# Intellectual property rights and international collaboration: A US perspective

*Kira Glover*

*In this article I present briefly the connections between intellectual property rights (IPR) and international scientific collaboration. IPR is an extremely important international issue and has a direct effect on not only the amount of international scientific collaboration, but also on the direction such research takes. Here I present a very brief overview of the US view of scientific collaboration and the role of IPR.*

THE US deeply supports a global move towards stronger intellectual property protection. Recent international agreements such as the TRIPS agreement under GATT and the World Intellectual Property Organization (WIPO) patent talks illustrate the global shift towards more robust IPR regimes. The US perceives strong IPR protection as a win–win situation. Yes, the research and development investments made by industry will be better protected from piracy, loss of royalties and licensing fees, and reverse engineering. But other significant societal benefits also accrue to countries with strong IPR regimes. Strong patent protection leads to increased foreign direct investment and technology transfer. A significant deterrent to US foreign direct investment in India is the perception of US industries that their technology will not be adequately protected from copying, piracy, and reverse engineering. Also strong patent protection, coupled with the elimination of compulsory licensing, leaves applied research and technology in the hands of the private sector, which is usually in a better position to decide where and when to invest in and introduce new technologies.

Long-term benefits are also significant. Strong IPR regimes spur both foreign and indigenous investment in research and development. With increased resources focused on research and development, particularly basic research, the local research establishment improves and rapidly becomes an in-country source of technology, thus increasing the global competitiveness of local industry. The experiences of the Italian and Japanese industries after their respective countries strengthened their IPR regimes supports this – both countries now hold significant market share in the global pharmaceutical market. Last months' award of a US patent to a team of scientists at the Vector Control Research Centre in Pondicherry for the development of thrombinase, a drug to remove blood clots and treat coronary thrombosis, shows that the Indian scientific establishment is already making its mark on the global pharmaceutical market. Indian software engineers are widely used by US and European firms to develop programs for world-wide distribution and sale. Individual Indian researchers are among the best in the world and need not fear global competition. Indeed as individuals they are often beating it.

'Brain drain' or the emigration of trained researchers and scientists should be reduced with adoption of improved IPR regimes. Once researchers are confident that they will be able to retain control over their inventions and reap the benefits therefrom, more will be inclined to remain in their home country. Increased investment in research and development naturally leads to job creation, both research positions and, as inventions are brought to market, manufacturing positions. With India's newly open economy and increasingly global outlook, more and more NRIs are returning to take advantage of new opportunities. This trend will only accelerate as India fulfills its TRIPS and WTO obligations.

Increased technology transfer is another major benefit of strong IPR protection. Once companies are confident their investment will be respected, state-of-the-art technology will become available to upgrade local industrial infrastructure. Such leapfrogging from obsolete to cutting edge technology has significant benefits. The newest technology increases the global competitiveness of local industry and, when provided under license or as part of a joint venture with the patent holder, leads to a technically prepared labour force through more efficient on-the-job training. The newest technology usually produces higher quality product at lower cost with less pollution – all benefits which free up new capital for additional investment.

Let me turn now to our specific topic – IPR and international collaboration.

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Kira M. Glover is with the US Embassy, Shantipath, Chanakyapuri, New Delhi 110 021, India.

The US and India have a long – over 35 years – history of scientific collaboration, starting back in the 1950s with USAID's agricultural research program. Funded by PL 480 excess rupees, this program assisted in bringing about the 'Green Revolution'. In the 1960s, USAID assisted in the upgrade of India's higher education system, including the establishment of agricultural universities, MIT and Harvard's involvement with IIT Kanpur, and the establishment of the National Centre for Educational Research. The US Department of Health and Human Services began still ongoing research programs on parasitic and communicable diseases, nutrition, and cancer. The US National Bureau of Standards, now NIST, the National Institute of Standards and Technology, collaborated on measurement technology. The Smithsonian Institute started research programs in astrophysics and ecology. The 1970s brought the National Aeronautics and Space Administration (NASA) into collaboration with the Indian Atomic Energy Commission. In 1974, the Indo-US Joint Commission created several subcommissions, including one on Science and Technology, forgave two-thirds of the rupee debt, and devoted the other third to science, technology, education, and culture programs. Following the creation of the Science and Technology Subcommission, the 1982 Gandhi–Reagan Science and Technology Initiative reiterated the importance of science and technology to the Indo-US relationship. The initiative gave science and technology a high profile and illustrated a strong political commitment from both sides.

In 1987, the United States–India Fund or USIF was created through a formal Congressional appropriation of approximately $110 million worth of rupees. Over its ten-year term, USIF will have spent over $200 million on Indo-US collaboration. These monies are divided between science and technology, which receives two-thirds, and education and culture. Under the terms of the USIF agreement, all USIF funds must be fully allocated to research projects by January 7, 1997. Currently over 24 US technical agencies and departments participate in USIF-supported collaborative projects. USIF has funded, to date, over 815 projects, valued at approximately 120 crore rupees.

In order to further expand Indo-US government-sponsored scientific collaboration, the US and India have been negotiating an umbrella agreement on Science and Technology. The conclusion of this agreement will allow us to begin and/or expand important collaboration in such areas as renewable energy, fossil fuels, and vaccine research. Until signature of the Science and Technology Agreement, several government-to-government agreements cannot be fully implemented. The Department of Energy, for instance, signed Joint Statements of Intent with the Ministries of Power, Coal, Non-Conventional Energy Sources, and Environment and Forests in July 1994. The Vaccine Action Program Agreement, which includes research on children's vaccines, AIDS, and tuberculosis, is also awaiting extension pending a final science and technology agreement.

The Science and Technology Agreement has been essentially worked out to the satisfaction of both sides with the exception of protection of possible intellectual property resulting from joint research. The US feels there should be a mechanism to help American and Indian scientists secure their rights to inventions to which they contribute and for which the US government provides funding. The US believes that the agreement, including the intellectual property provisions, will further the sovereign interests of both sides. The Intellectual Property Annex, the section in question, is a standard text routinely contained in over twenty bilateral science and technology agreements between the US and countries of various levels of development. The Annex operates successfully in agreements with countries that have varying levels of intellectual property protection. For example, the Annex is contained in the US agreement with Italy (which has IPR laws comparable to those of the US) and with China and Indonesia (which at the time their agreements entered into force, did not afford intellectual property the same degree of protection as did the US). The Annex is designed to be flexible and accommodate countries as their IPR regimes develop. The Annex is also nondiscriminatory as it applies to both parties.

Various US agencies inform collaborators, both US and non-US, that IPR issues should be addressed in collaborative agreements before joint projects begin. The Fogarty International Center of the National Institutes of Health, for example, as part of its project review process, will notify researchers if it appears that the cooperative project could lead to new commercially valuable products or processes. If so, they ask for a written understanding between the principal investigators, which recognizes the possibility that commercially valuable inventions could emerge from this collaborative project and commits the principal investigators to work out an equitable distribution of IPR should such inventions emerge. USAID and the US–Asia Environmental Partnership (US–AEP) have supported technology activities working predominately with the Indian and US private sectors. IPR concerns have been identified as an issue for the private sector participants to negotiate directly between the collaborators.

Even after signature of the Science and Technology Agreement, IPR issues will play a role in Indo-US collaboration. Given that international funding is becoming scarcer, alternate mechanisms for collaboration will need to be explored. One promising source of funds could be US industry. In the US, industry funds more than 50% of all research and development activities and performs about 80% of them. Of the approximately $75 billion spent on research and development, 10% of it is spent overseas. The US software industry already contracts certain types of software development to Indian firms. Other American industries may also be willing to take advantage of India's topnotch research establishments, which could provide needed research and development at significantly reduced costs. But as mentioned before, US industries, like their Indian counterparts, are unlikely to invest in research until and unless they are assured that the outcome of that investment – intellectual property – will be adequately protected.

In conclusion, I would like to reiterate that the US supports strong IPR protection. As outlined previously, this support comes more from a desire to protect researchers' interests, rather than political interests. The US firmly believes that strong IPR protection is beneficial to both industry and consumers in both developed and developing nations. International collaboration is one of the many activities that will flourish under improved IPR protection.

# Haldane's dilemma and its relevance today

*Krishna R. Dronamraju*

## Introduction

THE scientific and intellectual eminence of John Burdon Sanderson (JBS) Haldane is such that we are indeed fortunate to be holding this symposium under his name. The very mention of his name evokes scientific excellence and its benefits to humankind. Indeed, by honouring Haldane, we are honouring ourselves.

It has been said that it is only by standing on the shoulders of giants that we can see far. J. B. S. Haldane was one of those giants. Even some thirty-two years after his death, Haldane's direct impact can be readily seen from the long list of citations to his publications in the *Science Citation Index* and similar compilations today. Both directly and indirectly, Haldane's world-wide influence had been quite significant ever since his first scientific paper – in collaboration with his father John Scott Haldane in respiratory physiology – was published in 1912. To this day, he remains one of the most quoted scientists of the twentieth century. He left so much unfinished work when he died in 1964 that his manuscripts continued to be discovered and published posthumously. The last publication was a book on science fiction called *A Man with Two Memories*.

## Haldane in India

J. B. S. (or Jack) Haldane was born in Oxford, England, on November 5, 1892 and died on December 1, 1964, in Bhubaneswar, India. He received formal education at Eton and Oxford, studying mathematics and classics, but received no academic qualification in science. However, his early scientific education was provided at home by his father, distinguished Oxford physiologist John Scott Haldane. The younger Haldane successfully (and successively) pursued research in physiology, genetics, biochemistry, statistics, and biometry at several English universities including Oxford, Cambridge and London. In addition to his brilliant scientific contributions, Haldane became famous for his outstanding popularization of science in the lay press. Furthermore, he took part in politics also, especially during the 1930s and the '40s, writing and speaking extensively on the marxist philosophy. However, when he migrated to India in July, 1957, Haldane largely gave up his political activities, taking up a new interest in Hinduism and Indian philosophies. It was during that period, from 1957 until his death in 1964, that I came to know him intimately as a pupil and a colleague in Calcutta and Bhubaneswar. He adopted an Indian lifestyle – wearing Indian style clothes, eating only vegetarian food, studying Hindu classics and mythology, etc. All these distinguishing qualities – intellectual, political, philosophical, and personal – combined with his highly interesting family background, made Haldane a most interesting character for biographies.

I have previously described the biographical details of Haldane's life and work in numerous books and papers[1–9]. These may be consulted for further details. Haldane himself left a highly informative autobiographical sketch which mentions his life in India and his association with myself and others[10].

In India, Haldane was associated with three different institutions: Indian Statistical Institute in Calcutta (1957–61), Genetics and Biometry Unit of the Council of Scientific & Industrial Research in Calcutta (1961–

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Krishna R. Dronamraju is in the Foundation for Genetic Research, P.O. Box 27701-0, Houston, Texas 77227, USA.