

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 animals 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 much 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
 - that is, we can tell for sure that food production diffused relatively rapidly across Europe, compared to other regions of the world
 - this may support Diamond's claim about E-W axes encouraging rapid diffusion of ideas
- other evidence of this "fast" spread of food production in Eurasia is the apparent process of "preemptive domestication" in Eurasia
 - Diamond's "preemptive domestication" argument
 - Wild ancestors of Fertile Crescent crops were widespread in Eurasia

- with many different, local varieties
- Yet today, each Eurasian crop (wheat, rye, lentils, etc.) is descended from a single wild variety
- Implies that each was domesticated just once
 - that one domesticated variety was then adopted by farmers everywhere
 - If a crop had been domesticated separately in multiple places
 - each case would start with a different local wild variety
 - and each would have evolved different features early on
 - there would now be multiple kinds of wheat, etc. that were not closely related – but this is not the case
 - Why does that matter?
 - because it implies that Eurasian crops spread *rapidly*
 - otherwise, there would have been time for people in other areas to domesticate their own local varieties
 - instead, with a domesticated form available, there was no need to go through the domestication process again
 - the spread of the crop “preempted” or cut off the process of domestication in other places
 - leaving just a single variety of the crop, rather than multiple varieties, as evidence of this preemption
- In the New World, some crops have regional variants that were domesticated independently
 - beans, for example, were domesticated in multiple places
 - each variety with genetic evidence of having descended from a different original domesticated population
 - the process of domestication in one region was not “pre-empted” by adopting the already-domesticated variety from some other area
 - suggesting that crops spread so slowly that people in other places had already domesticated their local variety by the time seeds of another variety reached them
 - less or no preemptive domestication
- the apparent action of preemptive domestication in Eurasia, compared to its absence elsewhere
 - suggests that crops spread faster in Eurasia
 - maybe due to the East-West orientation of the continent
 - because much of Eurasia is at a similar range of latitudes, suitable for the same plants and social arrangements from one end to the other
 - or due to other barriers to movement of people, plants, and ideas
 - this rapid spread of crops, people, and ideas contributed in multiple ways to the advantages enjoyed by the Eurasians and Europeans over everyone else
 - whose continents impeded, rather than aided, interaction
- So food production spread rapidly in Eurasia
 - This rapid East-West diffusion meant that the Fertile Crescent also received crops spreading west from Asia
 - 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.
- 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 not evolved resistance
 - helping Eurasians to dominate others