[November, 2005-11-07 - 16h00 - ROOM A]

OC - The Instituto de Pesquisa em Patologias Tropicais de Rondônia (IPEPATRO): A strategic approach for Science and Technology in the Amazon Region

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In November 2003, a workshop co sponsored by the Human Frontier Science Program , Wellcome Trust, Third World Academy of Sciences and European Molecular Biology Organization discussed how to direct practical issues and applications of Science and Technology in favor of the developing world. The aim was to suggest issues to improve efforts of national and international funding agencies in favor of Science education and Scientific and Technological Research in the third world. From the discussions it emerged a consensual corollary, that social and economical development in the new millenium crucially depends on the promotion of science education and research activity, particularly in life sciences. The following recommendations were proposed as guide lines for Funding Agencies: 1) a clear commitment on scientific approaches to problems solving in developing world; 2) Needs to promote long-term research and training partnerships; 3) To convert ' brain draining ' in ' brain circulation' ; 4) Strong regional networks of scientists in developing world; 5) Sustain and encourage Centers of Excellence as regional centers of training and research development; 6) Encourage Diaspora scientists of developing world to participate in development of their home countries; 7) Improve coordination of donor and funding agencies activities adapted to local needs; 8) Better information about scientific programs in developed world; 9) Improve access to scientific information and publications; 10) Improve access to information and communication technologies to promote world's integration into global science. These ten recommendations could be called the Ten Commandments for global sciences, but their introduction in the real world practices, dominated by short term commercial interests and market laws are not easy. However, if the aim of scientific cooperation is to introduce a rational approach for social economic development, these conflicts of interest must be considered by scientists, Funding Agencies and Governments. I will emphasize in more detai some aspects of the problem. 1) In modern world, innovation arise from scientific and technological activities and represents a driven force for economical progress, social enrichment and also a factor for development of Science and Technology itself since the more dynamic area in innovation is exactly the industry of new equipment and new products for use in research. However, in developing world, new and renewed products used in research are dependent on import from developed countries and the exchange must be compensated by export of basic agriculture products or raw materials of relative low value. The acquisition, for instance, of one HPLC automatic equipment needs to spend 100 thousand US$ dollars To compensate this, Brazil must export 400 tons of soja bean grains, the amount equivalent to one year production of 200 hectares of agriculture rich land. This contrast makes innovation in research activity a positive factor for social economical progress in industrialized world and a parasitic factor in poor countries, depending on the social productive sector of the Society with low income conditions. . 2) Regional and social inequalities in Brazil , as in most third world countries reproduces, in its own society, the conflicts of interest observed between rich industrialized and poor countries. The introduction of modern super-qualified technology must be, in this respect, considered in some cases with suspicion. Agriculture technology, based in mechanization, automatism and robots has stimulated the expansion of exports with a positive effect on a national economic financial point of view but is not a social success, since does not improve social income equilibrium and does not integrate marginal sectors of the population . American style technology is acceptable for developed and industrialized areas in South and Southeast of Brazil, but has dramatic effects when introduced in under developed areas of Northeast and specially in the Amazon Region where, in addition, it produces intense and large environment degradation.. On the contrary, other modern agricultural technological - the zero tillage technology for instance - recently developed in large degraded soil areas of Brazil and Argentina have shown to produce the same national enrichment and global NBP increase but also to promote integration of rural populations and to improve their living standards. With these conflicts in mind, how to define research activity priorities in health sciences in the underdeveloped areas of the country and in Amazon region in particular? The proposal strategic choices of IPEPATRO takes into consideration the ten commandments of global science with a clear commitment on scientific approaches to solve health human and animal problems in pathologies of the tropics. Collaboration with scientists and technologists of the South and Southern Brazilian and foreign Institutions is one of our main goals with some success in the induction of ' brain circulation '. In our talk will be described some of our main research projects and some partial success that have been already obtained in Scientific and Technological subjects related to Tropical Pathologies.

[November, 2005-11-09 - 21h00 - ROOM A]

CC - CHAGAS: PARASITE IS VECTOR OF GENETIC DISEASE

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The demonstration of kDNA minicircle integration into germ line cells of birds represents a clean biological system for showing horizontal gene transfer. KDNA-positive chicks hatched from *T. cruzi*-infected eggs demonstrated pure kDNA transfer, which cannot stem from residual whole parasite contamination. Further vertical transfer of *T. cruzi* DNA to the progeny of kDNA-positive birds has been obtained by crossing. In the course of study of kDNA integration, we have observed that some kDNA-positive birds present with a generalized muscular weakness that evolves into death of the affected animal. ECG alterations typical of Chagas heart disease have been recorded in these sick birds. Interestingly, some kDNA positive hens and roosters can present signs of heart insufficiency, such as cyanosis (deficient oxygenation of blood) and shortness of breath. When these animals die, they show typical lesions of Chagas heart disease. We believe the events of kDNA integration can be important for understanding the manifestations of Chagas disease, which usually takes several decades to present symptoms in the human patient. Using several animal models, it was shown that the pathogenesis of Chagas disease is a parasite-kDNA vector phenomenon eliciting confluent rejection units, the common denominator of autoimmunity in Chagas disease. Looking at the common denominator of pathology, then, it is compelling to ask why the immune effector's cells change from physiological to pathological behavior. Certainly, kDNA integration that takes place in early embryonic life perpetuates through the germ line; the mutated somatic host cells could determine phenotype modifications that trigger autoimmunity in Chagas disease. Novel chimerical protein sequences correlated with potential ORFs detected by Blast analyses of DNA sequences originating from kDNA-integration mutated hosts. The chimeric protein encoded by ORFs formed by kDNA and host DNA juxtaposition carries the potential to induce anti-self immune responses. In favor of this model is the demonstration of striking Chagas lesions in kDNA-mutated birds. Therefore, kDNA mutation in the course of Chagas disease is associated with the histopathology evident in host tissues. Potential dispersion of the kDNA mutation in the population, representing a force towards an evolutionary change, is expected. Normally, this dispersal is achieved by sexual reproduction of interbreeding populations. Therefore, kDNA-insertion mutations could play different functional roles from advantageous to neutral in the hosts. Genetic drift can rapidly fix the advantageous and neutral mutations that could associate emergence of adaptive characters over time, fixation being the prevailing mechanism of evolution at the molecular level. It is particularly important to consider here that truly deleterious kDNA mutations have not been demonstrated in the above reported investigations. By definition, true deleterious or purifying mutations preclude the reproductive saga leading to perpetuation of the species. In the case of Chagas disease, individuals often live a standard reproductive life, but their progeny may be 'descendants with modifications'. Ongoing observations have shown that Chagas pathology that killed a greater number of founder (FO) than F1 and F2 birds gradually faded away in the third generation ($FO > F1 > F2 > F3$). These observations are consistent with our thoughts that autoimmunity in Chagas disease is a purely fortuitous share of negative selection, with biological effects that tend to be modulated naturally over time in due benefit of evolution of the species. A goal of future research in the field is to demonstrate whether microbial infections triggering horizontal gene transfer and further vertical transmission to the progeny can cause autoimmune rejection of target cells mediated by the host immune effector's cells. Such demonstration requires passive transfer of the lesions from a mutated syngenic donor to a healthy receptor. The hope is that future research will unravel the pathogenesis of the so-called untreatable autoimmune disease to which an etiological agent is missing.