THE STUDY OF ARCHAEOBOTANICAL REMAINS: VITALISING A DEBATE ON CHANGING CONCEPTIONS AND POSSIBILITIES

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Contents.

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1. Introduction.

In this paper, a modest attempt is made to initiate a debate on the current theory, methodology and objectives of the study of archaeological plant remains with special emphasis on issues relevant to archaeology and archaeological research on ancient plant remains. The paper also includes some suggestions (that are open to discussion) on prospective contribution of archaeobotanical research to applied science, and hence the needs of the contemporary world. However, as the title indicates, this presentation is not to be viewed neither as an exhasutive listing or coverage of all the debatable theoretical, methodological and interpretative nor as one that proposes definite answers, new ideas and /or solutions to the questions, problems and issues raised. Rather, it is meant to provoke a debate that will perhaps contribute new proposals and ideas and/or raise more issues.

In this debate, the phrase ¨archaeological plant (or archaeobotanical) remains¨ is meant to denote all types of ancient plant remains which are recovered from archaeological sites or from other areas with the intention of studying human-plants interrelationship and the context (environment) in which they took place. These remains are often found in two main forms: namely, macrobotanical and microbotanical remains (Magid, A., 1989: 65)). The macrobotanical remains are those which can be seen by the naked eye or low power microscope, such as seeds/grains, stones of fruits, leaves, charcoal, etc. The microbotanical remains can not be seen by the naked eye and require high power microscope (ibid: 64), e.g. pollen and phytoliths. Macro and microbotanical remains are deposited in or brought to archaeological sites by natural and /or cultural processes. They are preserved by carbonization, water logging, desiccation, and mineralization, as stomach contents and residues, e.g. coprolites, impressions in pottery (ibid: 64). They are identified (on the basis of their external morphology) by comparing them with reference collections, manuals, and by sorting types, size, measurements, shape and surface texture (ibid: 74).

It should be noted that in addition to published articles and books cited in this work, some internet web sites (www) are also used and quoted in this work as sources of information. The main emphasis are on those sites which have links to other sites, thus, are thought to make a good starting point for those who are interested to read further. These sites will be referred to as numbers preceded by http:// (e.g. http://1). Detailed information on these sites is presented at the end of the manuscript in their respective numerical sequence.

2. The state of the study of archaeological plant remains.

In this section, a broad outline on the history and the current position of the study of the archaeobotanical remains is presented in order to establish areas of its development and debate those areas of its weaknesses.

Interest in recovery and study of ancient plant remains captured the interest of researchers in the Old World since 1826, e.g. C. Knut work on desiccated seeds and fruits from ancient Egyptian tombs (Renfrew, J.M., 1973: 1). In the New World, the study of ancient plants can be traced to1895 but interest in archaeological plant remains started to developed during the 1930's (Pearsall, D.M., 1989: 1). As it became an established fact that carbonized, desiccated and waterlogged plant remains (e.g. seeds, fruits, etc.) could survive for thousands of years, studies on

ancient plant remains started to unfold. Most (if not all) of these studies were mainly concerned with reporting the finding of a species at a particular site or evaluating a particular plant species. Eventually, studies in the Old World began to focus on botanical taxonomy and precise description of plant remains. Those studies which were carried out in the New World (mainly in North America) emphasised more the cultural aspects such as the presence and use of plants at a site (ibid: 3).

The field of Ethnobotany was first introduced at the end of the 19th century mainly to study the relationship between contemporary small scale (or undifferential) societies and plants (ibid: 1). This field witnessed two main developments in its scope and conceptions since the early 1940's. These are: -

a. Introduction of interdisciplinary approaches in which anthropological and botanical methods and techniques were used in ethnobotanical studies. Ideally, a researcher who is familiar with methods, techniques and approach of both botany (plant sciences) and anthropology should conduct interdisciplinary (ethnobotanical/anthropological) research.

b. Expansion of the concept of ethnobotany whereby it included the relationship between plants of both ancient communities and industrial societies. Accordingly, the term ethnobotany was applied to the study of human- plant relationship, without limit to time or to the degree of cultural development (ibid).

Toward the end of 1950's Palaeoethnobotany was introduced as a part (or sub-field) of ethnobotany that is specifically concerned with the study of human-plant relations in the past through the study of archaeological plant remains such as macrobotanical remains as well as pollen, phytoliths analysis (ibid). Hence, the European and Old World studies started to move away from their traditional focus on taxonomy and morphology of remains towards cultural interpretations. In the New World and America, there was increased interest on reconstructing subsistence and palaeoenvironment, and greater emphasis was put (during the 1950's and 1960's) on recovering and studying macro-remains and pollen (ibid: 5).

Quantitative pollen analytical studies (which were known and first used in 1916) became fairly widespread in archaeological research during the 1960's. In addition, phytoliths analysis was known and used in the Old World since the beginning of the 20th century (1900, 1914) and in the New World since the 1960's (ibid: 326). However it was only during the 1970 's and 1980's that the introduction and development of techniques and methodology of these were applied on a wider and more systematic scale in archaeological research. Finally, a major advancement in recovery methods of marcobotanical remains was made when the method of Froth Flotation was introduced and widely applied (ibid: 7-9).

The development, refinement and wide application of pollen, phytolith analysis and the method of Froth Flotation in archaeological research are largely attributed to increased interest in the origins and spread of agriculture and the past human interaction with the environment. In turn, studies on archaeobotanical remains have witnessed a dramatic increase in recent years (ibid: 4) and for the last three decades or so, such studies got out of the laboratory and became an integral part of many archaeological projects (Greig, J., 1989: 2). That is to say, archaeologists developed a (healthy) trend toward interdisciplinary research in which biological science started to play an active role.

The foregoing outline shows that the studies of archaeological plant remains have undergone a remarkable development in their conceptions and scope mainly due to developments and changes in interests and the nature of the questions asked. The results and quality of these developments have been further promoted by introducing and/or refining field and laboratory methods and techniques. Nowadays, archaeobotanical research address a variety of questions and new issues, the most common and widely researched ones are:

1. The study of the past human-plants relationships and their change over time. This includes studies on: -

plant foods,

extractive strategies of plant foods and their change of overtime,

the craft uses of plants e.g. in construction, basketry, textiles, clothing, medicine, etc. and

uses of plants for fuel.

2. The effects of resource availability on settlement patterns.

3. The surrounding environment at the time of the formation of the deposit (i.e. occupation of the site).

Thus, many areas of developments and changes in the field may be viewed as positive, yet there are other areas which remained unchanged or that the changes introduced are disadvantageous, or conflicting and controversial in their implications.

As mentioned earlier in this paper, I shall focus on some of (what I think are) the main controversial issues and the potential contribution of this field of research. For convenience of presentation, I will divide these into the following sub-headings:

Botanical issues,

Archaeological issues,

Overlapping issues.

Potential contribution of Archaeobotany.

3. Botanical issues:

These consist of the following:

3.1 Problems of nomenclature.

3.1.1 Definition and application of terms.

The main emphasis here are on those terms, which are widely and commonly used. These are presented in two parts. The first part deals with some of the terms given to the ? fields (or ? sub-fields) of the study of archaeobotanical remains. The second part deals with some of the terms given to the archaeobotanical data.

3.1.1.1 Archaeoboatny, Palaeoethnobotany, Palaeobotany, Archaeoethnobotany, and Archaeological-botany.

The terms Archaeoboatny, Palaeoethnobotany, Archaeoethnobotany, Archaeological-botany etc. are handicapped by inadequacies, contradictions, inconsistency and vagueness of their definitions, and hence, their theories, objectives, applications and final results suffer the same weaknesses as demonstrated in the following examples.

For instance, some researchers use the terms Archaeoboatny and Palaeoethnobotany as synonyms (Mason, S., 2002a; http://1) and defined both as "the study of the interrelationship between people of the past and plants" (http://1; http://2). Accordingly, the two terms are used alternatively and randomly, sometimes within the same publication. Ideally, a definition of a scientific term is meant to leave nothing to contention as it states and clearly explain the scope, applications and exact limits of the term in question. In other words, each scientific term should have its own well defined scope and limits leaving nothing to contention. Therefore, applying one definition on two different terms obviously calls for an explanation of the philosophy behind such usage. Until an explanation is provided, such dual applications of these terms will keep creating a great deal of confusion (particularly among students).

The picture becomes more blurred when we take into consideration another usage in which the two terms (mentioned above) are regarded and used as synonyms but they are defined differently. On one hand, Archaeoboatny is defined as being "the study of ancient plant remains with emphasis on reconstruction of the environment, climate and resource availability". On the other hand, Palaeoethnobotany is defined as "the study of ancient plant-human relationships and their changes overtime" (Owen, B., 2002). In other words, Archaeoboatny is mainly concerned with natural vegetation and Palaeoethnobotany is restricted in scope to the study of (cultural) plants, which are associated with human beings. As the two terms are defined as having different scopes and limits, they should have been used as two distinct terms. Comparison of these definitions with the one stated earlier does not only create more confusion and inconsistency but it also reveals profound contradictions and controversy in their scope, applications and interpretations.

Other examples show that some researchers tend to use more than one definition for the same term. For instance one definition refer vaguely to Archaeoboatny as being "the study of plant remains of any kind from archaeological sites" (Greig, J., 1989: 1). Another definition associate the same term with the "recovery and identification of plant remains by a specialist regardless of discipline" (Hastorf, C.A., and V.S. Popper, 1988: 1). This inconsistent and random usage clearly reflects a confusion between methodology and scope which, in turn, creates controversy and casts doubt as regards the basis/principles on which the definitions of these terms are made.

In addition to the foregoing definitions of the term Palaeoethnobotany, there is one, which proposes an entirely different scope and application. It defines Palaeoethnobotany as "the study of the past cultures by an examination of human population interaction with plant world" (ibid: 1). Obviously, this definition extends the scope of Palaeoethnobotany far beyond the cultural interpretation of botanical remains. It states explicitly that entire past human cultures are researched only by studying the interaction between past human population and plants.

Other terms such as Archaeoethnobotany is defined as being the "study of prehistoric plant use and origins of agriculture " (http://3). This definition explicitly

confines the scope of Archaeoethnobotany to the prehistoric period within which it only deals with issues related to origins of agriculture. For some reason, this term is not widely used as the other ones. Similar to Archaeoethnobotany, archaeological botany is another term infrequently used in association with archaeological plant remains without a clear definition of its meaning, or specifications of its scope and objectives. Finally, there is another term, namely, Palaeobotany which is defined as ¨the study of plant fossils usually from the Tertiary, 65 to 1.5 mya- and earlier (Greig, J. 1988: 3). But it is often used (especially by archaeologists) to denote the study of plant remains recovered from Post-Pleistocene sites. Apparently, these different applications indicate that there are different emphases on the term fossil as discussed in more details in the following lines.

3.1.1.2 Fossil, Macrofossil and Microfossil.

Researchers are also divided as regards the usage of the terms macrofossil and microfossil in relation to plant remains recovered from archaeological sites. On the one hand, one group of researchers is of the opinion that these remains are not fossils. They argue that fossils are confined to the classic definition, i.e "trace or shape of an organism of the past geologic age which has been preserved in rock, ice or earth for millions of years" (Macfall, R.P., and J.C. Wollin, 1983: 11). Accordingly, they apply the term fossil to palaeobotanical data dated to the tertiary period and earlier. All remains which date to periods younger than that are described as macro (or micro)-botanical remains. On the other hand other researchers lean more towards a modern usage and are of the opinion that the term fossil also covers remains which have been dug from the earth regardless of their age or the state in which they are found (e.g. petrified). The modern usage extends application of the term fossil to inorganic matter, e.g. fossil lake, fossil landscape, etc (Magid. A., 1989: 65).

As previously stated, these definitions are presented as examples reflecting the lack of consensus on the distinction between the terms (Hastorf, C. A., and V.S. Popper, 1989: 2) and the subsequent faulty criteria used to define these terms. Evidently, the lack of distinction between terms creates a state of confusion, and hence lack of direction and loss of orientation among students and young researchers. Indeed, it will be a perpetual dilemma. Therefore, there is immediate need and necessity for drawing a clear distinction between these terms by revising and redefining their scopes, and applications.

Until the problem of the controversial definitions is resolved, the present writer opted to adhere to the term Archaeobotany and to employ it on the basis of its literary meaning. That is to say, Archaeobotany is viewed as (an umbrella) term that denotes the study of all types of ancient plant remains recovered from archaeological sites and off site areas. These remains are studied to serve various cultural and non-cultural research purposes e.g. study of past human-plants relationships, interaction between humans and their environment, reconstructing of past natural environment, climate, etc. More terms and definitions can be found in most of the publications on ancient plant remains, e.g. J. Greig, 1989; C. A. Hastorf and V.S. Popper, 1988; S. Mason, 2002b, http://4; http://5; http://6.

3.2 The dual identity of Archaeobotany.

The sources of data with which an archaeoboanist work are diverse and their nature and value are equally varied (Greig, J., 1989: 3). While a very few individuals have given attention to investigation of Archaeoboatny for its own sake, much of the archaeobotanical information has accumulated in records incidental to investigations for other purposes (ibid.) as for instance archaeological investigation.

Thus, the position of Archaeoboatny is not yet clearly identified as to whether it is an independent discipline and or it is more like a service (or resources)- unit that renders research services to other disciplines (e.g. archaeology). Some researchers consider it as one of the archaeological sciences that form environmental archaeology (together with other subjects). Others view it as an independent discipline which render research service to archaeology as well as other fields of research such as pharmacology, linguistics (place-names), environmental science, etc. (ibid.).

It is probably more relevant to regard Archaeoboatny as a potential interdisciplinary field of research awaiting development of its own research goals and questions. Development of these areas, may positively direct researchers to appropriate methods of data collection and analysis which will enable them to extract more information from the botanical data for its own sake and for other research purposes.

3.3 Methods of collection and analysis of data.

Theoretically the general rule stresses that it is "only after our methodologies and interpretations are clearly expressed leaving nothing to implications that we can invite all researchers to apply, discuss and improve them" (Hastorf, C.A., and V.S. Popper, 1988: 3). Practically, most of the studies on archaeobotanical remains suffer the following weaknesses:

a) Research has not developed beyond the technique-oriented one. Despite of the fact that detailed reports and descriptions of the methods of collection and analysis of data are provided, yet they seldom explain why a particular method or a set of methods is used (ibid). In other words, most researches fall short of integrating research goals and procedures.

b) Inseparable from the foregoing, there is lack of flexibility to change methods with unexpected field and laboratory conditions (ibid: 4), for instance failure to develop successful collection-method(s) of data for pollen analysis from arid areas.

Moving from qualitative and semi-quantitative lists of species recovered from archaeological sites into a truly quantitative domain is still received with great enthusiasm (ibid). Currently, most researchers believe in the logic that the more statistical concerns are discussed, the more detailed matters of interpretation can be raised. This could largely (but not fully) be the case in regions and at sites where conditions provide 100% representative preservation for all botanical remains originally buried in the site. Otherwise, this application does not seem to have considered the difficulty (often the impossibility) of applying quantitative analysis in areas where there are deposition and recovery biases in forms of under-representation or over-representation due to one or some or all of the following circumstances:

a) Preservation conditions are not in favor of survival of certain types of vegetal material, (e.g. with thin exterior surface), hence they are under represented while other types of plant material (those with hard and woody exterior surfaces) survive. Plant remains such as grains of cereals, tubers etc. perish shortly after their disposal leaving no traces behind,

b) Plant foods which are most consumed are least represented in the archaeological record. In addition to this

(i) cooked plant foods are less represented than those eaten raw,

(ii) plant foods with robust inedible portions are more likely to appear in the record than foods that are completely consumed (e.g. staple cereal foods and stones of fruits).

c) Plant foods eaten away from the site may leave no record (except may be in coprolites but even coprolites may not survive), which means that part of the food stuffs used may never be accounted for.

d) Deposition of seeds of weedy taxa that grew on the site during the occupation or after the abandonment of the site (Pearsall, D.M., 1989: 440) may be interpreted as being evidence of plant remains that are contemporary with the period of occupation of site.

The present writer learnt (through his research-experience in arid and semi-arid zones) that statistical studies of macrobotanical remains can be useful in certain cases. For instance, they are useful if the objective is to compare efficiency of different recovery methods and techniques at the same site or at several contemporary sites with similar deposits, environmental and preservation conditions. Biases of representation exist even in excellent preservation conditions. It may be easy to count or weigh each fruit-stone or seed type recovered from a site, but it is often difficult to interpret the meaning of the quantitative data.

3.4 Use (and misuse) of ethnographic and ethnobotanic data.

In order to help better processing of the data, to generate more questions and to draw more dynamic interpretation, studies of archaeological plant remains have many sources to tap. These sources comprise anthroplogical accounts, ethnobotanical data of current plant use by existing people and documentary and historical records (such as travelers', and geographers' accounts, tales, writings of classic authors, medieval herbal records, etc).

In exception of a few published works (that I am aware of), the use of ethnographic and ethnobotanic studies and other useful sources in the interpretation of archaeobotanical remains is both rare and unsystematic. Thus, the final archaeobotanical interpretation provides only partial and sometimes biased if not misleading information. This is not to be understood as if ethnographic and ethnobotanic observations furnish us with ready answers for similar archaeological occurrences and finds, rather, I would argue, they provide us with clues to questions that researchers should ask (from the phase of data recovery, its context and association to its analysis). Ethnographic and ethnobotanic research is (almost) always guided by two main questions: one**,** how and in what ways people use nature? Second, how and in what ways people view nature (http://1)? These, together with their finds, steer archaeologits and archaeobotanists to the type of questions they should raise and ask. As for instance, when we find a macrobotanical remain, we might ask questions such as what sort of plant species might be expected to grow with it, where might it be located in relation to other cultural and biological finds, how was it brought to the site, etc. (ibid). We can keep moving back and forth between our theories (ideas and questions) and the data (the finds) and eventually we often realize that our original ideas about the finds need to be changed. The more questions we ask the more we understand about the context and the finds and will probably go on asking and changing ideas for ever because ¨ we can feel pretty sure about something in the past but we can not really prove it ¨ (ibid).

Unfortunately, some researchers tend to be skeptic about the use of ethnographic studies (due to the wide temporal and cultural gap) and most of those who make use of them tend to make almost blue copies of the ethnographic experiences in their interpretations. In a previous work on plant remains recovered from archaeological sites in the Sudan, the present writer discussed the validity and limits of ethnobotanic and ethnographic data in archaeobotanical interpretation (Magid, A., 2003).

3.5 Manipulation of experimental studies.

Experimental research on processing and preparation of (wild and domesticated) food plants is also generally lacking and the few projects done or running are uncoordinated and mostly access-restricted (Mason, S., 2002c).

Experimental studies contribute to our understanding of the archaeobotanical data in three main ways (ibid):

a. producing samples of foodstuff at various stages of processing which can also be used as reference material for comparison with the archaeological remains.

b. obtaining more or better understanding of the possible sequence that may need to be undergone in producing an edible product from raw-plant.

c. providing greater insight into taphonomic biases, which are likely to affect archaeological preservation as well as providing insight into the importance of such things as cultural preferences.

It has been proven that doing experimental research in co-ordination with ethnobotanic and ethnographic studies (e.g. on gatherers and incipient farmers) make the task of experimental studies ¨much more easier, cheaper, focused and realistic¨(ibid).

3.6 Communication (between archaeobotanists).

There is a problem of provincialism and a general lack of communication among researchers and most (if not all) of the communications are based on personal relationships. Consequently, there is little integration of research goals and procedures e.g. many papers dealing separately with the same issue are found scattered in the literature. This is probably one of the main reasons for having many conflicting terms and applications (as discussed earlier in this paper).

Another disadvantage for the lack of communication is that isolated researchers (e.g. in Africa) fail to follow up recent developments in the field, and hence, they fail to update and maintain the quality of their research and interpretations (Pearsall, D.M., 1989: 7). Better communication through e.g. literature reviews and regional and international meetings would enhance the research of all (ibid).

Finally, many of the publications and research results are found buried in the literature of individual projects and institutions or little known languages, and hence are difficult to access or make use of their contents (ibid).

Most (if not all) of the above mentioned difficulties can be overcome by establishing an *efficient* network of communication and commitment of researchers.

4. Archaeological issues.

4.1 Negligence of archaeobotanical remains.

Increasing attention is being given to investigating archaeological plant remains. Nevertheless, recovery and study of botanical remains is still largely an afterthought in most of the archaeological projects (particularly those on prehistoric research). It is often the case that an analyst is contacted for the first time after the fieldwork and budget plans are made and repeatedly long after the fieldwork was started (Pearsall, D.M., 1989: 8). This apparent negligence is partly attributed to one or some or all of the following reasons (Mason, S., et al, 2002):

a. received opinion among many archaeologists is still that plant foods formed a minimal part of the diet of the prehistoric (mainly late Pleistocene-Early Holocene) populations,

b. even if plant foods are important, it has been argued that they are not well preserved on early sites and it is unlikely to find evidence for their use. Moreover, archaeological-research budgets are too little to allow for expensive archaeobotanical analyses (that often yield negative results). Thus, archaeologists interested in plant domestication and the origin of agriculture have often relegated the botanical evidence a secondary (or no) position and focused mainly on the economic, social and cultural developments.

c. archaeologists, especially processual ones, tend to focus on the most prelevant (and flashy) part of the diet, such as animal bones, fish remains (http://4) etc.

This attitude ought to be changed to one in which botanical remains are valued as significant finds and handled as any other faunal or material culture remains.

4.2 Problematic issues of sampling and interpretation.

A minority of archaeologists are keen to learn about the nature of archaeobotanical material, the method and technique of its recovery and its laboratory treatment and finally its advantages and limitations. Therefore, most (if not all) of the archaeological approaches to collection of archaeobotanical data often lack any definite plan or order or purpose. Every step is governed by or depending on chance. In addition, many archaeologists embrace a positivist model of interpretation (ibid) that is derived on the basis of empirical data and observations and the results obtained are considered truthful and objective knowledge (Pearsall, D.M., 1989: 8). By so doing, they repeatedly fail to explore and consider the following scientific realities (ibid):

a. distribution of plant remains on a site is affected by planned and unplanned cultural activities and by natural factors,

b. excavated area within a site constitutes a sample of the site. The excavated sample of the site does not necessarily represent (i) the whole site, (ii) all activities performed on the site or (iii) the distribution and types of botanical remains originally deposited on the site.

c. the botanical sample retrieved constitutes a sample of the sample of the botanical materials originally brought to the site (as we mentioned earlier in connection with the botanical issues).

In addition to these scientific facts, archaeologists fail to involve the logic of questions and answers in their interpretations of archaeobotanical data.

Consequently, these interpretations tend to be static in nature and limited in scope. Static and limited explanations fail to provide room for the following:

(i) future developments in the methods and techniques which may enable researchers to reveal remains not possible to uncover with the methods available. For instance, until recently, exploitation of food-plants in the Early Holocene Central Sudan has been interpreted as being mainly based on gathering of immediately eaten food plants which do not require processing or preparation before being eaten, e.g. fruits and berries (Magid, A., and I. Caneva, 1998: 78-87; Magid, A., in press). The archaeobotanical evidence, on which the interpretation was derived, consisted mainly of individual finds of stones and seeds of fruits which were mostly hand-picked while excavating or during sieving (Magid, A., and I. Caneva, 1998: 78-87). However, this interpretation was proven wrong when the method of making positive casts of plant impressions on pottery was introduced and evidence of wild cereals and grasses was recovered from the same sites (ibid; Magid, A., 1989: 71-93; 1995: 147-177). In fact, application of this method and extraction of new archaeobotanical evidence changed long and firmly held interpretations of economic strategies related to food-plant exploitation during both the Early and the Middle Holocene periods in the Central Sudan (ibid; Magid, A., in press). It is also anticipated that such methods as phytoliths analysis (and may be other new methods to be developed) will be applied in arcaheobotanical research in the Sudan in the future. Application of these methods may yield new evidence that lead to changing further the present interpretations on food-plant exploitation.

(ii) possibilities for raising more questions which may generate different interpretations because, no matter what archaeologists do, their cultural interpretations are to a varying degree coloured with their cultural biases and experiences. For instance, whenever evidence of pottery, grinders and wild cereals/grasses are recovered from a Neolithic site (e.g. in the Sudan), these findings are interpreted as being indicative of e.g. cultivation activity. But, a different interpretation (e.g. suggesting gathering) is drawn when similar botanical and cultural evidence are recovered from a Mesolithic site.

4.3 Usage of the term cultivation.

It is often the case that the term ¨cultivation¨ is used by archaeologists and in the archaeological literature (on the early exploitation of food-plants) to denote ¨domestication¨. This usage strongly implies that the term cultivation is only associated with domesticated plants. Indeed, some archaeologists argue that the available evidence does not, in any direct or indirect way, show the actual transition (or shift) from the gathering of wild food plants to their cultivation and domestication. Therefore, they could not use the term cultivation unless they have evidence of domesticated plants. Obviously this restricted use of the term cultivation reflects a positivist model of archaeological interpretation, which obviously seems to overlook the following scientific facts:

a. if wild plants were not regularly cultivated they would not have been domesticated; thus, cultivation is an activity which can be exercised on wild plants, incipiently and fully domesticated plants

b. all domesticated plants are cultivated but not all cultivated plants are domesticated (Magid, A., 1989: 229). For more information on this issue see ibid: 228-230.

Therefore, it should be stressed that when dealing with prehistoric and early historic economic strategies related to exploitation of food plant and/or evolution of

food plants, it is necessary and very significant to specify and distinguish between cultivation of plants that are wild and those which are domesticated.

5. Overlapping issues

These are problematic issues and worries shared by both archaeologists and archaeobotanists.

5.1 Problem of communication.

It is often the case that, on one hand, archaeobotanists only know and are only concerned with the technical and scientific parts of the study of archaeobotanical remains retrieved from archaeological site but they know very little or almost nothing about the cultural context of these remains. On the other hand, archaeologist often know nothing about the nature and limitations of the archaeobotanical remains and the methods used to retrieve and analyise them. Consequently, there is almost complete lack of a common language of communication. Lack of a common language of communication creates situations where archaeologists and archaeobotanists (unintentionally) misinform and/or misunderstand each other and hence they fail to fulfil the goals and objectives of their endeavour.

5.2 Problems of interpretation.

Building on the previous point, a question arises: Who should draw the final interpretation of archaeobotanical data: the archaeologist who knows about the cultural context or the archaeobotanist who knows about the botanical remains? In either case, the end product is obviously incomplete interpretation because the writings of an archaeologist are too often lacking the explicitness concerning the plant remains involved and the archaeobotanist often fall short in ethnological details. This dilemma leads us to the following issue.

5.3 Ideal situation for efficient research (often lacking).

As Archaeoboatny is marginal between botany and archaeology, the ideal situation is to have a researcher trained in both archaeology and botany. Unfortunately, until now there are a very few specialists who have such qualifications and it still is a matter of debate whether it is better for archaeobotanist to be first good botanist and then to learn about archaeology, or whether archaeologists can become good botanists. The current positive tendency towards interdisciplinary research work might motivate future archaeobotanists to acquire training in both disciplines. Until then, it may be practical to suggest that both archaeologists and botanists embark on developing a language of communication that enables each to learn the fundamentals of his partner's field of research. By so doing, they will be able to promote a language which enables them to plan and investigate jointly those points at which plant science and archaeology overlap and to interpret the mutual significance of their interrelationship (Greig, J., 1989: 3). In short, archaeologists and archaeobotanists need to acquire language by which they can understand and

communicate the questions to be asked, the plans to be made, the work to be carried out, analysis to be done and objectives to be achieved.

6. Possible contribution of Archaeobotany to the present day needs.

Nowadays, the validity of any science or field of research lies in its durability and ability to render tangible services to human-needs and expectations in different situations at different places and environments. If it fails to meet these conditions, then both interest and need for it rapidly decline. Consequently, research-grants progressively dwindle until they cease to flow. So, one may ask whether Archaeoboatny is capable of meeting such challenges and if the answer is yes, how can it contribute to the needs of people in the times we live in? In a recent work, the present writer attempted to address the relevance of Archaeoboatny to our today's world, its needs and expectations (Magid, A. 2003). He concluded that Archaeobotany has the potentials to restore and conserve (rapidly disappearing) indigenous knowledge on plants and their uses. It also contributes to resettlement and/or development of displaced people due to famines, civil wars and political instability (ibid).

Archaeobotany also has the potentiality to furnish pharmaceutical research with raw-materials and recipes and to promote the current healthy trend in the (Developed) World towards the use of natural herbs for different purposes (e.g. remedies, dietary, body-grooming, natural cosmetics, etc.). Archaeobotanical research could contribute to serving these goals by assembling detailed information on ancient plants, their types, properties and applications. This information can be used to reviving ancient herbal recipes/applications and adding unknown ones to the present formulas.

In short, Archaeoboatny has the potential of addressing issues related to current socio-economic crises and rural development as it contribute to solving problems of food-crises and resettlement of displaced communities. It also has the potentials to enriching newly found old (e.g. remedial, cosmetic, etc.) ways of using plants.

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