

# How Cockatoos Evolved

## Is the Cockatiel a Member of the Cockatoo Family?

By Linda S. Rubin

### INTRODUCTION

In the discussion of cockatoo evolution, it appears a long debate has been answered that would shed light on the cockatoo's family structure, including the order and relationship of various genera to one another and just how closely they are related. Pivotal to this exploration and an adjunct to the question of cockatoo ancestry is whether the Australian Cockatiel is an actual member of the cockatoo family. This is an important question not limited to cockatiel enthusiasts. Should it be found that the cockatiel is indeed a cockatoo—and the genera to which it is related is identified—perhaps some parallels might be drawn that could prove beneficial to cockatoo culture at large, or to some species of the cockatoo family.

It is generally understood that cockatiels are quite prolific and a greater number can be reared in captivity compared to many species of cockatoos. Because cockatiels can be raised in greater numbers within a shorter span of time, lessons may be more quickly learned concerning husbandry and other aspects of aviculture. In some instances, this knowledge could be considered where appropriate, perhaps concerning some aspects of health, genetic predisposition to disease, husbandry, nutrition and possibly further evolutionary questions involving environmental adaptation.

For example, many cockatiel breeders feed low-fat diets (e.g., it does seem that cockatiels can simply “glance” at a seed and appear to gain 5 grams!). Feeding cockatiels a diet low in fat can assist in preventing a shortened lifespan, and can help with some difficulties in



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Red-tailed Black Cockatoo

reproduction and various health issues (for example, weight gain can prompt a propensity for growing tumors and other health issues, especially when space is restricted in captivity). We already know these issues similarly appear to affect the Galah. A significant pool of knowledge in cockatiel culture has already accumulated over the decades and could prove useful in providing a wider view or a reference when examining this family of birds.

Strides in nutrition and avian medicine have added greatly to keeping and raising avian species in captivity, and cockatiels have benefitted from many formal studies and observations providing noteworthy information. Additionally, cockatiel breeders throughout the world have established various gene pools of cockatiels and their mutations, which might prove informative as a reference.

Fortunately for aviculturists, a unique study was undertaken some years ago to address the evolution of cockatoos, which revealed some fascinating results.

### RESEARCH STUDY

Researchers at the University of California at Davis; David M. Brown, a Ph.D. student at UCLA; and Dr. Catherine A. Toft, professor at the Center for Populations Biology at UC Davis, conducted the study, “A Cockatoo’s Who’s Who: Determining Evolutionary Relationships Among the Cockatoos.” The study was published in volume 11, No. 2 of the *Exotic Bird Report* in the Psittacine Research Project of the Department of Avian Sciences at the University of California at Davis, and highlighted intriguing new findings.

To start, Brown and Toft acknowledged a lengthy history of the exhaustive work by other researchers identifying 350 species of parrots, beginning with Linnaeus in 1758, and which revealed the following facts before Brown and Toft began their own investigation.

First, it was found that cockatoos form a unique group in themselves among the parrots. Some of the more notable morphological characteristics include an erectile crest that can be lowered and raised at will (aiding many observers to be able to explain and interpret cockatoo body language), plus a lack of dyck texture in feathers that other parrots use to produce the blue and green colors that appear in their plumage.

Second, it was noted that cockatoos have traditionally been divided into two major groups, the predominantly black *Calyptorhynchi*, *Calyptorhynchus*, and the predominantly white *Cacatuini*, including *Cacatua*.

### EVOLUTIONARY RELATIONSHIPS

The goal of the researchers was to establish both the evolutionary relationships

between the cockatoos, and to determine an exact hierarchical order in which the cockatoos descended from a common cockatoo ancestor. The second question to consider was at what point in the evolution did the Gang-gang, Galah and Major Mitchell's Cockatoos depart from their common cockatoo ancestor? A major element in the research was to determine whether a cockatiel is actually a cockatoo. And, if it turns out that the cockatiel truly is a cockatoo, to which group of cockatoos is the cockatiel most closely related?

Researchers Brown and Toft built an evolutionary tree by sequencing a segment of mitochondrial DNA (a region of the ribosomal 12S gene) from 15 of 19 species of cockatoos. The researchers found that the genetic evolutionary tree confirmed the following results.

It was found that the first species to diverge from the common cockatoo ancestor was the Palm Cockatoo, followed

by a group that included the Gang-gang Cockatoo, the Red-tailed Cockatoo and the cockatiel. Later descendants to follow included the Galah, the Major Mitchell's and finally, the two groups of white cockatoos.

It was also discovered that the sexually dimorphic species that readily identified their gender differences such as the Gang-gang, Red-tailed Black and the cockatiel, are in fact more closely related to one another than to any other species of cockatoo. Additionally, it was specifically mentioned that the shared trait of sexual dimorphism by the above species is probably inherited from a common ancestor, as opposed to evolving as an independent trait.

Of significant import, it was determined that the cockatiel is indeed a cockatoo and is most closely related to the black cockatoos in the genus *Calyptorhynchus* (the Red-tailed, Yellow-tailed,

White-tailed and Glossy Cockatoo), and the Gang-gang Cockatoo of the genus *Callocephalon*.

Additional research revealed that the white cockatoos that include the Moluccan, Blue-eyed, Greater Sulphur-crested and Lesser Sulphur-crested Cockatoos most notably shared prominently colored crests, rounded wings and heavy beaks.

Furthermore, the remaining group of white cockatoos containing the Red-vented, Little Corella, Ducorp's and Goffins carried shorter crests, slender wings and smaller beaks.

Interestingly, the primarily deep pink cockatoos that include the Galah and Major Mitchell's—based on the researchers' DNA data—very likely evolved after the Palm Cockatoo and black cockatoo groups (including the cockatiel), but prior to the existence of the two white cockatoo groups. This fact indicated that the two white cockatoo groups did not evolve

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on the evolutionary tree until much later or further along.

Finally, it was determined that cockatoo species that originated at the base of the evolutionary tree are distributed across Australia. It was also found that cockatoo species that split from their common ancestor, evolving in more recent history, spread northward to New Guinea, Indonesia and the South Pacific Islands.

## ANOTHER COCKATOO

Many cockatiel enthusiasts have long regarded the cockatiel as a miniature cockatoo. The nominant grey cockatiel in its wild form is more closely aligned to the black cockatoos, sharing their darker color, distinctive cheek patches and under tail-barrings. It is easy to see how the smaller, wild, dark grey cockatiel could be related to the black Red-tailed, Yellow-tailed, White-tailed and Glossy Cockatoos sharing similar facial cheek marking, scalloping, flecking, spottings and under-tail barrings. Even the mutation cockatiels of today, such as the newer yellow-cheek and golden-cheek cockatiel mutations, among others, display the cheek markings of some of its larger cousins.

Cockatiels similarly share the same unique powder-down feathers and lack of dyck feather texture that prevent them from displaying any authentic green or blue feather colors as seen in other Psittacine birds. Many aviculturists are aware that the whiteface cockatiel is the genetic form of the blue allele, which can also be seen in the “blue” mutation form of the



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### Black Palm Cockatoo

Galah Cockatoo.

In more recent years two examples of a successful hybridization between the cockatiel and the galah have produced at least two known “Galatiels” in two Australian aviaries. These babies were viewed at conventions and verified by other aviculturists and their story is documented in several Australian avicultural consumer magazines. Videotapes were also released for wide viewing.

Cockatiels share the cockatoo’s erectile crest, characteristic of all cockatoos, and an obvious enthrallment for endless head scratching sessions, but with a bonus of vocalizing with a much quieter voice.

The cockatiel—or smallest of cockatoos—with many of the characteristics of a large cockatoo built into a much smaller “package,” make it an excellent alternative for anyone who cannot keep a larger cockatoo. And, because of its propensity to reproduce quickly, a closer study might prove useful for possible reference when

considering cockatoo behaviors or other aspects of cockatoo culture.

Aviculturists can be grateful to researchers Brown and Toft for forging the answers to these intriguing questions that once held long debate. Many an aviculturist working with reproducing cockatiels will be surprised to learn that they are, in fact, a breeder of cockatoos—albeit, “the littlest cockatoo.”

## FUTURE STUDIES

To learn more about avian research at UC Davis, or to make a donation to future projects, contact:

The Psittacine Research Project  
Department of Animal Science  
University of California  
One Shields Ave.  
Davis, CA 95616-8521.

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## REFERENCE

Brown, David, M., and Toft, Catherine, A. A Cockatoo’s Who’s Who: Determining Evolutionary Relationships Among the Cockatoos. *Exotic Bird Report*, Volume 11, No. 2. Psittacine Research Project, Department of Avian Sciences, University of California, Davis, CA.



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