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A vision for medicinal plants

[Una visión de las plantas medicinales]

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Abstract

In the past few years, the author has written a number of articles discussing a vision for the development of medicinal plants. This article will therefore present only a brief synopsis of some of the more salient features of those articles, resulting in the presentation of four, clear, coalescing visions for the future of medicinal plants: enhanced quality control, sustainability for medicinal plants, pharmacognosy in a suitcase, and finding a strong “voice” at the political table of global health care.

Keywords: medicinal plants, regulatory affairs, pharmacognosy, quality control, sustainability, global health care.

In the past few years, the author has written a number of articles discussing a vision for the development of medicinal plants (Cordell, 2000; 2002; Cordell and Colvard, 2005; 2007). This article will therefore present only a brief synopsis of some of the more salient features of those articles, resulting in the presentation of four, clear, coalescing visions for the future of medicinal plants in global health care.

In “A Still Forest Pool” the venerated Thai monk, Ajahn Chah opined that “If you are on the fifth step and you think that you are too high, you will never make it to the sixth step”. What I believe that he is saying, at many different levels, is there is always room for improvement, and don’t be so complacent as to think that all is known that can be known, or that the best that can be done is being done. It is a philosophy that later came to be known in western management parlance as continuous quality improvement (CQI), questioning how further improvement of a system was possible. In my view, as far as medicinal plants in public health care globally are concerned, we are just beginning to LOOK at the first step. Yes, it is a public health care issue, although in some countries it is not seen that way, and thus the paucity of effective local regulations based on science. A recent WHO survey showed that of the 192 countries surveyed only 53 had any form of regulations for traditional medicines, and for only 18% of the countries were medicinal plants included in the National Pharmacopoeia (WHO, 2002). Yet, at least 64% of the global population use medicinal plants as their primary form of health care (Farnsworth et al., 1985), and this percentage will rise steadily as the global population reaches 10 billion in the next 30 years.

The lack of attention to the regulation of medicinal plants has occurred for a number of reasons, two of which are that: i) it is often assumed that these
medicinal agents, because they have been used for hundreds or thousands of years, are safe (and thus don’t need regulation), and ii) their supply is unlimited. These are both myths which need to be dispelled.

As we think about the future of medicinal plants in health care, there are two burgeoning issues to be addressed: quality control and sustainability. For most of the countries of the world, pharmaceutical companies will not be providing the medicinal agents for local prevalent diseases, and for those diseases that are global, the drugs are likely to be very expensive. The question for these health care systems is how to address those issues, for optimum local health care. Medicinal plants, all over the world, are sold in a manner which has changed little in hundreds, may be thousands, of years. That is not something medicinal plant scientists should either be proud of, or condone. Quite the reverse, they should be irate that their science is having such a limited impact on public health.

From a public health perspective, what is a reasonable time frame to enhance quality control through the application of science and technology to traditional medicine? What can be done in 5 years, what in 10 years, and what in 15 years? Can a strategic health care plan which incrementally enhances the safety and effectiveness of traditional medicines for the benefit of the patient be developed? Where do we start to make these improvements? What are the sciences and the technologies that need to be involved? Are there enough scientists locally who are trained to do the work? Are governments prepared from a regulatory and science enforcement perspective? And of course, who will fund all those studies and protocol developments?

This is not the place to be addressing in great detail all of the steps to achieve a safe and efficacious traditional medicine, but a brief overview is presented (Cordell, 2000; Cordell and Colvard, 2005): i) All research programs begin with a literature evaluation. In the field of medicinal plant research, one of the highest priorities must be the determination of what is known and what questions need to be answered with a view to not duplicating previous research and wasting precious human and fiscal resources; ii) It is rare indeed that ethnomedical research is conducted with the scientist and clinician doing field evaluations of particular remedies using standardized clinical evaluation methodologies. Such strategies will markedly enhance the veracity of medicinal plant claims; iii) Plants are complex factories for secondary metabolites. A determination of the active principle(s) and their mechanism of action is critical for the development of systems for chemical and biological standardization; iv) Given the diversity of medicinal plant materials that are now in global commerce, it is critical that there be analytic standards in place to eliminate contaminants and adulterants which might pose a health hazard, are illegal, or which give a non-reproducible, false biological responses; v) Standardization of a given preparation for the patient should be based on a three-fold botanical, chemical, and biological standardization so that on a lot-to-lot basis there is a safety and efficacy guarantee for the patient. Botanical standardization based on PCR analysis, chemical standardization based on a known active principle (or principles), and biological standardization based on a cheap, relevant, and validated in vitro bioassay; vi) The age of a traditional medicine is an important issue, but is rarely given. For each preparation there will need to be stability and safety studies, since it cannot be assumed that a preparation that has been used for hundreds of years is necessarily “safe”. Neither can it be assumed that the active principles, and therefore the clinical effectiveness of the product, will be stable for the shelf life of the product; vii) These botanical, chemical, biological, and stability studies should culminate in a demonstration of clinical effectiveness for a well-defined, standardized preparation in an appropriate clinical trial; viii) There is the need to report and register observed plant drug – drug interactions which occur. Some of these may be adverse interactions causing unwanted side effects, while others might be synergistic interactions causing potentiation of activity, and requiring dose modulation; ix) Finally, there is the need for sustainable development of a commercial medicinal plant.

The forests and the mountains are already being depleted of medicinal plants as demand increases; and many desirable medicinal plant species are now listed as endangered in their native habitats. Relatively little attention is being given to this aspect of medicinal plant development because the science to discern which plants are the most effective has not yet provided priorities for sustainable development. As the UN Millennium Ecosystem Assessment indicates (Millennium Ecosystem Assessment, 2005), we can no longer assume that the plant materials that are used as resources today will be there tomorrow. Consequently, and if the world is to have plant-based
medicinal agents in the future for a rapidly expanding global population, we must think of plant-based drugs as a fundamental health care requirement. For continued availability, we must therefore regard an effective medicinal plant as a sustainable, renewable resource; a **sustainable drug**. For most people that is a new concept; many medicinal plant scientists do not think in those terms.

New strategic thinking is also needed as to how medicinal plants are initially validated. We need to consider how to reverse the paradigm of collecting medicinal plant materials, identifying them macroscopically, drying them, bringing them back to the laboratory, extracting them, and testing the extracts for biological and pharmacological activities. Supposing the “laboratory”, the techniques needed to accomplish all of the steps just described, was taken to the field, and the preliminary determination regarding a level of interest for further experimentation made on site. Is there the potential to determine the authenticity and the chemical and biological potential of a medicinal plant in the field? What are the implications for future studies of medicinal plants if that strategy can be successful? What are the range of technologies that need to be assembled for the botany, chemistry, and biology to be conducted? What are the nano technologies which can be applied to realize this? What areas of the required technologies need further development? Are there other barriers to the realization of this goal? What would “pharmacognosy in a suitcase” look like?

These are my three very clear visions for medicinal plants: enhanced quality control, sustainability for medicinal plants, and pharmacognosy in a suitcase. They are significant regulatory, scientific, technological, economic and social challenges. They will take many years to accomplish, and many people to educate about the validity and absolute need for the approach. That brings me to my fourth vision... which is that medicinal plants, and their study for the future of the health of humankind, will find a strong “voice” at the political table of global health care for the sake of future generations.

**LITERATURE CITED**


