

Recipient of the 2015 IETS Pioneer Award: Jean Paul Renard, Ingénieur Agronome, PhD

Dr Jean Paul Renard was born in a charming region in the southwest of France, in an area bordering the Pays Basque where the Blonde d'Aquitaine breed of beef cattle was developed. At an early age, he showed a keen interest in farm animals in general and cattle in particular. He obtained the Baccalauréat (major in mathematics) in 1965. He ranked among the first students after taking the national examination to enter one of the Grande Ecoles of Agronomy, which allowed him to be admitted to the University of Paris (now called AgroParisTech) where he graduated as Ingénieur Agronome in 1969.

Following graduation, Jean Paul became focused on international agriculture. He completed a 1-year special course about the agricultural economies of Third World nations and then spent 3 years in the field in Laos and Vietnam where he dealt with improvements in the breeding management of the local livestock (the Indo-China Yellow breed).

He then returned to France and joined the renowned Centre National Zootechnique in Rambouillet (near Paris). For the next 4 years, he devoted himself to the education of animal breeding and reproduction technicians, who in turn organised the extension services for the French cattle industry. While at Rambouillet, Jean Paul obtained good insight into practical aspects of farm animal breeding and artificial insemination techniques that were already well-developed in France at this time.

His expertise in animal reproduction became widely recognised in France, and he was recruited by INRA in 1977 as Assistant Professor under his mentor Professor Ch Thibault (IETS Pioneer awardee) in the Animal Physiology Laboratory at the famous campus of Jouy en Josas. He defended his Doctorate ès Sciences thesis in 1992 at the University Pierre et Marie Curie in Paris (*Développement de l'embryon de mammifères après exposition à température ambiante et à basses températures*). While working extensively in the laboratory he always made certain to maintain contact with the farming community. Nonetheless, he developed a growing enthusiasm to tackle more fundamental problems. In 1982, he joined the Institut Pasteur of Paris as a senior scientist in the Laboratory of Mammalian Genetics headed by Pr. Charles Babinet. There, he began to study the control of cellular differentiation in the early embryo, as will be described briefly a bit later.

Due to his fruitful output during 10 years at the Institut Pasteur, he was recalled to INRA in 1991 to assume the role of Directeur de Recherche in Developmental Biology. In 1999, he was nominated by the President of INRA as Head of the Department: 'Developmental Biology and Reproduction', which consisted of 10 research groups and 20 senior scientists at Jouy en Josas where he remained until dictated of French law lead to his retirement in 2011. He now holds the title of honorary Director of Research.

Jean Paul's expertise in making, organising and leading research has led to his appointment at several national



committees including the group 'Sciences and Law' at the French Ministry of Research, the first French National Ethical Committee, the Scientific Committee of INRA, the Commission « Biology of Development », French Ministry of Research, the National Committee of CNRS (French National Centre for Scientific Research), the Scientific and Administrative Committees of INSERM (French National Medical Research Institute), and the Scientific Committee of INRA. He has also been involved during several years in the peer review of research Grant applications for the French National Research Agency (ANR). He has also been very involved in IETS and has presented several presentations to the Annual Conference.

The career of such a high-level scientist is exemplary in many ways. Among other lessons, it shows that starting one's career in the field, in contact with real life, can provide insights that spur creativity in fundamental studies and result in pioneering achievements. In the case of Renard, those achievements have included many that are important for embryo research and the embryo transfer industry. Three research areas lead by Jean Paul that represent major advances related to embryo transfer technology are highlighted.

1. Osmotic characteristics and metabolic activities of early embryos and their relationship to cryopreservation

As a member of Ch Thibault's team and with his colleagues, Renard fine-tuned transcervical methods to transfer embryos and semi-embryos and showed that the technique was feasible in the field. He initiated experiments on the *in vitro* culture of early mammalian embryos and consequences for metabolic activity. These studies, conducted with different mammalian species (rabbit, cattle, pig and mouse), represented his initiation to comparative cellular physiology. Insights developed were important for defining the methodology for deep freezing embryos. Some members may remember the dual presentations

of Stan Leibo and Renard at the Society of Cryobiology in London (1980) where, using similar methods, they presented procedures to allow preparation of a deep frozen bovine embryo in a straw ready for transfer (Renard *et al.* 1982). An INRA patent was one result of this research.

2. Molecular aspects of preimplantation embryonic development

While at the Pasteur Institute, Renard concentrated his efforts on molecular aspects of early embryonic development, taking the mouse as a model. At the time, this topic was an open field of investigation. Two pioneering findings were published. The first was the demonstration that the oocyte's transcripts were directly involved in the control of cellular differentiation up to the blastocyst stage. The second was the identification of an early paternal molecular factor present before the fusion of the pronuclei which can interfere with development of the embryo at the blastocyst stage when it differentiates into trophoblast (Renard and Babinet 1986).

3. Nuclear reprogramming and cloning

While pursuing investigation into nuclear reprogramming, Renard and his colleagues put cattle clones on the ground (Vignon *et al.* 1998) and later produced rabbits and rat clones. The birth of the cloned calf, which was called Marguerite, almost simultaneously with the birth of a cloned calf from Jim Robl's group, had two major impacts. The first was that 'the French clone provided support for Dolly' and 'Controversy about the authenticity of Dolly, the lamb cloned from an adult udder cell, took a new turn last week with the release by a French group of preliminary data appearing to confirm that differentiated somatic mammalian cells can be reprogrammed to make them totipotent' (*Nature*, 1998, 392; 113, March 12, 1998). The second was that a media buzz was generated in France and Europe that raised questions about the ethics of cloning. Despite the pressure from the media, Jean Paul defended his research in rational terms.

Jean Paul with his colleagues Y Heyman, P Chavatte and others demonstrated that nuclear reprogramming could induce long-lasting postnatal effects due largely to placental dysfunction (Renard *et al.* 1999). This was a critical finding as such data contributed to the emergence of epigenetics as a major field for understanding regulation of developmental events.

It is in such a context that Renard and his colleagues were able to identify differences in the genomic methylation process between cloned embryos and *in vitro* produced embryos (Yang *et al.* 2007). He also showed the variability of the genomic methylation between physiologically normal adult cattle clones (de Montera B *et al.* 2010).

Awards

Dr Renard has been well-recognised by his peers. Among his many awards are the Golden Medal of the French Academy of Agriculture 2000 and the Grand Prix of the French Academy of Medicine 2006. He was also honoured as Chevalier de la Légion d'Honneur and Commandeur du Mérite Agricole.

Selected Pertinent References

To date, Jean Paul has authored 138 articles in peer-reviewed journals, 10 book chapters, and 5 patents. It is remarkable that during the last 5 years he published 40 papers in peer-reviewed journals.

Among the publications that represent his career are the following:

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And his last publications:

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