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Charles Auffray is the son of poet, singer and textile artist Mariel Clarmont and quantum physicist, mathematician and science history writer Jean-Paul Auffray. He was born in Paris on January 9, 1951. He is married to Marie-Hélène (1973). They are the proud parents of 5 children (Bertille born 1973, Jeanne-Claire 1975, Matthieu 1979, Laetitia 1984, Louis 1991) and 11 grand-children (2001-2018). He has been an amateur practitioner of basket-ball, track and field, skiing, mountaineering, hiking, swimming, chess, Scrabble, choir singing, photography, reading and writing since a young boy.

Charles Auffray grew up in the St Louis island in Paris as a "Ludovician" and went to its public elementary school (1956-1961). He studied at the Lycée Henri IV junior high school in Paris (1961-1963) and as an intern at the high school in Rambouillet (1963-1968), obtaining his Baccalauréat in Life Sciences with the highest honors (1968). He prepared the entrance examination for French Grandes Ecoles at Lycée Saint Louis in Paris (1968-1970) and Lycée Georges Clémenceau in Nantes (1970-1971), entering Ecole Normale Supérieure de Cachan as major (1971), from which he graduated with a Masters in Biochemistry from Denis Diderot University of Paris, the Professorships certifications in Nutrition (1974) and Agrégation in Physiology and Biochemistry (1975), the Pierre & Marie Curie University of Paris laboratory training diploma at CNRS Institute for Chemistry of Natural Substances in Gif s/Yvette with Dr Michel Privat de Garilhe, and the Pasteur Institute Immunology Course diploma with teammate Chantal Rabourdin-Combe who graduated together as majors (1976).

He prepared his State Doctorate in Molecular Immunology and Genetic Engineering with Dr François Rougeon at the Genetic Engineering Unit of the Pasteur Institute in Paris and graduated with the highest honors from Pierre & Marie Curie University of Paris (1981). He was a Post-doctoral Fellow and Junior Faculty with Prof Jack Strominger at the Department of Biochemistry and Molecular Biology, Harvard University, Cambridge, USA (1981-1983); Group Leader at the Institute of Embryology, CNRS and Collège de France in Nogent s/Marne with Prof Nicole Le Douarin (1983-1991); Scientific Director of the Genexpress Program at Généthon in Evry, the first ever trans-disciplinary laboratory dedicated to the different facets of the Human Genome Program in which patients and their families, doctors and clinicians, scientists and engineers joined forces to accelarate the collection and integration of the multiple types of knowledge that are required to decipher the molecular, cellular, organ and functional bases of genetic diseases. Généthon became a model for the development of similar centers across the world, extending its scope to prominent chronic and infectious diseases. It was founded by the French Muscular Dystrophy Association and the CEPPH-Jean Dausset Foundation with Prof Daniel Cohen, Dr Jean Weissenbach and Mr Bernard Barataud (1991-1995); Head of the CNRS Research Unit in Molecular Genetics and Developmental Biology, then Functional Genomics and Systems Biology for Health in Villejuif with Drs Rima Zoorob, Dominique Piatier-Tonneau, Marie-Dominique Devignes, Guido Kroemer, Geneviève Piétu, Anna Senik and Prof Bernard Charpentier as team leaders (1991-2011).

Charles Auffray is a Research Director at the CNRS Institute of Biological Sciences since 1986. He founded the European Institute for Systems Biology & Medicine (EISBM) in December 2010 with operations in Lyon supported by the local authorities, the academic and industrial partners of the Lyonbiopole international competitive cluster through Mr Yves Laurent and Prof Alain Cozzone, with facilities hosted by Claude Bernard University of Lyon and the Technology Research Institute Bioaster within the Lyonbiopole Infectiology Center with Dr Alain Troesch, both located within the Charles Mérieux campus of Lyon University in Gerland. In 2012 he joined the Joliot Curie transdisciplinary Laboratory of CNRS and Ecole Normale Supérieure de Lyon with Dr Françoise Argoul, also collaborating with Dr Vitaly Volpert from the Camille Jordan Institute of CNRS and Claude Bernard University. From 2015 to 2017, he was affiliated to the International Center for Infectiology Research with Drs Vincent Lotteau and François-Loic Cosset. He is currently pursuing his research activities as CNRS Honorary Research Director and EISBM President on a voluntary basis with physiotherapist Mr Bertrand Boutron through an extensive international network of cross-disciplinary scientists, scholars, citizens and organizations.

Charles Auffray develops a systems approach to complex diseases, integrating functional genomics with concepts and tools of mathematics, informatics and physics, also contributing to the development of a scale-relative biology framework for Integrative Systems Biology, Physiology and Medicine with astrophysicist Dr Laurent Nottale (Paris-Meudon Observatory) and physiologist Prof Denis Noble (University of Oxford). He is promoting open-access reagent, instrumentation and information platforms through public-private partnerships. He co-founded the IMAGE Consortium in 1992 with US colleagues Dr Greg Lennon (Department of Energy, Lawrence Livermore), Dr Mihaelis Polymeropulos (National Institutes of Health, Bethesda) and Prof Bento Soares (Columbia University, New York). The Systemoscope International Consortium he formed with Profs Leroy Hood (Institute for Systems Biology, Seattle, USA) and Zhu Chen (Center for Systems Biomedicine, Shanghai, China), was launched in Paris in 2003 under the auspice of the French Republic President with the support of sociologist and philosopher Mr Edgar Morin, Dr Magali Roux Rouquié and Mr Jean-Paul Dussausse (Association for Complex Thinking), as well as Mr Michel Rouger and Mr Philippe Rouger (PRESAJE Institute for Prospective, Research and Societal Studies in Law and Economy). The Disease Maps Community was initiated in 2011 with Profs Rudi Balling and Reinhard Schneider (University of Luxembourg Center for Systems Biomedicine), joined in 2017 by Dr Emmanuel Barillot (Institut Curie, Paris). Each of these initiatives were designed to also tackle the related epistemological, ethical, legal, philosophical and socio-economical issues with emphasis on interdisciplinarity, public outreach and education.

The Disease Maps Community is currently fully engaged with over 150 voluntary scientists and clinicians from 30 countries worldwide to fight the COVID-19 pandemy in close collaboration with other complementary initiatives such as DisGeNET, ELIXIR, Garuda, IMEx, OHDSI, Pathway Commons, Physiome Project, Reactome, Virtual Metabolic Human, and Wikipathways, contributing to the « Olympics of Solidarity and Health ».

Charles Auffray has participated since 1990 in more than 20 European Union funded projects, as the coordinator of EURO-IMAGE (Integrated Molecular Analysis of the Genome and its Expression, devoping cDNA resources for functional genomics 1996-2001), and as an active participant in the recent Innovative Medicines public-private partnerships: U-BIOPRED coordinated by Prof Peter Sterk, Amsterdam Medical Center, The Netherlands (Unbiased BIOmarkers for the PREDiction of pulmonary disease outcomes with focus on severe asthma 2009-2015), eTRIKS coordinated by Prof Yi-Ke Guo, Imperial College, London, UK (European Translational Research Information and Knowledge management Services 2012-2018) and PIONEER coordinated by Prof James N'Dow, University of Aberdeen, UK (Prostate Cancer DIagnOsis and TreatmeNt Enhancement through the Power of Big Data in EuRope

2018-2023); similarly, he has been involved in FP7 MeDALL coordinated by Profs Jean Bousquet, Inserm, University of Montpellier, France and Josep Anto, CREAL, Barcelona, Spain (Mechanisms of the Development of ALLergy 2010-2015); SysCLAD coordinated by Profs Laurent Nicod, Centre Medical Vaudois, Lausanne Swizerland and Christophe Pison, University of Grenoble-Alps, France (Systems prediction of Chronic Lung Allograft Dysfunction 2012-2014); PREPARE coordinated by Profs Herman Goossens, University of Antwerp, Belgium and Menno de Jong, Amsterdam Medical Center, The Netherlands (Platform for European preparedness against Re-emerging epidemics 2014-2018); and the Coordination Action CASyM developing the road map for implementation of Systems Medicine across Europe coordinated by Dr Marc Kirschner (2012-2017), through which he co-founded the European Association of Systems Medicine (EASyM) in 2015, acting as Chair of its Executive Board until 2017.

At the European Institute for Sysems Biology & Medicine, Charles Auffray is fostering the transition from reactive to proactive Systems Medicine (Preventive, Predictive, Personalized and Participatory, P4 Medicine) through the Pioneers of Health and Wellness Vistera Project in partnership with the Institute for Systems Biology in Seattle, USA (with Pof Leroy Hood) and a worldwide network of systems medicine centres, including the Luxembourg (with Profs Rudi Balling and Reinhard Schneider), New Delhi, India (with Prof Samir Brahmachari) and Shanghai, China (with Profs Zhu and Sai-Juan Chen) Centres for Systems Biomedicine, working toward a World Alliance of Health and Wellness that should form a partnership with the United Nations organizations such as WHO and Unesco.

Charles Auffray is the co-author of more than 300 publications in international peer-reviewed journals (H-index=72). He has contributed to 12 books or book chapters for the general public including *Le génome humain (The human genome),* Flammarion, Paris 1996, 2002; L'origine de la malformation (The origin of malformation) in *A visage différent. L'alliance thérapeutique autour de l'enfant meurtri (With a different face. The therapeutic alliance around the bruised child)* Hermann, Paris 1997; *Le Trésor, Dictionnaire des Sciences (The Treasury, Dictionary of Sciences)*, Flammarion, Paris 1997, a trans-disciplinary dictionary of major scientific concepts, methods and tools led by science philosophers Prof Michel Serres and Mrs Nayla Farouki, with computer scientists Dr Gilles Dowek and Prof Jean-Gabriel Ganascia, mathematician Prof Christian Houzel, geneticist Prof Albert Jacquard, physicist Prof Etienne Klein, chemist Prof Pierre Laszlo, and earth scientist Prof Jean-Paul Poirier, which became a reference for the general public in France. It was followed up by *Le Petit Trésor, Dictionnaire de la Biologie (The Small Treasury, Dictionary of Biology),* Flammarion, Paris 1998 with Prof Albert Jacquard*; Qu'est-ce que la vie ? (What is life?)* Collection Quatre à quatre, Le Pommier-Fayard, Paris 1999 with Dr Louis-Marie Houdebine; *Paysage des Sciences (Landscape of Sciences)*, Collection Lire l'image, Le Pommier-Fayard, Paris 1999; A series of chapters as support for school teachers and parents involved in the hands-on science education initiative « La Main à la pâte » : La cellule (The cell) In *Graines de Sciences 1 (Seeds of Sciences 1)* Le Pommier-Fayard, Paris 1999; Le corps humain (The human body) in *Graines de Sciences 2 (Seeds of Sciences 2)*, Le Pommier-Fayard, Paris 2000; Les cinq sens (The five senses) in *Graines de Sciences 3 (Seeds of Sciences 3)*, Le Pommier-Fayard, Paris 2001; Les puzzles de la matière vivante (The puzzles of living matter) in *Les progrès de la peur (The Progress of Fear)*, Le Pommier, Paris 2001; Cellules souches et clonage: dilemmes éthiques et juridiques (Stem cells and cloning: ethical and legal dilemnas) with Prof Zhu Chen in *Les défis du vivant (The challenges of life)*, Institut PRESAJE, Paris 2004; *Qu'est-ce qu'un gène ? (What is a gene?)* Collection Les Petites Pommes du Savoir, Le Pommier, Paris 2004; Le défi de la biologie systémique intégrative: développer une théorie du vivant fondée sur les principes premiers de la relativité d'échelle (The challenge of integrative systems biology: develop a theory of life founded on the first principles of scale relativity) with Dr Laurent Nottale in *Défis Technologiques et Scientifiques au XXIème siècle (Technological and Scientific Challenges in the 21st Century)*, Ellipses, Paris 2007; La nouvelle jeunesse d'une vieille dame de deux

cents ans (the new youth of a two-century old woman) with Dr Laurent Nottale in *Les dix ans du Pommier*, *Ten years of Le Pommier*, Le Pommier, Paris 2009.

National and international societies: member of the Human Genome Organization (HUGO) since 1991, chaired its intellectual property rights committee; Co-founder of the International Society for Systems Biology (ISSB), Yokohama 2006-present; Co-Founder and Vice-President of HLA et Médecine-Systemoscope with Prof Dominique Charron 1989-2018; Member of the European Respiratory Society (ERS) 2010-present; Co-founder of the European Association of Systems Medicine (EASyM) Brussels 2015-present, Chair of the Executive Board 2015-2017; Honorary member, Associazione Italiana di Medicine e Sanita Sistemica (ASSIMSS - Italian Association of Systems Medicine and Health) with Drs Christian Pristipino and Alfredo Cesario, Rome 2017-present.

Review committees of research projects: Member (2008-2013) then Chair (2015-2017) of the European Research Council (ERC) panel for Advanced research grants on genetics, genomics and systems biology 2008-2017; reviewer of ERC Starting grants 2008-2012, Synergy grants 2011-2013; Academy of Finland 2004-2006; Advanced Industrial Science and Technology Agency (AIST), Japan 2000-2005; CNRS National Committee 1991-1993; National Cancer Institute, France 2008-2011; National Research Evaluation Committee, Tunisia 2003-2010; Department of Energy (DOE) Genome Program, USA 2003; Severo Ochoa Centers of Excellence Review Comittee, Spain 2012-2014; European Science Foundation (ESF) and Foundation for Science and Technolgy (FST) Life Science and Interdisciplinary Research Institutes Review Committee, Portugal 2014.

International Scientific Boards: Biovision (2011-2014); Center for Infectiology Research, Lyon (2011-2015); European Molecular Biology Laboratory, Heidelberg (2003); AIST, Japan (2000-2005); DHU2020 on Personalized Medicine of Chronic Diseases, Nantes University Hospital (2014-2016).

Editorial boards of international peer-reviewed journals: *Genome Research* 1995-2003, *Public Library of Science* 2000-present, *Faculty of 1000 Physiology* 2005-present (95 recommendations), *EMBO/Nature Molecular Systems Biology* 2005-2016, *Genome Medicine* section editor 2009-present.

Peer-Reviewer for *BMC Genomics, BMC Journal of Translational Medicine, BMC Medical Genomics*, *British Medical Journal Open*, *EMBO Journal, EMBO Reports, Elsevier Books, Foundations of Science, European Respiratory Journal, Gene, Genome Research, Genome Biology, Genomics, Immunogenetics, Journal of Complementary and Alternative Medicine, Journal of Proteomics, Journal of Theoretical Biology, Nature, Nature Genetics, Nature Medicine, Nucleic Acids Research, PLoS One, PLos Computational Biology, PNAS, Respiratory Research, Theoretical Biology and Medical Modelling, etc.*

Reviewer of research grant applications for international research organizations: Génome Québec (Canada); Ministerio de Economia y de Competitividad (Spain); European Science Foundation, Human Science Frontier Program (ESF-HFSP, France), Association Française contre les Myopathies (AFM-Généthon, France), Italian Association for Cancer Research and Italian Ministry Program for Funding of University Research (Italy), Bar-Ilan University Faculty of Sciences (Israel), Foundation for Polish Science (Poland), Wellcome Trust (United Kingdom), Bill & Melinda Gates Foundation, USA; US Department of Agriculture and National Science Foundation (USDA, NSF, USA).

Organizing committees of national and international conferences in functional genomics and systems biomedicine (e.g. Paris 2000, Sao Paulo 2001, Seattle 2002, Tokyo 2003, Shanghai 2005, Berlin 2015, Rome 2016, Utrecht 2017). H-Invitational Consortium for integrative annotation of 21,037 human

genes validated by full-lenth cDNA clones, Co-coordinator with Prof Takashi Gojobori (JBIRC/AIST, Tokyo, Japan), with 67 teams from 40 institutes in 12 countries (2000).

Consultant for Rhône Poulenc Santé, Pasteur Vaccins, France (1983-1989); InforMax, USA (1998-2000); bioMérieux, Marcy L'Etoile, France (2006-2008); Member of the Scientific Board of Institut Mérieux, Lyon, France (2008-2014).

Training: Charles Auffray has recruited, supervised and trained 20 researchers who obtained permanent positions in prominent academy or industry organizations worldwide, 55 post-docs, 12 graduate students, 45 engineers, technicians and administrative staff.

Awards: Charles Auffray has received the Young Immunologist Bernard Halpern Prize (Paris 1985), and delivered the Alexander Bayev Memorial lecture (Moscow 2002). He was distinguished in 2016 at the Génocentre in Evry as a « French Pioneer of Medical Genomics » together with Prof Daniel Cohen, Dr Jean Weissenbach and Mr Bernard Barataud during a public ceremony presided over by the Prime Minister in the presence of the Secretary of State for Higher Education and Research and the AFM President, receiving on this occasion the distinction of honor of Génopole, the gold medal of the Essonne department, and the medal of honorary citizen of the city of Evry.

He has given >250 invited lectures at scientic meetings and research centers around the world (Algeria, Austria, Belgium, Brazil, Canada, China, Czech Republic, Egypt, Estonia, France, Germany, Greece, India, Ireland, Israel, Italy, Japan, Luxembourg, Poland, Russia, Saudi Arabia, Slovenia, South Korea, Spain, Sweden, Switzerland, The Netherlands, Tunisia, Turkey, UK, USA), delivering a brief introduction and conclusion in 17 of the local languages.

He was invited in 1992 by UNESCO Director General Federico Mayor in a joint-session organized with Prof François Gros from the French Academy of Sciences to present the view of the academic community supporting the free dissemination of the data generated on the human genome and its expression, and the impact this could have on the deciphering of the molecular bases of the large number of orphan genetic disorders that affect the lives of large numbers of individuals and their families, brought to the forefront of the international scene on this occasion. His statement was viewed by 115 million people worlwide. It served as a basis for the preparation of the Universal Declaration on the Human Genome and Human Rights endorsed unanimously by Unesco (Paris 1997) and the United Nations Organization (New York 1998).

Public service, education and outreach: Charles Auffray has been a member of the Council for the Rights of Future Generations to the President of the French Republic with explorer Cdt Jacques-Yves Cousteau, philosopher and historian of sciences Prof Michel Serres and geneticist Prof Albert Jacquard (1993-1995), of the Working Group of the UNESCO International Bioethics Committee since 1992. He represented Unesco General Director Federico Mayor and the French Government at a hearing of the US Congress Office of Technology Assessment on genome patenting held in Washington DC (1993). He has contributed actively to public education through the hands-on science initiative *La Main à la Pâte* with Profs Georges Charpak (CERN) and Pierre Léna (French Academy of Sciences) in elementary and secondary schools (1996-2001).

Through the Center for Bioethics Observatory of Genetics, University of Montréal, Canada he has published 10 online contributions to societal debates on such issues as medical responsibility and national solidarity, the handicap, and DNA as a myth (2002); a common ethics of genomics for France and China, the worlwide landscape and the divergent views of France and China on stem cells with Prof

Zhu Chen (2003); the conceptual, technological, ethical and societal principles of the Systemosope Consortium dedicated to the study of the complexity of biological systems with Profs Zhu Chen and Leroy Hod (2003); the technical and ethical issues of cloning and human embryonic stem cells (2004); an historical perspective of Gregor Mendel's pertinent experiments on the development of hybrid plants contribution at the sources of genetics and systems biology based on a detailed re-analysis of Gregor Mendel's 1865-1866 lectures and papers (2005). He has published with Prof. Jan Klein (former Director of the Max Planck Institute of Biology in Tübingen, Germany and Professor at Pennsylvania State University, USA) and his father Dr. Jean-Paul Auffray (former Prof at the Current Institute of Mathematics of New York University, USA) an article entitled « Les années heureuses de Gregor Mendel, l'enfance du fondateur de la génétique » (The happy years of Gregor Mendel, the youth of the founder of genetics), in the journal *Signatures* (Editions Faton, Dijon, France 2009). He has published with Prof Denis Noble (University of Oxford, UK) a comparative analysis of the English and French translations of William Harvey's seminal work, published in Latin in 1638, on « the movement of heart and blood in animals », showing that Harvey was a precursor of systems biology (2009).

Charles Auffray regularly gives interviews and publishes opinion articles in the general press and the media, contributing to contemporary societal debates.