Foundations of World Civilization: Notes 9

The importance and origins of food production

- Diamond is absolutely right to place a great emphasis on food production
  - one reason we are using his book is because it highlights farming and animal domestication as foundations of world civilization
  - as any archaeologist or historian would agree they were
- First, some important terms:
  - **subsistence** (or **subsistence strategy**)
    - "how people get their groceries"
    - the methods used to get food and other necessities
  - **foraging** = **hunting and gathering**: subsisting on wild plant and animal foods without intentionally interfering with plant or animal reproduction and growth
    - the kind of subsistence strategy and society that we lookes at last time
  - **Agriculture** = **farming**
    - interfering with a plant's reproduction and growth in order to increase its yield
    - preparing the soil, planting, irrigating, weeding, fertilizing, etc.
  - **Fallow**
    - a resting period for the land between periods of being farmed
    - may be many years (long fallow), down to little or no time (short or no fallow)
  - **Intensification**
    - putting more labor into a plot of land to get more product out
    - farming is always more intensive than foraging
    - farming can range from low intensity to high intensity
    - can be intensified by weeding, irrigating, fertilizing, fencing, etc.
    - can be intensified by shortening or eliminating fallow periods
    - farming with these methods is often called "intensive agriculture"
  - the opposite is **extensive** agriculture
    - using more land, less intensively
    - less labor input per acre, longer fallows, etc.
  - **Pastoralism** = **herding**
    - keeping domesticated animals
  - **Agropastoralism**
    - agriculture plus pastoralism
    - societies vary widely in how they mix these
    - Diamond does not use this term
  - **Food production**
    - Diamond's general term that includes agriculture, pastoralism, or agropastoralism
    - in contrast to foraging
    - Diamond sometimes uses "farming" to mean "food production" or "agropastoralism"
- Why is food production so important? (Diamond's chapter 5)
  - in case after case, farmers win out and dominate foragers

    - usually driving them off their land
    - or leading them to adopt food production themselves
  - Diamond argues that societies that started farming earlier had longer to develop social and technological advantages that would help them dominate others
  - farming seems to be necessary for complex society to appear and develop
    - all known complex societies have been based on either food production, or exchange with other societies that were food producers
    - no complex societies have been based on foraging
    - no socially and economically complex societies developed before food production was well established
  - why?

- Farming produces more food per acre than does foraging
  - farming supports 10 to 100 times as many people per acre as does foraging
  - that means farmers are simply more numerous
    - more settlers to encroach on foragers' land
    - more soldiers to take the land
  - reasons:
    - farming causes land to be covered densely by mostly edible plants, compared to the low density of edible plants in the wild
    - domesticated animals further increase the number of people supported
      - they eat plants that we can't, and in return, provide
      - meat
      - milk
      - blood (Diamond does not mention this, but it is an important, common food in some pastoralist societies)
      - fertilize fields with manure, increasing plant yields
      - pull plows, increasing yields and making farming possible on additional kinds of land, such as heavy clay soils

- Is farming a good deal, compared to foraging?
  - the surprising, empirical answer is, in most cases: no!
  - In fact, agriculture usually requires more labor per unit of food produced than does foraging
    - That is, a farming family has to work more hours per year to provide its own food than a foraging family does

- The tradeoff of agriculture is clear if we consider the difference between the yield of food *per acre* and the yield of food *per hour worked*
  - agriculture produces more food per acre
  - but agriculture produces *less* food per hour worked
    - it takes more work to plant and tend a plant than to just find it and harvest it
  - In a given area, agriculture can produce more food than foraging can, so agriculture can feed more people
    - But each one has to work harder than before to survive

- Foraging is a good deal if there is a lot of land per person, that is, a very low density of people

  - But if there are too many people for the available land, foraging just can't provide enough food
  - so if population gets too high, or the land's natural productivity becomes too low, farming or herding become the only alternatives to hunger

- You often hear the idea that when people switched from foraging to farming, they escaped the pressures of a precarious existence and suddenly had the time to develop "civilized" practices like art, literature, science, and technology
  - but in fact it was the reverse
  - farmers have *less* free time than foragers
  - so we need some more sophisticated explanation for the development of civilization
  - instead of looking at the total or average amount of "free time", maybe we should think about how the free time is distributed in the society
    - *who* has to spend more time on subsistence tasks
    - and who gets to spend less time on subsistence tasks

- **Sedentism**: living permanently in one place
  - in very good environments, foragers can settle (be sedentary)
    - being a sedentary forager requires either
      - year-round food availability, or
      - food that can be collected seasonally in great quantity and stored for consumption during the rest of the year
    - foragers who can do this are usually highly specialized
      - on the particular foods and preparation and storage technologies required
  - in poorer environments
    - Agriculture *allows* people to become sedentary
      - they can produce enough food for the whole year in one place
    - Agriculture *encourages* people to become sedentary
      - they have to work on their fields throughout the year
      - they have to store a few big harvests - hard to move
      - stored food and fields may need to be defended

- Both agriculture and sedentism encourage population growth
  - Both increase fertility for biological reasons
    - women don't go through seasonal periods of low fertility due to extremely low body fat
    - mothers need not constantly carry infants, so they may wean sooner - increasing their fertility
    - mothers need not constantly carry infants, so they can have more than one at a time
      - can quit abstinence, contraception, abortion, infanticide...
    - birth interval for foragers is typically around 4 years
      - for farmers, around 2 years
      - so population grows
  - For economic reasons, too
    - Farmers want large families to help with the work

- An effect of population growth

  - Foragers may outgrow the area's carrying capacity
    - they may have to take up farming
  - farming leads to population growth
    - so farmers may have to intensify farming, producing still more per acre
  - Eventually, they are locked in
    - There are more people than the land can support by foraging
    - Returning to foraging would mean hunger
    - seriously adopting agriculture may tend to be irreversible
- Agriculture and sedentism also affect health
  - Less varied diet - poorer nutrition
  - More carbohydrates - dental caries, etc.
  - More labor - more arthritis, etc.
  - Sedentism - sanitation problems
  - Larger groups - epidemic diseases
  - Net effect - more stress
    - often poorer health
    - often reduced lifespan
    - but increased fertility outweighs decreased lifespan - population grows
- More importantly for Diamond's argument, agriculture and sedentism have profound effects on culture and society
  - Sedentism allows accumulation of goods
    - thus development of economic differences
    - accumulation may be over generations - classes, aristocracies
  - Agriculture and sedentism permit production and storage of **surplus**: goods beyond the producer's subsistence needs
    - surplus can support people who don't produce all their own food: craft specialists, ritual experts, etc.
    - surplus opens the way to many complex arrangements
  - Agriculture permits living in larger groups
    - kinship becomes inadequate
    - new systems must be added: rank, caste, class...
  - Larger groups - more conflicts - need for conflict resolution mechanisms
    - laws, courts, police, etc.
  - Settled people are easier to control
    - have land, houses, crops to defend - can't run off
    - raids and warfare become possible
    - more easily threatened or coerced by leaders
    - surplus can support specialists to do this coercion (thugs, police, army, IRS…)
  - So sedentism and surplus make power hierarchies possible
- So Diamond argues that food production, with the sedentism it facilitates, has a big impact on a society's ability to dominate others

- which is the peculiar lens through which he looks at all of history: his Grand Narrative of European domination of the rest of the world
- Why food production and sedentism help in the domination game:
- Food production feeds more people: greater power in warfare and occupation
- Surplus supports specialists:
  - long-term soldiers and military leaders
    - not just farmers taking time off from food production
  - political leaders
    - organize large efforts like wars, colonization, etc.
  - craft producers
    - make weapons, ships, etc.
    - develop better technology that eventually gives a big advantage
  - priests
    - maintain an ideology supporting collaboration and domination
  - scribes
    - allow accumulation of knowledge, communication
- Provides materials
  - fibers for ropes, bone for tools, leather, etc.
- Provides animals for transportation and warfare
  - especially horses
- Leads to development of communicable diseases
  - because "herd" diseases originally evolved among herd animals
    - jumped to humans when humans domesticated animals and starting living in close proximity to them
    - and when humans started living in groups large and dense enough to support "herd" diseases
  - the food producers have longest to evolve immunity
    - and the disease organisms become more virulent in response
  - leaving other people vulnerable when they first encounter the highly developed disease

- So: food production led to many of the advantages that Pizarro enjoyed over Atahuallpa
  - (but… didn't the Inkas farm, too?)
  - yes, Diamond implies, but with fewer, poorer crops and animals
  - is that convincing?

- Archaeological evidence shows that people adopted agriculture independently in many different places and times, with different crops (Diamond chapter 5)
  - (these are current estimates; a lot of research is going on to better define these cases)
  - Some of the details here don't agree with Diamond
    - in some cases, I think my information is better
    - in others, we probably just consulted different sources
  - 10,000 - 8,500 BC: the Levant (Jordan valley of Palestine and Israel, nearby areas; the western part of the Fertile Crescent)
    - wheat, barley, rye, lentils, peas, etc.

- 8,500 - 7,700 BC: crops domesticated mostly in the Levant spread throughout the rest of southwest Asia (Anatolia, Egypt, the rest of the Fertile Crescent, reaching east across Iran towards India)
  - animals began to be domesticated too, adding to the food production system
    - sheep, goats, pigs, cattle
- 10,000? - 6,500 BC: southern China, southeast Asia
  - yams maybe earliest; rice
  - water buffalo, pigs
- 6,500 - 5,000 BC: north-central China
  - millet (a grain), etc.
  - pigs
- 9,000 - 3,000 BC: Andean South America (especially Peru, some of Ecuador)
  - beans, peppers, squash, quinoa (a grain-like plant that produces lots of tiny edible seeds), potatoes, gourds, cotton
  - guinea pigs (for food), llamas / alpacas
  - many apparently fairly independent processes of domestication of different plants at different times in different places in a highly variable, patchy environment
    - Diamond takes this as evidence that crops (and other ideas) spread slowly in the New World
  - generally an even more gradual shift to agriculture than elsewhere, with long periods of mixed foraging and agricultural adaptations
  - but notice: agriculture started in South America almost as early as in the Fertile Crescent, yet thousands of years later, the Eurasians easily trounced the Inka
    - so just starting early cannot be the only reason for Eurasian dominance
    - Diamond will have to argue that the particular crops and animals, features of geography, limited movement of goods and ideas, and so on made the difference
- 7,000 - 4,000 BC: Papua New Guinea
  - tubers such as yams or taro
  - this is the region that Yali came from, supposedly so disadvantaged compared to Europe
  - yet New Guineans probably started farming as early as Europeans, if not earlier!
    - they had a large, dense population of farmers when the Europeans arrived
  - apparently, just being farmers for a long time was not enough to give them significant advantages
    - Diamond suggests that their crops were low in protein, and they lacked domesticable animals to make up for that
    - plus, they lacked some of the other advantages he discusses later…
    - but early adoption of agriculture in Eurasia is clearly not enough to explain Europe's domination over New Guinea
- 5,000 - 3000 BC: Mexico
  - maize (corn), beans, squash, peppers, gourds
    - not quite as early as Eurasia and New Guinea
    - but the "triumvirate" of corn, beans, and squash has plenty of protein and generally all the necessary nutrients for a balanced diet
    - at least as good a diet as the crops of the Fertile Crescent

    - so Diamond can't say that Central Americans were at a disadvantage because their crops were poor, as he does with the New Guineans
  - turkeys, dogs
    - aha- people in the New World lacked the large domesticated animals so useful for plowing (increasing agricultural productivity), warfare, transportation, etc.
- after 2000 BC: Sub-Saharan Africa
  - rice, sorghum (a grain), millet (another grain)
- by 1000 BC: Midwest North America
  - marsh elder (small, oily, edible seeds), sunflower, goosefoot (close relative of quinoa)
  - once thought that beans and squash were adopted later from Central America, but now looks like they may have been independently domesticated in North America, too
  - corn was adopted from Mexico much later, maybe when a variety that was more tolerant of North American conditions had evolved

- The processes leading to farming were probably different in different cases
  - The transition was often a gradual shift in emphasis from foraging, to foraging with a little tending of plants, to an ever greater dependence on farmed food
    - making it hard to pick a specific date when farming "started" or became important
  - Depending on where you draw the lines, most of the world's major independent agricultural traditions began between about 10,000 BC and 3,000 BC
    - Humans existed for well over one hundred thousand years, then in a span of "just" a few thousand years, many different populations independently developed agriculture at roughly the same time

- What was special about this time that many different cultures began farming then?
  - *Homo sapiens* evolved mostly during the Pleistocene (ice ages)
    - during that climate regime, farming was probably impossible
  - For several thousand years leading up to about 10,000 BP (about 8000 BC), the Pleistocene tapered off and the climate warmed, ice retreated, sea level rose, wild plant and animal communities changed...
  - within a few thousand years of the shift to the modern (Holocene) climate, humans were farming in many places around the world
    - in the broad view, these independent inventions of agriculture all happened in the same post-Pleistocene time frame, reflecting the same general processes
      - they presumably had something to do with the climate and ecological changes
      - and possibly with the gradually rising populations of humans around the world
    - at a more detailed level, thousands of years separated the adoption of agriculture in different regions
      - and each case happened in ways specific to the environment and cultures of the area

- Now Diamond asks:
  - why in the Fertile Crescent before other places?
  - What gave Eurasians in general a head start?