

**Animals, axes, and germs**

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- Diamond Ch 9: The Anna Karenina Principle and the domestication of animals
  - A cute phrase to help you remember a useful fact
    - about animal domestication
    - the principle:
      - “Happy families are all alike; every unhappy family is unhappy in its own way.”
      - There is only one way for everything to go right; but many different things that might go wrong
    - point: there are many requirements for a wild animal to be domesticable
      - and only a few meet every one of them
      - which is why having several good domesticable large animals was such a big advantage for Eurasians
        - they are unusual, and other regions lacked them
  - Only 14 large domesticated animals of importance today or in the past
    - The “major five”
      - cattle: domesticated aurochs
      - sheep
      - goat
      - pig
      - horse
      - All Eurasian
      - in fact, all but horses were domesticated in the Fertile Crescent
        - horses probably domesticated to the northeast, in central Asia
        - but quickly adopted in Southwest Asia
      - all spread into Europe more or less together with agriculture as a package
    - The “minor nine”
      - Arabian one-humped camel: Arabia
      - Bactrian two-humped camel: Central Asia
      - Donkey: North Africa, maybe Southwest Asia
      - Reindeer: northern Eurasia
      - Yak: Himalayas
      - Mithan (relative of aurochs): India and Burma
      - Balinese cattle (relative of aurochs): Southeast Asia
      - Water buffalo: Southeast Asia
      - Andean camelids (llamas, alpacas): Andes
      - All but one (Andean camelids) Eurasian
        - none from sub-Saharan Africa, Australia, North or Central America
        - no others from South America
  - As with plants, domestication of animals involves evolution of new varieties
    - due to human involvement with reproduction
      - probably initially unintentionally, later intentionally selecting for desired characteristics

- aurochs, pigs, sheep got smaller
- sheep and alpacas got woolier
- cattle give more milk
- some developed smaller brains
- To be domesticable, a wild animal must have all of the following characteristics
  - herbivore or omnivore
    - carnivores need more food, since they eat herbivores
  - grow quickly
  - breed in captivity
  - can't be too dangerous to people
  - respond to threats by standing, not running
  - live in herds
    - have dominance hierarchy that humans can co-opt
    - tolerate living in dense groups, even in mating season
  - point: this is a lot of requirements
    - only a handful of large wild animals meet them all
- These few large domesticable wild animals were unequally distributed among the continents
  - Of the “major five” and the “minor nine”
    - 12 of the 13 are Eurasian
    - 7 of the 13 are from Southwest Asia
  - Why? Eurasia
    - has the largest land mass
    - is highly diverse (hmm)
    - did not suffer post-Pleistocene megafauna extinctions
    - but also, a higher percentage of large land animals were domesticable in Eurasia
      - Diamond notes this, but gives no explanation
- Point: Eurasians in general had a big advantage over others in having numerous domesticable wild animals available to them
  - especially people living in the Fertile Crescent
  - and the people who were geographically well positioned to adopt the package of plants and animals that were domesticated there: the Europeans
- Diffusion
  - The domestication of a plant or animal is only the start
  - Diffusion: the spread of an idea, practice, crop, etc. across populated space
  - Diffusion can be caused by population movement
    - the population of the food producers may grow
    - allowing them to spread and displace the surrounding foragers
    - spreading food production with them as they expand
      - scholars used to attribute most diffusion to this kind of spread of people
      - now this form of diffusion is thought to be less common
  - Diffusion may also be caused by people adopting ideas from their neighbors
    - people may adopt crops or animals from neighbors who have already domesticated them
    - adopters may have been starting to farm for their own reasons

- may find the already-domesticated variety more attractive to cultivate than their local wild varieties
- adopters may have been foragers
  - because foraging was preferable to farming the available wild varieties
  - but availability of the better, domesticated varieties tipped the balance in favor of farming
- this form of is now thought to be much more common
- One of Diamond's central claims: much of the advantage of the Eurasians is due to the shape of their land mass
  - because it promoted rapid diffusion of agriculture (and other ideas) compared to slower rates of diffusion on other continents
  - the key geographic advantages of Eurasia:
    - generally oriented east-west, vs. north-south for other continents
    - by far the largest single continent
    - with the most varied environments
      - (hmm... is that really true? maybe...)
    - and with no barriers that cut it into severely isolated sections
      - (again, this depends on how you look at it)
- Diamond suggests that agriculture spread more rapidly E-W than N-S
  - due to similarity in day lengths, seasons, climate
  - helps the entire suite to spread
    - rather than limiting the spread to just the hardier crops
    - the ability of the whole suite to spread together makes food production more attractive relative to foraging
    - and hence more rapidly adopted
    - than in the case of, say, the slow spread of maize from Central to North America
      - due to the N-S axis of Central to North America
      - which meant that maize was domesticated in a tropical climate, but took a long time to spread to the temperate climate of North America
- Diamond suggests that animal domestication also spread more rapidly E-W than N-S
  - animals also benefit from the climate similarities
  - animal domesticates spread together with agriculture
  - as part of the attractive package, in competition with foraging
- There is pretty good evidence of the speed of the spread of agriculture into and across Europe from dated archaeological sites
  - very roughly 0.7 miles per year
- other evidence of this “fast” spread of food production is “preemptive domestication”
  - the idea here is that if a domesticated variety of plant or animal is adopted by neighboring people, they will not have had the need or time to domesticate their own, local variety of that plant or animal
    - so the plant or animal will be genetically fairly uniform
    - apparently all deriving from a single, original population that was domesticated

- domestication of the same species by other groups is “pre-empted” by the arrival of the already domesticated variety
- but if there are several fundamentally different varieties of a domesticated species
  - like beans in the New World
  - each variety with genetic evidence of having descended from a different original domesticated population
  - then each probably resulted from a separate process of domestication of the same wild ancestor, but in different places and conditions
  - so the process of domestication in one region was not “pre-empted” by adopting the already-domesticated variety from some other area
  - this suggests that the spread of plants or animals was slow
- Diamond suggests that Eurasian crops and animals mostly all come from single domesticated populations
  - indicating a rapid spread of the domesticated forms in Eurasia
  - while crops and animals on other continents frequently show genetic signs of having been domesticated independently in several places
  - suggesting a slow spread of domesticated forms everywhere else
- So food production spread rapidly in Eurasia
  - Fertile Crescent crops thus spread easily E-W
  - Fertile Crescent also received crops spreading west from east Asia
  - best documented case is Europe
    - took “only” 2000 – 3000 years for food production to spread across Europe, replacing foraging
  - While N-S spread of crops and animals was slow
    - Sub-saharan Africa
    - Australia – not until European contact
    - New World
    - Indian subcontinent
  - Other barriers also affect the rate of spread
    - the narrow isthmus between North and Central America
    - the desert of Texas
    - Himalayas and central Asian desert
- Diamond then claims that other ideas also spread more rapidly E-W
  - piggybacking on contacts, similarities, competition among societies in similar latitudes
  - other technology, ideas, etc. were connected to food production
    - tended to be adopted along with it
      - writing
      - wheel
      - metalworking, etc.
- so the E-W orientation of Eurasia sped the spread of food production
  - and with it, the spread, combination, and improvement of many other ideas and practices associated with it
- Eurasia also had the advantage in epidemic diseases

- Human epidemic diseases mostly evolved from herd animal diseases
  - Measles: from rinderpest in cattle
  - Tuberculosis: from cattle (hmm)
  - Smallpox: from cattle or others?
  - Influenza (flu): from pigs and ducks
  - Pertussis (whooping cough): from pigs and dogs
  - Malaria: probably from chickens or ducks
- Epidemic diseases first jumped to humans in societies that first
  - lived in large groups
  - had extended contact with domesticated herd animals
  - lived in permanent settlements with their waste
  - had water systems and rat infestations as vectors
  - practiced long-distance travel, spreading disease
  - That is, many epidemic diseases originated among Eurasians
- then an “arms race” of
  - evolving disease organisms
  - and evolving human resistance
- so Eurasian diseases were virulent, and non-Eurasians had little resistance
  - helping Eurasians to dominate others