

Lecture 12: The Invention of Cuisine



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Tubers and quartered rock hyrax on a fire made by friction lighting in Hadza country, Tanzania. The fur of these animals is burnt off, the entrails are fed to the dogs but everything else is eaten.

12 /40 ways of cooking Chinese food



Chinese culture prides itself in the multitude of culinary approaches to food preparation!

Cooking Culture



Cuisines are ways in which human cultures define themselves. Differences in cuisines are used for cultural pride and prejudice alike.... Cuisines represent a huge cultural amplification of local ecology but are also strongly shaped by local beliefs and norms.

early training



my credentials for talking about cooking

Roasting



roasting meat or tubers directly over fire.
No containers needed.



Roast suckling pig, stuffed with herbs (lemon grass, ginger, garlic). No metal used, only bamboo, New Zealand phlox for tying and obsidian flakes for cutting.

mortars



Mechanically pounding cooked tubers or grain.

Practice question: What are examples of foods made in mortars?

Answer: Grinding grain, pounding tubers or plantains, making sticky rice cake (mochi), preparing sauces (pesto, literally means “pestle”).

Practice question: Name four traditional dishes made in a mortar.

Poi, Futu or Fufu, Pesto sauce, and Mochi

mortars



Taro (or kalo) is the corm of a monocot plant and an important staple in Polynesia.

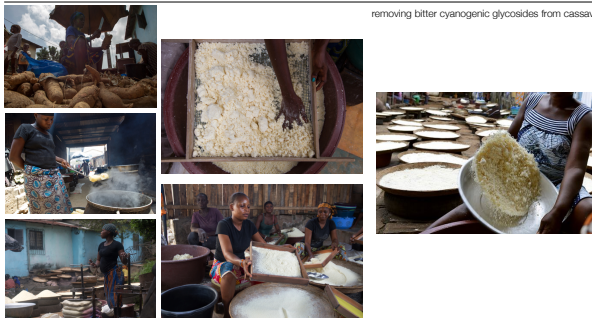
The boiled corms are peeled and then pounded in a mortar to make poi. In modern times, Poi is made by machine (meat grinder).

Practice question: What is the origin myth for the first human in traditional Hawaii?

Answer: Humans descend from the Kalo plant (taro).

Processing Cassava in West Africa: Attiéké

removing bitter cyanogenic glycosides from cassava.



Cassava, the root vegetable, was peeled then boiled, pressed, grated, spread to dry on large woven discs in the sun and then sifted again before being steamed over a wood fire and sifted finally into three different sizes before spooned into plastic bags for sale. Making attieke involves peeling and then grating cassava, mixing the resulting paste with a small portion of already-fermented paste, and letting the lot sit for a day or two to ferment, allowing the tubers natural acidity to dissipate. The paste is then dried in the sun and then simply steamed for a few minutes before being served. Attieke is also popular in neighbouring countries, with several tons being exported every month to Burkina Faso, Mali, France and the United States.

Extracting starch from palms: Sago



A Marind woman processes sago palm, which is a source not only of food but of kinship and shared stories.

Pearling by heating and stirring small aggregates of moist starch. Sago palm starch can be boiled in a pot, baked as flat bread or boiled inside a banana leaf by steaming.

Practice question: What is sago?

Answer: Starch from a tropical palm (technically a cycad) used as staple carbohydrate in Papua New Guinea.

mortars

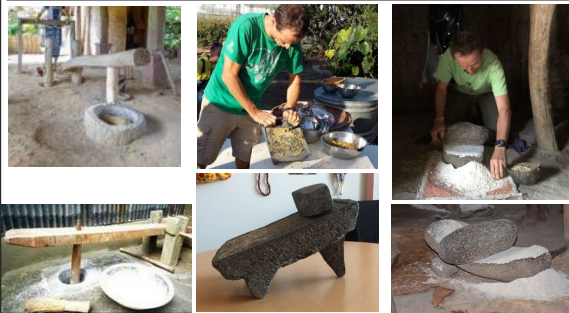


Morteros (mortars) by split rock in Anza Borrego. These were made by native people hundreds to thousands of years ago. One can boil acorn meal in water with hot rocks in these mortars.

Practice question: How could you use a mortar to cook food?

Answer: Add hot stones heated in a fire to food in a mortero.

mills



foot activated mortar to mill rice in Thailand and India, metate grinding stone from Mexico, ugali (corn) flour mill in Tanzania.

Practice question: Why were round (cylindrical) mills not used in ancient central America?

Answer: The maize grains were ground wet on a metate (grinding stone) to produce masa (Tamal). A rotation mill would clog up with wet grains.



Nixtamalizing corn and making tortillas.

mills



Three different circular hand activated mills from Roman times.

mills

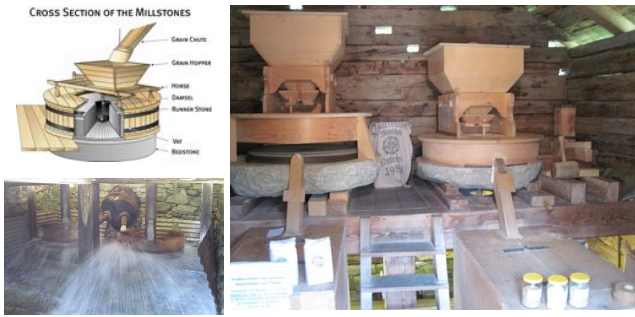


For grinding olives and spices.

Practice question: What uses of mills other than for grain or starch?

Oil from fruit or seeds (olives, sesame) and fresh spice mixtures (wet curries).

mills



Water-activated mills driven by horizontal wheels (Pelton), in Switzerland.
These water wheels extract energy from the movement water as opposed to the weight of water like traditional water wheels do.

power mills



water wheel (China), ox-powered mill (China), wind mill (Russian windmill in Fort Ross, CA).
Practice question: What methods of powering mills are there?
Answer: Water weight, water movement, animals, people, wind, steam engine, internal combustion engine, electric engine.

gruel: simple cooking of grain and water



Boiling whole grains or milled grains to make gruel is the easiest way to eat starch.
Practice question: Why is preparing gruel easier than baking bread?
Less heat (fuel) required.

bread: making cereals more interesting to eat?



Fermenting dough with baker's yeast or wild yeasts creates bubbles in the dough:

bread is made by “catching” yeast bubbles.....in the cooked dough.

Practice question: What gives bread its structure?

Gas bubbles generated by the fermentation with yeasts (baker's/brewer's yeast or wild yeast).

bread



Varieties of bread: Tanzanian chapati, Tanzanian “oven”, poi bread, sour dough, brioche, and Basler boot from my home city of Basel, Switzerland.

noodles: making cereals more interesting to eat, part 2?



From dough to delicate shapes boiled in water.

Practice question: What sources of starch are used for making noodles:

Answer: Millet, sorghum, wheat, buckwheat, rice, bean and mixtures thereof

yeasted bread, living dough generating many shapes



Yeasted breads allow bakers to play with infinite shapes, for every occasion!

ground ovens: Imu in Kawaii



Ground ovens are used around the world to bake/steam large amounts of food. Baking a pig with taro and plantain creates very nice flavors

Practice question: What is a Polynesian imu?
A traditional Polynesian ground oven.

ground ovens: simple hole in Pacific Beach



Baking tubers and roots with the steam from blue agave in PB.

Ovens: Dutch Ovens



Pots with lids can be used as ovens by adding most of the coals on the lid.
More coals/embers need to be placed on the lid than under the pot, to avoid burning.

Ovens: hot plates, pans



Bread can also be “baked” on flat surfaces, clay plates, skillets etc.

ovens



Ovens for bread, plates for enjera. Cob ovens are essentially miniature “clay igloos”, they work well even without chimney.

vertical ovens



Tandoor oven and vertical ovens in China using braided pine needles as fuel.

oven from scratch



Building a wood-fired bread oven and baking bread in Switzerland in 1982... and baking loads of bread using residual heat.

Steam: 蒸. zheng

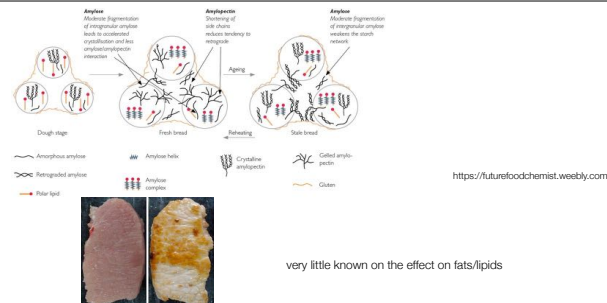


Steaming bread dough for xiaolongbao, mantou, or baozi.

Practice question: What is the most full efficient way to cook bread?

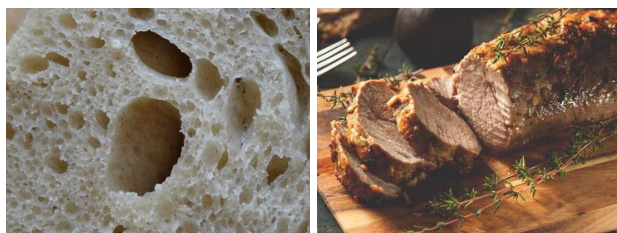
Answer: Steaming.

Cooking massively improves energy intake for starch and meat



Starches and proteins, both become much easier to digest after cooking. Little is known about the effects of cooking on fats (lipids). Cooking of course allows one to extract fat from bone (boiling bone in water), allowing to get such fat without having to chew the bones into powder, like the hyenas....

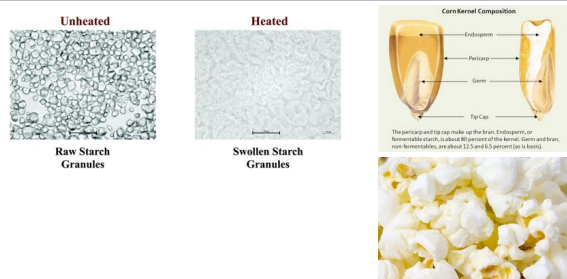
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Gelatinized starch of bread crumb.

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Gelatinization Popcorn



David Julian McClements ^{1a}, Cheryl Chung ^a and Bi-cheng Wu ^{Food Funct.}, 2017, 8, 498-510

Morphology of modified starch granules (3.5%) suspended in an aqueous solution before and after heating (90 °C, 5 min). The starch granules take in water and swell during heating (gelatinization).
Practice question: What is a critical grain quality requirement for popcorn?
 Intactness of seed coat and moisture content.

Wrapping for baking/steaming



Cooking food inside plant leaves or stems.

Practice question: name a way to steam food that does not involve pots and pans.
wrapping in leaves or filling into bamboo.

Stews without pots



Cooking in animal skin ,gourd or depression in rock using hot stones.

Stews with pots



earth ware pot

stone ware pot

copper pot

cast iron pot

stainless
steel pot

Clay and metal pots open up many new possibilities for heat management and cooking.
Pottery was very important for the development of cuisines.

Honey goes with every thing



wild honey harvest

Honey harvest on a baobab tree in Tanzania.

Flat bread



Pasqualone, A. 2018. *J. of Ethnic Foods*

Diffusive pathway of flat breads. Flat breads substantially followed the same path of cereals (wheat and barley), starting from the Fertile Crescent. From there, flat breads spread westward around the Mediterranean, across North Africa and southern Europe, northward across the Anatolian peninsula to the Balkans and to Central Asia, and eastward to India. Interlinks with another agricultural center of origin in Ethiopia, contributing some indigenous crops including sorghum, teff, and pigmented tetraploid wheat, are found across the Arabian Peninsula.

Flat breads: unleavened and leavened



Pasqualone, A. 2018. *J. of Ethnic Foods*

Loaves of Egyptian breads. (A) Puffing of the Egyptian aesh baladi bread in a domed oven. Puffing is the visible inflation occurring in the oven when dough discs, sheeted to a few millimeters, optimally leavened, and not punched, are baked. The inflation is due to the thermal expansion of gases and produces the so-called "double-layered flat breads". Optimal puffing requires a horizontal support; therefore, a domed oven is preferably used. (B) Loaves of Egyptian roqqa bread. This bread is baked until dry; therefore, it has relatively long shelf life, and usually, it is rehydrated before eating.

Loaves of Italian piadina, unleavened flat bread made of flour, lard or olive oil, salt, and water, baked on a terracotta fire plate. Piadina is particularly appreciated in the Romagna territory (northern Italy), i.e., the area surrounding the towns of Forlì, Cesena, Ravenna, and Rimini.

Decoratively punched dough, ready to be baked to prepare the Uzbek non. The decorative punches are named chekich and are used in combination with the bread stamps named bosma.

Iranian breads, allowed to cool on a net. (A) Barbari bread. (B) Sangak bread. The surface of barbari is punched by knuckles, whereas the surface of sangak shows the imprints of the pebbles on which it is traditionally baked.

Two vertical ovens.

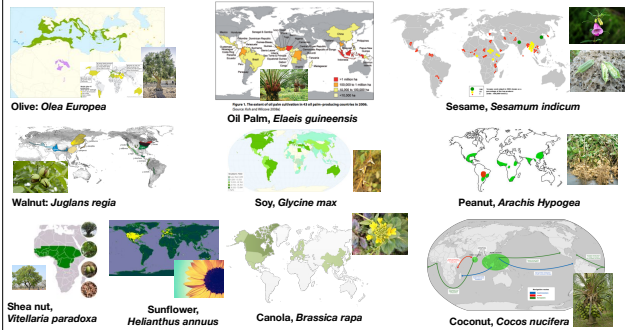
Frying



Using large volumes of hot oil to cook.

Practice question: What makes fried foods a relative luxury?
The need for large volumes of oil.

Food Oils



Plant oils come from many sources and differ greatly between vegetation zones, from temperate to tropical. Many crops have been massively selected for oil content, e.g. corn and canola (rape seed).

Practice question: What sources for plant oil are used in temperate zones, mediterranean climate, Sahel region and tropical Africa respectively?

Answer: walnut, olive, shea, palm.

Animal fats



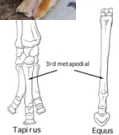
SCIENCE ADVANCES | RESEARCH ARTICLE

ANTHROPOLOGY

Bone marrow storage and delayed consumption at Middle Pleistocene Qesem Cave, Israel (420 to 200 ka)

R. Blasco^{1,2,3,*}, J. Rosell^{4,5}, M. Arilla^{6,7}, A. Margalida^{8,9}, D. Vilella¹⁰, A. Gopher¹¹, R. Barkai¹²

Bone marrow and grease constitute an important source of nutrition and have attracted the attention of human groups since prehistoric times. Marrow consumption has been linked to immediate consumption following the procurement and removal of soft tissues. Here, we present the earliest evidence for storage and delayed consumption of bone marrow at Qesem Cave, Israel (~420 to 200 ka). By using experimental series controlling exposure time and environmental parameters, combined with chemical analysis, we evaluated bone marrow preservation. The combination of archaeological and experimental results allowed us to isolate specific marks linked to dry skin removal and determine a low rate of marrow fat degradation of up to 9 weeks of exposure. This is the earliest evidence of such previously unidentified behavior, and it offers insights into the socio-economy of the human groups who lived at Qesem and may mark a threshold to new modes of Pleistocene human adaptation.

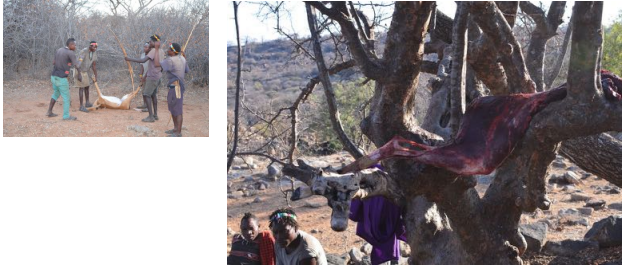


Blasco et al. 2019, Science Advances

Qesem Cave in Israel was occupied by archaic hominids from 420 ka on.

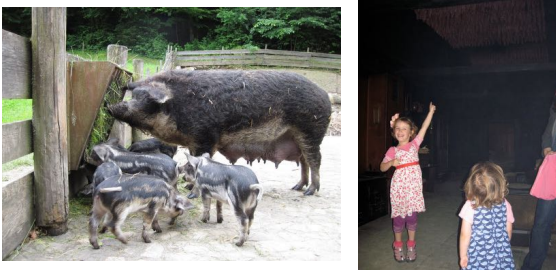
These were not *H. erectus* but possibly a “dead end” population of archaic *Homo*.

Keeping meat



Hadza tribes people tracking an impala shot with a poison arrow. hanging meat in trees to consume later. Dried meat strips can also be seen as early cuisine.

Smoking and drying, e.g. sausages



One year there were pigs, next year they were gone...then my daughter spotted where the pigs went..... sausages hanging in the smoke....

Fermenting foods



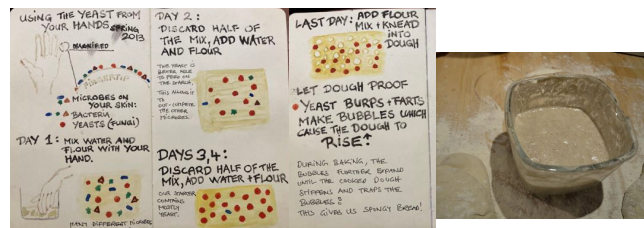
Natto (soy beans fermented with *Bacillus subtilis*), Kefir, a symbiotic community of bacteria and yeast (SCOBY), Sauerkraut, Yamaimo (mountain yam) Kombucha with SCOBY, Miso: soy beans fermented with fungus *Aspergillus oryzae*, wine making using human feet, thousand year eggs.

Kefir: composition of SCOBY: the grains were predominantly composed of Lactobacillaceae, which accounted for >50% of the populations in all but grain Ir6. The other major family were the Proteobacteria-associated Acetobacteraceae. Other families detected were Streptococcaceae (19 grains), Leuconostocaceae (4 grains), Lachnospiraceae (16 grains), Ruminococcaceae (8 grains), Bifidobacteriaceae (2 grains), Clostridiaceae (2 grains), Propionibacteriaceae (2 grains), Bacteroidaceae (2 grains), Enterococcaceae (1 grain) and Rikenellaceae (1 grain) fungal

Ascomycota, the largest phylum of the fungal kingdom. Ascomycota were also shown to dominate within the kefir milk, ranging from a high of 100% in Ger1 to a low of 89.38% in Ir10 (Table S6; Table S7). Basidiomycota, the other phylum belonging to the subkingdom Dikarya, was found in 9 milk samples at relatively low read numbers. 9 of the milk samples also harboured trace amounts of uncultured fungi. The lower diversity in the grain is again evident at the family level where all but one sample (Sp1) contain >99% Saccharomycetaceae. The overall average proportion of

Saccharomycetaceae is significantly lower in the milks ($p < 0.001$), but still correspond to >99% of reads in 16 of the 23 samples. The fungal composition of kefir milk Sp1 was unusual by virtue of containing 34.27% Pichiaceae. In contrast, the next highest proportion of Pichiaceae was 0.48% (in milk UK3). Other fungal families detected in both the kefir milks and grains were Davidiellaceae and Trichocomaceae. Herpotrichiellaceae, Teratosphaeriaceae, Valsaceae, Debaryomycetaceae, Phaffomycetaceae, Malasseziaceae, Bondarzewiaceae, Dermataceae, Pezizaceae, Ganodermataceae, Tricholomataceae, Tremellomycetes. In addition, Wallemiomycetes were only detected in the milks whereas Dothioraceae were only detected in the grains.

Fermenting foods



Using natural selection to select for wild yeast in dough starter.

Cuisine by combining:

berry and leaf



nuts, leaves, lime juice



leaves, flowers
fish, lemon



fresh pasta, tomato sauce,
cheeses, textured soy protein,
pepper, salt, herbs etc

Simplistic cuisine without fire, contrasted to complex baked dish: lasagna

Practice question: What dishes can be created without fire?

Answer: ceviche (lime/lemon treatment of fish, shellfish), salads, pounded meats (tatar), raw fish (sashimi),
raw fish with fermented coconut milk (Tahiti).....fermented dishes not requiring boiling....

sauces and spices



A variety of sauces and spices are used in various regional cuisines.

Some recent industrial flavors such as hydrolyzed vegetable bouillon cubes from Maggi (owned by Nestle) are found all around the world.

Practice question: What is the basis for flavoring sauces such as soy sauces, fish sauce, liquid amino, maggi etc?

Hydrolyzed protein from protein rich plant sources (beans) or fish provide glutamate that can from salts with sodium, monosodium glutamate activates the umami receptors and thus strongly enhances the “savory” taste of foods.

cuisine as identity



atlas of prejudice contain plenty of food related entries.....

Italy centric, some would argue that some Italians might have lower tolerance than indicated on the map....

cuisine as identity



atlas of prejudice contain plenty of food related entries.....

France centric

cuisine as identity

Summary

Processing food was the beginning of cuisine

All known human cultures cook.

Food is chopped, pounded, grated, fermented, pickled, roasted, boiled, steamed, baked, dried, freeze-dried

Culture-specific ingredients and combinations and modes of preparation define regional cuisines.

Human cuisines are quick to adopt novel ingredients and techniques.

Staple foods consist of starchy foods in almost all regions except the high arctic.

Protein comes from animals but after farming was invented, high protein pulses provided much needed protein.

Fats come from plants and animals.

Without cooking pots, cooking techniques include ground ovens, wrapping in leaves and bamboo and cooking with hot rocks.

Many crops have been intensely selected to yield either high levels of protein, carbohydrates, or oil.

Starches from tubers, sago palms, grass grains and beans are rendered more interesting by pounding, forming doughs for bread and noodles.

Grains and other plant seeds are milled in a variety of ways.

Spices and sauces can add instant flavor to dishes and help define regional cuisines.

Honey is an important source of sugar that can be added to dishes.

