DIGITAL ATLAS OF TRADITIONAL FOOD MADE FROM CEREALS AND MILK

R.T.J. Cappers
Digital Atlas of Traditional Foods
Made from Cereals and Milk
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R.T.J. Cappers
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Preface

Every year, in various parts of the world, people harvest barley and wheat from fields and process the grain into food. The processing of the harvest and food preparation that take place today are based on an experience of around 14,000 yearly harvests, starting in south-west Asia. The first 4,000 yearly harvests involved wild grains, whereas subsequent harvests involved domesticated cereals. Once domesticated cereals started to be harvested and processed, it took another 1,000 years before pottery became available and another 1,700 years before metal utensils, such as containers, became available. At the same time as the first crops became domesticated, the first animals were being domesticated. The presence of milk residues on early pottery suggests that milk became part of the human diet quite early on as well, although some 2,000 years after the first domestication of crops. This implies that late hunters-gatherers and early farmers had a long trial period during which they had the opportunity to gain experience and develop technologies for the efficient processing of grain and milk.

Initially, food production was dependent on plants and animals from the local environment. Through trade contacts, new ‘ingredients’ gradually became available. The traditional ‘cuisine’ that characterizes the cultural identity of a certain region is therefore quite changeable and often reflects a tradition covering only a limited period of time. The preservation of traditional cuisines can be explained by the availability of stable food sources and the advanced technology that is necessary for ‘harvesting’ and milking, for post-harvesting processing and milk processing, and for final food preparation. This technology is based on basic processes that play a role in cereal and milk processing and food preparation, as well as other crops.

The examples of traditional foods that are presented here most probably have a long tradition. Some of them even go back to the transition from hunting and gathering to early agriculture. These traditional food items are characterized by their amenability to large-scale production and by their long shelf-life, both of which enabled efficient use of labour and fuel. Examples of such foods that were recently collected in south-west Asia and North Africa are presented in the atlas section of this book. These examples clearly illustrate the variation that can be produced even when food is based on simple recipes.

Direct evidence of the characteristics of traditional foods can be obtained from the analysis of subfossil food remains. Some recent publications show an increased interest in the study of such food remains and suggest updates to the standards for their documentation (e.g. Carretero et al., 2017; Heiss et al., 2017; Samuel, 2000). Other recent publications argue that archaeobotanical research and archaeozoological research should become more integrated and more closely linked to the material culture related to crop and milk processing.
and food preparation, such as pottery, implements for ‘grinding’ and ‘pounding’, and heating installations (Cappers et al., 2016; Vigne, 2015).

In order to assess the quality of traditional foods, further research is required. It is important, for example, to achieve a taxonomic identification of the grain down to the level of subspecies and to determine which processes have been applied to the grain. This is particularly relevant when these processes cause reallocation of nutrients, such as in ‘par-boiling’, or when a part of the nutrients is removed, such as in ‘polishing’ and ‘pearling’.

All of the traditional foods documented in this book have been archived in the reference collection of the Groningen Institute of Archaeology (G1A) and are available for such research. This will further increase our knowledge of traditional foods and of the criteria that played a role in crop selection, which in ancient times were often different than in modern times.

I would like to thank everyone who helped me during my fieldwork and in collecting and documenting the samples of traditional foods.

René Cappers
Groningen, January 2018
1 Introduction

1.1 Late foragers and early farmers

1.1.1 Landscape exploitation
For most of their history, humans have been supplied with food by means of hunting and gathering. It is only recently that agriculture was developed as a new form of food economy. Agriculture is characterized by the cultivation of crops in fields and the control and protection of animals, during which these animals are also partly housed in or near the settlement.

For both hunter-gatherers and farmers, the landscape must provide enough food for them to survive. There must also be sufficient fuel available for food preparation. Both plant material and animal dung can be used as fuel. When plant material is used as fuel, it is desirable to only use dead plant parts, such as the dead matter of herbaceous plants and dead branches of shrubs and trees. Such dead plant material has the advantage that it burns well and that its use does not affect the carrying capacity of the vegetation as a supplier of fuel.

Food is necessary for the building, repair, and maintenance of body tissues and as an energy source. In order for an organism to survive, the energy balance will have to be positive. The amount of energy needed for collecting or producing food, for collecting fuel, and for preparing food should be at least equal to the amount of energy needed to stay alive.

The energy present in items of food is ultimately all fixed by green plants. This energy originates from sunlight and is used by green plants to make sugar from water and carbon dioxide. Green plants thus form the first link in every food chain. During the last ice age, the availability of water was a limiting factor for plant growth, and therefore also for other organisms, including humans. This forced humans to hunt and gather in small groups in relatively large areas. Research at the 23,000-year-old settlement of Ohalo II, located on the shore of the Sea of Galilee, shows that former hunter-gatherers in this area still had enough plants available to them to survive and that they were able to feed on a wide spectrum of plants.

Many temporary camp sites and settlements of hunter-gatherers have been identified in the eastern Mediterranean region dating from the final phase of the last glaciation, the Late Pleistocene (12,700–9,600 BCE). Apparently the conditions were sufficiently favourable for these hunter-gatherers (referred to as Natufians) that they were able to keep themselves alive in small groups. The food collected by the Natufians consisted in part of wild grains and wild legumes. During the Younger Dryas (10,800–9,700 BCE), the climate deteriorated and was once again characterized by Ice Age conditions, and hunter-gatherers were once again challenged to adapt to changing vegetation. Pollen research at various locations in south-west Asia has shown that the climate became warmer and more humid some 10,000 years ago (Zeist & Bottema, 1991). This climatic improvement marks the end of the last ice age, and with that the end of the Pleistocene and the beginning of the current...
geological epoch, which is called the Holocene. Of special interest in relation to the early food economy is the development of a so-called Mediterranean climate, which is characterized by cool and wet winters and warm and dry summers. This climate extended, and still extends, over large parts of the Mediterranean basin and the area contiguous with the Taurus Mountains and the Zagros Mountains.

As a result of this climatic improvement, herbaceous plants and trees expanded from their glacial refugia. Trees need more water than do herbaceous plants, and their expansion in particular is indicative of the increased availability of water. Different types of vegetation developed, including a tree steppe with undergrowth that was sometimes dominated by huge populations of the progenitors of the founder crops of agriculture. Characteristic trees were deciduous Oak species (including Quercus cerris, Q. ithaburensis, and Q. robur), Almond (Prunus dulcis), and Pistachio species (including Pistacia terebinthus and Pistacia atlantica).

Although most of that landscape has now been radically changed through the impact of humans, some large populations of wild cereals are still present where grazing is prevented (figure 1; see also Anderson 1999: figure 12.24). Similarly large concentrations of wild food plants must have become attractive for hunter-gatherers to harvest on a large scale. But to be able to make use of such large quantities of grain and ‘seeds’, which were only available seasonally, they would have to have been stored.

Figure 1: A population of wild Barley (Hordeum vulgare ssp. spontaneum) in southeastern Anatolia. Most of the plants are present without their spikes (Susuz Dagleri, Turkey, October 1998; RN).

The desire to make use of these wild foods, in turn, would have necessitated the protection of the stored harvest, which will have been an important stimulus for hunter-gatherers to give up their mobile lifestyle for a temporary or more permanent sedentary lifestyle. Suitable locations for settlements will have been chosen on the basis of their strategic location in terms of defence and proximity to water. If such suitable locations were at a considerable distance from fields with wild grains and wild pulses, it would have been
desirable for hunter-gatherers to create fields in the vicinity of the settlement. In order for them to create fields closer to the settlement, hunter-gatherers would have to have been aware of the life cycle of plants, specifically the fact that a seed that is buried in the soil will provide a new generation the next year. In this way, protection of crop plants could be optimized, transport of harvests over long distances was no longer necessary, and the harvest could be safely stored and well protected.

Contemporaneous with the development of the first settlements and the creation of fields, the first animals were also integrated with the domus (home) of humans, receiving care and protection (Zeder, 2011). In west Asia, sheep, goat, cattle, and pig are the first animals to become domesticated. These animals provide usable products both during their lifetime and after their death (figure 2).

<table>
<thead>
<tr>
<th>Product</th>
<th>Goat</th>
<th>Sheep</th>
<th>Cattle</th>
<th>Pig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traction</td>
<td></td>
<td></td>
<td></td>
<td>O</td>
</tr>
<tr>
<td>Skin (hair)</td>
<td>©</td>
<td>©</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leather</td>
<td></td>
<td></td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td>©</td>
<td>©</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Dung</td>
<td></td>
<td></td>
<td>©</td>
<td></td>
</tr>
<tr>
<td>Meat</td>
<td>©</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Bones</td>
<td>©</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 2**: Main products obtained from goat, sheep, cattle, and pig (© = ante-mortem products; O = post-mortem products).

By integrating crop production and keeping domestic animals, humans created a mixed agricultural economy in which a large part of the landscape could be, and continues to be, exploited in a controlled manner. The first trophic level, represented by plants, offers a large carrying capacity of energy. It is obtained from a combination of fields, grasslands, and vegetation where edible plant parts are collected from wild-growing plants and where hunting is still practiced. Humans are thus a consumer feeding on two trophic levels: as plant eaters and as eaters of animal products.

In the traditional agricultural systems of the Mediterranean basin, southwest Asia, and North Africa that are the focus of this book, the crops cultivated in the fields are generally intended for humans, although in exceptional cases, crop plants are given to animals. For example, grain can be given as an extra food supply to a cow prior to hard work, such as ploughing a field. It can also happen that the quality of a grain harvest is poor and that it would take too much labour to remove the impurities. The grain stock can then be downgraded to animal feed. Sufficient amounts of hay will have to be harvested and stored as winter feed for sheep, goats, and cattle. In some cases, some members of the herd are slaughtered before the onset of the season during which the available vegetation can no longer support the entire herd.

Sheep, goats, and cattle thus feed primarily on the vegetation growing outside the fields. The arable weeds that are a companion of crop plants can only be grazed once the harvest has been removed from the field (figures 3 and 4). While sheep and cattle are grazers and feed on herbaceous plants close the ground and on branches of trees and shrubs that are accessible to them by stretching their necks, goats are browsers, and they can also climb trees. Goats thus have access to more plant material than do sheep and cattle. Pigs are real
omnivores and feed on a large variety of organic material that is available both in the subsoil and on the ground surface, including kitchen waste (figure 5). Animal dung from animals that can be easily collected and shaped can subsequently be dried and used as fuel. It is also possible to use dung as a fertilizer when long-term harvesting has depleted the minerals in the soil.

Figure 3: This landscape is providing humans with food on two levels. The flat land in the foreground, which can be ploughed without the risk of erosion, is used for crop production. The cereal crop has been recently harvested. The vegetation on the slopes is grazed by sheep and goats and will nourish farmers with milk and meat (west of Kanimaran, Iraq; June 2014; RC).

Figure 4: After harvesting of the cereal crop, sheep and goats are allowed to graze the stubble field. The culms of cereals are cut at some distance above the ground to prevent damage to the cutting tool. The low-growing arable weeds offer good fodder and are partly converted into milk and meat (north of Dagalah, Iraq; August 2013; RC).
1.1.2 Cereal domestication

1.1.2.1 The concept of domestication

Plants that are exploited by humans can be designated as ‘economic plants’. These plants are distinguished from ‘wild plants’, which are not used by humans. Economic plants can be used, for example, as food, as medicine, as fuel, for colouring and tanning, as construction material for making basketry or shelter, and to obtain fibres or hairs for the production of fabrics.

Within the economic plants, a further distinction is made here between ‘cultivated plants’ and ‘domesticated plants’. In a cultivated plant, the plant is still capable of ‘seed dispersal’ and thus of propagating independently of humans. In a domesticated plant, in contrast, the seed distribution is blocked (Harlan, 1992). Note that the term ‘seed dispersal’ is used regardless of the composition of the dispersal unit (also known as ‘diaspore’). The dispersal unit of a plant can be a seed; a ‘fruit’ containing one or more seeds; or one or more fruits surrounded by vegetative plant parts (exocarp). The dispersal unit of a grass is a 1-seeded fruit with its vegetative plant parts or, in the case of some domestic grasses, only the 1-seeded fruit (‘grain kernel’).

The majority of the economic plants are cultivated, whereas only a limited number have become domesticated. An important group of domesticated plants is represented by cereals and pulses. The first cereals to be domesticated were barley and wheat. The exploitation of barley and wheat initially involved wild cereals, which were still characterized by natural seed dispersal. This initial phase of exploitation is referred to as pre-domestication cultivation (for a recent discussion, see Asouti & Fuller, 2013).

The domestication of barley and wheat involved not only the hampering of seed dispersal, but also a complex of changes in both morphological and physiological characteristics (figure 6). Hammer (1984) introduced the term ‘domestication syndrome’ to refer to diseases that are characterized by a complex of symptoms. The hampering of seed dispersal is considered to be a major...
change. For plants that cannot propagate vegetatively, this change is lethal. Of course to us humans, the reality of a farmer sowing a field is more likely to suggest a successful symbiosis than a complex of changes that recall a disease. After all, there is mutual dependency: the plant has become dependent on humans, who use part of the harvest for sowing in order to allow seeds to germinate and to produce a next generation. And humans have become more and more dependent for their food supply on these domesticated crops. The success of this symbiosis is supported by the current large-scale cultivation of domesticated crops, even outside their original distribution area.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Morphological traits</th>
<th>Physiological traits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growing season</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– loss of vernalization</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>– different photoperiodic response</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Yield</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– reduced dormancy</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>– increased photosynthesis</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>– increased tillering</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>– increased number of grain kernels</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>– increased grain size</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Harvesting and crop processing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– synchronous fruit ripening</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>– reduced rachis brittleness</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>– reduced hull tightness</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>– reduced appendages (awns and hairs)</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 6:** Morphological and physiological domestication traits of cereals categorised in relation to growing season, yield, and harvesting and crop processing.

The domestication of barley and wheat is a complex process in which selection by humans was initially unconscious. The morphological and physiological changes have a genetic basis and are caused by mutations. The domestication of barley involved mutations and selection within a single species. The domestic history of wheat is more complex because hybridization has also taken place between different types of Wheat (*Triticum*) and Goat beard (*Aegilops*), a related grass genus.

1.1.2.2 Domestication and taxonomy

The large variety within domesticated barley and wheat is taxonomically classified into subspecies. In barley we are dealing with three subspecies: wild Barley (*Hordeum vulgare* ssp. *spontaneum*), domesticated 2-row Barley (*Hordeum vulgare* ssp. *distichon*), and domesticated 6-row Barley (*Hordeum vulgare* ssp. *vulgare*). In barley, the classification on the subspecies level is based on the ‘rachis brittleness’ and on the fertility of the ‘spikelets’. In the case of 2-row barley, only the central spikelet is fertile, while in the case of 6-row barley, the two lateral spikelets are also fertile (figure 7). Both domesticated subspecies have become available as ‘hulled’ and ‘naked’ forms, but this difference in ‘hull tightness’ is not taken into account in the taxonomic classification.
Galiyya is an Arabic name for roasted ripe grain kernels. Galiyya is considered to be one of the most traditional examples of a cereal food because the first stage of harvesting wild cereals was limited to only ripe grain and because the processing of grain into galiyya requires only dry-heating, which can be done without special equipment. The roasted ripe grain is not suitable for grinding, not even coarse grinding.

Originally, dry-heating had a twofold purpose in cereal processing: facilitating the removal of the chaff and making the grain more digestible. Once barley became domesticated, the removal of the rachis and spiny awns and glumes was easily achieved after threshing by winnowing and/or sieving, and the removal of the two remaining hulls that still tightly cover the grain kernel was not necessary. In domesticated hulled barley, therefore, the dry-heating is primarily applied to improve the digestibility. This is supported by modern samples from Ethiopia, which concern roasted florets of barley (that is, grain kernels with the hulls still present). The transition from wild to domesticated hulled wheat, in contrast, did not change the morphology of the harvesting unit, and the removal of the chaff remained necessary. Therefore, it is plausible that dry-heating was applied to hulled domesticated wheat as one of the methods to facilitate the removal of the chaff. Unfortunately, all of the modern samples of roasted wheat that we have collected concern naked wheat, where the roasting has only been applied to improve its digestion.

Before roasting, grain kernels can be polished or soaked for some time. The roasted florets and grain can be mixed with other roasted seeds or fruits. Today, roasted ripe florets and grain are still offered for sale in shops and markets, but on a limited scale.
**Galiyya**

**Obtained**
Groningen (province of Groningen, the Netherlands)

**Origin**
China

**Date**
November 2015

**Collector(s)**
R. T. J. Cappers

**Context**
Shop

**GIA-accession**
39658

**Length/Diameter**
–

**Thickness**
–

**Weight**
–

**Quantity**
–

**Photographer**
D. Fennema

**Composition**

<table>
<thead>
<tr>
<th>Hordeum vulgare ssp. distichon</th>
<th>Hulled 2-row Barley</th>
<th>floret</th>
</tr>
</thead>
</table>

**Impurities**

<table>
<thead>
<tr>
<th>Galium</th>
<th>Bedstraw</th>
<th>fruit (mericarp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hordeum vulgare ssp. distichon</td>
<td>Hulled 2-row Barley</td>
<td>floret (burnt)</td>
</tr>
<tr>
<td>Hordeum vulgare ssp. distichon</td>
<td>Hulled 2-row Barley</td>
<td>rachis fragments</td>
</tr>
<tr>
<td>Hordeum vulgare ssp. vulgare</td>
<td>Hulled 6-row Barley</td>
<td>floret</td>
</tr>
<tr>
<td>Hordeum vulgare ssp. vulgare</td>
<td>Hulled 6-row Barley</td>
<td>rachis fragments</td>
</tr>
<tr>
<td>Persicaria</td>
<td>Knotweed</td>
<td>fruit</td>
</tr>
<tr>
<td>Setaria</td>
<td>Bristle grass</td>
<td>spikelet</td>
</tr>
<tr>
<td>-</td>
<td>lumps of clay</td>
<td></td>
</tr>
</tbody>
</table>

**Description**
The grain kernels have been roasted in the chaff (florets). The degree of puffing varies from none to very pronounced. Scorch marks are present, though only to a small degree. Some florets still retain their original shape, whereas others have cracked open, exposing the white endosperm. The cracks are mostly on the lateral faces, where lemma and palea are connected. A few fragments of the rachis of 2-row barley are present, as well as a few fragments of the rachis of 6-row barley. Although 2-row barley is part of the intended ingredients, both sets of rachis fragments are considered to be an impurity. The rachis fragments are partly still connected to the florets and may bear one or both sterile lateral spikelets (and, in the case of 6-row barley, a fertile floret). Other impurities concern burnt diaspor of arable weeds and clumps of clay. Some lemmas also still bear part of the awn. The sample was bought at a supermarket specializing in oriental foods. The label on the package mentions roasted wheat.
**Galiyya**

<table>
<thead>
<tr>
<th>Obtained</th>
<th>Amsterdam (province of Noord Holland, the Netherlands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Origin</td>
<td>Ethiopia</td>
</tr>
<tr>
<td>Date</td>
<td>December 2017</td>
</tr>
<tr>
<td>Collector(s)</td>
<td>R. T. J. Cappers &amp; Y. Okur</td>
</tr>
<tr>
<td>Context</td>
<td>Shop</td>
</tr>
<tr>
<td>GIA-accession</td>
<td>41098</td>
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<td>–</td>
</tr>
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<td>Thickness</td>
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</tr>
<tr>
<td>Weight</td>
<td>–</td>
</tr>
<tr>
<td>Quantity</td>
<td>–</td>
</tr>
<tr>
<td>Photographer</td>
<td>D. Fennema</td>
</tr>
</tbody>
</table>

**Composition**

<table>
<thead>
<tr>
<th>Hordeum vulgare</th>
<th>Hulled Barley grain kernel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cicer arietinum</td>
<td>Chick pea seed</td>
</tr>
<tr>
<td>-</td>
<td>salt</td>
</tr>
</tbody>
</table>

**Description**

This roasted grain is mixed with a small quantity of chick pea. This combination represents a cereal and a pulse from among the founder crops of south-west Asia. Only the chaff (lemma and palea) has been removed from the barley florets. Remains of the chaff (palea) are especially visible in the hilum groove. The grain kernels have become swollen and the bran has broken lengthwise, whereby the starchy endosperm has become visible. The seeds of the chick pea are unprocessed. The local word for this product is ‘kolo’, which translates as ‘roasted barley’. This product is still a traditional snack in Ethiopia. This sample was bought in an Ethiopian shop in Amsterdam.
**Galiyya**

**Obtained**
Amsterdam (province of Noord Holland, the Netherlands)

**Origin**
Ethiopia

**Date**
March 2017

**Collector(s)**
R. T. J. Cappers & Y. Okur

**Context**
Shop

**GIA-accession**
40330

**Length/Diameter**
–

**Thickness**
–

**Weight**
–

**Quantity**
–

**Photographer**
D. Fennema

**Composition**
- *Arachis hypogaea* Peanut seed
- *Hordeum vulgare* Hulled Barley grain kernel
- salt

**Description**
The roasted grain is mixed with a small quantity of peanut. Only the chaff (lemma and palea) has been removed from the barley florets. Remains of the chaff (palea) are especially visible in the hilum groove. The grain kernels have become swollen and the bran has broken lengthwise, whereby the starchy endosperm has become visible. The seeds of the peanut are polished and split. The local word for this product is ‘kolo’, which translates as ‘roasted barley’. This product is still a traditional snack in Ethiopia. This sample was bought in an Ethiopian shop in Amsterdam.
Galiyya

Obtained: Sivas (Sivas province, Turkey)
Origin: 
Date: February 2017
Collector(s): E. Boybeyi
Context: 
G1A-accession: 40296
Length/Diameter: 
Thickness: 
Weight: 
Quantity: 
Photographer: D. Fennema

Composition

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<th>Description</th>
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<tr>
<td>Secale cereale</td>
<td>Rye</td>
<td>grain kernel</td>
</tr>
<tr>
<td>Triticum aestivum ssp. aestivum</td>
<td>Bread wheat</td>
<td>grain kernel</td>
</tr>
</tbody>
</table>

Impurities

<table>
<thead>
<tr>
<th>Species</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centaurea cyanus</td>
<td>Cornflower</td>
<td>fruit</td>
</tr>
<tr>
<td>Elytrigia repens</td>
<td>Common couch</td>
<td>floret</td>
</tr>
<tr>
<td>Rumex</td>
<td>Docks</td>
<td>fruit with perianth</td>
</tr>
<tr>
<td>Triticum aestivum ssp. aestivum</td>
<td>Bread wheat</td>
<td>chaff</td>
</tr>
<tr>
<td></td>
<td>stone</td>
<td></td>
</tr>
</tbody>
</table>

Description

Home-made roasted grain made of unpolished grain kernels. The grain consists of a mixture of bread wheat and rye, the latter in small quantities. Judging by the glossy surface, it seems probable that fat was used in the heating process. The intensity of roasting varies among the grain kernels, as does the presence of scorch marks. Chaff remains of bread wheat concern glumes and fragments of the awn.
**Galiyya**

**Obtained** | Van (Van province, Turkey)
---|---
**Origin** | –
**Date** | 2015
**Collector(s)** | H. Balcı
**Context** | –
**GIA-accession** | 40025
**Length/Diameter** | –
**Thickness** | –
**Weight** | –
**Quantity** | –
**Photographer** | D. Pennema

**Composition**

<table>
<thead>
<tr>
<th><em>Triticum aestivum</em> ssp. <em>aestivum</em></th>
<th>Bread wheat</th>
<th>grain kernel</th>
</tr>
</thead>
</table>
**Impurities**

| cf. *Lathyrus* | Pea | seed |

**Description**

Home-made roasted grain made of unpolished grain kernels. The grain kernels have been roasted in animal fat, giving the surface a somewhat glossy appearance. Usually sheep's fat, taken from the waist area, is used for this purpose. It is unclear if the grain kernels were soaked before roasting.
Galiyya

Göcer (Karaman province, Turkey)

Obtained

Date

Collector(s)

Context

GIA-accession

Length/Diameter

Weight

Quantity

Photographer

Composition

Triticum aestivum ssp. aestivum

Bread wheat

grain kernel

salt

Impurities

Avena fatua

Wild oat

floret

Secale cereale

Rye

grain kernel

Triticum aestivum ssp. aestivum

Bread wheat

burnt grain

Description

Home-made roasted grain made of unpolished grain kernels. The grain kernels have been sprinkled with salted water prior to roasting. Small scorch marks are present. The impurities consist of a few burnt grain kernels, a grain kernel of rye, and a diaspor of an arable weed.
Galiyya

Obtained  Karaman (Karaman province, Turkey)
Origin  –
Date  August 2014
Collector(s)  Y. Okur
Context  Market
GIA-accession  34964
Length/Diameter  –
Thickness  –
Weight  –
Quantity  –
Photographer  D. Fennema

Composition

Triticum aestivum ssp. aestivum  Bread wheat  grain kernel

Impurities

Triticum aestivum ssp. aestivum  Bread wheat  grain kernel

Description

Home-made roasted grain that was offered for sale at a local market. The unpolished grain kernels have been roasted. Only small scorch marks are present. The bran may have become isolated from the starchy endosperm at these spots, resulting in puffed scorch marks. Only a fragment of a burnt grain kernel was detected in the sample. The uniform quality of the roasted grain and the almost absence of impurities indicates that this home-made roasted grain was thoroughly checked by hand picking before it was offered for sale.
Galiyya

Obtained: Karaman (Karaman province, Turkey)
Origin: –
Date: September 2014
Collector(s): Y. Okur
Context: Market
GIA-accession: 35103
Length/Diameter: –
Thickness: –
Weight: –
Quantity: –
Photographer: D. Fennema

Composition

<table>
<thead>
<tr>
<th>Triticum aestivum ssp. aestivum</th>
<th>Bread wheat</th>
<th>grain kernel</th>
</tr>
</thead>
</table>

Impurities

| Cannabis sativa | Hemp | fruit |
| Hordeum vulgare | Hull Barley | floret |
| Secale cereale | Rye | grain kernel |
| Triticum aestivum ssp. aestivum | Bread wheat | burnt grain |

Description

Home-made roasted grain that was offered for sale at a local market. Unpolished grain kernels have been used for making the roasted grain. The name in Turkish for this product is ‘kavrulmuş bugday’, which translates as ‘roasted grain’. Judging from the glossy surface, it seems likely that fat was used in the heating process. Most of the grain kernels have small scorch marks on the fruit wall. The weakest point of the bran is the hilum groove and the lateral part of the grain kernel. It is in these regions that the bran bursts open and the starchy endosperm becomes visible. A small quantity of burnt grain kernels is present. These burnt specimens are a bit smaller than the roasted and puffed grain kernels. Although in some types of galiyya fruits of hemp are also used for roasting and mixed with roasted wheat, the small quantity of hemp in this sample is considered to be an unintended admixture.
**Galiyya**

**Obtained**
Karaman (Karaman province, Turkey)

**Origin**

**Date**
August 2014

**Collector(s)**
Y. Okur

**Context**
Market

**GIA-accession**
34963

**Length/Diameter**

**Thickness**

**Weight**

**Quantity**

**Photographer**
D. Fennema

**Composition**

| Triticum aestivum ssp. aestivum | Bread wheat | grain kernel |

**Impurities**

<table>
<thead>
<tr>
<th>Hordeum vulgare</th>
<th>Hulled Barley</th>
<th>floret</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triticum aestivum ssp. aestivum</td>
<td>Bread wheat</td>
<td>burnt grain</td>
</tr>
</tbody>
</table>

**Description**

Home-made roasted grain that was offered for sale at a local market. The grain kernels have been polished and coarsely ground before roasting. The absence of the bran has resulted in a somewhat tuberculate surface. Remains of the bran are only present in the hilum groove. Scorch marks are present but rare. Impurities are present but rare and include fragments of burnt grain kernels and a fragment of a pearled barley grain kernel.
Galiyya

Obtained: Rasht (Gilan province, Iran)
Origin: possibly Qazvin (Qazvin province, Iran)
Date: July 2017
Collector(s): R. T. J. Cappers & M. Kaffashi
Context: Bazaar
GIA-accession: 40881
Length/Diameter: –
Thickness: –
Weight: –
Quantity: –
Photographer: D. Fennema

Composition

<table>
<thead>
<tr>
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<th>Description</th>
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</thead>
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<td>Triticum aestivum ssp. aestivum</td>
<td>Bread wheat</td>
</tr>
<tr>
<td>Aegilops tauschii</td>
<td>Goat beard</td>
</tr>
<tr>
<td>Fabaceae spp.</td>
<td>Pea family</td>
</tr>
<tr>
<td>Galium</td>
<td>Bedstraws</td>
</tr>
<tr>
<td>Hordeum vulgare ssp. vulgare</td>
<td>Hulled 6-row Barley</td>
</tr>
<tr>
<td>Ranunculus arvensis</td>
<td>Corn buttercup</td>
</tr>
<tr>
<td>Secale cereale</td>
<td>Rye</td>
</tr>
<tr>
<td>Triticum aestivum ssp. aestivum</td>
<td>Bread wheat</td>
</tr>
</tbody>
</table>

Description

The grain kernels have been soaked in water overnight, then dried, and then roasted. After roasting, the grain was sprayed with salt water. The roasting time was rather limited and the grain kernels are still quite hard. But this galiyya is considered good quality. The roasted grain is not a common supply in the bazaar. The impurities consist of a mixture of arable weeds and two other cereal crops: rye and hulled 6-row barley.
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<tr>
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<tr>
<td>Ingredient</td>
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<tr>
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<td>26, 42, 82, 85–86, 172, 174, 182, 194, 196, 298, 341, 346, 356, 368, 540</td>
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