Wheat – Its role in Social and Cultural life

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Introduction

Any crop has a social and cultural heritage, especially if it is a staple: a predominant part of the food, affordable, eaten at most meals and often exceeding 50% of the calories of the daily consumption required. Its price, preparation, taste and fragrance are daily subjects for discussion and become key parts of culture. The same used to apply to how grains are produced and reproduced through the agricultural cycle. This is especially so in subsistence farming, where every aspect, from tilling to milling and baking, is a household skill and heritage specialized by gender, age and social status, their specific expressions molded by the crop. When a staple crop decreases in importance or is replaced, its heritage aspects are usually also affected. The more modern and diversified diets become – purchased through markets involving a chain of specialized professions – the less the practical impacts of this heritage. Wheat has a paradoxical history in this regard. While its role as a dominant local staple has been reduced in the past 50 years, its role as a global staple has increased (Khoury, Bjorkman et al., 2014). However, in local and regional diets it retains a major influence in meals, in religion, in language and expressions, and is a social force that may be activated in times of political crisis, as seen in Egypt in 2008 and 2011.

A framework for our investigation is given by Article 2 (1) of the Intangible Cultural Heritage Convention. This states that “an intangible cultural heritage means the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artifacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage. This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides
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them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity” (ICH Convention, 2003: 11). Article 2(2) adds that intangible cultural heritage can be found in a variety of forms, such as oral traditions and expressions (including language), social practices and knowledge and practices concerning nature and the universe (ICH Convention, 2003: 11).

In our context, this will encompass all aspects of the social life cycle of wheat, from sowing to harvesting, processing, cooking and eating. However, we will focus on those genetic traits that are appreciated by people. They include the differences between species as well as genetic and environmental differences within them, e.g. noticeable yield or quality (processing) differences between years or varieties. Therefore wheat must always be seen in relation to available alternative foods, in our case mainly cereals.

**Wheat as a staple crop**

Wheat is the most widely grown crop on the planet and occupies 30.3% of all land devoted to cereals. It supplies 18.3% of all calories and 19.8% of proteins in all food consumed (FAOSTAT, 2014), and in the next decade it is expected to pass rice as the world’s most important food crop. The average per capita consumption is 65.4 kg per annum, but in North Africa, the Middle East and Central Asia the average consumption is twice this level and reaches 210 kg and 53% of food calories in Azerbaijan. The production conditions range from semi-subsistence to highly mechanized, from major exporters like Kazakhstan to the world’s top wheat importer Egypt. While the current Azerbaijani consumption certainly qualifies wheat as a staple crop, it was most likely more important before. In the Sardinia of the 1930s, wheat accounted for 85% (78% bread, 7% pasta by weight) of the food consumed, a figure assumed to be representative at least 150 years back (Counihan, 1984).

Logically, the rest of the menu was called “that which accompanies bread” e.g. *companatum* in Malta (Kliewer, 2008), *katik* in Turkey (Sauner-Leroy, 2010). This term is very ancient. In the Jewish Talmud the Babylonians were ridiculed for eating bread with bread (Belhassen, 2010), and the early Roman expression *pulmentarium* means “that which accompanies the puls” (porridge) (Purcell, 2003). Since e.g. a pasta dish will always be accompanied by bread, the Tajik often say they eat bread with bread. Similar expressions concerned rye bread in Estonia.

This corresponds well with figures from late medieval English nobility, whose standard daily food ration was between two and three pounds of wheat bread and about a gallon of ale. Military garrisons and the local hospital patients had almost exactly the same rations by weight, though probably not by quality. In France the 3500 residents of Medieval Chambéry received approximately 24 liters of wheat per month, or about a two-pound loaf of bread per day.
In other words, bread was the absolute staple of the medieval diet throughout Europe, at all levels of society. This is in contrast to (at least northern) Scandinavia, where animal products were much more common. From Swedish Lapland the botanist and priest Laestadius (1824) described the plight of the would-be barley farmer, whose daily menu was butter, milk, cheese, fat fish and fat meat, while barley water porridge was a festive dish.

**The social and cultural heritage of wheat in the Middle East**

This heritage has a surprising unity, despite the long time span (since the Neolithic period) and the ethnic, religious and geographical diversity. We will call this the core area of wheat for the Middle East, although it extends from the Mediterranean to Central Asia.

Throughout the region, wheat is considered superior to barley as a food (malting is not considered, though Islam’s ban on alcohol may have influenced this ranking). This notion is very ancient and no doubt relates to its baking quality and as a marker of social class. Bread was a concern for all, but a choice available only to the privileged few that left written records. Although less documented, barley, millet and later maize were also staples along with wheat. It is a sign of recent relative affluence that Syrians consider barley as an insult if served at table – only fit for sheep. However, naked barley is a significant food grain in North Africa (and up to 4,400 metres above sea level in Himalaya).

**Case 1: Status of wheat in the classical Middle East**

**Mesopotamia**

The main cereals were barley and wheat (most likely emmer). Much of the cultural heritage is related to both as the basis for the accumulation of wealth and social stratification. The Danish historian, Axel Steensberg (1986), has described the close relationship between hard grains and the first civilizations. Because grains are storable, they became the world’s first currency and available capital. If the store was tight and dry, grains would keep as food and seed for years. In Babylon and Egypt grains were used as currency for at least 1000 years prior to coins. That wheat was valued more highly than barley was probably due to quality preference, as well as increasing scarcity. Salinization made the soil less suited for growing wheat, while barley is much more tolerant. Most Babylonian labor wages were paid in barley which was the common staple (beer included), while wheat became the gold standard (Bamforth, 2008). The exchange terms are astounding:

- Monthly salary, child below 15: 20 liters of barley
- Monthly salary, soldier: 40 liters of barley + edible oil
Dowry for a poor bride: 20 liters of barley + 40 liters of beer + 1 sheep =
1 shekel

Comparing barley with wheat, there is a significant difference seen between
the value of wheat and barley:

1 shekel = 180 grains of wheat = 8.3 g silver = 0.6 g gold.

In other words: 22 grains of wheat = 1 g silver,
and
1 talent = 3600 shekels = 648000 grains of wheat = 30 kg silver = 1.4 kg gold.

In 2013 prices, the relative wheat to silver to gold prices are rather different:
1 kilogram of wheat costs approximately 0.35 USD, silver 700 and gold
28,000 USD.

The Babylonian measures are still with us in familiar idioms like a “grain of
gold” (the etymological root of the word gram is grain). According to the Oxford
Concise Dictionary one gram corresponds to 16 grains of wheat. Until the 20th
century, goldsmiths used wheat grains as weights when measuring small quanti-
ties. An equally Babylonian equation was included in the Magna Carta, when it
declared the value of one silver penny (sterling) to be 32 grains from the middle
part of a mature wheat spike.

Another Mesopotamian heritage is the tannur oven, dating back to at least
4800 BC and still the typical breadmaking oven from the Mahgreb and Turkey,
throughout the Middle East and Central Asia to India and Myanmar. It is used
for leavened as well as unleavened bread.

The third heritage ascribed to Babylonians is the liquid bread, beer made
from barley malt. Indeed, in the Gilgamesh epic “to drink beer is a sign of a
civilized life”. This was probably safer to drink than the river water, plus a major
source of calories.

Egypt

Egyptian baking of leavened wheat bread greatly influenced Classical
antiquity. The Egyptian Museum in Cairo (and numerous museums around
the world) displays desiccated bread of emmer dating back to 2000 BC. They
resemble blackish sponges, often the size of flat rolls. Although of rather
compact texture, leavening by sourdough (yeast and lactic acid bacteria) is likely
from the baking technology (below) and the physical proximity of brewery and
bakery (see review by Samuel, 2000). Grave reliefs from the tomb of Rameses
III (1275-1155 BC) display men kneading dough with their feet (common in
Antiquity and practiced in France until early 20th century (Barboff, 2010)).
There were large numbers of different loaves, from long and rectangular to pita-
like rolls, and sweet and fat cakes in a variety of shapes.

Baking technologies developed from the most primitive, in ashes and
embers, via fire heated baking plates having walls, into dome shaped brick
prototypes of our current ovens (Währen, 1960). Egyptians likened this baking oven to a pregnant womb giving birth, an image preserved in proverbs to this day (table 1). Alternatively, leavened dough was put into hot clay molds embedded in the ashes and would rising be baked under clay cones. This type disappeared in the New Kingdom when the cylindrical Mesopotamian *tannur* became common, the leavened (or unleavened) loaves baked on the hot insides.

Preserved loaves are all emmer, but when Herodotus writes that Egyptians despised other grains, he may be correct or cite the preferences of his elite informants (barley bread had its own hieroglyph). While neighbors adopted naked wheats, emmer remained the sole wheat in Egypt until the conquest by Alexander the Great in 332 BC. Then it was replaced by durum. Bread wheat seems to have been of minor importance, and spelt has never been recorded in Egypt.

**Israel**

This is dealt with in depth in Chapter 46 by Benoît Vermander. For comparative purposes it suffices to point out that wheat was ranked as twice as valuable as barley in the Old Testament. That Jesus compares his destiny to the grain of wheat (John 12.23) and not barley, reflects this difference between the two species. Similarly, in the gospel of John, chapter 6, the miracle of the loaves was specifically performed with barley loaves, hinting at a doubtful quality. Otherwise, bread presumably implies wheat bread.

**Rome**

The term *frumenta* designated wheat as a plant, *frumentum* wheat as grains (and, not accidentally, as tax). It is unclear to what extent durum and bread wheat, or emmer and spelt, were considered as separate crops, although natural selection must have played a role in such mixtures. Columella mentions that pure crops were grown. Barley was a staple for the lowest classes and for strengthening soldiers and gladiators (*hordeari*) before battle. However, in both *The Civil Wars* and *The Gallic Wars* Julius Caesar (Caesar, 2013) expressly mentions provisions of wheat (*frumentum commeatumque*) as a key military concern. The almost industrial milling and baking processes were largely based on wheat, which was also the pre-eminent among the fruits of Ceres (*cerealia*, or *démétrioi karpoi*, of Demeter).

**Case 2: In praise of bread – bread and the social network in the Lebanese countryside**

*Ils ont dit à celui qui a faim: Deux plus deux? Il a dit: Quatre pains (Lebanon)*

“Like other Mediterranean countries, Lebanon is part of a civilization of wheat”, writes Kanafani-Zahar (1995, 2010). Based on field work from 1980-89,
**Table 1** Expressions (proverbs) about wheat bread and their meaning.

<table>
<thead>
<tr>
<th>Expression</th>
<th>Meaning</th>
<th>Origin</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>His bread is baked</td>
<td>He is provided for</td>
<td>Malta</td>
<td>Kliewer (2008)</td>
</tr>
<tr>
<td>One who has bread, never dies</td>
<td>We may feel secure (in general)</td>
<td>Sardinia</td>
<td>Counihan (1984)</td>
</tr>
<tr>
<td>We have bread in the home</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>He does not even have bread</td>
<td>He is destitute</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>A cercare pane migliore di quello di grano</em> - to look for bread better than that of wheat</td>
<td>Refers to the futility of challenging destiny, which is as immutable as the fact that bread is made of wheat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor man’s bread</td>
<td>Have a low salary</td>
<td>Israel</td>
<td>Belhassen (2010)</td>
</tr>
<tr>
<td>Bread</td>
<td>Slang for money in English</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grano</td>
<td>Same as in Italian slang, wheat or Gryn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gryn</td>
<td>Scandinavian: gruel, groats</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eat one’s bread</td>
<td>Have a meal</td>
<td>Turkey</td>
<td></td>
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<tr>
<td>Days of wheat bread; Semmelwoche, Weißbrotwoche</td>
<td>Honeymoon</td>
<td>Scandinavia; Germany</td>
<td>Grøn (1939)</td>
</tr>
<tr>
<td>Sell like warm wheat bread</td>
<td>Be in high demand, a hit</td>
<td>Scandinavia</td>
<td></td>
</tr>
<tr>
<td>Have a bun in the oven; She’s tasted the dough to early (<em>emprunter un pain sur la fournée</em>)</td>
<td>To be pregnant; to be pregnant before she’s married</td>
<td>Egypt; France and elsewhere</td>
<td>Kaplan (2006)</td>
</tr>
<tr>
<td>Etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Le blé est la moëlle de l’homme</em>, Wheat is Man’s marrow</td>
<td>Referring to its core importance for human food security (proverb from Auvergne, central France)</td>
<td>France</td>
<td>Originally from Homer <em>The Odyssey</em>, XX, 107-109</td>
</tr>
<tr>
<td><em>Peuple sans blé, mal assemblé</em>, a people without wheat is poorly united</td>
<td>Prepare a project well if you want to succeed</td>
<td></td>
<td>(Various sources)</td>
</tr>
<tr>
<td>Expression</td>
<td>Meaning</td>
<td>Origin</td>
<td>Reference</td>
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<tr>
<td><em>Champ bien semé rapporte du blé</em>, Well sown field, good wheat yield</td>
<td>16th century proverbs</td>
<td></td>
<td>Quoted from anonymous manuscript <em>Boulangerie de la préhistoire à...</em></td>
</tr>
<tr>
<td><em>Mieux vaut un pain d’orge sans dette qu’en prêt un pain de froment</em></td>
<td>Rather own a bread of barley than loan a bread of wheat</td>
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<tr>
<td><em>Ou pain faut, tout est à vendre</em></td>
<td>Where bread is missing, all is for sale</td>
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<tr>
<td><em>Grande faim ne trouve jamais mauvais pain</em></td>
<td>Great hunger knows never of bad bread</td>
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<tr>
<td><em>Wheat or barley?</em></td>
<td>Success or not? If the situation concerns a new-born baby, it means Boy or girl?</td>
<td>Assyrian diaspora</td>
<td>Abdalla (2000)</td>
</tr>
<tr>
<td><em>Rye bread’s for the enemy, /don’t serve proso bread to your son,/ barley bread is for the donkey/ foxtail bread is for the devil,/the bread of wheat, if first or second, is what God made and it’s my bread</em></td>
<td>Common proverb in Spain outlining the ranking order of breads</td>
<td>Spain</td>
<td>Duhart and Medina (2010)</td>
</tr>
<tr>
<td><em>One started with wheat bread and naturally continued with the more common, but quite wholesome rye when the bread runs out, we shall eat wheaten (...leipä kul loppuu ni syyyvä vähnästä):</em></td>
<td>Metaphors in a speech given by a silver-bridegroom</td>
<td>Origin: Kangasniemi, Finland</td>
<td>From the novel <em>A marriage</em> by the Norwegian writer Jonas Lie (1833-1908) Nirvi and Hakulinen (eds.) (1948) <em>Suomen kansan sananparsikirja. [A book of Finnish proverbs]</em> - Sanakirjasäätiön toimituksia V: 1-464.</td>
</tr>
</tbody>
</table>
she describes how wheat fashioned social life in three villages – one Shia Moslem and two Christian (Druse and Maroni). Despite the different religious frameworks, the social role of wheat – how it was grown and processed into bread – was practically identical. Wheat was cultivated by men, but (except in the cities where all bakers were men), it became the dominion of women after harvest. They brought the grains to the mill, and while waiting there was time for small talk and a cup of tea. Since men could lend helping hands in milling, it was one of the very few areas where men and women interacted in public. A key duty of a wife was to provide each household member one perfect, tasty 40-75 cm wide bannock of leavened *khobz tannour* per meal. It had to be kept fresh, although baking was only once a week. The know-how of breadmaking – from preparing the dough, heating and maintaining the ovens to baking and storing fresh bread – was an exclusively female tradition. Kanafani-Zahar (1995) also gives a rare glimpse of how female purity rules concerning menstruation affected breadmaking, recalling the ancient sexual connotations of baking.

The sanctity of bread was also expressed at the table. As today washing of hands was mandatory, since the bread was broken and served both as a fork and a napkin. It was blessed and respected – dry pieces or crumbs used in soups or salads. The fellowship around breadmaking transcended political or religious differences and persisted during the civil conflict in the 1980s. Of special significance was the willingness to share the sourdough symbolically containing the sacred spirit which is communicated into the dough (Kanafani-Zahar, 1995).

**Case 3: Bread and the social network in rural Sardinia**

The level of bread consumption in ancient Sardinia has been mentioned above. The town studied by Counihan (op.cit.) was typical in this regard. The diversity of breads was astounding and always from wheat. Due to the highly unequal land distribution most households had to rent marginal hilly land where the men would grow wheat for subsistence. After harvest the wife would take over, mill it (in different sifting qualities) and then bake it at home at some 10-14 day intervals. Baking days were communal events, where many other women would join for help and discuss both baking and current issues in the town. They would get some of the bread to take home, as would any visitor or relative. Social relationships were expressed through bread gifts. Although the town had a bakery since 1912, it was considered shameful to buy bread. After World War II this attitude changed, especially when the European Economic Community Common Agricultural Policy was introduced in 1960 and wheat flour became easily available. Cultivation disappeared in just 6-7 years, private baking declined and with it the reciprocal gift giving as a mutual security system. One woman informant added that she enjoyed the
privacy that the more individualized market dependence gave her and did not miss the gossip of baking days. However, the market was a mixed blessing, since it did not establish alternative employment in the towns, which became dependent on public social support systems.

**The European bread map**

Just as the word *corn* generally means the main staple in an area, the word *bread* signifies the most common bread. Climate and soils determined choice of the major grain species and with it the traditionally preferred bread types. On this basis, the Swedish ethnologist Åke Campbell (Campbell, 1950) divided Europe into three major ancient bread cultures:

- a western and Mediterranean culture based on wheat (bread and durum). Other ideal features are oil and wine, circular oven types and plows drawn by horses;
- an eastern culture based on rye also suited for leavened bread, butter and beer, and the ard, drawn by oxen;
- a northern culture based on barley and oats (as food, for beer or horses they were used everywhere), butter and beer, bread mostly unleavened baked on griddles or stone slabs on open hearths;
- to these bread cultures should be added countries or regions where maize bread – often mixed with other grains – has been a staple since its introduction in the sixteenth century.

Seen from a subsistence economy, the map (figure 1) reflects both the biological adaptations of the cereal species, and differences in taste and preference – as virtues of necessity, as habits or as social markers. Last, it is of great interest to see how this changes with the emergence of eventually global grain markets.

In reality, the dividing lines between zones were quite blurred and often mixed. Since most of this Chapter is about wheat, the reasons for wheat preference will be discussed later in this Chapter. This subject is also be considered in Chapter 1 on the importance and evolution of wheat by Bonjean *et al*.

**The West European – Mediterranean wheat bread culture**

Bread wheat was predominant in Atlantic and NW Europe from Portugal to England and Germany, in Central Europe from Hungary and Austria to the Ukraine, and along the Mediterranean from Spain to the Levant. In the west the leavened loaf is typical, while in the east (starting from Greece) bannock-like breads like pita or lavash take over and dominate in Turkey, the Caucasus, Middle East and Central Asia. In the southernmost parts of Spain and Italy durum wheat makes up a substantial share of bread flour. In hilly or alpine areas spelt was the predominant type of wheat, especially in southern Belgium and the
Alps (from the German Schwaben to Switzerland). It also remained in certain mountainous areas of France and Spain (the Asturias).

The traditional dividing line between wheat and rye lands went through western Germany. The borderline between the black rye bread and the white wheat bread used to be a cultural marker between Germany and France and a deep divide in times of hostility and war. Parmentier himself served in the Seven Years War (1756-63) and was captured several times. He used the opportunity to study bread types and developed a deep distaste of rye bread, in particular the cooked *Pumpernickel*. During the French-German War (1870-1871) French prisoners of war had to eat the German military staple Schwarzbrot, but rejected it saying *quel sale pain!* (What dirty bread!) Goethe, crossing the border from Germany into France in 1782, encouraged German soldiers to appreciate the advantages on both sides, as jotted down in this short epigram (Grøn, 1939):

Nein hier ist es keine Noth:
Schwarzen Mädchen, weisses Brot.
Morgen ist ein anderes Städtchen,
Schwarzes Brot und Weissen Mädchen.

Figure 1 ■ Map of the main bread zones in ancient (pre-1900) Europe, mostly based on Chapters in Vol. I and II of the *World Wheat Book* and the *Dictionnaire Universel du Pain* (De Tonnac, 2011). The zones are crude and miss many details such as the ubiquitous role of wheat as a social class marker, or variations in ecogeography within the countries. Oats were widely grown as horsefeed, barley for malt and both for porridge, but this not indicated.
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(Truly there is no want here,/ black [dark] girls and white bread,/ Tomorrow [at home] there is another village/ black bread and white [blonde] girls.)

In England, wheat was the preferred staple. According to the famous agronomist Percival (1948) wheat bread was preferred by all classes whenever available, and up to and during the Roman occupation of the country appears to have been the chief bread corn. Anglo-Saxons introduced rye around 500 AD, and from then rye bread or mixed wheat/ rye was extensively eaten, but depending on the district in England. Harrison (1586, quoted by Percival) wrote that the bread through out the land is made of such “… graine as the soile yeeldeth, never-thelesse the gentilitie commonlie provide themselves sufficientlie of wheat for their owne tables, whilst their household and poore neighbours in some shires are forced to content themselves with rie, or barlie, yea in times of dearth manie bread made either of beans, peason, or otes, or of altogether, and some acorns.”

The qualification in some shires is significant. By 1758 some 62% of inhabitants in England and Wales ate bread from wheat, most others in the rural north and west did not. The better salaries in the cities made people discard rye bread, and in 1616 the London paupers refused barley or rye bread, although there was a scarcity of wheat in the winter of that year (Percival, op. cit.). The superiority of wheat to barley or rye was humorously described by Chaucer in his late fifteenth century Canterbury Tales. He lets the Wife of Bath use the wheat/barley image to distinguish the virgin from the married woman (Chaucer, 1475):

(…) many a saint, since that this world began,
Yet ever liv’d in perfect chastity.
I will not vie* with no virginity.
Let them with bread of pured* wheat be fed,
And let us wives eat our barley bread.
And yet with barley bread, Mark tell us can,
Our Lord Jesus refreshed many a man.
(*contend; *purified)

Later the Wife of Bath returns to wheat imagery, while telling about her fourth husband she laments her advance in age:

The flour is gon, there is no more to tell,
The bran, as I best may, now must I sell.
But yet to be right merry will I fand.*
Now forth to tell you of my fourth husband,
(*try)

The topic of wheat and fertility in mythology is further explored by Benoit Vermander in Chapter 46.
The East European – Russian rye bread culture

In the eastern bread zone rye was dominant, its western and southern borders largely following the limits of safe cultivation of winter wheat and lower fertility of soils. Rye areas were Belgium, most of Germany, Austria, northern Hungary and Ukraine into central Russia. In Germany the border is blurred by traditions in the different lands (states) – from dark pure strongly leavened rye in the north via various degrees of milder tasting Mischbrot (mixed wheat and rye) to some times pure wheat bread in the west and south. Significantly, around 1900 40-45% of the cereal acreage was given to rye (Miedaner, 2008) and only 13% to wheat (Porsche, 2001). The transition line in Scandinavia is characterized by the leavened hard crisp rye bread, knäcke, a term originating in central Sweden where rye survived winters, but baking quality was too irregular for making loaves, and where it otherwise suited in the hard bread households without ovens.

By 200 AD, rye was a bigger crop than barley in the sandy soils of northern Germany and from the migration times, around 500 AD, it had become an important crop from the Ukraine to Finland and Jutland. Surprisingly, it seems a “late comer” in Russia, not recorded in 11th-12th century AD samples studied by Flyaksberger (cited from (Ahokas, 2012). In pre-1800 England 40% of the area outlined as wheat was used for growing rye, but wheat replaced rye more than 100 years before other parts of Europe. Rye (and spelt) also survived in higher altitudes or more marginal soils throughout the wheat lands from France southwards.

It is widely accepted that rye originated from Secale montanum L. in the Caucasus and is a secondary domesticate from “weedy” rye migrating with barley and/or wheat. However, how and where this happened is still obscure. As noted by Vavilov, shattering is less phenotypically expressed in cooler climates such as in the high altitude Caucasus. Rye may also be genetically semi-brittle, as witnessed from Anatolia to Finland. According to Behre, this trait was probably fixed already before migrating out of Caucasus. As a weed semi- or non-brittle rye ears would be selected against during harvesting and remain insignificant. A major change in late Roman excavation sites is the purer rye crop. According to Behre, this was due to cutting or pulling stems at the base, which would quantitatively favour rye over wheat or barley wherever this harvesting technology was practiced in areas where rye had a competitive edge. Hannu Ahokas (2009, 2012) has argued that weediness would be insufficient to fix non-shattering in open pollinated rye. He has advocated fire as a decisive selective agent for a truly non-shattering rye and Finland as a key area. This does not only mean traditional slash-and-burn, but the frequent burning of piles of branches and/or peat soil in the cultivated fields called kytö, a regular practice in ancient Finland. This would destroy not only wild oats, but also the shattered rye. Furthermore, the special Finnish drying prac-
tice would favour sessile seeds (as well as remove ergot). Ahokas ascribes the great export of seed rye from Finland – according to the 16th century historian Olaus Magnus (1916) as far as Portugal – to its high degree of non-shattering and this practice.

Although beyond the scope of this Chapter, in their seminal paper on the crop-cum-language dispersal hypothesis Diamond and Bellwood (2003) do not discuss the Uralic language family, nor rye. Hannu Ahokas has indicated such a connection in the domestication of rye, based on historical, genetic and linguistic evidence.

Once rye was established, in historical times *Korn* always meant rye in Denmark and most of Germany, but spelt in the south Alps from Bavaria to Switzerland. Similarly, *klebs* (*хлеб*) and *leipä* meant rye bread. In vast areas people preferred rye to wheat, as indicated by the Finnish proverb in table 1.

The first basic advantage of rye in the east was its greater winter hardiness compared to winter wheat (Fowler, 2008). As a corollary, Mediterranean climates may not satisfy the vernalization requirements of rye, making it a crop for mountainous areas in Italy, Spain or France. However, if winter hardiness was inadequate in continental Europe, why was spring wheat not the alternative? It could have replaced barley in the common 3-year rotation of fallow–barley –winter cereal – oats. One reason may be that barley was needed for beer. Another may be a lack of alternatives. Percival (1948) mentions that spring wheat was unknown in Great Britain until it came from Siberia in the 16-17th century. In Finland both spring and winter wheat were grown in the 16th century, but both were insignificant compared to rye (Ahokas, *pers. comm.*).

A second advantage of rye was its greater tolerance to poor soils, specifically low pH bog soils and drought-prone sandy soils widespread in northern Germany and Poland. At least four QTLs for Aluminum (low pH) tolerance have been mapped in rye, one of them orthologous to the major *TaALMT1* gene on wheat chromosome 4D. This has been used with great success in breeding acid soil tolerant wheat during the past decades and it also occurs in barley (Fontecha, Silva-Navas *et al.*, 2007). By keeping a healthy root system it also improved the drought tolerance of rye in sandy soils.

A third advantage is the numerous well known resistance genes rye has to diseases like powdery mildew and rusts.

Taken together, these reasons may explain why even in recent German yield trials (2001-2003) rye hybrids exceeded winter wheat in sites with yield levels below 9.2 t/ha and population varieties below 7.5 t/ha (Peer Wilde, KWS-Lochow GMBH, *personal comm.*). With the greater demands on winter hardiness in Norway, hybrid rye out-yielded winter wheat by 20-25% in high as well as low yielding conditions.
The disadvantages of rye were above all a poorer baking quality than wheat. First, the lack of dormancy combined with high amylase activity easily compromised the weak gluten in lodged crops and in wet harvests. Next, rye had a dubious reputation due to its susceptibility to ergot \((Claviceps purpurea)\). This fungus infects the cross pollinating rye when pollen is scarce in the air due to cool and wet weather (still a problem in hybrid rye, but corrected by mixing in a small percentage of open pollinated rye). The infection often makes the grains conspicuously swollen and black or brown and produces an array of alkaloid toxins causing ergotism. This dreaded and often fatal condition, characterized by convulsions, gangrene or hallucinations, was called Holy fire in medieval times. Ergot was already a recognized danger associated with rye during Roman times. The harsh comments about rye quality made by Galenus or Pliny (cited by Jacob (1944/1997)) may reflect this association with ergot. Columella (cited by Jacob) prescribed how to clean the rye before milling, as did Olaus Magnus who praised Swedish women for their skills in cleaning the rye \((purgare sili-ginem)\).

In 1856 Heusinger (cited by Alm and Elvevåg, 2013a) listed 85 ergot epidemics since 945 AD. Hospitals and churches dedicated to St. Anthony (the patron saint against Holy fire) were widespread and witnessed the frequent incidences. It is possible that patients were given ergot-free wheat bread, which may have been (an inadvertent?) part of the treatment. Of course ergot was untraceable once ground to flour, and Alm (2003) has linked numerous 17th-18th century prosecutions of witchcraft in northern Norway to rye flour and in certain cases directly to ergot. The link to rye was (increasingly) proposed from the late 16th century in Europe, but with little apparent impact. Since rye was cheaper flour than wheat, the people most likely to be affected were also the least educated. After a bad rye harvest in 1851 followed by an ergot epidemic, a Norwegian local doctor reported that it happened although ergot grains were well known to the layman (Alm and Elvevåg, 2013b). The higher classes must have favored wheat as a safer and higher quality grain also for their common rye porridge and bread.

The Northern hard bread culture

Another dividing line made the cool and/or wet north and west – from Finland to Ireland – the domain of oats and (mainly six-row) spring barley. Thus \(korn\) meant barley in Sweden and Norway, while in Scotland \(corn\) was oats. The two were often mixed both in the field and in the flour. Much was consumed as porridge or beer.

The bread types were unleavened \(thin bread\) kept dry for long term storage or flat circular \(bannocks\) of variable sizes consumed fresh. Both were baked on flat stones or iron plates over fire, usually the hearth in the house. In northern Sweden and Ireland bannocks were tilted facing the fire and baked by the radia-
Dry thin unleavened bread was usually baked twice a year and stored, or consumed fresh in times or areas of scarcity where supply was inadequate for long term provisions. The Scottish staple oat cakes were often dried and stored as biscuits, while the Irish brown bread (sowen, barley leavened with soda) was consumed fresh.

In historical medieval times, wheat bread was rare and available only to the privileged few. The Norse Poetic Edda poem Rigstula (ca. 1100) describes how the god, Heimdall, visited the world in shape of the man, Rig. Wherever he went, he was well entertained, but the menus differed. In the house of the slave he was served ökkevin hleif, thungan ok thykkvan, thrunginn sádhom – a doughy bannock, heavy and thick, filled with glumes, the coarse flour mixed with water, no yeast and baked on coals enveloped in bark or cabbage leaves. Similar breads found in Mid-Sweden date from about 700 AD, but are known there and the Faroe Islands less than a century ago. At the Earl’s manor, Rig was offered a more delicious meal. The table was laid with a fine linen cloth, and the bread was hleifa tuna, hviti af hveiti – thin and white wheaten loaves, a bannock (lefse) baked on flat stone or an iron pan, but owing its fine texture and white colour to sifted wheat.

In the warm Bronze Age climate emmer, einkorn, spelt and (likely) club wheat were common from Yorkshire to central Finland, but they all had disappeared towards the much colder Early Iron Age (200 BC-200 AD). Relicts of emmer, einkorn and spelt cultivation were found in the Baltic island of Gotland (Sweden) in 1965 (Hjelmqvist, 1966), and club wheat was grown in Sweden up to 1900 (Nilsson-Ehle, 1909). Wheat, probably from winter wheat, was grown only in the more favorable parts of Scandinavia during the Viking era (circa 1000). It was imported from England, as witnessed in the saga of Egill Skallagrímsson. It tells that in the year 875 the Icelander, Torolf Kveidulfsson, loaded his ship with wheat, honey (for mead) and wine, implicitly meaning luxury goods. Vikings would also loot churches and monasteries for the tithes, preferably paid in wheat (Steensberg, 1986). The wheat grains found in the Viking ship buried in 826 in a mound at Oseberg (close to the Oslo fjord) may reflect the royal rank of the woman buried as well as the exclusive status of wheat.

With Christianity introduced after 1000AD the demand for domestic wheat for church use is reflected in records of farms that around 1130 paid their tithes in wheat, no doubt aided by an improved climate. Wheat was later discriminated against by the German Hansa merchants whose grain trade privileges around the Baltic and North Sea strongly favoured rye. However, they also traded English wheat and malt to Bergen (the biggest Nordic city at the time), but at times (around 1300) wheat flour imports were restricted or even forbidden. Although Olaus Magnus (1555, cited by Campbell) described rye as the prevailing bread grain, his rank order was clear: wheat>rye>barley>oats. Wheat bread gradually became a common treat for Christmas and other holidays, then for
weekends in the early 20th century and the daily bread after WWII. The lavishness of weddings is reflected in (common, but anachronistic) expressions like “the days of wheat bread”, meaning honeymoon (an expression also well-known in Holland and Germany, see table 1). This then contrasts “the oat bannock”, meaning the grey day-to-day.

The southern maize bread culture

In warm and ecologically varied areas along the Mediterranean and France, maize – after its introduction in the 16th century – replaced millets. In Portugal, more than half of the bread consumed around 1900 was still called pão de milho, though baked from maize. Maize bread was also common in the Balkans and into Greece. For most Serbs the unleavened pan baked maize bread proja was a staple since the Ottomanian empire. Such mostly unleavened breads (pogaca) are still commonly made from any grain – also whole grain wheat. However, the chernozem soils of Vojvodina (Serbia) and northern Croatia (part of Hungary until 1918) belong to the wheat belt extending into Russia. Leavened white loaves (bijeli kruh) of wheat are a 20th century habit since wheat flour became widely available. In Greece a mixed bread of barley, rye, maize and/or wheat was common in the north, white bread of wheat (psomi or kathario) preferred in the south.

Etymology of wheat in different languages

The English name wheat for Triticum comes from the old German crop name weizzi, which is recorded in at least back to the 8th century AD, as weiz(z)e, weiz, hwēti and wēte. The old-German root of the crop name hwētja' is hwēna, which simply means [the] white. This connection is found in all Germanic languages, such as in the current German Weizen/weiss, the English wheat/white, the Danish hvede/hvid, etc.

It is notable that most other names for wheat do not emphasize whiteness. Such connotations are absent in e.g. the Latin name frumentum or the French blé, both simply meaning the most common grain or the one most preferred by the ruling classes, just as the current grano stems from granum. The Latin frumentum simply meant fruit and granum (grain) meant seed, small kernel. Both are synonymous with wheat, like grano in current Italian.

The Russian name пшеница (psevica) comes from the old Slavic old-slavic псевица and emphasizes the ground flour. It is also found in the Ukrainian пшеница, Bulgarian пшеница, Serbian-Croatian виенци, шецица, Slovenian пшеница, Czech пшеница, Slovakian pšenica and the Polish пшеница. They have all arisen from the word for «millet» (in Russian пшено, The current word for millet is просо (proso), from ръщепъ meaning pounded from ръхати meaning to
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pound, Latin pinsere, pistum (to crush), old-Indian piṣṭām (flour), pistas, pinasti (pounded, to pound), all meaning crushed cereal.

In the wide family of Uralic languages two words for wheat exist (Toivonen, 1958), Hannu Ahokas, personal comm, 2014). In Fenno-Ugric it is vehnä, and vehnäleipä is wheat bread. However, etymologically it traces to vis or visä meaning spelt in Mordvin and Mari languages (the consonant s changed to h about 2-3000 years ago). The word for wheat in Baltic Finnish languages (including Estonian, Livonian, northern Saami and others) is nisu and, accordingly, wheat bread is nisuleipä. The etymology is from nisä, meaning mother’s breast or milk, probably indicating whiteness.

Looking toward the Middle East, the Akkadian name is kibu, deriving from the Semitic root kbd, meaning heavy or the heaviest of the grains (Halloran, 2011). In current Arabic the word for wheat varies. In Egypt the word for bread is eish, which also means life/living. In other Arab countries bread means khubz. In either case it reflects the close historic roots between wheat and bread (see Chapter 46). In Tunisia the Arab word for wheat is gamh, meaning durum (most commonly grown), while bread wheat is farina.

The Sanskrit name of wheat, godhûma, is interpreted by Mahdihassan (1984) as stemming from the Chinese ku t’ou me, meaning the first (i.e. best) of the cereals. (The word sveta (white) is not applied to wheat.) This leads us to the following question:

**Why was wheat considered superior?**

Why has wheat so often – and apparently for ages – been considered the superior grain? We may safely suggest that since bread wheat was higher yielding and more adaptable than einkorn, emmer and durum, this in itself was a cause of historical dominance. Also the hullessness was a big advantage for bread wheat and durum over einkorn, emmer and spelt. Still hullessness does not account for wheat’s success as a crop. Rye has had far less success, and naked oats has been mainly a Chinese crop. In barley naked varieties are less preferred, except in areas where they remain a major food source as in Tibet (producing tsampa with naked 6-row barley flour mixed with yak butter in the tea) and parts of North Africa. Although barley is a major food grain in Ethiopia, most varieties are covered, chiefly because of flexibility between the main end uses – beer or food.

The bread making properties made wheat unique. The elasticity of glutenins and viscosity of gliadins made wheat (leavened or not) better adapted to the prevailing ovens, whether tannur, Egyptian or Roman. The viscoelasticity allowed an almost infinite variety of bread shapes, as witnessed from pretzels to toast and whole grain bread. The cultural heritage extending from bread to pastries and cakes will be reviewed below.
The milder taste compared to rye, the higher glycemic index and higher digestibility due to less fibers (glumes and beta-glucans of barley) also favoured wheat, especially when white and sifted. A faster energy kick was probably easily noticed and appreciated. Of course, consumed as porridge or as unleavened bannocks, phytic acid may be an important anti-nutrient, notoriously noted for causing rachitis in English working class children subsisting on oat meal rich in phytic acid. In a whole grain wheat dough it is released as digestible energy during fermentation, but the higher phytase activity makes rye more efficient in this regard (Møller Nielsen, Damstrup et al., 2007).

The physical and chemical basis of whiteness

The etymology of wheat stresses the relative whiteness of wheat bread (or porridge) compared to the prevailing alternatives rye, barley or oats.

To explain the relative whiteness, we must therefore compare if inherent differences that makes wheat comparably whiter, as a physical property are due to efficient light reflection (dispersion) and/or a chemical property due to less light absorption.

The role of physical whiteness is often overlooked. The whiteness of an attractive crumb comes from the intense dispersion and reflection from innumerable air spaces, just as in a white paper, snow or fluffy rice. In other words the leavening itself gives the loaf a whiter appearance. Using artificial flours – a range of mixtures of gluten and starch granules – illuminated by NIR, Martens (2011) developed a Partial Least Squares Regression model that removed all whiteness (light dispersion) as noise, leaving the starch-gluten ratio due to absorption as the only important parameter.

Such chemical whiteness in the flour then depends on absence of pigments present in the grains, dough or finished product. Oxidation of polyphenols leading to browning may be non-enzymatic (polymerization and Maillard reactions) or enzymatic. The latter is due to poly-phenol oxidase (PPO) activity producing o-quinones that react with other phenolic compounds and amino acids to give discoloration highly unwanted in pasta or noodles, but more or less accepted in bread doughs.

That wheat has less compounds producing colour compared to barley and rye, may explain the ancient reputation as white. However, the literature does not fully agree. According to Baik and Ullrich (2008) barley contains much more polyphenols than other cereals, mostly in the bran, but also in the endosperm. Pericarp colours range more widely than in wheat, from the normal yellowish to black or purple (also in wheat), and the aleurone may also be pigmented. Even in barley products from flour pearled at a 50% extraction rate the grey and darkish colours are major obstacles to its use in food. Likewise, Zilic et al. (2011) found that for most compounds there was a higher antioxidant activity in barley, rye and oats than in wheat. Some phenolic compounds like
ferulic acid were most abundant in rye. Heiniö et al. (2008) found that rye had the highest content of phenolic compounds, and that the bran fraction, containing PPO, caused most of the colour and special taste of rye bread.

Possibly genetic variation within species (and the limited genotypes tested) may explain some of the discrepant results. Wheat has a wide variation in antioxidant activity (Shewry, 2009). It is well known that the proanthocyanidins that give red pericarp colour in wheat lead to haze in weiss beer. White wheat varieties with colourless pericarp are currently used to make white whole grain bread. The old practice of letting the ground flour mature by storage was supposed to improve whiteness, presumably through oxidation of carotenoids. Yellow Pigment (YP) is highest in durum and einkorn, similar in rye and bread wheat, least in barley.

A low PPO activity is otherwise essential in breeding for pasta or noodle quality and functional markers are available (He, 2007). YP is also selected against in bread wheat to be used for noodles (He, Wang et al., 2009), but is a must in durum wheat breeding.

**Whiteness, milling and hardness**

In summary, the biological basis for the greater average whiteness in wheat seems reasonably well understood. Although whiteness may have become less important with the recently growing market for whole grain bread, it has had a strong historical impact. Extraction rates, milling technology and hardness all interact in making flour white.

In spite of their calling it weizzi, the manual (saddle or rotatory) mills used by Germanic peoples prior to 1000 AD, was unable to produce flour with the whiteness that we associate with refined wheat products. It is difficult to make white flour from soft wheat with any stone mill technology. That extraction rates were lower than today – 50-60% was common in 16th-18th century France – must have helped the whiteness. Implicitly the bran fraction may have been much more nutritious than today.

The more sifted the more expensive the air of luxury associated with whiteness. White bread was a marker of social class (affluence) or celebration (religious festivals or family events). Spain provides a good example (Duhart and Medina, 2010). In the 15th century bread was made from wheat, barley, millet or rye, in that ranking order. In Barcelona the elite could relish freshly baked white bread from the finest wheat, but even if brown it was a sign of comfortable economy if enjoyed daily. A still well-known Spanish proverb quoted in Table 1 eloquently displays the ancient social order.

Hard varieties were discouraged by stone millers, since they also wore down the stones much more quickly. Very probably, wheat was wheat and quality secondary to yield, if an issue at all.
The great innovations in milling technologies in the 19th century – the invention of the roller mill and the more efficient sifting by means of the associated Plansichter – surpassed stone milling both in price and whiteness. The rollers also allowed a higher extraction rate of hard wheat than did stone mills, without compromising whiteness (but of course also extracting the nutrient content).

This technology interacted with the liberalization of grain imports to produce a major challenge for European farmers and millers. After 1850 imports of high quality white wheat flour from Hungary (then including the Ukraine) gave French millers and farmers a hard time. A few decades later the imports from North America followed suit. Beside the price, its quality – hardness and high protein – created a fierce competition for European farmers growing mostly soft wheat. Countries reacted differently to this challenge from imports and higher quality demands. Imports effectively killed wheat growing in England except for the sake of straw (Edgar, 1902, p. 48), production in 1901 was less than half of that in 1870. France and Germany, however, protected the homegrown wheat production effectively during the period.

The late 19th and early 20th century breeders in the UK, Germany, France and Scandinavia were struggling to meet millers’ demands for high quality winter wheat varieties from domestic production. To what degree their concern about quality refers to hardness, protein content, sprouting tolerance or a combination, is hard to decipher from older literature, but German wheat ca. 1900 was of a soft variety (Edgar, 1902). Many new high quality European wheat varieties released had parents from the Black Sea area, some of which are known to be hard. In the UK, Biffen’s variety Yeoman - released in 1916 - was from a cross of the (soft?) Browick with an improved bread making potential from Red Fife (Angus, 2001). In France the soft Squarehead was prominent among early pedigrees, but even more so the hard landrace Blé de Noé (Jonard, 1951), introduced from the Ukraine around 1850 (Bonjean et al., 2001). In Sweden, Sven Otto Berg’s hard winter wheat Eroica (1943) resulted from a cross of Squarehead with Hungarian Bankuti (descended from crosses with the Red Fife progeny Marquis).

The overall impact of the hardness gene is hard to assess in this context. The main progenitors of Hard Red Spring – Red Fife – and Hard Red Winter – Turkey – were of course both hard, although with different puroindoline mutations (Morris, Lillemo et al., 2001). For 20 years Turkey met with considerable resistance from traditional stone millers in the lower Midwest, and it did not champion before it survived the tough winters in the years 1894-96 (Quisenberry, 1974). Red Fife faced less trouble once the roller mills came into operation in Minneapolis from 1879. In Europe a survey of hardness mutations is available for Northern Europe (Lillemo and Morris, 2000). Hardness is common in spring wheat, hard winter varieties appear fewer.
The social role of whiteness

Needless to say, the availability of affordable wheat flour and daily wheat bread in the 20th century deeply changed bread habits. However, the reasons why white bread came to dominate differed between the USA and in Europe. In the first it symbolized modernity, science and sometimes race (in South-Africa explicitly so), while in Europe it meant the ascent of the lower classes.

The study *White Bread: A Social History of the Store-Bought Loaf* by Aaron Bobrow-Strain (2013) describes how the white ready sliced bread conquered not only markets, but minds in the US in the first half of the 20th century. By the mid 19th century American bread was 90% home baked. In 1869, in their very influential *The American Woman's Home*, the sisters Catherine and Harriet Beecher-Stove (the latter the author of *Uncle Tom's Cabin*) described bread making as a fine art to be guided by the laws of aesthetics. By the 1920s, however, bread making was guided by the laws of science and 75% was store-bought. In 1928 the invention of slicing completed the triumph of factory-baked bread. Bobrow-Strain shows how this was part of the general bio-politics of the time.

The 1906 Pure Food, Drink and Drug Act effectively addressed (highly justified) concerns about food safety. Although not immediately evident, doubts were also cast on the off- or non-white colour of home baked bread. As stated in 1913, “the unconquerable preference of the human stomach for white bread had been triumphantly vindicated. Not merely white bread, but the whitest of the white” (Bobrow-Strain, 2013). The emerging big business baking industry used this to remove competition from backward and dirty artisan bakers as well as housewives, who were told to put their pride in a whiteness guaranteed by the expertise of science. The hygienic inventions of bagging and slicing came to symbolize a modern loaf unachievable by human hands. The fast and almost universal adoption of bleaching agents made flour even whiter.

However, it also met with resistance from protagonists of whole grain, natural bread. White flour was “a product of greedy industrialists and violated the provisions of the Creator (...) Only undenatured and unrobbed wheat… is a true nerve, blood and bone food”. In this way whiteness not only evoked the image of purity, but also the livid aspect of death. In 1914 bleaching was contested all the way to the US Supreme Court, but defeated. As observed by Bobrow-Strain, this debate is closely similar to today’s arguments over natural organic or non-GM “polluted” foods against industrial food. This also applies to the current local or traditional food debate. Ironically, faced with medical concerns during WWII, since 1942 the US baking industry voluntarily enriched the depleted white loaves with thiamin, niacin, iron, dry milk, riboflavin and folic acid. In a foresighted remark, Percival (1948) criticized the use of so-called grain and flour improvers as “a possible factor in the increase of obscure ailments among civilized communities”.


The quest for whiteness had not only strong class, but also race aspects. Indeed, the Oxford English Dictionary defines the colloquial adjective “white bread” as belonging to, or representative of the (North American) white middle classes. The protagonists for improved hygiene noticed that dirt was more common and harder to correct among the less privileged darker races. They sometimes advocated white bread as the proper nourishment of the white race. This became explicit in South Africa in 1948 when, after years of war scarcity, the slogan “White bread for a White South Africa” brought the Apartheid regime to power. Fifty years earlier symbolically modern white maize had replaced local creole landraces in South and later most of Africa (McCann, 2005).

This differs clearly from Europe, where white bread for centuries had been the sign of aristocracy. In France it was a kind of “Maginot line” to be defended against the masses, especially the little people of the cities who so easily might pick up a dangerous and destabilizing taste for luxury (Kaplan, 2008). The emergence of the roller mill eroded this symbolic privilege. When the baguette was introduced around 1920, as a fast baked bread to remove all-night work for bakers and implicitly redressing social injustices, it became an immense success and symbol for modernity, but remained a luxury item and was forbidden during WWII. Since it became the symbol of prosperity for all until – white, cheap and tasteless – it was hit by the return of “good bread” (Kaplan, 2006). Around 1990 the Paul chain resurrected the oldish cv. Camp Rémy for its strong colour, later bred into the very successful cv. Apache in the late 1990s (Bonjean, Doussinault et al., 2001). Yellow colour is now preferred by artisan bakeries in France baking tasty and authentic low-tech baguettes and country bread with a not incidental upper middle-class flair.

Wheat as a Western lifestyle marker is now rapidly changing consumer habits and markets in Asia (Chapter 1). Fortunately, the imperialism of wheat also adopts the whole grain trends. One may hope that the exaggerated dominance of white bread becomes just an episode in food history.

**Bread, cakes and shapes**

The border between bread and cake was never sharp. In the Scandinavian hard bread area any leavened bread was a treat and called cake. Sweet bread has followed cereal cultivation as faithfully as alcoholic drinks. The Egyptians sweetened their bread with dates or honey, and Roman bakers could specialize as *pistores dulciari*, bakers of treats. The use of brewers’ yeast, malt extract, honey, dates or raisins in a dough of sifted rye or wheat immediately transformed the common bread. Add whiteness and sugar and we are in the realm of the patisserie, which is based on the finest white flour from wheat. Despite the amazing diversity of colours, textures and tastes of rice cakes, or of sweet *tamales* (maize dough steam baked in husks), the superior ability of wheat to
leaven by bakers’ yeast or soda, the starch quality range from hard to soft or waxy and the gluten has allowed an enormous diversity of shapes and textures of wheat cakes.

The ethnologist Christine Armengaud (2001) has traced many of the shapes and their significance in the Mediterranean region. Since ancient times the new agricultural cosmology demanded new symbols wrought in clay, metal, wood – or dough. Bread molds from Mesopotamia dated 2000 BC display suns, stags, fish, men and women. Like the familiar Neolithic clay figurines, they were votive offerings invested with magical properties to promote health, hunting luck or fertility. The baked versions destined to be eaten were very widespread and diverse around the Mediterranean. Certain shapes are rather obvious. The rising of a dough may have inspired its imitation in baked phalli that were buried in the furrow or presented to the bride-to-be for breakfast on the morning of her wedding. Figures of the female genitalia were often connected to February 2nd, a Spring sowing festival now usually called Candlemas. A certain Bulgarian cake represented a child suffering from chicken pox and was offered for her healing. The largely Iberian Bread of the Dead is well known, linking the dead and living through the bread. Outside Mexico they have lost much of their significance.

Many familiar Christmas cookies have shapes of Christian (angels, stars) or Norse/Germanic (pigs, bucks) origins. Other cakes have specific legends or are attributed to saints. Although the croissant (crescent) has been attributed to the victory over the Ottoman army during the siege of Vienna in 1683, it is much older. Such pane lunense were made during Roman times. Also pretzels were baked by Romans.

The changing image of wheat

The increasing commonness of wheat bread has imperceptibly changed its image. This may be followed through the history of art, and an excellent place to do so is in the Museum for Bread Culture in Ulm (Germany) or the book entitled Art and Bread (Seifert, 2005), showing one hundred art works from the Museum. From classical times depictions of bread and wheat ears were always religious, symbols of life born and reborn, sustained and protected by divine providence, be it from Osiris, Demeter, Ceres or Christ. In the late Medieval painting “Mary in dress with wheat ears” the fertility of Mary is associated with her child as the grain of wheat. She herself is draped in a deep-blue robe strewn with wheat ears. In the Renaissance symbols become more of this world, although they retain a clear religious or moral message to the observer. In the highly detailed Summer, painted by Jan Brueghel Jr. between 1620-35, the bountiful wheat harvest involves reapers working and drinking. Into this serene rural scene the image of the Reaper communicates the brevity of all life. In a
monumental canvas the Flemish painter Franz Francken Jr. (1605) displays the rich man and the destitute Lazarus, who merely wished to eat the crumbs that fell on the rich man’s floor (Luke 16:19-31). However, on the lavish table the wheat bread almost disappears among steaks and pastries, and the poodle sitting under the table is more likely to relish other things than crumbs. In Sebastian Stoskopf’s Still life with woven bottle, goblet and bread (1630-1635), the solemn display of bread and wine in a common table setting carries an uncommented message.

In the late 19th century wheat harvests or newly baked bread are typically scenes of bounty and thanksgiving. The military bakery (Pain de munition) by Eugene Chaperon (1888) shows baking as a masculine physical activity. Huge loaves lie piled on the floor to cool and release fragrance. Julien Dupré’s Boy with wheat bundles (1880) has collected two bundles tall as his body. Possibly they are left over spikes in a harvested field – a privilege of the poor, perhaps the reason for his rather sad eyes.

Another painter fascinated with wheat was Vincent van Gogh (1853-1890), who in his last years painted wheat fields from sowing to harvest, creating iconic images of the crop as well as the people working with it. In 1889 he wrote of the way in which wheat was symbolic to him: “What can a person do when he thinks of all the things he cannot understand, but look at the fields of wheat... We, who live by bread, are we not ourselves very much like wheat... to be reaped when we are ripe”.

An aspect of scarcity is very marked in bread paintings from the early 20th century. The couple in Pablo Picasso’s A frugal meal are lean in body and unenergetic, the two dry pieces of bread and cheese lying casually beside an empty plate. The effect is chastening and followed by many artists in this period, reflecting and protesting against wars and scarcity. Even the bountiful wheat harvest evoked in Arthur Segal’s Bread for all! (1931) conveys this message of protest.

In the post WWII period the image of bread changes – often symbolized by the baguette. In Jean Helion’s Table set with breads (1952) baguettes are carelessly spread on a table, some have fallen on the floor. The crusts have deep scars, and the baguettes stick outside the table. The absence of chairs, cutlery or plates does not associate this table with a meal. This careless desecration is also present in the Blue Bread by Man Ray (1960): a completely accurate full-size baguette cast in acryl and painted blue lifts it out of the realm of material food. This ambiguity is also present in Retrospective female bust – woman with bread (1977) by Salvador Dalí. A female figure (a hairless hairdresser’s bust) balances two baguettes on her head, and on the top of them a gilded copy of Millet’s Angelus, the farm couple interrupting their harvesting to join the church bells in prayer. For a necklace two maize cobs are tied by their sheaths, almost touching each of her strutting breasts. On her forehead ants are crawling towards a certain uncanny beetle at a wound-like spot. Still she is unaffected and aloof like an
antique fertility goddess in marble. The Ear, *dithyrambic* (1972) by German painter Marcus Lügertz also has classic connotations. Dithyramb is a poem praising Dionysos, and the green and golden almost 1.5 m long wheat ear lifted up on a clayish background bears no trace of irony. In his *What if?* the painter Bernd Finkeldei (1992) hints a new note of scarcity: an empty supermarket cart apparently not touching ground and possibly heading for darkness.

Another approach is conceptual landscape art. One of its pioneers, Agnes Denes, planted a two-acre installation *Wheatfield* on a landfill in central Manhattan in 1983. For an entire growth season wheat silently accompanied the Twin Towers, the Statue of Liberty and financial hustles. The installation may be seen at [http://en.wikipedia.org/wiki/Agnes_Denes](http://en.wikipedia.org/wiki/Agnes_Denes).

**Wheat – Heritage for the future**

Wheat as a food crop will increase, not decline in importance, despite some current debates about wheat, health and lifestyle. The cultural heritage touched in this Chapter is deeply embedded and holds a symbolic power which may become a potential force if activated. We may look at a few widely different cases.

In Mexico the slogan *Sin maíz no hay país!* (No maize, no nation!) – triggered huge demonstrations in 2006. In 2008 and in 2011 the Egyptian people demanded *Bread, Freedom, Dignity!* As mentioned the (Egyptian) Arab word for bread, *eish*, also means life. The eruption of the Arab spring was not sudden, but dates back to the Bread Riots in Egypt in 1977, a pivotal moment in Egyptian politics. Advised by the International Monetary Fund, president Sadat abolished the subsidized bread enjoyed by half of the Egyptian people – and was faced with uncontrollable popular resentment. This not only deterred any subsequent attempts, but turned wheat bread into a key promise in all later elections. In 2011 the Morsi regime, squeezed between the need for huge imports and dwindling foreign currency assets, kept the scarce wheat supplies a deeply guarded secret. The daily tensions around subsidized bakeries have involved far more people than those in the Tahrir Square. Like in the European past, bakers are blamed and victimized and need police protection. Moreover, Egypt mainly imported wheat from Russia, which did not want to support the Moslem Brotherhood. After they were overthrown, Russia offered subsidized wheat to come on good terms with the Sunni Moslem countries. In this way wheat not only symbolizes, but represents the current material foundation of the country.

In the social instability of current Ukraine wheat is a powerful national symbol. The flag – the lower half yellow, the upper half sky blue – symbolizes the innumerable wheat fields easily searched on internet.
Make/break bread, not war! In contrast we may consider the international Bread Houses Network (BHN) movement, initiated by a young Bulgarian woman, Dr. Nadezhda Savova-Grigorova, trained as cultural anthropologist at Princeton University (see http://www.breadhousesnetwork.org). She founded the first Bread House community cultural center in Bulgaria in 2009, and by 2014 they have spread to more than 15 countries on 5 continents. Initially it is a movement of young people within the Orthodox Church, concerned with reviving the rich bread traditions related to the Liturgy. They baked the prosphora bread used in the Eucharist and the special breads for the Orthodox feasts, as well as told the stories related to bread in the lives of saints. Dr. Savova discovered that this not only revived old sacramental bread baking, but created a social network transcending religious, ethnic or minority divisions. The events involved not only culinary discussions but also various other topics, poetry, and other arts. With psychologists and social workers Dr. Savova further tested the method with people with various mental and physical special needs, and bread therapy proved to be a new and very successful form of art therapy. The method demands modest resources: simply a table, an oven, some flour and some social space (school, kindergarten, community center, church, even hospitals).

In the USA, Princeton University students built a Mobile Bread House out of fully recycled materials on a trailer, housing 10 people and a wood-fired oven. In Bulgaria, one of the most recent BHN projects is to rebuild mobile army cooking stoves into mobile wood-fired bakeries taken to refugee camps and underprivileged neighborhoods like Roma ghettos. Baking bread together evokes discussions beyond bread; the stages of breadmaking as metaphors of different stages of life, social relations and social justice. Such reunions become platforms for local initiatives that improve the wellbeing of the area. The events are also a school in practical ecology. They involve discussions on where flour comes from, its quality, if the bread you make is healthy, tasty and is it socially just? Such networks, says Nadezhda, are not high tech, but high touch – they create social bonds supplementing the ubiquitous, but fleeting virtual links and truly re-build neighborhoods.

Concluding remarks

The three volumes of the World Wheat Book have shown the pivotal role of wheat in world history. The close to a sevenfold increase in global production since 1900 was made possible on slightly more than twice as much land. Despite the recent awakening around food security, the historical significance of the exceptional 20th century has escaped many.

Previously, shortage was the norm and more wheat an unquestionable good. Similarly, the plough was a symbol of progress and civilization. Today many in Western societies associate wheat bread with coeliac disease or having “wheat
belly”, and the high yielding varieties of the Green Revolution with unsustainability. The plough is associated with loss of top soil or rainforest biodiversity. No wonder stamps with Ceres or golden fields of wheat have become fewer.

It was necessary for agriculture to reflect on and reduce its environmental impact. With major exceptions like the US Dust Bowl, environmental footprints of wheat were few before 1950.

Still there is no way back to less intensive production or lower yields or output. The current trend is to achieve more through a greater diversity in genes, varieties, environmentally tuned management and products. This also includes a revitalized interest in history. Older heritage varieties are advanced and people made aware that wheat is more than some substance in their bread. A few heritage aspects are now used by local farmers, bakeries, milling industry and food enthusiasts. Flour or bread bags now often (try to) tell stories, but they might tell much more. Indeed, as shown in this Chapter (and this book), the heritage of wheat is much broader. It may be just as interesting for the consumer to know that their usual loaf has a 20% contribution from Kazakhstan, and why wheat is the most widely grown crop on Earth. Such stories of wheat and products other than white bread may restore its image.

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