Scientific Event:
Appearance of Birds in the Sky

Time Frame: ~150 to ~120 million years ago

The scientific descriptions on these pages are derived from AI investigations using ChatGPT and Gemini 3 asking for the history of the flying creatures and birds on the earth. The AI output has been revised appropriately for improved accuracy, ease of comprehension, and relevance to this study of Genesis 1.

Background: The Origin of Theropod Dinosaurs

The first vertebrates that were capable of truly powered flight were the Pterasaurs, who lived around 230 million years ago. They had hollow, pneumatic bones for weight reduction and a keeled sternum for strong flight muscle attachment. Body fossils have been found in Europe, Greenland, and Brazil. Pterosaurs dominated aerial ecosystems until the extinction event in 66 million years ago. These are not, however, the ancestors of the birds that we know today.

In the Linnaean taxonomic hierarchy, birds are of the Kingdom Animalia (animals), Phylum Chordata (animals with a spinal cord), Class Aves (birds). However, concerning how birds are classified based on ancestry, they are understood phylogenetically to be living theropod dinosaurs. Modern birds are descended from a group of feathered theropod dinosaurs called maniraptorans. These dinosaurs possessed feathers for insulation, display, brooding, or maneuvering.

The Archaeopteryx is an interesting case study in how birds have been understood in paleontology. In the late 1800s through the min 1900s, the Archaeopteryx was widely called “the first bird”. But after the 1990s, it was concluded that birds are dinosaurs, and that Archaeopteryx has been classified as a basal avialan, not a modern bird. In fact, some recent analyses place Archaeopteryx slightly closer to non-avian deinonychosaurs than to later birds, highlighting how fine-grained the transition is. Because of the recent discoveries in China, Siberia, and other places, the lineage of theropod dinosaurs, flight, and birds remains one of the most active areas of paleontology research today.

- **Time Frame:** ~ 170 to 160 Ma
- **Evidence:** There are exceptionally well preserved fossils from China's Jehol Biota and German Solnhofen limestone. Chemical analyses showing melanosomes in fossil feathers, allowing color reconstruction.

Development of Birds

As mentioned above, the development of flight and birds remains an area of intense research. This supplement pack focuses on the earliest animals that might be classified as birds. Currently these are believed to be the adaptive radiation of birds that happened during the Cretaceous Period from about 145 to 66 million years ago. By the Cretaceous Period, birds were no longer rare dinosaurian experiments; they were ecologically established vertebrates. Two lineages of birds dominated during the Cretaceous Period - **Enantiornithines** (the most diverse and widespread) and **Ornithuromorphs** (the lineage leading to modern birds). These groups coexisted for ~80 million years but followed different trajectories.

1. **Enantiornithines**
    a. **Time Frame:** ~130 to 66 million years ago
    b. Most abundant and diverse birds of the Cretaceous, occupying arboreal, terrestrial, and possibly coastal niches worldwide
    c. Teeth retained in jaws
    d. Retained **clawed fingers** on wings
    e. **Evidence:** Fossilized remains
2. **Ornithuromorphs**
    a. **Time Frame:** ~130 million years ago to today
    b. Began with a body plan that became increasingly similar to modern birds in flight mechanics, respiration, and skeletal fusion
    c. Increasingly exploited aquatic and shoreline niches – could have been critical to their survival from the extinction event 66 million years ago.

Description in Genesis 1 of This Event

In the beginning, And God said, "Let the water teem with living creatures, and let birds fly above the earth across the vault of the sky." So God created the great creatures of the sea and every living thing with which the water teems and that moves about in it, according to their kinds, and every winged bird according to its kind. And God saw that it was good. God blessed them and said, "Be fruitful and increase in number and fill the water in the seas, and let the birds increase on the earth." And there was evening, and there was morning—the fifth day.

Genesis 1:20-23 (NIV)

Passages left highlighted are those most relevant to the scientific event of interest

The approach that this supplement pack takes in making associations between Genesis 1 events and scientific events is to use the earliest scientific event that makes sense according to the Hebrew words used in Genesis 1 (i.e., the use of good hermeneutics) while also considering where the event would likely be placed on a timelines that is consistent with the sequence of events described in Genesis 1.

For the case of the birds, it was the Ornithuromorphs lineage that has survived as our modern birds. And the Ornithuromorphs lineage began around 130 million years ago. Therefore, we take the 130 Ma date for the timeline for birds that are mentioned in Genesis 1:21.