Duke in Denmark 2022

Exercise #4: The Copenhagen Zoo

When most people think about lions, tigers, antelopes, elephants, hippos, and rhinos, chances are good they are also thinking of the wide steppes of Africa. Remember though that prior to the onset of what we have called the "glacial-interglacial seasaw" around ~3 million years ago, temperatures in Europe had been warmer. Indeed, the last time the Earth's atmosphere had CO_2 concentrations as high as today was between 2.2 and 2.8 million years ago, as the Pliocene epoch ended and the Pleistocene began. Temperatures at that time were between 2-3˚C warmer than pre-industrial global averages (we are currently at ~1.1˚C above that). This is one of the reasons why projections for 21st century warming fall into a similar range (2-4˚C). In other words, we are returning rapidly to a Pliocene world. Only that world WAS very different, and in Europe, you could easily have run into the animals listed above, that are today limited Africa. As glacials came and went, some of these animals ultimately succumbed, but others adapted, at least much of the European megafauna disappeared during the last glacial period (perhaps exacerbated by stone age hunters).

Today, we are going to look at some modern representatives of these formerly European inhabitants such as wooly rhinos, cave bears, and cave lions: beasts that Neanderthals and early humans would have encountered, both in the role of prey and predator. We will also look at some extant Danish inhabitants, as well as a few former temperate inhabitants that disappeared since the end of the last Ice Age.

Ok, let's head to the "The North (Norden)" area first.

1) Find the polar bear exhibit. Polar bears in Denmark? Well, yes, sort of. NOT in continental Denmark but certainly in their oversees territory of Greenland. The last time polar bears roamed mainland Denmark was during the Younger Dryas cold period. What is the scientific name for polar bear? What does that imply about where these animals spend more than 80% of their lives (!).

2) How are the polar bear's hands and feet adapted to that lifestyle (two ways)?

3) Its senses, particular its vision and smell are extremely-well developed for bears. How are those two senses particularly useful to this animal (think about where it lives and what that is like)?

4) Interestingly, polar bear foot and hand pads have "apocrine glands" that leave behind a prominent scent trail. Although largely solitary creatures, how (or when) does this adaptation become useful to them in their environment?

Ok, let's head off to find the polar bears closest living relative, the brown bear.

5) Brown bears clung on a little longer to their Danish homeland than polar bears, but they too disappeared around 5000 years ago. Today you have to travel to Norway, Sweden, or Finland to see their descendants. What mammalian order are bears in? Hm, why is that a little odd (hm, what do bears stereotypically seek in fairy tales; why are they considered "dangerous to hikers", particularly in US National Parks)?

6) Brown bears are generally “crepuscular” – what does that mean?

7) The most (in-)famous Pleistocene cousins of the living brown bear are the so-called “Cave Bears” because thousands of their remains have been found throughout caves in Europe. These remains are almost all from juveniles, very old, or diseased/hurt individuals. Hm, so did the Pleistocene “cave” bear live in caves, or what is actually going on here?

Unfortunately, there are no wooly mammoths and rhinos left on Earth BUT one extant creature gives them a run for their money: the musk ox (go find it)!

8) Yes, this animal is native to Denmark, Greenland that is (also to parts of Canada). Musk “ox” is a little misleading because this animal is actually more closely related to, what?

9) Although a lonely musk ox breathed its last breath in Scandinavia around 9000 years ago, they were an important part of the “large beasts of the Ice Age”, a group that is generally referred to as the _____. They are also only one of a few members of this proverbial group that did NOT go extinct.

10) Take a look at their horns. Which part appears widest and strongest? How is this consistent with the fact that males will charge one another at high speeds and then head butt each other?

11) Ugh, why are they called “musk” ox? What do you think? Actually now is not the time to think but to use your other senses….

Let’s go find Rudolph. Follow the shine of that red nose…

12) Some archeologists have called the time period between 30,000 and 12,000 BC the “Age of Reindeer” because their remains are as common as the stone implements with which they are found in stone age sites. Reindeer first appear in the fossil record around 700,000 years ago (now we know when Santa got started). In order to see a wild reindeer today you’ll have to travel into Norther Scandinavia and Siberia. Clearly these are cold-adapted animals. Why then were they so much farther South during the last Ice Age?

13) Take a look at both the male and female reindeer here, what is unusual about this group of “deer”

14) The antlers of reindeer are shed and regrown every year, what does the antler consist of? How are they different from the "horns" of say musk ox? How are they, in turn different from the "horn" of say the tusks of mammoths?

15) Some of the hair of reindeer are actually hollow tubes (!). How is this remarkably useful to the lifestyle of reindeer?

16) Another important adaptation to living in cold dry environments are the highly developed and convoluted "turbinate bones" in reindeer's noses. What are they and how do they aid the animal in adapting to its environment?

17) Here is an image of a typical deer hoof. Now look at the reindeer hooves. Hm, how are they different and how does this aid walking in their particular environmental conditions?

18) Reindeer are one of the few mammals that regularly dines on lichens. What are lichens?

Alright, let's follow the "call of the wild" to the gray wolves…

19) In the last 20 years, wolves have been reintroduced into several European environments. Ecologically, it is fair to say they have been a success, culturally, however their presence has caused a bit of a controversy, both with farmers, and even city folks. Europe's history and interaction with wolves runs deep (all the way into the stone age) and despite their canine (man's best friend) nature, wolves have long been vilified in European culture and history, sometimes for good reason and other times unfairly. List at least FOUR famous (probably Grimm's) fairy tales that have a "big bad wolf" – that's deep cultural memory. By the way, Denmark's last wild wolf was killed in 1813!

20) An interesting fact about wolves, is that, contrary do what we might expect, they rarely "bark", like their domesticated cousins. Why do dogs bark? In contrast, why do wolves more likely whimper, grow, and howl? What role does "barking" play in wolf packs?

Speaking of barking, let's move closer to the shore and find what many European cultures refer to proverbially as a "sea hound": the seal. Find the Harbor Seal.

21) After the Ice age, with sea level rising and Denmark becoming a largely "island nation", both seal and whale became important staples of Meso- and Neolithic hunters. What aspect of a seal's anatomy (and whale), makes them such a valuable food source (what do they have in ABUNDANCE?).

22) Take a good look at the seals. How do they move on land? How is that different from a "sea lion" (they also have California Sea Lions at the Zoo, if you wanted to compare)? What does this say about where seals (as opposed to sea lions) are TRULY at home?

23) What sense is very clearly highly reduced in seals (as opposed to sea lions)? This might require a closer look…..

24) What made seals such an "easy prey", well into the 20th century (threatening their very existences), but probably also for stone age hunters?

OK, let's go to some "smaller" native Danish animals, that also lived along stone age hunters, but were probably not a major menu item for them…..let's first find the large Eurasian Eagle-Owl, also known as the "Uhu".

25) The name Uhu is largely derived from the sound of the animal's call. Obviously, owls are night hunters, hence the huge eyes. Uhu's also have prominent "ear tufts", except, ugh they are not really associated with the ear. What do you think these tufts are used for? Where ARE the ears of the Uhu actually located?

26) Strangely enough, many owls have ear holes that are placed slightly asymmetrically, for example, the left ear is slightly higher than the right hear. This isn't a natural imperfection. How do you think this aids the owl in prey capture in total darkness?

27) If you are lucky you might see one of the owls fly. What is remarkable about owl flight? How is this important to a night hunter?

Ok, let's find a more "earthly" Danish Native who spends most of their time creeping around and creeping out human-type Danes…find the Common European Adder.

28) Remember I told you that there is really only one venomous snake you have to worry about in Denmark? This is it. Although, their danger to humans is outrageously overstated and their bites are rarely if ever fatal. They are part of the "Viper Group" of Snakes. We think of "vipers" as the poisonous-fanged snakes. But did you know that the word "viper" actually comes from viviparous? Which reflects what unusual trait common among vipers?

29) What do European vipers notably lack, a characteristic, that is often touted as the distinguishing characteristic of Vipers from other snakes (falsely so)?

When Europeans think of the United States and are asked to think of "quintessential American animals", that stand symbolically for freedom, liberty, and strength, they usual provide the Golden Eagle, and…..perhaps not surprisingly, the horse. They have horses at the petting zoo section here….if you wish, you may go and have a moment with them.

30) Horses were a major menu article for stone age hunters, and there are kill sites that strongly suggest both Neanderthals and perhaps even members of *Homo heidelbergensis*, were fans of horse meat. What types of environment is a horse primarily adapted to?

31) Why is the association of horses with North America, actually quite strange?

32) Although horses were domesticated and became important beasts of burden throughout Europe, which animals were actually the first to aid in the early farming revolution in Europe?

Ok, let's move on to some critters that represent the descendants of animals that once roamed the European continent but have essentially disappeared from it since the last Ice Age. This will require travel to some of the other exhibit areas of the zoo, notably, the "World Square" and the "Savannah" sections.

Let's start with the pachyderms….find the Indian elephant.

33) Members of the Order Proposcidae used to be a common sight on the European continent and we have already encountered two Pleistocene members, the straight-tusked elephants and the mammoths. What's a ready way to distinguish Asian elephants from their African cousins?

34) What DO elephants use their oversized ear flaps for? Knowing this, why does it make sense that mammoths had relatively small ears flaps?

35) What do the immense elephant tusks actually consist of (what part of the usual mammal morphology do they actually represent?)

36) We think of modern elephants as being “naked”, that is they have no fur like mammoths. Is this really correct?

37) Mammoths and African elephants had two “finger-type” nobs on their trunks. How is this different in Asian elephants?

Ok, let’s go to the rhinos.

38) Copenhagen’s rhino is a White Rhino, home in Africa today. The massive wooly rhinoceros that our stone age ancestors faced must have been truly terrifying and many a hunter probably found their demise on the end of that fierce horn. How is rhino horn different from the antlers of reindeer and the horn of musk ox?

Ok, running the danger of making this exercise too long again, I am going to stop here. Be sure to check out the myriad of other wonderful critters found at the zoo.