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A Speculation: Avian Migration and the K-T Extinction

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Abstract

One caveat to the dinosaur's extinction is the conclusion that avian dinosaurs survived and became ancestors of birds. Their mobility enabled them to migrate great distances and find the nutrients needed to survive. Given this scenario, could the current observable migration of birds (the "dinosaurian offspring") now be related? Migration is the regular seasonal movement undertaken by many species of birds, with the most common pattern, flying north in the Northern spring to breed in the temperate or Arctic summer and returning in the Northern autumn to wintering grounds in warmer regions of the south. The primary motivation for migration appears to be food. None of the major North-South migratory pathways fly over the Caribbean but three main fly ways, past to the west of the theorized K-T impact centre. Due to their ability to fly, the "avian Dinosaurs" adapted and survived very quickly in response to the disaster that marked the K-T boundary. It is an interesting speculation that the avian migration that we witness today is rooted in an event that occurred 66 million years ago! But it does explain why the migratory birds mostly fly from Polar summer to polar summer when they could just be as easily fly from Polar zone to the warmer equatorial region and back. In the recent article in Nature by Melanie During about identifying the late spring timing of the "Astro disaster", it can be cited as consistent with my speculation. A late April early May Impact as suggested by During would have seen these migrations completely. The western migratory routes would have been found to be "luxurious" in vegetation in that first northern autumn after the "Astro-impact" while all eastern routes would have still been barren.

Keywords

Dinosaur Clades, K-T Mass Extinction, Avian Migration, Migratory Pathways, Avian Dinosaurs, K-T Impact Centre

1. Introduction

Over the years working in the Mineral exploration business, I have often been researching events related to "Plate Tectonics" and how they have shaped the physical world. What is less clear is how these processes affect the living species at the time and the lingering effects. Yes, the extinctions are well noted in the geologic record, that allowed one species/genera to "replace the dominant one" of the prior epoch usually documented in that geologic strata that we can physically see.

What we can't see is the affects on the living. Or can we?

The following "speculation" is based on observations of current "practices" of migratory birds and the possible relationship to physical events that are well documented in the geologic record.

2. Avian Migration and the K-T Extinction

One caveat to the dinosaur's extinction, that we are now quite comfortable with, is the conclusion that avian dinosaurs survived and became ancestors to our current flocks of birds. This survival fits our theory as the mobility of this branch of the Dinosaur Clades (another biological term for a division of the Phylum Chordata—eight branches or Clades of Dinosaurs were well represented in the pre-K-T boundary, but only one severely reduced and only recently identified, is found post K-T boundary), enabled them to migrate great distances and find the nutrients needed to survive. Again, it is proffered that not necessarily the largest avian dinosaurs survived, as again their nutrient demands and the short time frame for adaptation would have been compromised.

Given this scenario, could the migration of birds (the "dinosaurian offspring") now be related to their current migratory patterns?

Most of our information is based on our recent observations and information—ergo it will be the most accurate but if one looks at the current migratory patterns it would not be too much of a stretch to suggest they reflect what would have developed in the "avian" Dinosaurs as a result of the "astro-impact!"

Migration is the regular seasonal movement, often north and south, undertaken by many species of birds. Bird movements include those made in response to changes in food availability, habitat, or weather. Approximately 1800 of the world's 10,000 bird species are long-distance migrants [1].

The most common pattern involves flying north in the Northern spring to breed in the temperate or Arctic summer and returning in the Northern autumn to wintering grounds in warmer regions in the south. The primary motivation for migration appears to be food. The routes taken on forward and return migration are often different [2].

Most species of penguin migrate by swimming. Migration in birds is highly labile and is believed to have developed independently in many avian lineages [3]. But my speculation would suggest that it is an "inherent" trait!

I would add several other observations. None of the major North-South mi-

gratory pathways fly over the Caribbean but three main fly ways, past to the west of the theorized K-T impact centre. The patterns when adjusted for the continental movement become more distinctively north south. This is most pronounced in the case of the European flyway that leads from the Russian north, with a "right (westward) hook" to end up on the West coast of Africa, which would have been more straight North-South with the geographic position of the African Continent Plate at the K-T time frame (as seen in the global schematic Figure 1). Most of the breeding grounds in the north reflects the land mass that was there at the K-T time, although there would have been substantial favourable areas in the south due to the juxtaposition of South America and Australia with Antarctica (A later development or refinement due to plate tectonics?).

The point of this is that the "avian Dinosaurs" adapted and survived very quickly in response to the disaster that marked the K-T boundary. Due to their ability to fly, they could overcome the seasonal normal variation due to the earth's orbit around the sun, but also enable them to avoid the barren areas of the equatorial region while they were still recovering. The Polar Regions' summers would also provide a favourable environment for the breeding and feeding with the long hours of daylight.

Our knowledge and understanding of birds as direct descendants of these avian dinosaurs has only recently emerged. The ability to rapidly adapt that was unavailable to their earthbound co-clades and subsequently to shrink in size, reflecting the lack of food resources (except for the carrion eaters and some of the raptors!). Again it is because of the proximity of that extinction to our current time that we can "find" evidence of the events and although there will be a very difficult time proving migration as a result of the impact—the results "post hoc" are a plethora diversity of birds "clades" verses the singular "post hoc" dinosaurian "Clade".

It is an interesting speculation that the avian migration that we witness today is rooted in an event that occurred 66 million years ago! What other traits could be rooted in some of these or other events? It is pure speculation—there will be just no evidence not tainted by later events that would be available! But that is what scientists do… Look at events theorize and then find evidence, test them, modify and so on…

But it does explain why the migratory birds mostly fly from Polar summer to polar summer when they could just as easily fly from Polar zone to the warmer equatorial region and back.

For the events in the geologic record related to extinctions—except for the KT event—we are likely never to establish an acceptable concept to explain them.

The K-T mass extinction with its most preserved evidence of the speed and effects of an event that wiped out a large amount of the extant species can be postulated as an effective model fitting the "good Theory" which a lot of the models of the other extinctions don't have. With no evidence of an impact (ocean impact?) other theories are proffered but, in my opinion, don't satisfy the "good Theory" outlined with my added factors.

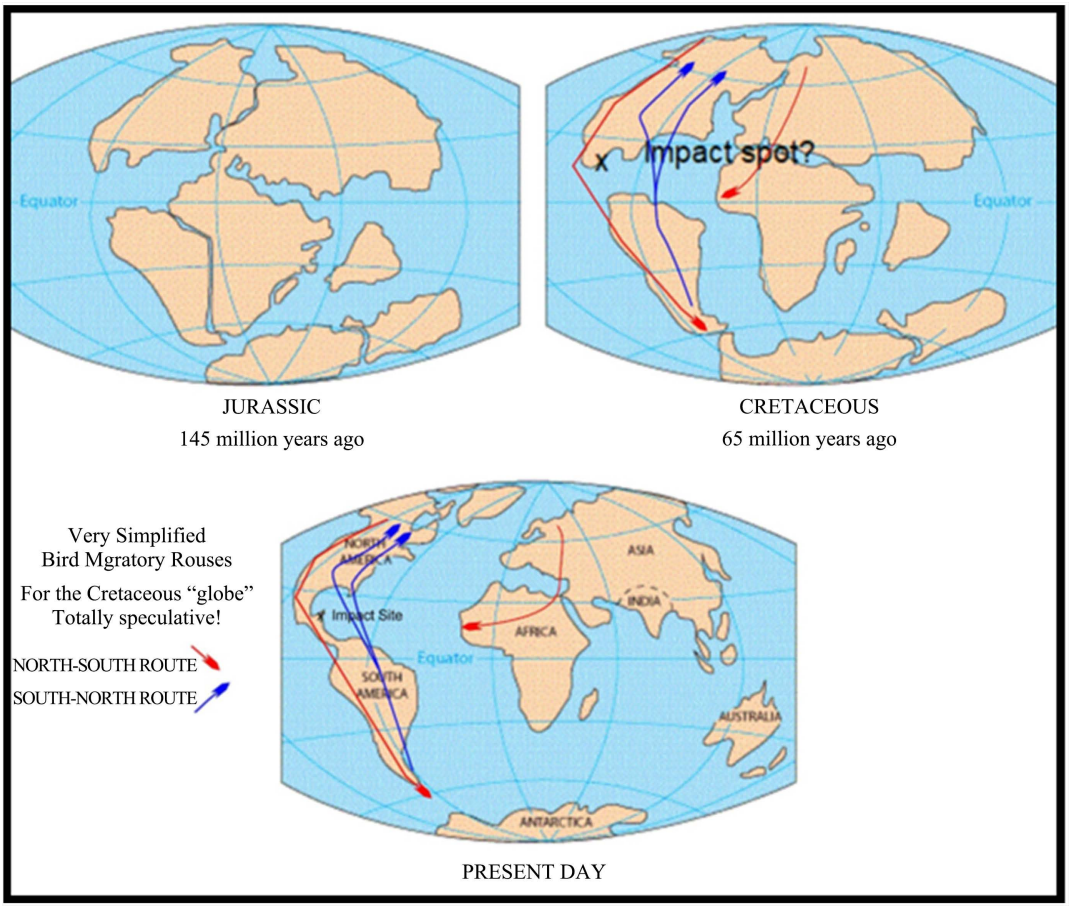

Figure 1. Position of the continental plates from the Jurassic to Present Day with the Main Bird Migratory Routes Superimposed and the Cretaceous—Tertiary Boundary "Astro Impact spot (**X**)".

["A good theory for a particular mass extinction" are met if: 1) all of the losses, not just the dinosaurs would have faced these events (there is probably exceptions, but I think this can be generally agreed); 2) particular groups of organisms survived (in the mammals case although decline in numbers, there size and habitat, suggested by many paleontologists enabled them to adapt and survive in their K-T locations); 3) the comet/asteroid impact is strong enough to cause a mass extinction but not a total extinction; 4) the evidence confirms that the events or processes happened! As well the two additional factors I suggest are: a definable time frame and accounting for the theory of evolution being equally met in the short geological time frame (even human time frame is short in the model!); and the planet wide devastation and location of the continents at that time prevented the larger dinosaurs from adapting, evolving to a succeeding branch.]

In the recent article in Nature by Melanie During about identifying the late spring timing of the "Astro disaster" can be cited as consistent with my speculation [4] (a prior article in *Scientific Reports* by R.A. DePalma also supports the timing with a "Spring Summer" time frame [5]). Migrations tend to occur in the early to mid-autumn of the hemisphere's year. September October for the north

and March April for the south. A late April early May Impact time as suggested by During would have seen these migrations complete. It would also tend to support the "randomness" of the South-north migratory patterns over areas that although devastated by the "Astro-impact" would have sufficiently recovered to support the ensuing migratory period, in the following year.

The western migratory routes would have been found to be "luxurious" in vegetation in that first northern autumn after the "Astro-impact" while all eastern routes would have still been barren. Could one event so affect the Avian Clades that timing and actions were altered irredeemably the North South migration but not the South North migration?

For the European flyway that ends in West Africa, due to the "prevailing" global wind currents (again very speculative for the K-T time frame) would not the damaging impact clouds been carried to the North and therefore sparing this part of the K-T globe, providing a "lush" setting to migrate to?

Again, I speculate: did this 66-million-year-old "Astro-event" create the North South bird migration corridors, we observe today?

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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