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# Introduction

## Keywords

Noah, Ark, Apologetics, Genesis, Flood, Vertebrate Taxonomy, Vertebrate Zoology, Vertebrate Husbandry.

## Abstract

This work is a systematic evaluation of the housing, feeding, watering, and waste-disposal requirements of some 16,000 animals on Noah's Ark. It is also a comprehensive rebuttal to the myriads of arguments that have been made against the Ark over the centuries. It is shown that it was possible for eight people to care for 16,000 animals, and without miraculous Divine intervention. Proven solutions are offered to the problems of animals with special diets, such as the panda and koala. The bulk of hay poses no problem, and neither do the climatic requirements of animals.

The latter part of this work considers the immediate post-Flood world. It answers, among other things, arguments related to salinity tolerances of organisms in floodwater, seed survival and germination through the Flood, and a host of genetics "problems" of post-Flood population bottlenecks.

## Rationalistic Attacks on the Ark: A Brief History

Attacks on the credibility of the Ark account go back to classical antiquity. Allen (1963, pp. 70-91) and Browne (1983, pp. 3-27) offer comprehensive histories of these criticisms. I provide a brief summary of them. Apelles, a disciple of the heretic Marcion, is listed as one of the first critics of the Ark. He asserted that the Ark was barely large enough for four elephants! The early church fathers responded to some of these criticisms. However, it is noteworthy that various apologists of the early Church (e.g., Origen, Augustine, Ambrose, Procopius) were all too eager to disregard Scriptural specifications for the Ark's size and shape in favor of their own rather imaginative ideas. At the same time, pagan critics of the Bible had been trying to reduce the Flood to a local phenomenon, and there were a few early believers (e.g., Pseudo-Justin) who went along. However, most commentators (e.g., Tertullian, Pseudo-Eustatius, Procopius) recognized and strongly supported the universality of the Flood.

Allen (1963, p. 84) contends that questions related to the Ark and the Flood were largely forgotten during the Middle Ages. However, during the Renaissance and 17th century, interest in the Ark enjoyed a revival (Allen 1963, p. 78-79). Even so, many theologians during this time, impatient with questions about the Ark, preferred to "spiritualize" it and to relegate all

## Chapter 1

# Which Part of the Animal Kingdom was on the Ark?

## The Living Cargo: Mammals, Birds, and Reptiles

Did the Ark actually have to carry *every* type of animal in existence? Modern anti-creationists continue to resurrect long-discredited tomfooleries about the overcrowded Ark. For instance, although it was shown long ago (Whitcomb and Morris 1961; Jones 1973) that the Ark was not required to carry every member of Kingdom Animalia, recent critics (e.g., Futuyma 1983, McGowan 1984, Moore 1983, Skehan 1986, Plimer 1994, and Morton 1995) continue to burlesque the Ark by placing just about every imaginable living thing on it. Morton (1995, pp. 68-9) has visions of snails and earthworms struggling for thousands of years to make it to the Ark in time. Moore (1983, p. 16) fantasizes that the Ark carried deep-sea fish. McGowan (1984, p. 57), not to be outdone, puts whales and sharks on the Ark. Futuyma (1983, pp. 202-3) adds to the farce by repositing all the millions of plant and animal species onto the Ark. Schneour (1986) and Plimer (1994) take rationalistic arguments against the Ark to new heights of absurdity by insisting that it had to carry cultures of microorganisms!

At the other extreme, we have compromising evangelicals (e.g., Hugh Ross 1990) who want to “save” the Flood by insisting that Noah only had to carry a few common domesticated animals on the Ark. Needless to say, Scripture does not limit the contents of the Ark to domesticated animals (Jones 1973). Neither, for that matter, does Jewish tradition (Friedler 1967, p. 5; Ginzberg 1909, 1988, p. 328).

Let us now consider what Scripture *does* say concerning the types of animal life taken on the Ark. It is clear that the contents of the Ark were limited to all living and extinct land mammals, birds, and land reptiles (Jones 1973), as elaborated and shown here in Tables 1 and 2. The Hebrew terminology in the Genesis account rules out invertebrates having been taken on the Ark (Jones 1973). The same holds true for marine and amphibious vertebrates (Hasel 1978, pp. 86-7). Let us consider the main inhabitants of the Ark in more detail.

**Birds.** Terrestrial birds were undoubtedly on the Ark. By contrast, many types of seabirds spend less than 10% of their lives on land, and for this and similar reasons can be considered marine creatures (see Ainsley 1980). It is thus very unlikely that they were on the Ark, but I have included them in the totals. The distinction between true seabirds, and shore-birds, is discussed in detail in the section *Carnivores and Piscivores*.

**Dinosaurs.** Most if not all dinosaurs were present on the Ark, as they were clearly terrestrial creatures (Bakker 1986, pp. 105-124). When Moore (1983, p. 9) ridicules some earlier creationists who had suggested that dinosaurs were aquatic animals and could have survived the Flood outside the Ark, he had better reserve his scorn for his fellow evolutionists. After all, it is they who suggested that dinosaurs were too heavy to walk on land without their massive bodies being supported by water. This notion had been widely prevalent in both popular and scientific depictions of dinosaurs (in fact, Bakker 1986, p. 116, called it an "eighty-year orthodoxy"). For instance, the classic Charles Knight paintings of dinosaurs, displayed in the Field Museum in Chicago and reprinted in countless books, depicted dinosaurs as swamp creatures. Bakker (1986, p. 124), has shown that the dinosaurs' anatomy is completely incompatible with even a swampy habitat.

Although many terrestrial vertebrates can swim continuously anywhere from several hours to a few days (see Johnson 1978, and references cited therein), it is quite impossible that they could have survived the Flood outside the Ark once the floodwaters had prevailed on the earth. However, many land animals must have temporarily survived while the Floodwaters were still cyclically advancing and retreating. As the waters buoyed them up, they swam. At the same time, the sediments were deposited beneath them. When the waters temporarily retreated, the animals were stranded on the sediment, and made footprints. Such a cycle must have repeated itself up to several times, thus generating the successive layers of footprint horizons we now find in the geologic record. Note that footprint horizons found near the top of the sedimentary column (e.g., Late Cretaceous) should not be mistakenly thought of as late-Flood deposits. Any local stratigraphic sequence containing footprint horizons is probably entirely early-Flood in origin (e.g., Oard 1995). Although land animals certainly drowned, sooner or later, the same need not have been true of their eggs. For instance, while lizards were on the Ark, lizard eggs, notably resistant to seawater (Carlquist 1974, p. 9), may have survived the Flood in a viable state.

**Amphibians?** Possibly the more terrestrial amphibians were on the Ark (Jones 1973). But since they were few in number (Carroll 1988; Duellman 1979) and were mostly small in size (Carroll 1988; Jenkins and Walsh 1993; Pough 1989), their inclusion could only have had a negligible effect on the calculations of Ark inventory. Furthermore, I have erred on the side of amphibious animals by including, on the Ark, many mammalian and reptilian genera that may have been or actually are aquatic or semi-aquatic. This was necessary because various members of otherwise-terrestrial vertebrate families are aquatic, and an unknown number of extinct genera may have been capable of prolonged life in water without necessarily bearing any skeletal features indicative of such capabilities.

**Unknown Animals.** We can be confident that we have discovered nearly all genera of extant land animals. However, there is no way of determining, or even intelligently guessing, the numbers and sizes of unknown extinct animals. A number of estimates for the numbers of specific unknown types of extinct animals do exist (e.g. dinosaurs: Dodson 1990). However, the computations involved all presuppose the validity of organic evolution and the geologic time scale in their calculations, and thus have no meaning in the creationist-diluvialist paradigm.

When considering unaccounted-for extinct animals, we must remember that there is plenty of extra space on the Ark beyond that accounted for in this study (as quantified and discussed in: *The Engineering and Infrastructure of the Ark*. Secondly, by choosing the kind as equal to the genus instead of the family, I already have placed up to eight times the actual number of animals on the Ark.

# NOAH'S ARK

## A FEASIBILITY STUDY



**T**he Bible plainly teaches that the Flood of Noah's day covered the entire globe. Old Testament writers believed it. Jesus Christ and the Apostle Peter based key doctrines on it as a fact of history.

But this raises serious questions. How could Noah and his family have cared for 16,000 animals? What did the carnivorous animals eat during and after the Flood? and many others. Lack of answers to these questions had encouraged theologians in the early 1800's to deny Biblical inerrancy and open the door for full-scale denial in the days of Darwin. Today skeptics make great fun of the whole account, and believers often retreat to local-flood compromises.

This book presents good answers to all these questions. Biologist John Woodmorappe has shown that there are always satisfying answers, even to the hard questions, if we are willing to study and be open-minded. No longer can there be an excuse for theological disbelief or the jokes of scoffers. *NOAH'S ARK: A Feasibility Study* ably shores up the foundation of this crucial Scriptural doctrine.



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