Fondation Francqui-Stichting
Fondation d'Utilité Publique - Stichting van Openbaar Nut

Ceremony of the Francqui Prize by His Majesty The King Albert II at the "Fondation Universitaire" on June 20, 1996

Curriculum Vitae - Scientific achievements - Report of the Jury

---

Etienne Pays

Curriculum Vitae

Date of birth: November 2, 1948.
Address: 19, place Saint Vincent, 1457 Nil St. Vincent, Belgium.
Married, one daughter

Laboratory of Molecular Parasitology, Institute of Molecular Biology and Medicine, Free University of Brussels, 12, rue des Professeurs Jeener et Brachet, B-6041 Gosselies, Belgium. Tel: 32 2 650 9759; fax: 32 2 650 9750; e-mail: epays@ulb.ac.be

Diplomas

- 1ère candidature Biologie (Univ. Louvain) 1966-67, Grande Distinction
- 2de candidature Biologie (Univ. Louvain) 1967-68, Grande Distinction
- 1ère licence Zoologie (Univ. Brussels) 1968-69, Grande Distinction
- 2de licence Zoologie (Univ. Brussels) 1969-70, La Plus Grande Distinction
- Doctorat Sc. Zoologiques (Univ. Brussels) 1974, La Plus Grande Distinction
- Agrégé de l'Enseignement Supérieur (Univ. Brussels) 1984

Occupations

- Stagiaire FNRS: 1970-71
- Aspirant FNRS: 1971-75
- Contract ULB: October 1975-December 1975
- Unemployment: January 1976-April 1976
- Contract asbl SMIB-ULB: May 1976-March 1977
- Concerted Action State-ULB: April 1977-December 1984
- "Long-term" EMBO fellowship: October 1977-September 1978

- Chef de Travaux ULB: January 1985
- Agrégé de Faculté ULB: January 1988
- Professeur Ordinaire ULB: January 1998
- Co-Director (October 1991), then Director (October 1992) of the Laboratory of Molecular Cytology and Embryology. In 1993, name converted into Laboratory of Molecular Parasitology.

Honorary distinctions

- Membre titulaire de l'Académie Royale de Médecine de Belgique
- Membre du Comité national de Biochimie et Biologie Moléculaire
- Chevalier de l'Ordre de Léopold

Scientific distinctions

- Léon et Henri Frédéricq Prize (Academy of Sciences, Brussels) 1983
- Albert Dubois Prize (Academy of Medicine, Brussels) 1986
- Adolphe Wetrems Prize (Academy of Sciences, Brussels) 1990
- Mohamed El Fasi Prize (Haut Conseil de l'AUPELF/UREF, Paris) 1990
- Merck, Sharp & Dohme Prize (FNRS, Brussels) 1992
- Francqui Prize (Francqui Foundation, Brussels) 1996
- Carlos J. Finlay Prize (UNESCO, Paris) 1997
- Francqui Chair (Vrije Universiteit Brussel) 1999
- Nomination for the International Research Scholars Program of the Howard Hughes Medical Institute (USA) 1999
- Quinquennal Prize for fundamental biomedical sciences (FNRS, Brussels) 2000
- Member of the Scientific Council of the Pasteur Institute (Paris) (2001-2004)
- Member of the « Collège d'examinateurs du Programme des chaires de recherche du Canada »
  (2004)
- Member of the Advisory Board of the Cochin Institute (Paris) (2005)
- Member of the Scientific Council of the Institute of Microbiology and Physiology, Université Joseph Fourier, Grenoble (2001)
- Member of the Belgian Society of Tropical Medicine (1990)
- Member of the British Society for Parasitology (1990)
- Board member of the Belgian Society of Biochemistry and Molecular Biology (2000)
- Member of the « Commission Biochimie-Biologie Moléculaire" of the FNRS/FWO and jury member at the FRIA (1993-2002)
- Member of the Scientific Council of the DEA "Expression Génique chez les Microorganismes et les Parasites" (Orsay and Lille, France)
- Member of the Steering Committee “GPH 1” (Pasteur Institute, Paris) (2004-)
- President of the Scientific Council of the Erasme Foundation (Brussels)
- Board member of BioVallée asbl
- Board member of the Brachet Foundation (Brussels)
- Board member of the Lambertine Lacroix Foundation (Brussels)
- President of the Belgian Society of Protozoology (1993-1996)
- Expert (Department of Immunology, Pasteur Institute, 1988, 1992 ; STD3 Program of the EU, 1991, 1992, 1993; AUPELF-UREF (Paris), 1995, 1996,1997,1998,1999; WHO; Wellcome Trust (London); NATO; Ministry of Cooperation (France), 1995, 1996, 1997, 1998, 1999; ARC Paludisme (Agence des Universités Francophones, Paris); UPRES A 6023 (Biologie des Protistes, Université Blaise Pascal, Clermont II, France); IFR M. Prensier (Univ. Clermont-Ferrand); CNRS (Comité ATIP Microbiologie).
- Referee (Cell, Nature, the EMBO Journal, Molecular and Cellular Biology, Nucleic Acids Research, European Journal of Biochemistry, Molecular and

Biochemical Parasitology, International Journal of Parasitology, Gene, Infection and Immunity, Parasitology, Experimental Parasitology, Trends in Parasitology, Molecular Microbiology, Journal of Cell Science, Eukaryotic Cell, Molecular Biology of the Cell)
- 'Guest Editor' of Molecular and Biochemical Parasitology, Special Issue 91, 1 (1998)
- Member of the Editorial Board of « Microbes and Infection » (Pasteur Institute, Paris)

Work periods abroad

- INSERM Virology Unit, Lille, France, april 1973
- Beatson Institute for Cancer Research, Glasgow, UK, 1977-1978
- Laboratory of Prof. P. Chambon, Strasbourg, France, April and October 1979

Academic activities

- President of the Institute of Molecular Biology and Medicine (IBMM) (2006-2008)
- Direction of Master theses : 56 in 2006
- Direction of PhD theses : in 2005, 18 completed, 5 under way
- Teaching : Biologie Moléculaire des Parasites (15h) (2de Licence Zoologie and Licence Spéciale en Biologie Moléculaire)
- Jury member for many PhD theses (ULB, VUB, UCL, Univ. Namur, Pasteur Institute Lille, Pasteur Institute Paris, Univ. Bordeaux, Univ. Cambridge, Univ. Clermont-Ferrand ...)
- President of the « Comité des Bourses » of the Brachet Foundation

* * *

Scientific achievements

Antigenic variation and the problem of the vaccine against African trypanosomes.

Introduction

African trypanosomes are unicellular parasites that cause "sleeping sickness" in man and a related disease termed "Nagana" in cattle. These deseases occur throughout large areas of subsaharan and central Africa, and have enormous medical, veterinary and economic consequences, representing a major hindrance to the development and well being.

The trypanosomes are injected in the bloodstream wy the biting of mammals by several species of Glossina usually called tsetse flies. The mammals react by raising antibodies against the major surface protein of the parasite, termed VSG for Variant Surface Glycoprotein. However, the trypanosomes are able to change repeatedly this surface antigen and, thus, evade the immune defences of their host. The continuous interplay between this mechanism of antigenic variation and the immune response leads to a constant limitation in the number of parasites present in the bloodstream, which allows the survival of the host long enough to ensure the possibility of transmission of the trypanosomes to the next vector, the tsetse fly. Therefore, the variation of the VSG is responsible for the development of long-lasting chronic infection by the parasite and, of course, represents a major obstacle for vaccination against trypanosomiases.

Genetic mechanisms of antigenic variation.
In order to design effective measures against trypanosomiases, it was important to understand the mechanisms of antigenic variation of the parasite. Our work has contributed to the characterization of the genetic processes involved in this phenomenon. At any given time, a single VSG gene is transcribed from a repertoire of 1,000 VSG genes present in the parasite genome. This transcription always occurs at an "expression site" located at the end of a chromosome. While several chromosome ends can be used as expression sites, only a single one is active at a given time. Antigenic variation occurs either by rearrangement of the transcribed BSG gene (DNA recombination) or by switching of the expression site. These mechanisms allow the trypanosome to continuously create new VSG genes from fragments of other genes. Analysis of these gene activation procedures led to the conclusion that the variation potential of the VSG is probably unlimited. This study also produced a wealth of information about the processes of DNA recombination, replication, modification and transcription at chromosome ends (telomeric DNA).

Mechanisms of cellular differentiation.
During their life-cycle in the fly and mammalian bloodstream, the trypanosomes undergo important transformations (cellular differentiation) which enable them to adapt to the very different environmental conditions. We undertook the analysis of the genetic controls underlying these transformations. This work has uncovered an original organization of the genome, which is completely different to that of other eukaryotes (organisms with a cellular nucleus). The trypanosome genome is organized in polygenic transcription units containing different genes transcribed together. The relative extent of expression of each gene, which in turn determines cellular differentiation, is controlled at several steps during the production of individual messenger RNAs from the initial polygenic RNAs. These observations have led to new insights in some of the processes involved in the expression of genetic information in all living cells.

Invariant surface proteins and vaccination prospects.
The study of the function of the different genes present within the polygenic transcription unit containing the VSG gene led us to discover several invariant surface proteins, the functions of which are important for the growth of the parasite. Examples include several different adenylate cyclases with a receptor-like structure and a novel type of receptor for fransferrin, which carries the vital iron molecules. Together with other surface receptors, these molecules are clustered in a specialized invagination of the parasite membrane, termed the flagellar pocket. Our recent results allow us to hope that some of the proteins present in this particular location may prove useful as new vaccination targets against trypanosomiases.

* * *

Report of the Jury (April 13, 1996)

Considering the impact that the elucidation of the mechanism of antigenic variation in trypanosomes has had on the understanding of how invading

micro-organisms evat their hosts' immune defences and in particular its importance to the health of developing countries;

considering the advances in understanding the mechanisms of transcription of polycistronic transcription sites and regulation of gene expression at the post transcriptional levels in cells with true nuclei and its importance in understanding how cells differentiate;

the Jury proposes that the Board of the Francqui Foundation awards teh 1996 Francqui Prize to Professor **Etienne PAYS** of the Free University of Brussels (French).

Jury members :

Professor Howard RASMUSSEN
Professor and Director Institute for Molecular Medicine and Genetics
Medical College of Georgia
Augusta, Georgia - USA

Voorzitter

en verder

Professor Lorne BABIUK
Director of the Veterinary Infectious Disease Organization
University of Saskatchewan
Saskatoon, Saskatchewan - Canada

Professor Allan BALMAIN
Professor of Molecular Oncology
University of Glasgow
UK

Professor Brian F.C. CLARK
Professor at the Aarhus University
Department of Biostructural Chemistry
Aarhus - Denmark

Professor Norbert E. FUSENIG
Professor at the Deusches Krebsforschungszentrum
Heidelberg - Germany

Professor Félix M. GONI
Professor at the University of Basque Country
Department of Biochemistry
Bilbao - Spain

Professor P. Helena MAKELA
Research Professor Departement of Vaccines
National Public Health Institute
Helsinki - Finland

Professor Peter PROPPING
Professor and Director of the Institut für Human genetik
Rheinische Friedrich-Wilhems-Universität
Bonn - Germany

Professor R. VAN DE WATER
Professor of Otolaryngology & Neuroscience
Albert Einstein College of Medicine

Bronx, New York - USA

Professor H. VOORHEIS
Professor at the University of Dublin
Senior Lecturer in Biochemistry
Trinity College
Dublin - Ireland

Professor C. WEIR
Professor at the Joslin Diabetes Center
Harvard Medical School
Boston, Massachusetts - USA

* * *