

Coordinator: Sofia Fonseca

## Module 2: Introduction to African Archaeology: Methods

### Archaeobotany: The study of Charcoal

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#### Anthracology

Anthracology is the analysis of wood charcoal pieces from archaeological or pedological contexts. Based on the wood anatomical structures, that remain largely preserved after carbonization, the anthracologist identifies charcoal types and deduces the taxa from which the charcoal could have been derived.

#### Goals

Charcoal identification may tell about **wood use** – the types of wood that were used to construct a roof or the wood selected to fuel an iron smelting furnace for instance.

It may also allow to reconstruct the **woody vegetation** that has been exploited at a certain site and to trace its changes over time.

Through the integration of other paleoenvironmental and archaeological data, it is possible to conclude to **human impact** as a result of land use and land management. **Sampling in the field**

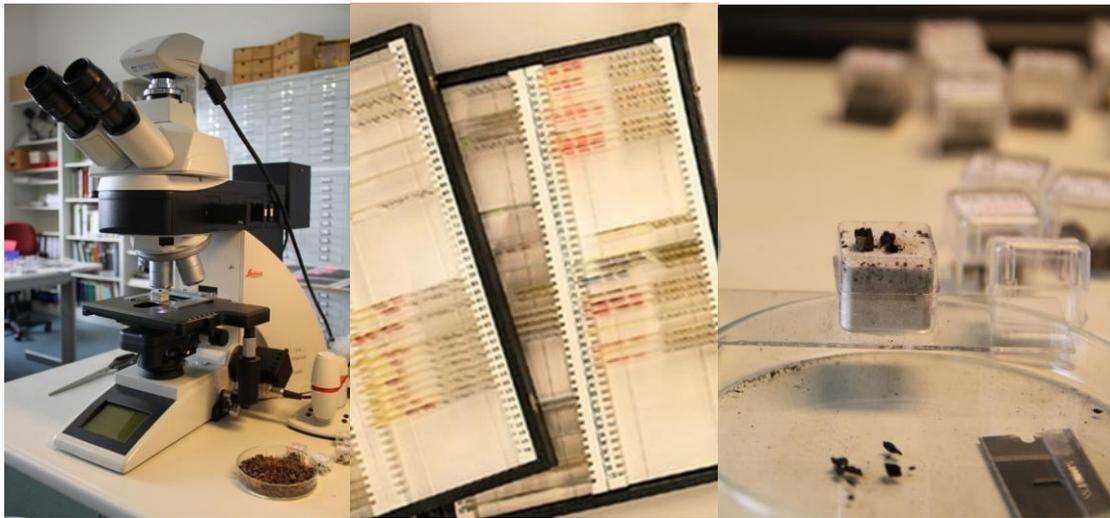


**Hand picking** (left) charcoal fragments is appropriate when sampling burnt structures, like roof support posts or burnt roof beams.

**Dry sieving** (middle) works well with sandy sediments and is a good source of charcoal when sieving for small artifacts is employed during an archaeological excavation anyway.

**Flotation** (right) and wet sieving ensure a thorough sampling of fragments of all sizes and can be operated on all types of soils. It is mandatory with dry heavy clay soils, where otherwise it is not possible to separate the charcoal from the lumps of clay. However, very dry charcoal pieces may dissolve when coming into contact with water!

### Equipment



For the identification of the charcoal fragments, an **incident light microscope** (left) is necessary. The fragments are split by hand into the three planes necessary to fully grasp the anatomical structures, which are illuminated by the light falling through the microscope's objective onto the fragment.

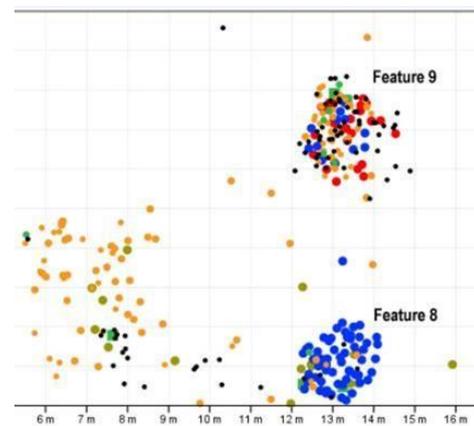
The features of each charcoal fragment allow searching online databases but a **comparative collection** (middle) is necessary to understand the variability of features in different specimen of one species and to grasp features that are characteristic of certain types but not well codeable in a key.

A sand bed to hold and orient the fragments towards the light, razor blades as breaking edges and boxes for storage, as well as tweezers, are **little things** (right) facilitating charcoal analysis.

## Workflow

Zeit (AD)	Oursi 1 ca. 0-250	Oursi West ca. 100-300	Oursi 2 um 950	Oursi 3 um 950	Oursi 4 um 950	Kissi 40 um 1100	Kolèl Nord um 1000
Berechnungsgrundlage (Fragmente)	74	2105	639	220	295	157	260
<i>Acacia</i> sp.	+++++	+++++	++++	++++	+++	++++	++++
<i>Anogeissus leiocarpus</i>	+++++	++	++++	++++	++++	+++	++++
<i>Guiera senegalensis</i>		+	++	++	+++	+	+
<i>Sesbanium sesban</i>		+	++	+	++	-	+
<i>Detarium microcarpum</i>		(-)	+++	-	++	++++	
Rubiaceae Typ II		+	+	+	-	-	
<i>Lannea</i> sp.		++	++	++	+	+	
Rubiaceae Typ I		++	+	+	++	++	
<i>Vitellaria paradoxa</i>		+	+	+	+	++	
<i>Tournefortia bicolor</i> /macrop.		-	+	-	++		
<i>Combretum glutinosum</i> cf. <i>Prosopis africana</i>		-	+	+	+	+	+
<i>Ziziphus</i> sp.	+	+	+	+	-	-	++
<i>Maenua angustifolia</i> /crass.		-	-	-	+	+	

Legende: +++++ = mind. 50%    +++ = 10 - <20%    + = 1 - <5%  
 ++++ = 20 - <50%    ++ = 5 - <10%    - = <1%



Identification is only the first step and facilitated a lot by online databases like Inside Wood (see “Other teaching resources”). Still consultation of wood anatomical atlases, published reports furnishing SEM images of charcoal types and the comparative collection whether of wood slides or carbonized wood cubes is mandatory when encountering new charcoal types.

Tables are the foundation of every data analysis but depending on the sample size and sample numbers, as well as on archaeological contexts, different types of analyses are possible; qualitative, semi-quantitative (left) or quantitative analyses allow tracing presence/absence or even relative changes within the charcoal assemblages.

For the interpretation of the data ecological information about the species, their distribution, their uses as well as the archaeological context (right) of the samples have to be considered.

## Crucial Points

From identification to publication, it is necessary to bear some crucial points in mind:

Often species or even genera share the same wood anatomical structure. Moreover, wood structure is variable depending on growth conditions or the position on the tree. Thus samples from one species may look very different and in the worst case not show the typical features at all.

Especially concerning paleoenvironmental questions, a set of “filters” reduces and determines the information present in any anthracological record. These filters have to be taken into account when analyzing the data.

Largely, anthracology reconstructs local woody vegetation. Therefore, general classification of species to vegetation types might not suffice for the interpretation of the data. Local environmental conditions need to be regarded, especially concerning the ecological plasticity of the identified taxa. It is also important to consult publications that describe regional vegetation before the increase in human impact of the last decades and ethnographic records concerning plant and wood use.