Training Tomorrow's Scientists

In September 2005, under UK presidency the political decision was taken to create the ERC for the funding of basic sciences, including social sciences and humanities, by the FP budgeted. The funding should be based on no other criteria than Scientific excellences as defined by independent peer review process as required by the scientific community.

However, two common key points were not included in the initial political agreement and in fact these are still open i: The creation of the ERC as areal European Institute ii. The creation of a mechanism preferably under the ERC umbrella to fund collaborative (Bottom up) basic research. Today such a position still acts as a powerful blocking factor against greater contributions by scientists to scientific strategic steering of EU science policy.

Anyhow campaign for the creation of ERC and for the funding of bottom up research by the EU-FP exclusively on scientific ground was a unique event in the history of European Science policy. Initially, this was a movement led by some large European Scientific Societies like FEBS and other Euro Science federation joined by a few rather independently managed organization as the ESF, EMBO etc. As well as individual scientists.

Horizon 2020 was Europe's flagship programme for research and Innovation. Among the main objectives of the program were leverage excellence and foster cross border collaboration, boost the European Health and wealth, close the gap between research and market. Although Horizon is an interesting programme the scientific community has faced it with scepticism. As can be seen from the results of the mid-term evaluation, among the main points of criticism are: the low percentage of the budget available for basic research, the overall success rate below 13% (compared with ~20% for FP7), high bureaucracy and problems with reviewer selection.

Towards shaping of FP9 the commission appointed a committee called "Lamy high level group" for suggestions. The committee made eleven recommendations and the general group mandate was: "To formulate a vision for the future EU research and Innovation, to draw strategic recommendation on maximizing the impact of EU R&I programmes in the future".

In the same time Scientific federations between them "Alliance for Biomedical Research in Europe whose FEBS is full and very active member made important recommendations for the EU's ninth framework programme between them: Strongly support the lamy report's recommendation in double the overall budget of the next framework programme advocating dedication of 25-30% of the FP9 budget to biomedical and health related research, increased funding for ERC and basic clinical and translation research, improving the low success rate of application through balanced and broader calls, as well as a rigorous selection at 1st stage and continuity in funding for successful networks established in previous frame work programmes.

IS-15

A RESEARCH TRAINING CENTER MODEL: THE WEIZMANN INSTITUTE OF SCIENCE

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The Weizmann Institute conducts research and offers graduate education in the breadth of scientific disciplines, with an emphasis on cross-disciplinary investigation. The Weizmann Institute is comprised of five faculties, constituted of 18 departments and additional service units. The Faculty of Chemistry advances the dream of Dr. Chaim Weizmann, an organic chemist, who was the original visionary of the Institute. Research in the Faculty is ranging from theory to experimentation, and from the Nano to the planetary scales. The Faculty of Physics advances research in the physics of complex systems, condensed matter physics, and particle physics and astrophysics. There is about an equal number of experimentalists and theorists. The Faculty of Mathematics consists of the Department of Mathematics and the Department of Computer Science and Applied Mathematics. The research carried out in the faculty ranges from abstract and theoretical studies within mathematics and computer science in other sciences, to their application in concrete industrial developments. The Faculty of Biology together with the Faculty of Biochemistry, span research efforts towards understanding of life at all levels, from the molecule to the cell and the entire organism, from immunology, the human brain, to the body's development and

regulatory processes. Biochemistry research focuses on the processes of life at the levels of molecules, cells, organs, organisms and ecosystems. At the basis of all these levels of organization are the biomolecules, including DNA, RNA, proteins, polysaccharides and small molecules. Graduate studies at the Weizmann Institute of Science are conducted through its Feinberg Graduate School which awards M.Sc. and Ph.D. degrees in life sciences, chemical sciences, mathematics and computer science, and physics. It also awards non-thesis MSc degrees in science education. Graduates go on to senior positions in academia and industry. All students are integrally involved in research conducted at the Institute, working collaboratively with faculty members and postdoctoral fellows. All students receive full scholarships and living stipends so that they can devote their time to research and study.

IS-16

BIOLOGY IN THE THIRD MILLENNIUM: TOOLS, PROMISES, CHALLENGES AND ETHICS

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The early 2000 were characterized by the publications of several eukaryotic genomes of major importance (*Homo sapiens* or *Arabidopsis thaliana* for examples, even if the *Saccharomyces cerevisiae* genome was previously released in 1996) and at the time they were considerate as a critical data sets for future functional analysis. However, an incredible number of new high-throughput technologies (genome, transcriptome, proteome, interactome, metabolome, etc.) directly related to the development of new bioinformatics approaches have emerged each couple of years. The massive usage of these new tools is at the origin of a tremendous acceleration of biological information: an incredible burst of knowledge.

We proposed to observe how few of these new tools for deciphering life have introduced changes to conduct biological analysis; to reveal what was hitherto the domain of the unknown (gut, deep ocean); the link between traditional description of living organism and their genome (the come-back of Natural History); the positive and negative role of "model organisms".

Due to the genomic tools, the biodiversity so frequently cited but still widely unknown, starts to reveal its incredible complexity. The corresponding data have strongly modified the tree of life and in addition revealing how important is the horizontal transfer of genetic elements. These incredible new data sets, scientifically interpreted, could be used for potential positive application for the human societies as for examples identifications of a new generation of antibiotics; improving teaching efficiency based on brain imaging that facilitate a better understanding of the human brain function in space and time; production of cereal genomes fully sequenced and annotated (wheat for example) is a perfect data set to do breeding in a knowledge-based way. In addition genetics tools are used to determine both the function of genetic elements but also to modify all kinds of genomes. This last point was discussed as an important bio-ethical question (43rd FEBS Congress, Prague 2018, July). The consequences of this burst of knowledge are multiples, the high production of data introduce the notions of: data bank quality (EMBL-EBI for ex.), long-term storage of all data, quality of publications and accessibility (paywall and unpaywall), misconducts, fake science, plagiarism and intellectual property. Another consequence for our working group: what to be teach in the future in molecular science education? This is a very important open question.

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IS-17

JOINT RESEARCH WITH THE INDUSTRY

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During the last few decades the shift from uni-directional flows of funding and innovation between government, academia and industry to the