



Perspective

**Thomas Eisner, chemical ecology and the sustainable development of natural products**

Stephen A. Matlin

The 90<sup>th</sup> anniversary of the birth of Thomas Eisner on 25 June 1929 has been marked by a retrospective article in [Proceedings of the National Academy of Sciences of the USA](#) (PNAS) celebrating his major scientific contributions. Having developed an early fascination with entomology, he devoted his research to identifying the structures and functions of natural products in living organisms. Eisner, who [died](#) 25 March 2011, is [remembered](#) as the ‘[father of chemical ecology](#)’ and pioneered interdisciplinary studies linking physical, biological, behavioural and environmental fields.

Eisner was also conscious of the importance of economic factors in making the case for preserving biodiversity. He strongly promoted the concept of ‘[chemical prospecting](#)’ as a way of discovering substances with useful properties and demonstrating the value of conserving natural resources including for low- and middle-income countries (LMICs) with an abundance of these resources. He brokered a ground-breaking prospecting partnership between Costa Rica and the multinational chemical and pharmaceutical company Merck, which established the National Biodiversity Institute of Costa Rica (INBio) and enabled bioprospecting of the country’s rich biological resources. Merck paid INBio US \$1 million over two years, and provided equipment for processing samples and scientific training, while guaranteeing an economic return on any profits from resulting discoveries. Eisner [bemoaned](#) what he regarded as the short-sightedness of science approaches that gradually downgraded the importance of such natural product work.

From its inception in the early 1980s, IOCD has had range of interests in natural products chemistry. At a time when many chemists in low- and middle-income countries (LMICs) found it difficult to undertake synthetic chemistry projects requiring expensive and difficult-to-import chemicals and equipment, the investigation of natural products provided an important avenue through which they could develop their scientific careers and conduct world-standard research. IOCD [created](#) a series of [Analytical Service Laboratories](#) in the 1980s to provide spectroscopic analyses to support this work. IOCD later helped [establish](#) the Network for Analytical and Bioassay Services (NABSA) in Africa, based at the University of Botswana under the initial direction of Prof Berhanu Abegaz (later Executive Director of the African Academy of Sciences and currently serving as an IOCD board member), which still functions as a [resource centre](#) for the continent. Conferences and training workshops on the isolation, structure elucidation and bioassay of natural products were conducted for many years by IOCD’s [Working Group in Plant Chemistry](#), under the direction of [award-winning](#) scientist Prof Kurt Hostettmann and many others who supported the work, including Andrew Green, Mahabir Gupta and Jacob Midiwo.

In the 1990s, Eisner encouraged IOCD to establish an activity known as the ‘[Biotic Exploration Fund](#)’ (BEF) to help facilitate the development of capacity for [ethical bioprospecting](#) in LMICs. Initial funding to set up the BEF came from the US National Academy of Sciences, the American Chemical Society, the John D. and Catherine T. MacArthur Foundation, UNESCO and the Novartis Foundation for Sustainable Development. Under the direction of IOCD scientist John Kilama, supported by Michael Tempesta and Charles Weiss, the BEF’s contributions to biotic exploration included work in Latin America, Asia and Africa. Particular emphasis was placed on capacity building, including training in the management of intellectual property and assistance with the development of policy and draft

legislation. John Kilama co-authored a [review](#) of the value of natural biological resources as a source of new medicines, in a book co-sponsored by the UN Development Programme, UN Environment Programme, Secretariat of the Convention on Biodiversity and World Conservation Union.

Eisner's visionary approach to chemical ecology, ethical bioprospecting and biodiversity conservation and exploitation is even more urgently needed at the present time. The latest [assessment for the UN](#), showing the accelerated pace of biodiversity loss on the planet and presaging the threat of extinction of a million species in the next few years, highlights the importance of valuing biodiversity – including for the treasure trove of unique and invaluable chemicals it represents and the potential these hold for life-saving benefits for health and well-being. The work of IOCD's '[Chemists for Sustainability](#)' action group continues IOCD's tradition of promoting ways that chemistry can contribute to sustainable development and embody science for the benefit of society. Thomas Eisner serves as a continuing inspiration for this effort.

*Stephen Matlin is a visiting Professor in the Institute of Global Health Innovation, Imperial College London, Secretary of IOCD and a member of its action group 'Chemists for Sustainability'.*

---

*Recommended citation:*

S. A. Matlin. *Thomas Eisner, chemical ecology and the sustainable development of natural products*. International Organization for Chemical Sciences in Development, Namur, posted online June 2019. <http://www.iocd.org/perspectives>