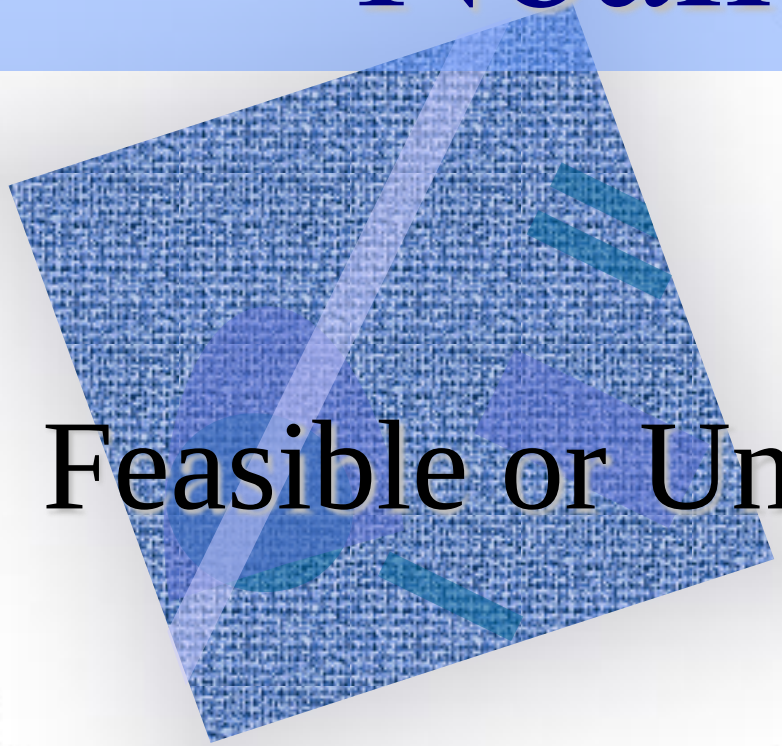
Noah's Ark



Feasible or Unbelievable?

Is the Biblical ark feasible?

- Skeptics point to the Biblical ark as an example of the absurdity of taking the Bible accounts literally.
- The Bible provides very little detail about the design and outfitting of the ark.
- We don’t have to prove exactly how it was done, but only that there is at least one way that it could have been done.

Is the Biblical ark feasible?

- *Noah's Ark: A Feasibility Study*, by John Woodmorappe
  - M.A. Geology
  - B.A. Geology
  - B.A. Biology
- While not questioning the possibility of miraculous activity in connection with the care of the animals in the ark, he shows that the Genesis account makes sense even if no miracles were involved.

Why Not a Local Flood?

- Genesis 7:22 says *Everything on dry land that had the breath of life in its nostrils died*.
- Flood waters covered the tops of the mountains.
- Noah could have simply moved somewhere else.
- No need to save animals.
- God's promise (Genesis 9:11b) *Never again will there be a flood to destroy the earth*.
  - If this was a local flood, the promise has been broken many times!

How big was the ark?

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- Gen. 6:14-16
- *Make for yourself an ark of gopherwood; make rooms in the ark, and cover it inside and outside with pitch.*
- *And this is how you shall make it: The length of the ark shall be three hundred cubits, its width fifty cubits, and its height thirty cubits.*
- *You shall make a window for the ark, and you shall finish it to a cubit from above; and set the door of the ark in its side. You shall make it with lower, second, and third decks.*

How big was the ark?

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How big was the ark?

	Cubits	Hebrew Cubit (17.5 in.)	Egyptian Cubit (20.65 in)
Length	300	438 ft	516 ft
Width	50	73 ft	86 ft
Height	30	44 ft	52 ft

What was the square ft? 95,922 ft^2 133,128 ft^2

What was the cubic ft? 1,406,856 ft^3 2,307,552 ft^3

How big was a Clipper ship?

- Typical Dimensions of a clipper was:
- 212’ x 21’ = 4452 x 2 = 8904 ft^2 of floor area if we assume it was a rectangle which it wasn’t.
- How many people would it hold?
  - Usually 25-50.
- How long could they stay at sea?
  - As long as 4-5 months.
- How much bigger was the ark than the typical clipper ship?
  - At least 10x bigger probably closer to 20x.

Who Was on the Ark?

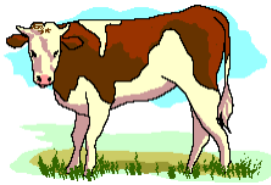
- Land mammals
- Land reptiles
- Terrestrial birds
- Dinosaurs
- Amphibians
- Some animals now extinct
- Eight people

What are Species, Genus, Family?

Class: Mammalia

Human, Hippopotamus, Cow, Dog






Order: Carnivora

Cat, Bear, Mouse, Dog




Family: Canidae

Fox, Wolf, Dog



Genus: Canis

Wolf, Dog


Species: Familiaris

Dog

How Many Species, Genera, Families?

- Land mammals
- Land reptiles
- Terrestrial birds
- Dinosaurs
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- Number of Species
  - 2-50 million estimate
- Number of Genera
  - 15,754
    - 7,428 mammals
    - 4,602 birds
    - 3,724 reptiles
- Number of Families
  - Could be as few as 2,000

How big were the animals?

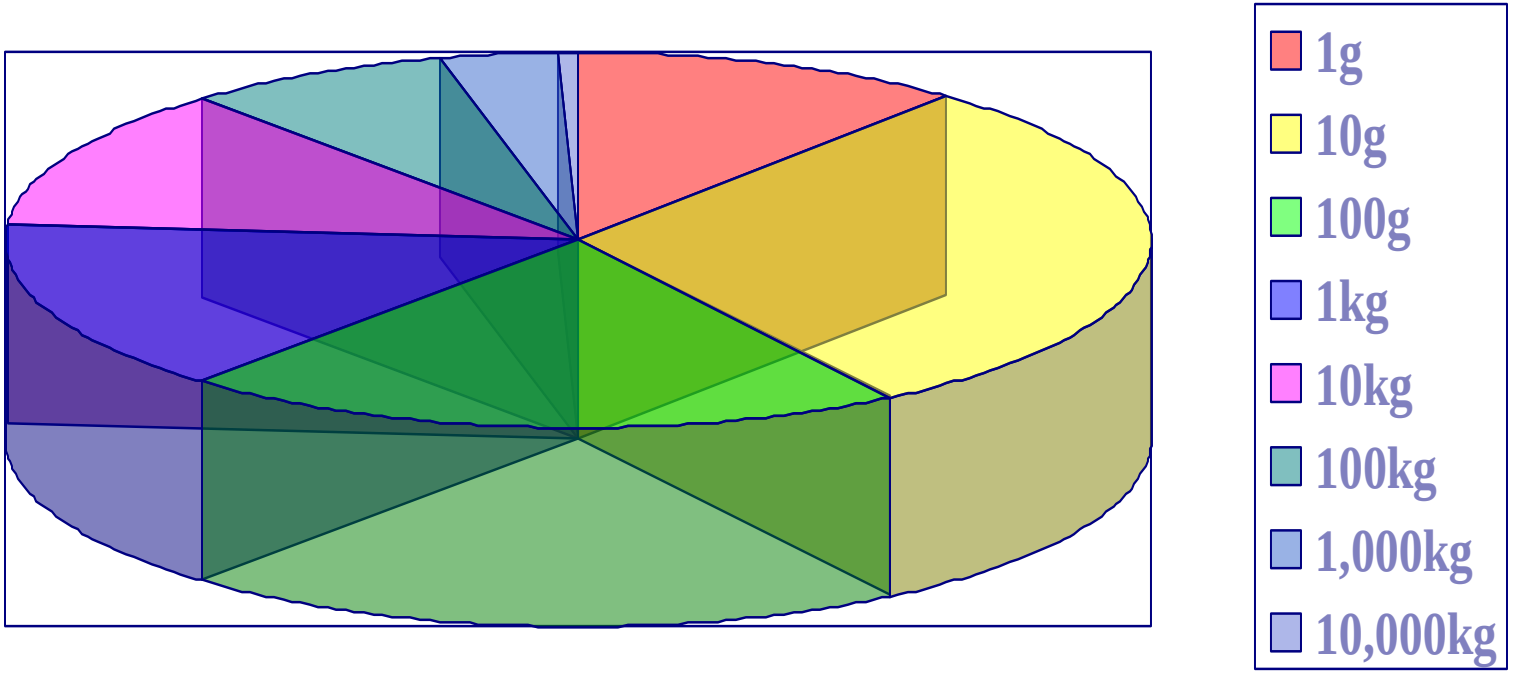
1kg =2.2 pounds

	To 10g	To 100g	To 1kg	To 10kg	To 100 kg	To 1 ton	To 10 tons	To 100 tons
Mammals	466	1570	1378	1410	1462	892	246	
Birds	630	2272	1172	450	70	4		
Reptiles	642	844	688	492	396	286	270	106
Totals 15,754	1738	4686	3238	2352	1928	1188	516	106

What are all of those tiny mammals?

- Many tiny mammals go relatively unnoticed because they are so small and live underground or in remote locations.
- Over 1,000 of the 16,000 animals Noah carried would have been varieties of the rodent family which weigh less than 100 grams as adults.
- About 400 would have been chiroptera, bats, in the same weight range.
- About 300 would have been insectivora, such as the dwarf shrew, which weighs about the same as a dime.

How big were the animals?



- Median size = a small rat
- Only 11% larger than a sheep
- Taking juveniles reduces this greatly

Next Week we'll look at the space requirements needed on the Ark

Animal Space, Food, Water Needs

- Ark situation equivalent to intensive livestock confinement (not a zoo)
  - Temporary captivity, need only to survive in reasonable health
- Animal housing: 46.8% of ark floor space
  - 2.5 sq. meters for juvenile of largest animals

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- Food: 6-12% of interior ark volume
  - Compressed hay, dried fruit, meat, fish
  - Though Genesis 1:29-30, and 9:3 indicates people and animals were vegetarians before the flood.

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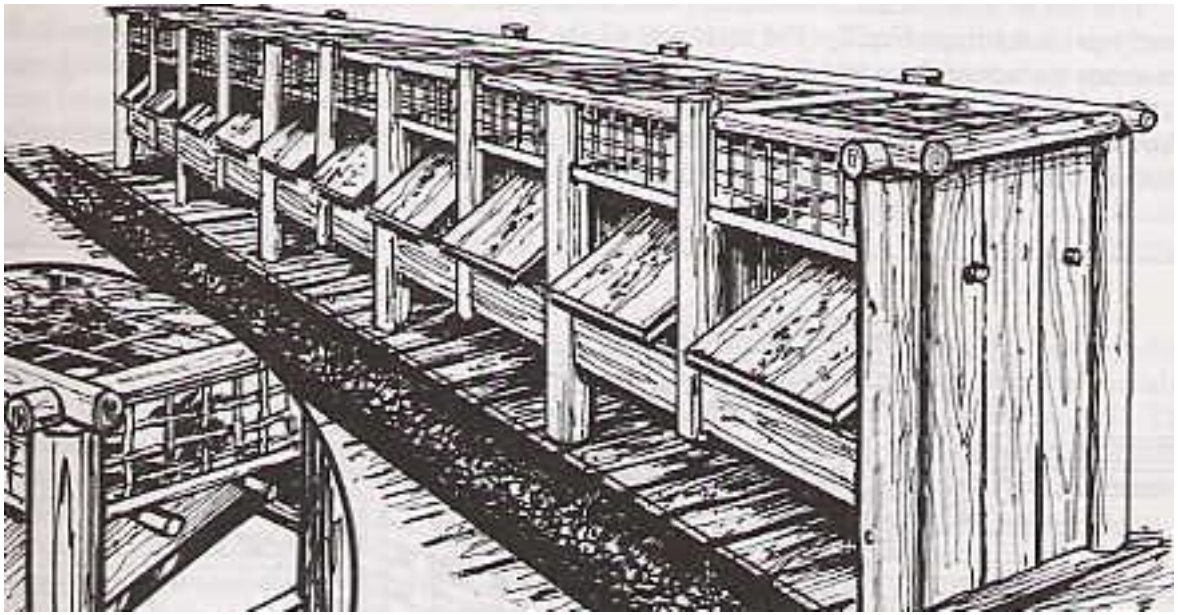
- Food: 6-12% of interior ark volume
  - Compressed hay, dried fruit, meat, fish
- Water: 9.4% of ark volume
  - Or could have collected rainwater

Waste Management

- 12 tons of wet excreta produced daily (12 cubic meters) - comparable to intensive poultry house
- Animal enclosures designed to minimize cleaning
  - Sloped, non-bedded floors



Waste Management

- 12 tons of wet excreta produced daily (12 cubic meters) - comparable to intensive poultry house
- Animal enclosures designed to minimize cleaning
  - Sloped, non-bedded floors
  - Slatted floors with manure pits
  - Thick sanitary bedding with no excreta removal
  - Manure gutters (animals can't turn around)
- Use of biological pest control (ducks, cats, mongooses)
- Vermicomposting (use of earthworms to biodegrade manure)

Ventilation

- Needed primarily for dissipation of body heat.
- Is the one window at the top of the third deck enough with all of those animals aboard?
- Under-eave slots widely used in rabbitries and intensive swine buildings.
- Smoke-release studies demonstrate air in animal houses is in constant circulation due to interaction of animal body heat with cooler wall surfaces.
- Recommended design ratio of inlet size per unit length for sheep housing yields a 14-inch high window for an ark-sized animal house.
- Moderating effects of water on temperature.

Lighting

- Ratio of window area to floor area for ark was 4.6%.
  - Design ratio for naturally lit stanchion barns for cows is 6.7%.
  - Design ratio for intensive confinement of sheep is 3 to 5%.
- Some areas on lower deck were probably dark.
  - Could use candles or lamps.
  - Could use biological sources: fireflies or luminous bacteria.
  - Advantages of darkness.
    - Livestock are quieted by darkness, reducing aggressive encounters.
    - Burrowing animals adapt well to captivity when caged in darkness.
    - Nocturnal animals can be housed in poorly-lit areas.

Was the ark overloaded?

Category	Tons
Empty Ark	4,000
Biomass at start	111
Biomass at end	411
Food at start	2,500
Water at start	4,070
Total needed	11,000
Cargo capacity	17,000
Spare mass	6,000

Could they build a ship that big?

- Larger than any known wooden ship.
- The ark was not a *ship*, but merely a floating box.
- Can a ship that long be built of wood without self-destructing due to sagging?
  - Dutch shipbuilders suggest a deck made of logs, four layers deep, would be sufficient.
  - 15th century sea-going junks of Chinese ambassador Cheng Ho approached the size of the ark.
    - Disputed.
    - Archaeologists have found huge anchors to corroborate the records that the ships were in the size range claimed.

Would the box shape be stable?

- The typical ship design with a narrow hull and a significant superstructure is driven by considerations of efficient movement through the water and comfortable habitation.
- The broad hull and lack of superstructure on the ark would serve to make it much more stable in the water than a typical ship.

Could Noah have had the knowledge necessary to care for the animals?

- There are records of many ancient individuals of renown with menageries with tens of thousands of animals.
- Roman Emperor Trajan had 11,000 animals in his collection.

Do 8 people have time to care for 16,000 animals each day?

- In a zoo, one person can only care for 23 animals.
- With modern labor-saving devices, one person can care for:
  - 6,000 laboratory animals
  - 4,000 pigs
  - 5000 cattles
- The ark did not have modern machinery either, but other labor-saving practices were available.
  - Self-feeders
  - Watering troughs

Food Preservation

- Even hay deteriorates, but can be cured to last over a year.
  - Lev. 25:21-22 shows knowledge needed to preserve foodstuffs for at least three years.
  - Romans and ancient Egyptians preserved grain for several decades.
- Dehydrated meat has almost the same nutritive value as fresh meat.
- Some tubers and gourds can keep for a full year.
- Berries, leaves, roots and meats can be preserved in honey or in oil.

What About the Carnivores?

- Giant tortoises have long been used to provide meat on long voyages, since they can go several months to a year without food or water.
- Dried meat closely resembles fresh when soaked in water.
- Even snakes will eat inert prey if hungry enough. It is a myth that they will only eat live prey.

What About Insectivores?

- Jewish tradition says Noah bred insect larvae in bran.
- Fruit flies and meal worms are easy to cultivate.
- Dried insects have good food value.
- Most insectivores can be switched to more common diets in captivity.

What About the Piscivores?

- Did Noah have to do hours of fishing each day?
- Very few piscivores were on the ark; most are marine creatures.
- Seabirds could fish from the ark on their own.
- Since ancient times, a certain fish has been used as a food source. When the water they live in dries up, they burrow in the mud, aestivate, and do not reawaken until soaked in water, up to several years later.

Animals With Specialized Diets

- Three-toed sloth rarely lives in captivity due to plant/gut-microflora symbiosis.
  - Since it is unique to individuals, it must be micro-evolutionary in nature and have arisen after the flood.
- The panda eats little but bamboo.
  - Red and giant pandas commonly eat other foods in captivity.
  - When fresh bamboo becomes unavailable, giant pandas subsist on dry bamboo stems.
- Koala eats almost nothing but fresh eucalyptus.
  - Growing evidence of a more varied diet.
  - Recently discovered to eat Monterey Pine.
  - Young koalas can live exclusively on milk.

Could all marine creatures live in the same flood water?

- Antediluvian seas were probably considerably less saline than in modern day.
- Distinct saltwater and freshwater layers could have developed in the flood waters.
- A Number of fish are known to spend time in both salt and fresh water.