

# Microbiology and Food History: Tasty and Dangerous Encounters

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- Microbiology and Food Safety
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# Microbiology and Food Production

# Hunter-gatherer or forager

Little stockpiling possible

Hunted game and gathered fruit largely consumed

Seasonal dependence

No planned cultivation



# Neolithic Revolution

- “Sometime after 12,000 B.C., sedentary hunter–gatherer communities in the Levant, followed slightly later by inhabitants of Anatolia and parts of the Zagros Mountains, embarked on a path that led to the domestication of plants and animals and, ultimately, food production. This shift in subsistence that archaeologists refer to as the “Neolithic Revolution” was the most profound change in human history and one that still has a far-reaching impact on the planet.”
- (Miller/Wetterstrom, *The Beginnings of Agriculture*, 1124)

# Fermentation

- Fermentierung = „etw. durch Einwirkung, Zusatz von Enzymen, Bakterien, Hefen oder Pilzen chemisch umwandeln, wobei Gase, Säuren oder Alkohol entstehen, und auf diesem Wege Lebens- und Genussmittel veredeln, genießbar, haltbar machen“  
(<https://www.dwds.de/wb/fermentieren>)
- Fermentation = "chemically converting sth. by the action or addition of enzymes, bacteria, yeasts or fungi, whereby gases, acids or alcohol are produced, and in this way refining foodstuffs and luxury foods, making them edible, preservable"  
(<https://www.dwds.de/wb/fermentieren>)
  - Grain → Beer
  - Grapes → Wine
  - Milk → ...

# Fermented milk

- Widespread lactose intolerance among earlier humans
- Slow adaptation process
- Fermentation significantly reduces the milk sugar content (= lactose)
  - Food rich in lactose: whole milk (4.6 g lactose / 100 g)
  - Food containing lactose: Yoghurt 3.5 % fat (4.1 g lactose); crème fraîche (2.4 g)
  - Almost lactose-free: Butter, lard, cheese, as lactose remains in buttermilk or whey during production; lactose is fermented to lactic acid during cheese ripening
- (<https://dr-hinterleitner.at/service/laktoseintoleranz.php>)

# Fermentation and Civilisation

- „It was the development of new techniques of chemically transforming food that allowed the theoretical advantages of the agro-pastoral system to be realized. [...] The ability to preserve large quantities of varied foods permitted surplus accumulation that, in turn, provided an impetus toward the developments we associate with civilization: urbanization, a high degree of economic specialization, and social inequality”  
(Miller/Wetterstrom, The Beginnings of Agriculture, 1125f.)

# Beer in Antiquity

Hunters and gatherers: intoxicating effect of fermented fruit discovered (hypothesis)

Settlement/agriculture: porridge and bread as well as preliminary forms of beer made from fermented grain

Clay tablets of the ancient Sumerians (before 3000 BC): established beer production

Ancient Egypt: half-baked bread fermented with date juice and filtered into "beer"; drinking with a straw (liquid bread); for the upper class as well as for pyramid workers



Hirschfelder, Europäische Esskultur  
(2005), 55



# Japan and Sushi

*Narezushi* ("matured sushi" → left)

Original preservation method: salted fish is coated with cooked rice → Lactic acid fermentation prevents bacterial growth → Rice removed before consumption

Faster fermentation (15th century) makes the rice edible → Snack


Sushi without fermentation → combined with *sashimi* = raw fish (late 18th century) → (Today's) hand-rolled *nigiri sushi*



# Japan: Vegetables and condiments

- Soya bean
  - Miso (Soybean paste, see picture)
    - boiled soya beans mashed; mixed with rice or barley on which the *kōji* mushroom grows; mixed with salt; matured for 1 year
  - Shōyu (Soya Sauce)
    - Boiled beans mixed with dried wheat grains on which *kōji* mushroom grows + salt water → ferment for 3-4 months, then mature for 1 year





# Microbiology and Food Security

# Traditionelle Konservierungs- methoden

- Fermenting
  - Drying
  - Smoking
  - Salting
  - Pickling in vinegar, oil, alcohol
  - Use of cats
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- Die Katze und die Maus
  - "Es war einmal ein Mann, dem taten die Mäuse in seiner Speisekammer vielen Schaden, da nahm er eine Katze an, damit sie die Mäuse vertreibe und vertilge."
  - (The cat and the mouse
  - "Once upon a time there was a man whose pantry was full of mice, so he hired a cat to drive them away and eat them.")
  - Ludwig Bechstein, Deutsches Märchenbuch, 1847;  
<https://maerchen.com/bechstein/die-katze-und-die-maus.php>



Iron bacon hook, Austria, late 19th century. (Volkskundemuseum Wien)

[https://commons.wikimedia.org/wiki/File:SpeckhakenL1110130\\_\(2\).jpg#/media/Datei:SpeckhakenL1110130\\_\(2\).jpg](https://commons.wikimedia.org/wiki/File:SpeckhakenL1110130_(2).jpg#/media/Datei:SpeckhakenL1110130_(2).jpg)

# Medieval Cuisine

In medieval cuisine, frequent use of exotic, imported spices (cinnamon, coriander, aniseed, saffron)

Older research and popular works: use of spices to mask the bad flavour of meat

A case for microbiology and food safety?

Popular but false cliché

Upper classes, who could afford expensive spices, always consumed fresh meat

Spices used for representation or in dietetics

Menu for the Lunch served by Charles V on 5th of January at Le palais de la Cité, 5th January 1378

## FIRST COURSE

Soup in the German style with almonds  
Hare with black sauce  
Small pâtes  
Beef

## SECOND COURSE

Roasted meat in several styles  
Yellow sauce  
Fresh almond milk  
Norwegian pastries  
Lombard cakes

## INTERMISSION

Boar tail

## THIRD COURSE

Pink soup and tieulle soup  
Goslings and fat  
Capons with mushrooms and poultry sauce  
Gruel of frumenty with eggs and game

## INTERMISSION

Hens roasted to a golden brown  
Green and yellow [sauces]  
Meatballs

## SOURCE:

The Parisian Summit, 1377 - 78. Emperor Charles IV and King Charles V of France  
By František Šmahel  
Karolinum 2014



From: *Fêtes gourmandes au Moyen Âge*.  
By: Jean-Louis Flandrin and Carole Lambert  
Imprimerie Nationales 1998.

# Hygiene and meat inspection in the Middle Ages

- Regulations for slaughtering
  - Slaughter in one place
  - Further processing separately
  - Sale at market stalls; meat in larger pieces and hanging
- Meat inspection (*Fleischbeschau*)
- Authorities appointed meat inspectors who had to check meat at the market every morning
- Tasks:
  - 1. price control
  - 2. prevent deception (wrong type of meat etc.)
  - 3. condition of the meat
  - 4. uniform supply to the population