Online journal ISSN - 1676-5680
GMR Genetics and Molecular Research
EVOLUTION AND TECHNOLOGY

Point of View

Comment

Science in Brazil: not just a matter of economy and natural resources

S.U. Dani

Excegen Genética S.A. e Instituto Medawar de Pesquisa Médica e Ambiental, Vale do Acangaú, Paracatu, MG, Brasil

Present address: Zimmermannstrasse 28, 37075 Göttingen, Germany.

Corresponding author: S.U. Dani
E-mail: srgdani@gmail.com

Genet. Mol. Res. 8 (4): 1496-1497 (2009)
Received October 6, 2009
Accepted November 9, 2009
Published December 15, 2009

Gene Russo's account on the prospects of life sciences in Brazil (Russo, 2009) raises the important question as to whether a booming economy and abundant natural resources could help this country become 'a life-science juggernaut'. The interviews he carried out in Brazil make it clear that unless critical steps are taken to correct priorities, the answer to his question is clearly 'no' (Dani, 2009). Russo indicates that Brazilian science has promise, but he makes it clear that institutional obstacles need to be overcome. Some of the reasons pointed out by the Brazilian scientists, entrepreneurs and a policy-maker that he interviewed are insufficient private and public investments allocated to science, low salaries, brain drain, excessive bureaucracy, and an academic culture that does not support entrepreneurship.

The two general categories of reasons embodied in Russo's question deserve closer inspection. The first is economic and political in nature. Brazilian's economic and political foundations are deeply rooted in its colonialist model. The booming growth of Brazilian economy is largely explained by the recent intensification of a commodities exportation model that has been in place since before the country was founded. This recent economic boom has not resulted in a proportionate reduction in chronic poverty and income inequalities, because of inadequacies in the Brazilian political and financial systems as well as in educational, science and technology structures.

The second general reason has to do with (ab)use of Brazil's abundant natural resources. A large proportion of Brazil's current positive trade balance (68%) is accounted for by the primary sector, which is very dependent on natural resources: minerals, food and fuel (52, 8 and 8% of the

trade balance, respectively). Brazil could capitalize on its potential as the "world's bread basket" and "world's largest mineral resource" conditions to the benefit of science and social development, but it has not yet done so in a significant way. One important reason is the low appropriation of wealth from exported mineral commodities. In 2008, Brazilian iron exports alone summed US$16 billion, but royalties from all mining activities in Brazil summed only US$462 million. Gold royalties are 1% of self-declared net incomes of the gold mining companies operating in the country - the world's lowest taxation on gold. An overall calculation yields the result that Brazilian society is left with less than 1% of the wealth created by a sizeable proportion of the country's natural resources. Some sectors of Brazilian society are struggling to pass new legislation to increase this proportion, in the hope that things will improve. If they succeed, they will create an opportunity for another question to be put forward: Is there any reason to believe that more money in governmental hands means more money allocated to science and better science in Brazil?

A simple and customary way to evaluate a country's performance in science - also known as 'scientometry' - is the number of peer citations. In a ScienceWatch (2009) survey of most-cited papers from the top 20 countries, Switzerland shows up as the country with the highest average number of citations per paper (14.85), followed by the USA (14.28), Denmark (13.77), Netherlands (13.59), Scotland (13.39), Sweden (12.94), England (12.92), Canada (11.68), Belgium (11.64), Germany (11.47), Israel (11.04), France (10.82), Australia (10.42), Italy (10.25), Japan (9.04), Spain (8.91), South Korea (5.76), People's Republic of China (4.61), India (4.59), and Russia (4.10). Though Brazil has a larger economy and more natural resources than most of these countries, Brazil does not figure among these top-ranked 'science juggernauts'. The conclusion is drawn that there is no overall relation between good science (as evaluated by citations) and the size of the economy and the quantity of natural resources of a country.

The answers to Russo's and to my own questions obviously are influenced by the political and cultural foundations of Brazilian society. There is every reason to believe that science in Brazil, as it is everywhere else in the world, is not merely a matter of economy or natural resources. It is much more a matter of societal values and how and where and why resources are allocated. In a word, it is a matter of culture.

These observations should not be an excuse to discourage science enterprise in Brazil. What we need is to find and make public the real reasons behind Brazil's poor performance in science and development and look for and put into practice efficient solutions for this problem.

REFERENCES

Dani SU (2009). Brazil's system stops its natural wealth helping science. *Nature* 462: 411.

Russo G (2009). Fertile grounds. *Nature* 461:1308-1309.

ScienceWatch (2009). Country profiles, 2009: 1998-August 31, 2008. Available at [http://sciencewatch.com/dr/cou/2009/09janALLPAPRS]. Accessed November 3, 2009.

