

## **Archaeobotany Questionnaire Preliminary Results**

Naomi F. Miller

University of Pennsylvania Museum Near East Section

March 18, 2010

Prepared for Society for American Archaeology Forum:  
Quantification and Presentation:  
Effective Means of Presenting Plant Evidence in Archaeology  
(Friday, April 16, 2010)

In the fall, 2009, I devised a questionnaire about archaeobotany methodology. I advertised the link to the "www.surveymonkey.com" website on the Archaeobotany listserv, on my own website, and to about 10 North American archaeobotanists of my acquaintance. The sample was not in any way random or representative, and each 'case' is not truly independent, as practitioners are influenced by their university training and experience in different world areas. At least 138 people started the questionnaire, and 120 finished it. I would like to thank all who took the time to answer the survey. Although the survey does not directly address the topic of the SAA forum, the forum is one solution to a common problem: lack of communication among archaeobotanists!

For some questions, "majority" opinion is valuable to know. Just knowing that not everyone does what you do can encourage discussion of appropriate practice. Sometimes, an individual's comments and observations in the more narrative sections yielded useful insights.

I gave respondents many choices, so the answers are sometimes ambiguous. Not everyone answered all questions, and some questions allowed multiple answers. The following analysis summarizes the basic results and also collapses some of the categories; for questions that accepted multiple answers, I sometimes prorate the results to equalize the influence of the respondents. For purposes of the SAA forum, the most relevant sections are the Recording and the Reporting and Analysis sections.

|                           |    |
|---------------------------|----|
| Summary of a few findings | 2  |
| FIELD                     | 3  |
| LABORATORY                | 7  |
| RECORDING                 | 10 |
| REPORTING AND ANALYSIS    | 12 |
| SUGGESTIONS AND COMMENTS  | 17 |
| DEMOGRAPHY                | 22 |
| REFERENCES                | 27 |
| WEBSITES MENTIONED        | 28 |

Archaeobotany Listserv: [archaeobotany@jiscmail.ac.uk](mailto:archaeobotany@jiscmail.ac.uk)

URL: [www.sas.upenn.edu/~nmiller0/](http://www.sas.upenn.edu/~nmiller0/) ; E-mail: [nmiller0@sas.upenn.edu](mailto:nmiller0@sas.upenn.edu)

Assigned UPM-ELR number May 17, 2010

online: <http://www.sas.upenn.edu/~nmiller0/AbotQ.pdf>

### Summary of a few findings

Demographic. Most of the respondents are practicing archaeobotanists with PhDs who have published three or more botanical reports. Most live in North America (42) and Europe (63). Most people work in the general region in which they live, although North Americans and Europeans tend to get around more, presumably due to economic conditions and historical circumstances. About half of 117 listed archaeology as their highest degree, and about 30% listed anthropology. The remainder studied botany, ecology, and earth sciences. Anthropologists and archaeologists are most likely to live in North America or Europe; botanists are most likely to live in the UK, ecologists in Europe. Those living in Europe, Latin America, and North America are most likely to be anthropologists or archaeologists, those living in the UK are more likely to have archaeology or botany backgrounds. The sociocultural interests of most archaeobotanists focus on small-scale agricultural societies rather than foragers, the early civilizations, or historic periods. Of the topics offered, agriculture itself, along with cuisine/foodways and environment were the primary topical concerns; ethnoarchaeology, climate and gender trailed.

Challenges. The methodological focus of the survey undoubtedly affected the responses. Aside from the importance of integrating archaeobotanical data with the archaeological study, and a few mentions that there should be more synthetic studies, most of the challenges mentioned concern practice, not theory or results. Aside from funding issues (not enough jobs, which leads to too few people to do the work and feelings of intellectual isolation; also inadequate laboratory facilities or time to do the work), aspects of co-operation were mentioned: Archaeobotanists are not part of the planning, execution, and analysis, from sampling strategies to integration of our research in the final publication or report. People living in the US/Canada and Latin America feel most undervalued; those in the UK seem most concerned about sampling and statistical issues.

Many of the suggestions for improving archaeobotany are actually within our control as a community of practitioners. Even where floras are reasonably well known (Europe and North America), a number of people would like to see higher standards for identification of seeds and plant parts, and access to adequate references collections, descriptions, and images. "Continuing education" workshops and training (seeds, charcoal, statistics), online access to reports, and seed and plant part identification databases were mentioned most on people's wish lists.

State of the field. Underlying many of the concerns is the lack of institutional support for archaeobotany. To this day, many archaeologists do not think of plants (and archaeobotany) as being essential for understanding ancient societies, and that is reflected in the way the field is treated in institutional settings. The desire for databases of reports and identification tools is being addressed by a few individuals who maintain websites, but what we really need are databases that can be contributed to collectively by practitioners and that will outlive their creators. Communication within the field is also necessary for it to advance. Personally, I do not advocate standardizing reports, as sites are all different, but agreement on identifications, statistical methods, and reporting standards requires that we help each other, since students and professionals have very varied backgrounds and skills.

## FIELD SECTION

Some respondents indicated they do not direct this part of research (some are still students who only work in the laboratory).

**1. What kind of flotation apparatus do you use? (N=126)**

|   |              |
|---|--------------|
| Mechanical: SMAP- or Siraf-type machine                                   | 49.2%        |
| Mechanical: Flotec  | 11.9%        |
| Mechanical: hand pump (bilge pump)  | 4.0%         |
| Manual: use strainer to remove flot. from bucket                          | 25.4%        |
| <b>Manual: pour floating material from bucket into cloth or fine mesh</b> | <b>54.0%</b> |

Many people use more than one flotation system, presumably as conditions and budget allow. For those who answered, prorated, about 45% of the responses were for a mechanical system, and 55% hand.

35 both  
39 mechanical only  
52 manual only  
12 no answer

**2. How do you guide the excavators in order to obtain appropriate samples for your analyses? (N=123)**

|  |              |
|--|--------------|
| <b>Request excavators to systematically collect samples from all or nearly all deposits)</b>           | <b>54.5%</b> |
| Request excavators to collect samples from particular contexts or phases                               | 43.9%        |
| Give excavators an idea of your priorities, and let them take as many samples as their budget permits. | 44.7%        |

Prorated, 41% prefer systematic, 28% by context, 31% give priority

NFM comment: In my experience, it is better to get at least a few samples, so I advise excavators that there is a sampling design for every budget, and then advise on what the priorities are.

**3. What kind of samples do you recommend (and hope the field archaeologists give you)? N=112**

|  |              |
|--|--------------|
| <b>Grab (also called bulk): one from a particular, provenanced deposit</b> | <b>58.9%</b> |
| Average (also called scatter): several smaller ones combined               | 25.9%        |
| From a specific spot located on the top plan                               | 5.4%         |
| Column   | 9.8%         |

Although several people wanted to give more than one answer, grab samples from archaeological features are clearly the most commonly taken. Several commented their choice partly depends on the kind of sample and the questions asked by the excavator or the archaeobotanist's own research problem.

**4. How do you prefer to record sediment volume?**

|   |              |
|---|--------------|
| In the ground (by measuring the excavated area and depth)   | 5.1%         |
| <b>In a volumetric container (e.g., bucket with liter markings or container of standard size)</b>   | <b>94.1%</b> |
| I don't record or request sediment volume   | 1.5%         |
| The archaeologists whose samples I analyze do not provide me with information about sediment volume | 8.1%         |

NFM comment: My impression is that increasingly archaeobotanical reports include sample volumes, but this is not universal. Sometimes, those doing the flotation neglect to measure volume, and there is nothing the archaeobotanist can do about it.

NFM comment: Some archaeobotanists record weight of sediment floated (as I did on my first excavation as archaeobotanist). Weight and volume are both somewhat variable (weight for a given volume differs depending on packing—clay will be heavier than sand, since the particles will be packed more closely; volume of a certain weight differs depending on moisture content, and freshly excavated samples will be heavier than those that have dried out some).

**5. I record sediment volume of (N=125)**

|  |              |
|--|--------------|
| Sieved sediment (with rocks, artifacts, and clumps of dirt removed)                                      | 14.4%        |
| <b>Unsieved sediment (some very large rocks or artifacts may be removed prior to volume measurement)</b> | <b>85.6%</b> |

Some record both or say "it depends."

**6. With regard to the amount of sediment per flotation sample (N=129)**

|  |              |
|--|--------------|
| I need samples to be of a specific size (e.g., to meet statistical requirements of analysis) | 33.3%        |
| <b>I do not require that all samples be the same size</b>                                    | <b>66.7%</b> |

Although many commented they would prefer a standard size, most of us are pretty flexible, given the realities of excavation as well as the fact that some interesting deposits may not be as big as the "standard" size.

**7. What size sediment samples is closest to the volume usually adequate for your purposes? (N=136)**

|  |              |
|--|--------------|
| 2 liters                                 | 10.3%        |
| 5 liters                                 | 8.8%         |
| <b>10 liters</b>                         | <b>33.1%</b> |
| More than 10 liters                      | 26.5%        |
| Too variable to generalize               | 21.3%        |
| By weight (please indicate weight in kg) | 0.0%         |

In response to the previous question, one person commented that even if the sample is 40 liters, they prefer it to be broken up into 10-liter subsamples for ease of handling. (As for me...I cannot safely lift more than about 15 liters, so I agree with that respondent!)

Another commented that I should have asked "What is the average size of samples that are actually taken by the field archaeologist (as compared to the size you think is adequate)?"

Those using mechanical flotation seem to prefer larger samples, presumably because it is faster to process large volumes:

| liters  | mechanical | hand |
|---------|------------|------|
| 2       | 3          | 12   |
| 5       | 7          | 8    |
| 10      | 21         | 31   |
| >10     | 32         | 13   |
| too var | 11         | 23   |

There does not appear to be an association between world area or environmental setting. Anyone who works in lowland South America also works in highlands, so those are combined:

| liters     | US/<br>Canada | Meso | S<br>Amer | "Eur" | Medit. | W, C<br>Asia | S, E<br>Asia | "Afr" | Pacific |
|------------|---------------|------|-----------|-------|--------|--------------|--------------|-------|---------|
| 2          | 2             |      | 1         | 4     | 1      | 3            |              | 2     |         |
| 5          | 2             | 3    |           | 2     | 4      |              | 1            |       |         |
| 10         | 9             | 4    | 9         | 18    | 10     | 4            | 3            |       | 1       |
| >10        | 9             | 1    | 3         | 11    | 8      | 3            | 1            | 1     | 2       |
| too<br>var | 4             | 1    | 2         | 11    | 4      | 5            |              |       | 3       |

| liters  | temperate | (wet) tropics | arid,<br>semiarid | montane | coast |
|---------|-----------|---------------|-------------------|---------|-------|
| 2       | 5         | 2             | 8                 | 2       | 3     |
| 5       | 7         | 2             | 6                 | 3       | 3     |
| 10      | 22        | 8             | 21                | 8       | 18    |
| >10     | 20        | 3             | 17                | 3       | 13    |
| too var | 11        | 4             | 12                | 7       | 12    |

NFM comment: For me, a rich flot. sample is, say 50 cc of charred material per 10-liter bucket, and if an average sample for a site is about 25 cc, I have enough to analyze. Therefore, I sometimes wonder that if you need to process, say 50 liters to accumulate 25 cc, the density is so low as to be not specific to the archaeological context it comes from, and therefore not readily interpretable except in the most general terms.

NFM comment: in the mid-1980s, I did a similar survey at the SAA, with most of the 25 respondents working in the Americas. It was interesting that in the US southwest, 2-liter samples were deemed adequate, but in the midwest, 40 liters was not uncommon.

#### 8. What do you do with the heavy fraction? (N=135)

|  |              |
|--|--------------|
| <b>Scan or sort for artifacts, bones, etc. as well as plant material</b> | <b>82.2%</b> |
| Sort for plant materials only  | 13.3%        |
| Give to specialists  | 12.6%        |
| Don't sort   | 3.7%         |

One person commented that they "sort by hand while floating," leaving the "rest for the gods." I do that too, when I use a manual system.

**9. Which, if any, of the following remains routinely obtained from sediments in your flotation samples are analyzed by you or someone else, or would probably be useful if they were analyzed? (N=133)**

|   | Are analyzed       | Would be useful to analyze | Are rarely recovered in my samples | Response count |
|---|--------------------|----------------------------|------------------------------------|----------------|
| Fish remains                                    | <b>65.9% (87)</b>  | 23.5% (31)                 | 10.6% (14)                         | 132            |
| Bird remains                                    | <b>62.1% (77)</b>  | 17.7% (22)                 | 20.2% (25)                         | 124            |
| Mollusk remains                                 | <b>49.6% (64)</b>  | 36.4% (47)                 | 14.0% (18)                         | 129            |
| Insect remains                                  | 23.0% (28)         | <b>46.7% (57)</b>          | 30.3% (37)                         | 122            |
| Small artifacts (beads, debitage, etc.)         | <b>79.8% (103)</b> | 15.5% (20)                 | 4.7% (6)                           | 129            |
| Phytolith (sediment sampled prior to flotation) | 24.1% (26)         | <b>47.2% (51)</b>          | 28.7% (31)                         | 108            |
| Starch (sediment sampled prior to flotation)    | 15.5% (15)         | <b>44.3% (43)</b>          | 40.2% (39)                         | 97             |

This question was poorly phrased; I was trying to find out if it would be useful to try to get more information out of the heavy fractions. I was assuming that archaeobotanists remove plant remains (including charcoal, mineralized seeds, etc.) and large bones, but should have asked those as separate questions. There is general agreement that if fish, bird, mollusk and small artifacts are found, they are analyzed, or at least it would be useful to analyze them.

Among the comments, several people added pollen (I would have thought contamination from the air would limit the usefulness of pollen from bags of sediment). Among the faunal remains, no one mentioned bone fragments of large animals as being removed.

NFM comment: I am willing to pick heavy fractions only for plant material or big things; my experience is that if I suggest to some other specialist that they are welcome to pick out the material of interest to them, they suddenly don't need the material from the heavy fractions. As a matter of principle, I am unwilling to ask people to do things that I am unwilling to do myself, even for pay (e.g., picking 2-mm bone fragments from heavy fractions). The Çatahöyük model of close attention to everything does not work for smaller or less well-funded projects.

**10. Please provide any clarifications or comments on the flotation section here.**

Several people commented that I placed too much emphasis on flotation as the recovery method of choice. For wood charcoal recovery, one person recommends dry-sieving much more of the deposits through 5-cm mesh; another comments that flotation is not so useful for waterlogged deposits; and another has found found "the destruction caused by sudden moisture stress" can be severe for charcoal, as well as for desiccated material.

## LABORATORY SECTION

**1. Do you split flotation samples before sorting? (N=132)**

|                         |              |
|-------------------------|--------------|
| <b>Yes or sometimes</b> | <b>93.2%</b> |
| No                      | 6.8%         |

Some interpreted the question in terms of reducing the total amount to be sorted, if a sample is very big.

**2. If 'yes or sometimes', why? (N=120)**

|  |              |
|--|--------------|
| <b>Facilitate sorting</b>  | <b>70.8%</b> |
| Separate out one or more size fractions for differential treatment | 40.0%        |
| Separate (roughly) by taxonomic group (e.g., seeds and charcoal)   | 25.8%        |

NFM comment: For my samples, it is not too onerous to sort everything down to 2 mm, and as the fragments get smaller, identification becomes less secure. So for smaller than 2 mm, I don't separate out wood charcoal and I pull only seeds, seed fragments, and identifiable plant parts. For me, the 2 mm sieve is analytically important, and 4.75, 1, and 0.5 mm sieves are for convenience. If a sample is too big to sort 100%, I prefer to use a riffle box to reduce the amount to analyze. Some people will totally sort the large fraction and a portion of the smaller fragments, and then multiply up. I think that misrepresents the quantities of rare types.

**3. If 'yes or sometimes', what mesh sizes do you use? (N=113)**

|                                |              |
|--------------------------------|--------------|
| 4.75 mm (US standard 4)        | 5.3%         |
| 4 mm (US standard 5)           | 49.6%        |
| 2 mm (US standard 10)          | 82.3%        |
| 1 mm (US standard 18)          | 73.5%        |
| <b>0.5 mm (US standard 35)</b> | <b>83.2%</b> |

In the comments, a number of people mentioned using 0.25-mm sieves, and scattered responses included other sizes, as well

**4. In flotation samples, which of the following amounts of plant material (whether count or weight) do you record (N=134)**

|  |              |
|--|--------------|
| Whole seeds (s.l.; including achenes and similar structures) | 95.5%        |
| <b>Seed fragments</b>  | <b>96.3%</b> |
| Wood charcoal  | 79.9%        |
| Other identifiable plant parts                               | 88.8%        |

Nearly everyone records whole seeds and seed fragments (96%; the remainder may be anthracologists!)

Several respondents mentioned that they pass the wood charcoal on to specialists. Others mention parenchyma, resin and similarly amorphous materials.

**5. For a typical sample, down to what to size do you quantify the following items? (N=133)**

|  | >4.75 mm | >4 mm | >2 mm        | > 1 mm | > 0.5 mm     | > dust | Count |
|--|----------|-------|--------------|--------|--------------|--------|-------|
| Wood charcoal  | 4.4%     | 16.8% | <b>59.3%</b> | 10.6%  | 2.7%         | 6.2%   | 113   |
| Whole seeds  | 0.0%     | 2.4%  | 2.4%         | 10.2%  | <b>47.2%</b> | 37.8%  | 127   |
| All seed fragments   | 0.8%     | 1.6%  | 6.6%         | 17.2%  | <b>48.4%</b> | 25.4%  | 122   |
| Seed frags identifiable at least to a named type (like nutshell, cereal) | 0.0%     | 1.6%  | 8.2%         | 17.2%  | <b>46.7%</b> | 26.2%  | 122   |
| Maize plant parts  | 0.0%     | 5.0%  | 15.0%        | 23.3%  | <b>48.3%</b> | 8.3%   | 60    |
| Other identifiable plant parts   | 0.0%     | 0.0%  | 15.6%        | 19.3%  | <b>45.9%</b> | 19.3%  | 109   |

In the comments section, several mentioned that for purposes of answering the question, some interpreted '0.5 mm' as 0.3 mm, and 'dust' as 0.25. It was also clear from the comments that fragmentary items like nutshell and cereal fragments can be problematic in terms of weight, fragment count, or some kind of minimum number of individuals count.

**6. For identifications based on comparative material, I use (N=134)**

|   |              |
|---|--------------|
| <b>My personal comparative collection</b>   | <b>73.1%</b> |
| A colleague or mentor's comparative collection  | 26.9%        |
| My institution's comparative collection   | 60.4%        |
| The comparative collection of another institution                                     | 30.6%        |
| I do not have ready access to an adequate comparative collection (and rely on images) | 9.0%         |

Of the 12 who said they do not have ready access to an adequate comparative collection, only two indicated that had no access at all to a collection.

**7. If you identify charcoal (from flotation samples or hand-picked), how do you choose the number of pieces to identify? (N=80)**

|  |              |
|--|--------------|
| <b>Predetermined number if available (put number in 'other' box)</b> | <b>42.5%</b> |
| Arbitrary  | 16.3%        |
| All pieces greater than a particular size (put size in 'other' box)  | 37.5%        |
| As much as possible  | 21.3%        |

Many people just made a comment, and many indicated directly or indirectly that they "sample to redundancy." Also, several commented that these numbers refer to the ideal sample, it depends on how many identifiable pieces are available. Others indicated that the amount identified may also depend on the amount of money provided. That said, for those giving specific answers of how many pieces they aim for, if available:

No. pieces  
 10-15 : 1  
 20 : 13  
 30-50 : 5  
 100+ : 17  
 200+ : 3

For those who think in terms of size: about 10 people examine all or some of the material >4 mm, and about 10 also try to identify pieces >2 mm.



NFM comment: After mistaking the early and late wood of *Fraxinus* for two different types, I now will only consider identifying charcoal with at least one complete growth ring unless it is a type, like genera in the Chenopodiaceae, that doesn't have annual rings. This approach also solves the problem of over-representing easily identified types like *Quercus*. Also, I think the concept "sampling to redundancy" makes a lot of sense for charcoal analysis, at least where I work, as there are not that many taxa.

**8. If you identify charcoal (from flotation samples or hand-picked), how do you decide which pieces to identify? (N=83)**

|   |              |
|---|--------------|
| Informal attempt at representativeness                            | 47.0%        |
| <b>Randomly (through riffle box or randomly numbered squares)</b> | <b>48.2%</b> |
| Arbitrarily   | 15.7%        |

Some people checked two or all three of the options.

**9. Please provide any clarifications or comments on the laboratory section here.**

One person wrote: "I adapt the way I work with charcoal to the type and importance of the excavation, to the material and to the importance and the nature of the question it has to elucidate. But... I am very interested to know how other anthracologists work."

Another: "charcoal is the most contentious in the British scene, I think—weight versus count, down to what size; how selected. The main thing is always to say what was done in the methodology [section,] although this is all too frequently not done and even more frequently omitted from a published report. Rant over!!"

Another: "I take a really good look at the charcoal first—including reading the excavation and contextual find notes. (In fact, I summarise all of this data in a preliminary audit before I start. That way I already know something about the likely biases that might exist in any context.) In interpretation I also do not place great importance on say, the individual % frequency of a taxon in just one context, since this is going to be an imperfect indicator—but I will group my data for reporting into say, centuries, or archaeological phases, so that such bias and context by context differences will tend to be averaged out."

## RECORDING SECTION

**1. How do you record the different plant parts listed below? (N=131)**

|   | Count         | Weight | Volume | Response Count |
|---|---------------|--------|--------|----------------|
| Seeds (small &/or wild)                           | <b>100.0%</b> | 12.0%  | 4.8%   | 125            |
| Seeds (large &/or cultivated)                     | <b>100.0%</b> | 26.6%  | 6.5%   | 124            |
| Nutshell  | <b>92.3%</b>  | 49.6%  | 6.8%   | 117            |
| Wood charcoal                                     | <b>69.4%</b>  | 60.2%  | 20.4%  | 108            |
| Identifiable or otherwise interesting plant parts | <b>96.7%</b>  | 26.4%  | 5.0%   | 121            |
| Grain rachis                                      | <b>100.0%</b> | 13.9%  | 1.9%   | 108            |
| Maize cob   | <b>97.9%</b>  | 56.3%  | 6.3%   | 48             |
| Maize kernel                                      | <b>100.0%</b> | 53.1%  | 6.1%   | 49             |
| Maize cupule                                      | <b>98.0%</b>  | 55.1%  | 6.1%   | 49             |
| Tubers  | <b>91.5%</b>  | 40.4%  | 5.3%   | 94             |

Pretty much everybody counts the various plant parts (seeds, nutshell, identifiable plant parts, tubers) (91–100%) except for wood charcoal, at 69%. Although weight and volume are less popular in general, wood charcoal is more likely to be weighed than other plant parts, and some record volume.

In the comments section, several people indicated practical approaches as exceptions (if there's lots of material then they will also include weight of items they normally only do counts for; typically only record volume on very large samples—99% of the time they record count and weight, etc.

**2. When you record or report seed or nutshell fragments, which methods might you use to estimate equivalence of whole items? (N=121)**

|   | Yes or sometimes | No    | Response Count |
|---|------------------|-------|----------------|
| Conversion factor (weight or volume)                | <b>68.3%</b>     | 31.7% | 63             |
| "MNI" (Minimum number of individuals)               | <b>76.9%</b>     | 23.1% | 78             |
| Neither, but I do provide identified fragment count | <b>92.1%</b>     | 7.9%  | 76             |

This question was unclear. The bottom line: many people do convert fragments into equivalent whole seed by weight or volume, or MNI, or they use fragment counts that allow comparisons of quantities across samples. For those who answered the question at all, everyone provides at least one of these measures to quantify fragmentary remains.

**3. Please provide any clarifications or comments on the recording section here.**

One comment: "the recording of fragments is always somehow difficult!!!!"

Another: "Counting of cereal grain fragments remains very problematic—MNI grossly underestimates numbers, and weight conversion assumes that proportions in fragmented grain are the same as in whole grain—not the case either. No easy answer but no one ever discusses the problem!"

NFM reply: Some authors report conversion factors. Hans Helbaek 1969: 388) reports 1000 cereal grains weigh 9.0 g. W. van Zeist and W. Waterbolk-van Rooijen (1985) give averages of 1.05–1.28 g/100 charred naked wheat grains from Neolithic Bouqras and Erbaba, and 0.70–0.76 g/100 grains from Ramad; I used those figures to compare with some Medieval naked wheat from Gritille, which weighed in at 0.96–0.98 g/100 grains (Miller 1992). For rough-and-ready intersite comparisons of cereals, I tend to use

1.00g/100 grains, or, if a site has enough grain, I calculate an average for that site. In my experience, archaeobotanical results are robust enough that this degree of estimation is good enough.

## REPORTING AND ANALYSIS SECTION

**1. Which of the following do you like to see in published reports? (N=128)**

|  | Response Percent | Response Count |
|--|------------------|----------------|
| a. Seed measurements   | 56.3%            | 72             |
| b. Seed drawings or photographs  | 82.8%            | 106            |
| c. In-text description of identification criteria (including measurements)                       | 71.1%            | 91             |
| d. Descriptions, illustrations of unknowns   | 73.4%            | 94             |
| e. Descriptions, illustrations of unusual (i.e., rarely or never-before illustrated) types       | 85.2%            | 109            |
| f. Descriptions, illustrations of nearly all types   | 30.5%            | 39             |
| g. Deposit-by-deposit inventory of plant remains   | 72.7%            | 93             |
| h. Volume of sediment floated (for each deposit sampled)   | 82.8%            | 106            |
| <b>i. Archaeological context of samples from each deposit sampled</b>                            | <b>95.3%</b>     | <b>122</b>     |
| j. Field and laboratory procedures spelled out (as in the first two parts of this questionnaire) | 88.3%            | 113            |

Several people commented that certain kinds of "complete" documentation are basically unpublishable, and reports would never come out. One person "desperately would love to see images of various parts of plant remains. Maybe we can get a web site if people would contribute their images of identified charred remains." Another comments, "Because I work in an area with very little palaeoethnobotanical literature, all methods are important to report."

As for items not in this list: "An assessment of how the material became charred" and "Discussion of taphonomy and context-related variation."

Another comment: "Although the published reports are key, for many of listed items (seed measurements, seed drawings, etc.) I would be happier with an online database that includes this information, as more descriptive text could be allowed, more charts could be presented, and photographs could be viewed at a much higher resolution."

Another comment: "Whilst I understand the current trend in the publication of excavation reports for putting specialist contributions on a CD ROM at the back, as a specialist I find this extremely annoying. I want to see, at least, the full data tables in the main publication, along with their discussion. A summary in the main publication text is not adequate to assess the material for comparison purposes."

NFM comment: as digital photography become more prevalent, and with the archaeobotany listserv (maybe there are others out there?) available, it is getting much easier to get expert opinion not only from people you know, but from other colleagues, too!

**2. Which of the above items are the most important in helping you... (Please limit your reply to 5 or fewer per item.) (N=118) [numbers are %, except for last column]**

|  | a    | b           | c    | d    | e    | f    | g    | h    | i           | j           | Count |
|--|------|-------------|------|------|------|------|------|------|-------------|-------------|-------|
| Assess the reports reliability                           | 13.3 | 36.3        | 42.5 | 9.7  | 13.3 | 8.0  | 38.1 | 33.6 | 43.4        | <b>61.9</b> | 113   |
| Interpret your own material                              | 40.4 | <b>51.8</b> | 45.6 | 31.6 | 36.8 | 14.0 | 31.6 | 18.4 | 41.2        | 20.2        | 114   |
| Compare sites and the work of different archaeobotanists | 21.6 | 24.1        | 30.2 | 11.2 | 10.3 | 11.2 | 52.6 | 57.8 | <b>62.9</b> | 59.5        | 116   |

Several people said they didn't really understand the question; one would like to "have an idea of the experience of the analyst." Another says that the LACK of unknowns and "cf."s "becomes a worrying factor!" Another specifies mesh-size as one of the critical items to be included in methodology sections.

NFM comment: If you simplify by grouping the botanical description and archaeological responses: the botanical information provided by others is most useful for interpreting your own material, but for assessing the report's reliability and for comparing sites, the archaeological information about the samples is most important:

|  | a-f (botany) | g-j (archaeology) |
|--|--------------|-------------------|
| Assess the reports reliability                           | 139          | 200               |
| Interpret your own material                              | 251          | 127               |
| Compare sites and the work of different archaeobotanists | 126          | 270               |

**3. What are your biggest complaints about archaeobotanical reporting? (Please limit yourself to 3 or fewer options). Inadequate (N=123)**

|  | Response %   | Response Count |
|--|--------------|----------------|
| Accessibility  | 53.7%        | 66             |
| Reliability  | 13.8%        | 17             |
| Comparability with your own methods/procedures                       | 35.0%        | 43             |
| Recording of every sample analyzed                                   | 23.6%        | 29             |
| Information about volume of sediment floated                         | 30.9%        | 38             |
| <b>Discussion/reporting of archaeological context of the samples</b> | <b>60.2%</b> | <b>74</b>      |
| Discussion/reporting of field and laboratory procedures              | 36.6%        | 45             |

A few mentioned inadequate training (or lack of respect for archaeobotany as a specialized field of knowledge that cannot simply be "picked up"; they would like a discussion of "how identifications were made and with what level of confidence"; and a discussion "tying information into a coherent problem orientation" of more general archaeological or anthropological relevance, not just archaeobotanical.

"There are huge differences between the time and facilities available to an academic researcher and a developer-funded freelancer like myself"

#### 4. What information do you provide that you feel is too frequently omitted by other archaeobotanists working in your area? (N=114)

|   |              |
|---|--------------|
| Various identification aids (illustrations, descriptions, etc.) | 35.1%        |
| <b>Archaeological context of samples</b>                        | <b>55.3%</b> |
| Sediment volume of flotation samples                            | 43.9%        |
| Screen size used  | 26.3%        |
| Sampling design   | 43.0%        |
| Degree of confidence in identifications                         | 43.0%        |
| Wood charcoal analysis  | 35.1%        |

Several people specifically mentioned taphonomy of the samples. Another wrote, "Sadly, there are too few other archaeobotanists working in my area to answer this question."

NFM comment: The specific frequently neglected taphonomic issue for me is how the material became charred. Also, I find the seed:charcoal ratio particularly useful, but that requires sample-by-sample reporting of charcoal; I give weight of charcoal >2mm, but other measures would be ok, too.

#### 5. Which statistical methods or values do you find useful in describing your samples? (N=124)

|  |              |
|--|--------------|
| <b>Percent presence (ubiquity)</b>         | <b>89.5%</b> |
| Ratios (e.g., seed:charcoal, wheat:barley) | 65.3%        |
| Densities                                  | 68.5%        |
| Correspondence analysis                    | 33.9%        |

A few people mentioned Principal Components Analysis. Also box plots, chi-square; diversity indices. One respondent felt "In general many studies use ratios and densities (and even correspondence analysis) when there is no discussion of taphonomy — which is the very thing that may have a really great effect on any numeric results" and that the reality of excavation (e.g., ANY use of densities of soil volumes (for instance measured in buckets) has to be considered EXTREMELY approximate."

NFM comment: In my analyses, I give much less weight to conclusions based on small differences (or small numbers of samples) than on large differences. It does not solve the problem of the imprecision of the archaeological record, but it does allow you to discover patterns that may be interpreted in a provisional way.

#### 6. What websites or sections of websites do you find most useful when you are working on an archaeobotanical laboratory analysis and report? Please provide the URL and if it's not obvious, mention how you use the site. (N=62)

For a complete list, see Appendix. Here I list only the most mentioned ones:

|  |   |    |
|--|---|----|
| USDA Plants Database   | <a href="http://plants.usda.gov/">http://plants.usda.gov/</a>                               | 16 |
| Digital Seed Atlas of the Netherlands  | <a href="http://seeds.eldoc.ub.rug.nl/">http://seeds.eldoc.ub.rug.nl/</a>                   | 12 |
| Literature on archaeological remains of cultivated plants 1981-2004 (Helmut Kroll) | <a href="http://www.archaeobotany.de/">http://www.archaeobotany.de/</a>                     | 10 |
| Near Eastern Archaeobotany (George Willcox)  | <a href="http://pagesperso-orange.fr/g.willcox/">http://pagesperso-orange.fr/g.willcox/</a> | 9  |

|  |   |   |
|--|---|---|
| GRIN (Germplasm Resources Information Network, USDA)                                     | <a href="http://www.ars-grin.gov/npgs/">http://www.ars-grin.gov/npgs/</a>               | 6 |
| Wood Anatomy of Central European Species   | <a href="http://www.woodanatomy.ch/">http://www.woodanatomy.ch/</a>                     | 5 |
| Archaeology Data Service (University of York)  | <a href="http://ads.ahds.ac.uk/">http://ads.ahds.ac.uk/</a>                             | 4 |
| Archaeobotanical Database of Eastern Mediterranean and Near Eastern Sites (Simone Riehl) | <a href="http://www.cuminum.de/archaeobotany/">http://www.cuminum.de/archaeobotany/</a> | 4 |

**7. If you charge money for your analyses, what is the basis for your fee and amount? Please put rate or price in "other" box. (N=94)**

|  |              |
|--|--------------|
| Hourly rate  | 28.7%        |
| Price per sample   | 30.9%        |
| <b>Price per job (which might be informally based on estimated number of hours or samples)</b> | <b>57.4%</b> |

There are a few along the lines of: "I've never been paid to do work. Ha!" Others indicate they charge a variable amount. Many indicate that even if they sometimes charge, they may not charge for everybody. Several said (and I think it's true for most who do contracts!) that they do more work than they officially charge for. A few mention charging separately for the report. It is not clear whether the "price per sample" factors in report writing or not. One person would have liked me to ask "How much time do you spend on a sample and/or project? Do you provide different levels of analysis based on the requests of the project directors?"

A respondent would like to know "What methods do people use to advertise their services and to convince archaeologists that then need to collect archaeobotanical remains?"

One person asked, "For those who make a living doing archaeobotany outside of an institutional position funded by other sources, how difficult is it? Keeping everything anonymous, it would be nice to know their annual incomes and pet peeves." NFM response: I, too, am curious, but felt that such a question was too intrusive for this kind of survey. It would be interesting to have a survey that would focus more on working conditions and employment, and a different one related more to teaching and training issues.

For those giving amounts, here is the full range of replies:

Australia: \$1000/day (Australian)

Austria: € 4500/month

Canada: \$40/hour (Canadian)

England/UK: 3 @£150/day, 1 each @ £175/day and £250/day

Finland: € 50/sample, approximately € 10–15/hour

Germany: 1 @ € 30/hour or € 50 (small/dry/sieved or floated) to € 350

(large/wet/unsieved) per sample; "In the end I am happy if I get € 10/hour

Greece: € 80–100/day, or if paying less skilled sorters (students, e.g.), € 7/hour

Spain: Price per seed + report:

|                               |                 |
|-------------------------------|-----------------|
| 1-500                         | 50 cts per seed |
| 501-1999                      | 35 cts per seed |
| 2000-5000                     | 20 cts per seed |
| More than 5000                | 15 cts per seed |
| Report for under 1000 remains | € 200           |
| Report for over 1000 remains  | € 500           |

Switzerland: 70 Swiss francs/hour

United States: 4 charge per sample: \$ 50-100; \$170; \$180-250; and \$120, \$160, or \$200 for small, medium and large. 4 charge hourly: \$30-\$35; \$30-\$50; \$35 and, for student labor, \$10

One person charges \$15 to identify a single piece of wood charcoal, or \$40-80 for a sample with many pieces.

NFM comment: At the beginning of a contract project, I find out what the archaeologist has budgeted, and figure out the number of samples I could do based on a rough experienced-based estimate of about 5 hours/sample. My department used to charge \$50/hour for my services, but I had the luxury of doing more work (usually about twice as much) + typically a "free" report.

**8. Please provide any clarifications or comments on the reporting and analysis section here. (N=10)**

I incorporated a few comments in the relevant sections above. Also,

One respondent would have liked to see "more questions about the end product: Did you develop sampling procedures in tandem with project PI? If so did that affect the end product of your reporting and part of the investigation? That seems to be the primary problem, ultimately. Lastly, did your report make it into the literature? How long from report to publication did that take?"



## SUGGESTIONS AND COMMENTS SECTION

### **1. Do you have any questions you would have liked this questionnaire to have addressed? (N=34)**

I incorporated a few comments in the relevant sections above.

How often do you integrate results of macro and micro analyses? With faunal data?

It would have been nice to have a question about how researchers are photographing their material and maybe making a standardized way to photograph material so that it is easily comparable.

How many years experience do you have? Part-time? Full-time? Are you currently a student? Roughly how many samples have you examined since you started [order of magnitude)?

Theoretical aspects of interpretation of archaeobotanical assemblages. I think we have progressed further methodologically than we have theoretically.

You have not asked whether people regularly compare their results with other local/ regional/ national results from similar periods/ site types. I think this is essential but is often missing.

I hardly use flotation, since most of the material in my research is waterlogged. Will different types of preservation (as a rule) ask for different methods? What is the general idea about different specialists studying the same layer/unit/context; is it desirable to actually study the same samples, or is it enough to trust the archaeologists' interpretation of stratigraphy.

Why is it so narrowly focused on flotation (no offense)? I know that European and others working outside the US don't automatically go to flotation as a recovery means.

We as archaeobotanists have to develop better standardization of sampling and reporting, and thus this questionnaire is very valuable.

### **2. What do you think are the major challenges, both practical and intellectual, faced by archaeobotanists who study plant macroremains in your area? (N=83)**

There were several broad interrelated categories. I give shorthand descriptions and then a table. Most comments concerned what can loosely be described as working conditions (i.e., not intellectual challenges)

Co-operation: Archaeobotanists are not part of the planning, execution, and analysis, from sampling strategies to integration of our research in the final publication or report. We need "to communicate and work together"; "integration of environmental and archaeological information needs to be more intertwined...more exchange of information and more cooperation between scientists in writing papers."

Integration: Beyond the problem of our work put as add-ons in appendices, actually "integrating multiple lines of evidence" (animals, starch, phytolith, etc.); "lack of shared information with other specialists."

Value: Several people mentioned lack of support within the field of archaeology (lack of consultation regarding sampling, unwillingness to pay for archaeobotanical research.

"Getting the dirt archaeologists to understand the value of our studies and stop them from sticking us into appendices"; "Fighting with archaeologists...making clear to them that it is important to take samples, and that the analysis costs money....." In Spain, for example, "Spanish legislation does not consider archaeobiological remains as part of the archaeological material to be recovered, so rescue archaeologists are not obliged to collect environmental data."

Funding: lack thereof; It's a challenge "to convince the archaeologists that if they would like to have such research done, they should create also positions for archaeobotanists"

Time: There's not enough time to do the work.

Too few: there are too few adequately trained and funded archaeobotanists in a person's research area.

Isolation: from other archaeobotanists; a few express a desire for continuing education (with statistics and identification of plant remains mentioned in particular).

Identification tools: mostly, inadequate reference collections either for the region in general, or specifically available to the researcher, but also better keys, image availability online or in publications.

Statistics-sampling: our samples may be inadequate, or we may use inappropriate statistical methods of analysis. One UK, one Canada expressed concern about standardization, which ultimately relates to statistical validity of our results, so I include it in this section.

Quality: Several people, especially those who work in poorly known regions, feel there is a need for more/better training, better access to comparative material (in collections or online). This category also includes a couple of comments about improving the quality of publications and confidence in the identifications. A few people specifically mentioned their own or others' inadequate knowledge of statistical methods appropriate to the research design.

"There seems to be a perception that archaeobotany is "easy" and therefore, may be done as a hobby or part-time endeavor when not otherwise engaged at something else. One of the major challenges is the image of archaeobotany. If we want good, reproducible results we must train people that this is a professional field of study, not just an after thought. -- by "train people", I mean both the consumers (archaeologists) and the people wanting to "do" archaeobotany. What's missing appears to be the perception of archaeobotany as science."

Synthesize: Too many reports, but they are scattered and not synthesized to create understanding of general interest; mentioned in the context of contract/"commercial" archaeology.

"To gain representative data sets for each chronological period and site type. To compare site results while being aware of the uncomplete excavation of most sites (rescue archaeology) and different economic and scientific constraints of each excavation project To create really an interdisciplinary scientific dynamic between the excavator and the different specialists, who are not always in the same place and who's efforts are limited by budget and available time."

Intellectual challenges: Two people mentioned later periods as needing more work (post-Classical (Europe) and US historical archaeology), two mentioned understanding taphonomy better. Theory was a concern for one UK, 2 US/Canada and one Australia:

We need to relate archaeobotanical results to questions of broader relevance; "The days of archaeobots arising strictly from botanical backgrounds need to be put in the past."

Looking at "challenges" by country of residence (each comment counting as '1', even if someone gave more than one comment):

| residence    | co-op | \$ | value | id | stats | too few | isol | synth | no. comments | no. resp. |
|--------------|-------|----|-------|----|-------|---------|------|-------|--------------|-----------|
| US/Canada    | 8     | 10 | 11    | 6  | 3     | 4       | 3    | 2     | 47           | 32        |
| L.Amer       |       |    | 3     | 3  |       | 1       |      |       | 7            | 4         |
| Eur          | 3     | 4  | 4     | 4  | 4     | 4       | 3    | 2     | 28           | 21        |
| "med"        | 1     |    |       |    |       | 1       |      |       | 2            | 1         |
| "Tropic"     | 1     |    | 1     | 1  | 1     | 1       | 1    |       | 6            | 3         |
| UK           | 3     | 4  |       | 1  | 5     |         |      | 3     | 16           | 13        |
| no. comments | 16    | 18 | 19    | 15 | 13    | 11      | 7    | 7     |              | 74        |

| residence | co-op | funding | value | id   | stat/samp | too few | isol | synth | no. resp. |
|-----------|-------|---------|-------|------|-----------|---------|------|-------|-----------|
| US/Canada | 0.25  | 0.31    | 0.34  | 0.19 | 0.09      | 0.13    | 0.09 | 0.06  | 32        |
| L.Amer    |       |         | 0.75  | 0.75 |           | 0.25    |      |       | 4         |
| Eur       | 0.14  | 0.19    | 0.19  | 0.19 | 0.19      | 0.19    | 0.14 | 0.10  | 21        |
| "med"     | 1.00  |         |       |      |           | 1.00    |      |       | 1         |
| "Tropic"  | 0.33  |         | 0.33  | 0.33 | 0.33      | 0.33    | 0.33 |       | 3         |
| UK        | 0.23  | 0.31    |       | 0.08 | 0.38      |         |      | 0.23  | 13        |

People living in the US/Canada and Latin America feel most undervalued; those in the UK seem most concerned about sampling and statistical issues. There does not appear to be strong patterning by residence (see counts and % per region of residence).

I also decided to see if there was any obvious patterning by area of research; to avoid overcounting the influence of those working in more than one area, I arbitrarily divided each "challenge" by the number of areas in which the respondent works. In this case, those who research in the US/Canada express most concern about the lack of cooperation and funding, and they feel undervalued. Those working in Latin America also feel undervalued, but basic plant identification is more of an issue. For the Europeans, the challenges concern co-operation and funding. Those working in the Mediterranean seem more concerned about sampling and identification, and those working in the tropics have funding and identification issues:

| research  | co-op | funding | value | id  | stat/samp | too few | isol | synth | pro-rate no. |      |
|-----------|-------|---------|-------|-----|-----------|---------|------|-------|--------------|------|
| US/Canada | 5     | 6       | 6.2   | 2.7 |           | 1       | 3    | 3.3   | 1            | 18.2 |
| L.Amer    | 2     | 2       | 4.7   | 5.7 |           | 1       | 2    | 0.3   |              | 18   |
| Eur       | 5     | 4.5     | 1.7   | 2.7 |           | 3.5     | 1.5  | 2.3   | 3.5          | 18.5 |
| "med"     | 2.5   | 2.5     | 2.7   | 4.7 |           | 4       | 2.5  |       | 2.5          | 16   |
| "Tropic"  | 0.5   | 2       | 1.2   | 2.2 |           | 0.5     | 1    | 1     |              | 6.2  |

| research  | co-op | funding | value | id   | stat/samp | too few | isol | synth | pro-rate no. |
|-----------|-------|---------|-------|------|-----------|---------|------|-------|--------------|
| US/Canada | 0.27  | 0.33    | 0.34  | 0.15 | 0.05      | 0.16    | 0.18 | 0.05  | 18.2         |
| L.Amer    | 0.11  | 0.11    | 0.26  | 0.32 | 0.06      | 0.11    | 0.02 | 0.00  | 18           |
| Eur       | 0.27  | 0.24    | 0.09  | 0.15 | 0.19      | 0.08    | 0.12 | 0.19  | 18.5         |
| "med"     | 0.16  | 0.16    | 0.17  | 0.29 | 0.25      | 0.16    | 0.00 | 0.16  | 16           |
| "Tropic"  | 0.08  | 0.32    | 0.19  | 0.35 | 0.08      | 0.16    | 0.16 | 0.00  | 6.2          |

**3. What would facilitate or enhance your own archaeobotanical research in a practical or intellectual way. (Do you ever think, "If only I had..." or "If only I knew..." or "If only there were...")? (N=70)**

The open-ended answers can be lumped into some of the same categories listed above.

Totals include:

- 3 Co-operation (no one specifically mentioned field sampling issues)
- 8 Funding (for archaeobotany in general, or specifically for jobs)
- 0 Value
- 26 Identification (now divided into the need for identification criteria and published images for seeds and plant parts, reference collections, and on-line identification image and description databases)
- 0 Statistics/sampling
- 3 Too few (now included under "communication")
- 0 Isolation (now included under "communication")
- 1 Syntheses

New categories are identified:

- 16 Workshops or training: statistics, wood identification, starch and phytolith analysis; I also included those who answered more generally that they wished they knew more about a given topic.
- 14 Publication databases online (of published and gray literature reports)
- 17 Identification databases online (seeds, plant parts, descriptions). One specific suggestion for a website devoted to identifications of unknowns.
- 9 Facilities, equipment, library access (excluding reference collections); answers range from access to digital library resources (an independent scholar), to wanting a lab tech as an assistant, and digital imaging capability.
- 10 Agreed-upon, widely known identification criteria (including images, measurements, descriptions)
- 11 Time, not enough
- 9 Access to adequate laboratory facilities and equipment or to online resources
- 10 Communication (includes wishing there were more archaeobotanists working in one's research area or institution)
- 4 Collaboration between projects or different kinds of specialists
- 4 Archaeobotanical databases online (presumably regionally based)

| residence    | work-shops | pub db | id db | ref coll | id crit | facil. | com-munic. | no. comm. | no. resp. |
|--------------|------------|--------|-------|----------|---------|--------|------------|-----------|-----------|
| US/Canada    | 10         | 1      | 10    | 3        | 5       | 2      | 4          | 35        | 28        |
| L.Amer       |            | 1      | 1     |          | 1       | 1      | 1          | 5         | 7         |
| Eur          | 2          | 3      | 2     | 5        | 3       | 3      | 3          | 21        | 24        |
| "med"        |            |        |       | 1        |         |        |            | 1         | 2         |
| "Tropic"     | 2          | 1      | 3     |          |         |        |            | 6         | 3         |
| UK           | 2          | 7      | 1     |          | 1       | 1      |            | 12        | 15        |
| no. comments | 16         | 13     | 17    | 9        | 10      | 7      | 8          | 80        | 74        |

| research  | work-shops | pub db | id db | ref coll | id crit | facil. | com-munic. | pro-rated |
|-----------|------------|--------|-------|----------|---------|--------|------------|-----------|
| US/Canada | 6.5        | 0.5    | 4.2   | 2        | 3       | 2      | 3          | 16.7      |
| L.Amer    | 2.5        | 1.5    | 4.2   | 1        | 3       | 2.3    | 3          | 17.5      |
| Eur       | 2.5        | 7      | 1.2   | 2        | 1       | 3.3    | 0.5        | 17.5      |
| "med"     | 3          | 4.5    | 4.2   | 2.5      | 2       | 0.3    | 3          | 17.5      |
| "Tropic"  | 2          | 0.5    | 2.2   | 2.5      | 1       |        | 1.5        | 9.7       |

| research (%) | work-shops | pub db | id db | ref coll | id crit | facil. | com-munic. | pro-rated |
|--------------|------------|--------|-------|----------|---------|--------|------------|-----------|
| US/Canada    | 0.39       | 0.03   | 0.25  | 0.12     | 0.18    | 0.12   | 0.18       | 16.7      |
| L.Amer       | 0.14       | 0.09   | 0.24  | 0.06     | 0.17    | 0.13   | 0.17       | 17.5      |
| Eur          | 0.14       | 0.40   | 0.07  | 0.11     | 0.06    | 0.19   | 0.03       | 17.5      |
| "med"        | 0.17       | 0.26   | 0.24  | 0.14     | 0.11    | 0.02   | 0.17       | 17.5      |
| "Tropic"     | 0.21       | 0.05   | 0.23  | 0.26     | 0.10    | 0.00   | 0.15       | 9.7       |

For those living in North America, continuing education and databases for seed and plant part identification seem to be most important. For those in the UK, online report databases would be particularly helpful. Overall, additional workshops and training, online publication and seed and plant part identification databases were mentioned most on people's wish lists.

NFM comment: As someone who maintains an online database (bibliographies of archaeobotanical reports from Near East sites) and who is a user of a variety of databases, to be really useful, databases need to be institutionally and/or communally maintained, and should be set up so that content could be added by individuals. Only a few people mentioned archaeobotanical databases; those would be hard to set up since there are no agreed-upon standards, and no one format would be appropriate for all sites. But even imperfect ones (like [www.cuminum.de/archaeobotany/](http://www.cuminum.de/archaeobotany/)) are incredibly useful. Other databases might be standardized more easily.

## DEMOGRAPHY SECTION

**1. What country do you live in?**

For those who answered the question:

US/Canada: 5 Canada, 37 US

Latin America: 2 Argentina, 1 Columbia, 2 Mexico, 4 Peru

Europe: 1 Austria, 2 Belgium 1 Denmark, 1 Finland, 8 France, 7 Germany, 3

Netherlands, 1 Norway, 5 Spain, 1 Sweden, 5 Switzerland,

"UK" 1 Ireland (sorry!), 1 Scotland, 25 UK,

"Mediterranean": 1 Egypt, 2 Greece, 1 Italy,

"Tropics": 3 Australia

**4. What is your main geographical area for research? (Try to limit yourself to as few areas as reasonable); in the box "other" you can specify, e.g., US Southwest, Egypt, China, Australia, etc.)**

|                                       | Response Percent | Response Count |
|---------------------------------------|------------------|----------------|
| US/Canada                             | 24.3%            | 28             |
| Mesoamerica                           | 8.7%             | 10             |
| Highland South America                | 13.0%            | 15             |
| Lowland South America                 | 7.0%             | 8              |
| <b>Non-Mediterranean Europe</b>       | <b>38.3%</b>     | <b>44</b>      |
| North Africa and Mediterranean Europe | 23.5%            | 27             |
| West and Central Asia                 | 13.0%            | 15             |
| South and East Asia                   | 4.3%             | 5              |
| Subsaharan Africa                     | 2.6%             | 3              |
| Pacific                               | 5.2%             | 6              |

If the results are grouped and prorated (e.g., if someone works in two geographical areas, each area is scored as 0.5):

| Residence  | N  | US/Canada | Latin America | Europe & UK | Mediterranean (Eur, Afr, W&C Asia) | "Tropic" Pacific, SE Asia, SubS Afr |
|--|----|-----------|---------------|-------------|------------------------------------|-------------------------------------|
| Mediterranean, N. Africa, West and Central Asia      | 4  |           |               |             | 3                                  | 1                                   |
| "Tropic" (Pacific, SE Asia, Subsaharan Africa)       | 3  |           |               |             | 1                                  | 2                                   |
| Europe, inc. Spain                                   | 38 |           | 1.33          | 20.33       | 10.83                              | 2.5                                 |
| Latin American, inc. Carib.                          | 9  |           | 8             |             |                                    | 1                                   |
| UK, inc. Ireland, Scotland                           | 22 |           |               | 14          | 6                                  | 2                                   |
| USA/Canada   | 42 | 23.7      | 10.2          | 0.7         | 4.7                                | 2.7                                 |
| Number doing research in the area at least part time |    | 28        | 24            | 44          | 36                                 | 15                                  |

NFM: Not surprisingly, most people work in the general region in which they live, although North Americans and Europeans tend to get around more, presumably due to economic and historical reasons. Note: the three from the "tropics" all live in Australia.

**2. Educational status: your highest degree attained, and the major closest to your background. E.g., if you have graduated college with a BA in anthropology and are now in graduate school in an archaeology department, check Anthro BA/BS and Archaeology student. (N=119)**

Note: 100 respondents listed degrees in one field, 14 listed degrees in two different fields.

|                      | BA/BS            | MA/MS             | PhD               | Student          | Response Count |
|----------------------|------------------|-------------------|-------------------|------------------|----------------|
| Anthropology         | 35.7% (15)       | 35.7% (15)        | <b>61.9% (26)</b> | 9.5% (4)         | 42             |
| Archaeology          | 39.2% (29)       | <b>52.7% (39)</b> | 48.6% (36)        | 14.9% (11)       | 74             |
| Botany               | 30.3% (10)       | <b>45.5% (15)</b> | 42.4% (14)        | 15.2% (5)        | 33             |
| Ecology              | 30.8% (4)        | 30.8% (4)         | <b>38.5% (5)</b>  | 7.7% (1)         | 13             |
| Agricultural science | <b>50.0% (1)</b> | 0.0% (0)          | 0.0% (0)          | <b>50.0% (1)</b> | 2              |
| Earth science        | <b>33.3% (2)</b> | <b>33.3% (2)</b>  | 16.7% (1)         | 16.7% (1)        | 6              |
| Highest degree       | 10               | 34                | 71                | 1                |                |

| Highest degree | Anthropology | Archaeology | Botany | Ecology | Earth Sci. |
|----------------|--------------|-------------|--------|---------|------------|
| BA/BS          | 2            | 6           | 2      |         |            |
| MA/MS          | 7            | 19.5        | 5      | 1.5     | 1          |
| PhD            | 24.5         | 30.5        | 12.5   | 3.5     | 1          |
| Student        |              | 1           |        |         |            |

Note: the following are prorated answers (if someone has 2 MS degrees, it's 0.5 for each):

| Residence, Highest degree                       | Anthro. | Archaeology | Botany | Ecology | Earth Science |
|---|---------|-------------|--------|---------|---------------|
| Mediterranean, N. Africa, West and Central Asia |         | 3.5         |        |         |               |
| "Tropic" (Pacific, SE Asia, Subsaharan Africa   | 0.5     | 0.5         |        |         |               |
| Europe, inc. Spain                              | 11      | 14          | 3.5    | 3.5     | 1             |
| Latin American, inc. Carib.                     | 2       | 2.5         | 1      | 1.5     | 1             |
| UK, inc. Ireland, Scotland                      | 3.5     | 10.5        | 6.5    | 0.5     |               |
| USA/Canada                                      | 12.5    | 21          | 3.5    |         |               |

Proportion of respondents with degree of highest specialization: Anthropologists and archaeologists are most likely to live in North America or Europe; Botanists are most likely to live in the UK, Ecologists in Europe.

| Residence, Highest degree                          | Anthro.<br>n=29.5 | Archaeology<br>n=52.5 | Botany<br>n=14.5 | Ecology<br>n=5.5 | Earth Sci.<br>n=2 |
|--|-------------------|-----------------------|------------------|------------------|-------------------|
| Mediterranean, N. Africa,<br>West and Central Asia |                   | 0.06                  |                  |                  |                   |
| "Tropic" (Pacific, SE Asia,<br>Subsaharan Africa   | 0.02              | 0.01                  |                  |                  |                   |
| Europe, inc. Spain                                 | 0.37              | 0.27                  | 0.24             | 0.64             | 0.5               |
| Latin American, inc. Carib.                        | 0.07              | 0.05                  | 0.07             | 0.27             | 0.5               |
| UK, inc. Ireland, Scotland                         | 0.12              | 0.20                  | 0.45             | 0.09             |                   |
| USA/Canada   | 0.42              | 0.40                  | 0.24             |                  |                   |

Proportion of respondents residence compared to discipline of highest degree attained: Those living in Europe, Latin America, and North America are most likely to be anthropologists or archaeologists, those living in the UK are more likely to have archaeology or botany backgrounds.

| Residence, Highest degree                                | Anthro. | Archaeology | Botany | Ecology | Earth<br>Sci |
|--|---------|-------------|--------|---------|--------------|
| Mediterranean, N. Africa,<br>West and Central Asia (n=3) |         | 1.00        |        |         |              |
| "Tropic" (Pacific, SE Asia, Subsah<br>Afr.) (n=1)        | 0.50    | 0.50        |        |         |              |
| Europe, inc. Spain (n=33)                                | 0.33    | 0.42        | 0.11   | 0.11    | 0.03         |
| Latin American, inc. Carib. (n=8)                        | 0.25    | 0.31        | 0.13   | 0.19    | 0.13         |
| UK, inc. Ireland, Scotland (n=21)                        | 0.17    | 0.50        | 0.31   | 0.02    |              |
| USA/Canada (n=37)  | 0.34    | 0.57        | 0.09   |         |              |

**3. What are the major intellectual influences on your archaeobotanical practice (assuming there is an answer to this question!)? Be as general or specific as you are comfortable with revealing (discipline: archaeology, botany, anthropology, etc.; country; university; professor) (N=91)**

I can't really generalize about the answers, as they are so varied; most people who answered mentioned a discipline (not in order): archaeology, botany, social anthropology, human ecology, agroecology, paleoecology, palynology, geobotany, forestry, Classical archaeology, biology, plant systematics, Marxist theory



Some mentioned mentors (or strong intellectual influences)

8 Gordon Hillman

4 Christine Hastorf

2Vorsila Bohrer, Richard Ford, David Goldstein, Tim Ingold, S. Jacomet, Martin Jones, Helmut Kroll, Dolores Piperno, Lee Newsom, Deborah Pearsall, Margie Scarry, Richard Schultes, Marijke van der Veen, Willem van Zeist

1 Natalia Alonso, C.C. Bakels, Elso Barghoorn, Hetty Bertoldi de Pomar, Karl-Ernst Behre, Duccio Bonavia, Laurent Bouby, Robert Bye, René Cappers, Lucie Chabal, Rubén Correa, Gary Crawford, Carole Crumley, Phil Dering, K. Dierssen, Doerfler, Scott Fedick, Richard Ford, Gayle Fritz, David Gilbertson, A. Haffner, Jack Harlan, David Harris, Hans Helbaek, Glynis Jones, Jordi Juan-Tresserras, Udelgard Korber-Grohne, A. Kreuz, Bruno Latour, Li Jing Na, Naomi Miller, Mick Monk, Fanny Moutarde, M. Müller-Wille, David Douglas, Linda Perry, Laura del Puerto, Jr., Anaya Sarpaki, Nancy Asch Sidell, C. Earle Smith, Perry Tomlinson, Nancy Turner, H. Usinger, Ulrich Willerding

Some mentioned institutional setting, colleagues, their publications, or professional meetings.

2 UCL, UC-Berkeley. Also Umeå Sweden laboratory, CONICET (Argentina), Sheffield, Oxford University Environmental Archaeology, English Heritage Environmental Services, San Marcos University, Laboratorio de Etnobotánica y Botánica Aplicada (Universidad Nacional de La Plata, Argentina), UC-Riverside, Boston University, Northwestern University, Leiden University, Groningen University, Washington University, University of Michigan

##### 5. What are your main ecological areas (as many as relevant) (N=114)

|                         | Response %   | Response Count |
|-------------------------|--------------|----------------|
| <b>Temperate forest</b> | <b>57.9%</b> | <b>66</b>      |
| Tropics (wet)           | 16.7%        | 19             |
| Arid/semiarid lands     | 55.3%        | 63             |
| Montane lands           | 20.2%        | 23             |
| Coastal lands           | 43.0%        | 49             |

Additional responses included: boreal, island

**6. What are your main topical interests related to archaeobotany? (Please limit yourself to five or fewer) (N=120)**

|   | Response %   | Response Count |
|---|--------------|----------------|
| Hunter-gatherer   | 32.5%        | 39             |
| Origin and early development of cultivation/agriculture | 55.0%        | 66             |
| Prehistoric societies (pre-writing)                     | 58.3%        | 70             |
| 'Civilization' (with or without writing)                | 35.0%        | 42             |
| Historic (post-European expansion)                      | 20.8%        | 25             |
| Ethnoarchaeology  | 29.2%        | 35             |
| <b>Agriculture</b>                                      | <b>70.0%</b> | <b>84</b>      |
| Gender  | 4.2%         | 5              |
| Cuisine/foodways  | 52.5%        | 63             |
| Environment   | 66.7%        | 80             |
| Climate   | 26.7%        | 32             |

Also: settlement organization, evolution of human diet, wood fuel

**7. How many archaeobotanical reports have you published (as author or co-author)? (Note: by "gray literature", I mean reports available through an institution; that is, if a researcher knows about the archaeological site, but does not know that you worked on the material, that person would be able to find the report on line or obtain a hard copy). (N=120)**

|                      | none       | 1 or 2     | 3 or more         | response count |
|----------------------|------------|------------|-------------------|----------------|
| In books or journals | 11.1% (13) | 17.1% (20) | <b>71.8% (84)</b> | 117            |
| In "gray" literature | 8.6% (9)   | 10.5% (11) | <b>81.0% (85)</b> | 105            |

## REFERENCES CITED

Helbaek, Hans

1969 Plant-Collecting, Dry-Farming, and Irrigation Agriculture in Prehistoric Deh Luran. In *Prehistory and Human Ecology of the Deh Luran Plain*, by Frank Hole, Kent V. Flannery, and James Neeley, pp. 383–426. University of Michigan Museum of Anthropology Memoir 1. Ann Arbor.

Miller, Naomi F.

1992 The Crusader Period Fortress: Some Archaeobotanical Samples from Medieval Gritille. *Anatolica* 18: 87–99.

van Zeist, W. and W. Waterbolk-van Rooijen

1985 The Palaeobotany of Tell Bouqras, Eastern Syria. *Paléorient* 11(2):131–147.

References mentioned by respondents as useful

Archaeobotany Listserv: [archaeobotany-request@JISCMAIL.AC.UK](mailto:archaeobotany-request@JISCMAIL.AC.UK)

Hoadley, R. Bruce

1990 *Identifying Wood: Accurate Results with Simple Tools*. The Taunton Press.

Leonard, Kevin J.

1995 A Cheap and Efficient Flotation System. *Canadian Archaeological Association Newsletter* 15(1):9–12. (modification of a SMAP-machine)

## Appendix: Websites mentioned by respondents to the questionnaire:

|  |   |    |
|--|---|----|
| USDA Plants Database   | <a href="http://plants.usda.gov/">http://plants.usda.gov/</a>   | 16 |
| Digital Seed Atlas of the Netherlands  | <a href="http://seeds.eldoc.ub.rug.nl/">http://seeds.eldoc.ub.rug.nl/</a>   | 12 |
| InsideWood Working Group (North Carolina State University); I couldn't reach it.         | <a href="http://insidewood.lib.ncsu.edu/">http://insidewood.lib.ncsu.edu/</a>   | 11 |
| Literature on archaeological remains of cultivated plants 1981-2004 (Helmut Kroll)       | <a href="http://www.archaeobotany.de/">http://www.archaeobotany.de/</a>   | 10 |
| Near Eastern Archaeobotany (George Willcox)  | <a href="http://pagesperso-orange.fr/g.willcox/">http://pagesperso-orange.fr/g.willcox/</a>   | 9  |
| GRIN (Germplasm Resources Information Network, USDA)                                     | <a href="http://www.ars-grin.gov/npgs/">http://www.ars-grin.gov/npgs/</a>   | 6  |
| Wood Anatomy of Central European Species   | <a href="http://www.woodanatomy.ch/">http://www.woodanatomy.ch/</a>   | 5  |
| Archaeology Data Service (University of York)  | <a href="http://ads.ahds.ac.uk/">http://ads.ahds.ac.uk/</a>   | 4  |
| Archaeobotanical Database of Eastern Mediterranean and Near Eastern Sites (Simone Riehl) | <a href="http://www.cuminum.de/archaeobotany/">http://www.cuminum.de/archaeobotany/</a>   | 4  |
| Archaeobotanical Computer Database (ABCD)k, British Isles                                | <a href="http://intarch.ac.uk/journal/issue1/tomlinson/">http://intarch.ac.uk/journal/issue1/tomlinson/</a>   | 3  |
| Crow Canyon Archaeological Center, seed identification images                            | <a href="http://www.crowcanyon.org/ResearchReports/Archaeobotanical/Plant_Identification/plant_identification.asp">http://www.crowcanyon.org/ResearchReports/Archaeobotanical/Plant_Identification/plant_identification.asp</a> | 3  |
| Seed ID Workshop (Ohio State University)   | <a href="http://www.oardc.ohio-state.edu/seedid/">http://www.oardc.ohio-state.edu/seedid/</a>   | 3  |
| Bibliographies of Near East archaeobotanical reports (Naomi F. Miller)                   | <a href="http://www.sas.upenn.edu/~nmiller0/">http://www.sas.upenn.edu/~nmiller0/</a>   | 3  |
| International Association of Wood Anatomists (IAWA)                                      | <a href="http://bio.kuleuven.be/sys/iawa/">http://bio.kuleuven.be/sys/iawa/</a>   | 2  |
| Native American Ethnobotany Database   | <a href="http://herb.umd.umich.edu/">http://herb.umd.umich.edu/</a>   | 2  |
| Charcoal Analysis Web (Eleni Asouti)   | <a href="http://pcwww.liv.ac.uk/~easouti/">http://pcwww.liv.ac.uk/~easouti/</a>   | 2  |
| Flora Europaea (RBG-Edinburgh)   | <a href="http://rbg-web2.rbge.org.uk/FE/fe.html">http://rbg-web2.rbge.org.uk/FE/fe.html</a>   | 2  |
| Wood Anatomy and more (Andreas Heiss)  | <a href="http://www.holzanatomie.at/">http://www.holzanatomie.at/</a>   | 2  |
| International Plant Name Index   | <a href="http://www.ipni.org/">http://www.ipni.org/</a>   | 2  |
| Royal Botanical Garden, Kew  | <a href="http://www.kew.org/">http://www.kew.org/</a>   | 2  |
| Discover Seeds (Colorado State University)   | <a href="http://www.seedimages.com/">http://www.seedimages.com/</a>   | 2  |
| Tropicos (Missouri Botanical Garden)   | <a href="http://www.tropicos.org/">http://www.tropicos.org/</a>   | 2  |

|   |   |   |
|---|---|---|
| Laboratory Guide to Archaeological Plant Remains from Eastern North America (Gayle Fritz) | <a href="http://artsci.wustl.edu/~gjfritz/">http://artsci.wustl.edu/~gjfritz/</a>   | 1 |
| Arable Seed Identification System (Scottish Crop Research Institute)                      | <a href="http://asis.scri.ac.uk/">http://asis.scri.ac.uk/</a>   | 1 |
| Flora of the Hawaiian Islands (Smithsonian Institution)                                   | <a href="http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/">http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/</a>             | 1 |
| University of Missouri Phytolith Database   | <a href="http://database.coas.missouri.edu/fmi/xsl/phytos/imagetdatabase.xsl">http://database.coas.missouri.edu/fmi/xsl/phytos/imagetdatabase.xsl</a> | 1 |
| Flora of Israel Online (The Hebrew University of Jerusalem)                               | <a href="http://flora.huji.ac.il/">http://flora.huji.ac.il/</a>   | 1 |
| Neotropical Herbarium Specimens (Spanish & English), Field Museum                         | <a href="http://fm1.fieldmuseum.org/vrrc/">http://fm1.fieldmuseum.org/vrrc/</a>   | 1 |
| Muséum national d'Histoire naturelle, France  | <a href="http://inpn.mnhn.fr/isb/index.jsp">http://inpn.mnhn.fr/isb/index.jsp</a>   | 1 |
| Flora of Kaxil Kiuc (Yucatan, Mexico)   | <a href="http://oncampus.richmond.edu/academics/flora-kiuc/checklist.html">http://oncampus.richmond.edu/academics/flora-kiuc/checklist.html</a>       | 1 |
| Ancient Maya Botanical Research (Charles Zidar)   | <a href="http://research.famsi.org/botany/index.php">http://research.famsi.org/botany/index.php</a>   | 1 |
| Seed ID (Ohio State University); see workshop   | <a href="http://www.ag.ohio-state.edu/~seedbio/seed_id/index.html">http://www.ag.ohio-state.edu/~seedbio/seed_id/index.html</a>                       | 1 |
| Ancient Grains (Delwen Samuel, Mark Nesbitt)  | <a href="http://www.ancientgrains.org/">http://www.ancientgrains.org/</a>   | 1 |
| Dr. Duke's Phytochemical and Ethnobotanical Databases                                     | <a href="http://www.ars-grin.gov/duke/">http://www.ars-grin.gov/duke/</a>   | 1 |
| BIAB online: British and Irish Archaeological Bibliography                                | <a href="http://www.biab.ac.uk/index.asp">http://www.biab.ac.uk/index.asp</a>   | 1 |
| Wisflora: Wisconsin Vascular Plant Species  | <a href="http://www.botany.wisc.edu/wisflora/">http://www.botany.wisc.edu/wisflora/</a>   | 1 |
| CANew (Neolithic of Anatolia, Aegean, Upper Mesopotamia)                                  | <a href="http://www.canew.org/">http://www.canew.org/</a>   | 1 |
| Database of Irish Excavation Reports  | <a href="http://www.excavations.ie/Pages/HomePage.php">http://www.excavations.ie/Pages/HomePage.php</a>   | 1 |
| Flora iberica   | <a href="http://www.floraiberica.org/index.php">http://www.floraiberica.org/index.php</a>   | 1 |
| Fire Effects Information System   | <a href="http://www.fs.fed.us/database/feis/index.html">http://www.fs.fed.us/database/feis/index.html</a>   | 1 |
| Archaeobotany (Dorian Fuller)   | <a href="http://www.homepages.ucl.ac.uk/~tcrndfu/archaeobotany.htm">http://www.homepages.ucl.ac.uk/~tcrndfu/archaeobotany.htm</a>                     | 1 |
| Tervuren xylarium wood database   | <a href="http://www.metafro.be/xylarium">http://www.metafro.be/xylarium</a>   | 1 |
| Ethnobotany and Floristics of Belize (NY Botanical Garden)                                | <a href="http://www.nybg.org/bsci/belize/gallery.html">http://www.nybg.org/bsci/belize/gallery.html</a>   | 1 |
| Plants for a Future (edible, medicinal, useful)   | <a href="http://www.pfaf.org/index.php">http://www.pfaf.org/index.php</a>   | 1 |
| The Seed Biology Place (University  | <a href="http://www.seedbiology.de/index.html">http://www.seedbiology.de/index.html</a>   | 1 |

|  |   |   |
|--|---|---|
| Freiburg)  |   |   |
| Archaeology of Turkey  | <a href="http://www.tayproject.org/">http://www.tayproject.org/</a>   | 1 |
| Tele Botanica (French or English)  | <a href="http://www.tela-botanica.org/page:eflore">http://www.tela-botanica.org/page:eflore</a>                         | 1 |
| A Systematic Treatment of Fruit Types (R.W. Spjut, 1994)                   | <a href="http://www.worldbotanical.com/fruit_types.htm">http://www.worldbotanical.com/fruit_types.htm</a>               | 1 |
| Hawaiian Ethnobotany Online Database (Bishop Museum)                       | <a href="http://www2.bishopmuseum.org/ethnobotanydb/index.asp">http://www2.bishopmuseum.org/ethnobotanydb/index.asp</a> | 1 |
| Vegetation History and Archaeobotany                                       | <a href="http://www.springerlink.com/content/107470/">http://www.springerlink.com/content/107470/</a>                   | 1 |
| Laboratorio Darwinion  | <a href="http://www.darwin.edu.ar">www.darwin.edu.ar</a>  | 1 |
| Seed Image Database (Colorado University)                                  | <a href="http://www.seedimages.com">www.seedimages.com</a>  | 1 |
| Dieren, planten en paddenstoelen in Nederland (Animals, Plants, and Fungi) | <a href="http://www.soortenbank.nl">www.soortenbank.nl</a>  | 1 |
| Seed images, Kevin Leonard   | <a href="http://picasaweb.google.com/archaeoconsulting">http://picasaweb.google.com/archaeoconsulting</a>               | 1 |