

BOISE FUND END OF AWARD REPORT

Name	Katarina Almeida-Warren
Supervisor	Dr. Alejandra Pascual-Garrido
Year of award	2015
Project title	Mapping chimpanzee artefacts: What can they reveal about hominin evolution?
Amount awarded	£3000
Amount spent	£3000
Briefly restate the research question	Is there evidence of raw material selection and forward planning in chimpanzee termite fishing? Is there any difference in raw material procurement between two chimpanzee communities living in two different environments: woodland (Gombe, Tanzania) and open woodland-savannah (Issa, Tanzania) and, if so, what may be the cause of these differences?

In the following space please summarise your results. All text must be confined to this page. Any figures or diagrams can be attached on separate sheets.

The funding provided by TBTF enabled me to incorporate to my project and supervise MSc student Katarina Almeida-Warren (KAW) on her field-work based dissertation part of the MSc in Human Evolution and Behaviour at University College London (UCL), Department of Anthropology. KAW spent a total of 10 weeks in the field while collecting her data. Her research was awarded a Distinction by UCL, was presented at TAWIRI International Conference in Tanzania on Dec 2015 and has been selected for presentation at the Chimpanzees in Context Conference, to be held at Lincoln Park Zoo in Chicago 2016. Furthermore, part of the material collected during her research has been donated to the National Herbarium in Tanzania, University of Dar es Salaam, becoming the first chimpanzee artefact to be curated in Tanzania. We plan to publish this work at a high impact journal such as Journal of Human Evolution in the coming months. Below a summary of the main results.

A total of 324 termite fishing tools (Gombe: 276; Issa: 48), 560 plant raw material removals (Gombe: 273; Issa: 287) and 209 tool source plants (Gombe: 108; Issa: 101) were documented from a total of 8 termite mounds (Gombe: 3; Issa: 5). Analysis was undertaken at several levels:

Evidence of raw material selection: Raw material availability near termite mounds; Class of raw materials; Taxonomy and dietary familiarity of tool source plants

Evidence of forward planning: Distance of tool source plants to targeted mounds; Visibility of tool source plants from targeted mounds

Class of raw materials (Figure 1):

We found that Issa chimpanzees have a preference for bark even though twigs are by far the most abundant type of raw material (86%; $p < 0.05$). In contrast, chimpanzees at Gombe predominantly source bark and twig materials in equal measure - both equally abundant types of raw material (bark: 40%; twig: 60%; $p > 0.1$).

Taxonomy and dietary familiarity of tool sources (Figure 2):

A total of 18 different plant species from 10 families were identified as tool sources, 3 of which were exploited by chimpanzees at both sites. When compared to the species general abundance, chimpanzees at both sites are targeting select species to higher proportions than their general abundance, suggesting a preference for particular plant species. Furthermore, over 80% ($p < 0.05$) of sourced species are also known chimpanzee food sources, indicating that chimpanzees may have a preference for plants which they are already familiar with.

Distance and visibility of tool source plants from the targeted termite mound (Figure 3):

At Issa most raw material for tools (80.2%) was sourced between 1-16 m, with a maximum distance of 33.4 m, while at Gombe most raw material (81.8%) was sourced between 3-8 m from the mound, with a maximum distance of 10.8 m (a third of the distance recorded for Issa; $p < 0.05$). Additionally, ~25% of plant tool sources from Issa were not visible from the termite mound, while at Gombe only one plant was not visible ($p < 0.05$). This shows that at both sites raw material for tools is sourced both within-arms-reach of the termite mound and from considerably greater distances, indicating a mixed strategy of opportunism and forward planning. However, differences in distances and visibility of termite mounds between the two sites suggest that Issa chimpanzees engage in a higher degree of planning and may be sourcing raw material from plants *en route* to the mound. This is likely due to more sparsely distributed raw materials in the drier environment of Issa.

In sum:

Chimpanzees at both sites are being selective for specific plant species to manufacture their termite fishing tools. Issa chimpanzees only use bark as raw material to manufacture their tools (one of the least abundant materials), suggesting a possible cultural preference for this type of material. Additionally, Issa chimpanzees source tools from greater distances than Gombe. This is likely associated to the lower abundance of suitable and preferred raw materials in proximity to the termite mound resulting from the drier habitat of Issa. The questions asked in our research are similar to those asked by archaeologists, for example, about the distance from where raw materials are sourced, thus contributing with the emerging discipline of 'Primate Archaeology'. So far our results suggest that chimpanzee raw material procurement follows a similar pattern to that of early hominins, engaging in a mixed strategy of opportunism and forward planning. This may be caused by differences between individuals or differences in population demographics (sex; age); or the same individual may collect several raw materials on the way to the termite mound, but once the resulting tools are no longer functional, the same individual may then resort to sourcing plants that are closer to the mound.

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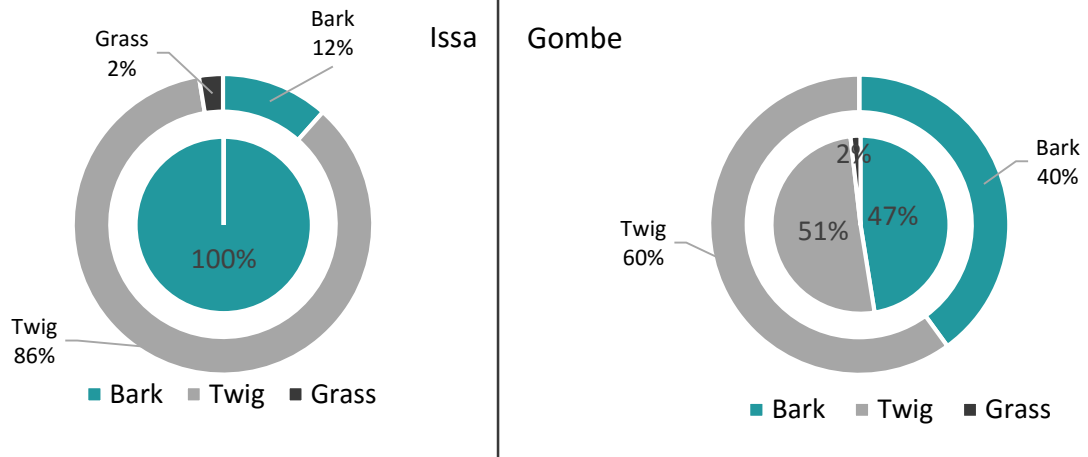


Figure 1: Class of raw materials used for tools (inner circle) relative to their general abundance within a 5-metre radius from the mound (outer circle)

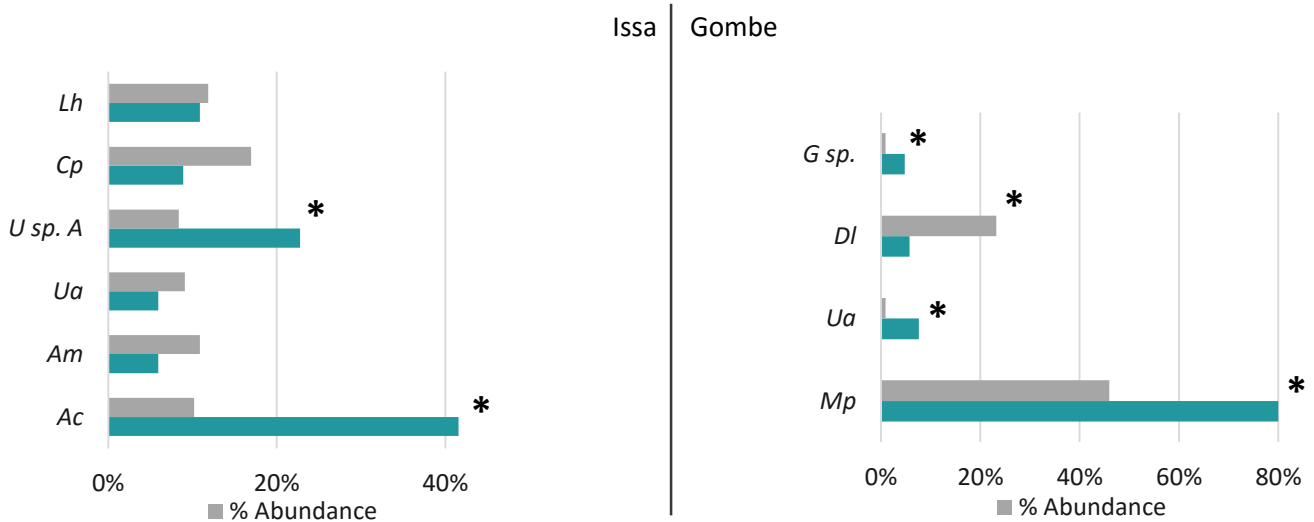


Figure 2: Percentage of plants sourced by chimpanzees per species relative to their general abundance. Only species with multiple sourced trees are included (* = $p < 0.05$).

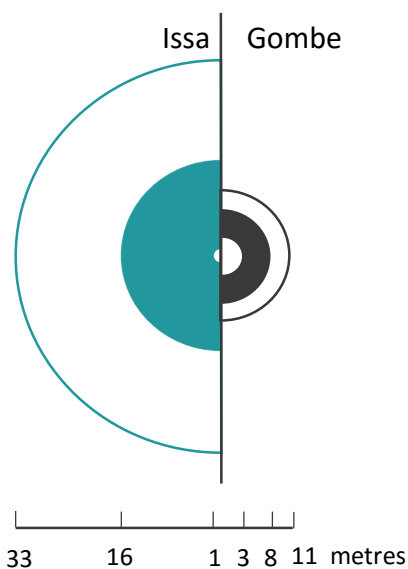


Figure 3: Distance of tool source plants from targeted termite mounds. Maximum distance – outer circumference. Highest concentration of plant tool sources (~80%) – inner shaded area

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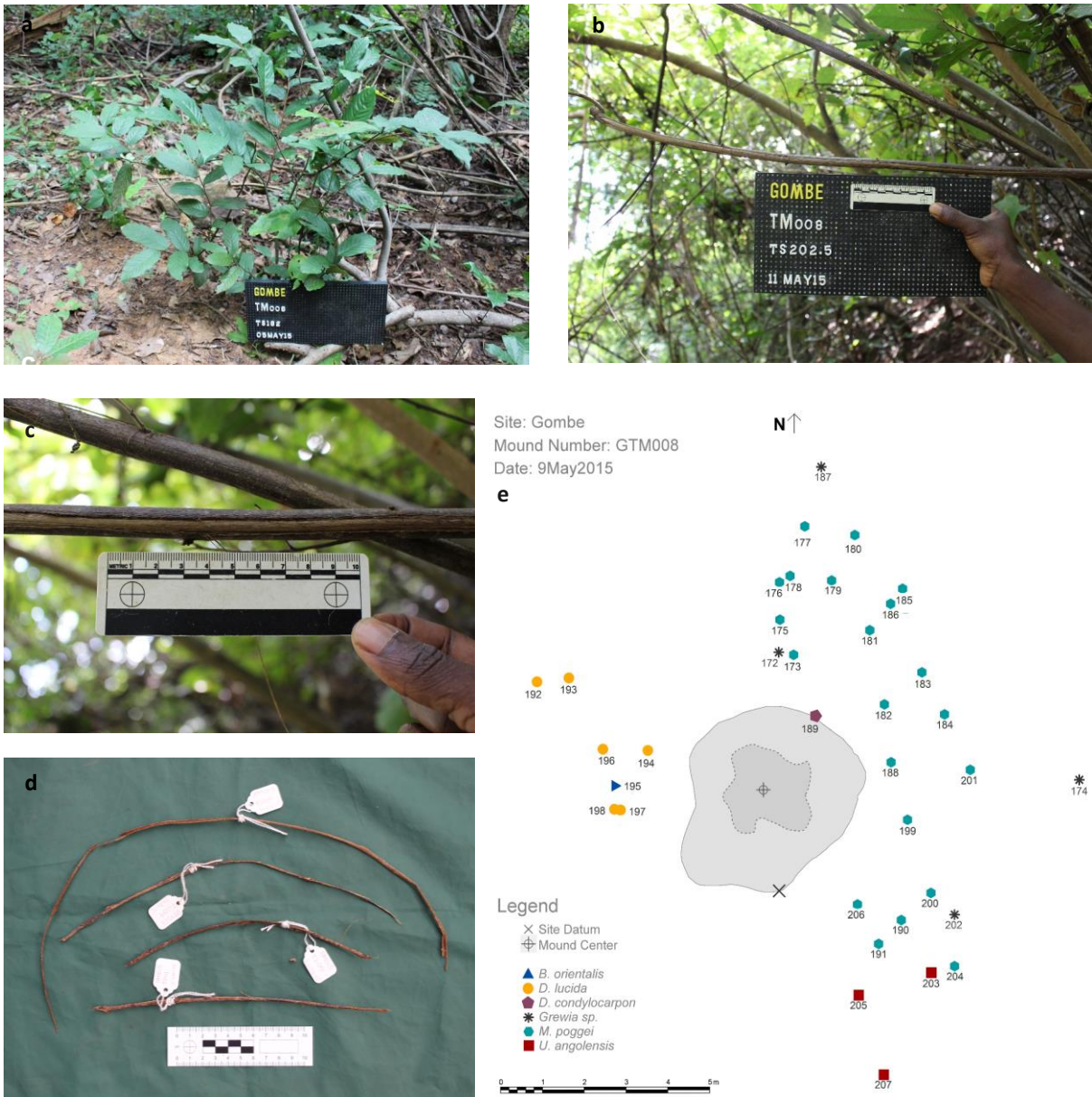


Figure 4: a) Tool source plant; b) tool removal; c) close-up of tool removal; d) tools; e) sample map of distribution of tool source trees.



Figure 5: a) A female chimpanzee (Sparrow) fishing for termites in Gombe; b) KAW taking measurements of a tool source tree with the help of field assistant Patrick Hassan at Issa.