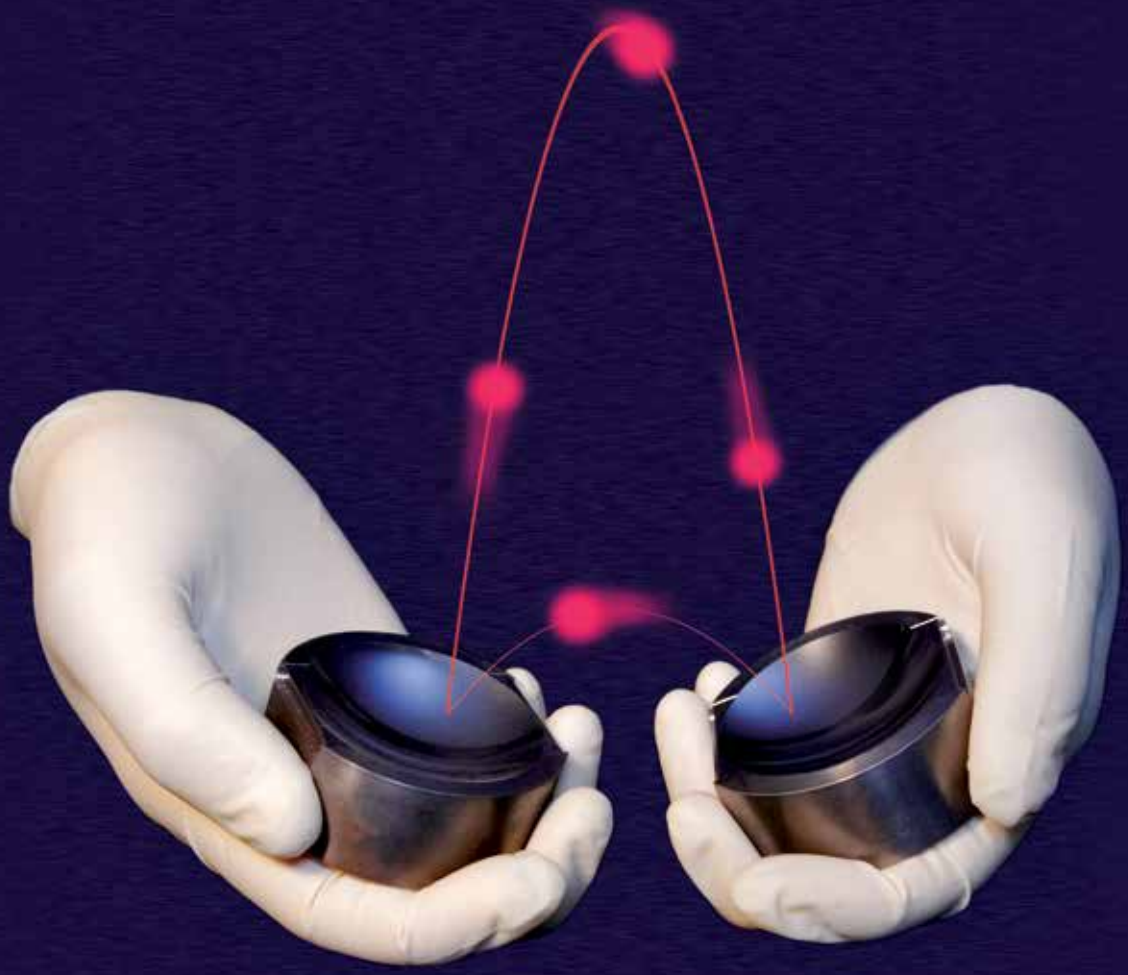

Collège de France
Newsletter

7

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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 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, conferences and seminars, and includes 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. Articles included in this issue were first published in nos. 33, 34 and 35 (Academic year 2011-2012). ■

SPECIAL REPORT

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Serge Haroche

Administrateur of the Collège de France since 1 September 2012

In June the Faculty put their trust in me to administer the Collège de France. They have done me a great honour, which comes with immense responsibility. The Collège de France is the only one of its kind in the world, with the crucial mission of teaching knowledge in the making, in all the domains of the natural sciences and the humanities. The list of professors who have held its Chairs since the sixteenth century across all disciplines attests to its standing and profound and ongoing influence on intellectual life. Our institution operates according to rules of independence and freedom rooted in a secular academic tradition. This precious legacy needs to be preserved, placing particular importance on the quality of the choices that the Faculty must make when renewing Chairs. I have been thinking about all this in these weeks of intense work as I get to know our institution "from the inside".

The mandate which I have been entrusted with begins at an important moment. Having just acquired management autonomy, the Collège de France must negotiate a new five-year plan with the State for the 2014-2018 period. The main lines of the contract currently being drafted are clear. The Collège de France will continue and intensify its actions in research, teaching and knowledge dissemination. It will base itself on a dynamic strategy of renewal of its Chairs and the creation of resident research laboratories, on the continuation of the renovation of its buildings, and on growing openness to the outside world, making use of the most modern information technology. This policy, which is a continuation of the one implemented by *Administrateur* Pierre Corvol during the previous four-year term, should allow the Collège de France to extend its reach in France and throughout the world. It must maintain a subtle balance between respect for traditions that have earned our institution its greatness, and its necessary adaptation to an academic and university environment undergoing rapid and profound transformation.

While retaining its own identity, its management autonomy and its freedom to define its Chairs and research paths, the Collège de France will seek to strengthen its ties with the institutions that make up the *Paris Sciences et Lettres* (PSL) federation, of which it is a founding member.

Within PSL, it will take part in joint cross-cutting research, training or resource management operations, wherever its effectiveness can be enhanced by the pooling of material and human resources rather than by acting alone. That is not to say that the Collège de France will loosen its ties with other institutions which are not part of PSL. It will also continue to deepen its international relationships, with the support of its Comité d'Orientation Scientifique et Stratégique (Committee of Scientific and Strategic Orientation) consisting of foreign personalities – a committee which has now become one of the institution's statutory advisory bodies. To pursue these actions, the Collège de France will have to complement its grant from the state with substantial contributions from private patronage.

I am assisted in my functions by the committee comprised of Professors John Scheid and Marc Fontecave (vice-president and secretary of the Faculty, respectively), and by a group of professors who form a broader managerial team and function collegially, as encouraged by the name of our institution. This team will place great importance on animating the cultural and social life of the Collège de France and on initiatives facilitating the flow of information between all staff.

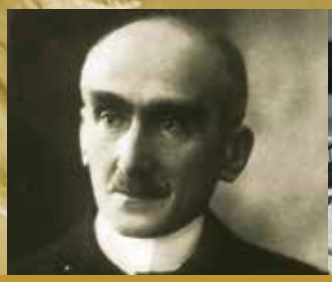
Despite the economic difficulties facing the country, Europe and the entire world, I am confident about the future of the Collège de France. I know it can count on the dynamism, the enthusiasm and the devotion to the institution's missions motivating all of its staff: professors, visiting professors, students and post-docs, administrative agents, engineers and technicians alike. ■

Prof. Serge HAROCHE
Quantum Physics

The Collège de France Laureates

On the occasion of the 2012 Nobel Prize in Physics, jointly awarded to Prof. Serge Haroche, Quantum Physics, and Prof. David Wineland (National Institute for Standards and Technology, Boulder, [NIST], United States), the Collège de France looks back on its professors who were Nobel Laureates between 1927 and 2012. As the second institution worldwide after Harvard to represent all of the Nobel Prize's historical disciplines, the Collège de France has once again attested to the interdisciplinarity characterizing it.

Ten Professors of the Collège de France Received the Nobel Prize between 1927 and 2012



Henri Bergson
Chair of Greek and Latin Philosophy (1900-1904), then Chair of Modern Philosophy (1904-1921),
was awarded the 1927
Nobel Prize in Literature
"in recognition of his rich and vitalizing ideas and the brillant skill with which they have been presented".

Charles Nicolle
Chair of Medicine (1932-1936),
was awarded the 1928
Nobel Prize in Physiology or Medicine
"for his work on typhus".

Frédéric Joliot
Chair of Nuclear Chemistry (1937-1958),
was awarded the 1935
Nobel Prize in Chemistry
with his wife Irène Joliot-Curie, "in recognition of their synthesis of new radioactive elements".

François Jacob
Chair of Cellular Genetics (1964-1991),
was awarded the 1965
Nobel Prize in Physiology or Medicine
with André Lwoff and Jacques Monod, "for their discoveries concerning genetic control of enzyme and virus synthesis".

Jacques Monod
Chair of Molecular Biology (1967-1973),
was awarded the 1965
Nobel Prize in Physiology or Medicine
with André Lwoff and François Jacob, "for their discoveries concerning genetic control of enzyme and virus synthesis".

Jean Dausset
Chair of Experimental Medicine (1977-1987), was awarded the 1980
Nobel Prize in Physiology or Medicine
with Baruj Benacerraf and George D. Snell, "for their discoveries concerning genetically determined structures on the cell surface that regulate immunological reactions".

Jean-Marie Lehn
Chair of Chemistry of Molecular Interactions (1980-2010), was awarded the 1987
Nobel Prize in Chemistry
with Donald J. Cram and Charles J. Pedersen, "for their development and use of molecules with structure-specific interactions of high selectivity".

Pierre-Gilles de Gennes
Chair of Physics of Condensed Matter (1971-2004), was awarded the 1991
Nobel Prize in Physics
"for discovering that methods developed for studying order phenomena in simple systems can be generalized to more complex forms of matter, in particular to liquid crystals and polymers".

Claude Cohen-Tannoudji
Chair of Atomic and Molecular Physics (1973-2004),
was awarded the 1997
Nobel Prize in Physics
with Steven Chu and William D. Philips, for developing "methods to cool and trap atoms with laser light".

Serge Haroche
Chair of Quantum Physics (2001-),
was awarded the 2012
Nobel Prize in Physics
with David J. Wineland, for developing "ground-breaking methods to measure and manipulate individual quantum systems".

Nobel Prize in Chemistry

Jean-Marie Lehn

with Donald J. Cram and Charles J. Pedersen in 1987

Supramolecular Chemistry: a Domain of Transmission

In 1967 Jean-Marie Lehn initiated research in a new field that was to be called "molecular recognition", as it was concerned with how molecules are able to selectively bind with one another, a given molecule choosing its partner as though it recognized it through a sort of "Lock and Key" complementarity. For this work, Jean-Marie Lehn was awarded the Nobel Prize in Chemistry in 1987.

Starting with the building of "cage" molecules, the "cryptands", able to incorporate host species in their cavity, thereby forming "cryptates", Jean-Marie Lehn's research led him to define a new field within chemistry which he called "supramolecular chemistry". This field is concerned with the complex entities formed by the association of two or more chemical species linked to one another through non-covalent intermolecular interactions, just as molecules are constituted with atoms bound to one another through strong covalent bonds.

The aim of supramolecular chemistry also extends to other functions relying on molecular recognition processes. Thus, like living processes but in other areas, it is also interested in the chemical transformation of molecules linked in the same way as enzymes, and to the phenomena of transportation through membranes.

Building on these basic functions, the work carried out led to the design and development of molecular and supramolecular systems using photons, electrons or ions as effectors (photonic, electronic and molecular ionic), with storage, transfer, and information processing properties at molecular level.

Jean-Marie Lehn's domain of activity then expanded towards increasingly complex systems and processes of organized matter, such as auto-assembly and auto-organization phenomena, involving molecular programming.

More recently, the transposition of the structural plasticity of supramolecular chemistry to molecular chemistry led to the emergence of a constitutional dynamic chemistry that covers both domains. It is based both on the lability of intermolecular bonds and on the introduction of reversible covalent bonds in molecules, so as to allow for a continuous exchange of components. The chemical object, whether molecular or supramolecular, thus becomes able to respond to external stimuli, from another substance or from the environment, by changing its own constitution. The result is the emergence of an adaptive and evolutional chemistry, which represents one more step towards understanding complex matter. ■

> Supramolecular chemistry is thus highly interdisciplinary in nature and draws bridges between chemistry, biology and physics while also paving the way for diverse industrial applications.

Source: La lettre, *no. 35, December 2012*

Nobel Prize in Physiology or Medicine

François Jacob

with André Lwoff and Jacques Monod in 1965

Genetics of the Bacterial Cell

Having thus constructed the requisite genetic tool for our analysis, we set out to isolate under different conditions a whole series of mutants constitutive for the lactose system, in order to subject them to functional analysis. These mutants proved to belong to two quite distinct groups, which possessed the predicted properties for the transmitter and the receiver, respectively. Many of these mutations were found to be "recessive" with respect to the wild-type allele. They allowed a definition of the transmitter, that is, of the regulatory gene.

In the second group, the mutations turned out to be "dominant" over the wild-type allele, and only those genes which were located on the same chromosome, that is, in *cis* position, were expressed constitutively. With these mutations, it was possible to define the receptor of the repressor, termed the operator.

The study of these mutants led, furthermore, to the notion that in bacteria the genetic material is organized into units of activity called *operons*, which are often more complex than the gene considered as the unit of function. In fact, the lactose system of *E. coli* contains three known proteins, and the three genes governing their structure are adjacent to one another on a small segment of the chromosome with the operator at one end. Constitutive mutations, whether due to the alteration of the regulatory gene or of the operator, always display the remarkable property of being pleiotropic; that is, they affect simultaneously, and to the same extent, the production of the three proteins. The regulatory circuit therefore had to act on one integral structure containing the information which specifies the amino acid sequences of the three proteins. This structure could only be either the DNA itself or a messenger common to the three genes. This idea was further supported by the properties observed in mutations affecting the structural genes of the lactose system. Whereas some of these mutations obey Beadle and Tatum's "one gene-one enzyme" rule in the sense that they abolish only one of the three biochemical activities, others violate this rule by affecting the expression of several genes at a time.

The notion of the operon, a grouping of adjacent structural genes controlled by a common operator, explained why the genes controlling the enzymes of the same biochemical pathway tend to remain clustered in bacteria, as observed by Demerec and Hartman. Similarly, it accounted for the coordinate production of enzymes already found in certain biochemical pathways. Although at first the operon concept was based exclusively on genetic criteria, it now includes biochemical criteria as well. There are, in fact, a number of experimental arguments, both genetics and biochemical, in support of the inference that an operon produces a single messenger, which binds to ribosomes to form the series of peptide chains determined by the different structural genes of the operon.

We can therefore envision the activity of the genome of *E. coli* as follows. The expression of the genetic material requires a continuous flow of unstable messengers which dictate to the ribosomal machinery the specificity of the proteins to be made. The genetic material consists of operons containing one or more genes, each operon giving rise to one messenger. The production of messenger by the operon is, in one way or another, inhibited by regulatory loops composed of three elements: regulatory gene, repressor, operator. Specific metabolites intervene at the level of these loops to play their role as signals: in inducible systems, to inactivate the repressor and hence allow production of messenger and ultimately of proteins; in repressible systems, to activate the repressor, and hence inhibit production of messenger and of proteins. According to this scheme, only a fraction of the genes of the cell can be expressed at any moment, while the others remain repressed. The network of specific, genetically determined circuits selects at any given time the segments of DNA that are to be transcribed into messenger and consequently translated into proteins, as a function of the chemical signals coming from the cytoplasm and from the environment. ■

Excerpts from the Nobel Lecture delivered on 11 December 1965

Source: La lettre, *no. 35, December 2012*

Nobel Prize in Physics

Claude Cohen Tannoudji
with Steven Chu and William D. Phillips in 1997

Cooling and Trapping Atoms with Laser Beams

The light emitted or absorbed by atoms has discrete frequencies which together constitute a line spectrum. As the line spectrum of an atom is a characteristic feature of it, in a way it constitutes its fingerprint.

Spectroscopy, the observation of the line spectra emitted by an environment, is therefore an important way of identifying this environment's components. It is in fact the essential source of information at our disposal in astrophysics, on distant objects like planets, stars and galaxies. Over the last few decades, the focus has shifted to another aspect of atom-light interactions. Light can be used to manipulate atoms and to control their polarization, their position, and their speed. This possibility is the result of conservation laws. When an atom absorbs a photon, it acquires some of this photon's physical properties, like its energy, its linear momentum and its angular momentum. By suitably choosing the characteristics of a beam resonantly exciting a set of atoms, we can modify these atoms' properties.

A first law of conservation is the conservation of the angular momentum. This value characterizes the state of rotation of an object around its axis, similar to the rotation of a spinning top. A circularly polarized light is constituted of photons which all have a certain angular momentum. When we make atoms resonantly absorb these photons, the photons' angular momentum is transferred to the atoms and it is thereby possible almost to completely polarise atoms, to ensure that all the atoms turn in the same direction around parallel axes.

I myself wrote a PhD thesis on the subject, which I defended in 1962. This research enabled me to further develop the quantum theory of optical pumping and to predict and observe new effects like atoms' energy levels being shifted by light. A second law of conservation is that of the linear momentum. ▶

NOBEL PRIZE
THE COLLÈGE DE FRANCE LAUREATES

In the same way that a canon firing a shell moves backwards, an atom which emits a photon moves backwards with a linear momentum equal to that of the photon emitted. Likewise, during absorption, an atom absorbing a photon moves backwards in the direction of the photon absorbed. With the development of intense laser sources with great spectral purity thus emerged new research domains like laser cooling which allows for an atom's speed to be reduced using a laser beam, and for the dispersion of the speeds around their mean value to be reduced. Radiative forces can also be used, depending on the position, and restoring forces obtained which allow for the movement of the atom to be confined to a region in space. The movement of atoms can thus be manipulated *ad libitum*. Here are a few orders of magnitude: with these methods temperatures of the order of 10^{-6} Kelvin are commonly reached when the room temperature is of the order of 300 Kelvin. At these temperatures the atoms move at speeds of no more than a few millimetres per second, whereas at room temperature their speed is of the order of a kilometre per second.

Cold atoms moving much slower can be observed for much longer periods of time. As in physics measurement precision is much greater the longer the observation time, laser cooling affords spectacular improvement of measurement precision, particularly for atomic clocks. For example, it is now possible to produce atomic clocks which would have less than a second's lag after a billion years. The fundamental theories of physics, like general relativity, can also be tested with far greater precision. Other important research domains have also opened up thanks to cold atoms. They are linked to the fact that the Broglie wavelength of a corpuscle, which characterizes its wave nature, is inversely proportional to its speed. The lower this speed, which is enabled by the cooling of the laser, the greater Broglie's wavelength, and the easier it becomes to demonstrate the wave nature of atoms. We can thus now produce matter waves associated with cold atoms and perform with them all the well-known experiments in optics.

Finally, if one is able to cool trapped atoms very effectively with a sufficiently high density, one can observe a condensation phenomenon resulting from Bose's quantum statistics and predicted by Einstein at the beginning of the last century: all the atoms cluster together on the same quantum level of the trap confining them, thereby forming a macroscopic quantum system. The demonstration in 1995 of these "Bose Einstein condensates" was rewarded by the 2001 Nobel Prize in Physics awarded to Éric Cornell, Carl Wieman and Wolfgang Ketterle. The interest of these condensates stems from the fact that all the physical parameters characterizing them can be controlled with great precision, including the sign and magnitude of the interactions between atoms, owing to resonating processes in the collisions between cold atoms which can, transitorily, associate to form molecules. We thus have macroscopic quantum systems which can serve as models to simulate and better understand more complex situations arising in other domains of science like superconductors or neutron stars. Almost three decades after their discovery, atoms cooled and trapped by laser beams therefore continue to allow for the birth of new research fields. ■

> This is the "optical pumping" imagined and accomplished by Alfred Kastler and Jean Brossel in the early 1950s. This method allowed for numerous fundamental discoveries and earned Alfred Kastler the 1966 Nobel Prize in Physics.

Source: La lettre, *no. 35, December 2012*

2012 Nobel Prize in Physics
Serge Haroche

When Thought Experiments Become Real

The world is made of atoms which emit, absorb and scatter light, the crucial vehicle of the information we receive from our environment. At the beginning of the last century, quantum theory revealed the strange laws which govern matter and radiation on a microscopic scale, in a counter-intuitive world where notions of wave and particle are intimately intertwined.

Light is both a continuous wave and a set of discrete photons! This "strange" physics is founded on a principle of superposition. A microscopic system can exist in several possible states at the same time, so to say suspended between different classical realities. In their famous discussions, the founders of quantum theory resorted to thought experiments, in which they manipulated atoms and photons virtually. These experiments, long dreamt, are finally being materialized. Juggling with atoms and photons, making them interact in a controlled way is now a flourishing field of experimental research. Serge Haroche is one of its pioneers. He forced an atom to interact with a few photons in a "photon box" once conceived of by Bohr and Einstein, with almost ideally reflective walls. He thus observed atom-light interaction at its most fundamental. Serge Haroche and the ENS team (which he currently heads with the co-authors of this article) were among the initiators of cavity quantum electrodynamics, which has been developed fast over the last thirty years.

Simple in principle, the ENS's experiments are technically complex. Cavities, which resonate in the domain of microwaves, are made of superconductive mirrors facing each other. These are the best mirrors produced to date, of which light bounces several billion times before being absorbed or scattered.

> Photons thus travel forty thousand kilometres in the narrow space (3 cm) between the mirrors, leaving experimenters with one tenth of a second to manipulate and observe them.

The atoms which interact with these photons are also very particular. These are atoms in which an electron has been positioned on a highly excited circular orbit, with a radius (0.1µm) 2 500 times greater than that of the atom in its fundamental state. These "Rydberg atoms" have motivated extensive work over the last 30 years. Serge Haroche was one of the pioneers of these studies in the 1970s, demonstrating these atoms' extreme sensitivity to microwaves and developing methods to prepare, manipulate, and detect them. ▶

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With these unprecedented tools, Serge Haroche and the ENS team recently revolutionized, for instance, the way that photons are counted. Whereas conventional detectors (including our eyes) destroy the photons they count, they elaborated a "transparent" detection process in which photons interact with the counting tool without being absorbed. The experiment consists in making the field, trapped in the cavity, interact with "probe" atoms. They move across the cavity one by one and, without absorbing the luminous energy, take away with them an imprint of the state of the field. The information on the number of photons is acquired gradually, as the successive atoms are detected, each one providing a partial contribution to the determination of the state of the field. When a photon subsequently disappears, absorbed by the mirrors' imperfections, the field's energy undergoes a sudden and discontinuous variation, detected by the atoms. These quantum leaps, fundamental quantum processes, had never been observed in light before this experiment.

The Zeno effect is another spectacular quantum manifestation illustrated by these experiments. In a paradoxical argument, this Greek philosopher denied the existence of an arrow's movement since, he said, at each instant it was in a place and therefore immobile. A succession of immobilities cannot result in movement. While this sophism is of course false in a macroscopic world, it can become true in quantum physics where observation influences the object measured. The ENS team showed that the evolution of a field to be injected into a cavity is frozen if its number of photons is repeatedly and non-destructively counted.

> Quantum physics thus substantiates Zeno's claim, although for a far more subtle reason than the one he had given!

Atoms and cavities can also serve to explore the boundary between the classical and quantum worlds. In a crucial experiment, Serge Haroche and his colleagues monitored with an atom the state of a field containing a few photons. The field is in a quantum superposition of two radically different states. While in practice the atom controls the oscillation phase, it amounts to the same and is simpler to consider that it controls the amplitude. After interacting with the atom, the field is in a superposition of a state where it oscillates intensely (high amplitude) and a state where it does not oscillate at all (zero amplitude). This is an impossible situation in the classical world, but a legitimate one according to quantum law. Such states are called "Schrödinger's cats", with reference to a thought experiment where it is imagined that a cat, trapped in a box with a radioactive atom, is placed in the uncomfortable situation of being suspended in a quantum manner between life and death. In real life, cats are either dead or alive! This is where decoherence comes in. Under the coupling effect with the environment, macroscopic objects see their superpositions of states disappear very rapidly. Quantum ambiguity subsides to give way to the classical world of daily experience. The ENS team was able to monitor this phenomenon live, by observing the evolution of a Schrödinger's cat made of a few photons. It showed that the decoherence time decreases as the number of photons increases. This explains why macroscopic systems, formed of a gigantic number of particles, always appear as classical. Beyond the performance of thought experiments, cavity electrodynamics plays an important role in the development of quantum information, as science seeks to exploit the strange logic of the quantum world to process information. In conventional computers, information is coded in the form of classical "bits" that take on two mutually exclusive values, 0 and 1. Quantum information uses "quantum bits" or "qubits" that can exist in a superposition of states 0 and 1. The principle of superposition considerably expands the possibilities. Machines juggling with such qubits could perform certain computations much faster than current computers, or make the secrecy of information communication unbreakable. Very early on, the ENS team was able to produce basic building blocks of these machines. Although Rydberg's atoms will probably not be the qubits of tomorrow's tools, they have demonstrated the feasibility of operations now used with systems that are easier to integrate, like "circuit electrodynamics", which uses microwave resonators made of parallel threads on a "chip" and superconductive junctions instead of Rydberg's atoms.

Serge Haroche's research has just been rewarded with the 2012 Nobel Prize, shared with David J. Wineland from the NIST (USA). There is a fine duality between these two adventures. The ENS team traps a few basic specs of light, photons, and manipulates them with basic specs of matter, atoms. The NIST team traps a few specs of matter (ions) and manipulates their quantum state with lasers, photon beams. These two teams have made very similar advances, sometimes simultaneously. Their works is driven by pure curiosity. Making thought experiments real requires complex methods and continuous effort which in both cases was only possible because these teams benefited from stable financial support, and from the contribution of generations of exceptional students. As it belongs to the field of pure research, their studies cannot however be envisaged without a constant feedback loop between fundamental and applied research. It relies on technological advances and, in turn, will inspire the development of new devices. ■

Jean-Michel RAIMOND / Michel BRUNE

Source: La lettre, *no. 35, December 2012*

Jean-Michel RAIMOND
Professor at the UPMC
Honorary member of the Institut universitaire de France (IUF)
Michel BRUNE
Director of Research at the CNRS

Jean-Michel Raimond and **Michel Brune** have worked alongside Serge Haroche at the Kastler Brossel laboratory, at the École normale supérieure, for 35 years and 27 years, respectively.

The Nobel Marathon

On the occasion of the Nobel Prize ceremony, the winner spent ten days in Sweden. There, with his consent, he followed a programme tailored to him by the Nobel Foundation – a fast-paced marathon which varies from one recipient to another. While it is customary for the winner to give at least one lecture, Serge Haroche chose to take up the five invitations he received.

From 13 to 15 December, he was thus able to present his research in the leading Nordic universities, in Uppsala, Goteborg, Lund, Copenhagen, and Helsinki. Several constants nevertheless remained: the awards ceremony, two days after the Nobel Lecture delivered by the winner, still took place on 10 December in the Stockholm Concert Hall, that is, on the anniversary of Alfred Nobel's death. It was followed by the great traditional banquet, hosted by the king of Sweden and the Prime Minister, and attended by several hundred people. The banquet is the media highlight of the week, and its ceremonial conduct is followed with the keenest attention by the entire Nordic population. Each year dozens of randomly selected people have the privilege of joining the guests. The winner's programme during his week in Scandinavia ultimately alternated between real scientific events (lectures given in universities), genuine contact with Nordic schools (Serge Haroche's visit to the French lycée Saint-Louis in Stockholm, for instance), relaxation (particularly concerts) and social functions eagerly awaited by the public. During one of the coldest times of the year, with the least sunlight, this was an exceptional moment. For an entire week, the world's media had their gaze set on science.

Prof. Antoine Compagnon

Winner of the Third Claude Lévi-Strauss Prize

While it is a great honour and an immense pleasure for me to receive today the Claude Lévi-Strauss Prize for the social sciences and humanities, I consider it first and foremost as a homage to the discipline that I represent.

It is a discipline that one has trouble naming – literature, literary history, criticism, philology, that is, "love of letters", or even the humanities, which is the broadest and most ambitious term and the one I prefer. It is also a discipline that may feel fragile in the new century and lost in the digital world. I am therefore particularly grateful to the jury for having chosen to award this year's prize to a literary scholar, a philologist.

As I know and admire the work of all of the members of the jury – Raymond Boudon, who is unfortunately absent, Ezra Suleiman, who introduced me too generously, Jean-Luc Marion, my former colleague from the Sorbonne, Mireille Delmas-Marty, Roger Guesnerie, and Philippe Descola, who welcomed me to the Collège de France, and Helga Nowotny, with whom I was brought into contact through the European Research Council, which she presides –, I am all the more sensitive to the fact that they deemed me worthy of such a distinction.

Another cause for satisfaction is that I shall be succeeding, in this the third year of the Claude Lévi-Strauss Prize, two prize-winners whose work I have esteemed for a long time and with whom I am friends: Dan Sperber, whom I read as soon as his first book on symbolism came out in the early seventies, and Jean Tirole, who went to the same schools as I did, although these did not prepare us for later receiving a prize in the social sciences and humanities.

Finally, and above all, I am moved by the name that this prize bears. In my Inaugural Lecture at the Collège de France, I evoked my incursions into the seminars of Claude Lévi-Strauss when I was a student at the École polytechnique. As I said, I sat at the back of the room, silent and attentive. It was there that I listened to Roman Jakobson, in particular, and there that I also heard for the first time Julia Kristeva, who was later to supervise my first doctoral thesis.

Today I will also evoke another memory, one which discreetly links me to Claude Lévi-Strauss by the back door, so to speak. When I was writing a Master's thesis in literature during my military service in 1973 in Verdun, I did not yet know how to type and I was looking around for a typist. A common friend recommended to me Claude Lévi-Strauss' secretary. So this is how I first entered the Collège de France, skirting the walls of the wing where the Anthropology Laboratory then stood. At the time, about a decade before computers were around, the latest thing was the self-copying chemical paper called "carbonless" or "non-carbon copy paper". Lévi-Strauss had some shipped over at great cost from the United States, and his assistant borrowed a few dozen of his sheets for my personal use. Imagine my pride at having my Master thesis typed on Lévi-Strauss' paper! And imagine my confusion when, thirty-three years later, his office, that I would creep past in order to get to his secretary's, fearing that he should open the door, became mine, in this corner pavilion built for Claude Bernard.

The first time I read Lévi-Strauss was when I read the passage on the invention of writing among the Nambikwara in *Tristes Tropiques*. These pages were as remarkable as those of Plato's *Phaedrus* on speech and writing. They had been given to us in our preparatory classes as a summary exercise by my professor of literature, Alain Ferry, present here this evening, who then lent me the volume, which I devoured with passion.

As you can well imagine, receiving a prize bearing the name of Claude Lévi-Strauss gives me a feeling of profound humility, or even of imposture or fraud. Who am I to deserve it? Just after I heard the news, I left for Beirut, where I was giving a seminar, and there I had this dream: the members of the jury were explaining to me that, on second thoughts, they had changed their mind and were not giving me the prize. I did not protest, as I could understand their about-turn and found it justified. Then, when I awoke, I was unsure for a while of what was dream and what was reality.

I would like to reflect with you for a moment on the researcher's concern that was expressed there: the researcher is always on the lookout, he or she is afraid of being wrong, of committing an error, of not being up to the task, no matter how high the recognition he or she has enjoyed until then. I can say that nothing, neither the Sorbonne, nor the Collège de France, nor any prize such as the one that is being awarded to me today can – or should – resolve this feeling of essential vulnerability. It is possible that this state of mind has been increased by my

unorthodox origins and by the solitary discipline that I have chosen. Physicists or sociologists are probably surer of themselves, because they work in a team and do not sign their articles alone, because they trust in bibliometrics, in impact factors and in their h-index. The lot of the literary scholar is to be increasingly uncertain of the quality and value of his or her work, because, more than others, he or she adds words to words and writing to writing.

That is why I remain surprised by the indulgence with which I met during my life as a researcher and professor, and I never cease to ask myself whether I was worthy of it then and still am today. It is said that the university is over-cautious. That is not my experience of it: it welcomed me, and I am immensely grateful to it.

However, please do not think that I am describing an idiosyncrasy here. If the literary scholar has more reason than others to be dissatisfied with himself or herself, the condition of the researcher, as I see it, is the same for all, which is to be in doubt, in perpetual doubt. There is no possibility of comfort for him, of self-contentment, or of "smugness" or "self-importance",[1] as two fine English words would say. The researcher's demon – which is closer to Socrates' ironist and prohibiting demon than to the affirming demon that pushed Baudelaire to accomplish dazzling feats after long bouts of procrastination – relentlessly whispers in his ear "*Memento! Souviens-toi! Esto memor!* Remember that at any moment you can be on the wrong track!" No prize can reassure him: like Groucho Marx, he mistrusts any institution that allows him in, any honour that is bestowed upon him, because it might give him the illusion that he knows, it might make him lose his ability to be amazed, to see everything with new eyes, like a child or a convalescent, as Baudelaire would say; whereas we, as researchers, must always start things anew from scratch, without ever having our rear protected and without any guarantee that we will succeed again.

To my doctoral students I have always preached the morals of "reasonable unhappiness" or "unhappy reason": you will doubt yourselves; your foundation will remain precarious; you will accept permanent discontent, which is the researcher's lot; you will be your most severe judge, your most uncompromising critic. Yet do not doubt this: reasonable unhappiness is the path to a greater happiness. As Pascal wrote: "You would not be looking for me if you hadn't already found me" (919), taking up Saint Bernard's thought: "He can look for you who has already found you" (*De Deo eligendo*). The researcher is a hunter, a hunter of infinity: if his only pleasure lies in the catch, as Montaigne said, he is only a researcher in name, for the catch comes as a bonus; it rewards, like a favour, the reasonably unhappy researcher. It is also said in the *Pensées*: "There are only three kinds of people: those who serve God and have found Him, those who are busy looking for Him, having not found Him, and those who live without looking for Him or having found Him. The first are reasonable and happy. The last are mad and unhappy. The middle ones are unhappy and reasonable" (160). And here we are in the middle: there is nothing more beautiful, nothing more human than the unhappy reason of the eternal researcher. No one has better described our condition than Pascal, who was at the same time a man of science and a man of letters, the model researcher. ▶

(1) In English in the text

MODERN AND CONTEMPORARY FRENCH LITERATURE
OTHER PRIZES AND DISTINCTIONS

As I have said, I am receiving this third Claude Lévi-Strauss Prize above all as a mark of esteem for my discipline: literature, philology or the humanities. That is why I will devote the amount to the promotion of research in modern and contemporary French literature.

You will perhaps object that, as a spokesperson for a discipline, I am neither typical nor exemplary: I have been incapable of keeping to one century and to one author – you yourself, Mr Minister, asked me about this the other day –, I have oscillated between the Renaissance and modernity, I have gone from Montaigne to Proust, making a few intermediary stops along the way, and I have at times played the historian, historian of the discipline, of the institutions and even of men and women. When I was a student, interdisciplinarity was often talked about but rarely practised. One of the reasons I left for the United States is that I longed to find myself in a university where all of the disciplines were present, not only the humanities and the social sciences, but also the natural sciences, medicine, law, etc. And one of the reasons I feel happy at the Collège de France – if you will allow me to use this word after having celebrated the "unhappy reason" of the researcher –, is that the disciplines interact there. In isolation they could become strongholds of certitude. One needs to get out of them, to take a look elsewhere, as I have always recommended my students to do, all the better to come back with fortified ideas, concepts and methods. If Claude Lévi-Strauss spoke to us so well of Montaigne, Diderot, Rousseau or Proust, it is because he was approaching them from a tangent, via a detour, from the outside. Far from wanting to encase literature in a discipline, the humanities want to open it up to the world.

And if I have accepted over the past years to sit on a – surely too great – number of councils and commissions dealing with education, science, technology, evaluation, and the teaching condition, working with representatives from all disciplines, it is primarily, as I suggested, because the institution has given me so much, because I feel obligated to it and that my duty is to give something back to it. However, I think I can represent it well, precisely because of the very anomie that has made me, who has received a scientific education, an all the more determined defender of the humanities, and who has worked for a long time outside of France, an all the more zealous servant of the French university and of French research.

As soon as I returned to this country, I began to advocate for radical reform of the universities, in order to improve the quality of research and to promote excellence in the humanities. It is thus with great satisfaction that I have followed – sometimes participating in their advent – the transformations of the French university landscape since the beginning of the new millennium. The French university has opened up to Europe and to the world, and that is a good thing. As you know, I did not approve of all the reforms, but the mobilization of the entire community leads me to think that the impetus is irreversible and that the problems that we were able to point out can be fixed.

The fact remains that these adjustments have sometimes seemed less favourable to the flourishing of the humanities than to the development of the other disciplines. The humanities have seemed to be suffering from a lack of legitimacy, which would make them more vulnerable in a context where research financing is increasingly collective, where research evaluation is increasingly statistical, and where the management system of the autonomous universities is increasingly based on accounting.

These are not fears that I share, albeit with two caveats. I am in favour of evaluation in research, provided that it is carried out by one's peers, as I have been accustomed to submit to and to practise in the United States. I think that this kind of evaluation is more trustworthy than the quantification of quality, especially for the humanities – but not only. What could a researcher fear from his peers when he, by vocation his own critic, is his own most merciless peer? And although I have taken part in a few large collective projects in the past, and still do, I remain an ardent defender of individual research, of the old-fashioned solitary kind, which must be safeguarded at all costs, because within our disciplines it is this kind of research which produces fundamental, lasting work, dense with knowledge and thought, for which the French academic tradition remains virtually unequalled.

I have just used the terms "defend" and "safeguard" on purpose, in order to be able to correct them straightaway and strip them of the passive, routine, distrustful or timorous aspect that you may have ascribed to them. These words as I mean them are assertive, and this time, like Baudelaire's, my demon is a combative one, ready for action. I am not one of those literary pessimists who dread the sciences and pose as victims. Nothing, as I said, gives the researcher energy as doubt does, the "unhappy reason". This is true for any researcher, but particularly so for the literary one. I bet on the humanities, on teaching and on research in the humanities a long time ago. It is a wager that I never regretted, because it is one that holds promise for the future. ■

Prof. Antoine COMPAGNON

Source: La lettre, *no. 33, May 2012*

This prize was created in 2009 to recognize and support excellence within the social sciences and humanities. The purpose of the Claude Lévi-Strauss Prize is to distinguish a researcher who is making a significant contribution through his or her work to the evolution of methods or approaches in the social sciences and humanities.

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

Prof. Alain Prochiantz

Winner of the 2011 Grand Prix Inserm

It is a great honour for our team to be distinguished this year by the INSERM Grand Prize.

Starting with an accidental observation, it took us 20 years to convince the scientific community that we had identified a new signal transduction pathway involving some 250 proteins. Time will tell the true significance of this pathway. For now, we have been able to find it a role in axon guidance, in cellular migration and in the physiological plasticity of the cerebral cortex.

This discovery of the intercellular movement of transcription factors, which went against certain dogmas, was perhaps not welcomed enthusiastically by our entire community. This is perfectly normal, and over the years we have endeavoured to answer all the questions that were raised. Some questions remain, and mistakes may have been made here and there that will have to be rectified, but I think it is fair to say that the reality of the phenomenon, as well as it functional value, are now widely recognized – even if it may still seem difficult for some to graciously reverse their position.

There is no need to have read Canguilhem to be convinced that there is not one physiology for health and another for illness. Our work opened onto the domain of peptide vectors capable of travelling through plasma membranes, and then allowed for the proposition and validation – on animals – of original hypotheses in the field of neurological and psychiatric diseases. Will these lead to therapeutic applications? We shall see.

In the meantime, the study of this new signalling pathway turned towards domains that seemed miles away from our concerns, like energy metabolism or genome plasticity. The possibility of discovering new worlds at all stages of one's career is one of the great pleasures of this profession.

If we are to review these past 20 years, the support of the CNRS and École normale supérieure, and more recently of INSERM and Collège de France, must be underscored. It seems to me that there is a poor understanding of the full extent of the role played in the past and still today by these institutions, especially the *Établissements publics à caractère scientifique et technologique* (Scientific and Technological Public Institutions), in keeping our country in the club of the scientific nations that count.

We know how much we owe to the universities and efforts in their favour should be encouraged. This however does not preclude greater and sustained support for EPSTs. Could we imagine our German friends, the first to have initiated a policy of Centres for Excellence, disarming the Max Planck Institutes?

Reforms are needed that are sometimes resisted by overly conservative minds, but reforms that reinforce the EPSTs, not ones that weaken them. Even though the creation of the National Alliance for Life and Health Sciences is commendable, I do not think that the most recent changes in the line of funding and evaluation point towards the desired reinforcement, nor that much has been gained. And that is an understatement.

Finally, I'd like to thank all those who, over the years, took part in this work, despite multiple difficulties. I won't name them in case I forget someone. They know who they are.

Apart from research structures, we should also recognize the generosity of the citizens who, through their taxes as well as donations to NGOs and foundations, support research. I would also like to thank the pharmaceutical laboratories, both small and large, which prove so useful when one is lucky enough to have developed relationships with them that are based on mutual respect for each party's specificities. Not to forget all the staff who, in virtually systematically difficult conditions, allow for our research to maintain the necessary scientific level in a nation that believes in its future. Among them, my thoughts particularly go out to our young colleagues, students and post-docs.

For biology, the ATIP-AVENIR programmes now allow junior researchers to set up a team independently and under conditions that would have been a dream for researchers of my generation. That is, however, provided one can make it to that point through a difficult journey.

More generally, how can we think about attracting the best towards our professions when, with 15 years of higher education, they are faced with the recruitment conditions and career prospects we all know? Except for soldier monks, but those are becoming rare. Raising awareness of the need to renew our scientific elites has become a matter of urgency, and it is not certain that the annual science festival is a response that can meet the challenge. Again, something of an understatement. ■

Prof. Alain PROCHIANTZ

Source: La lettre, *no. 33, May 2012*

Prof. Alain PROCHIANTZ
Morphogenetic
Processes

Prof. Philippe Sansonetti

Winner of the 2012 Grand Prix Inserm

I would like to address special thanks to my colleagues. Throughout all these years, they have made the Microbial Molecular Pathogenesis Unit what it is, and I dedicate this INSERM prize to them.

Junior researchers' careers are particularly important to me. Their role in society lacks recognition – and remuneration –, yet they show exemplary qualities: passion, curiosity, rigour, honesty, critical thinking, selflessness, universality and modernity, and trust in the future, for science is no short-term affair. Education and research are the only real guarantors of our future.

I would also like to thank microbiology and say a few words about it; more precisely about the human-microbe interface which corresponds to the INSERM. More than ever, microbiology is a crucial model in fundamental biology and its capacity to interface with other disciplines: cellular biology, immunology, and now the biology of development. These interfaces have seen the emergence of many recent discoveries, as they have their full role to play. As Theodosius Dobzansky said, "nothing in biology makes sense except in the light of evolution". As multicellular eukaryotes, we are born from bacteria and have evolved with them. All the phyla, from protozoa to higher mammals, host a microbiota. In light of co-evolution, the maintenance of these floras makes sense. Symbiosis models in primitive organisms attest to this and there is little risk in thinking that what holds true for calamari, flies or earth worms also does for humans.

Recent research has shown the crucial role of the microbiota in nutrition and the maturing of the immune system of mice. Yet who would have thought it was involved in the late stages of the brain's maturing, or as we have just shown in our laboratory, in the protection of adult stem cells ensuring the regeneration of my favourite epithelium, the most noble of all, the intestinal epithelium?

A new page of microbiology is being turned which is going to reveal the breadth and depth of this symbiosis, which makes us a eukaryote-prokaryote hybrid. This is also a new page of medicine, for the dysfunctions of the homeostatis of this symbiosis seem to hold the etiology of diverse diseases: insulin resistance, obesity, diabetes, inflammatory bowel diseases, allergy/atopy, or even certain colon cancers. These all provide new interface opportunities for microbiological research.

We are also looking at pathogenic microbes, in these times of infectious emergence. While they form a tiny minority next to microbiota, it is nevertheless an active one.

As I rewrite *War and Peace*, I am trying to draw a bridge between symbiosis and pathogenecity, but on the mucosal surfaces, in order to understand better how our immune system differentiates between pathogens and symbionts. How does the host sense the microbial danger and adjust its response accordingly? This has a corollary: pathogens' manipulation of this perception of danger and of the immune response through molecular strategies which we are deciphering and that never stop amazing us.

Shigella is a superb study model, due to the range of effectors devoted to the subversion of the host's defences that it expresses to invade the digestive tract. Recent examples of such strategies which my group has revealed include: blocking the secretion of ATP, a major danger signal, by closing the connexin hemichannels of the infected epithelial cells; post-translational modifications of the inflammatory response channels' key proteins, both in the cytoplasm and in the nucleus, by taking control of the regulation of pro-inflammatory genes on the transcriptional and epigenetic level; immobilization of the T lymphocytes travelling towards the T zone of the lymph nodes.

Pathogens know us perfectly well, especially our immune system. In fact, better than we do. Let us therefore let them educate us, through the analysis of their subversive strategies. Let us use knowledge of these strategies to develop new treatments, new vaccines. That is what we are currently doing, faithful in this way to the Pasteurian tradition.

I would like to conclude by thanking my friends and my family gathered here today, my mother, my brother, my children, my wife Nicole, and particularly by reassuring them that in spite of appearances, I do love them more than microbes. ■

Prof. Philippe SANSONETTI

Source: La lettre, *no. 35, December 2012*

Prof. Philippe SANSONETTI
Microbiology and Infectious Diseases

Prof. Philippe Descola

Winner of the 2012 CNRS Golden Medal

Of the sixty-four gold medals awarded by the CNRS since 1954, in some years to two laureates, only fourteen have rewarded researchers in the humanities and social sciences. It is therefore a very rare honour that is being bestowed upon me this evening.

The pluralist anthropology that I advocate does not consider the awareness that other peoples forge of their lifestyles as ideologies, the principles of which have to be revealed, or as alternative cosmologies that ought to be embraced since they are believed to reflect reality more accurately than our own, but rather as the consequences of predicative operations open to all, but which tend to be stabilized selectively in a community of practices in such a way that, within each of the collectives thus constituted by these operations, specific schemes of action and thought emerge, which imbibe life we lead in common with an observable coherence. We can see these operations as a sort of ontological sifting of the qualities of the world that impinges upon many aspects of human experience: the sorting of existing things into categories; the type of agency with which these existing things are credited, and the nature of the relations they maintain; the way in which collectives are constituted and in which they interact with other collectives; the definition of what an agent and a patient is, of how a legitimate or effective action can be deployed; the conditions under which a proposition can be held to be true and knowledge to be authentic; the types of metaphysical and epistemological problems that humans are confronted with and the procedures to solve them. All these basic features of human existence, along with many others, are instituted according to distinct modalities related to the types of quality and relationship that habits acquired in a particular collective have led us to detect or to ignore.

In this sense, a pluralist anthropology consists not in contrasting an elusive West that cannot be found with an undefined Rest of the world, but in considering these different ways of sorting the world's diversity on an equal footing, by devising a descriptive and analytical language that might enable us to account for widely diverse, but not infinite, forms, to assemble existing things, qualities, processes and relations, and in so doing making sure not to adopt the tools with which these operations were conceptualized in our own cultural tradition. Even if concepts such as 'society', 'nature', 'history', 'economy', 'religion' or 'subject' played a significant part in reflexive thinking in Europe, in bringing modernity into being and thus in creating an actual space within which the humanities and social sciences could develop, these concepts nevertheless relate to ways of objectifying phenomena characteristic of a historical trajectory that other peoples have not followed. They must therefore be treated not as universals, but as local expressions of a particular form of composing the elements of the world – a particular form of composition that has moreover known very different modalities. I therefore argue for a universalism that is both real and realistic, that is, one that refuses to universalize the relative notions by means of which we think that we can describe, using the terms of the cosmology derived from modernization, those cosmologies that have remained on its fringes; a universalism which aims rather to invent analytical tools that are less dependent on the anthropocentric conception of relations between humans and non-humans that naturalism spawned.

The paradox of this type of renewed universalism is that it stems from the lessons that anthropologists learned from observing situations that seem to be so singular that it would be impossible to infer generalisations from them. Thus, when I look back on the lessons that I learnt from my ethnographic experience among the Achuar Indians in the upper Ecuadorian Amazon, I realise that each one of them challenges the notions and values that I would previously have considered without question to be universally valid. The first of these lessons, and perhaps the most important one, is that nature does not exist everywhere and for ever; or more exactly, that the radical division that the West has made between the world of nature and that of humans is largely meaningless to other peoples who grant all the attributes of social life to plants and animals, consider them as subjects rather than as objects, and therefore would never banish them to an autonomous sphere governed solely by the procedures of science and techniques. Hence, saying of the Indians that they are "close to nature" makes little sense, since by giving the beings inhabiting it a dignity equal ▶

ANTHROPOLOGY OF NATURE
OTHER PRIZES AND DISTINCTIONS

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to their own, they do not behave very differently towards them than they do between themselves. To be close to nature, there has to be nature: an exceptional arrangement of which only the Moderns have been capable, and which probably makes our cosmology more enigmatic than all those of the cultures preceding us.

The Achuar also taught me that one can live one's destiny without the help of a divine or historical transcendence – the two branches of the alternative between which many contemporary societies still hesitate. For with them the individual in his or her singularity is not determined by a superior and exterior principle, nor driven by collective movements of which he or she is unaware, nor defined by his or her position in a social hierarchy that gives meaning to one's life according to the place in which one was born. The individual exists only in the ability to assert him- or herself through acts, according to a scale of desirable goals shared by all. Yet another lesson that the Achuar taught me was their way of living a collective identity without burdening themselves with a national conscience. Unlike the people's emancipation movement which, from the late eighteenth century in Europe, endeavoured to ground demands for political autonomy on the fact of sharing a cultural or linguistic tradition, the Achuar do not see their ethnicity as a catalogue of distinctive features lending substance and eternity to a shared destiny. Their common existence derives its significance from neither language, nor religion nor the past; it feeds on a same way of living the social bond and their relations with the peoples around them, human and non-human alike. This way of instituting collectives thus offers a valuable testimony of the fact that ethnic nationalisms are less a heritage of non-modern societies than an effect of contamination of former modes of community organization by modern doctrines of state hegemony.

These lessons, and all of those that anthropologists have learned from their ethnographic studies, are so many alternative experiences brimming with promise. Ceasing the frantic exploitation of nature obtained at the price of devastating the future generations' living conditions; doing away with blind nationalism and the predatory arrogance of large nation states and certain transnational firms; eliminating the unbearable inequalities in access to resources, especially those that should be common goods; ensuring that a form of public representation is given to the various types of non-humans to which our destiny is indissolubly bound: these are all concrete challenges facing our modernity that we would do well to envisage by analogy with the way in which the peoples studied by ethnologists construct their relationship with the world. Not, of course, that we could adapt their customs directly, since historical experiences do not lend themselves to transposition – assuming that this would be desirable. What anthropology is however able to do is to provide evidence that other ways are possible, since some of them, as improbable as they may seem, have been explored elsewhere or in past times, and thus show that the future is not simply a linear continuation of the present. On the contrary, it is filled with incredible potential, the realization of which we have to imagine if we are to build without delay a truly common house, one that lives better and that is less exclusive and more fraternal. ■

Prof. Philippe DESCOLA
Speech delivered at the award ceremony of the CNRS Golden Medal - 19 December 2012

Prof. Philippe DESCOLA
Anthropology of Nature

Prof. Jean-Noël Robert

From Medieval Buddhist Poetry to Twentieth Century Japanese Thought

One must ask oneself how can readers dive into the world of the *Tale of Genji* and into the world of Mishima with the impression that they are entering one and the same culture – a culture that would seem to reflect a mentality which has endured over centuries.

One could perhaps argue that this question concerns Western readers and not Japanese culture in itself, which could in no way be held responsible for any assumption we may have about it. It seems to me, however, that such an attitude is based on an accurate – though not necessarily uttered or expressed – perception of an essential feature of this culture, which is the perception of the historical continuity of its language. Here again, one will find that this feeling is one of the most common, at least within the great languages of civilizations that have developed in the Ancient World over thousands of years. It is nevertheless rare to see it so clearly reflected in the very history of the language as it is in Japan. The reason is that, from the moment it became a literary language, Japanese entered a dialogical relationship with the Chinese language, which was the great vehicle of the continental civilization, and this relationship has been sustained to this day. This is even the most striking and constant feature of the dynamics of Japanese civilization.

The year 1968 was rich in events, but the one that will remain the most important for our studies was unquestionably the attribution of the Nobel Prize in Literature to the Japanese novelist Kawabata Yasunari. Several things were apparent in this award: first of all, it was the second time in history that the prize was awarded to an 'Asian' writer in the broadest sense, since the first to have been celebrated this way, fifty-five years earlier, had been the Indian – or more exactly Bengali – poet, thinker and novelist Rabindranath Tagore. So many years had passed since then that it now seems difficult to comprehend that one could have ignored for such a long time the other Asian literatures, which are particularly robust in their Chinese and Japanese expressions. The other noteworthy fact was that it was a Japanese person who had had the honour of being Tagore's successor. It would probably be somewhat of an exaggeration to imagine that in Japan or India there had been a widespread feeling of cultural continuity between the two writers. However, one has to remember that Tagore had for a while entertained the idea that Japan could be the model for an original cultural development for Asia, even though he had in the end been disappointed by his trip there. The fact is there and cannot be erased from history: one of the most famous novelists of his time in Japan was elected in front of the nations as the eminent representative of Asian literature.

Biographers concur to emphasise the intense embarrassment that this decision occasioned in Kawabata. This was not just a matter of modesty; he was profoundly convinced that there were contemporary writers in Japan who would have been more deserving of this tremendous recognition. What probably embarrassed him above all was the obvious fact that he would from then on be considered within the entire world's intellectual circles as the representative par excellence of Japanese literature, from its very beginnings. It is the full awareness of this responsibility that is reflected in his speech on accepting the Nobel prize in Stockholm on 10 December 1968.

Written and read by the author himself in Japanese, it was translated and delivered in English by the American Japanese Studies specialist Edward Seidensticker, who aptly represents this perception of continuity in Japanese culture that I am attempting to describe. As a translator of the great twentieth century writers Nagai Kafū, Mishima Yukio and Kawabata, he devoted the end of his teaching career to translating the *Tale of Genji*, thereby going back to the source of Japanese literary writing. One can well imagine that this speech did not remain without a response in Japan. It also created quite a stir in Europe, as everything concerning the Nobel Prize in Literature usually does. However, both within its country and abroad, the speech was not fully understood, and people were mostly inclined to read into it the width of the gap that separated East and West.

It is true that the extraordinary subtlety deployed by Kawabata in these pages gave the listener and then the reader every opportunity to be misled. The fact that, at least in Japan, the speech was regarded as a decisive text beyond the circumstances which gave rise to it can be seen in the fact that it is still available in an independent paperback edition, along with its English translation, whose differences with the original would in themselves deserve a small study.[1] It is therefore relevant to ask ourselves what the author had wanted to tell us. ■

Excerpts from the Inaugural Lecture 2 February 2012

Source: La lettre, *no. 33, May 2012*

(1) It is the edition used here: Utsukushii Nihon no watashi – Sono josetsu, Kōdan-sha gendai shinsho, *1969 (2009, 56th edition).*

- **Inaugural Lecture published by Éditions Fayard and online at http://lecons-cdf.revues.org/543**
- **Videos of lectures available online at www.college-de-france.fr**

Prof. Jean-Noël ROBERT
Philology of Japanese Civilization

Prof. Jean-Pierre Brun

Did Techniques and the Economy Stagnate or Develop in Antiquity? Answers from Archaeology

How could such a powerful and well-organized empire as that of Rome disappear? This question has fascinated the West since the Renaissance. A number of historians have offered at least partial answers. What information is available to us?

More or less all the written sources from Antiquity disappeared during the Middle Ages. To write a complete history, we have only partial factual reports. Record keeping documents (which were numerous) are almost completely absent, likewise technical treaties and archival records.

This scarcity of documentation has given rise to contradictory economic models. It has raised questions on the role of technology used in Antiquity that led to the idea of a stagnation of technology after the Hellenistic period. This is not surprising: the huge gaps in written documentation mean that historians are silent on matters such as the economy or technology.

Should we thus lose hope for ancient history? The answer is no. We now have documentation from archaeological excavations, and this continues to grow. Thanks to the activities of a generation of researchers, public opinion and the political powers have realized that it is necessary to take measures to understand and thus to add value to our underground archives. In France, the law of 27 January 2001 recognized that the archaeological heritage must be materially preserved or protected through scientific study.

In terms of human, financial and intellectual resources, everything changed: over 4,500 archaeologists work in France, and about 15 000 researchers in the whole of the Mediterranean region. Even if they are not evenly spread, these figures suggest the possibility for the collection of a significant amount of data, which carries two dangers.

The first one is thinking that it is enough to undertake an adequate excavation to completely understand underground archives. Now, our successors will develop new questions provoked by the challenges of their time and they will invent methods to answer them. We must therefore, other than for essential emergency archaeology, do everything possible to preserve virgin territory for future archaeological investigations.

The other danger lies in the disorderly accumulation of these new documents. For archaeology to be made up of independent sources and scientific facts, actors must agree on protocols of identification and easily accessible data formatting, which will make archaeological remains useful to historians.

If we can overcome the obstacles arising from the abundance and complexity of the archaeological documentation, it will be possible to reveal basic phenomena such as development, stability and decline, and to provide minute details on regions. Our observations on the regions are all the more precious when the analytical points of view cross, thanks to interrelated analyses by a group of specialists from pollen, to dendrochronological, to 14C dating, or to quantities of 13C in bones for tracing paleo-diets, etc.

What questions would we like to ask of this new documentation? We would like to ask questions of the past that are relevant to our future.

Today, the questions are really diverse. They look at population, illness, food, economy, technology, environment, and climate. I personally concentrate on the study of production, an essential element that embraces the infrastructure of society and reconstructs the remains left by ordinary people who have neither the power nor the culture to provide written evidence.

Such studies compensate for the permanent bias present in history that favours those in power. In the coming years, I intend to present the state of research on the archaeology of technological innovations, energy, manpower and agriculture, especially specialized agriculture, the infrastructures of trade and the proto-industrial evolution of certain artisans.

Archaeology, through its mass of scientific information, can help us to draw a few lessons in the better understanding of economic and technological systems as well as the conditions for the collapse of ancient civilization, making our investigations more current. ■

Excerpts from the Inaugural Lecture
5 April 2012

Source: La lettre, *no. 33, May 2012*

- Inaugural Lecture published by Éditions Fayard and online at http://lecons-cdf.revues.org/566
- Videos of lectures available online at www.college-de-france.fr

Prof. Jean-Pierre BRUN
Technology and
Economy in the Ancient
Mediterranean

Gilles Clément

"Garden" Defies Cultural Divisions

"Garden" refers to the environment only to establish felicitous rules of gardening and to *landscape* for the sole reason that it is constantly creating gardens. The garden, everywhere in the world, signifies both *enclosure* and *paradise*.

The enclosure protects. Within the enclosure we find the *best*: that which we consider to be the most valuable, the most beautiful, the most useful and the most conducive to balance. The idea of the best changes with historical periods. The architecture of the garden reflecting this idea therefore also changes. It is a matter not only of organizing nature according to a scenographic representation of appeasement, but also to express therein an accomplished thought about the period in which we are living, a relationship with the world, a political vision. Irrespective of the stylistic figure and the architecture stemming from it, over time, the garden appears as the only territory where Humans and Nature meet each other, in which dreaming is allowed.

I won't say that beyond the enclosure lies the worst (as opposed to the best), but one does find there the wild unknown, hence disquiet, the city that is both oppressing and convenient, a land of unexpected encounters and necessary interactions, a mix of duties and prohibitions, the territory of rules, obligations and domestic relations, where basic issues of survival empty the public space of its obvious poetry to present it as a place of avoidance and confrontation. Outside the garden, human society is asked to suspend a dream to defend its social position or simply to exist. Within the garden, existential harassment disappears; it is no longer a matter of knowing where to head for and on what form of etiquette to base one's gestures and gaze; there is no question of the mode of adjustment to a so-called modernity; no point in impressing the birds by some or other performance in a managerial spirit of competitiveness. In the garden one just has *to be*, and that calls for silence.

The silence that I am talking about does not concern the space of the enclosure – by nature subjected to the discreet din of the animals – but that which one has to find deep within oneself by ridding oneself bit by bit of burdensome knowledge, just as one does with useless clothes. The presence of the garden implies a naked mind and an exposed body. Then it is possible to take the risk of dreaming.

The garden allows one to disarm. Whosoever enters the garden barded with certainties has taken the wrong door, for even if the garden is "botanical", filled with scientific labels, it is not science that it asks us to appreciate with devotion, but the incredible project of being given the keys of life forms via a scientific approach immediately warded off by the brilliance of petals, the buzzing of a bumble bee, the pilgrimage of ants, the mournful cry of the black woodpecker, and suddenly that light on the rusty grass of summer that throws an unknown, and therefore new, undergrowth into the shadows.

Where exactly does the mystery lie, in this distorted perspective that transforms a familiar object into a vision, or in the inventive power of life – peculiar to the garden and its profusion – that compels the gardener to change his or her point of view daily? Before understanding, let us be sure of our amazement. In this fragile phase of surprise in the garden – the mind naked and the body exposed – we test the child's gaze while he or she is still free, before learning by heart or by force the litany of the rules of life. In this adventurous journey, the sign "Don't walk on the grass" would make us laugh or doubt that we had entered a real garden, unless it had been put there simply to surprise us.

We don't know what exactly "the best" consists of since it varies with time. What we formerly maintained outside the enclosure – the wild, the weeds – is now moving into the garden. It may even be its main subject. We may well wonder what has changed so suddenly in the History of Humanity, for a discredited value to become a valued treasure. What is this grass that dictates its law to us?

In the past few decades the garden, limited to the space of the gardener – *l'hortus conclusis* – suddenly changed status; it came out of the enclosure. A considerable societal contribution, from the first half of the twentieth century, modified not only the idea of the best within the enclosure, but overturned the enclosure itself to the point of making it disappear. Ecology was born. Science intended to situate living beings in their habitat and to understand them through their relations with one another. But above all *cultural shock*, an observation through which all living beings find themselves bound in a complex system including humanity, air, water, rocks and invisible energy fields, each with an incidence on all the others in a finite space: the planet. ■

Excerpts from the Inaugural Lecture 1st December 2011

Source: La lettre, *no. 33, May 2012*

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- Videos of lectures available online at www.college-de-france.fr

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SUSTAINABLE DEVELOPMENT
ENVIRONMENT, ENERGY & SOCIETY
2011-2012

Paul Colonna

Stakes and Challenges for Sustainable Development

How can we ensure the sustainability of biological resources?

The development of new industries using biomass as raw material to produce a broad range of products, through a large number of different transformation processes, raises new questions on the associated environmental impacts. The current situation, mainly due to the significant development of the bio-fuel industries, is characterized by strong demand for sustainability criteria to apply to these new industries, particularly from an environmental perspective.

A foresight study of the future non-food uses of plant biomass was carried out using the classical scenario-building method during the ARP Plant for the Future (VegA) (foresight workshop), which involved CIRAD, IFP-En and INRA. Four contrasting scenarios of non-food uses of biomass were built, all integrating global energy demand scenarios devised by the International Energy Agency. These scenarios were used to study the potential share of biomass within the energy field and different innovation trajectories leading up to 2050, in relation to the transformations of society and the orientations of public policies and global governance. Chemicals were not considered as currently account for one tenth of oil uses. The uses of biomass in these different scenarios vary depending on whether it is used for transportation, production of electricity and heat, or chemistry, and on whether traditional uses of biomass, such as heat, are being replaced by new uses which render them more efficient.

Two factors are particularly important for the development of bio-energies: first, the evolution of public policies in relation to the dynamics of controversies, changing societal expectations and geostrategic issues; and second, the price of fossil fuels on which the economic profitability of these industries is contingent.

If, within the current means of production and processing, the biomass offer had to meet a demand ranging from 720 to 1150 Mtoe (million tons of oil equivalent) for "new" uses alone – that is, transportation (liquid bio-fuels), production of electricity and heat (other than so-called traditional direct combustion uses) and production of bio-molecules – the required surface areas would range from 275 to 925 million hectares.

These orders of magnitude rule out the possibility of meeting massive demands for biomass from a sustainable development perspective, using only dedicated crops (whether they are first or second generation-based), and call for caution regarding the long-term projections produced on the use of biomass for energy and chemistry. The ineffectiveness of complete reliance on biomass without a parallel policy to reduce energy consumption stands out very clearly. Finally, these results call for consideration of the possible tensions not only with food uses, but also with the non-food uses of biomass that already exist.

This quantified analysis also highlights the fact that the question of the competition between food and non-food industries exceeds the purely spatial dimension of the phenomenon (the issue is not one of space limitations: large arable surface areas remain in the world, though very unevenly distributed geographically): it relates more to the environmental and social impact of the exploitation of that land, and to the ways in which it can contribute to or constrain development trajectories, particularly the agricultural trajectories of countries of the South, which play an absolutely crucial role in overcoming global food challenges both in the short term and the long term. In short, these reflections broaden the debate on biomass beyond the scope of energy flows, carbon and hectares. We are faced with a host of interlinking research issues which, organized as a whole, should provide us with solutions for sustainable development. Can we however talk of a bioeconomy or a green economy? And what about citizens: how will they behave? The human factor is the main unknown. What should we make of expected developments relating to well-being? Energy sobriety, for example, shows us that beyond one Toe/person-year, life expectancy is stable. This simple correlation shows us how our efforts towards sustainability can be adapted locally according to societies' needs. ■

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- **Videos of lectures available online at www.college-de-france.fr**

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Jean-Paul Laumond

Robotics: Hephaestus is Starting all Over Again

Humanoid robots appeared in the 1970s.Technological advances in mecatronics – miniaturization of electronic components and increasing power of electric engines – have enabled their application in research laboratories over the past ten years. There are currently around twenty different prototypes.

Hephaestus is starting all over again with new Pandoras. They are no longer of clay, but mecatronic. And they are animated. The roboticist keeps on asking the question of autonomy: what adaptability can we hope to give these new machines? The analogy between humans and machines has to be made; it cannot be avoided. In the end, does Hephaestus have the keys to knowledge? With his machines that adapt, that "decide" on their actions, what can he tell us about our own "functioning"? The question is both dangerous and beautiful.

The danger is epistemic. Robotics cannot serve as an alibi for biology. A biological model cannot be validated on a robotic platform. Even though models of life forms can be simulated on computer, and robots can be controlled on the basis of these principles – sometimes very effectively –, it is in no way possible to conclude on their validity simply because they are operational in robotics. It is not because a roboticist successfully uses a bio-inspired model that this success says anything about the validity of that model. And conversely, it is not because the roboticist is capable of making a robot navigate in an environment cluttered with obstacles that we know how humans or animals solve the same problem.

If the roboticist can identify with Hephaestus and can shape Pandora out of clay, he is neither Athena nor Geppetto. He will never give any humanity to clay or wood. A robot is a machine controlled by a computer; nothing else. Although animated, it remains and will remain an inanimate object without a soul that becomes attached to our soul [and without] the power of love.[1] Let us allow the demi-gods to talk, let us enjoy works by Fritz Lang and Mary Shelley, and let us not be afraid. But are we actually anxious? That is not so sure. In any case, our Japanese friends aren't, they who are so different from us; they for whom union is possible.

The question of the analogy between humans and humanoid robots is hazardous; it had to be answered. It is also fine and fascinating, provided we give it some rigorous substance.

Lets take locomotion as an example. What trajectory does an individual take to leave a room? How can all the motors of a humanoid robot be coordinated to perform the same task? The question is precise. It concerns the relationship between the motor space and the physical space. This relationship is a key to understanding our relations to the world. Henri Poincaré set the terms. That is where the power of mathematics lies, in proposing a formulation common to science and techniques, and it is this foundation that is contributing today to the emergence of new fields such as neuro-robotics.

The main challenge of biped locomotion is balance. Today's humanoid robots have flat feet. Force sensors to measure the effort placed under the robot's feet show the position of the centre of pressure at any point in time. This principle of understanding means that they lack suppleness.

Neurophysiologists have a radically different approach: nature shows that the reference framework at the origin of the control of locomotion is in the head (the information is given by the vestibular system). Locomotion has to be envisaged as a process starting from the eyes and going towards the feet, and not the opposite. The message is clear. The principle has been discovered; the roboticist just has to invent it. It is not enough to say; one also has to do. Moreover, the child him- or herself has to "invent" it over a long learning period. What are the mechanisms driving this learning? That is a question concerning neurophysiologists and roboticists alike, and which fuels the fertile tension. Dialogue is possible: the probabilistic models, for example, are there to describe the processes. The fact remains however that, even if the correlation between two variables enables roboticists to stabilize their robots, it says nothing about the causal relations. In any case, they pay little attention to that, condemned as they are to doing. And if they can invent a method that can do without this learning phase, so much the better. I am deliberately over-stressing the point: we never protect ourselves enough from "dangerous analogies". ■

Excerpts from the Inaugural Lecture19 January 2012

Source: La lettre, *no. 33, May 2012*

*(1) Translator's note: Allusion is made here to Alphonse de Lamartine's poem "*Milly ou la terre natale*": "*… objets inanimés, avez vous donc une âme// qui s'attache à notre âme et la force d'aimer ?*"*

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INFORMATION TECHNOLOGY
AND DIGITAL SCIENCES
2011-2012

Serge Abiteboul

Data Sciences: From First Order Logic to the Web

To obtain information, we can query a *database management system*.

To do so, we express our queries in a simple computer language, perhaps using graphics, perhaps even in our natural language.[1] The system translates this request into a formal language. This consists of a syntax, which allows the user's query to be specified, and a formal semantics that gives this syntax an exact meaning. Mathematical logic allows for this kind of formal language. In this lecture, I will discuss the profound ties between what I here call *data sciences* and mathematical logic or, to be more precise, *first order logic*.

We will consider the *Web's information systems* that serve as entry points to information of all sorts. The most widespread examples of this kind of system are search engines like Google, which provides an index to billions of documents on the Web, and in a way allows us to think of the Web as a gigantic database. As for social network systems like Facebook, they serve as entry points to hundreds of millions of users' personal data.

The Web's information systems, just like centralized data management systems, are mediators between intelligent individuals with little desire to trouble themselves with programming details, and physical objects like discs or USB keys. We are interested in intelligent systems that can manage information, understand it and make it available to human users. This last sentence deliberately echoes an anthropomorphic view of computer systems.

We interact with machines that are becoming ever more autonomous, more difficult to distinguish from human beings. While the intelligence of a database management system is a small step toward artificial intelligence as defined by Alan Turing, the intelligence of the Web is a recent consideration, from both a philosophical and a scientific point of view. In this lecture I will discuss the emergence of collective knowledge fuelled by the sharing of large volumes of information. We will try to imagine what tomorrow's Web might be like with millions, perhaps even billions of interconnected machines reasoning collectively.

The World Wide Web, introduced by Tim Berners-Lee and Robert Cailliau around 1990, is based on hypermedia documents. This is the Web to which we so quickly became accustomed. The information is in a natural language and the texts are loosely structured with HTML tags, for example for titles or enumerations. The anchors on which Internet users can click lead not only to other HTML pages but also to pictures, music and videos. In this part, I will talk about one of the Web's greatest success stories, the *search engine*. Web search engines save us from having to tediously browse through the multitude of pages, and instead plunge us into a global digital Library.

The search engine sees the Web as a global library. The Internet user searches for information, and even though the Web most likely cannot answer all of his or her questions, this information may be somewhere amongst the truly extraordinary masses of information and knowledge it holds.

Like children, we marvel at the tens of billions of documents on the Web. But from the youngest age a child learns to evaluate, classify, and filter the considerable mass of information it encounters. What about us? If the search engine did not help us to focus on a small number of pages, what would we do? The technical exploit lies in finding, within an instant and thanks to its index, the Web pages that contain the words of the query. The magic part is that, from among tens or even hundreds of millions of possible pages, the search engine comes up with the few pages that so often contain what the user is looking for. ■

Excerpts from the Inaugural Lecture 8 March 2012

Source: La lettre, *no. 33, May 2012*

(1) "Natural languages" refer to languages elaborated over time by groups of speakers, like French or English. This is not so much in opposition with "constructed" languages like Esperanto, as with formal languages like first order logic, SQL or Java.

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Manuela Carneiro da Cunha

For New Ways of Relating to Traditional Knowledge

For several decades in the twentieth century traditional knowledge was compared and set apart from science. The criterion was rationality, which Hilbert, Carnap, and the Vienna Circle sought to establish as the basis and preserve of Science.

Although Gödel proved such an objective to be unattainable as early as 1931, it was only around the 1960s that philosophy of science definitively acknowledged it. As a consequence, anthropology went on comparing the systems of knowledge that it described with the (obsolete) assertions of logical positivism about science.

Now that science's positivist project has been eroded, relationships between traditional knowledge and science cannot be envisaged in the same terms. But I am not using this reminder to advocate that we simply equate science to traditional knowledge. On the contrary, it is necessary to understand and highlight their conceptual, institutional and historical differences.

Science as we know it has retained a fundamental distinction from classical Greece: that which separates theoretical knowledge, *episteme*, and know-how, *techne*. Science, as Jean-Pierre Vernant has shown, is the reasoning, the discussion, the demonstration; it is time – and this is what more contemporary anthropology shows us – to re-establish the importance of *techne* in the constitution of knowledge in general.

The category of "knowledge" or something that comes close to it seems to be present in any society. It is also everywhere unevenly distributed, and distinguished according to specializations and hierarchy. In contrast, there is a surprising diversity of regimes of knowledge. The status and nature of knowledge, what it is, its genres and kinds, its specific hierarchy; its forms of attribution and validation; the rights and duties that order it; its conditions of access, transmission, circulation and memory; all this and much more characterizes a particular regime of knowledge and underpins its functioning. This regime, provided it is robust, is what presides over the ceaseless borrowings. But it is also within its framework and thanks to it that discoveries and innovations occur.

It is therefore important to preserve not only the content but also the systems of traditional knowledge themselves, letting them follow their own paths, without isolating them. And then we also need to innovate with forms of research collaboration that involve them as full partners.

Most indigenous knowledge ontologies are incompatible with ours. Ultimately, is that so important? Today's physics simultaneously accepts two ontologies, general relativity and quantum mechanics, which for the time being are mutually incompatible.

I would therefore argue for a diversity of ontologies and of knowledges, and urge us, as we did in the past, to continue recording these methods and findings without seeking to reform these systems, and to do so by setting up networks to empower them as partners and stakeholders in their own right.

But there is more. It is through contact with these forms of thinking which differ from ours that we can become aware of our tacit assumptions, that which goes without saying, thereby limiting what can be said. Georges Canguilhem wrote: "the *episteme* is the soil in which only certain forms of discourse can grow". Becoming aware of other forms of thinking suddenly allows us to invent, to think differently – to multiply the *epistemai*. Thus, ethnopharmacologists are not simply in search of new molecules: far more ambitiously, they are looking for new models of therapeutic action. I am therefore not necessarily recommending borrowings, but drawing attention to the simple and surprising and liberating effect of realising that one is not compelled to think in set terms: it was by removing just one of Euclid's postulates that Lobatchevski and Bolayi were able to conceive of geometry differently. Whether Leibniz's binary numbering was truly inspired by China or recognized itself in it is less important than the exemplary fact of a scholar who was able to realize the implications of there being a different way of thinking. All of a sudden, other worlds are possible. ■

Excerpts from the Inaugural Lecture 22 March 2012

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INFORMATION TECHNOLOGY
AND DIGITAL SCIENCES
2012-2013

Bernard Chazelle

Algorithms and Science

The following anecdote, perhaps apocryphal, is told about the great Danish physicist Niels Bohr:
– Professor Bohr, I see you have a horseshoe hanging on the wall. Don't tell me you believe in this kind of thing!
– Don't worry, I don't believe in it at all, but I was told that it works even if you don't believe in it.

So it goes for the algorithmic revolution. Beyond the scepticism or infatuation of the day regarding the latest IT novelty hides one of those paradigm shifts dear to Thomas Kuhn. The algorithm is a subversive conceptual tool, which affords the possibility to look at science and technology from a new perspective extending beyond its practical applications. These lectures will explain the constituent elements of this intellectual revolution underway.

The algorithm owes its name to Abū 'Abdallāh Muhammad ibn Mūsā al-Khwārizmī, who spearheaded the Abbasid renaissance in Baghdad in the ninth century: a pedigree filled with revolutionary zeal. You are hardly likely to find this fervour in a passerby asked to define the word algorithm. An algorithm, they will say, is a formula painfully learnt in school, which allows you to multiply two numbers by aligning the digits in rows. Everyone knows how to add, subtract and multiply, which brings the number of universally known algorithms to three – or four, if we count the survivors of the digital era who still know how to divide. An algorithm is a sequence of instructions to follow in order to arrive at the desired result through a series of simple and boring steps. Don't let your calculator fool you. It has no more knowledge of arithmetic than a horse at Longchamp race-course has of the PMU.[1] Its algorithms read, write and delete without understanding a thing.

An algorithm is defined independently of the size of the data. Multiplying 10 or 10 billion digit numbers not only follows the same principle but also the same word-for-word instructions. Only the execution time differs. The multiplication of two 10 digit numbers produces a grid with 10 rows of 10 or 11 digits each, and requires a number of basic stages at most proportional to 10 x 11. Generally, multiplying two numbers of n digits each requires a number of stages at most proportional to $n\,(n+1) \approx n^2$: we then say that the complexity of the algorithm is on the order of n^2. It is of little importance whether the number of stages equals n^2, $3n^2$, or $17n^2 + n$: all that matters is the order of magnitude, n^2. These constant factors are not ignored out of laziness but because of a sharp sense of priority. They often reflect implementation details extrinsic to the algorithm in question (such as the numerical basis for multiplication). Another reason to get rid of them is to give credit where credit is due. Does your calculator multiply so quickly because of an outstanding algorithm or because of a turbo-charged processor? Generally speaking, constant factors are owed to computer power, and orders of magnitude (such as n^2) to the complexity of the algorithm.

School multiplication has a complexity on the order of n^2. Can we do better? The answer, which is positive, can be surprising. Schönhage and Strassen's algorithm reaches a complexity of a slightly higher order than n (to be precise, of the order of $n \log n \log\log n$). In practice it is useful for the factorisation of large integers. The method, recently improved by Martin Fürer,[2] is based on an old algorithm, the Fast Fourier Transform (FFT), a cornerstone for processing the signal present in all of your electronic gadgets. As strange as that may seem, the same algorithm which allows you to listen to music and interpret your fMRI scan will help you to multiply large numbers very fast. The algorithm owes its greatness to its versatility, and Gauss' FFT, rediscovered by Cooley and Tukey in the 1960s, is one of the greatest. In collaboration with Nir Ailon, I have shown how to randomize the FFT to exploit the Uncertainty Principle, a central concept in quantum mechanics, and to search for neighbours in very high dimensions.[3]

The rest of this lecture could inventory the algorithms which, perhaps without you realising it, have changed your life. But I have a greater ambition. It is to convince you that the algorithm is not so much a useful object as a different way of thinking. ■

Excerpts from the Inaugural Lecture 18 October 2012

Source: La lettre, *no. 35, December 2012*

(1) French horse-betting agency. (2) Fürer, M. Faster Integer Multiplication, SIAM J. Comput., 39 (2009), 979-1005. (3) Ailon, N., Chazelle, B. The Fast Johnson-Lindenstrauss Transform and Approximate Nearest Neighbors, *SIAM J. Comput. 39 (2009), 302–322.*

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Karol Beffa

How to Talk about Music?

In a 1960 issue of the *Saturday Review*, Glenn Gould reviewed a book by Professor Erwin Brodky, *The Interpretation of Bach's Keyboard Works*.

Brodky devoted part of his book to "seriously discussing the supposed intrinsic relations between the fourteen note subject of the *Fugue in C Major* of the first book of the *Well-Tempered Clavier* and the fact that the alphabetic arrangement of the letters in Bach's name add up to a total of 14 and that if we add the initials J.-S., we obtain the inverse number of 41". This kind of wild fantasy is far from being an isolated case. Certain exegetes claim to have discovered the importance of the number 3 and the number 7 in Bach's work. Supposedly allusions to the Holy Trinity and the seven day week that punctuates the religious calendar, they are said to be plentiful in his works: thirds, triplets, number of notes, bars or sections that are multiples of 3 or 7, etc. Using this invention as a pretext, others have taken an interest in 14 (twice 7), miraculously found in the numerological translation of Bach's name, in 41 (the mirror of 14), etc. This outmatching knows no limits. Another example of fascination that has motivated long essays relates to the Fibonacci sequence and the famous Golden Number. The Hungarian musicologist Ernó Lendvai has made it out to be the key to all of Bartók's work, particularly his string quartets. He sees it in the count of notes, tempos, and bars. To do so, all kinds of arrangement with reality are allowed, as are distortions. Each numerological coincidence is seen as an oracle. This discourse on music lapses into cabbalistic thinking. It cloaks itself in a scientific appearance as a guarantee of reliability, and sets out to decrypt works exclusively for a group of the initiated.

This cult of Number, like sesame opening the way to music for us, has been supported by dodecaphony, which requires that only a series of 12 notes determined beforehand be used in a musical composition. Serialism then takes over. As Nicolas Ruwet writes, this music presents itself as complex, difficult to perform, announced by "stern titles (*Polyphonies, Structures, Counterpoints*) which imply an advanced elaboration". Commentaries "insist on the problems of language and structure, mark their desire for rigour and complexity, reveal complicated schemes, long preparatory work to write the piece". And yet, to cite Ruwet again: "when heard by unbiased listeners, this music seems surprisingly simplistic ... acceptable as background music, as decor, this music fails to create an autonomous discourse". Add to this the fact that, as has been tried and tested, the composers themselves are often incapable of identifying by ear the series of twelve sounds underpinning their work. The profuse discourse is there to justify the system, which has taken the place of music. As Ruwet puts it, the composers have gone wrong in mistaking the ideological image painted by the commentary surrounding music, for musical reality itself.

Analogously, there are commentators who, speaking of works that are not all serial, insist on detecting elements hidden in the music sheet, whether perceived by the ear or not. Parodying Nietzsche and his famous "without music, life would be a mistake", I would say that for them, "without the music sheet, music would be a mistake". Their pernickety gloss is concerned with reading and not hearing. These music sheet enthusiasts are also adepts of the second meaning of the French translation of the term, *partition*, as their fetishism regarding writing *cuts them off* from other musics, excluding jazz, extra-European music, improvised music. For these exegetes, music is no longer the art of sounds but that of graphic signs. The uninitiated would struggle to imagine the importance placed by these people on quarrels that he or she would consider Byzantine. Any piece sees endless scrutinising of its outlines, its intermediate stages, the final score, all of which are compared to others in a quest for hidden treasures, and where the slightest graphic subtleties are marvelled at. And never in this entire process is the resulting sound taken into consideration. It is totally disregarded, all that matters being these pointless discussions in a language which claims to be scholarly but is often merely abstruse. The obscure is made out to be profound. For the more inaudible the hidden object, the more intelligent the one who discovered it is considered to be. In the realm of numerology, he who is short-sightedly fixed on detail is king; in the Oriental desert of "papyrology", the deaf is king. ■

Excerpts from the Inaugural Lecture 25 October 2012

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LITERATURES OF MEDIEVAL FRANCE
SYMPOSIUM

Languages Other than Mine

This symposium was held as part of Professor Michel Zink's seminar, under the research programme funded by his 2007 Balzan Prize, and as part of the activities of the Institute of Literary Studies of the Collège de France.

It focused on writers who, by choice or necessity, write in a language other than their mother tongue.

After stressing that this symposium resonated with the one that had preceded it in the same programme, after explaining the reference of his title to Emmanuel Carrère's novel, *D'autres vies que la mienne* (Lives Other Than My Own), and after showing how the papers that were about to be delivered covered the various aspects of the question, Michel Zink, in his opening statement, drew on Dante's *De Vulgari Eloquentia* to emphasize the meaning of the freedom that medieval writers enjoyed in choosing their language.

Both Pascale Bourgain (École nationale des chartes) and Karlheinz Stierle (University of Konstanz) further reflected on medieval multilingualism. The former highlighted the fact that in the Middle Ages, Latin, without being someone's language, was not a foreign language, while the latter showed why the title *Rerum vulgarium fragmenta* was better suited than *Canzoniere* to Petrarch's vernacular poetry collection.

Several papers explored the still difficult and tragic situation, after the Holocaust, of German-speaking Jews with regard to German, and even their sense of being stripped of all languages: Jacques Le Rider (EPHE) concerning Mauthner, Kafka and Canetti; Claudine Haroche (CNRS) concerning Aharon Appelfeld, before considering totalitarian newspeaks (Klemperer, Orwell); John E. Jackson (University of Bern) concerning Paul Celan.

Other speakers commented on their personal experience or used it as a starting point. Michael Edwards (Collège de France) read one of his poems which mixes English with French, and explained the use of each language based on their respective rhythmic and lexical resources. The reflection of Luciano Rossi's (University of Zurich) on the future of European culture was rooted in his own journey as a multilingual philologist, an Italian by birth and a Romanist by profession whose career essentially took place in German-speaking Switzerland, mixing political philosophy, derived from his father's example, with philology, drawing on Brunetto Latini's *Book of Treasures*. Antoine Compagnon (Collège de France), after pointing out the role that English had played in his training, due to family circumstances and his mother's tastes, stressed the importance of the lingo used by siblings and families, with analyses based on passages from Proust.

Jean-Noël Robert (Collège de France and Académie des inscriptions et belles-lettres) talked about the situation of Japanese literates who did not speak Chinese but read and wrote ideograms, and could thus hold a "paintbrush dialogue" in this language with foreigners. He commented on a moving conversation held in this way in Chinese, around 1600 CE, between a Japanese man and a Korean prisoner of war in Japan, neither of whom knew the other's language.

Wondering whether mathematics could be considered as a non-mother tongue appropriated by mathematicians, Michel Zink had invited one of them, Jean-Paul Allouche (CNRS), who addressed and delved into many questions: mathematics as a foreign language, even a sacred language; the words of mathematics; the question of knowing in what real language mathematics are written, and what influence the language used has on them; the relationship between mathematical language and poetry; the mathematics of language and attempts at generative linguistics.

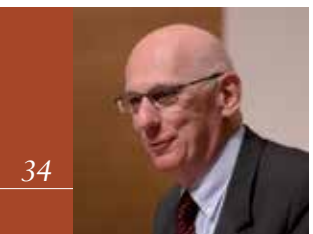
At the end of the first day, Marc Fumaroli (Collège de France, Académie française, and Académie des inscriptions et belles-lettres) analysed the rivalry between French and Latin in France during the classical era. He showed that certain minds steeped in classical culture preferred the direct and *naïve* imitation of nature – which is precisely what the Ancients themselves had done – rather than the imitation of the authors or artists of Antiquity.

At the end of the second day, Yves Bonnefoy (Collège de France) reminded us that, apart from the relationship between languages, there is a fundamental language which, by bypassing artificial concepts, coincides with the truth of the world through a re-appropriation of words, to all of which it gives the status of a "proper noun": poetry. ■

Prof. Michel ZINK

Source: La lettre, *no. 34, July 2012*

- Symposium held on 10 and 11 May 2012
- Programme and videos available online at www.college-de-france.fr



Prof. Michel ZINK
Literatures of Medieval France

Caption: Lot and his daughters *(1616) by Hendrick Goltzius (1558-1617) © DR*

Taboos and Transgressions

This year, the Chair of the Hebrew Bible and its Contexts brought together scholars of the Bible, Assyriologists and specialists of the Ancient Middle East for an interdisciplinary symposium.

The speakers were invited to examine the question of taboos and transgressions, from the point of view of their own disciplines and through their corpus of references:

• **Bible:** M. Bürki (Collège de France), D. Erbele-Kuester (Faculty of Theology, Brussels), D. Garrone (Vaudoise Faculty, Rome), J. Hutzli (University of Lausanne), L. Lanoir (Protestant Institute of Theology, Paris), A. Lemaire (EPHE), J.-D. Macchi (University of Geneva), A. Marx (University of Strasbourg), C. Nihan (University of Lausanne), S. Olyan (Brown University, Providence, USA), M. Saur (University of Kiel), O. Sergi (University of Tel-Aviv), T. Römer (Collège de France).

• **Qumran:** D. Hamidovic (University of Lausanne)

Mesopotamia: D. Charpin (EPHE), S. Démare-Lafont (EPHE), J.-M. Durand (Collège de France), L. Marti (CNRS), R. Pientka (University of Marburg).

• **Ancient Greece:** D. Jaillard (University of Lausanne).

• **Ancient Egypt:** Y. Volokhine (University of Geneva).

• **Mamelouk Period:** B. Martel-Thoumian (Université de Grenoble).

In addition to the particular interest of each paper, the comparative approach of this symposium facilitated transdisciplinary interaction and guided joint reflection.

Various contributions highlighted the absence of a term equivalent to the word "taboo" which anthropologists initially borrowed from the Polynesian languages in the last century. It seems however that several characteristics of this concept are recurrent in the different societies considered.

Several papers highlighted the importance of food-related prohibitions as identity markers. These "table manners", such as the prohibition of blood in ancient Israel, enabled the group to set its own limits "from the inside" and to define its modes of belonging and recognition. Some food regimes served to describe the group from the outside. This could prove to be unjustified and caricatural, such as the pork regime attributed to the Egyptians by Herodotus or, on the contrary, the reflection of a socio-historical reality such as that of the Amorites, a nomadic people that ate desert truffles and raw meat. The identity function of food regimes is also highlighted in inter-ethnic encounters where minority groups such as Jews in the Hellenistic period were forced to adapt their practices in order to avoid exclusion from the influential circles of society.

Sexual relations are a domain where laws have little impact and where taboos serve to define the limits. Prostitution in ancient Israel was thus discussed, as well as the use of this metaphor in prophetic discourse, the problem of inter-ethnic marriages that blur the boundaries of the community, and the possibility in exceptional situations of defying basic prohibitions such as incest in order to preserve other values of the group.

"Contact taboos" were also discussed. These taboos characterize exclusive places such as sanctuaries or the house of a high priestess, to which only the initiated have access. A sacred character is attributed to certain objects such as war booty or even certain people such as first-borns, to signify their exclusion from the group. Their contact with the group is thus subject to their observance of a ritual or of positions that ensure the protection of the rest of the group.

The understanding of prohibitions and of different forms of regulation require that the economic and social context in which they developed be taken into account, along with the collective imaginary to which they relate. The Assyrians, like the authors of Leviticus, make a fundamental distinction between the deliberate act and the unintended act. By taking into account acts carried out unwittingly, it is possible to explain any form of misfortune whose origins date back to the behaviour of the person affected by it. This sense of responsibility spawns new prohibitions set by hemerological science, which determines high days and low or bad days, knowledge of which makes it possible to limit inadvertent misdeeds. The texts of Judaism in the Persian era express an ideal where the law is under the authority of the temple. *Lex talionis* and the punishment by mutilation that it implies are consequently more of an ideological construction than a historical reality. ■

Michaël BÜRKI

Source: La lettre, *no. 34, July 2012*

- Interdisciplinary symposium held on 11 and 12 April 2012
- Symposium to be published in the collection "Orbis Biblicus et Orientalis", Academic Press Fribourg (Switzerland)
- Programme and videos online at www.college-de-france.fr

Prof. Thomas RÖMER
The Hebrew Bible and its Contexts

EPIGRAPHY AND HISTORY
OF THE ANCIENT GREEK CITIES
INTERNATIONAL SYMPOSIUM

Megarika

New Research on the Cities of the Megarid and the Megarian Foundations of the Black Sea: Archaeology, Epigraphy and History.

Caption: General view of the North-East necropolis of Megara by Yanni Chairetakis, courtesy of the Third Ephorate of Prehistoric and Classical Antiquities

In July 2012, the Chair of Epigraphy and History of the Ancient Greek Cities and several Romanian institutions organized a symposium on the history, archaeology and epigraphy of Megara and its Black Sea colonies.

Located on the Isthmus of Corinth, the city of Megara played a vital role in Greek colonization, having founded several colonies in Sicily and on the Marmara Sea and Black Sea coasts during the archaic period. Although the Megarians played an important role in the Hellenization process in several Pontic territories, research on Megara in Greece and the Megarian colonies of the Black Sea is still underdeveloped and relatively unknown, unlike that on Sicily. As part of this research context, the speakers were asked to address the following themes:

Colonization and contacts between the Megarian cities and the Aegean world: D. Knoepfler (Collège de France), I. Malkin (University of Tel-Aviv), A. Herda (University of Tübingen), C. W. Neeft (University of Amsterdam), R. Posamentir (University of Tübingen), T. Castelli (Université de Reims), V. Cojocaru (Institute of Archaeology, Iasi), F. Cordano (University of Milan).

• **The Archaeology and Epigraphy of the Cities of the Megarid:** Y. Kalliontzis (Collège de France), A. Robu ("V. Pârvan" Institute); representatives of the Greek Archaeological Service: P. Avgerinou, I. Svana, P. Valta, E. Tsalkou, Y. Chairetakis, S. Dreni.

• **Callatis and its Territory: New Research Developments:** A. Avram (Université du Maine), I. Bîrzescu ("V. Pârvan" Institute), F. Panait-Bîrzescu ("V. Pârvan" Institute), M. Bărbulescu ("Ovidius" University, Constanta), L. Buzoianu (Museum of Archaeology, Constanta), G. Talmatchi (Museum of Archaeology, Constanta), N. Alexandru; representatives of the "Callatis" Museum: S. M. Colesniuc, M. Ionescu, I. Pâslaru, T. Odobescu.

Several papers discussed the problems raised by the Greek colonization phenomenon, looking at the terminology used in the specialized literature, the founding traditions, the institutions, and the funeral and epigraphic customs of Megara and its colonies. The participants expanded their field of research by presenting new documents from Megara and Callatis (now Mangalia, hence the choice of this Romanian city as a meeting place). The rescue excavations carried out in Megara revealed numerous tombs, public buildings and parts of the water supply system. The excavations in the territory of Megara, i.e. the Megarid, also proved particularly fruitful: a new sanctuary was found in Pagai, on the Corinthian Gulf coast, dating back to the archaic period. Likewise, the history of another site of the Megarid, Aigosthena, could be renewed thanks to the presentation of four new catalogues dating back to the period when this city belonged to the Beotian League.

Inscriptions, coins, terracotta, and newly discovered papyrus from Callatis were examined through case studies, along with the funerary monuments and stelae of Chersonese, within the broader framework of Megarian colonization and the cities' encounters with the Aegean world. Foreign relations were furthermore studied through the onosmatic and iconographic documentation from the colonies. Due to a lack of time, several Megarian settlements were not included in the programme and will probably be discussed at similar events organized in the future. The Mangalia symposium proceedings are scheduled for publication next year by De Boccard, Paris. ■

Denis KNOEPFLER / Adrian ROBU

Source: La lettre, *no. 35, December 2012*

International symposium held from 8 to 12 July 2012 in Mangalia (Romania) by the "V. Pârvan" Institute of Archaeology of the Romanian Academy, the Collège de France Epigraphy and History of Ancient Greek Cities, the "Callatis" Archaeological Museum and the Museum of National History and Archaeology Constanta, funded by the National Council for Scientific Research (Romania) and the Collège de France.

Prof. Denis KNOEPFLER
Epigraphy and History
of the Ancient Greek Cities

On Turkish Art

For the first time since its creation in Ankara in 1959, the 14th International Congress of Turkish Art was held in Paris.

By deciding to hold it in our capital, the organizing committee, gathered in Budapest in September 2007, sought to honour France. This was a great event on the history of art and archaeology in the Turkish-Ottoman world. The committee wished to commend the dynamic nature of French research, both at national and international level, just as the new department of Islamic art was about to open its doors at the Louvre Museum.

Held every four years, this congress brings together academics, researchers and museum curators from across the world around the following themes:

- Turkish art in past empires: book arts (calligraphy, miniatures, illuminations), kiln crafts / ceramics and glass, metalwork, carpets and textiles, architecture.
- Turkish arts and the aesthetics of modernity: researchers, collectors and collecting; Orientalism in the arts; painters, paintings and decorative arts; the early days of photography in the Ottoman Empire; Turkish collections in Europe.
- The auxiliary sciences: archaeology, epigraphy, numismatics.

Prof. H. Laurens, who welcomed the congress participants, emphasized the place of Oriental languages at the Collège de France. He insisted on the personality of Guillaume Postel, one of the first "royal readers" at the Collège Royal founded by Francis I. Postel travelled twice to the Ottoman Empire, first in 1535, in the cortege of Francis I's first ambassador, Jean de la Forêt, and then in 1549.

From these "very long journeys" he brought back – at the cost, he wrote, of "countless struggles, countless troubles, countless hardships, countless dangers" – the observations that were recorded in his book *De la République des Turcs* (On the Republic of the Turks), published in 1560. His successors were to be secretary-interpreters of the king, for instance D.-D. Cardonne, P. Ruffin and D. Kiefer, and then interpreters, such as A. Desgranges, J.-M. Cor, and J.-B. Pavet de Courteille. Note that while these Orientalists held the Chair of Turkish language, other professors were in charge of Arabic and Persian studies.

Ö. Bozoğlu, head of the Fine Arts department of Turkey's Ministry of Culture and Tourism, then recalled the circumstances in which this congress was created and the history of its development – very shortly after the death of its latest representatives, Profs O. Grabar (1929-2011) and E. J. Grube (1932-2011). N. Clayer, head of the Centre for Turkish, Ottoman, Balkan and Central Asian Studies at the École des hautes études en sciences sociales, stressed the importance of such a congress at a time when Islamic arts occupy a significant position on the global museum scene.

The 14th International Congress of Turkish Art was thus a success: 180 speakers spread over 26 workshops. Among them were representatives of prestigious institutions like the Topkapi Palace, the Museum of Turkish and Islamic Arts, the Dolmabahçe Palace, the universities of Istanbul (Mimar Sinan University, Marmara University, Boğaziçi University, Sabanci University, Koç University), of Ankara (Gazi University, Hacettepe University), academics from Izmir, Konya, Edirne, and Mardin. Foreign institutions such as the Museum für Islamische Kunst of Berlin, the Textile Museum of Washington, The Metropolitan Museum of Art of New York, the Rijksmuseum of Amsterdam, The Wallace Collection of London, the Hermitage Museum of St Petersburg, the Louvre Museum and the Albert Kahn Museum, had all sent representatives (academics, curators and researchers).

This congress allowed art historians to come together, to present and compare their ongoing research, to exchange their points of view, and to review recent advances. During the debates, the strong growth of heritage awareness was noted, particularly in the domains of architecture and urbanism, and many workshops addressed the theme of industrial heritage. Another highlight of these days was old photography, the potential of which has recently been discovered. There are two aspects to photography in the Orient: an individual amateur practice (painters, archaeologists, literary persons or simply curious people) and a mass product, commercialised locally. Yet commercial perspectives have inevitably been represented at the expense of oft-forgotten archaeologists' or artists' work.

The objective of this encounter was to reinforce the ties between institutions, at a time when the Turkish and Islamic arts are stirring growing interest. This congress has attracted many young researchers, some of whom have benefited from support from the Max van Berchem Foundation in Geneva. There is a noticeable renewal of generations and strengthening of the scientific community, at a time when the Ottoman arts are subjects of study not only for specialists but also for an informed public, as seen in the growing number of exhibitions organised over the past few years. ■

Frédéric HITZEL

Source: La lettre, *no. 33, May 2012*

International Congress held from 19 to 21 September 2011

The *Administrateur* and the Professors of the Collège de France regret to inform you that their colleague Professor Gilles Veinstein, Turkish and Ottoman History (1999-2013), passed away on 5 February 2013, aged 67. Tribute will be paid to him in future issues of *La Lettre du Collège de France* and the *Collège de France Newsletter*.

Prof. Gilles VEINSTEIN (†)
Turkish and Ottoman History

Ofuda – The Japanese Pantheon in Miniature

By *ofuda* the Japanese refer to a kind of amulet or talisman printed on a small piece of paper.

Pilgrims, the faithful, simple tourists even, rarely visit a Buddhist temple or Shintô shrine without acquiring a piece or two, be that for their own purpose or for the sake of a relative or friend. In appearance and function, these charms are not unlike the "prayer cards" of the Catholic tradition. Bernard Frank (1927-1996), who taught Buddhist iconography at the Collège de France from 1979 to 1995, assembled during his stays in Japan a collection of close to a thousand such pictures representing the deities of the Buddhist pantheon. The collection was donated by his family to the Institut des hautes études japonaises (Institute of Advanced Japanese Studies) in 2009.

The year before last, the Institute was given the opportunity to put on display a selection of the most beautiful pieces at the Musée Guimet – the National Museum of Asian Arts. About one hundred and eighty prints were exhibited in 2011, from 11 May to 12 September, in the very same Galeries du Panthéon Bouddhique where Bernard Frank, twenty years earlier, had brought out from the dusty museum storerooms and back to life a collection of statues of Buddhist deities that Émile Guimet, the museum's founder, had shipped back from Japan in 1876. Thus displayed together with the sculptures, the images on paper brought an additional dimension to the personages present in the form of sculptures. As Bernard Frank had done for the statues, a team of researchers from the CRCAO (Centre de recherches sur les civilisations d'Asie orientale) described the prints in a catalogue published jointly and made possible thanks to the grants of institutions such as the Hugot Foundation of the Collège de France, the Fondation de France and the Honganji Foundation.

While the purpose of the exhibition at the Musée Guimet had been to introduce these images to the public, it could also be considered the starting point of a systematic and comprehensive study of Japanese amulets and talismans. Like the Christian holy cards, the *ofuda* is indeed a subject of research in its own right, though, although it has barely been explored so far, including in its country of origin. There exists as yet no monographic study of this subject, nor has any attempt been made to circumscribe the vast field of objects that this term covers, let alone to outline a general definition. In March of last year, researchers in different fields of study all related to religions and the printing arts met to take part in a symposium that was intended to give a first impetus and an international dimension to the study of *ofuda*. Among the participants were eight members of prominent Japanese institutions (the National Institutes for the Humanities, the Historiographical Institute of the University of Tokyo, the International Research Centre for Japanese Studies, Kokugakuin University in Tokyo and Shuchiin University in Kyoto, the Machida City Museum, and the Onju-in of the Hokekyō-ji Monastery in Ichikawa, whose participation was generously funded by the Japan Foundation). The nine other European speakers were from the Collège de France, from the CRCAO, and, thanks to the latter, from the Geneva Museum of Ethnography, the Pitt Rivers Museum of the University of Oxford, and the University of the Arts London.

The aim of the symposium was to stimulate the study of Japanese amulets and talismans as a genre, in all their diversity and at any moment in history, for charms exist in many variants, differing in shape, size and material (paper, wood, fabric) and in accordance with the religious creed, school or sect that produced them (Buddhism, Shintô, Shugendō, popular beliefs, etc.). They can, moreover, be distinguished by the way they are made (hand-made and -written, woodblock or machine-printed, customized for the votary) and classified according to function or *raison d'être* (amulet, talisman, magic charm, icon, prayer, vow, ex-voto, letter of oath, etc.).

The formal contents and the signifying elements of the *ofuda* were the subject of several papers: the image and its iconographical features, the modalities of the inscription, the votive or incantatory formula, the vermilion seal, the Siddham letters and other magical symbols. An anthology of pertinent texts showed the practical use to which they were put in pre-modern times. Three other papers pointed out analogies with practices, both ancient and current, in China and India, and even with the devotional print of the Catholic Church. The presentation of the two other *ofuda* collections existing in Europe, in Oxford and in Geneva, shed light on their respective characteristics and documentary value, and on how these were due as much to the collector's personality as to the time period in which they were assembled. The concluding round of discussions was meant to deal with the issue of how to define and classify *ofuda*, that is, of how to delimit more precisely the significance of the term and its semantic field. However, due to the lack of precision from which the use of the word suffers in Japanese, and to the absence of analytical research on the subject, no real consensus could be reached. Nor could the issue of taxonomy be broached. This is therefore a problem on which a future meeting will have to focus. ■

Josef KYBURZ

Source: La lettre, *no. 34, July 2012*

- **Symposium organized on 1 and 2 March 2012 at the Hugot Foundation of the Collège de France.**
- **The symposium proceedings will be published by the Institut des hautes études japonaises (Institute of Advanced Japanese Studies) in autumn 2013.**

Prof. Jean-Noël ROBERT
Philology of Japanese Civilization

Caption: Gottfried Wilhelm Leibniz (1646-1716) © DR

Leibniz's Principle of Reason *Theoretical and Practical Challenges*

The principle of sufficient reason, explicitly formulated for the first time by Leibniz, postulates that all facts have an explanation.

As such, it can pass for a principle of intelligibility of good practice which, according to Leibniz, constitutes one of the two cornerstones of reasoning with non-contradiction. But his radical interpretation, which sees a necessary and unlimited truth in the principle's extension (not only including the current world but also possible ones), is both the most interesting and the most controversial, because of requirements that are perhaps excessive. For the consequences are serious, from the principle of identity of the indiscernible, to the existence of an auto-necessitated being, to the principle of plenitude and the principle of the best. Hence, the challenge of circumscribing the principle of sufficient reason: is it limited to contingent truths or does it also require reasons from the necessary propositions? If the latter have a sufficient reason, does that mean their truth relies on such reasons? And how can one distinguish, in the order of the explanation, between reasons and causes?

Far from any overly optimistic rationalism, it became clear during this workshop that the contemporary take on the principle of sufficient reason highlights above all its fecundity, both in metaphysics and in epistemology. In this respect, Jean-Baptiste Rauzy (Paris-IV) argued for an ontological reading of this principle, by showing that the nature of ideas must be understood with the concept of expression, which induces a dangerous circularity between expression and knowledge. Jean-Pascal Anfray (École normale supérieure) then showed how the principle of sufficient reason constitutes the cornerstone of Leibnizian spatial relationism: if space were absolute, its material points would be indiscernible, but would each occupy a different position according to an arbitrary distribution, devoid of reason. Jean-Matthias Fleury (Collège de France, 2009-2011), stressed that the principle of sufficient reason also, and perhaps firstly, raises questions pertaining to free will and to the possibilities opened up by human actions, and that it plays a nodal role in the counterfactual analysis of history. Jean-Marie Chevalier (Collège de France) presented the critique of the principle of sufficient reason by a very Leibnizian Charles S. Peirce who, in the Kantian tradition, nevertheless opposes the possibility of total intelligibility with the resistance of hard facts. Finally, a series of crucial distinctions were made by Jacques Bouveresse. He dedicated the last two years of his lectures at the Collège de France (2009 and 2010) to the Hanover philosopher, and an electronic publication of the full text of the lectures is now available in the series "The Philosophy of Knowledge at the Collège de France", under the title *Dans le labyrinthe : nécessité, contingence et liberté chez Leibniz* (In the Labyrinth: Necessity, Contingency and Freedom in Leibniz's Work). After showing just how unsatisfactory Popper's critique of the principle of sufficient reason is, Bouveresse pointed out that while this principle does posit that all facts have an explanation, it does not posit that this explanation is accessible, in other words that from the *principium rationis* to the *principium reddendae rationis* the consequence is not right – an erroneous inference that invalidates the Heideggerian interpretation. Reason is gaining ground! ■

Jean-Marie CHEVALIER

Source: La lettre, *no. 34, July 2012*

The speakers present were:

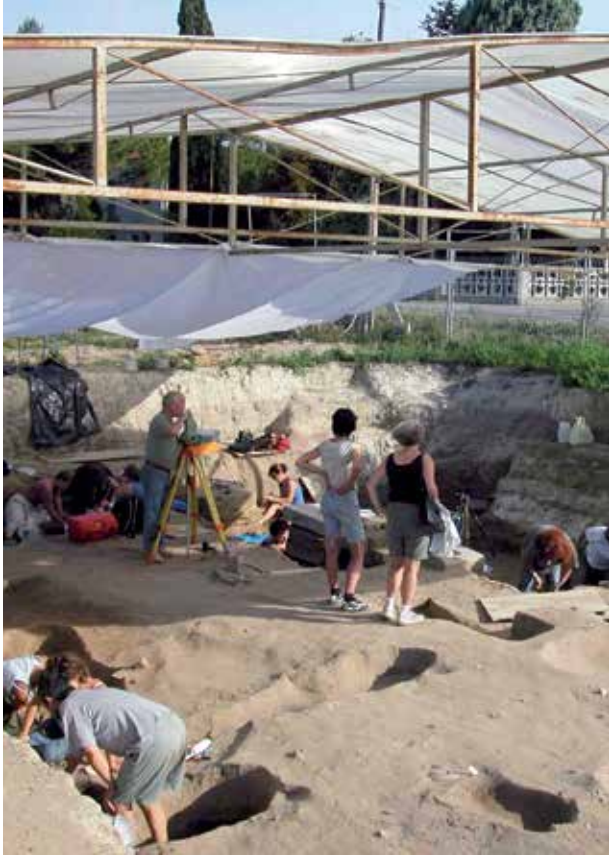
- **Jean-Matthias Fleury** (Lycée Louis-Armand in Nogent-sur-Marne & Collège de France). *Could Caesar have not Crossed the Rubicon? Leibniz and Reason in History*
- **Jean-Baptiste Rauzy** (Université Paris IV). *Leibniz and Armstrong: Having a Good Reason*
- **Jean-Pascal Anfray** (École normale supérieure). *Could Space Be Absolute? Sufficient Reason and Identity of Indiscernibles in the Controversy with Clarke*
- **Jean-Marie Chevalier** (Collège de France). *Leibniz, Reader of Pierce: the Reasons for the A-Priori*
- **Jacques Bouveresse** (Collège de France). *Some Remarks on the Relationships between the "Principle of Contradiction", the "Principle of Reason", and the "Principle of the Best" in Leibniz's Work*

Workshop held on 23 May 2012

Prof. Claudine TIERCELIN
Metaphysics
and Philosophy
of Knowledge

RELIGION, INSTITUTIONS AND SOCIETY IN ANCIENT ROME
SYMPOSIUM

The Necropolis of the Roman Fleet at Ravenna. Recent Excavations at Classe



Caption: Section of the excavations at Classe (2004)

A symposium, coordinated by Professors John Scheid (Collège de France) and Jacopo Ortalli from the University of Ferrara (Italy), on the international excavations at Classe, was held at the Collège de France in February 2012.

It brought together the team from the experimental excavations undertaken from 2003 to 2005. During this experiment, the archaeological teams from different countries in Europe where funeral archaeology has made strides ahead in recent years, worked together, each with its own methods. The excavations were on a section of the necropolis of the Adriatic fleet, in which the oldest graves date back to the first half of the first century C.E.

The German colleagues are accustomed to first doing a cross-section of the structure discovered, to analyse the stratigraphy (which in this case was difficult to discern since the part under excavation was in a sand-dune), before going through the rest of the grave layer by layer. The other partners in the experiment, from Italy, France, Switzerland and Luxembourg, disregarded the difficulty due to the sand-dune and proceeded by doing a horizontal stratigraphic excavation. They cleared the structure layer by layer, without first doing a probe to identify the stratigraphy.

The excavations were deliberately limited to a period of three years. The idea was to allow for joint reflection on the findings and to publish, within a reasonable interval, the data on the hundreds of tombs that had been unearthed and analysed. The team is currently in the publication phase and extensive laboratory studies on the material discovered is reaching an end.

The symposium revealed that the diverse excavation methods, especially those of our German colleagues, who proceed mainly by partial cross-sections of the archaeological structures before excavating the whole, and those of the other teams, who excavate the whole by horizontal strata, produce the same stratigraphic results.

Relations between the graves and funeral monuments were also presented, as well as the beginnings of syntheses on burial graves (Fiorella Bestetti, Bologna) and on pyre graves. Henri Duday broached the problem of urns, and John Scheid presented and, with Maria Romana Picuti, commented on the inscriptions discovered during the excavations. The symposium also afforded the opportunity for discussions between participants and the public on the first findings.

The next day the team met at the Hugot Foundation to prepare the publication programme and to examine questions of detail on the work that remains to be done before the final draft. ■

Prof. John SCHEID

Source: La lettre, *no. 34, July 2012*

Members of the archaeological teams

- **France:** Valérie Bel (INRAP), Patrice Méniel (CNRS), Henri Duday (CNRS, EPHE), Véronique Matterne (INRAP), John Scheid (Collège de France)
- **Switzerland:** Steffi Martin Kilcher, Christa Ebnöther (University of Bern)
- **Luxembourg:** Jeannot Metzler, Catherine Gaeng (Centre national de recherche archéologique)
- **Germany:** Marion Witteyer (Regional Archaeology, Mainz), Peter Fasold (Arcaeological Museum of Frankfurt)
- **Italy:** Jacopo Ortalli (University of Ferrara), Maria Grazia Maioli (Emilia-Romagna Archaeological Heritage Superintendance), Giovanna Montevecchi, Cristina Leoni (La Fenice Cooperative, Bologna), Maria Romana Picuti (Perugia), Fiorella Bestetti (Bologna)

Symposium held on 8 February 2012

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

Seeing is Believing-2, *Super-Resolution Meets Superbugs*

The morning session – *A Vision of Cell Infection at Super-Resolution* – illustrated the extraordinary progress made in the super-resolution of cellular imaging.

With regard to resolution, the "optical barrier" sits at 200 nm. There is therefore a gap between the maximum level of resolution imposed by the fundamental laws of optics and that of electron microscopy which is of the order of a nanometre, that is, of the resolution of a molecule. It is however crucial that we fill this gap, as the incursion of photon microscopy into this area would contribute to its versatility: multi-colour probes, 3D observation, ability to capture the dynamics of molecular interactions (FRET), and possibility of following events live. All of these are properties that are crucial for the detailed analysis of molecular interactions governing the development of infectious processes. A number of new optical tools, possibly combined with mathematical image processing (STED, PALM), are now regularly bringing resolution to about 10 nm. This represents a huge step for what is now called "super-resolution". This evolution was illustrated in the keynote lecture by Antoine Triller (ISBEN, ENS, Paris), whose study of the positioning dynamics of postsynaptic receptors as their ligands bond has led to significant advances, including through the use of new chromophores such as "quantum dots". A real chemistry of *in cellulo* imaging is in the making. Several presentations completed these approaches: atomic force microscopy allows for the interactions between bacteria/toxins and cells to be captured in real time, thanks to the versatility of use of the "cantilever" on which its functioning is based. Its combination with the PALM method offers a previously unimaginable super-resolution, from the dynamics of cellular components to the quasi-molecular scale. Finally, as "light sheet based fluorescence" combines the classical approaches of optical sections (confocal or two-photon microscopy) with optical tomography, the lateral and not vertical excitation of fluorophore, it sheds light on the focal plane. This method offers a direct use of 3D object imaging. The analysis of the evolution of organoids was presented, illustrating the quality of these approaches for studying, for example, the development and differentiation of an organized population of cells like an epithelium. Other more applied approaches showed how optical imaging that is "super-resolutive" or tends towards "super-resolution" effectively deciphers the properties of pathogenic microbes and parasites, as well as their mode of interaction with cells and tissues. This was the case of research on the dynamics of the Trypanosome parasite's flagellum, a real molecular "conveyor belt" allowing for the assembly and homeostasis of this flagellum; of research on the dynamics of disassembly of the HIV virus at the nuclear pore that could only be shown through a "super-resolutive" approach; and of the dissection of the mode of progression of the early form of the malaria parasite: the sporozoite.

The afternoon session – *A Vision of Tissue Infection at Super-Resolution* – considered the term "super-resolution" in the much broader context of improvements to the imaging of pathological processes within tissues like infection, cancer, fibrosis, ranging from improvements to the resolution of the optical analysis of the cell within the tissues, to the analysis of its molecular content through mass spectrometry. The session was introduced with a keynote lecture by Vasilis Ntziachristos (Technishe Universität and Helmholtz Centre, Munich), who showed how powerful the combination of fluorescence and opto-acoustics is, both for fundamental approaches and for medical imaging. Mass spectrometry allows for a real mapping of the presence of peptides or lipids on a tissue section or on the surface of an object to study. In terms of the molecular identification of the compounds present, the "super-resolution" afforded by mass spectrometry spectacularly complements the array of imaging techniques available. This session ended with a demonstration of the power of the two-photon microscopy approach in the dissection of micro-organisms' pathways of progression within tissues and their effect on the epithelial and immune cells. ■

Prof. Philippe SANSONETTI

Source: La lettre, *no. 34, July 2012*

- Symposium in English held on 4 June 2012
- Guy Tran Van Nhieu (Collège de France) and Régis Tournebize (Institut Pasteur) actively participated in defining the objectives of this symposium and choosing the speakers.

Prof. Philippe SANSONETTI
Microbiology and
Infectious Diseases

EXPERIMENTAL MEDICINE
SEMINAR

Risk Prevention in Medicine: from a Population-Based Approach to a Personalized Approach

Suffice it to say that the type of diseases or conditions that affect us is evolving, with a growing prevalence of chronic diseases.

The infectious diseases that largely determined life expectancy and mortality in previous centuries are now giving way to cancers and degenerative disorders. Along with this trend, our societies are demonstrating increasingly high expectations regarding the quality of care and the need to be shielded from the risk of disease. Some speak of the emergence of a new obsession with health which may go hand in hand with a growing refusal of pain, old age, or even death. This is the context of risk prevention in medicine demanded by our fellow citizens who want to avoid diseases and delay death at all cost.

The seminar of the Chair of Experimental Medicine, "Risk Prevention in Medicine: from a Population-Based Approach to a Personalized Approach", addressed so-called "mass" prevention, applied indiscriminately to an entire population, as well as targeted, personalized, customized prevention. The latter is becoming possible by means of an analysis of a given person's own particular antecedents and characteristics, in their own environment. The shift from global prevention to personalized prevention meets the desires of both doctors and patients.

The World Health Organization (WHO) defines prevention as all the measures aimed at preventing or reducing the number and gravity of diseases or accidents. It distinguishes three types of prevention; this seminar dealt only with primary prevention, which seeks to prevent or delay the appearance of a new disease.

The application of prevention to an entire population is not a recent phenomenon. Smallpox ranked among the primary causes of death in the eighteenth and nineteenth centuries: Paris counted 14,000 smallpox victims in 1796, as Jennerian vaccination was in its fledgling stages. Thanks to systematic vaccination, smallpox was eradicated – a unique yet crucial example of the elimination of a disease through mass-vaccinal prevention. Another landmark example of a simple tool for large-scale prevention is the practice of asepsis through hand washing. We owe this to the Austro-Hungarian obstetrician Ignace Semmelweis, who rigorously demonstrated that this hygiene measure reduced death from puerperal fever in the maternity wards of Budapest where this procedure was implemented.

In 1902, France saw the promulgation of a law on the protection of public health, following the occurrence of serious plague epidemics in Marseille. These epidemics motivated several general sanitary measures, and mayors were given responsibility for the difficult task of ensuring hygiene in their municipalities. Thus emerged an understanding and collective organization of medicine with detailed means, compulsory expenses and even legally prescribed penalties in cases where sanitary policy measures were not respected. This law was to thank for the prevention of epidemics, with smallpox vaccination made compulsory, and sanitary visits allowing entry right into buildings to ensure that the population was not at risk because of an insufficiently hygienic environment. Owing to this hygienist approach, success in terms of life expectancy was noteworthy. Tuberculosis, for example, had declined even before the first tuberculosis treatments appeared in the late 1940s.

A modern epidemiology serving prevention appeared in the wake of the Second World War, with the launch of large prospective empirical studies. The first and most significant such study began in 1948 in Framingham, in the United States. The initial project consisted in recording the cardiovascular diseases that had newly appeared over a generation, and linking them to patients' biometric and biological characteristics. The Framingham study, a first and a remarkable exam-

Caption: Louis Jouvet in Knock *(1951) © DR*

ple of "explanatory" epidemiology, allowed for the identification of the main risk factors responsible for cardiovascular diseases: high blood pressure, smoking and hypercholesterolemia. It motivated the prescription of medication-based treatments for high blood pressure in the 1970s and for hypercholesterolemia in 1985, thus paving the way for major medical progress, in view of the very high prevalence of cardiovascular diseases.

Today, it is becoming possible to personalize prevention measures for individuals, even though these measures are based on data stemming from the analysis of a population studied at a given time, in a given context. There are therefore cardiovascular risk prediction algorithms which use calculations based on factors such as age, sex, tobacco consumption, and blood pressure and cholesterol measurements. Initially based on the Framingham study in the United States, these prediction scores can be applied to our environment thanks to the studies carried out in France and elsewhere in Europe. They can be used, for a given patient, to calculate the probability of the occurrence of a cardiovascular condition, whether fatal or not, in the five to ten years to come, with a certain margin of error.

A risk prevention policy at the level of a population has several aspects: vaccination prevents infectious disease epidemics and is now also applied to the prevention of certain cancers; communication campaigns stigmatize dangerous individual and collective behaviours (smoking, dietary behaviours, alcoholism, unprotected sex, etc.) and promote "virtuous" habits, like physical exercise or a diet rich in fruit and vegetables. One of the major goals of prevention is to reduce avoidable mortality, such as smoking-related mortality, which still represents a third of cardiovascular deaths in France (60,000 deaths annually). Finally, screening campaigns allow for different conditions to be diagnosed and treated early on: chronic cardiovascular diseases, cancers, macular degeneration linked to age, etc.

Risk prevention in medicine must continuously adapt to take into account the evolving sanitary and medical context. New infectious diseases have appeared (Aids, prion-related diseases, bird flu, to name but a few), some of which can be prevented by developing new vaccines. The prevention of cancers and chronic conditions revolves around the identification of patients' individual characteristics: biometric, biological, genetic, medical imaging data, etc. Patients themselves can adopt preventive measures, including self-monitoring and the use of Internet (telemedicine, e-health). Validating and estimating the predictive value of new individual prevention indicators requires numerous prospective studies and therefore time and heavy funding. Thus, after the discovery of the human genome sequence in the early 2000s, it was believed for a time that we would be able to predict the risk of occurrence of a disease based on the variants of a person's genes. The human genome sequencing gave hope of customized forecasting of the occurrence of complex diseases. Twelve years later, we must face the facts that this is not the case, and that it would be dangerous today to make a prognosis for the ten years to come. This disappointing observation does not however mean that we have not made significant progress in pharmacogenetics or in the personalized treatment of several types of diseases.

The seminar also addressed the provocative issue of a possible extension of primary prevention of cardiovascular diseases through the medicinal treatment of a population known to be normal. "Normal and pathological" were long considered as two clearly distinct entities. Was it rightfully so from a prevention perspective? Perhaps not, for if we consider the correlations between the numbers of risk factors (blood pressure, cholesterolemia, etc.) and deaths from cardiovascular accidents, we observe a continuous relationship, without any threshold effect. Treating a "normal" population to prevent the occurrence of a cardiovascular accident becomes an option to consider with a person whose primary risk is, inevitably, age! Systematically treating risk factors from a certain age (55?) can be envisaged since generic medicines with a low dosage exist, which are affordable and remarkably well tolerated. This preventive strategy is particularly attractive in developing countries where the prevalence of these conditions is constantly growing. The changing intervention thresholds in cardiovascular prevention and the evolution of the economic context of medication are examples of new parameters in the cardiovascular prevention equation.

Risk prevention in medicine is inherently multidisciplinary. It draws both on the fundamental sciences and the humanities and social sciences, especially economics, demography, anthropology, and sociology. Any preventive measure first involves reflection on the targeted goal, the allocated means and the strategy to adopt. It requires an estimation of the cost/benefit ratio to expect. And its implementation is ultimately an eminently political decision. The seminar adopted a multidisciplinary approach to discuss the determinants, potential pitfalls and new possibilities of prevention which, while it is still currently based on a population approach, will shift to the individual level in years to come. ■

Prof. Pierre CORVOL

Source: La lettre, *no. 34, July 2012*

Prof. Pierre CORVOL
Experimental Medicine

Safety of Lithium Ion Batteries: Can there Be Zero Risk?

The electrochemical storage of energy is one of the great challenges of the twenty-first century, both for the exploitation of renewable energies and for the development of electric vehicles.

While batteries, especially ones based on lithium (Li) ions, are highly sought after for applications requiring large quantities of energy, their cost still needs to be reduced and their user-safety improved. The Electrochemical Energy Storage Network (RS2E) organized a day of debates on these themes, entitled "Safety of Ion Lithium Batteries: Can there Be Zero Risk?", chaired by Prof. Marc Fontecave.

This symposium, which included presentations by international scientific experts, addressed numerous topics: materials, systems and integration into electric vehicles, potential risks, and the national federating strategy implemented under the aegis of the Ministry of the Interior.

After a review of the different types of batteries and the safety issues surrounding this mode of storage, through a comparison of the quantity of energy stored by a battery as opposed to hydraulic or kinetic storage, the components of the battery were presented. This is a complex system where the behaviours of the cathode, the electrolyte and the anode are never completely separate due to coupled reactions. However, all the speakers recognized the major importance of the electrolyte and its interfaces with the anode and cathode in these safety issues. Hence, while the intrinsic differences between the behaviour of lithium manganese oxide cathodes (LiMn2O4) or lithium iron phosphate cathodes (LiFePO4) are significant, they are not dominant in terms of battery safety. To further reduce risks, speakers made various suggestions to improve each component of the accumulator: adding additives and designing new salts for the electrolyte, developing new methods for coating active materials, leading for instance to concentration-gradient cathode materials, etc.

The presentation of the many tests to control batteries' safety level led the speakers to emphasize the fact that the result of some of these tests could be biased by cells designed to take the test protocol into account. Therefore, even if they were all successful, they would not guarantee total safety. We must think in terms of systems rather than materials to address the safety aspect as a whole. This is why tests specifically dedicated to electric vehicles were developed, particularly fire tests in widely diverse conditions.

The contributions of speakers from around the world showed that safety is a concern shared by all the countries involved in the transformation of transport and the development of electric vehicles. They highlighted the initiatives of the public authorities of the countries in question, with federating approaches similar to those that are being implemented in France. Guillaume Dederen, the Civil Security representative, reported a first interesting outcome of these actions: fires in electric vehicles with Li ion batteries can be controlled and treated in the same way as those in internal combustion vehicles.

Manufacturers expressed their insistent wish to see efforts to standardize battery behaviour controls at national, European and even global level, so that all actors would be bound by the same requirements, regardless of the battery technology, and systems that were not properly controlled would be banned from the market.

To conclude, by emphasizing the safety aspects surrounding batteries, this conference-debate showed that the actors concerned were fully aware of the risks involved and determined to take joint action to secure a level of safety for electric vehicles that can at least match that of internal combustion vehicles. Three such actions were envisaged: holding this conference annually, creating a communication team on safety to avoid unfounded controversies, and implementing concerted action at national level, to harmonize initiatives more effectively. Researchers are enabling the chemistry of batteries to evolve, and manufacturers are mobilized: everything calls for optimism. The main pitfall, in a highly competitive market, would be for cost considerations to prevail over safety: to prevent this from happening, strict regulation is needed. ■

Prof. Marc FONTECAVE / Jean-Marie TARASCON

Source: La lettre, *no. 33, May 2012*

- International Symposium held on 7 November 2011
- Programme and videos available online at www.college-de-france.fr

Prof. Marc FONTECAVE (left)
Chemistry of Biological Process
Jean-Marie TARASCON (right)
Sustainable Development – Environment, Energy and Society

Structure, Composition and Dynamics of the Earth's Core

This international symposium gathered specialists from different disciplines within the earth sciences to review recent theoretical, experimental and observational findings which have furthered our understanding of the current physical and chemical characteristics of the Earth's core and of its evolution on a geological timescale.

Since the discovery of the inner core's anisotropy in 1986, significant efforts in seismology have gone into the detailed spatial mapping of this inner core and of the underlying isotropic structure (presentation by Dr Jessica Irving, Cambridge University). A model recently proposed and presented by Dr Annie Souriau (Midi-Pyrénées Observatory, Toulouse) interprets these observations in terms of the inner core's asymmetrical growth, associated with a progressive east to west translation of the iron crystallisation front.

The use of anvil presses within particle accelerators (synchrotrons) recently allowed for the development of *in situ* techniques to investigate materials under high pressure and temperatures – up to the conditions of the core – based on X-ray diffraction. Dr Daniele Antonangeli (IPG/UPMC) discussed recent progress in the experimental determination of the elastic properties of iron and its alloys to deduce, on the basis of comparison with seismic data, which light elements are present in the core and the inner core and in what proportions – a subject that has been highly controversial for several decades now. According to Dr Antonangeli, among the light elements generally proposed (oxygen, silicon, sulphur, carbon and hydrogen), silicon could be the dominant element in the inner core. Furthermore, various mechanisms were put forward to reconcile the elastic shear wave speeds recorded in the inner core with those predicted by materials physicists, which are significantly higher (10%). Based on theoretical calculations (*ab-initio*), Dr Vocadlo offered a simple explanation based on the previously neglected yet important effects of nickel on the elastic properties of the iron-nickel alloy in the inner core, in addition to the light elements already mentioned.

Through the comparison of the abundance of chemical elements observed in the Earth's mantle and in the solar system, the kinetics of oxido-reduction reactions, and through the quantification of the isotopes of radioactive elements, geochemistry/cosmochemistry also contributes to the constraints on the mode of formation, the age of the key events of the Earth's history, such as the giant impact at the origin of the moon's formation (presentation by Dr Bernard Bourdon), and the light element composition of the core (presentation by Dr Michael Walter).

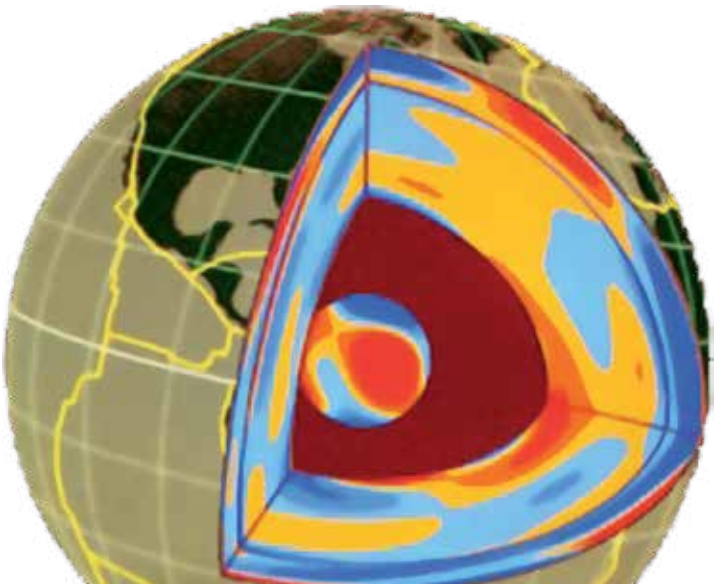
Finally, the different geophysical and geochemical constraints serve as a basis for the elaboration of models describing the evolution over time of dynamic processes, such as the inversions of the magnetic field (presentation by Dr Julien Aubert) and the growth of the inner core (presentation by Dr Philippe Cardin). The former suggests a data assimilation approach to build digital models of the Earth's dynamo, while the latter proposes a simple model of convection/translation inside the inner core to explain the seismic anisotropy observed and its hemispherical asymmetry.

The eight presentations were followed by a general discussion organized around a panel and a poster session, where PhD students from several Geophysics doctoral schools (IPGP, ENS, Paris-Sud Orsay) presented a summary of current research on a theme of their choice relating to the Earth's core. This poster session illustrated a possible way of involving students from the region's doctoral schools in teaching at the Collège de France. ■

Prof. Barbara ROMANOWICZ

Source: La lettre, *no. 33, May 2012*

- International Symposium held on 25 November 2011, and organized by Prof. Barbara Romanowicz and Dr James Badro (Institute of Earth Physics of Paris [IPGP])
- Lectures and audios available online at www.college-de-france.fr



Prof. Barbara ROMANOWICZ
Physics of the Earth's Interior

CLIMATE AND OCEAN EVOLUTION
SYMPOSIUM

The Ocean and Climate Change: Variations in Ocean Circulation

Figure credit: A. Biastoch GEOMAR-Kiel

The oceans cover over 70% of the Earth's surface. Along with the atmosphere, they redistribute the energy that our planet receives from the sun.

The joint action of winds and the Coriolis force induce surface currents, most of which have been known to sailors for centuries. However, sailors did not suspect the existence of a much larger system, on a global scale, linked to the circulation of the intermediate and deep layers of the ocean. The ocean can therefore play a key part in the climate system, involving far more than a passive attenuation of atmospheric variations.

Has the ocean circulation varied in the past and how will it behave in the future with likely changes in temperatures, rain and winds? With a view to exploring these questions, a symposium brought oceanographers from several countries together at the Collège de France. In his introductory address, Édouard Bard pointed out the fundamental role of the oceans in the climate's machinery, before illustrating variations in ocean circulation as part of long-term trends on the scale of centuries and millennia.

Harry Bryden (National Oceanography Centre, University of Southampton) reviewed the research on current variability in the North Atlantic, particularly the Gulf Stream and the southward deep western boundary current. The methods used range from the analysis of hydrographic data on over half a century, to direct measurements of water flows on an instrumented section at 26.5° N between Florida and Morocco. A complementary approach consists in studying the water masses in the North Atlantic, at a higher latitude, to follow their sinking at depth in the Nordic Seas and the Labrador Sea. Monika Rhein (Institute of Environmental Physics, University of Bremen) described recent research based on instrumented mooring lines, and on the penetration of chemical tracers like anthropogenic freons into the ocean. While the time series illustrate the short-term complexity linked to the North Atlantic Oscillation (NAO), they are still too short to distinguish a long-term trend. Gilles Reverdin (Oceanography and Climate Laboratory, LOCEAN, CNRS-IRD-UPMC Paris) showed how the combination of data from altimetric satellites and from drifters allows for the mapping of surface currents, and for the description of a "supergyre" system in the southern hemisphere, connecting the three main oceans. Long-term projections can be made using numerical models of the ocean-atmosphere coupling, by simulating the highest frequency oceanic variability. Jochem Marotzke (Max Planck Institute for Meteorology, Hamburg) reviewed the possibility of improving climate forecasts by initializing an oceanic model with atmospheric observations. This modelling work shows the importance of taking the dynamic atmosphere-ocean coupling into account to forecast surface temperatures in the North Atlantic and Europe over the next decade.

At the symposium, the importance and complexity of the ocean's role in global heat transfers and interactions with the atmosphere were illustrated using the example of the Agulhas current, around the southern tip of Africa. Mathieu Rouault (Department of Oceanography, University of Cape Town) first described this current's influence on regional meteorology, before showing how part of the current returns towards the Indian Ocean, while an element escapes towards the Atlantic through a series of mesoscale eddies. For the last 40 years, the transfer from one basin to the other has apparently increased significantly, affecting the hydrology and circulation of the South Atlantic. As Arne Biastoch (GEOMAR, Helmholtz Centre for Ocean Research, Kiel) then showed, numerical models of this link between the Agulhas current and the Atlantic circulation are being developed, with a constantly improving spatial resolution to simulate explicitly the transient eddies (see figure).

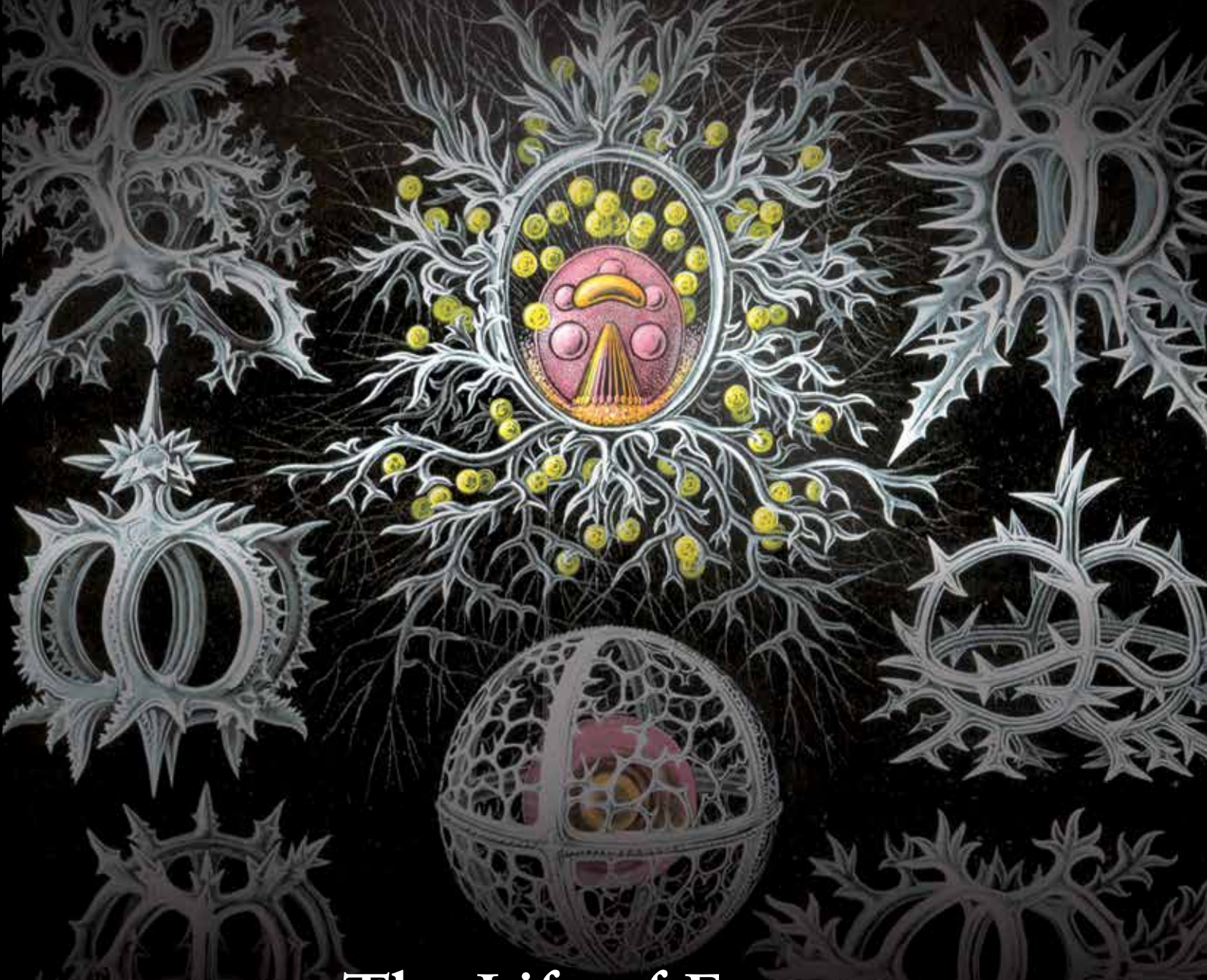
The study of the data and numerical models clearly shows that the variability of Atlantic meridional circulation and of its climatic impact can be understood by taking into account the influence of the high latitudes of the two hemispheres, especially sinking in the Labrador Sea and the Nordic Seas, as well as the combined effects of multiple phenomena occurring in the Southern hemisphere, particularly water mass transfers in South of Africa, through the Drake Passage, South of America, and at the level of the systems of westerly winds blowing over the Southern Ocean. ■

Xavier GIRAUD

Source: La lettre, *no. 34, July 2012*

- Symposium held on 30 March 2012
- Programme and videos available online at www.college-de-france.fr

Prof. Édouard BARD
Climate and Ocean Evolution



The Life of Forms & the Forms of Life

AUTUMN SYMPOSIUM 13-14 OCTOBER 2011

Excerpts from the talks of Jean-Pierre Changeux, Philippe Descola, Antoine Compagnon, John Scheid, and François-Bernard Mâche

This symposium was devoted to the notion of "form" in a multidisciplinary context ranging from its definition in the philosophies of Plato and Aristotle, its mathematical applications, its origins with the structure of the atom and the genesis of life, and its application in molecular and supra-molecular chemistry, to the morphogenesis of living organisms and its consequences in psychology and linguistics, anthropology and the arts. These debates have afforded an opportunity to re-examine the question of *intelligent design*, of Turing's laws, of Claude Lévi-Strauss' structuralism and of Henri Focillon's observations – from which the title "The Life of Forms" was taken – as well as those made by André Chastel in *Fables, Forms and Figures*.

E. Haeckel, "Stephoidea", *Kunstformen der Natur* (1904) plate 71

General Presentation

The title "The Life of Forms" is taken from a book by Henri Focillon, a work which he published in 1934 and devoted to the work of art. "The work of art", he wrote, "is an attempt at the unique, it asserts itself as a whole, an absolute and, at the same time, it belongs to a system of complex relations.

The work of art is the measure of space, it is form and this is what must be addressed". In one of his political treatises, Balzac wrote: "All is form, and life itself is a form". Focillon added: "Not only does every activity allow itself to be discerned and defined to the extent that it takes form, that it inscribes its curve to space and time; life itself acts essentially as a creator of forms. Life is form, and form is the mode of life. The formal relations within a work of art and between works of art constitute an order, a metaphor of the universe".

After looking at a first definition from the philosophies of Plato and Aristotle, we will examine:
• the mathematical definitions of form;
• the physical origins of form;
• the first life forms, their phylogenesis and, in the case of superior species, their ontogenesis;
• finally, the interlocking of the forms of the brain, which will serve as a transition towards mental forms and social forms.

We will conclude on what has served as our starting point, the work of art with André Chastel's *Fables, Forms and Figures*.

I. Firstly, what is a "Form"?

The Encyclopedia asks the question "what does form consist of? In what degree of movement, arrangement, situation and configuration of its smallest parts does the form of each body lie?" Form would therefore be defined as an organization of simple elements in space and time. But from where, then, does it come? What is the origin of these organized forms in the world around us? I will broadly distinguish between two main theories:

1- The first defies the canons of scientific method, calling upon natural theology from Plato to William Paley or abbé Pluche: here forms are understood as non-material, non-physical and extra-mental abstractions, "essences", created by a "demiurge" or a "great watchmaker". According to Plato, they are located *hype-rouranios topos*, meaning beyond the heavens... These ideas are resurging nowadays among the supporters of "intelligent design".

2- Another definition, relates to scientific explanation and is based on historical causation. It "consists in breaking down systems (at any level) into their parts and in identifying the regularities which characterize them by relating them back to theoretical principles that are as general as possible".

This takes us back to the atomists of Ancient Greece – Leucippus and Democritus – and the idea of a "principle of construction" of forms, rather than the revelation of a pre-existing form. In other words, "the appearance of forms" – noted Democritus – "stems from attempts which bind atoms to one another" according to random contingency. This brings us to a general model (II).

II. The Darwinian Model of the Genesis of Forms

The Darwinian model adds a dimension of "historical causation". The phenomenon is situated in space and time within a temporal series of causes and effects. It focuses on the stratification into levels of organization and on the transition from one level of organization to another, regardless of the level. The hypothesis is that the transition from one given level to the next requires two fundamental elements: a generator of diversity and a selection process.

1- The generator operates in the following manner: the elements combine with one another in a stochastic way, "transitory forms" are constructed which can correspond to the immediately superior level of organization. It is important to highlight that these forms are created from elements that are already structured (not necessarily atoms) and originate from the level below. There is a production of "Darwinian variations".

Another fundamental element:

2- A selection process stabilizes certain variations, while the others are eliminated. New variations then appear with the "telescoping", "interlocking" of successive levels of organization, and so on.

Finally:
3- The general selection model calls an additional notion into play: that of a function we can describe as being the real effect of form on the physical, biological, social and cultural outside world. This notion manifests itself, in particular, through feedback on the stabilization of the form which moves from being transitory to being stable. ■

Prof. Jean-Pierre CHANGEUX / Excerpts

Source: La lettre, *no. 33 May 2012*

Prof. Jean-Pierre CHANGEUX
Emeritus Professor,
Cellular Communications
from 1976 to 2006

Natural Forms and Symbolic Classifications

The question of the relationship between the perceived forms of organisms and the way in which human beings identify them and detect certain characteristics in order to use them in a wide variety of classifications has captured the attention of anthropologists and psychologists for over a century.

The categorization of plants and animals seems to demonstrate certain characteristics of its own, particularly the fact that it often appears in a taxonomic form. This means that it is presented with a hierarchy of inclusions on several ranks, which is much rarer in other domains such as emotions, artefacts or inorganic materials. It is therefore not absurd to think that the form of organisms, and the supposed adequacy between this form and some of the functions it permits, plays a part in the particular way in which human beings classify them. Although this is still controversial, certain authors thus argue that a specific cognitive device activates the perception and the taxonomic distribution of natural objects. This device corresponds to what developmental psychologists call a naive theory, meaning a presumably universal scheme of inference which structures the expectations of any individuals regarding the characteristics and behaviour of organisms. More generally, and insofar as most of human history has taken place in a context of intimate and permanent interaction with plants and animals, there are grounds to believe that our cognitive activity has been deeply shaped by this experience. For all these reasons, organisms constitute a particularly interesting domain for a better understanding of the mechanisms of categorization.

Now, there are several conflicting theories on the matter. One emphasizes classification according to the similarity of attributes: it is because individuals demonstrate a finite set of similar prominent features that we recognize them as belonging to the same class. Another draws on causal inference, in other words the intuition that a class of organisms possesses a stable essence, either because of the transmission of identical characteristics through reproduction, or because each class represents a unique synthesis of the functions needed to live. Finally, a third theory highlights the prototypicality of organisms, meaning the principle that certain members of a taxon constitute its prototype inasmuch as they are perceived as being the most representative of their class. In one way or another, these theories all use the form of organisms as a classificatory index. Attribute-based classification establishes a relation of belonging to a class founded on a predicative judgment according to which the specific and visible characteristics recognized in any object are the necessary and sufficient condition for it to belong to a class. Classification through causal inference implies the recognition of a functional identity demonstrated by morphologically singularized organs. As for prototypical classification, it is founded on the recognition of a general typical form which acts as a focal model for the class and serves as the basis for denomination. The hypothesis I wish to defend here is that these three categorization theories are complementary rather than mutually exclusive. In the domain of organisms, at the very least, completely different mechanisms of categorization and categorical reasoning are applied, depending on the classificatory contexts, the targeted levels of generality, and the intended uses of these classifications. ■

Prof. Philippe DESCOLA / Excerpts

Source: La lettre, *no. 33 May 2012*

Prof. Philippe DESCOLA
Anthropology of Nature

THE LIFE OF FORMS
ACADEMIC YEAR 2011-2012

The Literary Form

Wondering if there was anything new that could be said about literary forms, styles and genres, I was pleasantly surprised to notice that automated word processing, with its iterative review and algorithmic method, suggests the possibility of statistically surveying literary styles and genres.

Digital Humanities, which are poorly developed in France, could contribute to the analysis of literary forms and the renewal of the theory of genres.

As is often the case, it was while seeking to resolve another question that the implications of this method for the observation of genres became apparent. Initially, statistical stylistics were used to re-examine the old problem of Elizabethan theatre, particularly the collaboration between authors and the attribution of Shakespeare's plays to Shakespeare himself or to another playwright, Fletcher for example. Now, digital humanities have shown that, not only are they able to tackle certain questions relating to attribution, they can also raise new ones concerning genres. The pioneering work on the subject has come from John Burrows and Hugh Craig at the Centre for Literary and Linguistic Studies of the University of Newcastle, Australia. They have applied statistical stylistics to the study of attributions, that is to say, using linguistic forms as indicators for the attribution of texts.

The novelty of this approach consisted in letting the variables – signs or distinctive features – emerge from the texts through an unsupervised statistical analysis. Thus, the most frequently used words were simply counted and the resulting frequencies used as variables. As the most frequently used words in a text are function words, grammatical words, the relative frequency of the most common words will be used to compare texts and put their attribution to the test. According to a strong – and largely counterintuitive – hypothesis, the hallmark of a text resides not in its lexical, full or rare words, its *hapax legomenon* for example, but in its function words, its determiners (articles, possessives, demonstratives), its pronouns, its coordinators and its subordinators. Syntactic terms, as opposed to semantic ones, would therefore be those that best allow for the attribution of a text, that is to say, for identifying an author, a particular style. Trivial as they are, these function words form the insignificant outline of the text, a network of pegs that we do not pay attention to when we read and focus on meaning, yet the machine counts them. Drawing on another image, individual style comes from the binder, from the linguistic glue that linear reading moves through without stopping when it is in search of the singular, the original, perhaps even the unique.

Hugh Craig (2004), applying this method to the body of plays attributed to Shakespeare in the 1623 First Folio, has been able to find some of the generic differences between the plays categorized by the editors as tragedies, comedies, historical plays or late romances, as well as chronological differences between the early, middle and late plays. He thus used statistical stylistics to categorize a body of 25 plays (out of the 38 in the First Folio) by counting their 12 most common words.

This method was taken further by Jonathan Hope and Michael Whitmore (2010). Broadening the analysis to include all of Shakespeare's plays, they confirmed that clear and stable linguistic differences exist between the comedies and the historical plays as categorized by the publishers of the First Folio. They thus confirmed a strong correlation between the linguistic statistics results and genre divisions suggested by the first publishers.

These critics were also interested in the outliers, the exceptions and the anomalies that statisticians tend to overlook but that are relevant to literary analysis. In this way, statistics confirm an old remark according to which Othello is built upon a "comic matrix" which heightens emotion: the author introduced verbal schemes that are typical of comedy in tragedy, producing a sense of irony. ■

Prof. Antoine COMPAGNON / Excerpts

Source: La lettre, *no. 33, May 2012*

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

Metamorphoses in Greco-Roman Antiquity. Concerning Ovid's *Metamorphoses*

Matter and form. It has been shown that the poet was clearly inspired by the ideas of the Stoic philosopher Posidonius of Apameia (ca. 135-51 BCE), even though we do not have detailed knowledge of Posidonius' system.

Ovid was not a philosopher, and his poem is not a doctrinal presentation like that of Lucretius. In Book XV he barely gives a voice to Pythagoras for a 400-verse explanation of the reasons behind the rejection of animal sacrifice and meat consumption. Yet the underlying system in the *Metamorphoses* is not that of Pythagoras and of metempsychosis, it is altogether different. This can be seen from two points put forward by Heinrich Dörrie. In most of the metamorphoses described by Ovid, the soul has no part to play. The poet speaks only of the mutations which affect the human form. And, as with Posidonius, a person's being is based not on biological characteristics shared by all, the psyche, but on the substance which exists behind the visible form of that person, their personality. And it is precisely in the metamorphosis that this essential core reveals its permanency as only the form changes. Without self-consciousness coming into play in any way, the existential core of a human being is always defined by a singular behaviour, a behaviour which is either a desire, a reckless demand, or a mistake. Hence, the amusing story of the Lycian peasants. One very hot day Latona, pregnant with Apollo and Diana, felt thirsty and sought to quench her thirst with water from a pond. The local peasants forbade her to do so, insulted her and stirred up the pond water with their feet. Tired of their quarrelling, the goddess made the wish that they should live in their pond eternally, and they instantly turned into frogs. Their new form forever bound them to the water, which they denied to others, and led them to constantly fight among themselves as their legs stirred up the mud of the waterways.

According to Dörrie, this was their essential nature. Their mistake highlighted this characteristic and remained part of them even beyond the metamorphosis. This may be so, but we can also say that the metamorphosis had fixed their being in the very last form which was theirs: that of being attached to their water to the point of refusing it to others and insulting those who tried to quench their thirst. That is in fact their primary nature. The metamorphosis reflects their punishment, as it expresses in other cases the sorrow or the desire of those who are subject to it. It is as if the permanent form that these beings take on conveys their genuine primary nature. In this way Daphne, subjected to Apollo's increasingly brutal harassment as he was overcome by his powerful desire for her, asked her father, a river god, to free her from her overly enticing beauty through a metamorphosis. The god granted this and she was transformed into a laurel – *dáphnê* is the Greek word for laurel. Disheartened, Apollo accepted this with resignation and decided that, from then on, this tree's foliage would decorate his hair, his quiver and his lyre. Daphne was then forever fixed in this new existence which joined her to her persecutor whom she had rejected.

The second aspect of metamorphoses in which Ovid converges with the theories of Posidonius relates to the new existence of metamorphosed beings. Metamorphosis bestows upon human beings a life expectancy which would never have been theirs in their previous form. By entering, through transformation, into one of the three kingdoms identified by the philosopher – the animal, vegetable or mineral kingdoms –, beings lose their form but not their substance. This substance, from then on, determines form according to new rules. However their name remains the same and their existential core, therefore, does not change. Daphne remains as enticing as ever to Apollo and bound to the god, while he may only carry her with him without ever satisfying his passion. ■

Prof. John SCHEID / Excerpts

Source: La lettre, *no. 33, May 2012*

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

THE LIFE OF FORMS
ACADEMIC YEAR 2011-2012

The Life of Musical Forms

There are countless studies of musical forms. We often split them into two main groups: those that associate forms with genres, or even styles (fugues, concertos, gavottes, recitatives, etc.); and those which, more or less overlooking functional or stylistic connotations, strive to analyse pure structural organizations, temporal architectures of sound. My intention here is to show that, rather than offering an alternative, both approaches are necessarily complementary, insofar as many temporal organizations are universals and as such cannot be reduced to cultural choices.

Music that unfolded as an indefinite series of unforeseeable instants would elude any form. One could think that certain improvisations, or certain sequences of the "narrative" type, figure as examples of this. However, whether they stand as images of freedom or of pure chaos, this is but a utopian fantasy. The brain of the listener is shaped by the learning of language, and as such it is trained to break down any series of sounds into relevant elements. It therefore in any case places markers according to pauses, contrasts and recurrences, and tries to give a form even to the informal. If it does not succeed in doing so, it rejects what it hears as noise.

The identification of an auditory phenomenon as being either music or noise does not result exclusively from the acceptance or refusal of a cultural convention, but also from the more or less spontaneous identification of recurrent invariants and of "interesting" deviations from these invariants. This is not only why music is considered to be noise when the perception of its invariants proves to be too difficult; but also, reciprocally, why a sequence of sounds which is not culturally defined as music may nonetheless be listened to as such, whether it be the wind, certain liturgical practices, or a chorus of wolves.

In the latter case, we might perhaps be mistaken in talking of a purely metaphorical interpretation. Since the advent of sound recording and analysing devices, it has been possible to highlight a great many structural analogies between such phenomena and those of what is recognized as music. As we have long given up on establishing a purely acoustic distinction between noises and musical sounds, it would no doubt be appropriate also to re-evaluate this distinction according to general formal criteria. The world of sounds is not pure chaos, and inversely that of music has long been separated from the Apollonian order. What differentiates them is essentially qualitative: the perception of embodied intelligence in the dialectic between invariants and variations, what we call, for want of a better expression, a "musical sense". ■

François-Bernard MÂCHE / Excerpts

Source: La lettre, *no. 33, May 2012*

François-Bernard MÂCHE
Composer, musicologist, member of the Académie des beaux-arts

Talks

Anne FAGOT-LARGEAULT (Collège de France)
Form in Plato and Aristotle

Alain CONNES (Collège de France)
Duality between Forms and Spectra

Stanislas DEHAENE (Collège de France)
Forms in Geometry and the Universality of Mathematical Intuitions

Pierre FAYET (École normale supérieure)
Matter in all its Forms

Jean-Claude PECKER (Collège de France)
Forms in the Universe and the Form of the Universe

Jacques REISSE (Université libre de Bruxelles)
The First Forms of Life

Philippe JANVIER (Muséum national d'histoire naturelle)
A Paleontological History of Living Forms: The First Vertebrates as we Imagine Them

Denis DUBOULE (Université de Genève)
Genetics and the Architectures of the Living

Alain PROCHIANTZ (Collège de France)
The Living and the Mathematization of the World

Claude DEBRU (École normale supérieure)
Anatomical Forms and Physiological Functions from Claude Bernard to the Present

Jean-François MANGIN (CEA, Centre NeuroSpin, Saclay)
The Form of the Brain

Pieter ROELFSEMA (University of Amsterdam)
Brain Mechanisms that Integrate Features for the Perception of Visual Shape

Marc SMITH (École nationale des chartes)
The Form of the Latin Alphabet: between Writing and Reading

Jean-Jacques HUBLIN (Max Planck Institut, Leipzig)
Neandertal and First Symbolic Behaviours

Philippe DESCOLA (Collège de France)
Natural Forms and Symbolic Classifications

Marcel HÉNAFF (Université de Californie à San Diego)
The Form of Built Space, the Form of Thought: From the Bororo Village to the Network City

John SCHEID (Collège de France)
Metamorphoses in Greco-Roman Antiquity. Concerning Ovid's *Metamorphoses*

Mireille DELMAS-MARTY (Collège de France)
Forms, Norms, and Dogmas

Antoine COMPAGNON (Collège de France)
The Literary Form

François-Bernard MÂCHE (Académie des beaux-arts)
The Life of Musical Forms

Michel HOCHMANN (École pratique des hautes études)
Fables, Forms, Figures – A Tribute to André Chastel

Audios and videos available online at www.college-de-france.fr

Homage to Ernest Renan

AUTUMN SYMPOSIUM 11-12 OCTOBER 2012

Organized by Henry Laurens. Excerpts from the talks of Henry Laurens, Perrine Simon-Nahum and Pierre Rosanvallon

The author of a protean work, Ernest Renan was at once a writer, philologist, historian, and philosopher. He was also a professor of the Collège de France, of which he was the *Administrateur* from 1883 to 1892. The Autumn symposium of the Collège de France, which was held on 11 and 12 October 2012 on Henry Laurens' initiative, looked at this complex personality, who is ultimately little-known and who was profoundly coherent, down to his very contradictions.

Twenty participants took turns to discuss Renan, each from their own discipline's perspective. The symposium took place over four half-days, of which the first was devoted to Renan's life and the following ones to the mark he made on the domains of history and archaeology, philosophy, and politics. As a man of great curiosity and erudition, Renan was particularly well-suited to the cross-disciplinary perspective so dear to the Collège de France.

From one talk to the next, a dialogue thus emerged, reflecting Renan's interdisciplinary practice. Listening to them, the audience was able to gain awareness of the effective significance of such a personality: the Collège de France owes him its current motto ("Teaching research in the making"); and he was the founder of Assyriology, amongst other things. Renan was indeed at a crossroads, between Herodotus and Lévi-Strauss in his work as a historian, between the Enlightenment and Descartes in his approach to human reason. The man had an eminently syncretic dimension, due to which he raised numerous questions that are still relevant today: do religions have a future? What role can philosophy play in the new sciences? ▶

HOMAGE TO ERNEST RENAN
ACADEMIC YEAR 2012-2013

▶ As we progress through the papers a portrait of contrasts emerges: Renan was a man of contradictions – but not "schizophrenic", as the different speakers stressed.

In particular, how can we explain that he was far more interested in Semitic epigraphy than in Greco-Latin epigraphy, he who wrote a *Life of Jesus*? And why, while he was studying Phoenicia, were his thoughts not exclusively focused on Palestine, the cradle of civilization? The image painted over the course of these days ultimately represents Renan as a pathfinder, from Averroes to Buddhism: Renan the "creator of continuities" (Perrine Simon-Nahum). For these various approaches have the great merit of having successfully shown the extent to which these contradictions were only apparent, and how they could turn into underlying continuity: Renan was a man of great consistency in everything he did, loyal even when at odds, as attested to by his personal relationship to faith. "The particularity of faith", he wrote, "is that once it has disappeared it is still active. Grace survives through the habit of the living feeling one has had of it".

Fascination with this profound coherence is compelling, although it in no way leads to heightening the awareness of the critical mind . Renan's thinking, through its very constancy, is a tenacious, halting thought. He was a man of conflict, caught up in turbulent relations with religious authority, or in scientific controversies regarding the Semitic character he denied to Assyrian languages. Renan often even took debatable directions, from his simplistic standpoints on Phoenicians through to some of the statements he made, which would now sound resolutely racist.

The study of his texts invites us to adopt a critical approach: there is always something to be challenged. When the young Renan wrote his thesis on Averroes, it was to trigger the debate which he expressed in *L'Avenir de la science* (The Future of Science), and to attack what for him represented "ancient philosophy". While his approach as a historian of antiquity was founded on empathy, one should be able to decipher a posturing rather than real intimacy: it is best not to be seduced, for fear of falling back into caricatures that have portrayed the man in the past. Nowadays, Renan stands as an example in the very discontinuity, in the breaks and collisions he introduced: those of the modern mind. ■

Sarah LACOSTE

Source: La lettre, *no. 35, December 2012*

Find the Renan symposium at
www.college-de-france.fr/site/colloque-2012/
- abstracts of most talks
- videos of all the talks
- eight 2.5 minute interviews, with Henry Laurens, Thomas Römer, Corinne Bonnet, Claudine Tiercelin, Pierre Rosanvallon, Perrine Simon-Nahum, Antoine Compagnon, and Dominique Bourel.

Talks

Henry LAURENS (Collège de France)
General Presentation of Renan's work

Michel ZINK (Collège de France)
Childhood and Youthful Memories: the Eternal Seminarian

Tobie ZAKIA (Caisse nationale de sécurité sociale du Liban)
The Renan Family at Amschit

Céline SURPRENANT (University of Sussex)
Renan, *Administrateur* of the Collège de France

Dominique CHARPIN (École pratique des hautes études)
Renan, a Semitist at the Cradle of Assyriology

Corinne BONNET (Université de Toulouse (UTM) / Institut universitaire de France)
"This Mission that kept me for a year in the most intimate contact with Antiquity": Ernest Renan and the "Discovery" of Phoenicia

Denis KNOEPFLER (Collège de France)
The Use of Epigraphy in the History of the Origins of Christianity: a Concern for Renewal or an Erudite Style?

Thomas RÖMER (Collège de France)
Renan's Historical and Critical Exegesis of the Bible

John SCHEID (Collège de France)
Renan, the Empire and the Religion of the Romans

Claudine TIERCELIN (Collège de France)
Reason according to Renan

Jacques BOUVERESSE (Collège de France)
Science, Metaphysics, Religion, and the Question of their Future

Alain DE LIBERA (École pratique des hautes études)
Renan and Averroism

Jean-Noël ROBERT (Collège de France)
Renan and Buddhism

Perrine SIMON-NAHUM (CNRS)
Renan the Pathfinder: from the Science of Religions to the History of Religions

Jean BALCOU (Université de Bretagne occidentale)
Pius IX as Understood by Renan

Dominique BOUREL (CNRS, Centre Roland Mousnier Paris-Sorbonne)
Renan's Successors: Salomon Munk and Philippe Berger

Antoine COMPAGNON (Collège de France)
The God of the Third Republic

Sophie BASCH (Université Paris-Sorbonne)
The Fate of Prayer on the Acropolis

Pierre ROSANVALLON (Collège de France)
Renan, Founding Father of the Republic?

General Presentation of Renan's Work

Renan was born on 28 February 1823 in Tréguier. During the 1820s, the term Orientalism came to be widely used to refer both to scientific research and to a literary and artistic movement. Scientifically speaking, this Orientalism was based on the crucial discovery of the kinship between Indo-European languages.

In 1838, Renan was sent to the small seminary of Saint-Nicolas du Chardonnet, then to the big seminary of Issy, part of Saint-Sulpice. From 1842 he experienced a major religious crisis, as the philosophical training he received stood in opposition to the scholastic theology he was being taught. The difficulties experienced at that time were nevertheless alleviated by his discovery of biblical philology. In 1845, he definitively left the seminary. From his very first academic piece of work, the *Essai historique et théorique sur les langues sémitiques en général, et sur la langue hébraïque en particulier* (Historical and Theoretical Essay on the Semitic Languages in General, and on the Hebrew Language in particular), he was immediately seen in Orientalist circles as highly promising. His great intellectual project concerned religion. It obviously corresponded to his personal development, but its originality lay also in considering modernity as having a religious form.

In 1848, he wrote *L'Avenir de la science*. The book presents a whole series of working hypotheses in the form of assertions: the purpose of modern critique is to destroy all belief systems marred by supernaturalism; science, critique, rationalism, civilization, philosophy, are all synonymous; philology, understood as polymathy, is the science of the products of the human mind. This text already presented a fundamental opposition between the Indo-Germanic races, characterized by mythology and philosophy, and the Semitic races, characterized by the religious mind. But he first had to prove himself in the scientific domain before holding a Chair at the Collège de France.

Renan thus devoted the 1850s to developing his philological work. While extolling the virtues of the Indo-European mind, he essentially devoted himself to mapping out the Semitic mind. This philological work constituted both the prolegomena of a history of the origins of Christianity announced in *The Future of Science*, and the culmination of the synthesis of Orientalism and nineteenth-century historical thinking. Meanwhile, Renan started to become aware of the danger of giving too much importance to the racial aspect, especially if it was given a biological character.

Renan was elected to the Collège de France on 2 December 1861. His Inaugural Lecture, *De la part des peuples sémitiques dans l'histoire de la civilisation* (The Role of the Semitic Peoples in the History of Civilization), was a real provocation.[1] His contemporaries remembered the phrase: Jesus is "an incomparable man"; today, we especially remember his condemnation of Islam. Faced with scandal, the imperial regime suspended his lecture series.

During his mission in Phoenicia in 1860, Renan had planned the writing of a life of Jesus. While portraying Jesus as a personality of high moral integrity, he rejected any supernatural intervention. Published on 24 July 1863, *La vie de Jésus* (The Life of Jesus) was a new scandal, as well as a great bestseller. For lack of conciliation, Renan was relieved from his Chair at the Collège de France.

One of the first gestures of the Third Republic was to re-instate him in his Chair at the Collège de France in December 1870. In his public interventions, Renan advocated both harmony among the European peoples and the superiority of European races over the rest of the world, thereby justifying colonial domination. On 13 June 1878 he was triumphantly elected to the Académie française, and in 1883 he also became the *Administrateur* of the Collège de France. He died on 2 October 1892.

Renan owed his immense success to his qualities as a writer and his ability to answer the questions of his time. Yet his work was immediately called into question after his death. On this point, Renan bears an important responsibility. His bestselling success throughout Europe popularised the terms of Aryans and Semites which, with the distortions that are involved, came to be commonly used in the last few years of his life. But it would be absurd to call Renan an anti-Semite. His apology of the Greek miracle should not detract from the fact that he devoted his entire life to Semitic studies. ■

Prof. Henry LAURENS / Excerpts

Source: La lettre, *no. 35, December 2012*

(1) Œuvres Complètes, Paris, 1948, Vol. II, pp. 317-335

Prof. Henry LAURENS
History of the Contemporary Arab World

Renan the Pathfinder: from the Science of Religions to the History of Religions

Renan's work presents neither the contradictions nor the paradoxes generally attributed to him, but a singular response to the religious question, understood as the desire both to restore the religious dimension of the modern subject, the product of the French Revolution, and to reassert the need for a spiritual dimension of the collective political regime, that is, from 1870 onwards, the Republic.

This implies a dual shift performed by his work: first, the shift from a philology centred on biblical exegesis to a history of languages, and second, the definition of the movement of history no longer as teleologically driven but associated with religious sentiment.

Renan situated the science of religion at the foundation of a history of languages discovered through his study of Hebrew at the Seminary, when he was still considering priesthood. Through the composition of the biblical text, as well as through comparison with other Semitic languages, he discovered instances of incoherence that were soon to clash with the philologist as well as the believer in him. From then on, it becomes clear that in Renan's eyes only the historical perspective was able to make sense of the text's contradictions.

Understanding human beings: such was the ultimate goal of thought for Renan. This goal was inherently embedded in the world. As reality can never be assigned, language becomes the element in which these constructions occur and history the place where they are verified. The history of language is no longer understood as the development of natural progress but as the result of a construction of the mind which places human beings at the heart of its production. By adhering to a philological model, Renan made a twofold break from theology: on the one hand, in recognising the possibility of critiquing a supposedly inspired text, and on the other, in the ensuing anthropology, the mind and the body being closely intertwined in this scheme of development of civilizations.

The primacy he gave to religion and religious sentiment place him in Benjamin Constant's footsteps while also highlighting the novelty of his approach. Both shared the desire to stand against the aridity of rationalism and unbelief, as well as the concern for distinguishing themselves from an overly symbolic mysticism. Like Renan, Constant saw religious sentiment as a core element of human nature, as humans' share of the universal.

But where Constant saw the principles of philosophy take over from religious sentiment, Renan, on the contrary, was able to draw all the lessons from the deployment of hermeneutics and to build a history of meaning in which history and philology came together. What Renan sought in the past was not the embodiment of an individuality, whose global construction would ensure perfection, but a mediating element. The primitive is articulated here to understand not an individual in the present, in a form of actualisation, but a totality which induces the present and the future. Here again, a dual movement can be seen in Renan's work: the first elaborates on religious sentiment no longer only as a human trait but as an actual historical principle, while the second brings Renan's own way of relating to Christ into a history of meaning. Renan constructs a noetic history which draws its dynamic from the hermeneutics it implements. He inherited from the Oratorians and his reading of Berulle a personal relationship with Christ, which he never stopped proclaiming, and which came to add a third level of interpretation to the two commonly accepted levels of hermeneutics: the life of Christ actualized in the Passion. His whole work thus unfolds within a double circle: the desire to continue asserting the universality of Christianity without the help of revelation, that is, to demonstrate historically its universality, and the need to reconcile its framework with that of a general history of the human mind.

By justifying science through religion and religion through science, in other words, by underpinning philological practice with an understanding of history involving the divine person, and by ensuring the necessity of this involvement in philological practice itself, Renan develops a Christology that is parallel to the philological act. ■

Perrine SIMON-NAHUM / Excerpts

Source: La lettre, *no. 35, December 2012*

Perrine SIMON-NAHUM
Senior researcher at the CNRS (Centre de recherches historiques de l'École des hautes études en sciences sociales, Centre d'approches historiques du monde contemporain)

Renan, Founding Father of the Republic?

How could the man who accused universal suffrage of having made a "house of sand" of society, have come to be celebrated by the generation who had made its very conquest their ultimate goal? How could the man who claimed that "equality is the greatest cause of political and military weakening there is", have come to prevail as an intellectual reference in the eyes of those who, meanwhile, were having the republican motto engraved onto the pediments of schools and town halls?

To understand why Renan was celebrated by the first generation of founding fathers of the Republic we must make a detour through Orleanist thought. Royer-Collard, Guizot or Rémusat could all have put their name to the analyses and arguments in *La Réforme*. A man of liberal-conservative ideals, which were both aristocratic and based on qualified voting rights, Renan changed the tone of these ideals by dissociating them from the *sociological valence* (asserting a central role for the middle classes) with which the Doctrinaires had associated them. His elitist vision established itself as a cult of both science and intelligence, relatively indifferent to class. Encompassed in a reflection on progress, the aristocratic dimension of his thought thus shed the more scandalous elements of original Doctrinaire expression. Renan also repositioned these aims within a secular and scientistic moral framework, at a time when focal points of intellectual confrontation in society were being restructured, with the catholic/republican opposition adding itself to earlier antagonisms, sometimes to the point of erasing them.[1]

There is another factor to take into account if we are to understand the role played by Renan. It has to do with the social type that he represents: that of a scholar and eminent professor. What would have been dismissed, coming from a political orator, was accepted from a scholar's pen. Likewise, certain political views against the grain could be deemed unfortunate yet forgivable faux pas, as was certainly the case when Renan published *La Monarchie constitutionnelle en France (The Constitutional Monarchy in France)* in 1869.[2]

Renan's position with regard to Orleanism was therefore that of a rewriter rather than of an heir. The first generation of founding fathers recycled his critique of democracy as republican elitism, and rationalized a certain upper-class contempt for the peasantry, at the time still the large majority of the lower classes, by integrating it into a historical vision of political alienation.

Yet this is but one of the dimensions of the ties between Renan and the first generation of founding fathers, who also converged in the 1880s around a certain vision of the nation of which Renan had become a sensitive and theorizing interpreter. Although his thoughts on society's organization and legitimate mode of functioning could be elitist and barely democratic, it is crucial to see that Renan had a fully democratic vision of the nation. From this perspective, we can consider that Renan accepted and even called for the role of an institutional democracy, and that he manifested profound scepticism, if not opposition, with regard to a *regulatory democracy*. In other words, democracy was acceptable to him only as a power of legitimization, not as a regime or a form of government. Importantly, Renan and the first generation of founding fathers also shared the same pragmatic and disillusioned vision of political action.

Renan's position with regard to the second generation of founding fathers – that of Ferdinand Buisson, Léon Bourgeois and Waldeck Rousseau – was entirely different. Enlightened by the philosophies of Henri Michel, Charles Renouvier, and Alfred Fouillée, they consolidated the republican project in a perspective completely foreign to the Orleanist legacy. With them, the republican Republic became the democratic Republic, marked by a concern for the social question which was alien to the first generation of founding fathers. ■

Prof. Pierre ROSANVALLON / Excerpts

Source: La lettre, *no. 35, December 2012*

(1) Guizot positions himself in this new configuration of intellectual confrontations, as Sainte-Beuve aptly noted in the article he published on the first series of his Méditations sur l'essence de la religion chrétienne *[Meditations on the Essence of Christianity]. His opponents in the 1860s, he explained, were no longer Thiers, Barrot, Berryer, Duvergier de Hauranne, but "the Darwins, the Littrés, the Renans, the Scherers" (*Nouveaux Lundis, *Vol. IX, p. 90). As he was also politically close to Taine and Renan, his position was a complex one. (2) Later reprinted in* La Réforme intellectuelle et morale, *the text was not discussed any further, as it had been at the time of its first publication in the* Revue des deux mondes.

Prof. Pierre ROSANVALLON
Modern and Contemporary History of Politics

VISITING PROFESSORS
LECTURES BY PROF. EDUARDO RUIZ-HITZKY
OCTOBER 2011

Chemistry in all its States

1 • The Microwave Oven: from the Kitchen to Synthesis Chemistry

"A microwave oven is a domestic appliance that is mainly used to heat up food quickly, by agitating the water molecules contained in the food under the effect of a microwave radiation" (Wikipedia). From the outset, this technology was mainly used in the kitchen and sometimes in highly precise industrial applications. However, for the last twenty years or so microwave has also been used in chemistry laboratories, to activate chemical reactions and to prepare "advanced" materials of great value for new technology.

In order to understand properly the mechanisms of microwave action, we first have to consider the fundamental concepts of interaction between electromagnetic waves and matter, particularly with water molecules, followed by their energetic transformation in molecular rotational movements and the heating up of the immediate environment of those same molecules. That is how microwave-assisted reactions lead to a significant reduction of the reaction time. Moreover, the yield and even the selectivity of reactions are often improved. The application of microwave saves considerable time and energy (Green Chemistry). Microwave activation can be applied for organic synthesis in the so-called "dry media" conditions, that is, without solvents, where finely divided inorganic solids act as a solvent in a sense, while also supporting the reactants. What initially seemed to be a chemical synthesis revolution is nowadays being used for a wide variety of applications, not only in laboratories but also in certain industrial processes. In fact, some current uses offer interesting possibilities of synthesis in both organic and inorganic synthesis chemistry, for:

- solid-state reactions
- preparation of ceramic materials
- hydrothermal synthesis
- digestion of solid materials for chemical analysis
- polymerization of monomers and preparation of hybrid materials and composites, etc.

2 • Clays: a Raw Material for Advanced Materials

Amongst the most abundant, universal and accessible raw materials, clay is without a doubt a particularly interesting example. In fact, clays are used in widely diverse sectors of application, from the most traditional ones, like pottery and construction (bricks and tiles) to sophisticated materials like certain heterogeneous catalysts. This goes to show the real utility and great versatility of this family of silicates.

A raw material as simple as a clay can actually also have applications in domains associated with "advanced" technology. Clays can thus be transformed into materials for very specific purposes, or even into functional nano-materials. In order to illustrate these concepts, let us consider various examples constituting a concise review of clay-based functional materials, selected from research carried out within our research group over the last few years. At present, these clay-based materials are highly valuable for various applications, such as special adsorbents, specific catalysts, anti-pollution materials, components of electrical and electrochemical devices, selective membranes, photo-active systems, or even in the preparation of next generation adjuvants for vaccines. Among the most recent examples, clays have served as the base for the preparation of new multi-functional hybrid materials such as magnetic adsorbents or supported graphenes. When treated by means of interaction with ferrofluids, lamellar clays, like montmorillonite, or fibrous ones, like sepiolite, are transformed into super-paramagnetic materials that preserve their capacity to absorb organic species and to exchange cations in solution. Afterwards, their super-paramagnetic character makes easier its capture using a magnetic field, which allows the application of those materials for the sequestration and elimination of polluting substances in water without resorting to complex recovery processes such as filtration, centrifuging or membrane processes. Furthermore, clay-supported graphene has been produced through the controlled carbonization of totally harmless organic compounds such as caramel or gelatine. This is a new process for the preparation of graphene-based materials using a "soft route" which leads to carbon-clay compounds with properties that are simultaneously characteristic of both components, that is, molecular adsorption and electric conductivity.

3 • The "Intracrystalline Laboratory": The Chemistry in Confined Nano-Spaces

Certain nanoporous microcrystalline solids provide spaces where molecular access is controlled by different factors, mainly steric and topochemical ones. The size and shape,

as well as the chemical nature of the guest molecules play a determining role in allowing their passage through the nano-windows, in their arrangement inside the solids and, in some cases, in the event of unusual chemical transformations within the solid. Cavities inside solids with a 3D organisation, typically zeolites and related materials, the inter-lamellar spaces of solids with a 2D organization or the tunnels of monodimensional solids (1D), like certain mesoporous silicas, carbon nanotubes and fibrous clays, are all nanometric domains that offer the possibility of implementing a different chemistry to that which is produced in conventional homogeneous environments. These are real intracrystalline laboratories in which, for instance, water molecules can find themselves in an abnormal state of dissociation, typically 1,000 times greater than in water in a normal state. This leads to very high acidity in these environments, thanks to which unexpected catalytic transformations on the surface of these solids can be induced. Selected examples are the adsorption and the selective transformations in nanoporous solids related to ZSM-5 zeolite in the alkylation of toluene, molecular transposition reactions in smectite-type clays, mesoporous silicas asymmetrically grafted through organic functions and carbon nanotubes that can encapsulate nano-crystals with various chemical compositions. Regarding solids with a monodimensional nanoporous organization, we can also consider the example of the pigment known as Maya Blue, made by the ancient Mayans. In this pigment, the indigo dye was encapsulated at molecular level within the structural nanospaces of a microfibrous clay called palygorskite. Owing to this "encapsulation" in confined spaces, the characteristic blue colour lasted for centuries. Actually, this is the result of a nanotechnology developed about ten centuries ago!

4 • Biohybrids, a New Type of Materials at the Interface of the Inorganic and Living Worlds

The combination on a nanometric scale of compounds originating from biological species with inorganic solids produces a class of nanostructured materials called biohybrids. These materials represent a very important progress in the field of functional materials, as the incorporation of biological entities such as cellular fragments or even entire micro-species confers properties to the involved inorganic solids which by far surpass those of systems that exclusively use synthetic compounds. In the preparation of biohybrids by means of bottom-up methods usually applied to nanotechnology, the scientist uses construction units that are well-defined in soft chemistry preparation conditions. This method is very useful as it prevents the alteration of biological entities that are generally fragile and sensitive

In this respect, it is worth mentioning several systems that are of particular interest, like the immobilization of enzymes by sol-gel matrices, the inclusion of chlorophyll in mesoporous silicas, the encapsulation of living cells in rigid or flexible matrices, and the intercalation of biopolymers in solids with a 2D organization. Among biohybrids, those resulting from the assembly of inorganic solids with biopolymers have been called bionanocomposites. Certain bionanocomposites are of natural origin, as it is the case of bone or pearl, consisting of phosphate or carbonate particles bound on a nanometric scale with proteins, for example collagen or lustrin A. The use of various inorganic solids, such as silicas and silicates, combined with the wide range of choice offered by biopolymers, opens up to limitless possibilities for engineering and synthesis of new biomimetic materials. For example, lamellar or fibrous clay silicates combined with biopolymers were recently used to develop new biohybrids elaborated in the form of films or foams, useful as membranes for separation of gases or as ultra-low density materials with cellular structure. Furthermore, these materials are biodegradable, biocompatible and fire-proof, which leads to multiple applications in a wide variety of domains, for instance acoustic and thermal insulation. Biomimetic membranes based on biohybrid systems may also constitute an adequate environment to immobilize enzymes, microalgae cells and viral particles. These systems, which are halfway between the inorganic and living worlds, display interesting bioactivity properties and are currently under study for applications in domains pertaining to the production of biomass, vaccines or highly selective biosensors. ■

Source: La lettre, *no. 33, May 2012*

- **Prof. Eduardo Ruiz-Hitzky, from the Materials Science Institute of Madrid (Spain), was invited by the Faculty, on the proposition of Prof. Clément Sanchez.**
- **Lectures online at www.college-de-france.fr**

Eduardo RUIZ-HITZKY is, since 1988, a professor at the CSIC (National Research Council of Spain), and is currently the Head of the Hybrid, Biohybrid and Porous Nanostructured Materials team at the Materials Science Institute of Madrid. He has spent several decades doing pioneer research on hybrid and biohybrids materials, especially those involving derivatives of particulated inorganic solids such as clay minerals.

VISITING PROFESSORS
LECTURES BY PROF. ORTWIN DALLY
OCTOBER 2011

The Colonization of "Great Greece"

The colonization of Magna Græcia or "Great Greece" (second half of the eigth century to the middle of the fifth century BCE) was one of the milestones in Greek history. For the first time, large numbers of Greek settlements were created on a wide scale on the Mediterranean and Black Sea coasts. These settlements, founded by Greeks from the mainland, the Aegean Islands and Asia Minor, ranged from small trading posts to cities built according to an orthogonal plan. As they settled in these new spaces, the Greeks came into contact with various local populations who were then strongly influenced by Greek thinking and customs. They, in turn, to varying degrees, influenced the daily life, relations and customs not only of Greek immigrants but also of those who remained on the mainland, in Asia Minor and in the Aegean. This colonization cannot be seen in isolation from the developments taking place in mainland Greece, where the Mycenaean palatial civilization, with its centralized economic model, collapsed in the seventh century BCE.

Sources from Ancient Egypt tell us that, during the same period, the Near East was invaded by the Peoples from the Sea and the Hittite kingdom disappeared in Asia Minor. This change most probably had an immense impact on Greece and the Aegean Islands. Knowledge of writing disappeared. Researchers have good reason to think that there was also a significant decline in the population and a decentralization of dwellings and settlements. After the disappearance of the Mycenaean palatial civilization, this era was nevertheless marked by very different forms of occupation of territories in Greece, depending on the region. In some regions such as Attica, evidence points to continuities between the late Bronze Age and the early Iron Age, beyond the end of the second and the beginning of the first millennium BCE, whereas considerable discontinuity is seen in Messenia and in other regions. This also applies to sacred places. In this respect, recent research has clearly shown real religious continuity between the end of the Bronze Age and the beginning of the Iron Age in sanctuaries situated at Kalapodi. This contrasts with other places of worship in Olympia, where cultural activities began only after the end of the second and beginning of the first century BCE. All of this reflects a locally highly differentiated evolution which nevertheless provided the foundations for the birth of the *polis*. The term ***polis*** refers to the city states, which developed in widely scattered places, due to the high mountain ranges cutting across the region, and which supplanted the last Mycenaean palatial civilisation of the Bronze Age.

After the first lecture on the beginnings of Greek colonization, the second lecture addressed the way in which this historical process altered the perception of space, and, with the Greeks, led to the invention of cartography and geography. First, with the Greeks, the representation of space was empirical and hodological. Then, with the great Greek colonization movement, the vision of space changed rapidly. This evolution subsequently served as a foundation for the development of two-dimensional cartographic representations. This vision of space is immediately apparent with respect to the colonies and their surroundings. It subsequently led to the development of mapping and to a geometrical mathematical representation of the world as a whole. Now, these two ways of perceiving space co-existed; it was the movement of wider Greek colonization that made the two sides of the coin possible. Finally, it is not only to the founding of the colonies and cities in the Mediterranean and Black Sea region that we owe the abstract representation of the world as a whole, but also to the journeys of exploration.

Another question concerns the development of the identity of the inhabitants of a new polis. A sense of community was born from the outset with social practices, that is, celebrations and rites, with which the inhabitants were associated. These practices reinforced the legitimacy of the foundations of the new social order, including that of the different social groups, domains and steps of life, and of territoriality. This does not mean that such rituals were not considered to play any role on the mainland; on the contrary. But I wish to stress that their role was not as fundamental there. Our analyses of the

new colonies in the western Mediterranean and the Black Sea nevertheless enable us to understand at least partially how these rites and celebrations were reflected in a sacred topography that changed rapidly but that appeared from the beginning of the colonies. The veneration of *oikistès* to which the foundation of the polis was attributed was immediately part of these practices. In the framework of these rites and festivities, the myths and divinities that had existed since time immemorial served as a general framework outlining the first norms of community life. The emphasis on ancientness and its representation could thus explain the architecture of buildings and monuments as well as the noteworthy use of certain votive practices. Myths also enabled the Greeks to situate themselves in relation to people living outside the *poleis*, thus helping them to position themselves as specific groups.

Finally, one also wonders to what extent, beyond the analysis of particular cities, we can witness the appearance of a pan-Hellenic identity following the great movement of Greek colonization, and what role the great pan-Hellenic sanctuaries such as Delphi and Olympus might have played therein. The history of these sanctuaries is closely intertwined with the history of the birth of the *polis* and of Greek colonization.

The source that truly bound all Greeks together is a passage from Herodotus' Book VIII, 144. In a speech in which the inhabitants of Athens had called for Greek unity, under the Persian threat in the winter of 480/478 BCE, Herodotus commented that they should not become traitors of the common cause of all Greeks (*tò Hellenikón*). Thereafter, a more precise definition of *tò Hellenikón* was proposed. Apart from shared blood and a common language (*hómaimón te kaí homóglosson*), the sanctuaries and the common sacrifices (*theôn hidrúmata tè koinà thysíai*) are defined as characteristic of all Greeks. It is noteworthy that this definition contains no reference to a spatial dimension. Unlike the *polis* – which includes a spatial dimension that was without doubt a determining factor in the identity of every citizen – the community of citizens was not related to an actual spatial dimension. This point is particularly important. It was through the common sanctuaries and sacrifices that the Greeks communicated. These sanctuaries were part – as the German historian Peter Funke put it – of a pan-Hellenic *sacred landscape*.[1] Moreover, they were part of the religious idea that the Greeks had of themselves, and they existed in their imagination in the form of a *mental map*.[2] Thus, like a network, they covered the entire Greek world, and they were closely linked by worshipping, rites, celebrations, and mythical narratives. Thus, without physically existing in the territorial reality, the sanctuaries were nevertheless landmarks. They existed above all in the imaginary, and constituted a utopian fatherland whose importance, for the solidarity of the Greeks between themselves and for their self-confidence, cannot be over-estimated. This signification, that is, the formation of a *mental map*, is closely linked to the process and genesis of the *polis* and to great Greek colonization. It was only when the Greeks, in separate groups, went abroad that this system started to emerge. At the same time, it was through this system that they realized that they had more in common with one another than with the populations with which they were actually living. Yet, given that these journeys lasted for days, if not weeks, they probably favoured solidarity between Greeks. Moreover, the athletes who participated in the Olympic games spent a month at Elis to train and, divided into teams, to undergo a test for their admission to the competition. Finally, they met one another on the occasion of rituals and festivities that lasted several days. These pan-Hellenic cults – including the oracles and mystery cults, such as Zeus' sanctuary at Dodone, or that of Demeter at Eleusis – were more important for the pan-Hellenic identity than were political alliances or federations, some of which were highly fragile. ■

Source: La lettre, *no. 33, May 2012*

(1) (2) In English in the text.

Ortwin Dally, from the German Archaeological Institute, Berlin, was invited by the Faculty, on the proposition of Prof. John Scheid.

Ortwin DALLY
Ortwin Dally is the Secretary-General of the German Archaeological Institute (DAI) and Honorary Professor of Classical Archaeology at the Freie Universität Berlin. He was awarded his PhD in archaeology from Heidelberg University in 1996 and obtained his Habilitation in history and cultural sciences from the Freie Universität Berlin in 2004. Since 2008 he has been Chairman of the Berlin Archaeological Society.

VISITING PROFESSORS
LECTURES BY PROF. JEAN-DANIEL MACCHI
OCTOBER 2011

The Book of Esther:

Reflection on a Diasporic Literature in Judaism in the Period of the Second Temple

The Book of Esther constitutes a piece of literature emanating from the Jewish communities of Antiquity, which tells the mainly fictional story of a young Jewish woman who lived at the court of the Persian king Xerxes and managed to save her people from a pogrom. The analysis of this biblical text furthers our understanding of the issues and challenges confronting the groups that produced it between the third and the first centuries BCE, in a world largely dominated by Hellenistic culture.

General Introduction to the Book of Esther. History of the Transmission of a Book: the Hebrew Text of Esther and the two Greek Texts.

The Book of Esther can be qualified as a "diaspora novel", insofar as literary techniques which are characteristic of novels (set-up, plot, dénouement, twists, etc.) are used to recount an episode about the Jewish people living away from their homeland. The theme of anti-Judaism plays an important part in this story and is accompanied by reflection on the relevance of disclosing one's identity under a foreign empire where the functioning of the state cannot be controlled. Religious themes, on the other hand, generally remain implicit.

The textual history of the Book of Esther is relatively complex. This book did not reach us in a single form but in three very different textual forms, one in Hebrew and the other two in Greek. These different textual forms afford us an understanding of how the book was written, for the Hebrew text is actually a rewriting of an older text, the proto-Esther, which can be pieced together using one of the two Greek forms of the book.

The Book of Esther in the Context of Hellenistic Literature concerning Achaemenid Persia.

The authors of the Book of Esther share with the Ancient world of Greek expression a way of representing the functioning of Achaemenid Persia and its imperial Court. In the Book of Esther there are numerous parallels with the representations of Persia made by Greek authors like Herodotus, Thucydides, Ctesias of Cnidus or Aelien, as well as with episodes they describe. Through examples like those of the ascent of the Persian queen Aspasia or of Phaidyme's salutary action, one realizes that the Book of Esther re-appropriates the *clichés* about Persia drawn from Greek literature. These observations afford insight into the intellectual and identity challenges facing the Jewish communities settled in the ancient world, which were steeped at the time in Greek culture.

Resisting or Silencing one's Jewish Identity according to the Book of Esther. Esther Faced with Mordecai's Speech (Esther 4)

Chapter 4 of the Book of Esther constitutes a key passage for understanding the meaning and the socio-historical issues underpinning the work. It is at this point in the story that the Jewish woman Esther, who has become the Persian queen, is bid by her adoptive father to reveal her identity and risk her life in order to save the Jews from extermination. The issue of identity, asserted in spite of the difficulties encountered, is at the heart not only of the story but also of the concerns of Jewish circles in the ancient world. While certain Jewish groups seem to have tended to adopt the way of life of the prevailing Hellenistic culture, others considered that it remained crucial to observe ancestral rites and rules.

A careful reading of the chapter, as well as the comparison between its Hebrew version and one of its two Greek versions, shows that the Hebrew writers of Esther sought to promote the assertion of a strong identity.

Instituting a Nationalist Celebration of Diaspora. Esther and Mordecai's Letter at the End of the Book

The Book of Esther ends with letters sent to encourage the celebration of a festivity commemorating the victory of the Jews over their enemies. An analysis of Esther 9,20-28 shows how sending this kind of official letter constitutes a means of legitimizing a festive practice, and that such legitimization proves necessary insofar as festive rites constitute particularly significant social acts with regard to issues of identity.

The practice seeking to promote nationalist celebrations by sending authoritative letters is commonplace in the Jewish texts of the late Hellenistic period. This provides more precision about the context in which the last part of the Book of Esther was produced. ■

Source: La lettre, *no. 33, May 2012*

- Prof. Jean-Daniel Macchi, from the University of Geneva (Switzerland), was invited by the Faculty, on the proposition of Prof. Thomas Römer
- Lectures online at www.college-de-france.fr

Jean-Daniel MACCHI is professor at the Autonomous Faculty of Protestant Theology at the University of Geneva since 2005.

Fire in Old Avestan Literature

Fire played a fundamental role in Avestan ritual tradition and the significance of its centrality in ancient liturgy is undeniable.

However the role of fire in Old Avestan sources needs to be clarified by way of a comparative analysis. It is especially important to highlight a series of surprising pieces of evidence which has not received the emphasis it warrants:

1- There are only eight occurrences of the noun of "fire" (*ātar-*, m.) in the Gāθās, to which we add the four occurrences of Chapter 36 of the Yasna Haptaŋhāiti (= YH). Proportionally speaking, the YH (Y 36.1-3) devotes greater importance to fire that the five Gāθās put together.
2- Fire is never called "son of Ahura Mazdā", an exclusively recent designation. However it is called "your" several times with reference to Ahura Mazdā, which could be considered as an allusion to Mazdā's fatherhood.
3- The noun fire appears only in the singular.

Certain other characteristics of fire deserve particular attention. Y 34.4 reflects an ambivalent reference to fire, in its dual quality as "a remarkable aid" for the helping hand but "of visible malevolence" for the hostile. The mention of the violent, burning character of fire is important, as Ahura Mazdā himself can be "evil" against those who oppose his will. Moreover, fire is qualified by *θβa-* as "your" on five occasions, which is to say it belongs to Ahura Mazdā, and in Y 34.4 we find tōi *ātrām*. This belonging is undeniably mentioned again in Y 31.3, but also in the YH where fire is "Ahura Mazdā's". This relationship shows that ritual fire is Ahura Mazdā's. I do not think that one can make a distinction between divine fire and material fire. Through ritual, Ahura Mazdā's world and that of his body of assistants materializes in the liturgy. Furthermore, in recent liturgy, the body of seven assistants, with the *zaotar-*, functionally corresponded with Ahura Mazdā's with his Amәšas Spәntas.

The analysis of the occurrences of fire has allowed us to highlight an important point. The consecration of fire. Narten had interpreted the beginning of Y 36.3 as the official formula for the consecration of fire. This is a plausible solution, but we need to agree on the signified that we attribute to this consecration. In the Yasna which has reached us, fire had already been consecrated, or was already ready to be used during sacrifice. Two points cause me to think this: first, the Yasna ritual, in its solemn form, did not include any interruption; and second, the fire was never lit immediately before the ritual, but was and constantly remained lit, never exhausted and inexhaustible. It is unfortunately not possible to definitively establish a description of the ancient ritual before the Gāθās and the YH were positioned at the centre of the Yasna. If we suppose that Y 34 announced a very important sacrificial act and that Y 36 confirmed the effectiveness of the immolation that had already taken place, this sequence demonstrates that the fire had already been consecrated at the time of the recital of Y 34. An immolation cannot be done in the presence of non-consecrated fire. Kellens has clearly demonstrated that we can realistically note, in Y 58, the end of the cremation of the offering, placed in the fire at Y 36. This reconstruction does not prevent us from considering that the burning of the meat offering necessarily contrasts with a sort of internalisation of the sacrifice. Cooking sacrificial meat is not only a material act but also a sacred one, performed by the fire, in a speculative context. However one thing is sure: the Gāθās and the YH have been given a central position, devoid of ritual actions, with the exception of the combustion of the offering. Further reflection on the subject is still needed.

The YH contains another point worthy of interest: the designation of fire in Y 36.2 as *nąmišta-*. According to Baunack, echoed by Humbach, this designation is explained as part of an Indo-Iranian doctrine where fire, called *agni- yájiṣṭha-*, as in the RV, took on the role of high priest (*hótṛ- puróhita-*). The observation that fire had a priestly and divine function fits in with a conceptual framework where human ritual is or becomes a liturgy where gods are actively present.

The fire of sacrifice is Ahura Mazdā's fire. It is physical but it is also the *mainiiu- spāništa-* of the god, its visible form in the ritual. The living reality has therefore united with the active mental one, and the distinction between these different planes does not exist either. The ritual has fulfilled its purpose. We can then assert that fire, not only in the process of identification with the *mainiiu- spāništa-*, but also in its close relationship with the manah- that is vohu-, confirms the particularity of the speculative vision of sacred space and of the ritual function in Mazdean tradition – a space in which reality affords access to a different dimension, when the gods come to the sacrifice and the humans become the gods they represent. ■

Source: La lettre, *no. 34, July 2012*

Prof. Antonio Panaino, from the University of Bologna (Italy), was invited by the Faculty, on the proposition of Prof. Jean Kellens.

Antonio PANAINO
is professor at the University of Bologna (Italy) and President of the ASIAC (Association for the Study of Central Asia and the Caucasus in Italy). He holds an honoris causa doctorate from the New Bulgarian University of Sofia.

VISITING PROFESSORS
LECTURE BY PROF. HANS VAN ESS
FEBRUARY 2012

The Logical Composition of the First Chinese Dynastic Histories and its Impact on their Reading

The *Historical Records* (*Shiji*) were written at the end of the second century BCE. They are a description of the history of the world as it was known in China, from its early days to the time of its authors Sima Tan and Sima Qian.

Most of this book is devoted to the first century of the Han dynasty. Ban *Gu's Hanshu* (the Book of the Han), written around 80 CE, is about the history of the first two centuries of the Han dynasty until the beginning of the Christian era.

The *Shiji* and the *Hanshu* present a series of peculiar and striking structural similarities which reveal certain information on ancient Chinese historians' way of thinking. The last ten chapters of the *Shiji* have a very particular significance which becomes apparent by comparing them to certain chapter sequences in the *Hanshu*. There is a strong sense that when writing Chapters 58 to 66 of the *Hanshu*, Ban Gu had the last ten chapters of the *Shiji* in front of him, which he partially drew on, only leaving out two chapters on divination (soon to be considered lost by Chinese tradition, and therefore not entirely reliable). The author of the *Hanshu* therefore read the *Shiji* and used it.

There is a meaning to the order of these chapters. They narrate history in a logical order. Sima Qian, the author of the first of these two historical works, was gifted with an extremely critical mind: through his dynastic history he vehemently criticized the ruling dynasty and especially Emperor Wu, his contemporary.

Sima Qian used these biographies to paint a picture throughout the chapter of the society of the time, including the proponents of Emperor Wu's policy, its consequences in the country, opposition to it, and its effects on the economy. He ended his narrative in a climax with a decidedly critical tone.

In Chapters 58 to 66 of the *Hanshu*, this same history is found in the biographies of individuals and groups of individuals, but told from the opposite perspective. Instead of discussing a relatively insignificant Confucian group from a low social ranking, as Sima Qian did, in Chapter 58 of the *Hanshu*, Ban Gu chose to talk about Gongsun Hong, the powerful Confucian first chancellor. In Chapters 59 and 60, which run in parallel with the "biographies of cruel officials" in the *Shiji*, he presented a biography of two ministers of justice and their family who acquired fame and prestige during the dynasty. In Chapter 61, instead of talking about Ferghana, as Sima Qian did, Ban Gu presented the two generals who led the military campaign against this country, to then include in Chapter 62 the biography of Sima Qian who perceived it very negatively. In Chapter 63, instead of presenting the "knights-errant" of Chapter 124 of the *Shiji*, he described the life of Emperor Wu's sons, one of whom was to be the famous heir apparent who staged a rebellion in 91 BCE. Chapter 64 of the *Hanshu* includes the biographies of men who wielded significant political influence at the court, but who are presented as respectable people, unlike their chosen counterparts in Sima Qian's Chapter 125. In Chapter 65 of the *Hanshu*, such positive influence on the emperor is attributed to the famous jester Dongfang Shuo. This chapter corresponds to Chapter 126 of the *Shiji*, on satirists, which nevertheless omits the Han satirists. Finally, Chapter 66 of the *Hanshu* is devoted to the biographies of the most important chancellors who made history from the end of Emperor Wu's rule. It pays special attention to the biography of Sima Qian's grandson, who was executed because of his rebellious behaviour. At the same time, this chapter also tackles the country's economy, as does Chapter 129 of the *Shiji*.

The narration of the events during Sima Qian's time thus comes to a close in the *Book of the Han*. It is interesting to note that at the end of this cycle appears the description of the extermination of Sima Qian's clan. This suggests that the author of the dynastic history of the Han must have carefully read the *Shiji* and understood it well, for he used the same structure and adapted it while also contradicting his predecessor's work. ■

Source: La lettre, *no. 35, December 2012*

Prof. Hans van Ess was invited by the Faculty on the proposition of Prof. Anne Cheng

Hans VAN ESS (PhD from the University of Hamburg, 1992) is Chair of Sinology and Mongolian Studies at the Ludwig-Maximilian University of Munich. His main areas of interest are the history of Confucianism and the historiography of the early Chinese imperial era.

The "Great Arab Revolt" of the Twenty-First Century

Reflections on the Ongoing Upheaval in the Arabic-Speaking World

One question is immediately raised by any attempt to analyse the ongoing events in the Arab region, that of how to refer to them.

The most satisfactory term is "revolutionary process": it puts the emphasis on the potential of the uprising without making a definitive judgement on its results, by stressing that what was set in motion by the December 2010 demonstrations in Tunisia and gradually spread to the whole region is still far from over. The uprisings that the region has witnessed have not been limited to their political democratic dimension in the confrontation with regimes that were or are all "authoritarian", to varying degrees. The development deadlock crippling the economies and societies of the Arab world is the underlying cause of the events. This deadlock is illustrated both by the particularly weak growth of the average regional GDP per capita over the last few decades, and by record unemployment rates in the Arab world, particularly among women and the youth, with an over-representation of graduates among the unemployed.

These socio-economic factors are at the root of the social discontent which the anti-democratic or despotic practices of the incumbent regimes have considerably exacerbated, up to bursting point. The reason for this deadlock lies with the specific nature of the prevailing mode of production in the region. The Arab crisis is a response to a stalemate which goes back much further than the current global economic crisis, even if this has compounded the problem. Development in the region is first and foremost blocked by the predominance of rentier, patrimonial or neo-patrimonial states, in a general climate of arbitrariness and insecurity that inhibits long-term productive private investment and encourages the quest for short-term profit in speculative operations. This private-sector reality, combined with the reduction of state investment within the framework of the global domination of the neoliberal paradigm for the last thirty years, explains the regional crisis.

Regional and international political factors have added to this socio-economic picture. The region's oil wealth sealed its fate as the centre of particular attention by the powers that had the privilege of tapping into those resources before others. Great-Britain in the small monarchies of the Gulf, as much as the United States in the Saudi Kingdom, have consolidated ultra-archaic socio-political systems in order to secure their long-term control.

The George W. Bush administration however broke away from this tradition of stabilization of archaic regimes, thinking it was thereby drawing lessons from the 9/11 attacks. The invasion of Iraq in 2003, followed by the campaign to "promote democracy" launched by the administration in the region, have contributed to destabilising it.

This turning point in Washington went hand in hand with a new openness to the Muslim Brotherhood, the main organized movement of regional political opposition. Until the end of the Cold War, the United States had collaborated with the Muslim Brotherhood as part of their joint struggle against communism and Arab nationalism. The first war led by Washington against Iraq in 1991 had resulted in the two parties splitting. However Qatar, having become the Muslim Brotherhood's main sponsor after its split with the Saudi Kingdom, played a facilitating role in the thaw that served as a prelude to the new entente between the United States and the Muslim Brotherhood with the Arab uprising. The brotherhood's role in the region has been strengthened by the satellite TV channel Al-Jazeera, a property of Qatar, whose contribution to the politicization of regional public opinions and to the uprising itself cannot be emphasized enough.

The "Arab spring" erupted against this general backdrop. The different dynamics of the uprisings in the various countries are partly due to the nature of the social and political actors in each case: the decisive role played by the labour movement in Tunisia; the labour strikes in Egypt; tribal and/or religious factors in the other countries. It is also due to the nature of the states in terms of the composition of their armed forces and their degree of allegiance to the power in place. These factors have made the difference between situations where the movement was able to remove leaders through the political struggle and those where the uprising resulted in a civil war.

The Muslim Brotherhood's rise to power in certain countries cannot stop the revolutionary process. These parties do not have programmes comprising convincing answers to the profound crisis in their countries. They adhere to the same economic policies that inspired the toppled governments. The presidential election in Egypt revealed the ground lost by the Muslim Brotherhood in the space of a few months, just as it revealed the potential of the "third force" opposed to both the old leaders and the new ones. The driver of the crisis and uprising in the Arabic-speaking world will continue to run. It is still far from coming to a halt. ■

Source: La lettre, *no. 35, December 2012*

Prof. Gilbert Achcar was invited by the Faculty on the proposition of Prof. Henry Laurens

Gilbert ACHCAR
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SIDNEY WIENER
SPATIAL MEMORY AND NAVIGATION
(UMR - 7152)

Dopamine Synchronization and Reconfiguration of Neuronal Circuits during Learning and Sleep

The teams led by Sidney Wiener (LPPA CNRS UMR-7152) and Laurent Venance (INSERM U667) received the *La Recherche* magazine's prize for the best publication in Neuroscience in 2010, for their article of collaborative research published in the journal *Neuron*.[1]

One of the theoretical underpinnings of this project stemmed from the discovery of the dopamine mesolimbic system and the characterisation of the pathway linking the hippocampus to the prefrontal cortex by the team of Dr Anne-Marie Thierry and Prof. Jacques Glowinski, Chair of Neuropharmacology. At the time of the experiments, the LPPA (Laboratory of the Physiology of Perception and Action) was directed by Prof. Alain Berthoz, Chair of Physiology of Perception and Action.

This research was motivated by the observation that neurological patients suffering from damage to a structure called the hippocampus cannot acquire new memories. The fact that they can remember only those events that occurred prior to but not after their accident, suggests that the memory traces are acquired through the hippocampus but are not permanently stored there. After learning, these traces appear to be transferred to the cerebral cortex and especially to the prefrontal cortex. A leading theory postulates that this transfer occurs during sleep, when the neurons activated during learning are reactivated, thus reinforcing the synaptic connections that are believed to be the neural bases of permanent memory traces.

In a first study, the LPPA team had recorded neurons in rats as they learned a decision-making task in a maze. They showed that suppressing neuronal reactivation during sleep strongly impaired learning (see *La lettre du Collège de France*, no. 27, p. 15).

The researchers then sought to understand how the brain encodes the information that will be reactivated during sleep and consolidated in long-term memory. With multi-site brain recordings, the team discovered that, while the rat learned to select the correct path in the maze (for example, turning right at an intersection to receive a reward), the excitation/inhibition cycles of the hippocampus and the prefrontal cortex oscillated in phase with one another as the rat was at the choice point, and this increased substantially from the moment the rat first understood the rule. This synchronization is hypothesized to be a mechanism to facilitate communication between those brain areas underlying appropriate behaviour in a given context. This would facilitate a reconfiguration of the local circuitry leading to formation of synchronously active groups of neurons in the prefrontal cortex. Very importantly, these same prefrontal neurons which synchronize upon learning are also reactivated together with hippocampal neurons during sleep.

Finally, thanks to the collaboration with the INSERM U667 team, the researchers were able to elaborate the analysis at the molecular level and to show that these phenomena are linked to dopamine. Sometimes considered as the neurotransmitter of pleasure, dopamine's operating mechanism is still poorly understood. We know that the brain releases dopamine in rewarding situations, or when a future reward is anticipated. This research shows that the synchronization of rhythms in the hippocampus and prefrontal cortex and the joint activation of groups of prefrontal neurons observed during learning could be replicated by dopamine injections in the prefrontal cortex. It thus suggests that a potential mechanism of action of dopamine is the reconfiguration of neuronal circuits in the brain during rewarded learning.

The interest of this study lies in its multidisciplinarity and its links at different functional levels. Starting from the molecule, it extends to local neuronal circuits, then to the synchronization of different brain structures and finally to the global processes of learning and memory. In the future, the team will develop projects to implement these discoveries with a view to helping develop treatments for neuropsychiatric diseases. ■

Source: La lettre, *no. 33, May 2012*

The prize of the magazine *La Recherche* was created in 2004 to highlight research work at the interface of scientific and technological disciplines.

(1) Benchenane K., Peyrache A., Khamassi M., Tierney P., Gioanni Y., Battaglia F., Wiener S. (UMR 7152, Spatial Memory and Navigation Team and U667, Dynamics and Physiopathology of Neural Networks Team*), "Coherent Theta Oscillations and Reorganization of Spike Timing in the Hippocampal-Prefrontal Network upon Learning",* Neuron *no. 66:6, June 2010, p. 921-936.*

Sidney WIENER
Sidney Wiener (UMR - 7152), Director of the "Spatial Memory and Navigation" Resident Research Team at the Collège de France

What is New Today in a Mathematician's Work?

Conversation between Alain Connes and Jean-Christophe Yoccoz

JEAN-CHRISTOPHE YOCCOZ Mathematicians' work has changed and we are increasingly working collectively. Fifty years ago, people travelled less. They maintained postal correspondence, but collaborations were not as common. Most articles were single author ones. This was still the case when I started out. Today, there are far more conferences and collective work. This trend took place over the course of our generation and intensified in the last 10 to 15 years. Articles co-signed by two or three authors have become the norm. Speaking for myself, I have different collaborators in France, Brazil, and Italy. We see one another quite regularly, which involves travelling.

ALAIN CONNES As in other domains, this trend has perverse effects: there is now a plethora of information that needs to be filtered. First, there is less time to devote to each article and second, considerable redundancy develops, as for example in the field of theoretical physics. This is not as true of mathematics; but still, communication takes place on a more superficial level. On the other hand, Internet and search engines have profoundly altered the picture. Previously, a lot of importance was placed on a certain form of mathematical erudition. Now, Google instantaneously provides all the references one might need on virtually any subject. This wonderful tool is of immense relief to our memory. It is a sort of collective memory – metaphorically speaking of course, for it is no one's memory, but everyone can access it and draw from it what is needed. This is a great step forward.

J.-C.Y. We should specify that although the number of actors in our discipline has increased, it is still very small in comparison to other fields like biology. What's more, mathematics as a discipline has at the same time witnessed tremendous expansion. As a result, there are few mathematicians in the world working on the same problem. The situation is very different when it comes to finding, for example, a vaccine against Aids: given the urgency of the issue, one can understand that a large number of teams are mobilized to try and solve such a problem.

In mathematics, except for a few particularly exciting problems, the rule is rather the absence of competition. It is therefore an unusual domain, particularly in view of its demographics and the virtual absence of economic pressure. ▶

▶ Joint work corresponds to quite a general trend in science. The production of knowledge has become a collective endeavour in many domains. In medicine, in physics, great experiments, like those of the LHC at CERN, require the collaboration of hundreds, if not thousands of researchers, engineers, technicians, etc. from different disciplines. They can no longer be handled entirely by one individual.

J.-C.Y. In mathematics, collaborations are on a smaller scale. But the classification of simple groups, for example, mobilized about 200 authors and represents about 10,000 pages, spread across a large number of articles of 50 to 100 pages each. On the scale of our discipline, this work is of enormous proportions, and no one person is entirely responsible for the full proof, as it is simply too long. Still, in mathematics the authors of an article know and understand everything it contains, which is not the case in articles presenting wide-scale interdisciplinary research findings. A mathematician never uses a theorem whose demonstration he or she has not understood.

The question of mathematical proof has long been of interest to philosophers. Wittgenstein, for example, says that there must be a unified perception of proof. Is this possible for such long proofs?

A.C. There can be seemingly very long proofs that are still manageable. A mathematician, if he or she knows the subject well, will identify strategic points. A proof is not homogeneous; there are fundamental articulations where things happen. Mathematicians must be able to identify those crucial points and then to introduce hierarchy levels in the proof, so as to extract the essence, in such a way that it may then exist as an entity of its own. One of the crucial aspects of mathematical work is introducing levels of conceptualization. Furthermore, certain complications are disappearing with time. When one examines, for example, Descartes' writings and the way in which he used "Cartesian" coordinates, one gets a sense of great complication, especially because negative numbers were not commonly used. Once real numbers, followed by complex numbers, started to be manipulated, once the hierarchy of structures was understood, and the right notations were adopted, all this complication which was, so to speak spurious, disappeared to give way to great simplicity.

There is therefore a significant striving for simplification, a constant effort that will surely be made for instance for the classification of simple groups. As long as this process is still ongoing, we will not really have finished understanding, we will not really have isolated all important concepts, and things will continue to seem complicated.

There is therefore collective historical prioritization and simplification, on the one hand, and the work of mathematicians who have knowledge about a domain and a sort of virtuosity of proof and understanding, on the other.

J.-C.Y. Or a technique, which requires constant practice to maintain its fluidity. While this technical dimension of the activity is necessary, it is not enough.

A.C. Mathematics requires daily practice. If it is interrupted for too long, the know-how wanes. One loses the reflexes. Fortunately, that is temporary. One can compare that with the experience of musicians: Arthur Rubinstein said, "when I stop playing for a day, I hear it, when I stop for two days, the audience hears it".

Moreover, there is another equally important part of mathematical activity, which is stable: it consists in manipulating mental pictures. Should a layperson try to read an article, they would only see a collection of formulas with no meaning. But a mathematician who has sufficiently worked in a specific domain – inevitably limited – has constructed mental pictures that come to mind as soon as questions relating to that field of activity are addressed: the meaning immediately becomes visible, it jumps to mind.

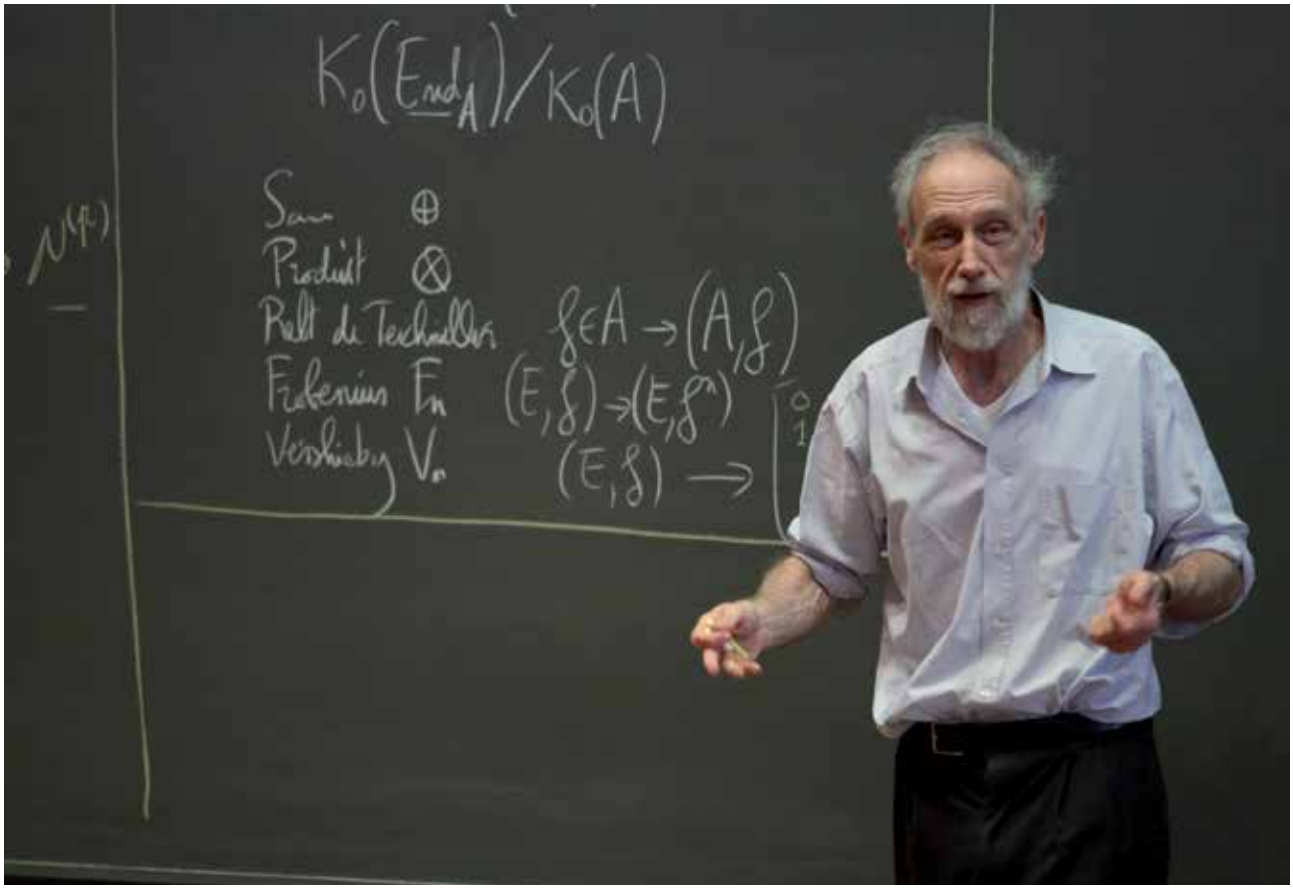
J.-C.Y. Even in a familiar domain, with certain difficult articles, due to their length or technicality, one can sometimes struggle to understand until a mental image suddenly forms and allows one to move past the abstract literal rendering involved in deciphering formulas.

What does this mental image correspond to? Is it the representation of something or on the contrary a pure construction? For many people, mathematics is like a foreign language, but everyone shares a basic knowledge made up of numbers and elementary geometric objects, which seems to be a sort of product of evolution, an innate mathematical baggage of our species. Do your mental images relate to objects of the same nature, only more complex?

J.-C.Y. Whole numbers are concrete images of this kind, which everyone shares. I will draw an analogy with physics. Certain postulates of classical physics allow for the association of images with theory, like in ballistics, where objects' trajectory can be seen. The relation to observation remains quite simple, and the properties grasped are basic, as are the properties of whole numbers or geometry. But there are domains of physics where observation is far less immediate, like electromagnetism or quantum mechanics.

As for the nature of mathematical objects, the Platonic position is prevalent among mathematicians. Even those who challenge it, in practice behave as though they were Platonist: they discover and manipulate mathematical objects as though they were real.

A.C. To begin with, and until the nineteenth century, a large part of mathematics was very close to physics. But then things evolved within mathematics itself. Without seeking to maintain a direct relationship with physics and the outside world, mathematicians discovered an extraordinary universe. Take the example of what is called the p-adic world, in number theory: it is a world that exists in as many versions as there are prime numbers. The real world corresponds to only one of these versions. There are therefore as many of these worlds as there are prime numbers, and these worlds are as beautifully, as brightly coherent as the "real" world of physics. The domain of mathematics is absolutely not limited to geometry or



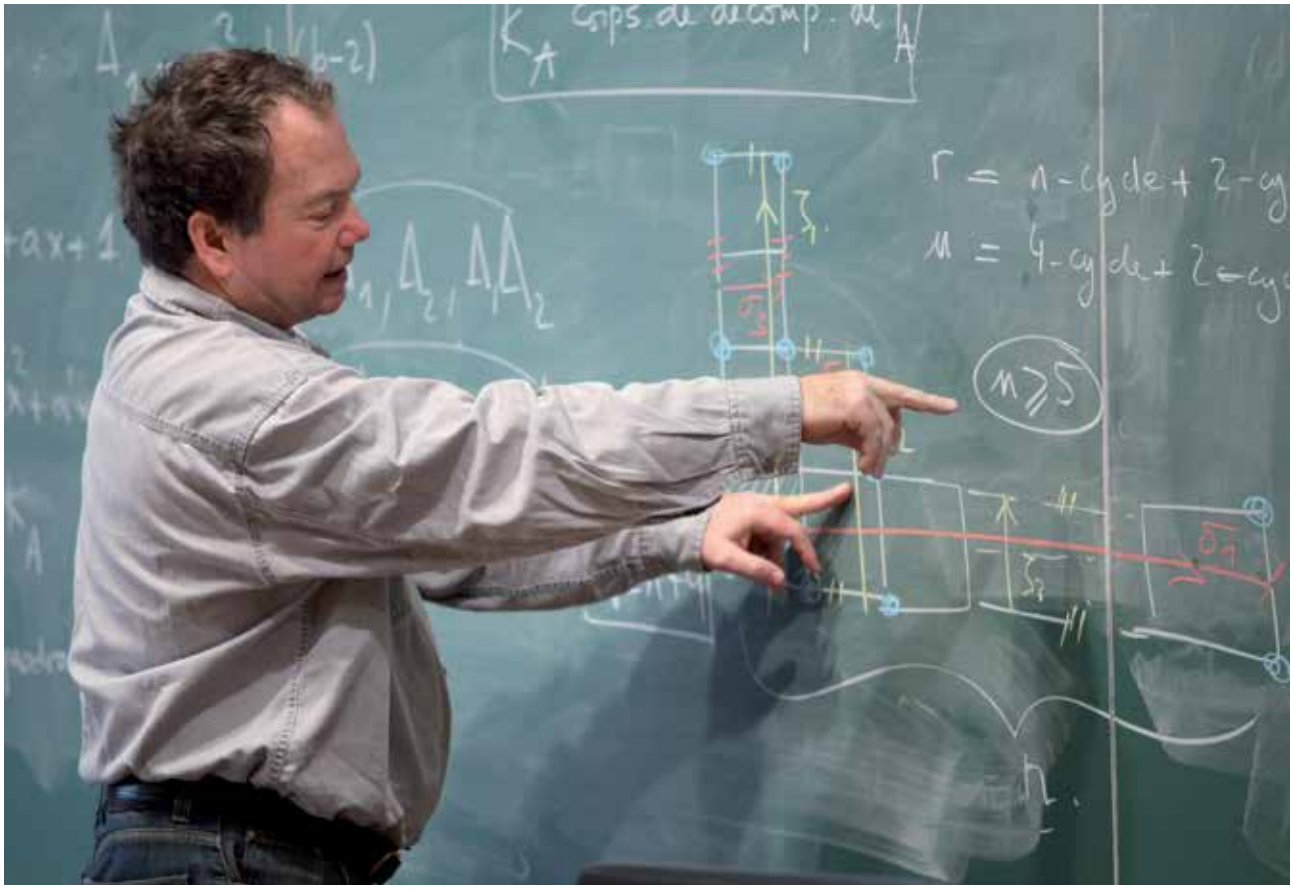
numbers: it is an extraordinary source of creation of concepts. In reality they encompass everything, so I believe that most of the qualities found in the real world, if truly understood, have a mathematical formulation.

One could think that mathematics was created by humans through an adaptive process, as an adaptation of humans to reality, which would explain the astonishing fact that intrinsically mathematical relations, produced from purely mathematical objects, are able to account for physical phenomena as though they were the rules governing them. Yet in fact mathematicians opened doors, discovered horizons that do not simply relate to the real world, but open to other worlds which, while incredibly coherent, have no relation to the "real" world, in the classical physics sense of the term. Or rather worlds that have no materialization in the real world...

J.-C.Y. Yes, because computer science, for example, gives them new applications, and I'm not just thinking about applications like cryptography. Computer science relies on the same validation and control principles as mathematics. I would readily compare their relations with those that exist between chemistry and physics: chemistry is more oriented towards industry and applications; computer science is likewise governed by applications. But they function by the same principle, respectively, as physics and mathematics. And just as chemists create products that do not necessarily exist in nature, so computer scientists create things that have a mathematical structure and that do not exist in the world.

A.C. I must admit that I have undue faith in the explanatory power of mathematics for our understanding of the world, and have a profound aversion to the all too widespread tendency to want to found our understanding of reality on the classical model which is valid up to a certain scale, but has no validity for microscopic objects, which are governed by quantum rules. Quantum physics has an explanatory power that is far from being fully integrated into the culture of the society in which we live. Think about electrons or quantum physics equations concerning electrons: this is a wonder. Starting from something extremely simple – Pauli's exclusion principle, which posits that electrons cannot coexist in the same quantum state – the periodic table of elements is reconstituted. That is breath-taking! Such an explanation does not fit in with the evolutionary framework. Without being mystical in any way, I think that nature is far more subtle and complex than we think, but that it has extremely simple ingredients and that these ingredients are of a mathematical nature.

Our sensory perception affords us only a very partial image of reality. Colour, for instance, captures only three of the infinity ▶



of parameters governing the distribution of the intensity of light frequencies. Mathematics has made it possible to simplify, to model parts of outer reality, to the extent that one can end up doubting the idea that mathematics was created to explain the outer world, starting from the material world that surrounds us. I have come to imagine a radically opposite point of view, according to which the mathematical world is in fact the one that pre-exists and it is from this world that a certain image emerges, that which we perceive in the physical world. But we are very far from understanding the fundamental explanation, which is, I think, far simpler and more mathematical than we believe it to be.

While these are crucial aspects of scientific culture, very few people know and understand them. The first step is quantum physics: our world is filled with quantum objects – laser, microchips, etc. – but we have not integrated the quantum dimension into our culture. We live in a quantum world and we continue to think as though we lived in a classical world.

J.-C.Y. Regarding the question of building, I would add another analogy with physics: in the same way that physicists create instruments, like the telescope, to explore the physical world, so mathematicians create instruments to analyse mathematical realities. There is an element of discovery and an element of invention. Mathematical techniques are human creations, just as physics instruments are.

Mathematics has moreover allowed for logical and mathematical operations to be physically materialized in the form of the computer. What role does this instrument play in the mathematics of today? Are computers capable of demonstration in the same way as mathematicians are?

J.-C.Y. No. First of all, we should specify that the question does not boil down to the sole problem of proofs. The computer is an unparalleled tool for exploration. To demonstrate something, one must have reasonable certainty that it is true. With a computer, counter-examples can, for instance, be discovered, propositions tested, etc. It allows for the observation of interesting phenomena, if only through the mass reiteration of complex calculations, which would be impossible without it.

A.C. The computer dramatically enhances the computational power. In Witt's work on rings, for example, we find very complicated polynomials: whereas these would be extremely long to calculate and manipulate by hand, the result is very easily obtained using a small computer program, thanks to which one can quickly become familiar with these objects that initially seem rather exotic. Yet this exploratory use of computers

should not hide another very important aspect, regarding formal proofs. The computer can do much more than check specific cases: it is capable of doing general proofs. It does so very effectively, not as a proof, in the sense of logical deduction, but through formal computation.

In practice, I very often use it in the following way. In a given context, I wish to know whether a formula is true: alone, I can verify it on a very small number of cases only and I'm still at the mercy of a computing error. The machine, however, is capable of demonstrating it (through formal computation) for values such that any mistake can be ruled out, so convincing is the verification. After experimenting in this way, then, I'm sure that it is true. Of course, the direct proof remains to be found, but that is not the most difficult part. It is not a test of specific cases; it is a formal computation which shows me that my formula is true. This power of formal calculation offers exceptional resources.

Over the course of the history of science, the question of the reliability of instruments has been raised. Can we rely on what we see of celestial bodies with the astronomical telescope? Is what we see in the microscope a reliable image of reality or an artefact? Can this question be transposed to the computer? Do we know what the computer does? What are its limits?

J.-C.Y. There is a difference between numeric simulation, where the margins of error are not entirely controlled, and computer-assisted demonstration, where errors are in principle controlled. In the first case, the role of the computer is to suggest answers and directions for research, their validation still being the mathematician's responsibility. In the second case, the mathematician entrusts the computer with this validation process. But there can be errors in the writing of the programme...

Often, proofs by computers are founded on the exploration of a huge number of cases, as in the case of the four colour theorem (which posits that any map divided into connected regions can be coloured in such a way that two adjacent regions will always receive two distinct colours). Therefore, even if we can be sure that it is true, that is not satisfactory proof for a mathematician.

A.C. There are limits to the use of computers to formally produce statements – including proofs. One cannot overlook the question of meaning, which in my opinion is certainly just as important as that of the nature of mathematical objects. The crucial question is understanding why certain statements have meaning, while others, even if they are true and proven almost mechanically by the computer, are totally uninteresting and devoid of meaning.

There are two human activities which for the moment entirely defy computers and which form a truly fundamental part of mathematics: firstly, the human mind is capable, often in highly complex situations, after having carried out a lot of experiments, calculations, etc., of forming a concept. This is a crucial point.

The second activity, which is out of the reach of computers, is analogical reasoning. When confronted with a given difficulty, mathematicians are able to recognize that the situation is not very different from another they encountered in a different, sometimes far removed context, and to use this analogy to resolve the new problem. This also relates to meaning. It is difficult to objectify: one knows that there is something analogous, but this stems from an intuition and not an explicit, well-formulated perception. A lot of time would be needed to crystallize it, just as it is difficult, in the phase of creation of a concept, to give a set definition. A whole system of maturation and distillation performed by the human mind is at play. This is an extraordinary power, from which the computer, it seems to me, is very far removed.

The computer therefore introduces a new way of working, but not a qualitative break. As a result, the history of mathematics has a cumulative aspect and builds a coherent whole, while other sciences are subject to upheavals, to paradigm overthrows that can lead to part or the whole of the construction being left to decay, having become practically unusable.

J.-C.Y. The history of mathematics presents a singularity. In physics or biology, centuries were needed before arriving at fundamental concepts like the electron or DNA. The objects that are now considered as fundamental only emerged at a late stage. In mathematics, it is the other way around. At the start, there are whole numbers or basic geometric figures. These are the fundamental mathematical concepts from which increasingly sophisticated concepts are built, like a knowledge pyramid resting on its tip. The concepts that form the basis of the edifice are also the first from a historical point of view. That is why it is so crucial that there be no mistakes: demonstration establishes things, it constitutes a validation and affords a solid grounding upon which to build. Things are different in physics, for example, where theory always has its limits – as seen for instance in the case of classical mechanics – and where one can go back on these theories.

A.C. As a result, in theoretical physics, the "cultural" rules are not the same at all. In a theoretical physics paper, rigorous justification does not weigh in as significantly as in mathematics. In both cases, one must be convincing, but the modalities differ. Unlike physicists, mathematicians cannot do without rigorous proof. This is a general feature of mathematics. ■

Interview by Marc KIRSCH

Source: La lettre, *no. 33, May 2012*

Prof. Alain CONNES (left)
Analysis and Geometry

Prof. Jean-Christophe YOCCOZ (right)
Differential Equations
and Dynamical Systems

Interview with Roland Recht

Your teaching has unfolded over a succession of Chairs of History of Art at the Collège de France, and has at the same time offered a new way of asking the question of the history of art, its nature and function. The question of style is at the heart of a journey that has led you to address a wide variety of themes. What does style represent for you?

The question of style has constituted a common theme since my early work. But the notion itself has not kept the same definition for me. I was the student and then the assistant of Louis Grodecki, himself a disciple of Heni Focillon, who was a great formalist. For them, style related to a set of general features with which to situate works in space and time. Later, I came to see style as an interpretative model founded on a binary relationship between the artist and their patron. In this case, style is a given answer to a given programme in very specific historical conditions. Nowadays, I would rather tend to revert to the detailed analysis of style so as to deconstruct the work in order to identify its signifying formal units, up, however, to the threshold beyond which no unit has any meaning anymore. There is, then, a departure from the global point of view of my initial understanding of style, to get closer to the work in a way, and with what I would call an "archæological" perspective. Medieval art offers an ideal field of study for this type of approach, as the vast majority of the works are anonymous.

Until the 1970s the purpose of examining style was to attribute each work to a "hand", to which an alias was given. Nowadays, particularly under the influence of the archaeology of buildings, the aim is to extend as far as possible our knowledge of techniques, artistic traditions handed down, tools, work organization within a workshop or a construction site, etc. Ultimately though, the technical aspect of style was introduced in the nineteenth century by Gottfried Semper, and an anthropologist such as Franz Boas had already brought the handling of tools to the forefront of the scene…

You distinguish between two aspects: a taxonomic element used mainly to attribute a piece of work to a style, and another aspect that could be associated with Michel Foucault's idea of archaeology, which concerns the establishment of the conditions of possibility of certain ways of representing and doing things.

Manipulating such notions presents a danger of several temptations: to see large cyclical movements, apex and decadence phases, to build hierarchies, to make a style the expression of a given culture, etc. As soon as art historians target a system, they drop the singularity of each piece of work into the background. Yet what is of prime interest to them is this very singularity, how it was made possible at a given time and what it teaches us today about its own time as well as ours...

You talk about a single piece of work, not the complete work of an artist.

Yes, I talk about a unique object, which cannot be replaced by another, even by the same artist's hand. At least that is how we must characterize works of art, insofar as we do not take the phenomenon of seriality into account. Yet to recognize that each work is singular means that there is something in each one that cannot be reduced to style. Ultimately, while the artist handles a set of forms and more or less intentional symbols in each work of art, in that very moment of handling them he or she is in a given psychological state that will never be experienced again. However, and I here return to your reference to Foucault, the possibilities for representing things raise the problem both of the form and the meaning of this form, for they can only be grasped by an audience within the framework of a horizon of expectation, otherwise it would not understand them. This means that the artist appropriates a symbolic register and shares it with the people of his or her time (and sometimes beyond) while also enriching it, that is, in turn by transforming it.

But a link with taxonomy remains: we continue to act as though there were a sort of ideal or prototype, subject to variations, and with which we attempt to constitute classes.

And the real question to ask ourselves is what purpose this kind of operation can really serve. Does this construction serve only for attributions, spatial-chronological distributions, or does it have other functions? I think it serves precisely for a hermeneutics of art. Using objects, we are able to return to the modalities according to which their form was produced. The aim, in Wilhelm Dilthey's words, is to "understand better than the author understood himself". But the idea of style supposes a coherent configuration and that is a dangerous assumption. Throughout the Middle Ages and until the classical period, artists were far more versatile than we think. Moreover we know of artists who, during the Renaissance, also produced décor for festivities and princely stage designs. Even at the beginning of the nineteenth century, painters still did restoration as well as producing their own work. The birth of modern art in the mid-nineteenth century – illustrated by Courbet's workshop – is what gradually brought an end to this type of activity, which amounted to tremendous versatility.

In today's art, style as a collective phenomenon has disappeared. If we are following an aesthetics of indeterminacy, as you put it, is style still an operative concept to analyse the art currently being produced?

I don't think so. The refusal of style, in other words the struggle against any form of identification with a single model, was a characteristic trait of some of the most significant artists of the twentieth century: I am thinking first and foremost of Picasso, but also of Marcel Duchamp, and closer to us, Gerhard Richter and Giuseppe Penone. Picasso alone is the *whole* history of painting; Duchamp went so far as to remove the hand, autograph writing, except in the signature – his *ready-mades* –; Richter reworked large parts of the history of twentieth century painting – abstraction, hyper-realism; Giuseppe Penone never drew on writing but on observation, and the coherence of his work stems from his gaze focused on humans and nature. In contrast with these attitudes, the art market requires sufficient unity from each artistic production to match the expectations of the public and therefore of collectors: it must be immediately identifiable.

Paradoxically, the desire to free oneself from constraints and claim total freedom of creation results in the dictatorship of self-reproduction: the artist is forced only to offer productions that are certain to be identifiable. How then can one envisage new forms such as, for example, installations?

Installations raise very interesting problems. An installation is first the appropriation of a space, or rather a *locus* whose outlines are generally rather fuzzy. The artist's installation is subject to variations, depending on the *locus* chosen. It therefore takes over a more or less significant part of the museum or gallery space and, in its definition, seeks to be both the content and the container, which was indeed the aim of the avant-gardes who spawned it: the artist not only creates an object but also the place of its exhibition. Finally, far more than any other works of art, installations are dependent on photographic pictures which memorize the general arrangement. ▶

This is a problem of our time: we are capable of taking any form seriously, but we are not very sure of what fits within the "art" category and what does not. What constitutes this category, which encompasses an infinite variety of things into a single concept?

As soon as *mimesis* and the associated concept of ideal beauty were dismissed, they gave way to novelty – Baudelaire gave it a name, as early as the mid-nineteenth century: modernity! What began from Duchamp's time – to simplify – was the novelty of an idea, a movement, an attitude, a form, however shocking or even trivial. Yet nothing is more fleeting than the new... Of course, what I am saying here does not hold true for all artistic production over the last few decades: abstraction continues to exist, so does realism, and both produce very interesting works, which can perfectly fit the definition of art as a quest for beauty. But this no longer serves as a universal reference and the public must therefore "learn" to look at the world of forms for purposes other than aesthetic satisfaction, which is often simply the comfortable satisfaction of finding what one is already familiar with.

What is known is thus what history of art has revealed. You have written on the history of this discipline. Could you remind us of the context within which it emerged?

Wilhelm von Humboldt carried out two great reforms: designing the museum and defining the university. From then on both were to be places where the *bourgeoisie* developed its culture and sensitivity. The taste for travelling, followed by the development of photographic processes, strongly contributed to providing this social class with an overview of what we would call the world heritage.

In Germany, history of art is moreover not just a branch of history, but also a matter of philosophy and aesthetics. During the nineteenth century, the first major German art historians, Franz Kugler for instance, a Hegelian like many of his contemporaries, sought to identify within a work of art the spirit of a moment, the spirit of a people. This is the context in which the first textbooks were produced, claiming to embrace the very long term and the entire world. This time, there were no more breaks: no more Middle Ages that were not spoken about, and the historical perspective continued right up to the present – 1840 for Kugler. His aim was a universal history of art. In his architecture textbook he spoke about the architecture of China and of India – neither of which he had seen –, placing them on the same level and demonstrating a growing awareness of the relativity of the European world – even though Europeans still remained at the centre, this time because it was their gaze discovering all this and conceiving of it as a whole. As for history of art, it did emerge in the midst of historicism, in so far as it was thought, like Ranke did, that the past could be described "as it had been". Art could then be considered as a crucial witness in this venture to reconstitute the past.

In Germany this historical and speculative position with regard to art was complemented with the idea of a hermeneutics of art. Dilthey, for example, heavily emphasized the way in which a work of art answers questions we have about ourselves. What we call "history of art" is a discipline in which a philosophical dimension actually comes into play, which is not the case at all when discussing history of art as a historical discipline.

History of art is the fruit of a cultural evolution. You talk about the influence of universal exhibitions, the decorative arts trend and the way in which the arts entered what can be called the *bourgeois* way of life as a highly valued element, etc. What role do you think sociological elements played both in the production of history of art and in the evolution of the arts and their place in society?

We should distinguish between different sociologies. Art historians sometimes realize that a given sociologist offers them not necessarily answers to the questions they ask themselves, but perhaps parallel questions. At one point it seemed to me that Norbert Elias could open up perspectives on the whole question of codification. In my 2004-2005 lectures on the court arts around 1400, I addressed this question of the codification of forms of upholding, of ties to customs, and of the distinction between a social codification and a codification introduced in the representation of the social. To talk about it, we use images; that is how Norbert Elias himself proceeded. Since then, with Pierre Bourdieu and his students, we have turned towards the sociological study of the art market, which has provided operative models for the economic study of the art market in the fifteenth or seventeenth century Netherlands, for example. Not to mention Bourdieu's work on the museum and photographic practices.

You say that photography has changed art, as well as the representation of what art was, in the sense that the way in which we made the history of art changed from the moment that reproductions of works were available, for instance.

It is obvious that photography introduced changes in artistic practices – look at how important it is in Picasso's or Rodin's

creative process. But it also changed the history of art as a discipline. Photography particularly allowed for a comparative study of styles. It afforded the constitution of vast photographic libraries encouraging the study of iconography – see, for example, the photographic documentation gathered by the Warburg Institute (University of London).

You say that photography multiplies the capacity to compare, and that it makes the discipline evolve. New technical systems give access to other ways of proceeding and thinking. This attention to the techniques and concrete practices of a discipline – and to its sociological aspects – can also be found, for instance, in the philosophy of science. Is this a recent orientation?

About thirty years ago, art historians, primarily in Germany and the United States, began to take an interest in the importance of the photographic medium for the history of art: the first photographs of monuments, the famous heliographic campaign, the creation of the major publishing houses like Braun or Alinari – in short, everything which gradually allowed for an increasingly faithful reproduction of works of art in the nineteenth century. A photographic history of art gradually developed. The glass plate, slides, today's presentation technology, tell different histories of art. The apparatus therefore influences the way in which a professor organizes his or her lecture: a projected image, mobilizing a whole room's attention like at the cinema, or an engraved reproduction distributed in the room when there were no projectors yet, as in Jacob Burckhardt's time. This then raises the question: how does the art historian who needs the image build his or her discourse based on the different media he or she uses? This question remains largely unexplored, mainly because these procedures are rarely documented.

What responsibility do art historians have in society? Why is it important to know how to look at art works?

We are swamped with images: this is a trivial observation. At the same time, the whole educational curriculum goes against learning greater visual acuity. Looking at things differently, seeing what surrounds us, understanding what an image is, the difference between an image and a picture: these skills have largely been left idle. Yet the flow of images is so invasive, especially given the omnipresence of audiovisual media, that we don't know how to see anymore. To see is to mark a pause in the flow. A time for contemplation and reflection which always move forward together. A painting or an architectural monument form complex configurations that no gaze, however informed, can scan in one go without losing of its substance.

How can we give art a place in education? How can we teach children to look, when most of the time we try to teach them to do?

Contrary to the widespread opinion, held by our successive Ministers of Education in particular, I do not think that giving art a place in the school curriculum is exclusively and primarily a matter of creativity. There is an essential need to provide everyone with the conceptual tools needed to form their critical sensitivity. And this necessarily involves reflection, language engaging in a game of reciprocal stimulation with the gaze.

As well as being an art historian, you have been head of museums, and a curator. You have written about the art of the Middle Ages and of the eighteenth and nineteenth century, but also about art in the last forty years... What ties all these activities together?

They revolve first around the study, conservation and promotion of art works, and second, around art in the making. I think I had a unique opportunity to be able to engage in all these activities, which enabled me to approach the work of art and our methods from different angles every time. I think I learnt the most at the head of the eight museums in Strasburg, at once about the theoretical challenges of what the art historian does, about the promotion of heritage, and about the question of exhibiting. I carried out my work in direct contact with living artists and works of the past, which was extraordinarily enriching for someone who had only ever written and taught. I must say that I cannot imagine an art historian with no interest in contemporary art, or else out of dogmatism. Having said that, the best way to entirely close oneself off from the art of one's time is still to immerse oneself fully in that of the more or less distant past. And it seems to me that blindness is a particularly widespread disability within our discipline. Learning to see works of the thirteenth century can make one completely blind to the works of the eleventh or even the fourteenth century. Art historians may not be best equipped to understand a domain which they do not know well. The gardens which our colleagues tend to are often very small gardens, mere flowerbeds, and they readily erect high walls between their own and those of their neighbours. I think positivism has always been and still is a highly widespread evil, its oft-extreme form being a certain attributionism: a certainty founded on nothing but itself. ■

Interview by Marc KIRSCH

Source: La lettre, *no. 35, December 2012*

Prof. Roland RECHT
Emeritus Professor
of History of European
Medieval and Modern Art
from 2001 to 2012

ANATOLE ABRAGAM
BY SERGE HAROCHE

Anatole Abragam was born in Moscow on 15 December 1914. He passed away on 8 June 2011 at age 96. A graduate from the École supérieure d'électricité, he was Head of Physics at the Atomic Energy Commission from 1962 to 1970. Appointed Professor at the Collège de France in 1960, he held the Chair of Nuclear Magnetism until 1985.

Note on the Life and Work of Anatole Abragam

Anatole Abragam was born in 1914 in a middle-class Jewish family in Moscow, where he spent his early childhood and witnessed the initial years of Soviet Russia.

He immigrated to France at age ten, with his mother and sister. His father, who had stayed in Moscow, was only able to join them in Paris eleven years later. From his childhood in Russia, he kept a perfect command of the language, as well as the essence of the Slavic soul, conveyed in his literature and poetry, which were part of him throughout his life.

As soon as Anatole Abragam arrived in France, he rapidly adapted to his new world, learning to speak French fluently and without an accent within a few months. He performed brilliantly in secondary school at the Lycée Janson de Sailly, where he shone in mathematics and Latin. After completing his *baccalauréat*, he first turned to medicine, the profession of his mother, who was one of the first female doctors in Russia, but soon realized he was not made for a medical career and decided after a year to study physics. Too much of an independent mind to comply with the discipline of the *classes préparatoires*, he chose the university path.

In the 1930s, despite a few distinguished professors, physics teaching in France was a very poor reflection of this discipline's effervescence and revival, witnessed primarily in English-speaking countries and Northern Europe, where most scholars chased from Germany by the rise of Nazism had taken refuge. Quantum mechanics was still taught little or poorly in Paris and the young Anatole, with a sharp and critical mind, was well aware of the limits of the education that was being offered to him. He was unable to find a thesis supervisor at the Sorbonne capable of leading him beyond his Bachelor's, which he obtained with flying colours in 1936.

He was starting to doubt his calling when the war interrupted his studies. He experienced the 'phoney war' and the German attack during his military service, without his unit being summoned to fight, and then hid out in the South, earning a living by giving Latin, maths and physics classes in private schools. He eventually took refuge in the Grenoble hinterland, joining the Free French Forces in the last year of the war.

Aged 30, at the Liberation, he had neither a profession nor training in physics that lived up to his ambition, but new possibilities were opening up to him with the effervescence of France's reconstruction. Unwilling to return to the Sorbonne and to his bad memories, he joined the École supérieure d'électricité (Supélec). There he learned the basics of radioelectricity and radiofrequency technology, which had made immense progress during the war, and knowledge of which was to serve Abragam later on. In 1947 his engineering degree allowed him to join the newly created Atomic Energy Commission. With three brilliant young graduates from the École polytechnique, he formed what they humorously called the "three musketeers" of the AEC, enthusiastically making up for lost time by studying the core texts of quantum physics in depth, using their complementary skills to translate them for one another from English, Russian and German.

Most importantly, he obtained two assignments with leave of absence from the AEC, allowing him to travel abroad to complete his training as a researcher: first in Oxford, from 1948 to 1950, where he learned about electron paramagnetic resonance and based his thesis on original theoretical work on the subject; and then in Harvard, from 1952 to 1953, where he discovered nuclear magnetic resonance (NMR) under Edward Purcell, one of the pioneers of this discipline born in 1946.

Back at the AEC, he was first asked to contribute to the nuclear and particle physics programmes that constituted the core mission of this organizsation, and worked in particular on designing a new accelerator. But he soon returned to the subject which had fascinated him since his time in America, the lighter physics of nuclear magnetism. In 1955 he created his own magnetism laboratory within the AEC, which, under various forms, was to be the world's Mecca of NMR for the next 30 years. Thus, between ages 30 and 40, Anatole Abragam made up for lost time, becoming an internationally renowned researcher, recognized for his original contributions to the exploration of the properties of nuclear magnetic moments.

His reputation was firmly established with the *Principes du magnétisme nucléaire* (Principles of Nuclear Magnetism), which he published in 1961, and which still constitutes a core reference fifty years later. Anatole Abragam's great educational qualities shine through in this book, written in elegant English, for after his time at Oxford and Harvard, he spoke the language as well as he did Russian and French. In it he explains scientific calculations through images and analogies which lighten the text and make it easier for readers to understand. Anatole Abragam also wanted to express these educational qualities through direct teaching. From the mid-1950s, with other researchers from the AEC, including the three musketeers mentioned earlier, he invented high-level education designed as an introduction to modern physics, which was cruelly lacking in the regular curriculum of French higher education. The "informal" courses he and his colleagues gave for a few years to young researchers, including Claude Cohen-Tannoudji and Pierre Gilles de Gennes, and even to experienced scientists like Alfred Kastler and Jean Brossel, were the true precursors of the Graduate School education that was to develop in universities much later, in the mid-1960s.

But this was not enough to quench Abragam's thirst to teach, and he dreamt of a professorship. University was not an option, as a thesis completed abroad, albeit in Oxford, would not afford him access to it. Alfred Kastler was the one who thought that the Collège de France was the solution to the problem and advised Anatole Abragam to apply! What institution could be better suited to his qualities than the Collège, which gives its professors total freedom in their teaching choices, allows them to express the full range of their theoretical and educational capacities, and above all as a legacy of François I's distrust of the Sorbonne, does not require its professors to hold a degree from a French university. The matter was settled in 1960 when he was nominated for a chair at the Collège de France by Francis Perrin, not without all sorts of incidents that do not need to be discussed here.

At the age of 45, Anatole Abragam, the late bloomer as he defined himself, became the young Chair holder of Nuclear Magnetism, which he remained for a quarter of a century. Every year he delivered highly valued education on diverse themes, stemming from his research at the AEC or the work of his colleagues, in France and throughout the world. During all those years, Anatole Abragam divided his time between teaching at the Collège de France and leading his research team at the AEC. For eight years, from 1962 to 1970, he was also Head of Physics at the AEC. This was an important administrative responsibility which allowed him to keep up to date on the evolution of many external research fields within and through which he contributed meaningfully to the evolution of the AEC. Along with the CNRS, the AEC became one of the most active multidisciplinary French research institutions. The reputation he acquired through the Collège de France, his research and his responsibilities at the AEC, came with numerous honours and distinctions, including entry to the Académie des sciences in 1973, nomination in several foreign academies and multiple international prizes, with only one exception, to which I will come back later. One distinction that was particularly significant for him was his nomination to the Pontifical Academy. A man of convictions, he nevertheless resigned a few years later to protest against John Paul II's position on birth control.

Drawing an outline of the major stages of Anatole Abragam's career gives only a vague idea of his style and his important scientific contributions. He was an intuitive and prolific physicist, with a deep sense of aesthetics in science, always searching ▶

ANATOLE ABRAGAM
BY SERGE HAROCHE

for the elegant idea and the simplest explanation, imagining new physical situations with a wealth of possible applications. A theorist before all else, he was very close to the experimenters in his group, whose progress he followed attentively and with a critical mind. He kept himself informed on every detail, in which, he said, the devil was always hiding. It is difficult here for me to be more specific. I will simply say that he made crucial advances in our understanding of the phenomena involved in the magnetism of atomic cores in condensed matter, whether solid or liquid. These nuclei generally carry small magnetic moments (spins) associated with their kinetic moment. These magnets tend to orientate themselves within an external magnetic field or a field created by neighbouring magnetic moments. This orientation, thwarted by thermal agitation, can be modified by applying radiofrequency fields with the appropriate frequency, the very fields that the young Anatole learnt to produce and control in his years of engineering training at Supélec.

By subjecting magnetic moments to such fields, Abragam and his colleagues (among them his collaborator for thirty years, Maurice Goldman) studied various effects related to the coupling of electron and nuclear spins with each other. They drew precise information on the structure of matter (the way in which these magnets are distributed) and on the dynamic mechanisms that disorientate the magnets, what we call their relaxation. They also invented ingenious methods for the dynamic polarization of these nuclear spins in an external field, transitorily obtaining much higher orientation rates than those observed in matter in its natural state. They were also able to produce a spontaneous orientation of nuclear spins in their internal field, what we call a state of nuclear ferromagnetism, and studied their properties.

Anatole Abragam touched on many other research themes of the physics of nuclei and magnetism that I will not mention here. He nevertheless steered clear of two significant developments in NMR: the study of molecules of biological interest using this technique, and medical imaging. These were two fields within which pure physics relied on sciences in which he did not feel competent: biology and computing. It was these themes with significant applications in society that the Nobel committee distinguished when rewarding research on NMR, beyond the recognition paid to the pioneers of this field of physics, Edward Purcell and Felix Bloch. Abragam never hid the fact that he had hoped things would be different and that his more fundamental research would be recognized by this ultimate prize. He nevertheless took the Nobel's decisions philosophically, even recognising the relevance of the choices made by the Stockholm committee which has always, by virtue of its statutes, distinguished a specific important discovery rather than crowned a whole career, no matter how brilliant. He comforted himself by humorously noting that, just like the president who had given France a young prime minister, he had given the Collège de France two young Nobel Laureates, since he was the one who, in the early 1970s, had suggested the creation of the Chairs of Pierre-Gilles de Gennes' and Claude Cohen-Tannoudji, who were to accomplish the careers we know they have had.

Apart from his personal scientific career, Anatole Abragam was one of the great craftsmen of the return of French physics to the highest level of research internationally. With a few other scientists of his generation, he contributed after the war to rebuilding the bridges between the community of French scientists and the major schools of global physics, particularly in the United Kingdom and the United States. They thus created the conditions that allowed the new generations of physicists, including my own, to work competitively, in an environment that is conducive to research. I believe it would be appropriate in this eulogy to associate the memory of Abragam with that of other departed physicists of his generation, by recalling a few personal memories. The laboratory in which I did my Doctorate and in which I in fact still work was founded in 1950 by Alfred Kastler and Jean Brossel, who dedicated their careers to the study of the magnetism of atoms in their gaseous phase, as opposed to the atoms in condensed matter that Abragam studied. However these two physics have a lot in common, which explains why, from the 1950s, Kastler, Brossel and Abragam knew one another and held one another in high esteem, both on a scientific and a human level.

I have already mentioned how useful Abragam's lectures at the AEC had been to Kastler and Brossel, and especially to their student Claude Cohen-Tannoudji, who then used the theoretical tools developed by Abragam to elaborate his theory of optical pumping. One of these tools is the master equation, which provides a comprehensive and precise description of the behaviour of atoms in an electromagnetic field with thermal agitation. When I began working on my thesis with Claude, he introduced me to the beauties of the master equation and advised me to read the bible on the topic, the famous *Principles of Nuclear Magnetism*, enthusiastically recalling the atmosphere of the classes he had taken at the AEC ten years earlier, and which seemed to have an aura of legend. Later on Claude and I constantly used this famous master equation, initially established by Felix Bloch but explicated remarkably well by Abragam, and which serves to explain so many phenomena in magnetic resonance, atomic physics and quantum optics,

and has thus been taught in the lectures of three generations of Chairs at the Collège.

Once again I was first exposed to Anatole Abragam's eloquence indirectly. In 1967, as Chairman of the French Physical Society, he had proposed to edit a collective volume to pay tribute to Alfred Kastler, who had just received the Nobel Prize for his discovery of optical pumping. Jean Brossel, who – in passing – had been unfairly left out of this prize, asked the young PhD student in his lab that I was at the time, to copy-edit the book. I immediately came across the following sentences in the preface written by Abragam, which I have condensed from his inimitable style:

> *The custom of jubilee volumes is not unanimously recognized by the scientific community: an eminent physicist, whose collaboration was incautiously solicited, thought he could call this kind of book a collection of second class articles written by first class physicists. I take exception to this assertion: at my own expense, I firmly insisted that second class physicists not be completely excluded from the collective work...*

I noted the self-mockery that I would find again later on in my direct interactions with Anatole, and at the same time, with some pride, the fact that as the author of a contribution to this book, I must belong to the same "second class" category as Abragam, which ultimately was not so bad. But it was mainly the wording he had used in French to say that he had firmly insisted, *"j'ai tenu la main à ce que..."*, which troubled me and which, knowing Anatole's origins, I somewhat naively and imprudently attributed to a possible transcription of a Slavic expression into French. I therefore returned the proofs to Brossel with that sentence underlined in red and accompanied by a question mark in the margin. I still see Brossel's smile and his eyes full of mischief, telling me with his South-Western accent (he had an accent, unlike the Russian Abragam): *"you fool, don't ever dare correct Anatole's French..."*

Four years later, Claude Cohen Tannoudji firmly insisted that Abragam sit on my thesis jury, which is how I first came into contact with him. The questions he asked me during the thesis defence were both incisive and precise, attesting to the extreme attention he put into studying the work of a young researcher, the extent of his knowledge of physics, and his sense of humour. Our relationship deepened only much later. I had the opportunity of meeting him during sessions at the Académie des sciences, at conferences, and at informal lunches or dinners with visiting foreign colleagues in Paris. I was then able, like all those who knew him, to appreciate his extensive knowledge of Russian, English and French literature. Like many Russians of his generation, he knew the poem novel Eugene Onegin off by heart, he loved Tolstoy, Chekhov and Lermontov, and never tired of Shakespeare's plays, whose lines he borrowed for the epigraphs of many chapters in his books. His knowledge of cinema was impressive, ranging from the silent cinema of his youth to Woody Allen, the Coen brothers and the Marx brothers. He had a devastating sense of humour and rarely missed an opportunity to make a joke, even at a colleague's expense. He had known all those who mattered in physics world-wide and had a story to tell about each of them. He also had an inexhaustible wealth of anecdotes illustrating all sorts of situations in the life of science, borrowed from the Jewish humour that had never left him. In Abragam's group, the almost automatic appearance of all sorts of technical difficulties that usually arise when researchers seek to concretely perform an experiment inspired by a fine theoretical idea, had been called the "Margaret effect", with reference to the story he liked to tell: a matchmaker, an essential character in Eastern European Jewish folklore, got it into her head – a very nice theoretical idea – to marry a son from a good family with the nice princess, the Queen of England's sister, whose love affairs were being written about in all the newspapers at the time. Putting her idea into practice, and coming out of a long interview with the boy's family whose reluctance she successfully overcame after long efforts, the matchmaker exclaimed, rubbing her hands together: *"phew, that's half the work done"*.

Another one of Anatole Abragam's stories came back to me recently as a sensational scientific announcement was made. A famous American physicist had published an article announcing the observation of a free quark. As this is an elementary particle whose theory only envisages its existence in bound form, hidden in atoms' nuclei, this astounding news put the physicist in the media spotlight for a while. The experiment, which was very tricky, could however not be reproduced by other researchers and the free quark, probably an artefact, soon disappeared from the newspaper headlines, as well as from physicists' conversations. This fleeting scientific bliss inspired Abragam to think of a metaphor in which the elusive quark is turned into a diamond: on a Friday evening, just before closing time, a man walks into a famous jewellery shop with a beautiful young lady who chooses a splendid ring. Our man pays for it by cheque on the spot. The salesman tells him that given the time, it is impossible for him to obtain confirmation from the bank that the check can clear. *"Never mind"*, answered the man, *"keep the ring until Monday and I will come and fetch it when you have the bank's agreement"*. He then walks out arm in arm with the fulfilled ▶

ANATOLE ABRAGAM BY SERGE HAROCHE

beautiful young woman. When he returns on the following Monday, the salesman regretfully tells him that the bank refused the check. *"I feared so"*, said our man with a smile, *"but what a great weekend I've had!"*. The announcement of neutrinos faster than light would undoubtedly have inspired Anatole to come up with a similar kind of fable.

But beneath the brilliant, even caustic character there was also a warm, down-to-earth man in private. Abragam was kind and considerate with his students, his colleagues and his friends. He had met his first wife, Suzanne, during the war and they remained happily married for close to half a century. Despite her frail health, she was her husband's companion in all the travels and public appearances that came with his professional life.

When he became a widower in 1992, Abragam made a donation to the Académie des sciences to set up the *Suzanne and Anatole Abragam* prize which, by rewarding a young researcher every year, sought to perpetuate within the scientific community the memory of a united couple, which remained without children, to his great regret. He spoke about his departed companion with emotion that clearly conveyed his love and admiration. The private man also appeared in his affectionate behaviour towards his second wife whom he married in 1996, Nina, a Russian physicist with whom he lived a long happy old age, *"waiting"*, as he said it himself, *"for the end of the story with serenity and no impatience"*. Finally I will mention the special ties Abragam had with the Collège de France. Of all the honours he received in his long career, his title as Professor at the Collège gave him the greatest pride. He cherished the opportunity our institution had given him to meet so many exceptional colleagues, namely from the humanities and social sciences (this was the time of Maurice Merleau-Ponty, Roland Barthes, Michel Foucault and Raymond Aron, all of whom he held in very high esteem. He saw our mission to teach science in the making to all as a noble one, and valued the unique character of our institution on the global academic scene. Two anecdotes on the subject, taken from his 1987 autobiography, *De la physique avant toute chose* (Time Reversal, an Autobiography), illustrate Anatole Abragam's culture and spirit, and what he thought of the Collège's original mission.

The first relates to our motto, *"Docet omnia"*. Anatole tells us that in 1980, it was with great ceremony that the Collège received the President of the Republic. As a man of culture, with his eyes probably already on the Académie française that was to welcome him a few years later, the latter ventured to complete our motto, in his speech delivered before the professors, with the additional idea that we teach everything to everyone, thus transforming it into "Docet omnibus omnia". When this speech was to be published, Anatole was more than happy to remind the literary professors, who he claims had not noticed (although this is probably too good to be true), that the presidential omnibus was incorrect and that one should say *"Docet omnes omnia"* according to the immemorial rule of the double accusative (following the classic example *"Doceo pueros grammaticam"*). Anatole adds that a highly political discussion ensued on whether to consult the presidential cabinet before making the correction, and that the *Administrateur* wisely decided instead to correct it without saying anything. The second anecdote recounts a dialogue between an American colleague and a professor at the Collège who was trying to explain to the former what our institution is. The American, who thought he had understood, exclaimed: "the Collège de France is like the Princeton Institute for Advanced Study!" This comparison, which portrays us as a copy of a foreign institution created four centuries after ours, reminded Anatole of a remark by a person who saw Hamlet and thought the author must have read a lot of Freud.

Those who knew Anatole Abragam remember his elegant silhouette, his smile, his fine, distinguished moustache, his gaze which could in turn be kindly or mischievous, and his clear and well-articulated voice that so often resonated in this room. A great scholar who has had considerable influence on physics through his scientific work, his teaching and his leadership and administrative research functions, Anatole Abragam was an honest man in the classical sense of the term, a man of great culture and convictions. His influence in the academic world and his reflections on research and university also made him a statesman of science, as the Americans would say. The Collège de France can pride itself on having counted him as one of its own. ■

Prof. Serge HAROCHE

Source: La lettre, *no. 33, May 2012*

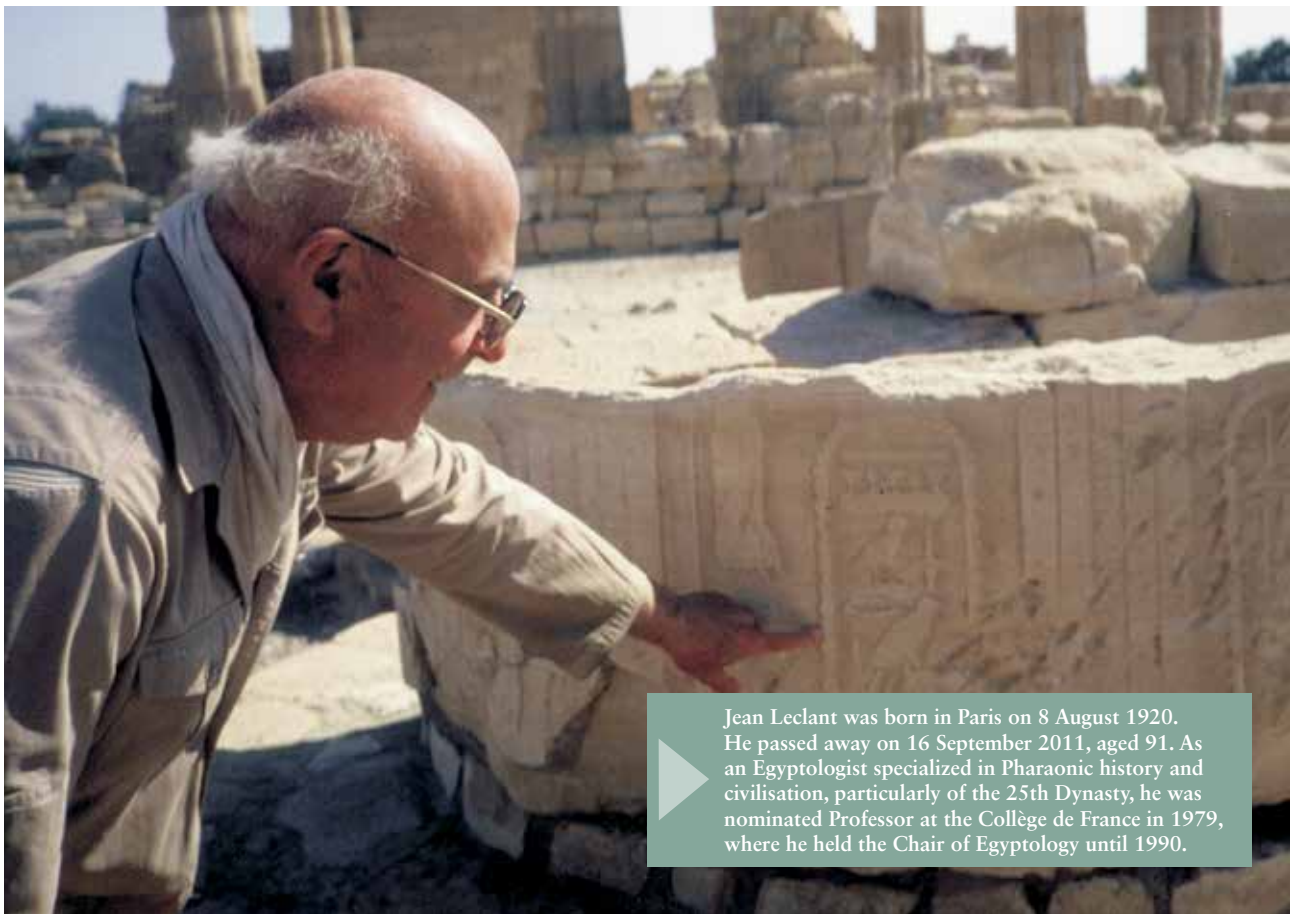
Prof. Serge HAROCHE
Quantum Physics

Note on the Life and Work of Jean Leclant

It was at primary school in the Rue Robert Estienne, in the 8th *arrondissement* of Paris, that, as he sometimes liked to point out, Jean Leclant learnt the surest foundations on which to build his life – foundations which he acquired from the age of seven: reading, writing, counting, and especially the historical, geographical and civic frameworks that the hussar of republican schooling ("les hussards noirs") were so good at inculcating into the future citizens entrusted to them, and to which he himself remained deeply attached throughout his life.

If he was with us today, he would probably comment that the rest goes without saying. Secondary studies, still in Paris, led him to obtain the first prize for Greek translation in the *concours général* in 1938 and to the *khâgne*[1] at the Lycée Henri IV. Times were hard, and following the German invasion, it was in Rennes that he had to sit the École normale supérieure (ENS) entrance examination in May 1940.

He had barely joined the ENS when he took part in the 11 November 1940 demonstrations following Paul Langevin's arrest. Himself arrested by the occupier, he subsequently had to report to his neighbourhood police station every week, like the rest of his fellow students. He remembered this lesson, painfully experienced during those miserable years: without ever denying the values of the Republic, he later learnt to find ▶



Jean Leclant was born in Paris on 8 August 1920. He passed away on 16 September 2011, aged 91. As an Egyptologist specialized in Pharaonic history and civilisation, particularly of the 25th Dynasty, he was nominated Professor at the Collège de France in 1979, where he held the Chair of Egyptology until 1990.

JEAN LECLANT
BY NICOLAS GRIMAL

paths for action that were all the more effective in that they favoured discretion.

At the École normale supérieure, Jean Leclant was able to give free reign to the immense curiosity that would always characterize him. It is true that he met masters who matched his thirst for knowledge: Jérôme Carcopino, Jean Bayet, Jean Bérard, Charles Picard, and André Piganiol, whose lectures he attended. He also attended Isidore Lévy's classes at the École pratique des hautes études (EPHE), alongside Georges Dumézil. His course mates were Pierre Levêque, René Marill – who was not yet René M. Alberès at the time –, Louis Déroche, Jean Pouilloux, Jean-Baptiste Duroselle, Jean Marcadé, Gilbert Lazard, Jacques Fontaine, Gilles Granger, and many others: the generation of our masters. Their paths were later to cross continuously, from university to the Collège de France, the École pratique des hautes études and the Institut de France.

In 1943, shortly after presenting his master thesis (*mémoire*) entitled *Ammon, son oracle à l'Oasis, son culte chez les Grecs* (Ammon, his Oracle in the Oasis, his Worship by the Greeks), Jean Leclant fled to the free zone to escape the threat of compulsory labour. There he built other equally strong friendships within the resistance circles in the Grenoble region, where he experienced times which his modest silence told us had been difficult. After the Liberation, in 1945, he returned to Paris and obtained the geography *agrégation*, which had just been created and was so well suited to his insatiable mind and curiosity.

In the meantime, he had two decisive encounters: one with Emmanuel de Martonne, who initiated him to the language of landscapes and places; and, most importantly, the other with Jean Sainte-Fare Garnot, who introduced him to Egyptology and for whom he had deep respect. A strong friendship developed between the two. Jean Leclant's young master guided him through the intricacies of the Egyptian language and along the paths of the captivating world of the *Pyramid Texts*. At the time he was preparing a *Doctorat d'État* on this fascinating body of texts, and his student was soon enthralled. Much later, Jean Leclant succeeded him, far too early, as he so often said, with gratitude and friendship.

Jean Leclant then attended Pierre Lacau's lectures at the Collège de France, and those of Gustave Lefebvre at the École pratique des hautes études. From the former he kept the crucial complementarity between knowledge from the field and the use of other sources, as well as methodological rigour. The second confirmed his idea that philology should remain the basis of his research.

As soon as he passed his *agrégation*, he began his *Wanderjahre*. He enrolled in the French navy, and was posted in Vienna as an aspiring interpreter and cipher officer. He would sometimes recall this episode of his life with some amusement, which had an undertone of "The Third Man", and during which he made fruitful contacts with the Austrian Egyptologists. He finished his military career as a Commander, and the navy riflemen were the ones to pay the last tribute on the day of his funeral.

From 1946 to 1948, the CNRS assigned him as a research officer for the National Museums. Thus, alongside Jacques Vandier, he completed his training in collections before leaving – at last! – for the field. The field was Egypt, where the French Institute of Oriental Archaeology (FIOA) recruited him as a scientific member, from 1948 to 1952. He travelled across the country with Paul Barguet, Serge Sauneron and the Bernand brothers. While taking part in the excavations of the FIOA, particularly in Thebes, he began to focus on an area that was to be central to his career: the buildings and inscriptions of the "Ethiopian" era, both within the precincts of Karnak and on the west bank. That is how he came to undertake two monographs that were to constitute his EPHE degree and his two theses: *Les Enquêtes sur les sacerdoces et les sanctuaires égyptiens à l'époque dite "éthiopienne"* (XXV^{e} dynastie), and then for his *Doctorat d'État, Recherches sur les monuments thébains de la XXV^{e} dynastie dites "éthiopienne"* (main thesis), and *Montouemhat, quatrième prophète d'Amon, prince de la ville* (complementary thesis).

After those four years, aged only 32, Jean Leclant founded the Ethiopian Archaeological Service at the Negus's request, and headed it until 1956. He created a scientific and human organization from scratch, which was able to survive the difficult future that awaited the kingdom of the Queen of Sheba, the mythical gate of Africa and of the Red Sea, both of which fascinated the young scholar.

He returned to France, having already lived so many adventures, and completed his EPHE degree in 1953. He was then recruited by the University of Strasburg, first as a lecturer and then, after defending his *Doctorat d'État ès-Lettres*, in 1955, as a professor. He taught there until 1963, perpetuating the tradition of excellence inaugurated by Johannes Dümichen, then Wilhelm Spiegelberg, and maintained, once Alsace had been returned to France, by Pierre Montet, whom he succeeded after being his student.

The premature death of his first master, Jean Sainte-Fare Garnot, on 20 June 1962, brought him back to Paris. He was elected to succeed him at the Sorbonne in 1963, and then at the 5th Section of the EPHE, in the following year. He thus took over the important research on Saqqara, which he studied jointly with Jean-Philippe Lauer for almost forty years, carrying out fruitful research on the complex funerals of Pepi and of seven of his queens.[1] These were further added to the body of the *Pyramid Texts*, which he had started studying again and was busy re-editing.

At the EPHE and at the Sorbonne, Jean Leclant extended teaching to the domains which he pioneered. This started with the study of belated cults, linked to the Hellenistic world and the expansion of the Roman Empire, the "Isiac" world, whose development on the scale of the ancient *oikoumene* he studied with his inexhaustible energy. These studies, entirely owed to him, are now taught in several universities.

The other focus of his research at the time was Sudan. As the epigrapher for Michela Schiff Giorgini's mission in Soleb from 1960, he fell under the irresistible charm of the Upper Nile Valley. He continued the excavations on the site close to Sedeinga, after the end of this mission and Michela Schiff Giorgini's tragic death.

At the EPHE, he invented Meroitic studies, tackling the challenge of deciphering the language spoken by the sovereign heirs of the Kushites. A small handful of disciples followed him on this adventure, which only one team dared to join, that of Fritz Hintze from Humboldt University in Berlin. Our two groups accompanied each other for years in this austere enterprise.

This specific research constituted one of the themes he taught at the Collège de France, where he was elected in 1979. He then left the Sorbonne, after sixteen years during which he had developed a fully-fledged research centre that still welcomes students from across the world.

Jean Leclant continued to teach in parallel at the Collège and the EPHE until 1990, constantly opening up new research paths to his audience, presenting and commenting on ongoing excavations as well as the numerous new publications that he devoured and savoured daily.

His election to the Académie des inscriptions et belles-lettres in 1974, to replace Jacques Vandier, was undoubtedly, from both a scientific and a personal point of view, a turning point in his life, which the warm and discrete presence of his wife, Marie-Françoise brightened up.

Throughout his life, he was concerned with the common scientific interest. Creator of the Archaeological chronicle that he published every year in the *Orientalia* from 1948 to 2002, he initiated many collective enterprises: not only bibliographies and tools adapted to modern technologies, but also, wherever he had the opportunity, the development of education and of the means for research in Egyptology. He always gave of himself with the same generosity, whether to support and encourage French programmes or to reinforce the international scientific network of Egyptologists, and, more generally, of Orientalists.

Jean Leclant headed the French Society of Egyptology, was the secretary-general of the International Association of Egyptologists after encouraging its creation in 1973, successfully organized the 1972 and 1990 celebrations dedicated to Jean-François Champollion, and headed the Society of Africanist Archaeologists, the French Society for Ethiopian Studies, and the Society for Nubian Studies. Honorary president of both the Asian Society and the Society for the History of Religion–Ernest Renan, he chaired, until his death, the Michela Schiff Giorgini Foundation, created in 1984 in memory of the "Lady of Soleb".

Elected permanent secretary of the Académie des inscriptions et belles-lettres in 1983, he broadened his activity further by becoming secretary-general of the Ministry of Foreign Affairs' Consultative Committee for French Excavations Abroad from 1973 to 1988, and then chairman of the Ministry of Culture's High Committee of National Celebrations from 1988 to 2008, as well as vice-chairman of the French commission for UNESCO.

As the tireless permanent secretary of his *Compagnie*, he invested himself in it unsparingly, mobilizing a wealth of energy, contributing to the creation of the Simone and Cino del Luca Grand Prize for Archaeology, and making the annual symposia of the Kérylos villa an international scientific event. He was head of publications at the Académie, looking after everything, proofreading every draft book, always allowing the authors to benefit from his remarks and comments.

That is not to say that he neglected his own scientific production, which was so abundant that we decided to dedicate a website to it – over 1,700 titles recorded to date.

Despite being absorbed by the management of the Académie, Jean Leclant published in quick succession the three volumes of the *Répertoire d'épigraphie méroïtique* (Directory of Meroitic Inscriptions) in 2003, *Les Textes de la pyramide de Pépy Ier* (Texts from the Pyramid of Pepi I), the Institut de France's *Recueil bio-bibliographique* in three volumes (Le Second Siècle, 1895-1995, 2407 p.), (The Institut de France's Bio-Bibliographic Collection. The Second Century, 1895-1995, 2407 p.), and the *Dictionnaire de l'Antiquité* (Dictionary of Antiquity), etc.

He was a member of several foreign and French academies: the British Academy, the Accademia dei Lincei in Rome, the Science Academies of Russia, Belgium, Denmark, Sweden, Munich, Romania, Madrid, and Barcelona, the Accademia Pontaniana of Naples, the Institute of Egypt in Cairo, the German and Austrian Archaeological Institute, the Istituto Italiano per il Medio ed Estremo Oriente, and the American Philosophical Society of Philadelphia. He also had an *honoris causa* doctorate from the Leuven, Bologna and Vienna Universities.

His international renown surely had to do with the immensity of his knowledge and work. It just as certainly came from the man himself, whose qualities were never concealed by the cloak of science and honours.

Always even-tempered, simple and smiling, Jean Leclant knew how to listen and always sought to understand before judging, just as curious about others as he was about everything else. He admired Gaston Maspéro, who was always his model. As fate had it, they are only a few metres away from each other in the Montparnasse cemetery, where he was buried by his friends and colleagues on 23 September 2011. ■

Prof. Nicolas GRIMAL

Source: La lettre, *no. 34, May 2012*

(1) Second year of preparatory course for the arts section of the École normale supérieure

Prof. Nicolas GRIMAL
Pharaonic Civilization: Archæology, Philology, History

JACQUES THUILLIER
BY ROLAND RECHT

Jacques Thuillier, a French art historian, was born in Vaucouleurs (Meuse) on 18 March 1928. He died on 18 October 2011, aged 83. In 1977 he was appointed as Professor at the Collège de France, where he held the Chair of History of Artistic Creation in France until 1998.

Note on the Life and Work of Jacques Thuillier

"Faced with a history of art always suspended to transcendence, whether it be the dialectic of Spirit or the mystique of Progress, he would perform a Copernican inversion, putting the work and the artist back at the centre of the enquiry. Such secularization was unwelcome at a time which we can now see was desperately trying to cling to beliefs, while assertively claiming its freedom. Instead of well-trodden paths which allow for ever more subtle scholastic speculation that students so love and that awes the public, he recommended that all problems be 're-examined from every angle'…"

These were Jacques Thuillier's words, about Henri Focillon. They could apply to our colleague himself, departed on 18 November last year. Jacques Thuillier's continuous, lifelong effort to "put the work and the artist back at the centre of the inquiry" is unmatched.

Jacques Thuillier was born on 18 March 1928 in Vaucouleurs, a village in the Meuse district, with a population of no more than 2,000. As his father was appointed as a literature teacher at the Nevers vocational school in 1937, he attended school in that town, in which there was a cathedral and a museum. In his Inaugural Lecture at the Collège de France he uncharacteristically confided that: "I learned from my parents to distinguish a Gothic door from a Romanesque door, just as I was starting to learn the alphabet."

In 1944 he came first in the *concours général* for Latin translation, and was accepted into an advanced preparatory *première* class at the Lycée Henry IV.[1] Like many of the youth of his age in the immediate post-war period, poor health slowed down his studies somewhat. He enrolled in an advanced *première* class at the Lycée Louis-le-Grand, this time for the academic year 1950-1951, and was then accepted at the École normale supérieure. After obtaining a Bachelor of Arts in 1952, he

JACQUES THUILLIER
BY ROLAND RECHT

Jacques Thuillier in the reserve collection storeroom of the Grenoble Museum. © Akiya Takahashi

wrote a thesis on the art critic André Félibien (1953). Jacques Thuillier's interest in Félibien never waned. He considered him to be the first biographer of French art, and his work as an art historian began with him.

In 1954 Jacques Thuillier obtained the *agrégation*. He then carried out research on art criticism in France in the seventeenth and eighteenth centuries, and on seventeenth-century French painting, as part of an optional fourth year at the École normale (1954-1955). He then used a stay in Rome, as a resident researcher at the Primoli Foundation, as an opportunity to carry out research on French artists in Italy. In 1956 he was a resident researcher at the Thiers Foundation, a research associate at the CNRS, and then taught a course on art criticism at the Sorbonne, before becoming an assistant at the Institut d'art et d'archéologie, Rue Michelet, in 1959. He pursued his teaching career in Dijon, where art history had no academic existence, even though we know that Lucien Febvre had taught the history of Burgundian art there in 1914. As a lecturer on the History of Medieval and Modern Art, Jacques Thuillier inaugurated the presence of this discipline in Dijon from 1962 to 1970. He subsequently kept a close eye on the fate of this university, where modernists and then medievalists were successively appointed.

His *Doctorat d'État* (*Peinture et doctrines artistiques en France au XVII^e siècle*) (Painting and Artistic Doctrines in France in the Seventeenth Century), defended in 1970, earned him his appointment from October of the same year as Professor of the History of Modern Art at the Université Paris-Sorbonne. Seven years later, the Collège de France created for him the Chair of History of Artistic Creation in France, which he held until his retirement in 1998. Until 1984, two art historians taught at the Collège de France, as André Chastel had held the Chair of Art and Civilization of the Renaissance in Italy since 1970.

It would be tedious to list all the responsibilities Jacques Thuillier held during his career: in academia, on national committees (CNRS, Universities' advisory committee), in heritage protection, (national committee for historical buildings, committee for the protection of museums, commission for classified and controlled museum acquisitions, etc.), international authorities (he was highly active on the International Committee for the History of Art from 1964 onwards, and became its scientific secretary in 1969), and on editorial committees (he took part in the creation of *Art de France* in 1961 and of *Revue de l'Art* in 1968).

Jacques Thuillier actually had several intertwined lives, linked by his tireless, hard-working disposition. I will begin by talking about his work as a great "curator" – an English term that he would not have liked, though it defines his activity as a designer and organizer of monographic exhibitions. I would like to talk about that activity first, because it is, in a sense, a key to his way of thinking. Just as photography altered the very object of art history as it was coming into existence during the second half of the nineteenth century, so too, a century later, great exhibitions altered the use value of art works, thereby modifying the way art historians related to them. Jacques Thuillier was contemporary to this movement and played a major part in it. To him, an exhibition was an opportunity to bring together, beyond time and space, the components of an artist's body of works. In that moment of truth, that which until then was only a hypothesis, a monographic fiction, was put to the test.

In 1963 he created a 450-page catalogue for an exhibition dedicated to Charles Le Brun at the Château de Versailles, for which he wrote a brilliant introduction, a biography of the artist, and the notes for all of the known works of Louis XIV's chief painter.

> *A great part of Le Brun's prestige amongst his contemporaries and, above all, amongst other painters stemmed from the fact that he was able, from a very young age and throughout his life, to accomplish the ideal not of the perfect painting but of the perfect painter, more fully and with more ease than anyone else.* ▶

JACQUES THUILLIER
BY ROLAND RECHT

The second major event to which Jacques Thuillier devoted himself entirely from the moment he entered the Sorbonne was the exhibition of the works of Georges de La Tour, which opened in 1972. At the time, the dust had not yet settled after the upheaval of May 1968, and those whom the youth saw as the supporters of orthodoxy, along with their conception of art history, were under attack. The tradition of connoisseurship as it exists in France was being strongly challenged. It was considered as the quintessential expression of an obsolete art history, because it was too remote from the social and ideological considerations that should matter to art historians. At the height of this protest, Thuillier wrote the following proclamation, or rather manifesto, as an introduction to his exhibition of La Tour's works (1972):

> *La Tour is the triumph, as well as the justification, of art history. For La Tour would not exist without art history. He who was seen as a "famous painter" had hardly passed away when he slid into oblivion for over three centuries. Only the steady work of art historians could allow for this miracle to happen: from a simple name, one of the greatest painters of the seventeenth century has been restored.*

Understand that this is the traditional art history which is now mocked and reviled, cut down to its core, and whose name no one dares to pronounce, even in universities and museums. There is nowadays a new way of dealing with artwork that rejects the thankless task of searching archives, that tolerates only direct confrontation with masterpieces, and that will comment only on the artist's feeling of sacredness or social alienation.

This was a declaration of war on Pierre Francastel's followers from the École pratique des hautes études, and on the advocates of a semiology of art and of historical materialism. The retaliation was sharp. Attacks came from every side. But Jacques Thuillier held on, firmly attached to the convictions that his Inaugural Lecture of 13 January 1978 would powerfully reveal. I will mention one in particular, which seems to have formed a fundamental guideline in his work. An art historian, he said, cannot separate value judgement from his historical work, just as he knows that all the hierarchies that he builds are relative, and therefore temporary. But this conception of relativity and value judgement can only be based on a meticulous study of archives, which is a prerequisite for the constitution of a corpus. It should then be based on careful examination of the works, of their state of conservation, of repaints. The study of the prints that often preserve the memory of a disappeared painting is another source of information which allows one to acquire the broadest possible knowledge base on an artist's works.

As monographic exhibitions and books accumulated, we witnessed the transformation of the French seventeenth century: Nicolas Poussin, the Le Nain brothers, Laurent de La Hyre, Sébastien Bourdon, Jacques de Bellange, Lubin Baugin, etc. But the nineteenth century also caught Jacques Thuillier's attention: in 1984 he pondered over what was called *"art pompier"*, just as the Musée d'Orsay was being prepared for inauguration, and composed an exhibition on Delacroix and French Romanticism for the National Museum of Western Art in Tokyo (1989). It revealed a large number of works that had been unfairly relegated to provincial museum reserve collections that were so deep that it had been decided that they were best forgotten. Paradoxically, French Romanticism had never been the subject of an exhibition and, to add to the paradox, Jacques Thuillier's exhibition would never be shown in France.

Jacques Thuillier was an indisputably talented writer. His demanding writing always showed a concern to translate as precisely as possible his intuitive response to a work of art. Although he belonged to the same tradition as Henri Focillon and André Chastel, his writing was neither overly rhetorical like Focillon's, nor did it have the very literary resonance of Chastel's – as for instance when he wrote about Charles Le Brun:

> *Le Brun is, above all, the painter of Battles. For him, virile nudes and beautiful horses suffice as a language. Momentum, combat and defeat abundantly multiply the movements of body and soul. Constantine and Alexander are convenient pretexts to unravel these*

"passions", still so close to those instincts we call ardour, anger, pity, fear or despair, and awaken the basic, secret, motivating forces of all life.

An authentic writer who practised what was called *écriture-artiste*, Jacques Thuillier admired a form of classicism which he thought was best represented by Félibien, whose "clarity and elegance" he admired. Thuillier worked on his texts with exceptional patience, irrespective of their intended purpose. Although he aimed to be clear and elegant, he never shied away from controversy: throughout the text, he would throw jabs, and sometimes bites, at the art of his time or at conceptions of art history that he did not share. It came as no surprise that the Académie française wanted a man who cared so much for language to join its ranks. He and the older André Chastel were the only art historians who could have aspired to do so. However, as Jean d'Ormesson and Marc Fumaroli revealed a few days ago, Jacques Thuillier never gave in to their friendly pressure.

He put his art of persuasion to use in his public action, when debating with his peers on problems regarding museum and monument heritage, with a particular focus on what was then still called "the provinces". It was in the provincial museums, as I have said, that he made so many discoveries. He searched the archives of the different *départements* (counties), in order to document a particular sale or fact relating to an artist's career. He was also a true lover of art, and he and his brother Guy made a pair of collectors which spontaneously brings to mind the Goncourt brothers. For sixty years they accumulated paintings, drawings and prints from all periods. He exercised his eye and his judgement virtually every day on prints and drawings found at art dealers or anonymous paintings the quality and historical interest of which he immediately detected. This collection he donated and, contrary to many donors who only think of prestigious institutions such as the Louvre or Orsay, the Thuillier brothers remained faithful to the Lorraine region. A total of 2,000 drawings and 12,000 prints were sent to the Nancy museum, and almost 100 paintings were sent to the county museum of Vic-sur-Seille, where Georges de La Tour was born. They now form the core of its collection.

And, of course, Jacques Thuillier was a marvellous teacher who, from the University of Dijon to the Collège de France, encouraged a great number of now famous art historians to study seventeent-century – and other – art. It is without a doubt at the Collège de France, where he taught for 21 years, that he gave the best of himself. He initially dedicated his lectures mainly to the seventeenth century, giving painters from Lorraine and art theory a special place. Then, from 1988 onwards, he alternated the study of romantic painting and the seventeenth century. But what is most surprising to this day is his interest in computer science, which he expressed by dedicating his 1986 seminar to it, and then all of his seminars from 1989. Ahead of his French and foreign colleagues, he had thought about the huge contributions that could be expected from the digitization of archive documents or collections.

Jacques Thuillier saw the Collège de France less as a place of consecration than as a unique form of scholarly sociability. He saw the co-habitation of so many disciplines as a formidable opportunity for intellectual emulation. He was moreover keenly interested in the work of his colleagues, especially when it came to the natural sciences. You have all seen him attending the quaterly meetings of the Faculty on Sundays, even just a few months before his death. He was exemplary in his discreetness, but was always attentive to and concerned about the future of the Collège. We will no doubt all remember him as a courteous man who, in his search for the personality of seventeenth-century painters and for that of his contemporaries, was particularly sensitive to all the expressions of a singular life. ■

Prof. Roland RECHT

Source: La lettre, *no. 34, July 2012*

(1) The concours général *is the French equivalent of the UK's* Advanced Extension Awards, *the advanced preparatory* première *class is the penultimate year of secondary education.*

Prof. Roland RECHT
Emeritus Professor
of History of European
Medieval and Modern Art
from 2001 to 2012

ASSOCIATE RESEARCHERS
AND COLLÈGE DE FRANCE'S PHD STUDENTS
LAUREATES OF THE HUGOT FOUNDATION

Chinese Intellectuals' Conception of Politics in the Early Twenty-First Century

At first glance, Chinese scholars' academic freedom and freedom of expression seem very limited. It is difficult to imagine that an interesting debate on the question of political reform could take place in China or that the proposals which some engaged academics put forward in spite of everything could have an impact on public policy. My experience of Pekinese universities and the interviews I was able to hold with about twenty renowned academics involved in debate on this issue have encouraged me to go beyond this reticence and to study what is actually being said and happening in Chinese universities.

One must first understand the context in which Chinese researchers are taking a stand. This context has seen university departments in the humanities and social sciences reopen from 1978 onwards to enable and serve the Reform and Openness Policy, in parallel with access to higher education for a generation of students strongly marked by the Cultural Revolution and eager to discover and use the theories and research developed in American and European universities. Divided on the ideological front but united by their patriotism, certain academics step out of their domain of expertise and take a stand, in the hope of influencing the orientation of government policies. While the impact of their political interventions is often difficult to assess, the Party has opted for a strategy of promotion of its legitimacy, through greater attentiveness to society's needs and adaptation to its changes – even though the Party readily resorts to repression when this charm tactic does not suffice to silence the opposition. This context explains the existence of a rich debate, in and around Chinese universities, on the most suitable regime for China. First of all, to the extent that the word "democracy" often comes to mean "good regime", who, among Chinese academics, could express their opposition to a democratic transition? Hence only a few voices are raised against "Western democracy" to propose a meritocratic regime that is more in phase with Chinese "tradition" and Confucianism. More generally speaking, the debate surrounds the timeline of democratic transition. Apart from those called liberals, Chinese academics are advocating gradual and cautious reform, having given up on any form of revolution. Furthermore, the wide range of interpretations of what democracy is and of propositions for institutional reform is expanding, from the meritocratic defence of the rule of law to a critique of "electionism" in favour of the rise of a constitutional and/or substantive democracy that is more social and more participative.

Such thriving debate is fascinating to study, not only because it allows us to understand how China's political future is thought about in Chinese universities, but also because it simultaneously reflects the broad spectrum of our own questions, both pre- and post-democratic. ■

Émilie FRENKIEL (Academic Year 2011-2012)

Religion in Sicily after the Roman Conquest 3rd to 1st c. BC

My current research is the last stage of a journey, which I embarked on five years ago at the Scuola Normale Superiore of Pisa. There, I defended a Master's thesis (now published as a monograph) which already dealt with a Sicilian cult: the goddess (Astarte/Aphrodite/Venus) of Eryx, in Western Sicily.

During my research on this goddess, worshipped by Greeks, Phoenicians and Romans from the 5th c. BC to the 3rd c. AD, I soon discovered the republican period as the richest of its history. Many sources allowed to show the way Romans made the goddess a symbolic point of their presence on the island. However, this had received little attention from a scholarship more concerned with origins than with historical developments.

Looking at the island as a whole, the situation is similar. The vulgate scholarly account of republican Sicily describes it as deeply Hellenized region, only partly influenced by conquerors. Yet Eryx's case demands this premise to be questioned.

I decided then to turn to the evidence on religion at this time, in order to identify the transformations in religious life.

As often in ancient history, the material at hands is heterogeneous both in terms of its nature and for its representativeness and the problems it raises. We are faced with passages from Greek and Latin literature, highly elaborate but partial; with archaeological findings of different date and accuracy; with images and inscriptions, often hermetic to modern readers. Only a thorough analysis of each piece allows us to shed light on the three main issues of the subject: the extent and nature of Roman intervention; the attitude of Sicilian cities; the transformations in individuals' religious life. The latter point, in spite of the usual lack of sources on private life, has to be addressed, since the traditional scholarly account of Roman religion has recently been criticized for mainly focusing on institutional data.

Through this framework, I intend to offer a more refined idea of religious change in the first province of the Empire. This issue concerns the history of Sicily as much as that of Roman religion: the way we should look at it, beyond the boundaries of the city of Rome, is now increasingly a topic of discussion. ■

Beatrice LIETZ (Academic Year 2012-2013)

Émilie FRENKIEL (left)
Research Assistant, Modern and Contemporary Politics (Prof. Pierre ROSANVALLON)

Beatrice LIETZ (right)
Research Assistant, Religion, Institutions and Society in Ancient Rome (Prof. John SCHEID)

Proust and Baudelaire:
Living One's Own Time

My research work is rooted in amazement. While novels, music, painting and theatre each have a figurehead, a herald representing their art, this disparate whole nevertheless forms a unified whole. But there is no poet.

Of the poets to which Proust alludes, Baudelaire seems to be by far the most important. Baudelaire not only frequently resurfaces in Proust's writing, he is also often found implicitly.

My aim was thus first a philological one. Setting myself the objective of researching on what Proust has borrowed from Baudelaire as exhaustively as possible, I used the notion of intertextuality in its broadest sense to find not only what came from Baudelaire, but also what pertained to Baudelairism. The study of the drafts of *In Search of Lost Time* sheds light on the evolution and gradual disappearance of a reference or an allusion, which appears in the final version as trace.

This process allows me to shed light on a singular practice: the more diffuse and implicit a reference or allusion to Baudelaire is, the more seminal it is. But the opposite holds equally true: the more an allusion to Baudelaire is obvious, the more it should be considered on a deeper level. Two figures of Baudelaire therefore traverse the *Search*: the one appears in the form of *cliché*, while the other deeply inspires the Narrator. The direct implication of this distinction is not insignificant, because it begs the question of the potential irony in the pages where poetic prose appears. Should the passages that have often been considered as poetic pages not be read less literally, as a form of self-pastiche by the Narrator making fun of the novice poet he once was? Finding Baudelaire on every page does not make him the forgotten poet. The absence of the poet is explained rather by what Proust understands to be poetry.

For Proust, poetry flows according to the situation and is experienced as a form of relationship to the world and to humans, and, as such, describes a certain way of relating to time. Poetry is at the hearth of modernity, in that it allows us to access a lost past, to "extract the eternal from the ephemeral". The poet compromises with the present, by developing careful attention to that which is contemporary to him. Just as Baudelaire gives in to what he calls "the tyranny of circumstance", Proust renews the realist novel, allowing himself to write in touches, with attentiveness to the trivial. That is perhaps where we would find the poet, who is not apparent in the *Search* and who is everywhere. We should look for him in the attention paid to what is forgotten and lost. The poet must come to terms with triviality; it is by accepting it that one successfully avoids it and becomes original. ■

Matthieu VERNET (Academic Year 2011-2012)

The Role of Hund's Coupling
in Correlated Metals

The electrons in atomic shells repel each other through the Coulomb force. When two electrons are placed in the same atomic orbital, the energetic cost of this repulsion is only partially compensated by the attraction of the electron towards the nucleus. The electronic configurations corresponding to the states where electrons are on average further apart are energetically favourable. The configurations found in the ground-state are those in which the electronic spins are maximally aligned. Such behaviour is dubbed Hund's rule coupling after Friedrich Hund who proposed it in 1925.

What role does Hund's coupling play in solids? In insulators, which resemble a set of isolated atoms, it is obviously important, as it specifies the size of the atomic magnetic moments. In metals, where Coulomb repulsion is insignificant, it has no effect. What role does it play in the intermediate case of correlated metals, e.g. transition-metal oxides such as ruthenates and recently discovered iron-based superconductors?

Using the dynamic mean-field theory, Antoine Georges (Collège de France), Luca de'Medici (LPS Orsay) and I have shown that Hund's coupling has two important effects. (i) The energetic cost of adding an electron is reduced whenever the outer-shell is not half-filled. This induces metallic behaviour. (ii) The other effect relates to degeneracy, which reduces as Hund's coupling increases, except in the case of a single electron per shell. Weaker atomic degeneracy prevents certain electron transfers between atoms, causing their state to become less metallic. Like the Roman god Janus, Hund's coupling has two faces, which are sometimes opposites. When the outer shell is filled with more than one electron, but is not yet half full, these two effects largely cancel: the effective repulsion reduces at the same time as the degeneracy. The resulting unusual metal is far from being an insulator, but has reduced kinetic energy. Iron-based superconductors and strontium ruthenates belong to this very interesting category.

Realising the importance of Hund's coupling has highlighted the consequences of atomic physics in metals which accounts for the systematic behaviour with the occupancy of the outer shell as the control parameter. In this classification the iron-based superconductors are akin to ruthenates which raises an interesting question: *why do the latter not present high temperature superconductivity?* ■

Jernej MRAVLJE (Academic Year 2012-2013)

Jernej MRAVLJE (left)
Lecturer, Physics of Condensed Matter (Prof. Antoine GEORGES)

Matthieu VERNET (right)
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Secretary: Marc FONTECAVE, Chemistry of Biological Processes

MATHEMATICS, PHYSICS, AND NATURALS SCIENCES

Alain CONNES, Analysis and Geometry
Jean-Christophe YOCCOZ, Differential Equations and Dynamical Systems
Pierre-Louis LIONS, Partial Differential Equations and Applications
Don ZAGIER, Number Theory
Gérard BERRY, Algorithms, Machines and Languages
Serge HAROCHE, Quantum Physics
Jean DALIBARD, Atoms and Radiation
Michel DEVORET, Mesoscopic Physics
Antoine GEORGES, Physics of Condensed Matter
Gabriele VENEZIANO, Elementary Particles, Gravitation and Cosmology
Barbara ROMANOWICZ, Physics of the Earth's Interior
Édouard BARD, Climate and Ocean Evolution
Antoine LABEYRIE, Observational Astrophysics
Clément SANCHEZ, Chemistry of Hybrid Materials
Marc FONTECAVE, Chemistry of Biological Processes
Jean-Louis MANDEL, Human Genetics
Christine PETIT, Genetics and Cellular Physiology
Edith HEARD, Epigenetics and Cellular Memory
Alain PROCHIANTZ, Morphogenetic Processes
Philippe SANSONETTI, Microbiology and Infectious Diseases
Stanislas DEHAENE, Experimental Cognitive Psychology

SOCIAL SCIENCES AND HUMANITIES

Nicolas GRIMAL, Pharaonic Civilization: Archeology, Philology, History
Thomas RÖMER, The Hebrew Bible and its Contexts
Denis KNOEPFLER, Epigraphy and History of the Ancient Greek Cities
John SCHEID, Religion, Institutions and Society in Ancient Rome
Jean-Pierre BRUN, Techniques and Economics in the Ancient Mediterranean
Jean KELLENS, Indo-Iranian Languages and Religions
Anne CHENG, Intellectual History of China
Pierre-Étienne WILL, History of Modern China
Jean-Noël ROBERT, Philology of Japanese Civilization
Henry LAURENS, Contemporary Arab History
Roger CHARTIER, Writings and Cultures in Modern Europe
Michel ZINK, Literatures of Medieval France
Antoine COMPAGNON, Modern and Contemporary French Literature: History, Criticism, Theory
Carlo OSSOLA, Modern Literatures of Neo-Latin Europe

Claudine TIERCELIN, Metaphysics and Philosophy of Knowledge
Philippe DESCOLA, Anthropology of Nature
Roger GUESNERIE, Economic Theory and Social Organization
Alain SUPIOT, The Welfare State and Globalization: A Legal Analysis of Forms of Solidarity
Pierre ROSANVALLON, Modern and Contemporary History of Politics

ANNUAL CHAIRS

Artistic Creation
Karol BEFFA, Music: Art, Technique, Knowledge (2012-2013)
Gilles CLÉMENT, Gardens, Landscape and "Natural Genius" (2011-2012)

Sustainable Development - Environment, Energy and Society
Anny CAZENAVE, Studying the Earth and the Environment from Space (2012-2013)
Paul COLONNA, Challenges and Issues Facing Sustainable Development (2011-2012)

Knowledge against Poverty
Dominique KEROUEDAN, The Geopolitics of Global Health (2012-2013)
Manuela CARNEIRO DA CUNHA, Indigenous Knowledge (2011-2012)

Information Technology and Digital Sciences (2011-2012)
Bernard CHAZELLE, Computer Sciences (2012-2013)
Serge ABITEBOUL, Data sciences: from First-Order Logic to the Web (2011-2012)

Technological Innovation Liliane Bettencourt
Yves BRÉCHET, Materials Science: From Materials Discovered by Chance to Made-to-Measure Materials (2012-2013)
Jean-Paul LAUMOND, Robotics: Back to Hephaestus (2011-2012)

EMERITUS PROFESSORS

Maurice AGULHON, Contemporary French History (from 1986 to 1997)

Spyros ARTAVANIS-TSAKONAS, Biology and Genetics of Development (from 2000 to 2012)

Étienne-Émile BAULIEU, Bases and Principles of Human Reproduction (from 1993 to 1998)

Alain BERTHOZ, Physiology of Perception and Action (from 1993 to 2010)

Georges BLIN, Modern French Literature (from 1965 to 1988)

Yves BONNEFOY, Comparative Studies of the Poetic Function (from 1981 to 1993)

Pierre BOULEZ, Invention, Technique and Language in Music (from 1976 to 1995)

Jacques BOUVERESSE, Philosophy of Language and Knowledge (from 1995 to 2010)

Michel BRUNET, Human Paleontology (from 2008 to 2011)

Pierre CHAMBON, Molecular Genetics (from 1993 to 2002)

Jean-Pierre CHANGEUX, Cellular Communication (from 1976 to 2006)

Claude COHEN-TANNOUDJI, Atomic and Molecular Physics (from 1973 to 2004)

Yves COPPENS, Palaeontology and Prehistory (from 1983 to 2005)

François-Xavier COQUIN, Modern and Contemporary Russian History (from 1993 to 2001)

Pierre CORVOL, Experimental Medicine (from 1989 to 2012)

Gilbert DAGRON, Byzantine History and Civilization (from 1975 to 2001)

Jean DELUMEAU, History of Religious Mentalities (from 1975 to 1994)

Michael EDWARDS, Literary Creation in English (from 2003 to 2008)

Anne FAGOT-LARGEAULT, Philosophy of Life Science (from 2000 to 2009)

Marcel FROISSART, Corpuscular Physics (from 1973 to 2004)

Jacques GERNET, Social and Intellectual History of China (from 1975 to 1992)

Jacques GLOWINSKI, Neuropharmacology (from 1983 to 2006)

Gilles Gaston GRANGER, Comparative Epistemology (from 1986 to 1991)

François GROS, Cellular Biochemistry (from 1973 to 1996)

Christian GOUDINEAU, National Antiquities (from 1984 to 2010)

Jean GUILAINE, European Civilizations in the Neolithic and the Bronze Age (from 1995 to 2007)

Ian HACKING, Philosophy and History of Scientific Concepts (from 2001 to 2006)

Claude HAGÈGE, Linguistic Theory (from 1988 to 2006)

Françoise HÉRITIER, Comparative Studies of African Societies (from 1982 to 1998)

François JACOB, Cellular Genetics (from 1964 to 1991)

Pierre JOLIOT, Cellular Bioenergetics (from 1981 to 2002)

Philippe KOURILSKY, Molecular Immunology (from 1998 to 2012)

Jean-Marie LEHN, Chemistry of Molecular Interactions (from 1980 to 2010)

Nicole LE DOUARIN, Molecular and Cellular Embryology (from 1988 to 2000)

Xavier LE PICHON, Geodynamics (from 1986 to 2008)

Georges LE RIDER, Economic and Monetary History of the Hellenistic Orient (from 1993 to 1998)

Emmanuel LE ROY LADURIE, History of Modern Civilization (from 1973 to 1999)

Jacques LIVAGE, Chemistry of Condensed Matter (from 2001 to 2009)

Edmond MALINVAUD, Economic Analysis (from 1987 to 1993)

André MIQUEL, Classical Arabic Language and Literature (from 1976 to 1997)

Philippe NOZIERES, Statistical Physics (from 1983 to 2000)

Jean-Claude PECKER, Theoretical Astrophysics (from 1964 to 1988)

Roland RECHT, History of European Mediaeval and Modern Art (from 2001 to 2012)

Armand de RICQLES, Historical Biology and Evolutionism (from 1996 to 2010)

Daniel ROCHE, French History in the Age of the Enlightenment (from 1999 to 2005)

Jean-Pierre SERRE, Algebra and Geometry (from 1956 to 1994)

Michel TARDIEU, History of Syncretisms in Late Antiquity (from 1991 to 2008)

Javier TEIXIDOR, Semitic Antiquities (from 1995 to 2001)

Jacques TITS, Group Theory (from 1973 to 2000)

Pierre TOUBERT, Occidental History (from 1992 to 2003)

Paul-Marie VEYNE, Roman History (from 1975 to 1999)

Nathan WACHTEL, History and Anthropology of Meso and South American Societies (from 1992 to 2005)

Harald WEINRICH, Romance Languages and Literatures (from 1992 to 1998)

Institutes

Institute for the Study of the Contemporary World

Director: Prof. Pierre ROSANVALLON,
Modern and Contemporary History of Politics
Prof. Philippe DESCOLA, Anthropology of Nature
Prof. Roger GUESNERIE,
Economic Theory and Social Organization
Prof. Henry LAURENS, Contemporary Arab History
Emeritus Professors:
Prof. Mireille DELMAS-MARTY, Comparative Legal Studies and Internationalization (2003-2011)
Prof. Jon ELSTER, Rationality and Social Sciences (2006-2011)
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Institute of Literary Studies

Director: Prof. Michel ZINK, Literatures of Medieval France
Prof. Roger CHARTIER, Writings and Cultures in Modern Europe
Prof. Antoine COMPAGNON, Modern and Contemporary French Literature: History, Criticism, Theory
Prof. Carlo OSSOLA, Modern Literatures of Neo-Latin Europe
Prof. Jean-Noël ROBERT, Philology of Japanese Civilization
Emeritus Professors:
Prof. Yves BONNEFOY, Comparative Studies of the Poetic Function (1981-1993)
Prof. Michael EDWARDS, Literary Creation in English (2002-2008)
Prof. Marc FUMAROLI, Rhetoric and Society in Europe (16th-17th centuries) (1987-2002)
Prof. Roland RECHT, History of European Medieval and Modern Art (2001-2012)
Prof. Harald WEINRICH, Romance Languages and Literatures (1992-1998)
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Oriental Institutes

Deputy Director, President of the Institutes:
Prof. Pierre-Étienne WILL, History of Modern China
Scientific information: Hubert DELAHAYE
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Institute of Advanced Chinese Studies (IHEC)

Director: Prof. Pierre-Étienne WILL, History of Modern China
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Institute of Indian Studies

Director: Prof. Jean KELLENS,
Indo-Iranian Languages and Religions
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Institute of Advanced Japanese Studies (IHEJ)

Director: Prof. Jean-Noël ROBERT,
Philology of Japanese Civilization
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Institute of Tibetan Studies

Director: Françoise ROBIN
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Institute of Korean Studies

Director: Alain DELISSEN
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Institute of the Ancient Near East (IPOA)

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Institute of Egyptology

Director: Prof. Nicolas GRIMAL,
Pharaonic Civilization: Archaeology, Philology, History
Contact information:
catherine.koczorowski@college-de-france.fr

Institute of Arab, Turkish and Islamic studies

Director: Prof. Gilles VEINSTEIN (†),
Turkish and Ottoman History (1999-2011)

Institute of Byzantine Studies

Director: Jean-Claude CHEYNET,
Université de Paris-Sorbonne, IUF
Contact information:
jean-claude.cheynet@college-de-france.fr

Institute of Biology

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

Chairs of Biology with laboratories at the Collège de France (Place Marcelin Berthelot):

- **Prof. Pierre CORVOL,**
  Experimental Medicine (Emeritus Professor 1989-2012)
- **Prof. Alain PROCHIANTZ,**
  Morphogenetic Processes

Chairs of Biology with laboratories outside the Collège de France:

- **Prof. Stanislas DEHAENE,**
  Experimental Cognitive Psychology
- **Prof. Edith HEARD,**
  Epigenetics and Cellular Memory
- **Prof. Jean-Louis MANDEL,**
  Human Genetics
- **Prof. Christine PETIT,**
  Genetics and Cellular Physiology
- **Prof. Philippe SANSONETTI,**
  Microbiology and Infectious Diseases

Emeritus Professor:

- **Prof. Philippe KOURILSKY,**
  Molecular Immunology (1998-2012)

Resident Research Teams

CIRB: Centre for Interdisciplinary Research in Biology (CNRS/UMR 7241 INSERM U1050)

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

The Center 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 nine research teams from different disciplines in order to foster new collaborations within the biological fields and across the usual disciplinary divide. In the long term, the nine founding groups, specialized in the fields of infectious diseases, neurosciences, and cardio-vascular research, will be joined by as many 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 conferences 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.

- **Neural Circuits and Behavior**
  Director: Alexander FLEISCHMANN
- **Junctional Communication and Neuro-Glio-Vascular Interactions**
  Director: Christian GIAUME, DR1 Cnrs
- **Smile: Stochastic Models for the Inference of Life Evolution**
  Director: Amaury LAMBERT, UPMC
- **Central Neuropeptides in Cardiovascular and Hydric Regulation**
  Director: Catherine LLORENS-CORTES, DR1 Inserm
- **Mice, Molecules and Synapse Formation**
  Director: Fekrije SELIMI, CR1 Inserm
- **Mathematical Neuroscience Laboratory**
  Director: Jonathan TOUBOUL, CR Inria
- **Intercellular Communication and Bacterial Infections**
  Director: Guy TRAN VAN NHIEU, DR2 Inserm
- **Dynamics and Pathophysiology of Neuronal Networks**
  Director: Laurent VENANCE, DR2 Inserm
- **Asymmetric Divisions in Oocytes**
  Director: Marie-Hélène VERLHAC, DR2 Cnrs

Other Resident Research Teams

- **Laboratory of Physiology of Perception and Action (CNRS UMR7152)**
  Director: Sidney WIENER
- **Internormativities in Criminal Law**
  Director: Stefano MANACORDA ■

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)

Riccardo BARBIERI, Physics, Scuola Normale Superiore, Pisa, Italy

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

Six Years as *Administrateur*

You have been *Administrateur* of the Collège de France for six years: what aspect of your work is most meaningful to you?

The Collège de France has three missions: teaching, research and the dissemination of knowledge. I have focused primarily on developing the third aspect. When I arrived, the website already existed and shared important information about the life of the Collège as well as a number of recordings and documents available to Internet users. I felt that more needed to be done, so that all the work that goes into the preparation of the professors' lectures would not to be the preserve of the happy few who are able to attend the classes given within the walls of the Collège. Current means of dissemination constitute a wonderful opportunity to accomplish this project. Our equipment was already of a very high standard, especially in terms of sound recording, and our staff highly qualified across the entire organisational and technical chain – which necessitated the switch to digital, in particular. We were therefore able to start making the lectures available to the public in 2006, in the then unfamiliar form of podcasts. The site rapidly gained momentum until it offered the bulk of the lectures by most professors, who were of course all free to choose what they wanted to broadcast. The system extended to the opening symposia and to important conferences or seminars.

Initially, few events were filmed. We have developed the supply of video documents considerably, thanks to the patrons' financial support, particularly that of the Bettencourt Schueller Foundation, which has allowed us to film and broadcast the professors' lectures and seminars and to translate most of the lectures into English voiceovers and, for some, into Portuguese, Spanish and even Chinese. This endeavour has paid off remarkably well: none of us could have imagined that we would be able to multiply the Collège's audience a hundredfold. And the press has enthusiastically welcomed this development.

Who follows the Collège de France lectures?

In 2009 and 2010 we carried out surveys on the audiences in the auditoriums and the Internet users visiting the website.[1] When I saw the results I was surprised to note, for example, that more than half of the members of the audience present in person followed at least two series of lectures. In other words, the people who are sufficiently specialized to follow a course in one ▶

SIX YEARS AS *ADMINISTRATEUR*

domain are also eager to learn about domains in which they are less specialized. The study of Internet users brought to light the existence of a young population interested in the Collège's courses. By making the characteristics of a very large, "immaterial" audience visible, it leads the professors to take a new dimension into account.This survey constitutes a reference which will allow us to analyse trends in later studies. The over-representation of Internet users from the Paris region, in particular, shows us that we can extend our audience further, to the rest of the country, and beyond. This action must be pursued tenaciously if we want to secure the Collège de France's role in the dissemination of knowledge over the long term.

Research continues to draw on written sources, which are increasingly digitized. What has the Collège de France done in this domain?

The accomplishments of the Collège de France in terms of electronic publishing should be emphasized. By publishing archive texts or unpublished books online[2], we are laying the foundations of a digital corpus that is both useful for Internet users today and valuable for the future. The online collection of *Inaugural Lectures*, for instance, traces the evolution of the Chairs and Disciplines at the Collège de France. Since 2006, 46 Chairs have been created, including the Annual Chairs. Inaugural Lectures can now be consulted online, both in conventional disciplines and in the case of chairs oriented towards societal problems. Old Inaugural Lectures will also be digitized. These texts, along with the other digital collections of the Collège, are available in different formats from the website (see p. 107).

Where does the Collège de France stand in relation to the other online knowledge offers?

The leading US universities – Yale, MIT, Stanford, etc. – as well as European institutions have developed online broadcasting initiatives, sometimes on a large scale. While the Collège is well positioned in this competition, it has comparatively very limited means. Our success presents us with a new challenge if we are to maintain our global ranking. We will have to further develop these initiatives and particularly urge the public authorities to provide us with resolute support, so that we can widen the scope of our broadcasting to the public, both in France and abroad. To do so, a concerted and extensive effort is needed, shared by the universities, graduate schools, embassies and French institutes abroad.

Since the advent of the Internet, the dissemination of knowledge seems to have taken on greater proportions than before, when it was removed from education and research.

The Internet turned everything upside down in the space of a few years. Teaching at the Collège de France has always been open to all and free of charge, but in the 5th *arrondissement* of Paris. There was a unique place in this city, well situated in the Latin Quarter. There, amongst other colleges and neighbouring institutions, was the Collège de France, where one could go to receive education that existed nowhere else. This situation had not fundamentally evolved. Today, everything has changed. The Collège de France is no longer just Parisian; it transcends all borders. It has become ubiquitous through the power of global networks, while remaining faithful to its spirit. The new broadcasting systems provided by the rapid evolution of the Internet have paved the way for practices that were not possible barely ten years ago. We are taking the evolution of practices into consideration and adapting our offer accordingly, in terms both of content and technical aspects: the next version of the site will therefore be adaptable to all mediums, particularly mobile devices. A smartphone application will soon be available. With regard to usage, I am delighted that a significant number of visitors report using documents viewed or downloaded for their own teaching or research. The Collège is therefore the starting point of a whole chain of knowledge dissemination: that is one of the objectives we wanted to reach. This success rewards the fact that the lectures of the Collège offer truly original content which is renewed annually and meets stringent requirements, while remaining accessible or at least being presented with a real concern for furthering education.

What ambition does the Collège de France have for the future? Where must it stand in the education and research landscape, both in France and abroad?

The Collège is a prestigious institution, recognized as such throughout the world. It has a particular aura in the humanities, a domain to which we pay a lot of attention. Its reputation in this domain is unquestionable, as evidenced by our colleagues abroad who consider the Collège as a flagship institution, the only one of its kind in the whole world. But we should also note that the "hard" sciences are currently the ones obtaining nine tenths of the research funding. Most of our laboratories have required extensive renovations due to the highly technical nature of the research. We are deploying considerable efforts, which are leading to a real revival of the laboratories of the Marcelin Berthelot site. Some have been created, others improved or reinforced. That is the case in biology, where 16 research teams have been brought together in a single unit, the Centre for Interdisciplinary Research in Biology (CIRB). This Centre provides technical and administrative support for the biologists, as well as a shared technical platform. A similar effort in terms of means, staff, premises and equipment is programmed for the development of research activities in physics and chemistry. The numbers speak for themselves: in 2006, the Collège counted approximately 150 researchers and technicians at the Marcelin Berthelot site; in 2013 there

will be close to 450. The revival of experimental research laboratories has led to the fostering of closer ties and collaboration, especially with PSL (Paris Sciences et Lettres, Research University), and in particular to developing close ties with the École normale supérieure (ENS) as well as with the École supérieure de physique et de chimie industrielle (School of Physics and Industrial Chemistry), the École nationale supérieure de chimie de Paris (School of Chemistry) and the Institut Curie. We thus have or will have, in the near future, well articulated Centres of Excellence for the three major domains of biology, chemistry and physics.

This effort should contribute to the recognition of the research carried out within our walls. It will contribute to reviving the institution's image by extending to a promising future the paths of a past punctuated with great figures of the scientific world whose names are engraved on our walls and in the history of science.

What is the role of a scientific institution like the Collège de France in society and in political life, in the broader sense, of a country?

This question appears throughout the history of the Collège de France. It is emblematic of the place made for knowledge in a society. The Collège must maintain an overarching position. One of its roles, in the domains of interest to the social and political life, is to supply analyses that are as objective as possible, performed by specialists whose scientific integrity is certified by peer recognition. On arrival at the Collège de France, professors are invested with a certain responsibility by society. The institutional recognition of their expertise imparts them with a particular authority: they are more than experts; they become references, in a sense, in their different disciplines. They also have a critical function, and become actors of political life in the broader sense of the term.

The Collège de France's strength lies in its capacity to choose the best professors and researchers in all disciplines, owing to its procedure for the selection of professors for perennial Chairs. When I took on my functions as *Administrateur*,[3] I emphasized the fact that while the Collège was certainly an assembly of great scholars, it was not an ivory tower. It is not insensitive to the questions and concerns of our society. It has built solid ties with the economic and social world, particularly with the intention of making the contributions of fundamental research available and of sharing them with its audiences. That is why we wanted the Collège de France to complete the education it offers with the creation of Annual Chairs on key issues in current affairs and on emerging scientific subjects with far-reaching social implications. Every year the Chairs created on subjects such as Technical Innovation, Sustainable Development, Knowledge against Poverty, Artistic Creation, and the Digital Sciences have allowed a renowned specialist in the field to deliver a lecture that has been broadcast on the website and translated into English, as with that of the perennial Chairs.

That is the spirit which has guided the creation of these Chairs. That is also why we have raised funding from patrons without departing from the missions that have been our own since the very beginning, and without encroaching in any way on the means that are allocated to us. The procedure for the nomination of the Annual Chairs follows the practices of the Collège: each one of them is the result of a concerted decision, after reflection by the Faculty, which mandates colleagues for preparatory work. The Annual Chairs represent an adjustable part of our activity, defined freely. Our Committee on Scientific and Strategic Orientation (COSS) has reinforced our strategy of creating Annual Chairs and seeking patrons.

We have thus benefited from the teaching of renowned researchers on current themes, and these regular spotlights have contributed to the visibility of the Collège de France on the research landscape and among the public at large. This sign of opening onto society has constituted an undeniable benefit for the institution.

The Annual Chairs can be seen as the Collège de France opening up to applied or oriented research aimed primarily at meeting the social demands that relate essentially to a political governance of science, while the Perennial Chairs are seen as representing "fundamental" science. Is this impression justified?

The boundary between fundamental research – so called "pure" research – and applied research – innovation and its transfer, for example in industry – is porous. It is actually a continuum. Of course, in the information sciences for example, one can do fundamental research essentially based on highly specialized mathematics, and one can also do applied research like in robotics where the focus is on developing a precise object, with numerous potential applications. In reality, the distinction is often not as straightforward and it is rare for the two aspects to be completely independent one from the other.

A certain number of Annual Chairs at the Collège, especially in the domain of technological innovation, are also entrepreneurs. I am glad that is the case, as it shows that the famous "transitional" research – often brought up in medicine, which seeks to ensure the transition from so-called fundamental research to application to patients –, can be carried out by real scientists who are also concerned with developing applications of their research, which can lead to the creation of a company. And this research has practical applications that are not just a source of profit for the company as they very often have wider benefits and allow for the improvement of many people's living conditions. That is at least the perspective from which we ▶

SIX YEARS AS *ADMINISTRATEUR*

▶ chose the themes and the type of education provided by these Chairs and convinced patrons to support us.

How is patron's money used?

Companies' patronage is often very oriented and requires more than returns in terms of image only: it implies that the activities of the beneficiary institutions correspond to the patron's interests. The Collège de France has been fortunate to have truly generous and trusting donors, and their donations have also encouraged projects that are not linked to teaching alone. They have provided funding for real estate projects like the renovation of the biology, physics and chemistry buildings – close to 16,000 m² –, of the General Library, and of the Cardinal Lemoine site, and for the equipment of the new biology, physics and chemistry laboratories, etc. Patronage has also been used for the broadcasting projects on our "digital campus". One of our patrons has also allowed for an ambitious information and library management system to be created.

This patronage will play a decisive role in the implementation of the archive reorganization and digitization project, which is closely intertwined with the history and identity of the Collège. We have given the Collège's renovated General Library an essentially heritage mission, as well as a mission to manage professors' archives and the archives of the teaching offered at the Collège. These are long-term projects that require forward thinking: I would personally like professors to each be able to file a certain number of their archives at the Collège, and for the documents and correspondence relating to their time at the Collège to be transferred to the archives and digitized to be usable. Eventually, research concerning all of the activities of the Collège's Professors could be done onsite.

It is moreover the contribution of a new patron that is allowing us to digitize of Étienne-Jules Marey's photographic plates, of photographs of the Chair of History of India and Greater India, of documents from the social anthropology laboratory, and of Claude Bernard's notebooks.

The Collège de France Foundation, created in 2008, also provides support for research both in the humanities and social sciences, and in the fundamental sciences. These funds represent a valuable supplement which contributes to the independence of the Collège and the freedom of its researchers.

These contributions are all the more useful since the current running budget of the Collège de France was fixed four years ago and has not evolved since, despite inflation and the charges generated by the new research spaces, which are still going to increase considerably with the completion of the physics and chemistry building's renovation and its return to operations.

The Collège de France has undergone another important change with the creation of the PRES Paris Sciences and Letters (PSL) and the allocation of the Idex. The Collège now belongs to a large collective. Does the future lie with collective work and the pooling of resources?

It is a future in the making. Creating PSL was an important and complex decision, and I recently reviewed the challenges involved[4]. It is one more opportunity to give our institution the means for consolidating its position as a leader in French research. By taking part in this project from its inception, I sought to transform the still limited cooperation attempts with the ENS into a powerful centre of research and higher education. Concerned with preserving each partner's identity in this joint undertaking, I strove for each of us to keep control over our projects and budgets. For the next five-year contract covering the 2014-2018 period, the Collège de France, just like each of the other PSL participants, will have a separate contract. This clearly means that our policy, as well as those of the ENS and the other Idex PSL partners, are preserved and individualized in our respective contracts. There will be an *additional* PSL contract, which represents supplementary funding for the Collège as well as its partner. Let me add that PSL and the Campus plan have also provided us with the opportunity to benefit from funds allocated to real estate, with which the Cardinal Lemoine site and its libraries will be modernized and restructured.

In reality, the Collège could not envisage remaining static and wallowing in splendid isolation when major reorganizations of university education and research are being implemented. This trend is not just affecting France: it is also present in Germany and in other European countries. It is necessary to bring together high-level research from the different disciplines into Centres of Excellence that are better able to gather the considerable means needed for their activities in order to be more competitive, to stay at the forefront of research.

What does the cooperation with the graduate schools involve?

The purpose of the Collège de France is to teach freely about research underway and discoveries in progress. It is not responsible for students' training. That said, the Collège cannot ignore that it is part of a higher education system to which it must also contribute. The audiences that follow the lectures and seminars of the Collège de France have always included students, as the knowledge thus imparted is different and complementary to the education received at university. For instance, the lectures of a scientist who is also the head of a biotechnology start-up provide information that would be hard to find elsewhere, and from which students can benefit. But it quickly became clear that the type of education provided at the Collège de France, as much in the humanities and social sciences as with the Annual Chairs or in the fundamental sciences, correspond to a real demand from PhD students.

With the agreement of the graduate schools, PhD students following the Collège de France courses can validate these as part of the education they are required to receive within their PhD curriculum. In this way, we are both respecting the universities' training mission and the mission of the Collège de France. In 2012, this system applies to all chairs: all lectures, seminars, symposia, and lecture series by visiting professors are offered for validation by the graduate schools with which we have conventions. Over 200 PhD students are presently following a professor's lectures. They come from 29 different graduate schools, in both the humanities and social sciences, and the hard sciences. This is a way of attracting to the Collège young audiences that benefit fully from this highly specialized education. We can surely do even better to attract PhD students if we further enhance our promotion efforts. The success of these initiatives in a competitive environment requires constant monitoring and great perseverance.

Is it easy to shift from the job of a researcher to that of the *Administrateur* of an institution such as the Collège de France?

It constitutes a very significant change which leads to new responsibilities that are different from those one is used to in a hospital ward or a university department. The objectives I had set myself with my colleagues from the Collège office required a steadfast commitment and a profound administrative reorganisation for the Collège to be able to continue fulfilling its missions. I have had to implement:

1. the shift to the Law on the Responsibilities and Freedom of Universities (LRU) on an administrative level: the Collège is now autonomous and can for example choose to handle recruitments itself and manage the positions it has;

2. the creation of *ad hoc* committees that were needed for the move to broader competences and that allowed for improved social dialogue within the institution;

3. the creation of the aforementioned research and higher education centre (*Pôle de recherche et d'enseignement supérieur* – PRES) of the PSL (whose legal structure is a scientific cooperation foundation);

4. the project of the Institute of Civilizations: apart from its scientific value, this project should allow the Collège to benefit from 45 million Euros in public-private partnership under the Campus plan;

5. the participation of the Collège in the PSL Idex project: it marks the integration of the Collège into academic and scientific collaboration with the institutions that are part of PSL, and secures the funding for major scientific projects.

Reorganizing the administrative services has required considerable efforts and an extensive mobilization of staff. These changes have allowed us to prepare for the future through the necessary modernization of the Collège.

Furthermore, I was eager to develop a social policy for the staff. As a result, a series of measures have been developed, such as an increase in funding for training, an increase in bonuses thanks to the LRU, which affords staff an administrative and financial incentive for their activity, and the implementation of a social assessment, through which every individual can situate him or herself in the life of the Collège.

I have endeavoured to foster dialogue between the different members of staff working at the Collège and to improve their living and working conditions. I have worked towards that goal in various ways: by creating an intranet to improve information within the institution; by taking advantage of the reopening of the renovated cafeteria to make it an interactive and friendly place; and by promoting the creation of the Chadocs society (young researchers and PhD students of the Collège) and supporting its activity. I have also sought to increase interaction between the professors by setting up two-day seminars for in-depth reflection on new possibilities concerning scientific life (new Chairs to create, etc.) and the major strategic options of the Collège (role of the Collège in the PSL, etc.). Finally, I have sought to enhance dialogue with the public, beyond the lectures, through events such as the Science Festival and the *Journées du patrimoine*.

You have also emphasized the international policy of the Collège de France. What does it consist of?

Our international activities are important and have warranted the creation of a dedicated unit (see "The Collège de France International Relations", pp. 100-102). Between its faithfulness to a humanist tradition that it has never denied, and its opening to new ideas and practices, the Collège de France has successfully evolved and advanced towards the future. The idea of promoting free research and working towards making it accessible to all has more currency than ever. ■

Interview by Marc KIRSCH

Source: La lettre, *no. 34, July 2012*

(1) See Henri Leridon's article in La lettre, *no. 29, July 2010. (2) Five collections are available on the OpenEdition portal, accessible from the Collège de France website (publication tab): Inaugural lectures, Directory,* Collège de France Newsletter *(previously T*he Letter of the Collège de france*), Conferences of the Collège de France, Philosophy of Knowledge. (3) See the editorial of* La lettre, *no. 18, December 2006. (4) Cf. Editorial of* La lettre, *no. 32, October 2011.*

Prof. Pierre CORVOL
Experimental Medicine
(1989-2012). *Administrateur* of the Collège de France from 2006 to 2012

The Collège de France International Relations: A Policy of International Openness

One of the Collège de France's missions is to promote French research and thought abroad, and to participate in intellectual debates on major world issues. The institution therefore participates in international exchange through its teaching and the dissemination of knowledge, as well as through the research programmes involving its Chairs and laboratories. The fact that one fifth of the professors are currently from abroad, confirms the Collège de France's widening research and education policy.

This policy of international openness translates into:
- Collège de France professors' teaching missions abroad
- Lectures and lecture series by visiting professors
- Junior Visiting Researchers scheme
- Lecture series and symposia abroad
- Internet broadcasts

Teaching in France and Abroad (*hors-les-murs*)

To encourage the dissemination of their teaching abroad, the Collège de France professors have the possibility of relocating up to a third of their annual teaching. During the academic year 2011/2012, 25 teaching missions were located abroad.

In view of this mobility, Chairs to host Collège de France professors have been created in a number of institutions abroad (each Chair receives two to three professors a year, who, in theory, give two to three hours of lectures or seminars, sometimes more as these residencies often give rise to other requests). Partnership agreements have been signed for this purpose. In 2011/2012, six of the teaching missions took place within the framework of agreements.

Visiting Professors

Following professors' proposals, including proposals by emeritus professors, the Collège de France extends invitations to numerous lecturers from abroad for two types of stay.

In the first case, a professor stays for one month (sometimes two) and gives four (or eight) one-hour lectures, once a week. Visiting professors are hosted at the Hugot Foundation of the Collège de France, which has accommodation suited to these four- or eight-week stays. The Collège de France can thus fund 24 months of residencies annually.

In the second case, lecturers' stay at the Collège de France is shorter. Lecturers generally give one or two lectures during their one- to two-week stay. The Hugot Foundation also covers for accommodation costs, and thirty-five lectures per year can be funded in this way. Most lectures delivered by visiting professors are uploaded onto the Collège de France website. Part of the proceedings can also be published in *La lettre,* the *Collège de France Newsletter* and the *Collège de France Yearbook (Cours et travaux du Collège de France)*.

Twenty-eight scholars were invited during the academic year 2011/2012.

The Partnership Agreements

To date, nineteenth partnership agreements have been signed with foreign higher education and research institutions. Most of them involve the creation of Chairs to host Collège de France professors. The agreements also provide for invitations of Visiting professors to the Collège de France. During the academic year 2011/2012, seven professors from partner universities (Berlin, Bonn, Jerusalem, Pavia, Uppsala [2], and Chicago) were invited to the Collège de France.

Certain agreements make provisions for the organization of joint symposia. Thus on 23 and 24 May 2011, under the agreement with the Peter Wall Institute of Advanced Studies (PWIAS), an international symposium on "The Commensal Microbiota: from Homeostasis to Disease" was organized at the Collège de France by Profs Phillipe Sansonetti (Chair of Microbiology and Infectious Diseases) and Brett Finlay (PWIAS), funded by the PWIAS and the Hugot Foundation of the Collège de France.

Finally, some agreements promote PhD or post-doc exchanges. During the year 2011/2012, the Collège de France hosted Francesca Lorandini, from the University of Trento, who was attached to the Chair of Prof. Antoine Compagnon (Modern and Contemporary French Literature: History, Criticism, Theory). This PhD students' visit was funded by the Hugot Foundation of the Collège de France.

Four new agreements were recently signed, one (14 March 2011) with the Pavia Istituto Universitario di Studi Superiori/ IUSS, the other (28 September 2011) with the University of Trent, the University of Tokyo (Tōdai) (29 November 2012), University of Lisbon (17 January 2013). These agreements make provisions for the creation of Chairs to host junior researchers, and for organizing exchanges between junior researchers from across the world.

Visiting Junior Researchers

As part of its research training mission, every year the Collège de France invites junior researchers (PhD students registered at other universities or post-docs) to join its Chairs, laboratories

and "Resident Research Teams". Around forty among them are recruited for associate lecturer or ATER positions that are funded by the Collège de France, and the others benefit from funding from various sources.

Three quarters of the junior researchers are scientists (primarily chemists and biologists), the others are spread across all disciplines in the humanities and social sciences.

During the academic year 2011/2012, a third of the 177 young researchers invited to the Collège de France for research residencies were from abroad (half were EU citizens).

The opening of new physics/chemistry laboratories on the Collège de France campus in 2013 will significantly increase the institutions' capacities to host junior researchers.

Partnership with France's Overseas Cultural and Diplomatic Network

Collège de France professors are regularly invited to take part in conferences organized by the Overseas Cultural and Diplomatic Network of the French Ministry of Foreign and European Affairs (MAEE). This network, one of the most extensive worldwide, includes 150 cultural centres (Institut français) and close to 30 French Research Institutes Abroad (Instituts français de recherche à l'étranger). The dissemination of French thought and the promotion of intellectual debate are among this network's main missions, which converge in this respect with the priorities of the Collège de France. Agreements have been signed with some of these institutions to set up Collège de France lecture series. The latter are organized in conjunction with local academic institutions and are often covered by the media. The first of these cycles was launched in 2007 with the Institut français de coopération in Tunisia. It was recently resumed after an interruption due to the events of 2011.

Six other cycles have been created to date, in partnership with (in chronological order) the Maison française d'Oxford (IFRE), the Institut français of Madrid, the French Embassy in South Korea, the Institut français of Budapest, the Centre Jacques Berque in Rabat (UMIFRE) and the Institut français of Bucharest.

The last three cycles were launched in 2011. Profs Pierre Corvol, Gilles Veinstein (†), and Don Zagier were invited to Budapest, and Profs Antoine Compagnon, Philippe Descola, Jon Elster, Henry Laurens, and Roger Guesnerie were invited to Rabat, where the series focuses on the study of the contemporary world. Profs Anne Cheng, Henry Laurens, Pierre-Étienne Will, Mireille Delmas-Marty, and Claudine Tiercelin gave lecture series in 2012. Finally, a series devoted to chemistry has just been launched in Bucharest. Note also that the Collège de France was the guest of honour at the celebrations for the 20th anniversary of the creation of the Collège universitaire français in Moscow, on 3-5 October 2011. Four professors (Profs Jacques Bouveresse, Pierre Corvol, Mireille Delmas-Marty, and Michel Zink) travelled to Moscow to give a series of lectures at Lomonosov Moscow State University. These partnerships have given rise to over eighty invitations extended to Collège de France professors in foreign institutions.

The creation of the Institut français on 1 January 2011 went hand in hand with the restructuring of France's Overseas Cultural and Diplomatic Network. In light of this reorganization, the Collège de France and the Institut français signed a partnership agreement in order to strengthen existing collaboration concerning the promotion of debate and the dissemination of scientific knowledge. This agreement was signed by Prof. Pierre Corvol, *Administrateur* of the Collège de France, and Mr Xavier Darcos, President of the Institut français, on 12 December 2011, on the occasion of the Cultural Diplomacy symposium organized by the Institut français at the Collège de France. This symposium, at which several Collège de France professors were speakers, was broadcast live on the Collège's website with simultaneous translation in English and Spanish, to ensure a very wide international audience.

Partnership with the Agence universitaire de la francophonie (AUF)

The AUF currently involves seven hundred and eighty institutions in close to ninety countries. Its mission is to foster ties between French-speaking universities of the North and South in order to promote solidary sustainable development.

It has set up "digital campuses" in about forty universities of the South, consisting of rooms equipped with computers and video-conferencing systems, with free access to digitized resources and remote training programmes.

In 2009, the Collège de France and the AUF initiated a partnership to disseminate the teaching of the "Knowledge against Poverty" and "Sustainable Development" Chairs in French-speaking countries of the South that are particularly concerned by these themes. A few days after their Inaugural Lecture, the holders of these Annual Chairs are invited to debate via video-conference with researchers, students, and development stakeholders, who are specially gathered specially on the digital campuses of the AUF. The audiences will have viewed the Inaugural Lecture beforehand and debated on it internally. The video-conferences then provide them with an opportunity to communicate with the professors, ask them questions and share their local experiences. Each video-conference involves six or seven digital campuses.

The French Development Agency, which supports the "Knowledge against Poverty" Chair, is closely associated to this project. Five video-conferences have already been organized. In 2011/2012, the Universities of Alexandria (Egypt), Ouagadougou (Burkina Faso), Niamey (Niger), N'Djamena (Chad), Bamako (Mali), Dakar (Senegal), Abidjan (Côte d'Ivoire), and Kinshasa (Democratic Republic of Congo) took part in the video-conference of Ismail Serageldin (Chair of Knowledge against Poverty, 2010/2011) and the Universities of Hanoi, Danang (Vietnam) and Vientane (Laos) took part in that of Jean-Marie Tarascon (Chair of Sustainable Development, 2010/2011). ▶

Creation of a Network of Junior Researchers around the Chair of "Knowledge against Poverty"

In January 2012, with this same objective of fostering relations with countries of the South, the Collège de France invited seven junior researchers from Cameroon, Brazil, Centrafrique, Madagascar, and Vietnam to a three-week residency in Paris. During this time, they were able to follow Prof. Carneiro da Cunha's lectures "For New Ways of Relating to Traditional Knowledge". Twelve of these interns have benefited from financial support from the Collège de France Foundation to carry out a research project. The operation has been repeated under the supervision of Manuel Carneiro Da Cunha, Chair of "Knowledge against Poverty" for 2011/2012. The ultimate goal is to promote the development of a network of junior researchers from the South working on the themes addressed by the Chair of "Knowledge against Poverty".

Partnership with the University of Tokyo (TŌDAI)

Every two years the prestigious University of Tokyo (Tōdai) organizes a Forum to promote its activities and encourage the development of new cooperation and exchanges, in association with some of the world's leading research and higher education institutions.

Stanford University, the National University of Singapore, and the leading universities of Beijing, Seoul, Sweden and the United Kingdom have been associated with these events. In 2011, the University of Tokyo chose French institutions for this event. The Forum took place from 17 to 21 October, in Paris and Lyon, on the theme of "The Frontiers of Knowledge". The inaugural session was held at the Collège de France on 17 October, and involved several Collège de France professors (Profs Roger Chartier, Anne Cheng, Pierre Corvol, Alain Prochiantz, Jean-Noël Robert, and Pierre-Étienne Will). Following this event, a permanent partnership between the Collège de France and the University of Tokyo, should be signed shortly.

Wide-ranging International Outreach, thanks to the New Knowledge Technologies

Since 2007, the Collège de France proposes, in open access, podcasts of lectures in audio and video, as well as the downloading of numerous textual documents. What was originally a pilot programme has been so successful that it has constantly grown and developed, owing to the simultaneous translation into English of most of the teaching cycles. A voice over is provided on the audio video, and texts (lecture notes and presentations) are translated. Some of the teaching cycles are translated into Chinese and Spanish, as well as English. In 2011, more than eighteen million hours of lectures were downloaded. The Collège de France thus aims to further the dissemination of knowledge, in line with its original mission, which is supported by the Bettencourt Schueller Foundation. ■

PARTNERSHIP AGREEMENTS
and their Collège de France coordinators (in brackets)

GERMANY

University of Bonn (Profs Michel ZINK and Don ZAGIER)
Deutsches Archäologisches Institut, Berlin (Prof. John SCHEID)

BELGIUM

Académie royale de Belgique (Prof. Jean-Pierre CHANGEUX)

BRAZIL

Federal University of Rio de Janeiro (UFRJ and Brazilian Academy of Sciences (Profs Roger CHARTIER and Jean-Christophe YOCCOZ)

CREPUQ (UNIVERSITÉS QUÉBÉCOISES)

Peter Wall Institute for Advanced Studies (PWIAS)
University of British Columbia (Prof. Philippe SANSONETTI)

CHINA

City University of Hong Kong (Prof. Claude COHEN-TANNOUDJI)

CZECH REPUBLIC

Charles University in Prague (Profs Jean-Marie LEHN and Michel ZINK)

ISRAEL

Hebrew University of Jerusalem/Institute for Advanced Studies (Prof. Gabriele VENEZIANO)

ITALY

Scuola Normale Superiore (SNS), Pisa (Prof. Gabriele VENEZIANO)
Istituto Universitario di Studi Superiori (IUSS), Pavia (Profs Stanislas DEHAENE and John SCHEID)
University of Trento (Profs Antoine GEORGES and Carlo OSSOLA)

JAPAN

University of Tokyo (Tōdai) (Profs Anne CHENG and Jean-Noël ROBERT)

LEBANON

Saint-Joseph University, Beirut (Prof. Henry LAURENS)

PORTUGAL

University of Lisbon

SWEDEN

Uppsala University (Prof. John SCHEID)

SWITZERLAND

University of Lausanne & École polytechnique fédérale de Lausanne (EPFL) (Prof. Thomas RÖMER)

UNITED STATES

University of Chicago/France-Chicago Center (Profs Édouard BARD and Pierre BRIANT)

TEACHING IN FRANCE AND ABROAD

FRANCE

École normale supérieure de Paris, Prof. Édouard BARD, Climate and Ocean Evolution, "Niveaux marins passés et futurs", October 2011 (1 seminar). **Institut national polytechnique de Lorraine (ENSG Nancy)**, "L'Océan et le changement climatique", November 2011 (1 lecture). **Université de Bretagne occidentale**, Prof. Thomas RÖMER, The Hebrew Bible and its Context, "L'Assyrie et la Bible", December 2011 (2 lectures). **Université Joseph Fourier de Grenoble**, Prof. Marc FONTECAVE, Chemistry of Biological Processes, "Chimie et défis énergétiques du XXe siècle : du soleil aux nouvelles énergies", March 2012 (3 lectures and 3 seminars). **Université Pierre Mendes-France-Grenoble II**, Prof. Roger CHARTIER, Writings and Cultures in Modern Europe, "Littérature et histoire. Les croisements de la culture écrite", May 2012 (1 lecture). **Université de Lyon (Fédération de physique André-Marie Ampère)**, Prof. Gabriele VENEZIANO, Elementary Particles, Gravitation and Cosmology, "De la corde hadronique à la gravitation quantique… et retour", March 2012 (3 lectures and 3 seminars). **Université de Nantes**, Prof. Pierre ROSANVALLON, Modern and Contemporary History of Politics, "Démocratie simple et démocratie complexe", October 2011 (3 lectures). **Université de Nice-Sophia Antipolis**, Prof. Antoine LABEYRIE, Observational Astrophysics, "Exo–planètes, étoiles et galaxies : progrès de l'observation", May 2012 (3 lectures and 3 seminars). **Université de Strasbourg**, Prof. John SCHEID, Religion, Institutions and Society in Ancient Rome, "L'étude des cultes funéraires dans l'Italie antique et dans les provinces septentrionales. Problèmes et difficultés", March 2012 (4 seminars).

ARGENTINA

Universidad de Buenos Aires, Faculdad de Ciencias Exactas y Naturales, Prof. Serge HAROCHE, Quantum Physics, "Cavity Quantum Electrodynamics", April 2012 (lecture series) Prof. Clément SANCHEZ, Chemistry of Hybrid Materials, "Design, Chemistry and Properties of Sol-Gel Derived Inorganic and Hybrid Material", October 2011 (6 lectures). **Universidad Nacional de San Martin, Buenos Aires**, Prof. Anne CHENG, Intellectual History of China. 1. "Le concept de la souveraineté dans la Chine ancienne". 2. "Les enjeux politiques de la formation du corpus canonique confucéen", April 2012 (2 lectures).

AUSTRALIA

Macquarie University and Queensland University, Prof. Stanislas DEHAENE, Experimental Cognitive Psychology, "The Organization of the Reading System: Universal Architecture and Individual Variability", December 2011 (2 lectures and 2 seminars). **Australian National University (ANU), Canberra,** Prof. Édouard BARD, Climate and Ocean Evolution, "Evolution of the Climate and the Ocean".

BELGIUM

Académie royale de Belgique, Prof. Pierre ROSANVALLON, Modern and Contemporary History of Politics, "Compliquer la démocratie pour l'accomplir", April 2012 (2 lectures). **University of Antwerp,** Prof. Philippe KOURILSKY, Molecular Immunology, "Systems Immunology", March 2012 (1 lecture).

CHINA

Sun Yat-sen University, Canton (Zhongshan daxue, Guangzhou), Prof. Anne CHENG, Intellectual History of China, "Sinology and Philosophy", September 2011 (1 lecture). **The Chinese PLA General Hospital, Beijing,** Prof. Christine PETIT, Genetic and Cellular Physiology, "Hereditary Deafness: from Genes to Molecular and Cellular Mechanisms of Hearing", December 2011 (3 lectures).

CZECH REPUBLIC

Charles University in Prague, Prof. Thomas RÖMER, The Hebrew Bible and its Contexts, "Les hypothèses récentes sur la formation du corpus biblique", April 2012 (2 lectures). Prof. Michel ZINK, Literatures of Medieval France, "Le chevalier humilié", March 2012 (2 lectures).

INDIA

The National Centre for Biological Science, Bangalore, Prof. Spyros ARTAVANIS-TSAKONAS, Biology and Genetics of Development, "Exploring Cell Signalling and Signal Integration in the Proteome", February 2012 (3 lectures).

ISRAEL

The Institute for Advanced Studies at the Hebrew University of Jerusalem, Prof. Gilles VEINSTEIN (†), Turkish and Ottoman History, "Diplomacy and Religions in the Ottoman Empire in the Early Modern Period", May 2012.

ITALY

University of Naples Federico II, Prof. Jean–Pierre BRUN, Techniques and Economics in the Ancient Mediterranean, "L'archeologia dell'energia nell'antichità", April 2012 (2 lectures and 2 seminars). **Istituto Italiano per l'Africa e l'Oriente (Rome),** Prof. Jean KELLENS, Indo-Iranian Languages and Religions, "Du monothéisme des Gâthâs au polythéisme de l'Avesta récent ?" May 2012 (3 lectures and 3 seminars). **University of Trento,** Prof. Antoine GEORGES, Physics of Condensed Matter, "Physics of Ultra-Cold Fermions in Optical Lattices", March 2012 (3 lectures and 2 seminars). Prof. John SCHEID, Religion, Institutions and Society in Ancient Rome, "Luoghi di culto, obbligazioni cultuali e dei dopo la conquista romana delle provincie settentrionali", February 2012 (3 lectures).

GERMANY

Universität Bonn, Prof. Michel ZINK, Literatures of Medieval France, "L'amour humilié", April 2012 (2 lectures).

INTERNATIONAL
VISITING PROFESSORS

TEACHING IN FRANCE AND ABROAD

JAPAN

Tokyo University, Prof. Anne CHENG, Intellectual History of China, "Le rôle de la culture japonaise de la traduction dans la modernité chinoise", September 2011 (2 lectures).

KOREA

Pohan University of Science and Technology (POSTECH), Prof. Don ZAGIER, Number Theory, "Mock Modular Forms and Mock Jacobi Forms", April-May 2012 (lecture series).

SINGAPORE

National University of Singapore, M. Serge HAROCHE, Quantum Physics, "Quantum Information with Atoms and Photons in Cavities"), February 2012 (lecture series).

SWEDEN

Uppsala University, Prof. Gabriele VENEZIANO, Elementary Particles, Gravitation and Cosmology, "Cordes, cosmologie et trous noirs", May 2012 (3 lectures and 3 seminars). Prof. Philippe DESCOLA, Anthropology of Nature, "The Structure and Agency of Images", November 2011 (2 lectures and 2 seminars).

SWITZERLAND

Swiss Federal Institute of Technology Zurich (ETH) Prof. Édouard BARD, Climate and Ocean Evolution, "Past, Present and Future Sea Levels", May 2012 (5 lectures).

UNITED KINGDOM

University of Oxford, Prof. Jean-Pierre BRUN, Techniques and Economics in the Ancient Mediterranean, "Archeology of Water-Mills in Italy and Gaul during the Roman Empire", March 2012 (2 lectures and 2 seminars).

UNITED STATES

The University of Chicago, Prof. Roger CHARTIER, Writings and Cultures in Modern Europe, "The Author's Hand and the Printer's Mind (Sixteenth and Seventeenth centuries", "Cultural History and Textual Criticism", November 2011 (1 lecture and 1 seminar). Prof. John SCHEID, Religion, Institutions and Society in Ancient Rome, "What is a Sacred Grove at the beginning of the Empire? The Example of the *lucus deae Diae* in the Suburbium of Rome", November 2011 (1 lecture and 2 seminars).

VISITING PROFESSORS

ARGENTINA

Prof. Michael JURSA, University of Vienna (Profs Pierre BRIANT and Jean-Marie DURAND) 10-31 January 2012. 1. Achaemenid Babylonia: political history and administration. 2. Babylonia in the wider context of the Achaemenid Empire. 3. Aspects of the social and economic history of Babylonia under persian rule. 4. Continuities and ruptures in the history of Achaemenid Babylonia.
Prof. Raphael ROSENBERG, University of Vienna (Prof. Roland RECHT) 19 January - 9 February 2012, "Que fait l'œil du spectateur ? Pour une histoire de la perception des œuvres d'art".

GERMANY

Prof. Ortwin DALLY, Deutsches Archäologisches Institut, Berlin (Prof. John SCHEID) 5-26 October 2011. 1. La prétendue colonisation de la Grande Grèce : l'exploitation du monde méditerranéen et de la mer Noire comme espaces économiques et de communication. Prémices et débuts. 2. La perception linéaire et la description abstraite de l'espace. L'invention de la géographie par les Grecs. 3. Les implantations nouvelles et l'identité de la population. Souvenir et mémoire. 4. La genèse de l'identité grecque : le rôle des sanctuaires panhelléniques.
Prof. Hans VAN ESS, Munich University (Prof. Anne CHENG) 9 February 2012, "The Logical Composition of the First Chinese Dynastic Histories and its Impact on their Reading".
Prof. Dieter MESCHEDE, University of Bonn (Prof. Serge HAROCHE) 6-27 June 2012. 1. Single Atoms: Probing the Quantum World. 2. Single Atoms & Single Photons. 3. Quantum Walks and Digital Quantum Simulation. 4. Have we Forgotten to Properly Celebrate the 50th Anniversary of the Laser?

ISRAEL

Prof. Israel FINKELSTEIN, Tel-Aviv University (Prof. Thomas RÖMER) 9-28 February 2012. "The Emergence of the Northen Kingdom of Israel".
Prof. Yossi GARFINKEL, Hebrew University of Jerusalem (Prof. Thomas RÖMER) 23 May 2012, "Portable Shrines from Khirbet Qeiyafa and the Biblical Descriptions of Solomon Palace and Temple".

ITALY

Prof. Andrea MORO, Institute of Advanced Studies, University of Pavia (Prof. Stanislas DEHAENE) 7 and 12 June 2012. 1. The Boundaries of Babel. The Brain and the Enigma of Impossible Languages. 2. How Much World is there in the Languages? A Case Study on the Relation between Mind and Reality.
Prof. Antonio PANAINO, Bologna University (Prof. Jean KELLENS) 12 January 2012, "Fire in Old Avestan Literature".

SPAIN

Prof. Eduardo RUIZ-HITZKY, Instituto de Ciencia de Materiales, Madrid (Prof. Clément SANCHEZ) 4-25 October 2011. 1. Le four micro-ondes : de la cuisine à la chimie de synthèse. 2. Les argiles : une matière première pour des matériaux avancés. 3. Le "laboratoire intracristallin" et la chimie dans les espaces confines. 4. Les biohydrides, un nouveau type de matériaux à l'interface du monde minéral et du vivant.
M. Jaume VALLCORBA PLANA, Writer and Editor (Profs Michel ZINK and Marc FUMAROLI) 9 and 16 February 2012, "Du Printemps au paradis. Des troubadours à Dante".

SWEDEN

Prof. Bengt MANNERVIK, University of Uppsala (Prof. Marc FONTECAVE) 27 March - 3 April 2012. 1. Glutathione transferases, detoxication, cancer and longevity. 2. Tiselius: Pioneer in separation science and the first professor of biochemistry in Sweden. 3. Molecular quasi-species in evolution applied to the engineering of promiscuous glutathione transferases.
Prof. Tord EKELÖF, University of Uppsala (Prof. Gabriele VENEZIANO) 6-27 June 2012. 1. Pourquoi poursuivons-nous la recherche sur les particules élémentaires ? 2. Les derniers exploits du Grand Collisionneur LHC au CERN. 3. Accélérateurs de particules pour la science et pour la société. 4. The Search for Charged Higgs at LHC.

SWITZERLAND

Prof. Jean-Daniel MACCHI, University of Geneva (Prof. Thomas RÖMER) 10 October - 2 November 2011, "The Book of Esther: Reflections on a Diasporic Literature in Judaism in the Period of the Second Temple".

TUNISIA

Aicha BEN ABED BEN KHEDER, Research Director, Tunisian National Heritage Institute (Prof. John SCHEID) November 2011, "Les maisons de Thuburbo Majus (Tunisie) et leur décor mosaïqué".

UNITED KINGDOM

Prof. Gilbert ACHCAR, School of Oriental and African Studies, University of London (Prof. Henry LAURENS) May 2012, "The 'Great Arab Revolt' of the Twenty-First Century: Reflections on the Ongoing Upheaval in the Arabic-Speaking World".
Prof. Riet VAN BREMEN, University College London (Prof. Denis KNOEPFLER) May - June 2012, "Les Néoi dans le monde hellénistique".

UNITED STATES

Prof. Sydney ALTMAN, Yale University (Prof. Spyros ARTAVANIS-TSAKONAS) 6 and 13 December 2012.
1. Origin of Life: The RNA World. 2. A Small Step in the RNA World: Rnase P and drugs.
Prof. Andrew ARATO, New School for Social Research, New York (Prof. Pierre ROSANVALLON) March 2012, "Theory and Practice of Post Sovereign Constituent Power".
Prof. Charles Jeffrey BRINKER, University of New Mexico (Prof. Clément SANCHEZ) June 2012.
1. Evaporation Induced Self-Assembly of Porous and Composite Nanostructures. 2. Protocells (Nanoporous Particle Supported Lipid Bilayers) for Targeted Drug Delivery. 3. Replicating Cellular Life Forms in Silica. 4. Biotic/Abiotic Materials: Behaviour of Cells in Nanostructural Isolation.
Prof. Michael BROWN, University of Southwestern Texas Medical Center (Profs Jean-Pierre CHANGEUX and Pierre CORVOL), May-June 2012.
1. Why Heart Attacks? 2. The Story of Statins. 3. Surviving Starvation. 4. Parnerships, Puzzles and Paradigms – The Joy of a Forty Year Scientific Collaboration.
Prof. Michael DETLEFSEN, Notre-Dame University (Profs Claudine TIERCELIN and Jacques BOUVERESSE), 10 and 20 October 2011. "Axiomatization, Formalization, and Completeness, Part I and II".
Prof. Chris FARAONE, University of Chicago (Prof. John SCHEID), 18 October-15 November 2011. "Ancient Greek Amulets".
Prof. Alvin GOLDMAN, Rutgers University (Prof. Claudine TIERCELIN) 9 and 19 March 2012.
1. Interpersonal Social Epistemology: Testimony and Reliance on Experts. 2. Institutional Social Epistemology: Democracy, Power, and Knowledge.
Prof. Anthony GRAFTON, University of Princeton (Prof. Roger CHARTIER) 6-22 June 2012, "Corrections et correcteurs d'imprimerie dans l'Europe de la Renaissance".
Prof. Gabriel KOTLIAR, Rutgers University, Princeton (Prof. Antoine GEORGES), 3-17 October 2011, "Strong Correlations and High Temperature Superconductivity".
Prof. Rasheed KHALIDI, Columbia University, New-York (Prof. Henry LAURENS), 12 March - 2 April 2012, "Three Moments: The United States and the Palestinians".

The New Website: www.college-de-france.fr

The project to redesign the Collège de France website drew on recurrent comments from Internet users, professors, researchers, and all the contributors.

Everyone converged around a same goal: to better promote one of the main political guiding principles of the institution, namely to share the results of first-class research with as many people as possible, using high-performing tools. The new Collège de France website was put online in September 2012, following eight months of preparatory work and the project's validation by the Faculty.

> Given the considerable increase in scientific content, both in French and in English (2,200 audio recordings, 3,000 videos and 5,000 pdf), a new architecture was adopted to allow for easier access.

All the information relating to an event is now gathered according to the date of the teaching (lecture, seminar or conference). The same goes for all of a professor's teaching activities, in order to preserve continuity over the years. Significant editorial work has therefore begun to enrich this presentation. The presentation of the teachings will be complemented with a number of texts written by the professors or their scientific colleagues, taken for the most part from summaries of the annual series of lectures published by the Collège de France. This HTML text supplement will also allow for enhanced referencing by search engines. The web pages' user friendliness has also been reviewed. In order to facilitate reading, we have opted for horizontal browsing, which is much more comfortable and intuitive for users than the previous vertical browsing.

Given that the use of handheld devices has virtually become the norm, users are now being offered a website which can adapt to smartphones and tablets. It is also compatible with all personal computer screen sizes. With this in mind the Iphone application will be launched in 2013, closely following the one for android phones. Furthermore, short videos recently made of interviews with the professors are now available; they are more accessible than a lecture and can be an incentive to gain deeper knowledge. While the website includes all the scientific material broadcast, the Collège de France has also extended its presence to social networks (Facebook, Twitter) and content aggregator sites (Itunes, itunesU, Youtube and dailymotion).

The third part of this new design project has consisted in promoting the General Library, the Archives and the specialized libraries of the Collège de France (see p. 108). They now have a specific section on the website. It seemed crucial to make them better known, as most of them offer unique collections worldwide. They provide users, and particularly students and researchers, with high-performance research tools. In line with these developments, the year 2013 will be more particularly devoted to the "Research" section, which still needs to be developed to reflect fully its core position at the heart of the Institution's activities. This will also be the case of the "Publications" sections, in order to promote the publishing activities of the Collège de France publishers involved in the dissemination of knowledge, particularly through electronic editing. Finally, one of the further aims of the website is to extend the Collège de France's international outreach and promote its visibility abroad. A wealth of content in English is already available on the site, which will soon offer browsing and contents in other languages as well, starting with Chinese.

Enlarging the content of the site and developing the media on which it is available were made possible thanks to the support of the Bettencourt Schueller Foundation. All these developments are allowing the Collège de France website to reflect the degree of excellence of this unique institution and to present fully its scientific wealth to as many people as possible, be they experts or simply curious laypersons. ■

Marion SUSINI

Source: La lettre, *no. 35, December 2012*

Publications (Printed and Online)

INAUGURAL LECTURES

NICHET, Jacques, *Le théâtre n'existe pas*, no. 213, Collège de France, 2011, http://lecons-cdf.revues.org/389.

SERAGELDIN, Ismail, *Mobiliser le savoir pour éradiquer la faim*, no. 214, Collège de France, 2011, http://lecons-cdf.revues.org/401.

KIEFER, Anselm, *L'art survivra à ses ruines*, no. 215, Collège de France, 2011, http://lecons-cdf.revues.org/386.

TARASCON, Jean-Marie, *L'énergie : stockage électrochimique et développement durable*, no. 216, Collège de France, 2011, http://lecons-cdf.revues.org/399.

ZERHOUNI, Elias, *Les grandes tendances de l'innovation biomédicale au XXIe siècle*, no. 217, Collège de France, 2011, http://lecons-cdf.revues.org/403.

SANCHEZ, Clément, *Chimie des matériaux hybrides*, no. 218, Collège de France, 2012, http://lecons-cdf.revues.org/485.

ABADI, Martin, *La sécurité informatique*, no. 219, Collège de France, 2011, http://lecons-cdf.revues.org/184.

TIERCELIN, Claudine, *La connaissance métaphysique*, no. 220, Collège de France, 2011, http://lecons-cdf.revues.org/444.

ROMANOWICZ, Barbara, *Physique de l'intérieur de la Terre*, no. 221, Collège de France, 2012, http://lecons-cdf.revues.org/487.

CLÉMENT, Gilles, *Jardins, paysage et génie naturel*, no. 222, Collège de France/Fayard, 2012, http://lecons-cdf.revues.org/496.

COLONNA, Paul, *Le carbone renouvelable dans les systèmes alimentaires, énergétiques et chimiques*, no. 223, Collège de France, 2012, http://lecons-cdf.revues.org/541.

LAUMOND, Jean-Paul, *La robotique : une récidive d'Héphaïstos*, no. 224, Collège de France, 2012, http://lecons-cdf.revues.org/498.

ROBERT, Jean-Noël, *La hiéroglossie japonaise*, no. 225, Collège de France, 2012, http://lecons-cdf.revues.org/543.

ABITEBOUL, Serge, *Sciences des données : de la logique du premier ordre à la Toile*, no. 226, Collège de France, 2012, http://lecons-cdf.revues.org/506.

CARNEIRO DA CUNHA, Manuela, *Savoirs autochtones : quelle nature, quels apports ?*, no. 227, Collège de France, 2012, http://lecons-cdf.revues.org/563.

BRUN, Jean-Pierre, *Techniques et économies de Méditerranée antique*, no. 228, Collège de France, 2012, http://lecons-cdf.revues.org/566.

IN ENGLISH TRANSLATION

LAUMOND, Jean-Paul, *Hephaestus Does it Again*, no. 224, Collège de France, 2012 http://books.openedition.org/cdf/540

ABITEBOUL, Serge, *Data Sciences: From First-Order Logic to the Web*, no. 226, Collège de France, 2012, http://lecons-cdf.revues.org/556.

CONFÉRENCES DU COLLÈGE DE FRANCE
(Monographs and Conference Proceedings)

SCHMITT, Oliver Jens, *Korčula sous la domination de Venise au XVe siècle*, Collège de France, 2011, http://conferences-cdf.revues.org/272

FUSSMAN, Gérard (ed.), *La mondialisation de la recherche*, Collège de France 2011, http://conferences-cdf.revues.org/285.

CORVOL, Pierre (ed.), *La prévention du risque en médecine*, Paris, Collège de France, 2012, http://conferences-cdf.revues.org/473.

PHILOSOPHY OF KNOWLEDGE
at the Collège de France

BOUVERESSE, Jacques, *Qu'est-ce qu'un système philosophique ? Cours 2007 et 2008*, Collège de France, 2012, http://philosophie-cdf.revues.org/84.

BOUVERESSE, Jacques, *Dans le labyrinthe. Nécessité, contingence et liberté. Cours 2009-2010*, Collège de France, 2012, http://philosophie-cdf.revues.org/345.

BOUVERESSE, Jacques, *À temps et à contretemps. Conférences publiques*, Collège de France, 2012, http://philosophie-cdf.revues.org/213.

ROSAT, Jean-Jacques, *Chroniques orwelliennes*, Collège de France, 2012, http://philosophie-cdf.revues.org/262.

LA LETTRE DU COLLÈGE DE FRANCE

The Letter of the Collège de France, no. 6
(Henceforth the *Collège de France Newsletter*)
http://www.college-de-france.fr/site/en-publications/#lm=1292512191319lp=/site/en-publications/all-issues.html

Libraries and archives

The Collège de France has an archive service and sixteen libraries across three sites.

Head Librarian and Director of the General Library: 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 groups together 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 buildings.
E-mail: bibliotheque.generale@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, the epigraphy, history and archæology of Egypt and Nubia, and, lastly, the portrayal of Pharaonic Egypt from the end of paganism to the present day. In addition, it holds the collections of scholarly archives of professors of the Collège de France and of French and foreign Egyptologists, including collections of photographic archives as well as a collection of videos.
E.mail: biblioth.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. 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 Jean Starcky and Marcel Cohen.
E-mail: assyriologie@college-de-france.fr

• **Library of Oriental Christianity.** This library consists of collections of books, periodicals and off-prints 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: assyriologie@college-de-france.fr

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 the 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 History and Civilization of Byzantium Research Centre.
E-mail: biblioth.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: bib.arabeturque@college-de-france.fr

Claude Lévi-Strauss Library (Social Anthropology Laboratory)

The library was founded, along with the laboratory in 1960, by Claude Lévi-Strauss. Its collections cover all fields of anthropology as well as related fields (sociology, history, prehistory 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, classifica- tion and filing of ethnographic data. The library participates in the ethnology network.
Website: http://las.ehess.fr/
E-mail: bibliotheque.las@college-de-france.fr

Far East Libraries

The collections of the Far East Libraries, which is the responsibility of a specific institute (see above Institutes pp. 92-93), consist of personal libraries bequeathed by professors of the Collège de France, and collections gathered by the oriental institutes of the Sorbonne 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 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 has computerized map and photograph collections covering the whole subcontinent.
E-mail **Institute of Advanced Chinese Studies:**
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caroline.riberaigua@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 Institutes. 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 (E. Chavannes, H. Maspéro, P. Demiéville), Tibetan studies (J. Bacot) and Indian and Southeast Asian studies.
E-mail: biblio.soasiatique@gmail.com

Archives

The Archives are run by the Collège de France's Libraries and Archives Department. They consist in reports of professors' meetings since 1656, course posters since 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.
E-mail: archives@college-de-france.fr ■

OTHER EVENTS

For Lectures and Lectures Series, See Visiting Professors, pp. 104-105

OCTOBER 2011

• **Inaugural Symposium of the Tōdai Forum (The University of Tokyo) "Imagining the Future"** 17 October 2011
Every two years, Tokyo University (Tōdai) organizes in a different country, under the heading of "Tōdai Forum", a presentation of its teaching and research activities in order to foster international collaboration and the mobility of its professors and students. In 2011, the Tōdai Forum "The Frontiers of Knowledge" was held in France: *http://www college-de-france.fr/default/EN/all/act_eve/17_octobre_2011_.htm*

• **Symposium "The Penal Responsibility of Legal Entity: European and International Perspectives"** 20-22 October 2011
Organized by the *Association de recherches pénales européennes* and the Resident Research Team at the Collège de France "Internormativities in Penal Law". Supported by the UMR of Comparative Law (Université Paris I Panthéon-Sorbonne/CNRS) *http://www.college-de-france.fr/default/EN/all/act_eve/Du_20_au_22_octobre_2011_La_re.htm*

NOVEMBER 2011

• **Symposium "Gender Bias and Diseases: Which Genetic Mechanisms?"** 23 November 2011
Organised by Prof. Jean-Louis MANDEL, Human Genetics

DECEMBER 2011

• **Symposium "Cultural Diplomacy: An Asset for France in a Changing World"** 12-13 December 2011
Organized by the French Institute at the Collège de France (with the participation of Collège de France professors)

JANUARY 2012

• **Guest Lecturers** (invited by the Claude-Antoine Peccot Foundation) Prof. Alessio FIGALLI, The University of Texas at Austin (USA) **"Stabilité dans les inégalités fonctionnelles, transport optimal et EDP",** Lectures series: 6, 13, 10 and 17 January 2012. Prof. Vincent PILLONI, Researcher CNRS, École normale supérieure de Lyon. **"Variété de Hecke et cohomologie cohérente",** Lectures series: 25 January, 1st, 8 and 15 February 2012

FEBRUARY 2012

• **A Tribute to Jacques THUILLIER (1928-2011)**, History of Artistic Creation at the Collège de France from 1977 to 1998. 16 February 2012 (Amphithéâtre Marguerite de Navarre)

APRIL 2012

• **Symposium "Baudelaire Modern and Anti-Modern"** 10 April 2012
Organized by Prof. Antoine COMPAGNON, Modern and Contemporary French Literature: History, Criticism, Theory

"Anatomy of a Humanoid Robot" 2 April 2012
Additional Lecture, Jean-Paul LAUMOND, Technological Innovation – Liliane Bettencourt (Illustrated by means of a humanoid robot HRP2 – 1m54, 58 kg, and followed by a debate with the audience on the stakes and challenges of humanoid robotics)

MAY 2012

• **Two-day International Symposium "From Mice to Men and Bench to Bed"** 2-3 May 2012
Organized by Prof. Philippe KOURILSKY, Molecular Immunology

• **Symposium"Metaphysics and Sciences"** 4 May 2012
Organised jointly by Prof. Claudine TIERCELIN, Metaphysics and Philosophy of Knowledge, and Max Kistler, President of the *Société de philosophie analytique* (SOPHA) and professor at the Université Paris I

JUNE 2012

• **Closing Symposium "Robotics: Science and Technology"** 12-13 June 2012 (In English)
Organized by Prof. Jean-Paul LAUMOND, Technological Innovation – Liliane Bettencourt

• **Symposium "INEXC: International Network on Expectational Coordination"** 27, 28 and 29 June 2012
Organized by Prof. Roger GUESNERIE, Economic Theory and Social Organization

• **Symposium "Les arts de la paix dans une Europe en guerre (1450-1945)" (The Arts of Peace in Europe at War)** 6-8 June 2012
Organized by the CNRS République des lettres - *Respublica Literaria* Research team, with the *Laboratoire d'excellence TransferS,* with the support of the Collège de France's Institute of Literary Studies, of the École normale supérieure de Paris, the CNRS and the *Société des amis du Louvre. http://www.college-de-france.fr/site/actualites/6-au-8-juin-2012-les-arts-de-la-paix-dans-une-europe-en-guerre-1450-1945.htm*

NOVEMBER 2012

• **Inaugural Lecture: Prof. Alain SUPIOT**
The Welfare State and Globalization: A Legal Analysis of Forms of Solidarity 29 November 2012

• **Closing Days of the Assises Nationales de l'Enseignement supérieur et de la recherche** 26-27 November 2012
Launched by the Prime Minister Jean-Marc Ayrault, followed by Serge HAROCHE, *Administrateur* of the Collège de France, and Geneviève Fioraso, Minister of Higher Education and Research

DECEMBER 2012

• **Inaugural Lecture: Prof. Edith HEARD**
Epigenetics and Cellular Memory, "Epigenetics, development and Heredity" 13 December 2012

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Collège de France Newsletter
2011-2012 – no. 7

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"Juggling with photons. This image illustrates the work of Kastler Brossel Laboratory researchers (Serge Haroche, Michel Brune, Jean-Michel Raimond, and their team), who successfully maintained a constant number of photons in a "photon box", a high-quality microwave cavity made of two superconducting mirrors."

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