



Biopiracy of natural products and good bioprospecting practice



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ABSTRACT

Background: Biopiracy mainly focuses on the use of biological resources and/or knowledge of indigenous tribes or communities without allowing them to share the revenues generated out of economic exploitation or other non-monetary incentives associated with the resource/knowledge.

Methods: Based on collaborations of scientists from five continents, we have created a communication platform to discuss not only scientific topics, but also more general issues with social relevance. This platform was termed '**PhytCancer** -Phytotherapy to Fight Cancer' (www.phyt-cancer.uni-mainz.de). As a starting point, we have chosen the topic "biopiracy", since we feel this is of pragmatic significance for scientists working with medicinal plants.

Results: It was argued that the patenting of herbs or natural products by pharmaceutical corporations disregarded the ownership of the knowledge possessed by the indigenous communities on how these substances worked. Despite numerous court decisions in U.S.A. and Europe, several international treaties, (e.g. from United Nations, World Health Organization, World Trade Organization, the African Union and others), sharing of a rational set of benefits amongst producers (mainly pharmaceutical companies) and indigenous communities is yet a distant reality. In this paper, we present an overview of the legal frameworks, discuss some exemplary cases of biopiracy and bioprospecting as excellent forms of utilization of natural resources.

Conclusions: We suggest certain perspectives, by which we as scientists, may contribute towards prevention of biopiracy and also to foster the fair utilization of natural resources. We discuss ways, in which the interests of indigenous people especially from developing countries can be secured.

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Preface

Based on scientific collaborations of the Department of Pharmaceutical Biology (Johannes Gutenberg University, Mainz, Germany) with scientists from across five continents working on ethnopharmacological projects during the past decade, an informal communication network has been formed, named '**PhytCancer** - Phytotherapy to Fight Cancer' (www.phyt-cancer.uni-mainz.de). The aim is to provide an independent, non-commercial, and academic platform for the exchange of scientific knowledge and to promote rational development of highly effective, yet affordable phytotherapeutic drugs contrary to the high-priced cancer drugs or conventional medicine. Another goal of **PhytCancer** is to discuss societal problems related to ethnomedicine and ethnopharmacology. As a starting point of this new communication platform, we herein discuss problems associated with the unethical use and commercialization of bioresources and traditional knowledge of indigenous communities. In this respect, **PhytCancer** projects itself as an interdisciplinary forum at the interface between life science and the humanities.

Introduction

The term biopiracy was coined in the 1990 s by environmentalists and non-governmental organizations and has been frequently used in public discussion platforms in and beyond the life science community. However, the correctness of its use has been criticized by scholars of jurisprudence (Chen 2006; Ho 2006). Independent from controversial and partly emotional discussions among different social groups, biopiracy mainly focuses on the use of biological resources and/or knowledge of indigenous tribes or communities without sharing the revenues earned out of economic and non-monetary exploitation of such resources (Hamilton 2006; Brody 2010). Another related issue is the ownership of knowledge (Shiva 1999). It was argued that the patenting of herbs or natural products by pharmaceutical corporations disregarded the ownership of the indigenous communities' knowledge on how these substances worked. Prior to very recent court decisions, neither native communities could provide evidence of their ownership of the knowledge, nor the evidence (in case provided) was recognized by the courts. Because of this legal situation, the patenting of indigenous

knowledge by pharmaceutical corporations was seen by critics as a new form of colonialism (Shiva 1999). Thus, any discourse on biopiracy is meaningful only if it caters to the protection of intellectual rights of people associated with the knowledge of the resources in question. This broader perspective would definitely facilitate evidence-driven rather than interest-driven dialogues. For a first overview, we performed a PubMed search on the published biomedical literature of more than half a century with selected search terms. PubMed is a free archive of biomedical and life sciences journal literature at the U.S. National Institutes of Health's National Library of Medicine (NIH/NLM). (<http://www.ncbi.nlm.nih.gov/pubmed>). PubMed comprises more than 24 million citations for biomedical literature from different sources, which may include links to full-text content from PubMed Central and publisher web sites. As shown in Fig. 1A, there is a steadily increasing number of publications containing the key word "patent". This number exceeded 1500 publications per year since 2011. To a lesser extent, this trend is also visible for publications dealing with the search term "intellectual property". "Bioethics" also exhibited an upward trend since 1960. However, the number of papers published annually on this topic declined after 2005. In general, it can be summed up that topics related to patents, intellectual rights, or bioethics have been forerunners of interest among scientists working in biomedicine irrespective of their sub-disciplines.

This presents a sharp contrast to what can be observed, if we focus on search terms specifically related to problems discussed here. Although the number of publications containing the search terms 'bioprospecting' or 'indigenous knowledge' have pleasantly increased during the past decade, the total number of annually published papers is about two orders of magnitude lesser (Fig. 1B). This striking result indicates that problems related to the utilization of indigenous knowledge do not occupy a central interest among the general scientific community. This becomes clearer while searching for PubMed-listed papers on 'biopiracy'. The number of papers remains below 10 without any significant upward trend over the years. These facts and figures illustrate how imperative it is to make the scientific community aware of this issue. It is a well-known fact from cultural studies that awareness is the first step towards providing effective and substantial protection of indigenous knowledge. This leaves us with the pragmatic question 'What has to be regarded as biopiracy?'

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