



European materia medica in historical texts: Longevity of a tradition and implications for future use

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ARTICLE INFO

Article history:

Received 15 January 2010

Received in revised form 17 May 2010

Accepted 19 May 2010

Available online 16 June 2010

Keywords:

Materia medica

New drug discovery

Dioscorides

History

Traditional medicine

Bioprospecting

ABSTRACT

Aim of the study: This study uses historical texts in order to obtain information on the natural products used in traditional medicines in European/Mediterranean therapeutics over the last two millennia. The information obtained may lead to new directions in the area of drug discovery, as recent research has demonstrated the continued promise of looking to natural products for bioactive compounds. Researchers have increasingly turned to traditional medicines to provide clues as to which natural products to investigate, but the oral traditions on which much of this medical knowledge rests are often unstable. Thus researchers have been prompted to use historical medical texts, as this study does, to find potential sources of new drugs.

Materials and methods: This study uses twelve Mediterranean/European medical texts from the 5th century BC to the 19th century AD to compile a list of the most commonly used “simples” – or single action drugs substances – used in therapeutics in traditional European medicine. This list was then compared to present-day herbal pharmacopoeia as represented by the National Institutes of Health (NIH).

Results: This study finds that traditional European materia medica was based on a Dioscoridean tradition that lasted through the 19th century with remarkably little variation, but is significantly different from the present-day herbal pharmacopoeia according to the NIH.

Conclusions: The most prominent simples in the European/Mediterranean medical tradition can provide clues to further bioactive compounds that have not as of yet been fully exploited for their potential, but were clearly of great use in the past.

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1. Introduction

1.1. Aim of the study

This study of ancient, medieval, and early modern pharmacopoeias argues that the materia medica of the ancient Mediterranean world had remarkable longevity in the European medical tradition, solidly in evidence well into the 19th century. Although historians are well aware of the prevalence of Galenic humoral theory in European medicine throughout this time, continuity of materia medica has yet to be fully verified. This study aims to document and prove that continuity by examining 12 medical texts that treat the subject of medicinal “simples,” or herbal, animal, or mineral substances thought to have inherent healing properties. These texts span more than two millennia, from the 5th century BC to the 19th century AD. This study first identifies these texts, then presents a compiled list of the top 439 simples, or those named in at least 4 of the 12 texts. Analysis of this list reveals remarkable consistency between later pharmacopoeias and Dioscorides’s *De*

materia medica of the 1st century AD, thus demonstrating that this work, rather than the Hippocratic Corpus of the 5th century BC, provided the basis for western materia medica through the medieval and early modern periods. Finally, this study compares the most common medicines and their uses throughout these periods with contemporary herbal medicine and finds a significant disconnect between the two. In this way, it seeks to point pharmacologists toward a study of traditional substances and their potential for providing clues to bioactive compounds.

1.2. Background/context: traditional medicine

Traditional medicine, including Chinese medicine, Indian ayurveda, Arabic unani medicine, and various forms of indigenous medicine, often employs medication therapies involving the use of herbs, animal parts, and inorganic materials that have been in place for millennia and developed from empirical practices over time rather than the application of theoretical principles. Prior to the 20th century, European medicine constituted one form of indigenous medicine whose formidable arsenal of drugs derived from natural products—mainly plants and plant parts from the Mediterranean region but with significant additions from the Middle East, Asia, and the Americas in the medieval and early modern periods.

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Despite the longevity of this tradition, which dates back to the 5th century BC, scholars have often been quick to dismiss its effectiveness (see discussion in Riddle, 1985, xx–xxii). Those who wish to present a picture of the triumphal march of western medicine in the modern era portray traditional healing and herbal medicine as profoundly irrational and un-scientific, the stuff of witch-doctors and shamans who did more harm than good. Any possible benefit that patients may have derived from traditional drugs, it has been argued, was the result of a psychological “placebo effect” (Shapiro, 1959). According to this narrative, prior to the modern age these “useless and often dangerous medications” were almost wholly ineffective, and drugs that had beneficial action were “the exception rather than the rule” (Shapiro, 1959; Dowling, 1973; Sneader, 2005, 2). One author has gone so far as to say that “claims made for traditional remedies in the past have no validity” (Sneader, 2005, 3).

Traditional medicine, however, and medication therapy that derives largely from herbal medicine constitute a highly significant component of modern medical care for most of the world's population today. In 2005, the World Health Organization outlined its significance in terms of expenditure and use in both developing and developed countries, finding that in Africa as much as 80% of the population turned to local indigenous methods of healing, while 42% of those surveyed in the U.S. had sought out alternative or traditional forms of health care at least once (WHO, 2005; see also Eisenberg et al., 1998). The importance of traditional medicine in the developing world and its growing popularity in industrialized countries has come to the attention of the pharmaceutical industry and the medical research community, both of which have sought to capitalize on the knowledge contained therein.

In conjunction with the growing appreciation for traditional medicine, there is concurrently a renewed recognition of the potential of natural products for new drug discovery. In contrast to a recent claim that “remarkably few [plants and minerals] possess the ability to relieve disease when rigorously evaluated by the criteria of modern, evidence-based medicine,” (Sneader, 2005, 3) recent research in fact shows evidence of the promise of natural products for providing prototypes for new drugs. Indeed, Newman and Cragg's in-depth survey of the sources of new drug discovery over the past 25 years indicates that the vast majority of new drugs have resulted from the isolation and imitation of bioactive molecules of natural products. In fact, only one new drug, the antitumor compound sorfenib, has resulted from chemical synthesis through the method of combinatorial chemistry and high-throughput screening (Newman and Cragg, 2007). The lack of expected results from this method has prompted researchers in the field to call for the further investigation and imitation of the products of “Mother Nature” both for single and synergistic effects, and for the use of new technologies for screening these products (Fabricant and Farnsworth, 2001; Chin et al., 2006; Newman and Cragg, 2007; Lam, 2007; Butler and Newman, 2008; Ji et al., 2009; Li and Vederas, 2009).

The recognition of the benefits of phytotherapy in particular has led to increasing research into plant products in order to isolate bioactive compounds. At least 25% (and probably more) of present-day medicines derive from plants, and recently, plant-based medicinals have been found to be effective in the treatment of cancer, HIV, and malaria, so much so that some pharmaceutical companies have directed research in this area (Fabricant and Farnsworth, 2001; Buenz et al., 2004, 2006; Gertsch, 2009). An obvious and rich source for information about these products lies in the medication therapies of traditional medicine (Fabricant and Farnsworth, 2001). There are more than 20,000 species of plant used in traditional medicines globally that can be “reservoirs of potential new drugs” (Gupta et al., 2008). These factors have combined to lead to “bioprospecting,” the idea that new drugs can be found by studying herbal medicine and phytotherapy in contempo-

rary and historic societies (Gertsch, 2009). Although bioprospecting is certainly not a new idea or practice (see Schiebinger, 2004; De Vos, 2007), it has gained renewed popularity over the past two decades among academic and industrial researchers.

Both of these trends – the increasing recognition of the value of traditional medicine and the recent rise in bioprospecting – converge in the field of ethnopharmacology, whose position as an interface between the social and natural sciences makes it a particularly important focus for new research into drug discovery (see Gertsch, 2009 on the rise in the impact factor for the *Journal of Ethnopharmacology*; Heinrich and Gibbons, 2001; Heinrich et al., 2006). Thus far, much of the emphasis in the social science aspect of ethnopharmacology has been on the use of paleoecological, archaeological, and especially anthropological methods to obtain medicinal knowledge from traditional societies—i.e., the analysis of the physical remains of ancient societies, the study of folk traditions, and the documentation of indigenous medical knowledge and local medical traditions through the study of contemporary societies (Gertsch, 2009). The articles in the *Journal of Ethnopharmacology*, for example, are largely devoted to the gathering of indigenous knowledge about local plants throughout the globe, testing them for bioactivity, and isolating bioactive compounds.

1.3. Historical texts of traditional medicine

All of these efforts have contributed to an ever more complete picture of the efficacy and wisdom of traditional medicine from virtually every corner of the globe. Nevertheless, there is a sense of urgency among researchers to record this information, largely because there is substantial evidence that these knowledge traditions, which are usually communicated orally, are quickly eroding. Oral traditions run the risk of being lost due to the disinterest and absence from traditional village life of younger generations under the influence of modern education systems and the pressures of industrialization, urbanization and the inculcation of western values (Cox, 2000; Srithi et al., 2009). In addition to the erosion of traditional knowledge, there is evidence that environmental degradation, deforestation, and invasion of non-indigenous plant species are depleting and threatening the sustainability of traditional species of medicinal plants (Buenz et al., 2004; Brandão et al., 2008).

Thus, a variety of recent publications have urged the use of textual traditions in Indian, Chinese, and European medicine to look for possible new examples for drug discovery – as Ji et al. (2009), 198, state, “we have a rich historical record from ancient physicians about how to use natural medicines alone and in combination, which might provide important clues for developing new drugs.” In the Mediterranean, there is a rich and continuous tradition of pharmaceutical writings of ancient Greek, Roman, Byzantine, and medieval Islamic and European physicians and compilers that dates back to the 5th century BC. Investigation into these sources requires the expertise of historians and classicists, thus prompting the expansion of interdisciplinary collaboration in the field of ethnopharmacology. The use of published textual sources in addition helps to overcome the risks and ethical controversies associated with bioprospecting (Buenz et al., 2004). Indeed, scholars argue that with the loss of traditional knowledge in modern-day society, the written historical record becomes increasingly important, not only for information about potential medicines but to address issues of ownership and intellectual property rights for traditional medical knowledge (Riddle, 1992; Holland, 1994; Buenz et al., 2004; Fiore et al., 2005; Lopez-Muñoz et al., 2006; Scott and Hewett, 2008; Lev and Amar, 2008).

Historical texts have been put to use in the field of ethnopharmacology in two main ways. The first type of study involves regional surveys of local *materia medica* that show correspon-

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