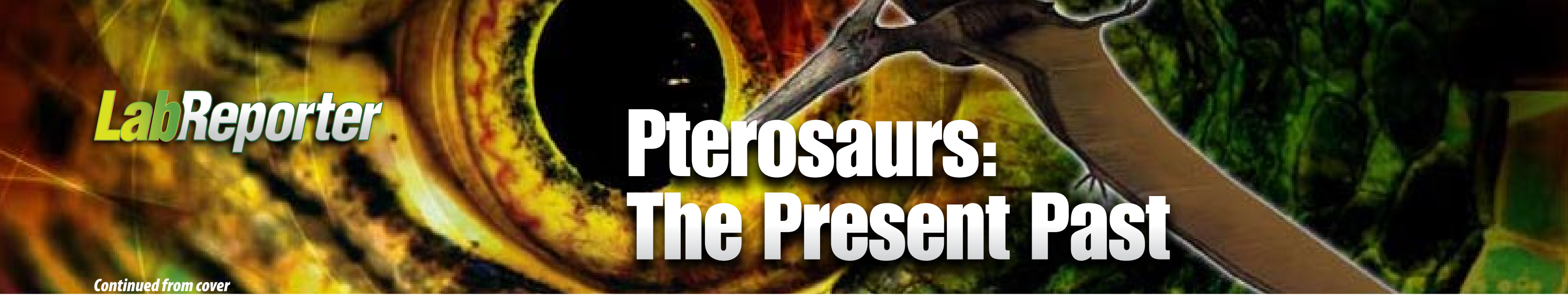

Pterosaurs: The Present Past

Continued from cover

This article will explore the latest and greatest revelations, after a brief, bare bones introduction.

Pterosaurs, also known as pterodactyls, emerged about 250 million years ago. They were the animal kingdom's first flyers, predating the first bird – the Archaeopteryx – by 50 million years. These ancients are divided into two main types: the long-tailed basal pterosauria that soared supreme during the late Triassic through the Jurassic Period, and their shorter-tailed descendents known as pterodactyloids that dominated until the end of the Cretaceous Period.

These so-called "giants" were not *all* gigantic. The smallest pterosaur was blackbird-size; the largest, Quetzal-coatlus, had a wingspan upwards of 40 feet – four times that of the modern albatross. All had large brains, well-developed optic lobes and hollow bones. Pound for pound, pterosaurs may also have had the strongest skeletons ever evolved. They remain pop culture icons thanks to their winged ways on the 1960's cartoon series *The Flintstones*. Animated pterodactyls flew the residents of Bedrock to and from Rock Angeles and Hollyrock.

Evolution

Contrary to long-standing belief, the introduction of birds actually accelerated the evolution of the reptilian flyers and prolonged, rather than shortened, their time on Earth. Pterosaurs reached their "Golden Age" 70 million years into their existence, at the same time birds began diversifying. In the early Cretaceous Period, about 125 million years ago, pterosaurs were three times more diverse than in the Jurassic Period (before birds). Usually, when a new group of animals or plants evolves, they quickly sort through their evolutionary options. "When we did [our morphological study], we thought pterosaurs would be the same," says University of Bristol researcher Katy Prince. In response to the feathered creatures, pterosaurs grew larger and experimented with different lifestyles. Skeletal remains indicate adaptation to new diets of seeds and fish, and that over time pterosaurs lost their teeth. Until recently, scientists doubted that these prehistoric reptiles could undergo significant evolutionary change and still retain their ability to fly. Structurally speaking, there was not a lot of wiggle room.

Flight

Pterosaurs were partial to gentle ocean breezes, according to engineer-turned-paleontologist, Colin Palmer. At the University of Bristol, Palmer constructed wing models using epoxy resin and carbon fiber, and subjected them to wind tunnel conditions. His findings: pterosaurs were aerodynamically challenged, but capable of flying at very slow speeds. Evidently, the reptiles adopted slow soaring to ensure soft landings and protect their delicate bones. Their wings were also too flexible to withstand the turbulent air over rough seas. Says Palmer, the wings were "unsuited to the marine-style [high-speed, aerodynamic] soaring adopted by many seabirds, but … well-suited to thermal slope soaring [using] the relatively weak thermal lift" found over tropical waters and hillsides.

Not only were they skilled flyers, but Chatham University researcher Michael Habib says pterodactyls were "pole-vaulters" of sorts. They took to the air with "leap-frogging long-jumps." Unlike their two-legged, fine-feathered friends, pterosaurs used four limbs to achieve lift-off. These included two super strong wings which, when folded, became front legs capable of launching the huge reptiles.

For years, scientists struggled to understand the animals' lift mechanism; the analogy with birds just didn't fly. Says Habib: "If a creature takes off like a bird, it should only be able to get as big as the biggest bird." In a series of studies, Habib measured the skeletal structure, wing proportions and muscle mass of pterosaurs and found they differed significantly from those of birds. Wings of the pterosaurs grew stronger with size, while bird wings tend to grow weaker. Birds also use their legs to launch, but don't derive in-flight power from them the way pterosaurs did. And, unlike pterosaurs, birds do not utilize their wings to help them power off the ground.

Gender

The recent discovery of a fossilized pterosaur — together with its egg — has rocked the paleontology world. Found in China, in 160 million-year-old Jurassic rocks, "Mrs. T" answers the mystery surrounding why some pterosaurs were crestless, and others had large, prominent protrusions. The egg and the crestless skull support the conclusion that, rather than members of different species, the two types of head forms were indicative of the male and female of the same species.

Examination of the fossil reveals that the female had larger hips than her mate and that her egg was structurally similar to a modern, reptilian egg; it was relatively small and the shell was soft. The smaller egg would have been an evolutionary advantage, requiring less energy to produce and sustain than a larger one.

The significance of the find is enormous. According to paleontologist Dr. David Unwin (U.K.), "We can exploit our knowledge of pterosaur gender to research entirely new areas such as population structure and behavior. We can also play matchmaker for pterosaurs, bringing back together long-separated males and females in the single species to which they both belong."

Summary

Although few pterosaur fossils exist — the worldwide collection would fit on a coffee table, according to Dr. Mark Witton (U.K.) — the amount of recent research is disproportionately huge. Adds Witton, "After almost a century in the doldrums, we're starting to see far more progressive research on pterosaurs. It's not quite a revolution but we're certainly going through something of a renaissance."

By: Terri Sota

Sources

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