

# DAILY BREAD

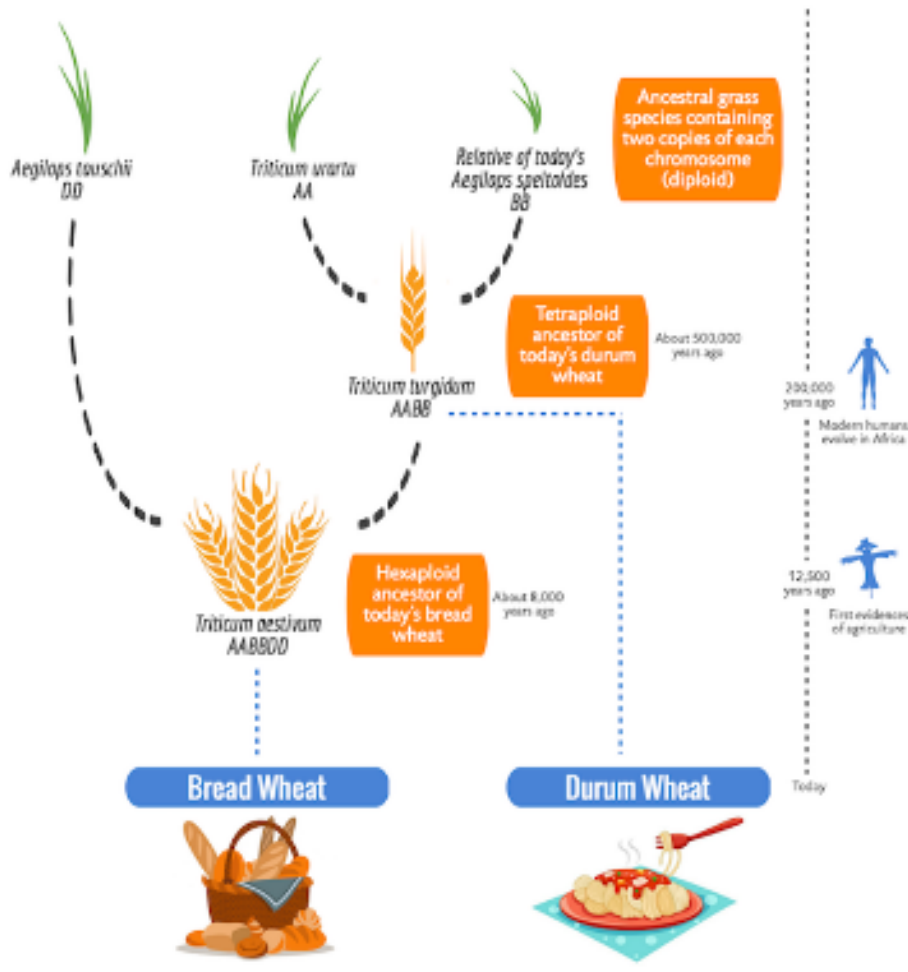
“Grain of Hope : Slice of Heaven”

## Diversity and Continuity



### The Origin of Wheat

Today's bread wheat originates from three ancestral grass species and results from two consecutive hybridizations



www.wheatgenome.org

### Diversity and Continuity

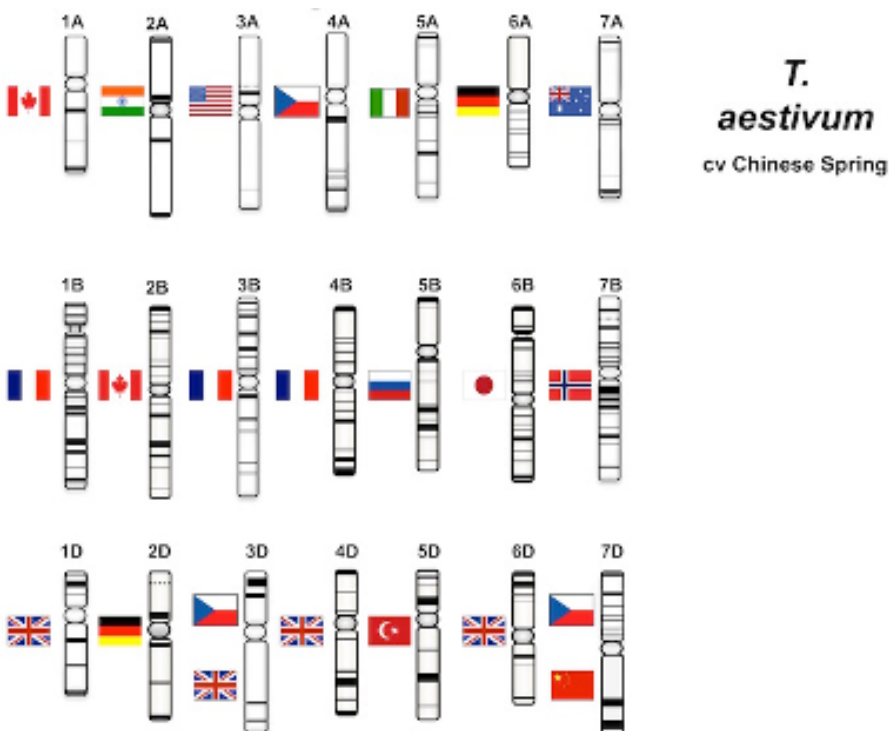
...are two sides of the same coin, reflecting other mysterious and holistic pairings like transcendence and immanence, competition and cooperation.

Wheat is one of the most diverse organisms on the planet with at least 25 000 extant varieties. Diversity confers resilience – there is a variety of wheat to suit most environments: hard and soft wheats, red and white wheats, spring and winter wheats. Within these broad categories, breeding for straw length; grain quality; disease and insect resistance; tolerance of heat, moisture, or salinity; timing of maturity; and myriad other physiological characteristics is unrelenting. Feeding earth's human billions relies on it.

Wheat has a colossal amount of DNA packed into a very complicated genome – six times as much as we humans. The DNA is collated into 21 pairs of chromosomes. Weirdly, this set of 21 pairs is made up of three sets of seven pairs from three different ancient parents. The diagram shows how this happened. What we know as *Triticum aestivum* is actually three species intimately combined to create a hexaploid organism. Interdependence manifests in many ways in the natural world, but this is surely one of the deepest: the abandonment of species-hood by three different plants in the name of an unpredictable, emergent new reality.

On top of that, the hexaploid genome is highly dynamic – genes and gene families have been lost, gained, fragmented, and swapped around between chromosomes over many millennia. Perhaps 80% of the genome is made up of repeat sequences, of unknown purpose. Perhaps only 2% consists of actual genes, coding for characteristics. Even so, this represents up to 330 000 genes - compare this with the human complement of 20 000 or so. Quantity does not necessarily equate with complexity – or we have a skewed understanding of the nature of complexity. Sequencing the wheat genome was a multinational effort, completed in 2018 – fifteen years after the human genome project concluded.

Continuity, perhaps paradoxically, grows out of this maelstrom of interchange and variety. Season after season, the genetic churn that produces each unique seed leads to a new plant which is in turn uniquely shaped by the habits of its home-place.



Today most farmers grow one subspecies of bread wheat - *Triticum aestivum*; sequencing the wheat genome was an international effort, with different chromosomes assigned to different countries.

“without Contraries is no progression”

William Blake



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