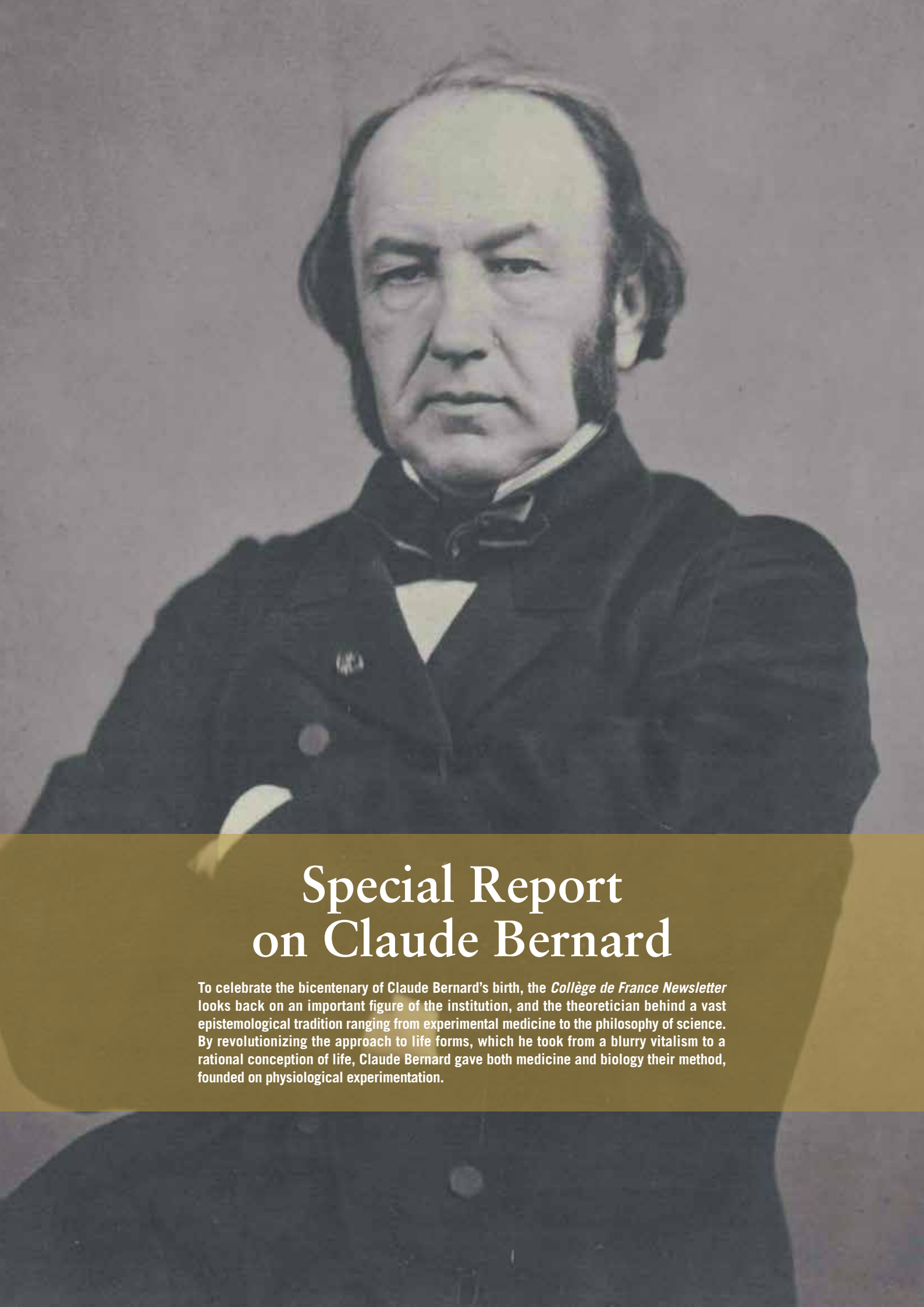
Getting in tune: tuning, transmission, and turnover in the ear

Our ability to identify different sound sources – to distinguish predators from prey, for example – rests upon the ear's ability to decompose complex sounds into their frequency components. Although the cochlear traveling wave initiates this process, individual hair cells are also tuned to specific frequencies both through hair-bundle mechanics and sometimes by electrical resonance. Not only the active process of hair cells, but even their synaptic transmission has been found to be frequency-selective. Hearing deficiency is widespread in industrialized countries, in which about 10% of the population is affected. In all cases, the dominant problem is the loss of hair cells. An important focus of contemporary research is therefore the potential restoration of human hearing through the reprogramming of progenitor cells in the ear. ■

Albert James HUDSPETH

- The Faculty invited Mr Albert James Hudspeth upon Prof. Christine Petit's proposal.
- The videos of the lectures are available on www.college-de-france.fr, on Prof. Christine Petit's page.

Albert James HUDSPETH
F. M. Kirby Professor, Investigator, Howard, Hugues Medical Institute (HHMI), Laboratory of Sensory Neuroscience, The Rockefeller University, New York, USA



Special Report on Claude Bernard

To celebrate the bicentenary of Claude Bernard's birth, the *Collège de France Newsletter* looks back on an important figure of the institution, and the theoretician behind a vast epistemological tradition ranging from experimental medicine to the philosophy of science. By revolutionizing the approach to life forms, which he took from a blurry vitalism to a rational conception of life, Claude Bernard gave both medicine and biology their method, founded on physiological experimentation.

Claude Bernard and Experimental Medicine at the Collège de France

We are celebrating the bicentenary of the birth of Claude Bernard, professor of the Collège de France for 23 years.

Bernard was appointed Chair of Medicine in 1855, a position he was to hold until the year of his death, in 1878. In fact, his presence at the Collège de France extended over more than three decades. As a young man, disappointed with his aborted career as a playwright, he left his birthplace in the Beaujolais for Paris, and discovered the Collège de France in 1841. As a simple 28-year-old medical student, he worked as the assistant of François Magendie, then Chair of Medicine, from 1841 to 1844. He obtained his PhD in medicine in 1843, and was already working successfully on the nervous control of gastric secretion. Appointed as Magendie's replacement professor in 1847, he was entrusted with the laboratory and the Chair of Medicine of the Collège de France when Magendie retired in 1852. He became the holder of the Chair in 1855. Later, as a tribute to his contributions and his influence, the name of the Chair was changed to "Experimental Medicine". Antoine Lacassagne was its first holder, from 1951.

It was to François Magendie (1783-1855) that Bernard owed his orientation towards physiological experimentation, a calling to which he dedicated not only his entire career but also his life, as he worked relentlessly. Bernard was responsible for spectacular advances in this discipline. His first steps at the Collège de France taught him just how valuable a tool animal vivisection was to understand life forms. Magendie considered him to be "better than him" at the experimental level, and encouraged him by showing him that experimental facts served to dismantle the false doctrines and empirical minds that Bernard was forever denouncing. This is the Claude Bernard who is of interest to us here at the Collège de France, not the Academician, the Senator or the Sorbonne professor.

Experimental Medicine at the Collège de France

The Chair of Experimental Medicine provides the unique example, at the Collège de France, of a Chair that is not only directly linked to a personality, but that also has a remarkably permanent title, as it has carried the same name since 1951. In 1951, Antoine Lacassagne turned the Chair of Medicine into the Chair of Experimental Medicine, both in the tradition of Claude Bernard and in keeping with his own teaching, as he was first appointed as Chair of Experimental Radiobiology in 1941 and worked on cancer research. From the beginning of his career, the research he carried out in radiobiology was at the frontier of experimental medicine. Hence, when the Chair of Medicine was freed up upon René Leriche's retirement, he naturally succeeded to him, bringing in this new title.

Professors who have held the Chair of "Experimental Medicine"

Antoine LACASSAGNE (1951-1954), Charles OBERLING (1955-1960), Bernard HALPERN (1961-1975), Jean DAUSSET (1977-1987), Pierre CORVOL (1989-2012)

A life of discoveries

From 1843 to 1860, Bernard made multiple discoveries, essentially about digestion, the glucidic metabolism, the nervous system and circulation. This list is actually far from exhaustive, so great was his scientific curiosity about any new physiological question.

Some of his most significant original contributions concerned: the role of sugar in the animal and human organism (including the famous theory of the liver glycogenetic function in 1848), the control of glycaemia by the central nervous system (1848), the "washed liver" experiment which reveals the *post mortem* production of sugar in the liver (1855), the discovery of *glycogen* (1855) and its isolation (1857), the presence of sugar in cerebrospinal liquid (1855), and the production of heat in animals and its regulation (1859). It is important to remember that the most widely accepted theory at the time was that sugar came from diet and that it was destroyed by combustion phenomena, particularly during breathing. Bernard quickly observed that the blood and liver of animals contained sugar even when their diet did not. Starting from the hypothesis that the liver was the organ that produce sugar in the organism and not the one ▶

CLAUDE BERNARD

destroying it, he carried out experiments to prove it. For instance, the famous so-called "washed liver" experiment performed on a dog allowed him to discover that the liver is capable of creating a reserve substance, glycogen. He thereby demonstrated that the liver is a sugar-retention organ and that it alternates storing and destoring functions, so as to maintain a constant rate of sugar in the blood. With regard to the nervous system, let us mention sympathetic innervation and the physiology of vasomotricity, the concept of "local circulations", the actions of curare and other poisons (strychnine, opium, carbon oxide, and anaesthetics) in which he saw potential for "chemical dissections" from which to draw valuable lessons. He also took an interest in the physiology of blood, asphyxia phenomena or cardiac catheterization.

This was a golden age for research. There was competition only at the European level and it essentially concerned France, Germany and Great Britain. Research was carried out in both public and private laboratories. A giant leap forward was made, medicine opened up to other horizons and other founding masters of modern experimental sciences. Although Bernard did not turn his attention towards the rise of cellular pathology, germ theory and heredity, he still had the genius of thinking that the great principles of non-living physics and chemistry could be applied to life forms, that the methods and measurements used by the exact sciences could also be used with humans, and that physiology and pathology could and should become experimental sciences.

While Bernard was a medical doctor, he never practiced at a hospital. But is that really so unfortunate? At the time, clinical and anatomical-clinical observation at the Faculty of Medicine was limited essentially to casuistic and nosological medical research. The hospital medicine of the time would not have allowed him to go beyond medical observation, which for him was only preliminary to laboratory research:

"Medicine does not end in hospitals ... but merely begins there. In leaving the hospital, a physician, jealous of the title in its scientific sense, must go into his laboratory; and there, by experiments on animals, he will seek to account for what he has observed in his patients."

Today, given the criteria of our current system, Bernard would not stand a chance of success: his research themes were too scattered, he practiced vivisection that is now prohibited, he ignored statistics, his work lacked "clinical application", etc. Yet no one contributed more than him to promoting medical research through the unlikely combination of the two words "experimental and medicine".

Léon Lhermitte, *Claude Bernard's Lesson*, 1889, ARR

A lifetime of experimenting and teaching

"Observation is investigation of a natural phenomenon, and experiment is investigation of a phenomenon altered by the investigator". This Bernard citation alone summarizes the scientific approach he developed. The experimental method, based on observation and interpretation, made the laboratory an ideal locus of knowledge production. Browsing through Bernard's experimental notebooks at the Collège de France, it is astounding to see the impressive number of experiments he performed rigorously and methodically, the underlying working hypotheses and the interpretations he gave them. This work took place at the Collège de France in buildings that no longer exist, which were situated on the corner of the rue Saint-Jacques and the place de Cambrai (now Place Marcelin-Berthelot). They hosted a lecture-theatre for the teaching of the Chair of Medicine, Bernard's office, his laboratory, and an "animal house" in the basement. All together these made up the "*caveau*" ("cellar") mentioned by members of his audience and his friends. This is where Bernard taught by performing experiments directly in front of his students, as shown in Léon Lhermitte's anachronistic painting *La leçon de Claude Bernard* (1889). What did he teach, apart from the extemporaneous experiment? His answer was that "our role here at the Collège de France is to see only pure scientific medicine; consequently medicine in the future…". He declared his desire to teach "a science that does not exist". His lectures therefore focused on research and had nothing to do with traditional medical teaching. At the end of his career, after two years of absence due to illness, he declared:

"I am beginning to see the medical science rooted in physiology, which I did not perceive 20 years ago, looming on the horizon. In view of this I would like to provide you with a few milestones that should clearly outline the determinants of this medical science as I understand it under the name of experimental medicine".

In short, as he put it so well, his mission was the "initiation to the scientific movements of the time".

He was a good teacher, who was able to set out his thoughts in textbooks, starting with *An Introduction to the Study of Experimental Medicine* (1865), and ending with *Les Principes de médecine expérimentale*, transcribed from his notes and published posthumously in 1947.

Claude Bernard, a pioneer of modern physiology

Thanks to his experiments and observations, such as those on the regulation of glycaemia, Bernard laid the foundations of a new physiology, that of regulations.

The concept of milieu intérieur, which still appears in French in articles written in English, was formally set out in his posthumous book *Lectures on the Phenomena of Life Common to Animals and Plants* (1878-1879), though it took a long time to form in his mind. It is based on the existence of two milieus, the one external and changing, and the other internal, constant, formed by the circulating organic liquid (lymph and plasma) surrounding and bathing all the anatomic elements of tissues. According to him, the milieu intérieur must remain stable in its physical-chemical composition (glucose concentration, alkalinity, etc.), as "it is the fixity of the milieu intérieur which is the condition of free and independent life". What a fine definition of life coming from a biologist!

Bernard proclaimed: "I am physiology" – and rightly so. For him, each experiment constituted the pieces of a puzzle which, seen with perspective, builds the outlines and the definition of life forms. A sketch outlined with agnosticism, rejecting empiricism, able to challenge many a dominant doctrine. Bernardian physiology was able to unite the organs through the concept of milieu intérieur, to link the animal and the vegetal (see the *Lectures on the Phenomena of Life Common to Animals and Plants* from 1878), to examine the mirroring definitions of health and disease, to offer living bodies to follow a certain determinism, to offer scientists a method.

Today, a new physiology called "systems physiology" or "systems biology", the term popularized in the English-speaking world, seeks to link the structure and the dynamics of biological systems by integrating and modelling a large number of physiological, cellular and molecular data. It uses model organisms where Bernard worked on the animal species that could serve his purpose. This new physiology draws on Bernard's reductionist method followed by an attempt at reconstruction and holistic understanding. Though the puzzle has more pieces, the process is the same to understand the functioning of organs and organisms. We still have a lot to draw from Bernard's legacy, and if we can now see further than him, it is because we are standing on his shoulders. ■

Prof. Pierre CORVOL

Source: La lettre, *no. 36, May 2013*

Prof. Pierre CORVOL
Emeritus Professor, Experimental Medicine from 1989 to 2012 and *Administrateur* of the Collège de France from 2006 to 2012

Pre-war bronze statue of Claude Bernard, requisitioned by the Germans in 1941 and replaced in 1946 by the current stone replica, ARR

Claude Bernard, Pioneer of Experimental Medicine

While the term "experimental medicine" may seem paradoxical at first, as patients cannot *a priori* be considered as experimental objects, Bernard's fundamental scientific contribution was to envisage medicine as a research subject in a radically new way. This fundamental theoretical advance, which from then on gave doctors the dual function of practitioner and researcher, can be characterized by three key dates attached to Bernard's name:

- 1865: Bernard published *Introduction to the Study of Experimental Medicine*.
- 1958: the Debré reform of University Hospitals was the first to introduce clearly the notion of "doctor researcher".
- 1988: the Huriet-Sérusclat law set a legal framework for clinical trials and experiments on patients.

"The Newton of the Grass-Blade"

Claude Bernard was born in 1813, and we are celebrating his 200th birthday. The celebration seems timid compared to the value of the work of the inventor of physiology.

It is true that Bernard had the bearing of a man of distinction and that, if my memory serves me right, his *Introduction to the Study of Experimental Medicine*[1], as it was fed to several generations of high school pupils, probably did not help to make him appealing. Fortunately, reading Georges Canguilhem[2], among other philosophers, reconciled us with this work and, more generally, with all of the physiologist's writings.

Pierre Corvol adequately set the scene in the pages above for us to claim outright that Bernard entered physiology through the mouth. That is, through nutrition. The washed-liver experiment (was it really a dog or a rabbit?) and the two discordant measurements of the liver sugar content set him on the trail of the liver glycogenic function, and thus of the capacity of animals to accumulate sugar reserves in the form of glycogen and to release them in the form of glucose (glycose at the time). Animal glycogen is like plant starch and Bernard was later to draw the physiological parallel between the two kingdoms of nature, in his lectures at the Muséum d'histoire naturelle, which he delivered in 1878, the year of his death.[3]

This is obviously very important, though surely not as much as the concept of milieu intérieur born from this experiment, which was also the transposition in the life sciences of the concept of milieu in physics, or rather of the post-Newtonian physicists' notion of ether. The concept of force – also transposed from Newtonian physics –, along with that of regulation, comes with it, as the organisms' milieu intérieur has to remain constant or more or less so, and in any case has to adapt dynamically, in order to ensure survival.

Without seeking to revive timeworn ideas,[4] it seems important to me to consider this work along two main lines. The first is that of method, with which we are most familiar since

it brings back to mind our final year of high school. What is at stake, however, is not a Discourse on Method, a sort of "how to reason?" or "how to find?", that could have a universal value. Bernard is not the Descartes of the nineteenth century. Rather, his approach is pragmatic, in that it defends the right to delve into the milieu intérieur of live animals, through the use of vivisection and of poisons, beyond philosophical considerations. It refers to a very concrete endeavour, as is now the concrete manipulation of genomes, the pathway to the modification of the milieu intérieur.

Nutrition is the second theme of reflection on the physiologist's contribution. The passage through reserves, then the release of the basic nutrients (sugars, amino acids, fatty acids, etc.) through the bloodstream and through the interstitial milieu so as to reach each cell of the organism clearly departs from a Lavoisierian conception, where nutrition is reduced to an energy balance sheet between what the organism absorbs and what comes out of it. Nutrition is no longer simply an organic combustion. It also becomes an organogenic or morphogenetic process given that the organs and the organisms retain their forms, that is, also their physiological functions, despite the renewal of nutrients. Although nineteenth-century physiologists could not explain the origin and the evolution of forms, nor their development or their maintenance in adults, Claude Bernard believed that this would be possible in the future:[5]

"I am perfectly willing to accept the fact that when physiology will have sufficiently advanced, physiologists will be able to make new animals and plants, just like the chemist produces bodies which have the potential to exist, but that do not exist in the natural state of things… But physiology will have to act scientifically… for it will know the intimate laws of the formation of organic bodies, just as the chemist knows the laws of the formation of mineral bodies. Experimental biological science therefore acts with knowledge of the law of formation of organized bodies…"

This citation (which I have often used – may my colleagues and readers forgive me for this), brings us to the maintenance of forms in adults, their "silent embryogenesis", to use the Bernardian expression. Underpinning the idea of organogenic nutrition is the on-going renewal of structures. This is what the bringing together of the two aphorisms "life is creation" and "life is death" means. Far from contradicting each other, they are complementary, the two movements of death and creation compensating for each other, as Bernard contended in the *Lectures on the Phenomena of Life Common to Animals and Plants*.

This marks a clear break away from Bichat for whom "life is the assemblage of the functions which resist death".[6] Furthermore, it veers away from a thermodynamicist vision of life and death, whereby life is order and death is an increase of the disorder that precedes the tilting over into organic nothingness. Hence, after having broken with Lavoisier and the first principle of thermodynamics, Bernard, with his conception of nutrition, also distanced himself from Carnot, the father of the second principle. This point seems important to me, given that, to a large extent, contemporary biology made a detour through information theory and cybernetics, which we know are closely linked to the second principle of thermodynamics.[7] This was particularly the case for bacterial genetics, to which we owe many of the concepts that are still used in our biological disciplines.[8]

Bernard's work is therefore isolated from the thermodynamicist conception of living forms that precedes it, but also from the one that followed it and that was well illustrated by the scientific and ideological role that Erwin Schrödinger's "what is life?" came to play.[9] This can partly explain that a scholar, who played an equally important role in nineteenth-century physiology as Darwin did for evolutionism, underwent a relative purgatory. In both cases, however, and as Canguilhem pointed out, there is a question of milieu and adaptation, as well as evolution, given that physiological adaptation relies on a renewal of living forms which is not necessarily their exact reproduction, even if their function must be preserved. ▶

In conclusion, I would like to suggest that physiology is on the way to becoming Bernardian again. This is so first in view of our ability to "make new animals and plants" by acting directly on genomes, in line with Bernard's visionary prediction. But it is also (or perhaps especially?) the case given our contemporary understanding of living forms. I recently talked about this and I am here doing so again only to highlight the fact that life is unstable at all levels.[10] Although at the level of species, or of individuals, instability is obvious because it is visible; instability and the renewal associated with it ("life is creation" and "life is death") is the rule at all structural levels: genomes, membranes, cells, etc. Physiology is embedded in this permanent renewal of forms, which is the basis of regenerative medicine. Likewise, in it we find the etiology of pathologies, which may now be discovered in what derails during a morphogenetic process that ceases only with death. Here is yet another Bernardian reference, as Bernard was the first to teach us that there is not one physiology for the normal and another for the pathological.

"Physiological, pathological and therapeutic phenomena are all explained by the same evolutionary laws and differ only in particular conditions, through particular determinism".

- Claude Bernard?
- Claude Bernard of course (*Principes de médecine expérimentale*). ■

Prof. Alain PROCHIANTZ

Source: La lettre, *no. 36, May 2013*

(1) Claude Bernard, *An Introduction to the Study of Experimental Medicine*, Macmillan & Co, 1927 [1865].
(2) Georges Canguilhem, *Knowledge of Life*, Fordham University Press, 2008 [2003].
(3) Claude Bernard, *Lectures on the Phenomena of Life Common to Animals and Plants*, Thomas, 1974 [1878-1879].
(4) Alain Prochiantz, *Claude Bernard. La révolution physiologique*, Paris, Presses universitaires de France, 1990.
(5) Claude Bernard, *Principes de médecine expérimentale*, Paris, Presses universitaires de France, 1987 [1947].
(6) Xavier Bichat, *Physiological Researches upon Life and Death*, Philadelphia, Smith & Maxwell, 1809 [1799].
(7) Léon Brillouin, *Vie, matière et observation*, Paris, Albin Michel, 1959.
(8) François Jacob, *La logique du vivant*, Gallimard, 1970.
(9) Erwin Schrodinger, *What is life?* Cambridge University Press, 2012 [1944].
(10) Alain Prochiantz, *Qu'est-ce que le vivant ?* Éditions du Seuil, 2012.

Prof. Alain PROCHIANTZ
Morphogenetic Processes

Sketch by Claude Bernard, © Collège de France

Seminar in Tribute to Claude Bernard. Papers are available at www.college-de-france.fr, on Prof. Prochiantz's page

WEDNESDAY 15 MAY 2013

What is the Living?
Alain Prochiantz
Simulation of Experimental Reasoning
Jean-Gabriel Ganascia
Claude Bernard, Bergson, Canguilhem (and Beyond): which Resurgences, which Ruptures, which History
Frédéric Worms
The Politics of the Living: the Third Reich in Context (1933-1945)
Johan Chapoutot
The milieu intérieur in 2013. A Bernardian View
Pierre Corvol
Claude Bernard Seen by a Diabetes Specialist
Michel Marre
Animal Experimentation
Anne Fagot-Largeault
Silent Embryogenesis, a Bernardian Concept
Beatrix Rubin

THURSDAY 16 MAY 2013

The Experimental Approach
Claude Debru
Is Vital Activity Movement?
Rocco Ronchi
Physiology and Systemic Biology
Philippe Kourilsky
Memory and Affect Depend on Stem Cells in Adults
Pierre-Marie Lledo
The Role of Mathematics in the Study of Biological Phenomena
Dominique Lambert
Claude Bernard and the Buffonian Complex
Thierry Hoquet
Claude Bernard's Posterity
Christian Bange
22,000 Handwritten Pages Online: Browsing, Seeing, Reading or Deciphering?
Nicolas Postel-Vinay

With the support of the Fondation Hugot of the Collège de France

An Exceptional Scientific Heritage: the Claude Bernard Handwritten Collection Goes Digital

The Claude Bernard collection, bequeathed to Arsène d'Arsonval in his will and passed on to the Collège de France in 1949, counts close to 23,000 pages, now available online.

Conceiving, filing, digitizing

From a chronological point of view, the collection includes notes taken during the winter of 1838-1839 (while Bernard was a student) and a notebook completed shortly before his death, in 1878. However this collection neither has a "beginning" nor an "ending" identified as such by its author, as Bernard wrote in several notebooks at the same time. Although his notes were not filed chronologically or by subject, he made sure to give most of his notebooks and loose pages titles and subtitles. Moreover, he numbered most of the pages of his notebooks by hand. At the Collège de France's request, Mirko Drazen Grmek (1924-2000), one of the most eminent specialists on Bernardian thinking, spent six years combing through each page and each note to give them a place in the Bernardian puzzle. Thanks to him, the collection is now filed into 20 series of notebooks and 15 series of loose pages. These markers have been kept in digital format, thus in keeping with the spirit of the *catalogue raisonné* published by Grmek.[1]

Digitizing the archives consisted in photographing all the pages of the collection in their various forms: notebooks, inserted or pasted pages, and notes that had been detached. In order best to render the original state of the copied documents, the front and back covers of the notebook were not overlooked, nor were certain blank pages which were also copied, bearing in mind that the position of a note within a notebook is likely to be interpreted.

"Seeds of Thought": a Bernardian archaeology

The written collection offers a complementary perspective on the published work. While the lecture notes sometimes served simply as memos, elsewhere they constituted "seeds of thought" which Bernard did not want to lose but did not have the time to develop that day. The notebooks and detached notes are never presented as correspondence or a collection of anecdotes, nor can they be seen as a "draft" of his published work. They constitute a corpus that neither Bernard nor his students edited, and that provide raw material for the historians of science and the philosophers who wish to understand the traces of a "science in the making", which are very different from the development of a constituted science. The notebooks are an immediate – and as such probably faithful – reflection of the researcher's actions; those leading to results not yet understood, contradictory data very distinct from the elegantly formulated syntheses or demonstrations. Studying them provides keys, not only for marvelling at the "I found it", but also in order to reflect on the "how I found it", to use Alain Prochiantz's expressions.[2]

Thanks to the internet, there is no longer any need for specific authorization, to go onsite or to browse through each page of the handwritten collection. Yet digitization certainly does not remove all the obstacles to reading Bernardian manuscripts. In addition to difficulties in deciphering the calligraphy – which is not always readable – there are difficulties in making sense of the very content. Accurately following the detail of certain recorded experiments requires not only sound physiological knowledge, but also knowing how to grasp technical details of laboratory manipulations as they were performed in the nineteenth century. Beware of anachronisms. For example, reading Bernard's text, it is impossible for today's reader not to be aware of the existence of insulin (discovered in 1922) or the tremendous role statistics came to play – after Bernard – in biomedical research. This explains the criticisms one may find here and there, accompanied with truncated citations, made against Bernard for not having discovered insulin or for having been so wary of the quantification of life forms. In retrospective interpretation, great caution can only be encouraged, especially when it comes to personal notes taken at the time of an experiment. The scientific impact of putting these Bernardian manuscripts online will be determined by the philosophical or epistemological work to come. This collection is an extraordinary site for archaeologists of knowledge. ■

Nicolas POSTEL-VINAY

Source: La lettre, *no. 36, May 2013*

(1) *Catalogue des manuscrits de Claude Bernard* (Catalogue of Claude Bernard's Manuscripts), established by Mirko Drazen Grmek with the collaboration of the Collège de France, Masson et Cie, Paris, 1967, 420 p.
(2) Alain Prochiantz, *Claude Bernard, la révolution physiologique*, Paris, 1990.

• The collection was digitized thanks to the Fondation de l'Orangerie and to its generous donors.
• https://salamandre.college-de-france.fr

Nicolas POSTEL-VINAY
Georges Pompidou European Hospital, Paris

YVES LAPORTE

Tribute to Yves Laporte

Yves Laporte was born in Toulouse on 21 December 1920. During the Second World War he was a member of the French Resistance and in 1945, following his demobilization from the First French Army, he was awarded the Médaille de la résistance and the Croix de Guerre.

On the advice of Alfred Fessard, then Chair of Neurophysiology at the Collège de France, he left for a two-year period in the United States, owing to the support of the French Ministry of Foreign Affairs, and then of the Rockefeller Foundation. There he studied under the supervision of the renowned American physiologist Stephen Kuffler, who also mentored David Hubel, Torsten Wiesel and Eric Kandel. On his return to France in 1947, he was awarded his PhD in medicine in Toulouse, where he settled until 1971, with the exception of a second two-year stay (1949-1951) at the Rockefeller Institute, working with Lorente de Nó and David Lloyd. During his years in Toulouse he was Professor of Physiology at the Rangueil Faculty of Medicine, until he succeeded Alfred Fessard as Chair of Neurophysiology at the Collège de France, in 1972. As *Administrateur*, he directed the Collège from 1980 to 1991, the year of his retirement. In 1985 he was elected to the Académie des sciences and was promoted to the rank of commandeur of the Légion d'honneur in 1999. He was decorated with the Grande Croix of the Ordre national du mérite in 2006.

Most of Yves Laporte's work was concerned with the muscular mechanoreceptors called spindles. These are highly complex sensors found in mammals, in all the muscles whose contraction allows the limbs and the body to move. Spindles are essentially comprised of a small fascicule of special muscle fibres – intrafusal fibres – that support the sensory endings innervated by afferent nerve fibres with a high conduction speed. These sensors send the central nervous system messages to signal voluntary or involuntary changes in muscle length. These messages are combined with those that come from other sensorial sensors (visual system and vestibular system). In addition to this first control, the spindles' sensitivity is modulated through a central motor innervation transmitted by the axons of the gamma motoneurons, situated in the spinal cord, of which two types exist, known as "static" and "dynamic". The latter increase the signal of change in muscle length when the former increase the frequency of afferent nerve fibres' discharge. This complex neuronal circuitry, which allows for the integration of information on muscles' state of contraction and of central instructions, plays a fundamental role in controlling movement. A large part of what we know about the properties of muscle spindles and their central innervation comes from Yves Laporte and his collaborators' works.

Prof. Yves Laporte, Chair of Neurophysiology from 1972 to 1991 and *Administrateur* of the Collège de France from 1980 to 1991

These discoveries owe a great deal to outstanding experimental skills. With Paul Bessou, Yves Laporte developed a revolutionary method to study the afferent messages of a single muscle spindle. The same method is used to isolate specific motor fibres stemming from gamma motoneurons situated in the spinal cord, in the same motor nucleus as the alpha motoneurons which innervate muscle fibres. With Françoise Emonet-Denand, he discovered the existence of skeletal-fusimotor motoneurons whose axons simultaneously innervate spindles and "ordinary" muscle fibres. These are the beta motoneurons, of which there are two types: dynamic and static. With Julien Petit, he worked on afferent nerve fibres and with David Barker he studied the nerve fibre endings that ensure the motor innervation of the spindle's muscle fibres. He also studied these fibres' histochemistry, demonstrating that their enzymatic equipment is very similar to that of ordinary muscle fibres.

At the Collège de France, alongside the above-mentioned work which earned him international recognition, he hosted brilliant and innovative teams, and supported certain, and sometimes risky, scientific ventures. Michel Imbert's team evidently comes to mind, which pioneered work on the development of the visual system. Or Pierre Buisseret's and Léna Jami's teams, who worked with him for a long time on spinal motoneurons. This generosity and his success are evidenced, for example, by his support of the INSERM 114 Unit, which was hosted on the Collège's premises before its Director, Jacques Glowinski, was himself elected to the Chair of Neuropharmacology in 1981. Yves Laporte was also highly attentive to the French neurophysiology scene, which is how he came to notice and help several young teams outside our institution, including that of Alain Berthoz who was developing a promising line of research on ocular motricity at the Centre de recherche des Cordeliers (CRC).

Yves Laporte was not only a master in neuroscience and a discoverer and protector of young talent: he also dedicated several years, as the *Administrateur* of the Collège de France, to the evolution and modernization of our institution. With great tenacity and highly effective discretion, he worked for the Collège de France and its development. Without his efforts, it is unlikely that the Collège de France would have had the Cardinal-Lemoine buildings and those of the Rue d'Ulm today, and it is he who was behind the creation of the Fondation Hugot. As a man of consensus, who knew how to be firm but preferred to avoid unnecessary conflict, he readily consulted with his colleagues, especially Professors François Morel, François Gros and Jacques Glowinski. He furthermore launched important reforms, including the establishment of a governing board that bore witness to the importance he attributed to staff's participation in the life of the institution.

To sum up what Yves Laporte's name echoes for many, beyond his scientific excellence and his role as a pioneer, he was a man devoted to the collectivity, who was able to listen; a man of immense modesty and remarkable tolerance, which in no way detracted from the acuity of his judgement. Characterized by tranquil patience, he knew how to "gauge things" with a wonderful mix of seriousness and humour.

Those who benefited from Yves Laporte's teaching, from his advice, his fair criticisms always given courteously, and his encouragements, in fact, all those who had anything to do with this man will, for a long time to come, legitimately be moved by the mention of his name and the memory of his silhouette of indescribable elegance. ■

Profs Alain BERTHOZ, Jacques GLOWINSKI and Alain PROCHIANTZ

Source: La lettre, *no. 36, May 2013*

Tribute to Yves Laporte. Papers are available at www.college-de-france.fr, on Yves Laporte's page

Opening
Serge Haroche, *Administrateur* of the Collège de France

CHAIRPERSON: Jacques Glowinski
The Neuromuscular Spindle. From Toulouse to Paris.
Michel Imbert
When a Deputy Director Meets an Administrateur
Pierre Buisseret
Performing an Experiment with Mr Laporte
Lena Jami
At "Yves Laporte's School"
Daniel Zytnicki
Yves Laporte, "An Exemplary Head of Laboratory"
Chantal Milleret

CHAIRPERSON: Léna Jami
Between the Spinal and the Cerebral, such a Lasting Friendship
Pierre Buser
Yves Laporte: a Human Neurophysiology Master too
Emmanuel Pierrot Deseilligny
Yves Laporte's Footsteps: from Muscle Spindles to the Spinal Cord
Elzbleta Jankowska
From the Marey Institute to the Collège de France, Unforgettable Encounters
Jean Azerad

CHAIRPERSON: Michel Imbert
My First Administrateur
Jean-François Rigoni
The Administrateur *of the Collège and the Vice-Administrateur of the Faculty*
Gilbert Dagron
A Determined Man
André Miquel
Courtesy at the Service of Rigour and Tenacity
Jacques Glowinski
Six Years as Administrateur *in Yves Laporte's Footsteps*
Pierre Corvol
Yves Laporte and the Notion of Motor Anticipation
Alain Berthoz
Yves Laporte: the Collège de France and the Académie des sciences
François Gros
An Impressive Neuroscientist
Émile-Étienne Baulieu
Gallant and Courteous
Michel Zink
At the Comité consultatif national d'éthique (CCNE)
Anne Fagot-Largeault
Yves Laporte and the Singer-Polignac Foundation
Yves Pouliquen

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Prof. Alain BERTHOZ
Physiology of Perception and Action (1993-2010)
Prof. Jacques GLOWINSKI
Neuropharmacology (1983-2006)
Prof. Alain PROCHIANTZ
Morphogenetic Processes



Prof. Gilles Veinstein, Chair of Turkish and Ottoman History from 1999 to 2012

Tribute to Gilles Veinstein

Gilles Veinstein was born on 18 July 1945 in Paris. His father was a lawyer in Grasse, but soon embarked on a new career by doing a PhD on the history of theatrical staging, which allowed him to enter the CNRS and become a librarian at the Bibliothèque de l'Arsenal. He was also a university lecturer. His mother worked at the Ministry of Culture and was a recognized specialist on Paul Claudel and Jules Romain.

Gilles Veinstein was a good student, who completed his schooling at the Lycée Janson de Sailly. He obtained his baccalauréat in 1963 and passed the competitive entrance examination for the École normale supérieure in 1966.

Drawn by "elsewhere", as he put it, he became interested in the Islamic Orient. His encounter with Alexandre Bennigsen, a specialist on Soviet Muslims, was decisive. Bennigsen drew his attention to the Ottoman Empire, which had a wealth of archives at least as significant as those of the great European countries, which were only starting to be exploited. Gilles Veinstein thus completed his studies in history at the Sorbonne, earning him an *agrégation* in 1970, while learning Turkish at the École nationale des langues orientales vivantes (ENLOV), which became the Centre universitaire des langues orientales vivantes (CULOV) during his time there, and ultimately the INALCO. Louis Bazin was the one who initiated him to the Turkish language and civilization. At the École pratique des hautes études (EPHE), he was taught to read the difficult Ottoman language by his masters Pertev Boratav, Irène Beldiceanu Steinherr and Nicoara Beldiceanu.

In 1972, after his military service, he directly joined, as project manager, the sixth section of the EPHE, which became the École des hautes études en sciences sociales (EHESS) in 1975. He spent most of his career in this institution, becoming assistant lecturer and then lecturer from 1977 to 1986, when he became senior researcher (Directeur d'études). He thus belongs to the generation of historians who were exempted from doing a *thèse d'état*.

His earliest research followed Alexandre Bennigsen's guiding threads, such as, the contribution of Ottoman sources to the knowledge of the Empire's partner countries. He first studied the Ottomans north of the Black Sea, that is, the Crimean Khanate, and he showed the continuity with the previous era. The situation could no longer be described in terms of decadence, but rather in terms of economic integration related to the supplying of Istanbul, the Empire's huge capital. Gilles Veinstein also shed new light on the period preceding the Russian conquest, for example on the Cossacks' origins.

From the Empire's periphery, he then turned to the study of the basic structures of the Ottoman economy. His goal was to verify, and also to challenge, old Marxist approaches (Asiatic mode of production) as well as new ones (theory of the world-economy). With this formidably complex question, which matched the attention paid to economic and social structures at the time, he could no longer limit himself to the information obtained from the central archives. He needed to work with local sources closer to the people, primarily represented by the provincial kadis' registers, the equivalent of our notary and legal archives. He thus carried out pioneering work on Balkan and Aegean archive collections. His findings, which showed that in many cases non-Muslims preferred to turn to Muslim courts rather than to their community court called into question the common understanding of relations between Muslims and non-Muslims. He also found important documents on the arrival of Spanish Jews in the Ottoman Empire.

Thus equipped, Gilles Veinstein addressed the crucial question of the study of the Ottoman State. This issue had long been overlooked, since the supposed decadence of the Muslim world was usually considered to have begun in the sixteenth century. He was one of the major actors of the movement which redefined the history of classical Islam as extending up to the eighteenth century. Personalities like Bernard Lewis or Halil Inalcik were protagonists of this historiographical revolution. Far from decadence, what those historians highlighted was that on the contrary, the State and social institutions were being perfected. Concrete knowledge thereof could finally be obtained through these archives which went into the depths of daily life. At the same time, Gilles Veinstein was faced with the persistence of turcophobia that was linked to the painful circumstances of the Empire's last decades, when the latter was faced with the national movements seeking to institute successor States. The French scholar was instrumental in the creation of centres for Ottoman studies in the Balkan countries.

In 1995, bringing together Bennigsen's and Bazin's heritages, he created the CNRS URA "The Turkish and Ottoman World". For him, a research laboratory was not an aggregate of people, but a wise assemblage of personalities that had to be compatible with one another and driven by common goals, even if their research fields differed. This explains the exceptional success of his team and its extraordinarily friendly atmosphere. Throughout his life as a researcher, he encouraged the creation of a seminar to study Ottoman documents, initiating the following generations of specialists on the Ottoman Empire. His natural curiosity and the vicissitudes that marred access to the Istanbul archives led him to multiply the resources on these subjects in Bulgaria, Greece, Venice, Rome, and Nantes. Over the last ten years, he thus carried out research with a small Franco-Greek team on the rich archives of the Monastery of Saint-John in Patmos. With his research companions, he led collective work on the history of Sufi brotherhoods and of death in the Ottoman Empire, a particularly innovative subject.

Subsequent to an unfortunate interview with Bernard Lewis in *Le Monde* in 1993, which marginally addressed the issue of the 1915 Armenian genocide and cost the American academic a legal conviction, Gilles Veinstein defended the great Islamologist, venturing somewhat imprudently into a chronological area with which he was not fully familiar. While he could not be sued for taking a stand, he was harassed by militants of the Armenian cause for several years. It even jeopardized his election at the Collège de France for some time. All those close to him know how wounded he was by this painful affair.

It was with his teaching at the Collège de France, from 1999 onwards, that he reached his intellectual maturity. Owing to his intimate knowledge of Ottoman archives, he went far beyond mere erudition, discussing the spirit of the institutions and constantly relying on solid points of reference. He started by discussing the nature of the Ottoman sultanate and caliphate, clarifying the history of the dynasty and of the institutions linked to it. These first four years of lectures coincided with the publication, with Nicolas Vatin, of the great book *Le sérail ébranlé* in 2003. This was an essay on the deaths, depositions and accessions of sultans; a synthesis based on the systematic reading of Ottoman chronicles. It dealt with the history of death in Islamic land as much as that of the complex management of successions to try and avoid wars between the heirs of the deceased sovereign. The whole question of the nature of power was thus raised.

The following five years were devoted to the relations between the Ottoman Empire and Europe, and to the fact that the Empire was largely a European power integrated into the Christian powers' complex systems of alliance. In parallel, he wrote the part dedicated to the modern era in the book on *Europe and Islam*, in collaboration with John Tolan and myself.

In 2008/2009, Gilles Veinstein undertook a major synthesis on the "slaves of the Ottoman Porte", that is to say, the Empire's ruling class. When he received the Légion d'honneur in 2010, he stated with melancholy that to him the honour meant that he had entered the autumn of his life. A few months later, the illness that took his life was revealed. His state of fatigue did not allow him to carry on working despite moments of remission; hence his decision to take early retirement. He died on 5 February 2013.

Listening to one of Gilles Veinstein's lectures was an intellectual pleasure. One had the impression of witnessing a real police investigation, as he always started from available documents, and then, by a process of elimination, arrived at a magnificent synthesis. While he wrote little in the lines of large books, he provided far more in a few pages than many highly repetitive books could. He was highly cultured and made moderate use of comparison with other times and places. He facilitated extensive collective work and was a great master, in every senses of the word. ■

Prof. Henry LAURENS

Source: La lettre*, no. 37, December 2013*

Prof. Henry LAURENS
Contemporary Arab History

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INSTITUTE OF BIOLOGY

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  Morphogenetic Processes

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Director: Prof. Alain PROCHIANTZ,
Morphogenetic Processes
Contact information:
nicole.braure@college-de-france.fr

The Centre for Interdisciplinary Research in Biology (CIRB) is a new Collège de France/CNRS/INSERM research structure located at the Collège de France in the center of Paris. This organization hosts eighteen research teams from different disciplines in order to foster new collaborations within the biological fields and across the usual disciplinary divide.The nine founding groups, specialized in the fields of infectious diseases, neurosciences, and cardio-vascular research, have been joined by nine new resident research teams, primarily junior ones, including chemists, physicists, and mathematicians, who share an interest in the biological sciences. The Center will benefit from its proximity both to several other laboratories and to an extraordinary rich intellectual milieu that offers lectures on all aspects of knowledge. Outside the Collège de France, the CIRB has developed close ties with high profile neighbouring institutions, in particular the École normale supérieure and the Curie Institute.

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  Alexander FLEISCHMANN
- **Role of Matrix Proteins in Hypoxia and Angiogenesis**
  Stéphane GERMAIN
- **Junctional Communication and Interactions Between Glial and Neuronal Networks**
  Christian GIAUME
- **Stochastic Models for the Inference of Life Evolution (SMILE)**
  Amaury LAMBERT
- **Central Neuropeptides in the Regulation of Body Fluid Homeostasis and Cardiovascular Functions**
  Catherine LLORENS-CORTES
- **Molecular Control of Vascular Development**
  Anne EICHMANN
- **Development and Neuropharmacology**
  Alain PROCHIANTZ
- **Neuroglial Interactions in Cerebral Physiopathology**
  Nathalie ROUACH
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  Marie MANCEAU
- **Pathological Angiogenesis and Vessel Normalization**
  Franck LEBRIN
- **Spatial Memory and Navigation**
  Sidney WIENER

• See "Inauguration of the Institute of Physics and the Institute of Chemistry", p. 89.
• See the CIRB website at www.college-de-france.fr/site/en-cirb/index.htm

The Collège de France Committee on Scientific and Strategic Orientation (COSS)

The Committee on Scientific and Strategic Orientation (COSS) was created by the Collège de France in 2003. The COSS consists of 12 leading scholars and scientists from abroad, chosen by the Faculty, which also appoints the Chairman and the Vice-Chairman of the Committee.

The role of the COSS is to analyse the Collège de France's scientific and strategic orientations and the conditions for fulfilling its missions, so that it can make recommendations on how these might evolve or be enhanced. The COSS also examines the coherence of the institution's strategy, the significance and the exploitation of the multidisciplinarity of its Chairs, its international policy, the adequacy of its research resources in relation to its objectives, and the optimization of its administrative structures. The COSS is not expected to examine individually the scientific activities of each Chair, as these are evaluated by outside experts.

The members of the COSS are appointed for a period of four years, and half of the Committee is renewed every four years. ■

Composition of the COSS (2013)

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Suzan BERGER, Chairman, Political Science, Massachussetts Institute of Technology, USA

Lorraine DASTON, History of Science, Max Planck Institute, Germany

Luiz DAVIDOVICH, Physics, Universidade Federal do Rio de Janeiro, Brasil

François DIEDERICH, Laboratory of Organic Chemistry, Swiss Federal Institute of Technology Zurich (ETH), Switzerland

Anne EPHRUSSI, Biology, European Molecular Biology Laboratory (EMBL), Heidelberg, Germany

Didier FASSIN, Anthropology, School of Social Science, Institute for Advanced Study, Princeton, USA

Jonathan HAY, Institute of Fine Arts, New York University, USA

Helmut HOFER, Mathematics, Institute for Advanced Study, Princeton, USA

Ann JEFFERSON, Medieval and French Languages, Oxford University, United Kingdom

Dominique LAMBERT, Vice-Chairman, Physics / History of Science, Louvain la Neuve, Belgium

Suzanne PRESTON-BLIER, Fine Arts and African American Studies, Sackler Museum, Harvard University, USA

A Partnership Agreement between the Institut français de Tunisie and the Collège de France

John Scheid with Valéry Freland at the French Institute in Tunis

On 15 March 2013, the longstanding relations between the Institut français de Tunisie and the Collège de France led to an agreement signed by Valéry Freland, Director of the Institut français de Tunisie, and John Scheid, Vice-*Administrateur* of the Collège de France.

Since the winter of 2007, when Claude Cohen-Tannoudji and Claude Hagège inaugurated the lecture series, four different professors have delivered annual lectures in Tunis, in a scientific venue, in another one open to a large public, and in a high school. Over the past six years, 28 professors have taken turns to present their recent research in Tunis, to engage with the Tunisian public, and to make contacts with colleagues and PhD students.

During this visit, Professor John Scheid and Yannick Le Roux, scientific cooperation attaché, who was the soul of the project for several years, visited heads of the partner institutions hosting these events. They first met with the Vice-Chancellor of the Université de Tunis, Hmaïd Ben Aziza, and with the Dean of the Faculté des sciences humaines et sociales de Tunis, Noureddine Kridis. Then, with the Principals of the lycées français Pierre Mendès-France (Mutuelleville) and Gustave Flaubert (La Marsa), and with two teachers who coordinated the lectures in these schools, they discussed how to improve the dialogue between visiting professors and high-school pupils. For the students too these visits were memorable events, especially, for instance, for the young student whom Xavier Le Pichon sent to stand in the corner during his lecture. The afternoon was devoted to discussions with Khaled Ghédira, Chairman of the Cité des Sciences, Jilani Lamloumi, Vice-Chancellor of the Université Virtuelle de Tunis, and Kamel Gaha, Head of the Bibliothèque nationale, who either host or broadcast our lectures.

All of the partners expressed their satisfaction with the way the lecture series were run, noting that they saw them as a tangible sign of the longstanding cultural and scientific relations between France and Tunisia. ■

Prof. John SCHEID

Source: La lettre, *no. 36, May 2013*

Lectures in Tunis by Collège de France's Professors

- **2007:** Claude COHEN-TANNOUDJI, Claude HAGÈGE, Jacques LIVAGE, Nicolas GRIMAL, Christine PETIT, Jean-Marie DURAND
- **2007-2008:** John SCHEID, Pierre CORVOL, Pierre-Louis LIONS, Jean-Pierre CHANGEUX, Nicole LE DOUARIN
- **2008-2009:** Michael EDWARDS, Antoine COMPAGNON, Alain PROCHIANTZ, Xavier LE PICHON
- **2009-2010:** Michel ZINK, Anne CHENG, Esther DUFLO, Mathias FINK
- **2010-2011:** Serge HAROCHE, Gérard BERRY
- **2011-2012:** Henry LAURENS, Pierre ROSANVALLON, Marc FONTECAVE, Jean-Marie TARASCON
- **2012-2013:** Claudine TIERCELIN, Jean-Pierre BRUN, Pierre BRIANT

Prof. John SCHEID
Religion, Institutions and Society in Ancient Rome

Six Years of Collaboration with the Peter Wall Institute for Advanced Studies (PWIAS) 2008-2013

The interaction between the Collège de France and the Peter Wall Institute for Advanced Studies (PWIAS) of the University of British Columbia (Canada) exemplifies the synergy that can develop between two institutions that share the same values regarding the impact of multidisciplinary knowledge on academia and society.

The remarkable proactivity of both parties, especially of the Head of the PWIAS, Professor Janis Sarra, and of Professor Brett Finlay on the Canadian side, has enabled us to continue fostering the close ties first established by Professor Alain Berthoz, which led to the creation of the Collège de France's Visiting Chair in Vancouver in 2008. Five Collège de France professors have thus delivered some of their annual teaching in Vancouver, as Distinguished Professors. As a result of these exchanges, four symposia have been organized in Paris and Vancouver in turn, with the valuable support of the Collège de France's Fondation Hugot. Our Faculty has decided to renew the partnership agreement for a further four years.

In September 2013, Professors Anne Cheng and Philippe Descola spent three weeks in Vancouver, where they delivered high-level lectures.[1] These two Collège de France professors, along with Professor Philippe Sansonetti, spoke at the bi-annual symposium of the Association of University-Based Institutes for Advanced Studies, held this year at the PWIAS. Their participation reinforced the Collège de France's presence within this network, and helped to promote its strengths. The discussions addressed several major themes: the relationships between art and science, between science and technology, and between science and society/ies, as well as the plurality of audiences, the relations between science and traditional knowledge, multi-disciplinarity, research freedom, and visual representations in science.

On 10 and 11 June 2013, the Collège de France in turn hosted a symposium co-organized by the PWIAS (Prof. Brett Finlay), the Chair of Microbiology and Infectious Diseases (Prof. Philippe Sansonetti) and the Chair of Anthropology of Nature (Prof. Philippe Descola and Mr Frédéric Keck). This international symposium on "Zoonoses and Emergence of New Infectious Diseases: Biology Meets Anthropology", provided a forum for highly fruitful and original discussions about the human factors in the emergence of infectious disease. The speakers included PWIAS members and scientists from British Columbia.

In 2014, the Collège de France will welcome several scholars from the PWIAS, and will host an international symposium on the theme "Microbiota, Nutrition and Metabolism", under the aegis of both institutions. Prof. Philippe Sansonetti and Mr Frédéric Keck are also taking part in reflection meetings initiated by the PWIAS, on the role of microbiota in human evolution. The Consulate General of France in Vancouver supports the dynamic interaction between the Collège de France and the PWIAS. ■

Prof. Philippe SANSONETTI

(1) During their visit, Professors Cheng and Descola delivered two lectures, on "The French Invention of Sinology as an Academic Discipline" and "What is Anthropological Knowledge?", respectively.

Symposium "Zoonoses and Emergence of new Infectious Diseases: Biology Meets Anthropology", Loretta Cormier (University of Alabama, Birmingham) 10 and 11 June 2013

Prof. Philippe SANSONETTI
Microbiology and Infectious Diseases

Collège de France's Lecture Series in Athens, 2012/2013

The Collège de France actively fosters international exchange as part of its mission to disseminate knowledge. In recent years it has developed mutually beneficial partnerships that have seen "Collège de France lecture series" organized in various countries, in collaboration with local academic institutions, and often relayed by the media.

The first cycle was launched in 2007, on the initiative of Prof. John Scheid, Chair of Religion, Institutions and Society in Ancient Rome, with the Institut français de Tunisie. Other countries presently concerned are (in chronological order): the United-Kingdom, Spain, South Korea, Hungary, Morocco, Romania, the Netherlands, and Indonesia.[1] In 2013, a new cycle was organized in Greece by the Institut français d'Athènes and the French Embassy, in partnership with Megaron (a concert hall). From January to May, five professors were invited to deliver lectures related to their teaching at the Collège de France[2]:

15 January: Karol Beffa, "Why still Compose Music?" (with guest speaker **Giorgos Kouroupos**, composer and pianist):

There is little interest in contemporary music among the general public, even among music lovers. Is this the public's fault or that of contemporary music? Does all kinds of music have the same value? With a few musical examples, Karol Beffa launched the discussion on these questions.

14 February: Antoine Compagnon, "Literature a User's Manual" (**Nikos Bakounakis**, Associate Professor of Journalism, Panteion University of Athens):

What is the purpose of literature? At a time when reading is being revolutionized by digital media, Antoine Compagnon examined this question drawing on Baudelaire and Proust.

26 February: Henry Laurens, "A Survey of the Arab Spring" (**Giannis Mazis**, Professor of Economic Geography and Geopolitics of the Middle East and Turkey, University of Athens):

The Arab Spring took the entire world by surprise. Henry Laurens discussed the subject of revolution in the Arab world, the underpinnings of authoritarianism, and the evolution of the situation since the beginning of 2011.

13 May: Denis Knoepfler, "Athens and Rome on the Eve of the Roman Conquest of Greece" (**Athanasios Rizakis**, Director of Research, National Hellenic Research Foundation):

Drawing on epigraphic sources, Denis Knoepfler examined the history, institutions and religion of Athenian society, in relation to Rome, in the turmoil of the *bellum civile* and the siege and capturing of the city. He thus described the end of an era.

28 May: Roger Chartier, "From Past to Present. Listening to the Dead with our Eyes (History, Literature and Memory)" (**Antonis Liakos**, Professor of History and Historiography, University of Athens):

Roger Chartier argued that historians do not have a monopoly on the representation of the past. The singular strength of works of fiction and of collective and individual memory lend a presence to the past which is often stronger than that found in history books.

The Collège de France Lecture series will be continued in 2014 in Greece, with the participation of Serge Haroche, Alain Prochiantz, Pierre Briant, Pierre-Michel Menger and Jean-Pierre Changeux. The series is expected to strengthen existing collaboration between various Greek institutions, to foster intellectual debate, and to make scientific knowledge available to an increasingly wider audience. ■

Despina CHATZIVASILIOU

(1) For further details, see "The Collège de France International Relations, *Collège de France Newsletter* , no. 7, 2011/2012, p. 100-102.

(2) Lectures were held at Megaron, with simultaneous translation into Greek, and were recorded by the company ΔΙΑΥΛΟΣ (https://webcast.grnet.gr).

Despina CHATZIVASILIOU
Religion, Institutions and Society in Ancient Rome

INTERNATIONAL
VISITING PROFESSORS 2012/2013

VISITING PROFESSORS

AFGHANISTAN

Prof. Khair Muhammad KHAIRZADA, Director of the Afghan Institute of Archaeology (AIA) (Jean Kellens, Indo-Iranian Languages and Religions), Kaboul 29 November 2012: « Mes Aynak, un site majeur pour l'histoire du bouddhisme et de l'économie en Afghanistan ».

GERMANY

Prof. Stefan MAUL, Heidelberg University (Thomas Römer, The Hebrew Bible and its Contexts), October 2012: « Vers une compréhension de la vision du monde dans le Proche-Orient ancien »; 1. Expulser le mal. Conceptions de la maladie et de l'art médical dans le Proche-Orient ancient; 2. Nourrir le dieu ensemble – Le sacrifice comme fondement de l'identité dans l'empire assyrien; 3. L'art divinatoire dans le Proche-Orient ancien et sa signification politique; 4. L'un et le multiple. Réflexions sur le monothéisme latent de certaines représentations du divin dans le Proche-Orient ancien.

Prof. Harry FALK, Freie Universität Berlin, Director of the Institut für die Sprachen und Kulturen Südasiens (Jean Kellens, Indo-Iranian Languages and Religions), 18 June 2013: "The Prajnaparamita Manuscript from Gandhara – New Light on the Genesis of Mahayana Buddhism".

Prof. Konrad VÖSSING, University of Bonn (John Scheid, Society, Religions and Institutions in Ancient Rome), May-June 2013: 1. Gensériс, roi des Vandales et de l'Empire Romain; 2. Hunéric – « le roi persécuteur » ? 3. La culture en Afrique vandale – qu'est-ce qui a changé ? 4. La chute du royaume vandale.

ITALY

Prof. Pier Marco BERTINETTO, École normale supérieure de Pise (Carlo Ossola, Modern Literatures of Neo-Latin Europe), January-February 2013: 1. Vers une typologie des systèmes de temps et d'aspect; 2. L'acquisition des catégories de temps-aspect par l'enfant : une perspective typologique; 3. Nominaux argument et nominaux prédicat en Ayoreo (Zamuco); 4. Entre parataxe et hypotaxe : la concaténation de phrases en Zamuco.

Prof. Dario MANTOVANI, University of Pisa (Carlo Ossola, Modern Literatures of Neo-Latin Europe), April 2013: 1. Les juristes « écrivains » : y a-t-il une « littérature » juridique romaine ? 2. Le juriste « philosophe »; 3. Le juriste « historien »; 4. Le juriste « enseignant ». Conclusion : le juriste « juriste ».

Prof. Sandro STRINGARI, University of Trento (Antoine Georges, Physics of Condensed Matter), May-June 2013: Novel Superfluid Features in Ultra Cold Atomic Gases: 1. Dynamics and Thermodynamics of the Unitary Fermi Gas; 2. Second Sound and Superfluid Density of the Unitary Fermi Gas; 3. Anisotropic Dynamics of a Spin-orbit Coupled Superfluid Bose Gas; 4. Superstripes and Supercurrents in a Spin-Orbit coupled Bose Gas.

JAPAN

Prof. Yasuo KOBAYASHI, Tokyo University (Anne Cheng, Intellectual History of China), November 2012, « La chair et le ciel : une interrogation sur les fondements ontologiques du Japon de notre après-guerre ».

Prof. Nobutaka MIURA, University Chûô, Tokyo (Anne Cheng, Intellectual History of China), 21; 28 February 2013: « Les intellectuels francophones du Japon moderne et contemporain ».

SPAIN

Prof. Alberto CANTERA, University of Salamanca (Jean Kellens, Indo-Iranian Languages and Religions), May-June 2013: La liturgie longue Zoroastrienne : 1. Le parcours historico-critique des éditions; 2. Matériaux pour une nouvelle édition; 3. Changement et continuité du récitatif; 4. Changement et continuité de la forme linguistique.

Prof. José Émilio BURUCÚA, National University of de San-Martin, Buenos Aires (Roger Chartier, Writings and Cultures in Modern Europe), 13 June 2013: « Textes et images dans les rapports artistiques entre l'Italie et l'Allemagne au début du XVI[e] siècle »; 17 June 2013: *La Cène à Emmaus* : la reconnaissance de l'absent entre la peinture vénitienne de la Renaissance et l'œuvre de Rembrandt.

Prof. Michel ROSENFELD, Cardozo School of Law, Yeshiva University, New-York (Alain Supiot, The Social State and Globalization: A Legal Analysis of Forms of Solidarity), 17 April 2013: « L'aversion américaine pour les droits économiques et sociaux : question d'identité, d'idéologie ou de politique ? ».

SWEDEN

M. Jesper SVENBRO, CNRS (John Scheid, Religion, Institutions and Society in Ancient Rome), February 2013: *Hamóthen*, contingence et cheminement dans la création poétique; 1. De la Muse à la *Lettre du Voyant*; 2. Topographie de la création poétique; 3. Adventures in the Song Trade; 4. Prendre l'alphabet par les cornes.

Prof. Eva HEMMUNGS WIRTÉN, Uppsala University (John Scheid, Society, Religions and Institutions in Ancient Rome), 10 April 2013: "Celebrity Science: the Making of Marie Curie"; 17 April 2013: "The Gift that Kept on Giving: Radium and Marie Curie's 1921 American Tour".

VISITING PROFESSORS

SWITZERLAND

M. Mario BOTTA, Dean of The Academy of Architecture, University of Italian Switzerland, Mendrisio (Carlo Ossola, Modern Literatures of Neo-Latin Europe), February-March 2013: 1. Homo Faber; 2. Architecture et mémoire; 3. Architecture de la ville; 4. L'Espace du Sacré.

Prof. Christian PFISTER, Oeschger Center for Climate Change Research, Berne (Édouard Bard, Climate and Ocean Evolution), 16 May 2013: « Le petit âge glaciaire dans les Alpes et son impact sur les sociétés, 1300-1860 »; 22 May 2013: Record Breaking Hot and Dry Years – A Comparison between 2003 and 1540 in Western and Central Europe.

UNITED STATES

Prof. Fred GAGE, Salk Institute for Biological Studies, La Jolla (Alain Prochiantz, Morphogenetic Processes), October 2012: 1. Adult Neurogenesis in the Mammalian Hippocampus; 2. Modeling Human Psychiatric Disease in a Dish; 3. The Mosaic Brain: a Role for Mobile Elements; 4. Studies of Neuronal Diversity among Primates.

Prof. Edward A. DENNIS, University of California, San Diego (Marc Fontecave, Chemistry of Biological Processes), October 2012: 1. Lipidomics in Health and Disease; 2. Omega-3 Fatty Acid Function in Inflammation, Retina and Nutrition; 3. Evolution of Phospholipases in Catalysis and Cellular Function on Membranes; 4. Eicosanoid Function in Inflammatory Hyperalgesia and Pain.

Prof. Wilt L. IDEMA, Harvard University (Pierre-Étienne Will, History of Modern China), October 2012: 1. Law as Literature: the Pan (judgment) as a Legal and a Literary Genre; 2. Animals in Court: Swallow vs. Sparrow and Mouse vs. Cat; 3. Judge Bao and the Nature of Crime; 4. Judge Bao: Authority and Independence.

Prof. William BALÉE, Tulane University, New Orleans (Philippe Descola, Anthropology of Nature), December 2012: 1. Philosophical Roots of Historical Ecology; 2. Traditional Knowledge of Anthropogenic Forests in Amazonia; 3. Indigenous Arboriculture in Amazonia: Classification and Nomenclature; 4. Transitions in Amazonian Landscapes: Succession, Domestication and Transformation.

Profs Douglas HOFSTADTER and **Emmanuel SANDER**, Indiana University Bloomington and Université de Paris VIII (Stanislas Dehaene, Experimental Cognitive Psychology), 27 February 2013, « Un débat sur le cœur de la cognition ».

Prof. James B. COLLINS, University of Georgetown (Pierre Rosanvallon, Modern and Contemporary History of Politics), March 2013: 1. La République et l'État en France, 1360-1740; 2. La culture politique en France, 1640-1757; 3. Hit the Road, Jacques; 4. « L'Absolutisme » : la critique anglophone.

Prof. Michael FRIED, John Hopkins University, Baltimore (Antoine Compagnon, Modern and Contemporary French Literature), 21 and 28 March 2013: « David – Manet, une affinité ignorée ».

Prof. Henri MOSCOVICI, Ohio State University (Alain Connes, Analysis and Geometry), March-April 2013: 1. Hopf Algebra Cohomology and Diff-equivariant Characteristic Classes; 2. Spectral Functionals and the Geometry of Noncommutative Tori.

Prof. Michael A. GIMBRONE, Harvard Medical School, Boston (Alain Prochiantz, Morphogenetic Processes), 17 May 2013: "Understanding Vascular Endothelium: Nature's Container for Blood"; 24 May 2013: "Vascular Endothelium, Biomechanical Forces, and the Pathogenesis of Atherosclerosis".

Prof. Edward L. SHAUGHNESSY, University of Chicago (Anne Cheng, Intellectual History of China), June 2013: Unearthing the Chinese Classics:1. The Classic of Changes; 2. The Classic of Documents; 3. The Classic of Poetry; 4. The Laozi.

Prof. Fred LERDHAL, Columbia University (Stanislas Dehaene, Experimental Cognitive Psychology), 19 November 2013, "Musical Syntax and its Relation to Linguistic Syntax".

Printed and Online Publications

INAUGURAL LECTURES

CHAZELLE, Bernard, *L'algorithmique et les sciences*, no. 229, Collège de France/Fayard, 2013, books.openedition.org/cdf/1296

BEFFA, Karol, *Comment parler de musique ?*, no. 230, Collège de France/Fayard, 2013. books.openedition.org/cdf/1365

SUPIOT, Alain, *Grandeur et misère de l'État social*, no. 231, Collège de France/Fayard, 2013, books.openedition.org/cdf/2241

HEARD, Edith, *Épigénétique et mémoire cellulaire*, no. 232, Collège de France/Fayard, 2013, books.openedition.org/cdf/2252

BRÉCHET, Yves, *La science des matériaux : du matériau de rencontre au matériau sur mesure*, no. 233, Collège de France/Fayard, 2013, books.openedition.org/cdf/2284

KEROUEDAN, Dominique, *Géopolitique de la santé mondiale*, no. 234, Collège de France/Fayard, 2013, books.openedition.org/cdf/2288

CAZENAVE, Anny, *La Terre et l'environnement observés depuis l'espace*, no. 235, Collège de France/Fayard, 2013, books.openedition.org/cdf/3286

BERRY, Gérard, *L'informatique du temps et des événements*, no. 236, Collège de France/Fayard, 2013, books.openedition.org/cdf/3297

DALIBARD, Jean, *Atomes et rayonnement*, no. 237, Collège de France/Fayard, 2013, books.openedition.org/cdf/3301

PHILOSOPHY OF KNOWLEDGE
at the Collège de France

TIERCELIN, Claudine, *La pensée-signe*, Collège de France, 2013, books.openedition.org/cdf/2209

TIERCELIN, Claudine, *Hilary Putnam, l'héritage pragmatiste*, Collège de France, 2013, books.openedition.org/cdf/2010

TIERCELIN, Claudine, *C. S. Peirce et le pragmatisme*, Collège de France, 2013, books.openedition.org/cdf/1985

BOUVERESSE, Jacques, *Why I Am so Very Unfrench, and Other Essays*, Collège de France, 2013, books.openedition.org/cdf/2123

BOUVERESSE, Jacques, *Études de philosophie du langage*, Collège de France, 2013, books.openedition.org/cdf/1949

INAUGURAL LECTURES
In English Translation

BRUN, Jean-Pierre, *Techniques and Economies in the Ancient Mediterranean*, Collège de France, 2013, books.openedition.org/cdf/2999

SCHEID, John, *Religion, Institutions and Society in Ancient Rome*, Collège de France, 2013, books.openedition.org/cdf/3009

SUPIOT, Alain, *The Grandeur and Misery of the Social State*, Collège de France, 2013, books.openedition.org/cdf/3085

ROBERT, Jean-Noël, *Japanese Hieroglossia*, Collège de France, 2013, books.openedition.org/cdf/3094

STERN, Nicholas, *Managing Climate Change. Climate, Growth and Equitable Development*, Collège de France, 2013, books.openedition.org/cdf/2200

RÖMER, Thomas, *The Horns of Moses. Setting the Bible in its Historical Context*, Collège de France, 2013, books.openedition.org/cdf/3013

HAROCHE, Serge, *Quantum Physics*, Collège de France, 2013, books.openedition.org/cdf/3294

SANSONETTI, Philippe, *Of Microbes and Men. War and Peace on the Mucosal Surfaces*, Collège de France, 2013, books.openedition.org/cdf/3278

ROMANOWICZ, Barbara, *Physics of the Earth's Interior*, Collège de France, 2013, books.openedition.org/cdf/2294

TIERCELIN, Claudine, *Metaphysical Knowledge*, Collège de France, 2013, books.openedition.org/cdf/2198

CHENG, Anne, *Can China Think?* Collège de France, 2013, books.openedition.org/cdf/2204

LA LETTRE DU COLLÈGE DE FRANCE

***La lettre du Collège de France*, no. 36**
www.college-de-france.fr/site/lettre-du-college-de-france/lettre-n-35.htm

***La lettre du Collège de France*, no. 37**
http://www.college-de-france.fr/site/lettre-du-college-de-france/Lettre-n-37.htm

COLLÈGE DE FRANCE NEWSLETTER

***Collège de France Newsletter*, no. 7**
www.college-de-france.fr/site/en-publications/newsletter-7__1.htm

OTHER PRINTED PUBLICATIONS

ANDO, Clifford, *L'Empire et le droit*, Éditions Odile Jacob, 2013

BLOCH, Maurice, *L'Anthropologie et le défi cognitif*, Éditions Odile Jacob, 2013

CHANGEUX, Jean-Pierre (dir.), *La vie des formes et les formes de la vie*, Éditions Odile Jacob, 2012

COMPAGNON, Antoine, *La classe de rhéto*, Éditions Gallimard, 2012

COMPAGNON, Antoine, *Un été avec Montaigne*, Éditions des Équateurs, 2013

COMPAGNON, Antoine, *Une question de discipline – (Entretiens avec Jean-Baptiste Amadieu)*, Éditions Flammarion, 2013

COMPAGNON, Antoine et YOSHIKAWA, Kazuyoshi (dir.), avec la collaboration de VERNET Matthieu, *Swann le centenaire*, Éditions Hermann, 2013

DAGRON, Gilbert, *Idées byzantines (2 tomes), Éditions ACHCByz, 2012*

DELMAS-MARTY, Mireille, *Le travail à l'heure de la mondialisation*, Éditions Bayard, 2013

DELMAS-MARTY, Mireille, *Résister, responsabiliser, anticiper*, Éditions du Seuil, 2013

DELUMEAU, Jean, *De la peur à l'espérance*, Éditions Robert Laffont, 2013

DELUMEAU, Jean, *La seconde gloire de Rome XV^e^-XVII^e^ siècle*, Éditions Perrin, 2013

DESCOLA, Philippe, *Beyond Nature and Culture*, University of Chicago Press, 2013

FINKELSTEIN, Israël, *Le Royaume biblique oublié*, Éditions Odile Jacob, 2013

GUESNERIE, Roger, et STERN, Nicholas, *Deux économistes face aux enjeux climatiques*, Éditions Le Pommier, 2013

HÉRITIER, Françoise, *Sida – Un défi anthropologique*, Éditions Belles Lettres, 2013

HÉRITIER, Françoise, *Le Goût des mots*, Éditions Odile Jacob, 2013

KELLENS, Jean et REDARD, Céline, *La liquidation du sacrifice (Y 62 à 72)*, Éditions De Boccard, 2013

LAURENS, Henry (dir.), *Ernest Renan – La science, la religion, la République*, Éditions Odile Jacob, 2013

OSSOLA, Carlo, *À Vif – La Création et les signes*, Éditions Imprimerie nationale (Actes Sud), 2013

OSSOLA, Carlo, *Le Continent intérieur*, Éditions du Félin, 2013

OSSOLA, Carlo, *Letteratura italiana. Canone dei Classici*, Éditions UTET, 2013

PROCHIANTZ, Alain, *Qu'est-ce que le vivant ?*, Éditions du Seuil, 2012

RÖMER, Thomas, EDELMAN, Diana V. , DAVIES, Philip R. et NIHAN, Christophe, *Clés pour le Pentateuque*, Éditions Labor et Fides, 2013

RÖMER, Thomas, *La Bible, quelles histoires !*, Éditions Bayard, 2014

RÖMER, Thomas, *Dark God – Cruelty, Sex, and Violence in the Old Testament*, Paulist Press International, 2013

RÖMER, Thomas, *Writing the Bible – Scribes, Scribalism and Script*, Éditions Acumen, 2013

SCHEID, John, *Les dieux, l'État et l'individu – Réflexions sur la religion civique à Rome*, Éditions du Seuil, 2013

WACHTEL, Nathan, *Entre Moïse et Jésus – Études marranes (XV^e^-XXI^e^ siècle)*, CNRS Éditions, 2013

WEINRICH, Harald, *Le Temps : le récit et le commentaire*, Éditions Lambert-Lucas, 2013

ZINK, Michel, *Les troubadours – Une histoire poétique*, Éditions Perrin, 2013

Libraries and Archives

The Collège de France is comprised of sixteen libraries and an archival service across three sites, Place Marcelin-Berthelot, Rue du Cardinal Lemoine, and Rue d'Ulm.
Head of the Direction des réseaux et partenariats documentaires (DRDP):
Anne Chatellier. **E-mail: anne.chatellier@college-de-france.fr.**
Library catalogue: **bude.college-de-france.fr**
Digital Library and online catalogue of the archives:
salamandre.college-de-france.fr.
The libraries SUDOC (ABES University Documentation System)
http://www.sudoc.abes.fr.

General Library

The General Library has collections related to the Collège de France's past and present teaching and research activity. It contains documents concerning the present Chairs, the history of the institution, and the 800 professors who have successively held Collège de France Chairs since the institution was founded in 1530. It also contains reserve collections bequeathed by professors, such as the Marcel Bataillon and the Georges Dumézil libraries, as well as archives which can be consulted in the same building.
E-mail: bibliotheque-generale@college-de-france.fr

Library of Mathematics

E-mail: bibliotheque-generale@college-de-france.fr

Oriental libraries

Byzantine Library

The Byzantine library, founded jointly in Paris in 1929 by the American scholar Thomas Whittemore and the Boston Byzantine Institute, holds a specialized collection on Byzantine civilization in general and more specifically on early Christian and Byzantine archaeology and art, Byzantine history and literature, the history of the Orthodox Church, and liturgy, art and history of the countries influenced by Byzantine civilization (Slavic countries, Georgia, Armenia, the Near East), as well as on Coptic art and literature. In addition, specialized collections in Byzantine epigraphy, numismatics and sigillography are developed within the collection of the Byzantin Institute.
E-mail: bibliotheque-byzantine@college-de-france.fr

Library of Arab, Turkish and Islamic Studies

The library of Arab and Islamic Studies contains the collections of Louis Massignon, Jean Sauvaget, Henri Laoust, Régis Blachère, Jacques Berque, and Claude Cahen. The books it holds therefore concern all the disciplines of Arab-Islamic civilization, from the origins of Islam to the contemporary era. A large proportion of the library's books is in Arabic.
E-mail: bibliotheque-eati@college-de-france.fr

Egyptology Library

This library boasts a specialized collection of books on Pharaonic Egypt and Christian Egypt, hieroglyphic, hieratic, demotic and Coptic philology, linguistics and palaeography. It also holds collections of the epigraphy, history and archaeology of Egypt and Nubia, and the portrayal of Pharaonic Egypt from the end of paganism to the present day. Finally, it holds the collections of scholarly archives constituted by and kept by Collège de France professors and French and foreign Egyptologists, including collections of photographic archives and videos.
E.mail: bibliotheque-egyptologie@college-de-france.fr

Institute of the Ancient Near East

Library of Assyriology

This library, founded in 1936 by Charles Fossey, contains a collection specializing in the history of the ancient Near East and specifically in cuneiform, Sumerian and Assyro-Babylonian documentation. It also boasts a large collection concerning Anatolia and Hittite and Hurrite studies. The archaeology of the Near East is also well represented.
E-mail: assyriologie@college-de-france.fr

Library of West Semitic Studies

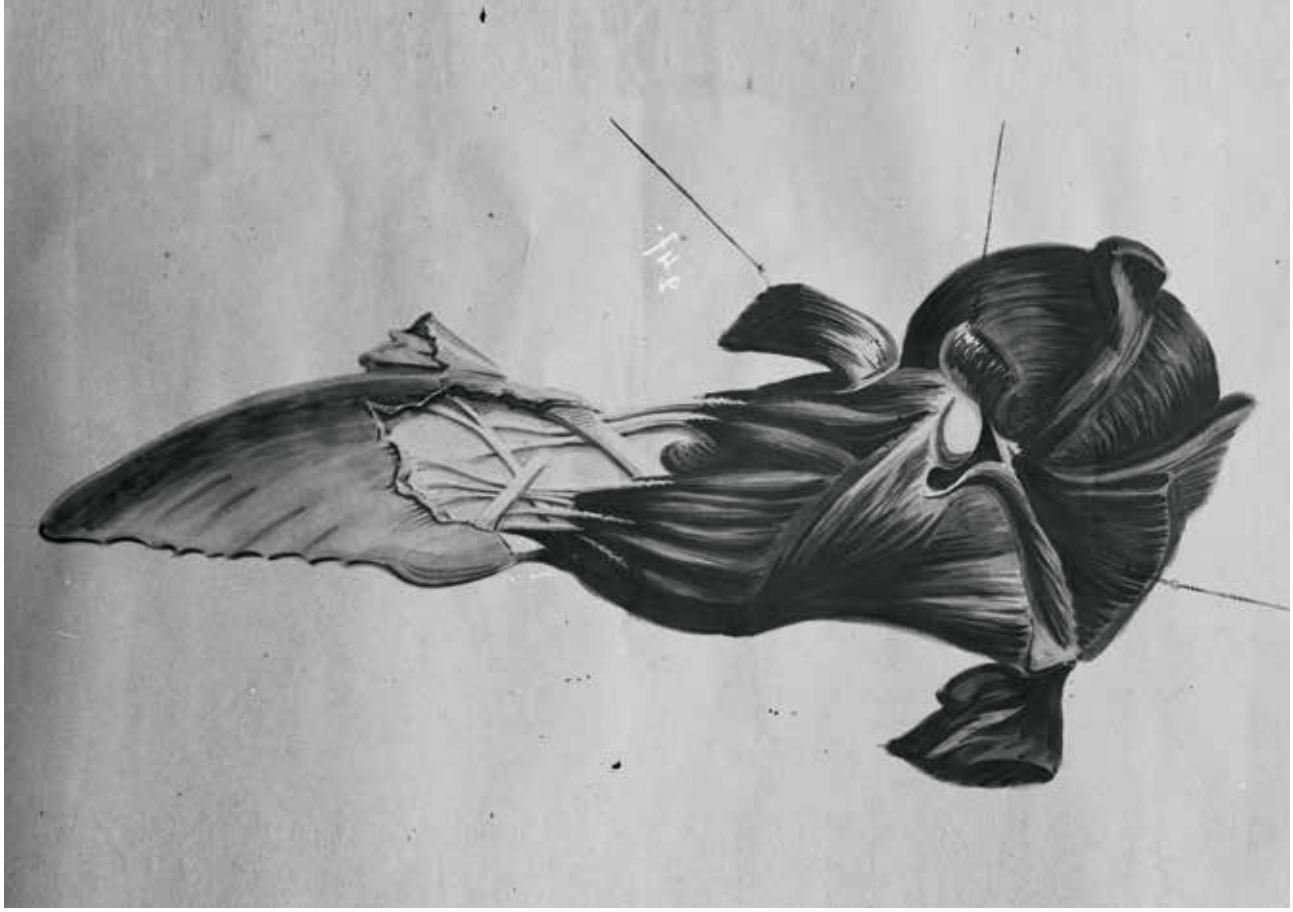
The library of the Institute of Semitic Studies holds a collection specializing in Semito-Hamitic (Afro-Asiatic) linguistics, western and southern Semitic epigraphy, and the history and archaeology of the Near East, North Africa and Ethiopia. A large part of the collection concerns the study of the Old Testament and the *Qumran* manuscripts. The Institute of Semitic studies also houses the collections bequeathed by André Dupont-Sommer, Jean Starcky and Marcel Cohen, as well as the scientific archives of the latter two scholars.
E-mail: etudessemitiques@college-de-france.fr

Library of Oriental Christianity

This library comprises books, periodicals and off-prints collections concerning the study of New Testament literature and the history of Oriental Christianity. The main subjects covered are Judeo-Christianity, Gnosticism, Syrian-Egyptian monachism, and Manichaeism.
E-mail: bibliotheque-ipoa.drpd@college-de-france.fr

Far East Institute

Far East Libraries' collections, consist of personal libraries bequeathed by Collège de France professors, and collections gathered by the Sorbonne's oriental institutes before their transfer to the Collège de France in 1972, as well as donations, transfers (the collections of the former Centre of Chinese Studies in Peking, brought back to France after 1950), and major purchases since 1973. The Chinese catalogue contains



Drawing by Étienne-Jules Marey, Unidentified Limb, undated, © Collège de France

the largest number of titles and includes rare books (*shanben*, with a published catalogue), the finest European collection of local monographs (*difangzhi*) and a rich collection of collectanea (*congshu*, with a published catalogue). The Japanese collection also comprises numerous collections on religion, literature and anthropology, as do the Korean and Tibetan collections. The Indian collection is devoted primarily to literature in Sanskrit and Indo-Aryan languages, history and archaeology. In addition, the Institute of Indian Studies library has computerized map and photograph collections covering the whole subcontinent.
E-mail: bibliotheque-ieo.drpd@college-de-france.fr
Institute of Advanced Chinese Studies:
bibliotheque-chine@college-de-france.fr
Institute of Korean Studies:
bibliotheque-coree@college-de-france.fr
Institute of Indian Studies:
bibliotheque-inde@college-de-france.fr
Institute of Advanced Japanese Studies:
bibliotheque-japon@college-de-france.fr
Institute of Tibetan Studies:
bibliotheque-tibet@college-de-france.fr

Claude Lévi-Strauss Library (Social Anthropology Laboratory)

The library, together with the laboratory, was founded in 1960, by Claude Lévi-Strauss. Its collections cover all fields of anthropology as well as related fields (sociology, history, pre-history and archaeology, linguistics, psychology and psychoanalysis, folk traditions and oral literature). It has been enriched over the years by the collections of Robert Hertz, Georges Devereux, Michel de Certeau, Isac Chiva, Ariane Deluz and Jean Pouillon, bringing together books, numerous offprints and archives. The library houses a paper copy of the Human Relations Area Files, a system of research, analysis, classification and filing of ethnographic data.
E-mail: bibliotheque-las@college-de-france.fr

Library of the Asian Society

A private institution, the library of the Asian Society is not part of the Far East Institute. It covers all fields dealing with Asia, it is devoted more to history and philology than to contemporary issues. It thus holds a fine collection of periodicals in Western and Asian languages (more than 1,800 titles). In addition, it has benefited from the bequests of entire libraries of considerable importance, primarily in the fields of Chinese studies (Édouard Chavannes, Henri Maspéro, Paul Demiéville), Tibetan studies (Jacques Bacot) and Indian and Southeast Asian studies.
E-mail: biblio.soasiatique@gmail.com

Research Institute for the History of Texts

E-mail: irht@college-de-france.fr
Greek Section:
E-mail: grecque@irht.cnrs.fr
Arab Section:
E-mail: bibliotheque-iena@irht.cnrs.fr

Archives

The Archives are run by the Direction des réseaux et partenariats documentaires. They consist in the Faculty minutes since 1656, lecture series posters since the seventeenth and the eighteenth century, audiovisual and iconographic documents, and professors' manuscripts, personal papers and scholarly documents. Access to documents is governed by the French Heritage Code. See below "The Launch of Salamandre" p. 82.
E-mail: archives.drpd@college-de-france.fr
https://salamandre.college-de-france.fr

The Launch of Salamandre

Two years ago, following the recommendations of its International Committee on Scientific and Strategic Orientation (COSS) and the proposal of its Libraries Commission, the Collège decided to organize the general library of the Collège de France as a heritage library, by holding the books published by and on the institutions' professors, as well as their archives. The Salamandre project was motivated by the desire to promote these heritage and archive collections, by gradually making them available to internet users online as they are digitized.

Salamandre is both an online catalogue and a pool of digitized heritage documents, as it meets two complementary objectives. First, it is designed to facilitate researchers' work by allowing them, from now on, to identify the items they need online, from their workplace in France or abroad, and thus to prepare their visits to the archives. Second, it is driven by the desire to make the Collège's rich heritage more visible: all internet users can now discover books, drawings, photographs and audio files retracing the history of the Collège de France, along with the discoveries made and the disciplines that have been taught there. These documents have become available through high definition digitization, and are systematically tagged with keywords and often enhanced with specialists' explanatory texts.

Several corpuses of documents, chosen for their rareness and their research value, were selected in 2011 by a steering committee comprised of several professors, librarians and archivists. This committee selected four themes: the history of the Collège de France, experimental medicine, anthropologists' fieldwork material, the sources of the Far Eastern and Near Eastern Institutes, and humanities.

Regarding the history of the Collège de France, Salamandre currently includes some 100 lecture series posters from the seventeenth and eighteenth centuries, professors' photographs, nineteenth century photographic reports on some laboratories, and a beautiful album of plans drawn up by the Collège de France architect, Jean-François-Thérèse Chalgrin (1739-1811). The platform's description of the Faculty minutes provides insights into the institution's debates, evolution and challenges.

The importance of experimental medicine at the Collège de France is illustrated by two exceptional collections: a set a manuscripts by Claude Bernard (who held the Chair of Medicine form 1855 to 1878), and over 2,000 photographic plates by Étienne-Jules Marey (Natural History of Organized Bodies, 1869-1904).

There are two types of anthropological fieldwork material. The first is comprised of copyright-free documents, such as notes taken during Claude Lévi-Strauss's lectures by his student Jean Pouillon; the manuscripts and notes of Robert Hertz (1881-1915); and photographic campaigns by geographer Jean Brunhes (1869-1930). The platform also includes documents subject to authorization from the head of the anthropology laboratory: archives of anthropological campaigns describing rituals still practiced today.

The humanities are represented by recordings of Michel Foucault's lectures and by invaluable books and photographs belonging to the libraries of the Far and Near Eastern Institutes, in particular, a set of eighteenth- and nineteenth-century manuscripts, some of which are unique, and which were brought back from Korea by Professor Maurice Courant (1865-1935) and digitized with the support of the National Library of Korea; photographic campaigns that Professor Fussman conducted on archaeological sites in Pakistan; and the archives of Thomas Whittemore (1871-1950), who was the founder of the Byzantine Library and of the Byzantine Institute.

Over the course of 2014, Salamandre will be supplemented with audiovisual archives of lectures delivered at the Collège de France by some 20 professors, such as Georges Duby, Pierre-Gilles de Gennes, Claude Lévi-Strauss and Jacqueline de Romilly.

Salamandre was created and promoted by the DRPD (Direction des réseaux et partenariats documentaires) with the technical support of the DSI (Direction des systèmes d'information). It came into being thanks to the support of the Fondation de l'Orangerie and its generous donors, and to work carried out by the Fondation du Collège de France in collaboration with the former. The National Library of Korea and the CNRS also contributed to the digitization of certain collections. ■

Prof. John SCHEID
Vice-*Administrateur* of the Collège de France
Anne CHATELLIER
Head of the Direction des réseaux
et partenariats documentaires

Source: La lettre, *no. 36, May 2013*

The platform was launched on 6 March 2013, and is available on the Collège de France homepage > Bibliothèques > Salamandre.

Prof. John SCHEID
Vice-President
of the Collège de France
Anne CHATELLIER
Head of the Direction des
réseaux et partenariats
documentaires

Pierre Janet, © Collège de France

The Janet Donation

A New Archive Collection for the Bibliothèque générale

The Bibliothèque générale's collections and the Collège's archives were recently enriched by a large archive and book collection bequeathed by Mrs Noëlle Janet, the grand-daughter of Pierre Janet, Professor of Experimental and Comparative Psychology at the Collège de France from 1902 to 1934.

This donation, which the Faculty accepted on 30 June 2013, completes the Collège's existing Janet collection, comprised essentially of books, but also of administrative and scientific archives.

The Janet collection bears witness to a time when psychology was emerging as a discipline in its own right, at the interface of philosophy and medicine. Pierre Janet (1859-1947) was a philosopher by training, a PhD graduate of the École normale supérieure, who became a physician at the age of 34 and was a follower of Jean-Martin Charcot. He started his career as a philosophy professor in Le Havre, where he studied the "lunatics". He drew on the numerous findings of this research for his PhD thesis on psychological automatism: *L'automatisme psychologique* (1889). This was the start of his highly prolific work, fuelled by his teaching at the Collège de France. Pierre Janet authored some one hundred studies, including *Névroses et idées fixes* (1898), *De l'angoisse à l'extase* (19261928) and *L'amour et la haine* (1932). In France, his books have recently made a comeback. Admirers of his work see him as an equal of Sigmund Freud, of whom they claim he was a precursor. However Janet's theories differ from those of Freud in many respects, particularly concerning the treatment of hysteria and neuroses, the role of sexuality, and the definition of the unconscious, which Janet referred to as the "subconscious". He also founded the *Société de psychologie* in 1901 and the *Journal de psychologie normale et pathologique* in 1904. His candidacy for the Chair of Experimental and Comparative Psychology at the Collège de France was presented and supported by Henri Bergson.

The archives given by Mrs Janet include 98 photographs, representing the scholar in personal and academic settings, a series of newspaper clippings relating to Pierre Janet's scientific activity, and family correspondence, particularly a set of 61 letters from Janet to his parents from his days as a young medical student. Noëlle Janet's donation also includes several books by her grandfather which were recently republished by L'Harmattan, and which complete the Bibliothèque générale's collections. Finally, the highlight of this donation, which considerably expands the Collège's existing Janet collection, is a very interesting unpublished typescript entitled "Croyances", written by Janet during the Second World War and which will likely soon be published. ■

Sarah REY
Bibliothèque générale
Anne CHATELLIER
Head of the Direction des réseaux et partenariats documentaires

Source: La lettre, *no. 37, December 2013*

The books of the Janet collection are available for consultation at the Bibliothèque générale (the list is available from the libraries' catalogue at bude.college-de-france.fr), along with the scientific archives, described in Salamandre at salamandre.college-de-france.fr (> Pierre Janet)

Sarah REY
Bibliothèque générale
Anne CHATELLIER
Head of the Direction des réseaux et partenariats documentaires

The World through Tibet's Lenses

The Newspaper *The Tibet Mirror* at the Collège de France

Not only was the Institute of Tibetan Studies (ITS) in possession of a large collection of *The Tibet Mirror* – the origin of which is unfortunately not known –, its collection also partially complemented those of the libraries of Columbia and Yale, and that of the Musée Guimet in Paris.

At the end of this operation, 70% of the entire newspaper was digitized, 30% of which came from the Columbia collection, 25% from Yale, 10% from the ITS and 5% from the Musée Guimet. The Columbia team, led by Lauran Hartley, a Tibetologist and head of the Tibetan collection at the C.V. Starr East Asian Library of Columbia, hopes to obtain the remaining 30% in 2014. This will be possible owing to the collaboration of the Amnye Machen Institute, a Tibetan cultural centre in exile, active in the promotion of the non-religious cultural heritage, and to that of the Library of Tibetan Works and Archives (LTWA) in Dharamsala (India). The LTWA was founded in 1970, ten years after the creation of the Tibetan government in exile, to preserve the rich Tibetan literary heritage.

With this digitization, a large yet hitherto unknown Tibetan journalistic, historical and linguistic heritage was made available to internet users. Although Tibetan literary production since the adoption of a system of writing in the seventh century is remarkable as regards both quantity and quality, the development of the press is a relatively recent phenomenon. It was only in 1904, in Ladakh, a Tibetan speaking area of India, that the first newspaper in Tibetan language, the *Ladakh-ki-akbar*, was published – and its issues remained irregular. A little later, between 1909 and 1911, the *amban* (the Manchu representatives of the Qing Empire stationed in Lhasa) published a bilingual Chinese-Tibetan periodical. Finally, two newspapers in Tibetan were published in China in the early republican

Bombing of monasteries in 1956 (*The Tibet Mirror*, vol. 23, no. 3, 1 July 1957, p. 3-6). The death toll of these bombings is indicated on the drawings.
(Cha phreng: 1,400 monks before the attack, "there are reportedly only seven left"; Brag mdo: 1,000 monks before the attack, "there is only one left"; 'Ba' thang: 700 monks before the attack, "there is only one left".)

period, between 1913 and 1915. *The Tibet Mirror*, issued from 1925 till 1963, did therefore have antecedents, but unlike them it enjoyed a remarkably long life and accompanied the turbulent history of Tibet for close to four decades. Throughout this period it was noteworthy for the quality of its content.

The Tibet Mirror was first established in Kalimpong, a cosmopolitan city in the north-east of India that was a thriving commercial and political centre at the time. Close to Darjeeling and closer to Lhasa than to Calcutta, in an area where Tibet was spoken, Kalimpong lay on the main trade route between India and Tibet and was home to a large community of Tibetan merchants. It was also the route of Tibetan pilgrims and traders going to Buddhist sacred places in India. Finally, children of the Tibetan nobility were at missionary boarding schools in Kalimpong.

The founder of the newspaper, Gergan Tsering Dorje Tharchin (1890-1976), nicknamed Tharchin Babu, was the son of a Christian convert from the Himalayan valley of Spiti, in the north-west of India. Tharchin Babu was first employed by the Scottish Union Mission as a teacher and then a translator. It was at the Kalimpong mission that he found an old, unused roneo machine that he repaired and then used to print the first issue of *The Tibet Mirror*. The circulation of what was soon to become a monthly was extremely modest, with an average of no more than fifty subscribers and around one hundred copies sent free-of-charge to the then Tibetan leaders. But the newspaper could pride itself on a prestigious readership: in 1926 the 13th Dalai-Lama (1875-1933), who presided over the destiny of Tibet at the head of his government which in Tibetan was called Gandän Phodrang, sent Tharchin Babu a letter of praise accompanied by a donation of twenty rupees. The 14th Dalai-Lama (born in 1935), extended the subscription, and the 9th Panchen-Lama (1883-1937) was also a subscriber.

The Tibet Mirror had several parallel titles in English, such as, *Tibet Mirror*, the *Weekly Tibet Mirror* (when it was a weekly), or else *Tibetan Newspaper*. But the Tibetan title never varied over the thirty-eight years of its existence: it remained "The Mirror of each region's news" (*Yul phyogs so so'i gsar 'gyur me long*, ཡུལ་ཕྱོགས་སོ་སོའི་གསར་འགྱུར་མེ་ལོང་).

The Mirror was the first lasting attempt to report, in the vernacular, on the political and economic affairs not only of Tibet but also of India, China and the rest of the world. The Sino-Japanese war (1937-45) and the Second World War were covered particularly closely, with many maps in Tibetan locating the battles and indicating the movement of armies. Remember that, at the time, India – where the newspaper was published – was still part of the British Empire. Since it catered not only for the political and religious elite, but also for Tibetan merchants who had businesses in Kalimpong, the newspaper provided economic news as well, including the prices of wool, of black or white yak tails, of gold, silver and musk, of butter and of various currencies. Naive illustrations, maps and, later, photographs illustrated the pages. There was also cultural news, for instance Rabindranath Tagore's visit to Kalimpong in 1938, which occupied an entire page. This was the first time that the history and work of the first Asian to have been awarded the Nobel Prize for Literature (1914) was reported in Tibetan. Finally, Gendun Chophel (1903-1951), the most eminent Tibetan intellectual of the first half of the twentieth century, frequently contributed critical articles to the newspaper.

The Mirror is of particular interest as a witness and chronicler of the progression of the troops of the young People's Republic of China, sent by Mao Zedong in 1959 to "liberate" the Land of Snow. From the late forties, the question of the status of Tibet in relation to China was one of the subjects regularly discussed in the newspaper. While most of the opinions expressed tended to be in favour of the Republican government before its expulsion from China in 1949, they clearly became nationalistic and pro-independence after 1950. An article dated 12 January 1955 stated, for example, that "claiming that the Chinese state wishes to grant Tibet its freedom or plans to do so is like a flower in the sky or a rabbit horn" – familiar images in Indo-Tibetan Buddhism to denote an ontological impossibility. The warriors and resistants of Kham, in eastern Tibet, who had witnessed the progress and abuses of the Chinese army, and who moved to Kalimpong in 1956 and 1957, described the situation to Tharchin Babu. This enabled the newspaper to publish first-hand illustrated reports on the heavy fighting between Chinese and Tibetans. After the flight and exile to India of the 14th Dalai-Lama, in 1959, Tharchin Babu refused the financial support of the Chinese authorities, as they demanded in exchange an editorial line that was favourable to them. He interrupted the publication of the newspaper in 1963, at a time when the Tibetan community in exile was starting to publish its own press.

The online publication of the mythical *Tibet Mirror*, which otherwise could not be found, was very favourably received not only by Tibetologists throughout the world, but also by Tibetans themselves. In early 2013, the site had had over 55,000 visits since it was launched in May 2009, with an average of almost ten pages seen per visit. Along with the other participants, the ITS and the Musée Guimet contributed to this success. But everything, or almost everything remains to be done as regards research. Only two researchers, Paul Hackett and Isrun Engelhardt, have started to analyze the mine of information contained in *The Mirror*. This concerns fields as widely diverse and as important for our understanding of the twentieth-century Tibetan world as Tibet's domestic and international policy, the political and economic life of the Himalayas and of Tibet stricto sensu, the Who's Who of Tibetan personalities, and of course the textual analysis of the new journalistic style that *The Mirror* contributed to elaborating. ■

Françoise ROBIN

Source: La lettre, *no. 36, May 2013*

See the Insitute of Advanced Tibetan Studies on www.college-de-france.fr; Link to Columbia University Libraries Digital Collections: http://www.columbia.edu/cu/lweb/digital/collections/cul/texts/ldpd_6981643_000/

Françoise ROBIN
Director, Institute of Advanced Tibetan Studies, Collège de France

Philosophy of Knowledge

A New Collection of Digital Books

The philosophy of knowledge has had a strong presence at the Collège de France for the past fifty years, through the teachings of Jules Vuillemin (Philosophy of Knowledge, 1962-1992), Jacques Bouveresse (Philosophy of Language and Knowledge, 1995-2010) and Claudine Tiercelin (Metaphysics and Philosophy of Knowledge, 2010).

In order to deal seriously with the issues with which it has always been concerned – truth and objectivity; rationality and justification; language, perception and reality; causality and the laws of nature; description and explanation, etc. – the philosophy of knowledge must now fulfil four main requirements. First, it must be informed by the history of science and the history of philosophy, without ever limiting itself to them. Second, it must apply the most rigorous conceptual analysis. Third, it must assimilate, as far as possible, the most recent contributions and the state of problems in other branches of philosophy: the philosophies of logic, mathematics and language; the philosophies of perception and of the mind; and the philosophy of science and metaphysics. Finally, it cannot overlook the issue of the relations between knowledge and society, especially between rationality, truth and democracy.

The "Philosophy of Knowledge" digital book collection, created in January 2012, is designed to make visible and widely accessible the work of the three Chairs that have successively been involved in this task. It now counts nine digital books: two lecture volumes, four article and lecture collections (including one in English), and three new editions of books that are out of print at their original publisher. A seminar, several years of lectures, and recent symposia will soon be published.

All these books are available in Open access on the *Collège de France's Publications* pages of the OpenEdition Books platform, alongside the Inaugural Lectures and Symposia. Derived products (PDF, e-pubs for e-readers) are also on sale (they are free for the users of subscribed libraries).

This is the first Collège de France collection of digital books that is published under a Chair's scientific and editorial responsibility. It meets several requirements.

Making the "hard core" of research available to all

For several years now, the Collège de France has been developing the audiovisual broadcasting of most of its lectures, seminars and symposia. A real digital campus has thus been established on its website. In parallel and complementarily, research at the Collège de France (which is still not visible enough) is shared by making texts available online, especially in disciplines like philosophy, not so much in PDF formats, but rather as digital books as such, which are edited as carefully as printed books (editing, layout, critical apparatus, bibliography, etc.). Not only can these books be read anywhere in the world, they can also be cited and referenced, and thus provide an invaluable resource.

Making research visible in a coherent way and in context

As we publish within a single collection books produced within the same Chair or within the succession of Chairs that have recently dealt with philosophy of knowledge, each book of the collection sheds light on the other, which allows us to deepen our reading of these texts. The impact and meaning of a book are not the same, depending on whether it is published in isolation or within a collection that is part of and materializes a real intellectual project. Moreover, a digital collection is not isolated either: on the Collège de France's Publications platform, the professors' books are found alongside their Inaugural Lectures (in French and in English). And, on the OpenEdition Books platform (which hosts our space and now counts over twenty-six publishers, including the CNRS, the EHESS, the MSH, the ENS-Ulm, etc.), each book can be found via the indexed references.

Combining the long timeframe of research with the flexibility of digital technology

Research is always a long-term process, with its own rhythm. Rigorous philosophy is incompatible with show-philosophy, media stunts and "pop philosophy". This choice does not confine it to an ivory tower or to a laboratory – one of the collection's series is entitled "Rationality, Truth and Democracy" – but, as Wittgenstein's aphorism suggests, "This is how philosophers should salute each other: 'Take your time!' ".[1] Building a digital collection is a good way of trying to bring the pace of publishing closer to that of research and thinking: one can publish a lecture a few weeks after it was delivered or a lecture series a few years after it was delivered (and not 40 years later), and republish an out-of-print book that has not lost its currency.

Providing researchers with publishing autonomy

The various constraints weighing on the academic publication of printed books are well-known: a narrow market, production costs, publishers' policies, including choices informed by interests that do not necessarily match those of research, narrow distribution channels, etc. A collection of digital books is a means to avoid many of these constraints. Open access multiplies the number of potential readers. Thanks to the partnership with OpenEdition Books – a public partner that provides a sound technical infrastructure and takes care of distribution –, publishing a book does not take us much longer than the time needed to prepare it. Admittedly, this time can be considerable, and while it is no greater than the time needed to prepare a printed book, the author and the Chair's team are entirely responsible for this process. That is, however, the price to pay for autonomy. Researchers decide on their publishing policy themselves, and the books are available worldwide, especially since they can be published on the same website in languages other than French.

Statistics confirm this analysis. Between February and September 2013, Jacques Bouveresse's lectures *Qu'est-ce qu'un système philosophique ?* and *Dans le labyrinthe : nécessité, contingence et liberté chez Leibniz* recorded 9,048 and 7,639 visits respectively, and Claudine Tiercelin's *La pensée-signe* recorded 8,367. These are indeed only visits, and a visit does not necessarily mean that the whole book has been read, but buying a printed book does not either necessarily mean that it will be read in its entirety. ■

Jean-Jacques ROSAT

Source: La lettre, *no. 37, December 2013*

(1) Ludwig Wittgenstein, *Culture and Value*, University of Chicago Press, 1980, p. 80.

Catalogue

• LANGUAGE AND KNOWLEDGE
- Jacques Bouveresse, *Qu'est-ce qu'un système philosophique ?* 2007 and 2008 lectures
- Jacques Bouveresse, *Dans le labyrinthe : nécessité, contingence et liberté.* 2009 and 2010 lectures
- Jacques Bouveresse, *Études de philosophie du langage.*
- Jacques Bouveresse, *Why I Am so Very Unfrench, and Other Essays*

• METAPHYSICS AND KNOWLEDGE
- Claudine Tiercelin, *La pensée-signe. Études sur C.S. Pierce* (rééd. 1993)
- Claudine Tiercelin, *C.S. Peirce et le pragmatisme* (reed. 1993)
- Claudine Tiercelin, *Hilary Putnam, l'héritage pragmatiste* (reed. 2002)

• RATIONALITY, TRUTH AND DEMOCRACY
- Jacques Bouveresse, *À temps et à contretemps. Conférences publiques*
- Jean-Jacques Rosat, *Chroniques orwelliennes*

• FORTHCOMING IN 2014
- Claudine Tiercelin (ed.), *La reconstruction de la raison. Dialogues avec Jacques Bouveresse* (May 2013 Symposium)
- Jacques Bouveresse, *Kurt Gödel : mathématiques, logique et philosophie.* 2004, 2005 and 2006 Lectures
- Jacques Bouveresse, *Temps, récit et fiction.* 2003 Seminar

The "Philosophy of Knowledge" collection is available in Open access on OpenEdition Books: http://books.openedition.org/cdf/

Jean-Jacques ROSAT
Metaphysics and Philosophy of Knowledge

NEW DIGITAL RESOURCES
DIGITAL BOOKS

A New Platform for the Collège de France's Digital Books

In July 2010, the Collège de France inaugurated four online collections on the Revues.org[1] platform, which is part of OpenEdition portal since 2011. This portal is now split into two, since the launch of the OpenEdition Books platform in February. Alongside the 300 journals available on Revues.org, the new space that OpenEdition Books provides is specifically devoted to digital books, and will become an international library for the digital humanities.

Three months after its launch, OpenEdition Books counted close to 500 books from fifteen French and international publishers, half of which are in Open Access (OA), including the last four years of the Collège de France's inaugural lectures (i.e. 25 titles, thirteen of which are also published in English). The books of the collections "Conférences du Collège de France" (original monographs and conference proceedings) and "Philosophie de la connaissance au Collège de France" have also been added to OpenEdition Books. Thanks to funding from the French Ministry of Higher Education and Research obtained by The Centre for Open Electronic Publishing (Cléo)/OpenEdition, over 15,000 books will be put online by 2020. As part of this initiative, 60 inaugural lectures have already been digitized and are currently being published electronically. In time, all the Collège de France's inaugural lectures published since 1949 (many of which are out of print) will be available on this platform.

Open access

The Collège de France's digital books can be accessed through its website[2] or through any search engine (particular care goes into referencing). They can also be found from the homepage of the OpenEdition Books platform, with direct access by publisher, through a search by discipline (archaeology, literature, etc.) or by theme (keyword, geographical area or historical period in particular). They can also be found in the cross-thematic files put together by OpenEdition.

All the texts published online by the Collège de France are available in Open access, without DRM or obstacles to their appropriation by readers. Derived formats (PDF and ePub), called "digital books" (or e-books), will be available to users of the libraries subscribed to OpenEdition and sold individually to internet users. By offering the ease of reading on tablets and mobile phones, predefined formatting for printing, and so on, these purchasable formats supplement the online publication, which is the standard edition of the texts produced with rigorous copy-editing. It will soon be possible to order the printed format, when available, directly from the platform.

Books

The quality of the editing, the interoperability of the metadata and the tools provided for citation purposes remain the cornerstones of the new platform. However, new functionalities are proposed, such as, for example, a clickable table of contents and a local search engine for individual books. It will also be possible to embed texts to be cited.

The Collège de France also has its own homepage on the portal, where it can highlight its latest releases or certain sections of its catalogue by thematic files.

Internet is a valuable tool for the circulation of information. Yet knowledge is not reducible to information and data. It is acquired primarily by reading books that are sometimes long, dense and complex, and that are the fruit of collaboration between different actors (authors and publishers). The new OpenEdition Books platform is set to become a sound and innovative facility at the service of a large "bibliodiversity" (as Marin Dacos, Head of OpenEdition puts it), an international and multilingual platform that is built around books. With the launch of the new platform, books and the web can now join forces. ■

Céline VAUTRIN

Source: La lettre, *no. 36, May 2013*

(1) See *La lettr*e no. 31, p. 52-55; http://lettre-cdf.revues.org/1236
(2) http://www.college-de-france.fr, under Publications > Electronic Publications

To access OpenEdition Books:
http://books.openedition.org/cdf/

Céline VAUTRIN
Collège de France
publication

NOVEMBER 2013

• **Inaugural Lecture: Frantz GRENET**
History and Culture of Pre-Islamic Central Asia
7 November 2013
• **Inaugural Lecture: Sanjay SUBRAHMANYAM**
Early Modern Global History 28 November 2013

DECEMBER 2013

• **Inaugural Lecture: Gilles BOEUF**
Chair of Sustainable Development – Environment, Energy and Society
Biodiversity, the Ocean, the Forest and the City
19 December 2013

JANUARY 2014

• **Inaugural Lecture: Prof. Pierre-Michel MENGER**
Sociology of Creative Work 9 January 2014
• **Inaugural Lecture: Prof. Jean-Marie TARASCON**
Chemistry of Materials and Energy 23 January 2014

MARCH 2014

• **Inaugural Lecture: Philippe WALTER**
Chair of Technological Innovation Liliane Bettencourt
On the Artist's Palette: Chemical Physics in Artistic Creativity
20 March 2014

FEBRUARY 2014

• **Inaugural Lecture: Prof. Alain DE LIBERA**
Histoire de la philosophie médiévale 13 février 2014

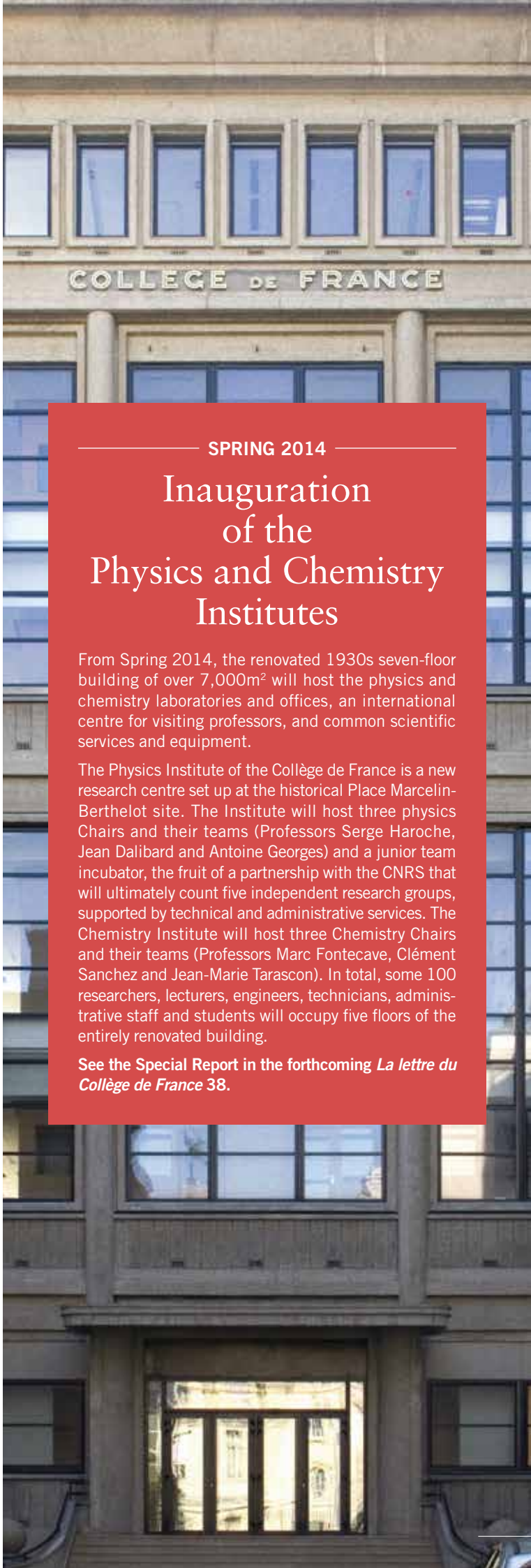
APRIL 2014

• **Inaugural Lecture: François BOURGUIGNON**
Chair of Knowledge Against Poverty
Poverty and Development in a Globalized World 3 April 2014

• **Inaugural Lecture: Nicholas AYACHE**
Chair of Information Technology and Digital Sciences
From Medical Imaging to the Digital Patient 10 April 2014

MAY 2014

• **Inaugural Lecture: Prof. Alain FISCHER**
Experimental Medicine 15 May 2014



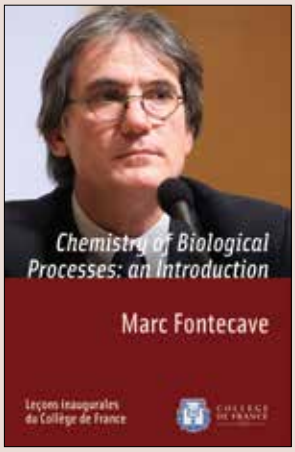
SPRING 2014

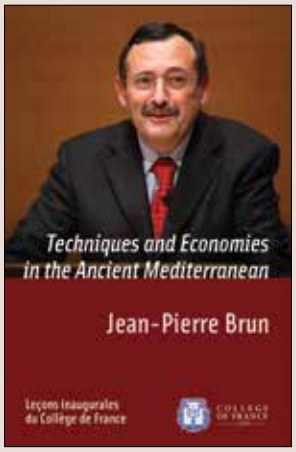
Inauguration of the Physics and Chemistry Institutes

From Spring 2014, the renovated 1930s seven-floor building of over 7,000m² will host the physics and chemistry laboratories and offices, an international centre for visiting professors, and common scientific services and equipment.

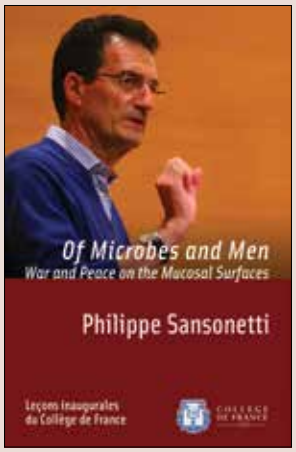
The Physics Institute of the Collège de France is a new research centre set up at the historical Place Marcelin-Berthelot site. The Institute will host three physics Chairs and their teams (Professors Serge Haroche, Jean Dalibard and Antoine Georges) and a junior team incubator, the fruit of a partnership with the CNRS that will ultimately count five independent research groups, supported by technical and administrative services. The Chemistry Institute will host three Chemistry Chairs and their teams (Professors Marc Fontecave, Clément Sanchez and Jean-Marie Tarascon). In total, some 100 researchers, lecturers, engineers, technicians, administrative staff and students will occupy five floors of the entirely renovated building.

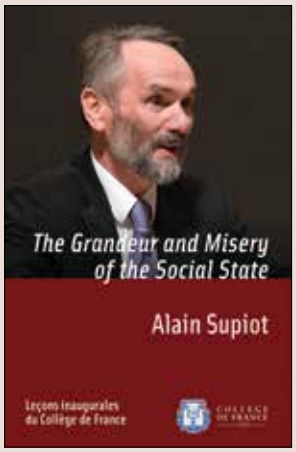
See the Special Report in the forthcoming *La lettre du Collège de France* 38.





NEWS FROM THE COLLÈGE DE FRANCE'S **ONLINE PUBLICATIONS**





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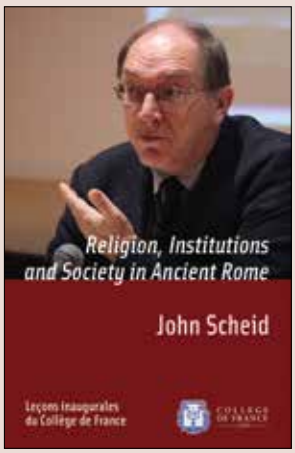

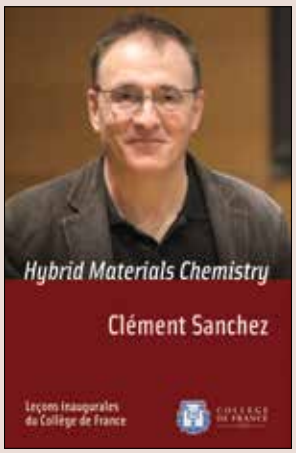

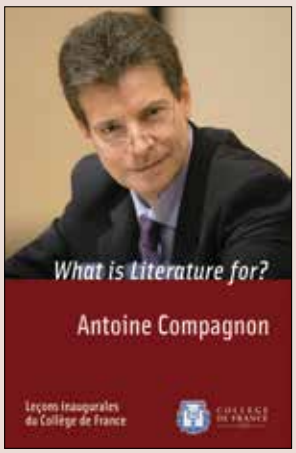

Cover photograph:

From Claude Bernard's *Notebooks* (*Petit cahier de notes et de projets de cours*, undated), in the Collège de France Digital collections available in Open access through the newly launched portal Salamandre.
See "The Launch of Salamandre" (p. 82) and "An Exceptional Scientific Heritage: the Claude Bernard Handwritten Collection goes Digital" (p. 63).

"Collège de France Lecture
How to define determinism and experimental medicine. We need principles, not systems. The history of medicine provides systems, doctrines and theories (terms to be defined) but let us look for principles away from them. The only principle of medical science is the same as that of all other experimental sciences: determinism."

Further information may be found through social media

8

Collège de France Newsletter
2012/2013 – no. 8

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