

## #EXTINCT SPECIES

If birds are dinosaurs, why aren't they cold-blooded?

If dinosaurs were reptiles, then why aren't birds cold-blooded?



For more than 100 years, researchers assumed that dinosaurs were like giant lizards, sluggish reptiles that spent most of their day basking in the sun. This image changed when we started to realize that dinosaurs were far more similar to birds than to modern-day lizards. Today, researchers agree that birds are technically dinosaurs, the only ones to have survived the mass extinction 66 million years ago. Yet, if that's true, why aren't birds cold-blooded like most modern-day reptiles?

The answer is straightforward. Most dinosaurs were probably warm-blooded, too. Birds are descended from a diverse group of two-legged dinosaurs called *theropods*, which included giant, meat-eating predators like 'Tyrannosaurus rex,' as well as the smaller 3-foot-long (1 meter) 'Mononykus.' Like mammals, birds are warm-blooded, or endothermic, meaning they internally regulate their own body temperature. *Endothermic* animals have a higher metabolism, which permits more physically demanding activities like flying but requires more calories to maintain.

"Animals, that are warm-blooded, are usually more active," Holly Woodward, a professor of Anatomy and Paleontology at Oklahoma State University, told *Live Science*. "They can be active into the night. And so it's an evolutionary strategy in which you can be foraging for food when other animals can't, because they're too cold and slow."

Birds, generally, have a higher metabolism than similarly sized mammals and keep their body temperatures up, between 106 and 108 degrees Fahrenheit (41 to 43 degrees Celsius). Hummingbirds, which flap their wings 720 to 5,400 times per minute, need to consume about half their body weight every day, or eat every 10 to 15 minutes.

In contrast, cold-blooded animals, or *ectotherms* like most modern reptiles and fish rely on their environment to change their body temperature. Because they don't expend as much energy heating themselves, they don't need to eat as regularly, alligators, for example, can go more than a year without food. For years, researchers

assumed that because most modern reptiles are ectothermic, ancient reptiles must have been, too.

"So often, if you look at living animals and make an assumption about the ancestral state based on the current condition, it will lead you wrong," Jingmai O'Connor, associate curator of Fossil Reptiles at the Field Museum in Chicago, told *Live Science*.

Views started changing around the late 1960s, with the discovery of a bird-like specimen called 'Deinonychus.' Since then, researchers have found physical characteristics that indicate many dinosaurs, including ancient birds, were warm-blooded. The presence of feathers is one such indication. Feathers help animals conserve body heat, which isn't needed in ectotherms.

In her lab, Woodward has been looking at another proxy, *bone tissue microstructure*. She's found that endotherms have much different bones than ectotherms, mostly because ectotherms usually grow more slowly. This growth rate is reflected in the bones' mineral component, which she described as 'little fibers.'

"I imagine them kind of Pick-up sticks. If you're growing really slowly, those fibers tend to orient themselves parallel to each other, and so they become flat," Woodward said. "But if you're growing faster, the fibers are just sort of a jumble," which is the type of structure she tends to see in warm-blooded bones.

Her observations have shown that dinosaurs' bone structures are more similar to birds' and mammals' than to crocodiles'.

Exactly when warm-bloodedness first popped up is unclear. All dinosaurs (including birds) and crocodiles share a common reptilian ancestor, and both Woodward and O'Connor said that there's good evidence that this ancestor was warm-blooded meaning *endothermy* arose prior to dinosaurs. Cold-blooded dinosaurs would have appeared later.

But it's possible that endothermy showed up even earlier. If both mammals and most reptiles were endothermic, perhaps, their common ancestor, which lived about 310 million years ago, was also endothermic. "However, endothermy, most likely evolved independently in mammals," O'Connor said.

# The Most Stupid Rules in Language

The English language prohibition against 'preposition stranding,' ending a sentence with a preposition like with, at, or of, is a fantastically 'stupid' rule that, when followed, often has the effect of mangling a sentence. And yet for hundreds of years, schoolchildren have been taught to create disastrously awkward sentences like "With whom did you go?" The origins of this rule date back to one guy you may have heard of. Of whom you may have heard. Whatever. His name was *John Dryden*.

• Dan Nosowitz

There are thousands of individual rules for proper grammatical use of any given language. Mostly, these are created, and then taught, in order to maximize understanding and minimize confusion. But the English language prohibition against 'preposition stranding,' ending a sentence with a preposition like with, at, or of, is not like this. It is a fantastically 'stupid' rule that, when followed, often has the effect of mangling a sentence. And yet for hundreds of years, school children have been taught to create disastrously awkward sentences like, "With whom did you go?" The origins of this rule date back to one guy you may have heard of. Of whom you may have heard.

Whatever. His name was *John Dryden*. Born in 1631, John Dryden was the most important figure throughout the entire Restoration period of the late 17th century. He was more prolific, more popular, more successful, and more ambitious than any of the other writers of his era, and his era included John Milton.

He was England's first official poet laureate. He wrote dozens of plays, poems, and works of satire, literary prose, and criticism. The best modern edition of the collected works of John Dryden took the University of California Press about 60 years to create, and runs to 20 gigantic volumes.

He invented the heroic couplet. He was the most important translator of classics into English for hundreds of years, possibly ever. He was, without a doubt, *the guy* in the London literary scene of the late 17th century, and that was a very important scene.



Dryden's House.



John Dryden.

## #LANGUAGE



John Dryden, The English Poet and Playwright being introduced to Alexander Pope.

## Hostile Response

That said, Dryden was routinely mocked by his contemporaries. He does not seem to have been particularly well-liked. "There is more hostile response to Dryden than there is to any other early modern writer. I think than any other writer, period," says Steven Zwicker, a professor at Washington University in St. Louis, who is one of the premiere Dryden scholars in the world. Dryden twice stated an opposition to preposition stranding. In an afterword for one of his own plays, he criticized Ben Jonson for doing this, saying, "The preposition in the end of the sentence, a common fault with him, and which I have but lately observed in my own writing." Later, in a letter to a young writer, who had



asked for advice, he wrote, "In the correctness of the English, I remember I hinted somewhat of concluding (sic) your sentences with prepositions or conjunctions sometimes, which is not elegant, as in your first sentence." Dryden does not state why he finds this to be "not elegant." And yet some-

how this completely unexplained, tiny criticism, buried in his mountain of works, lodged itself in the grammarian mind, and continued to be taught for hundreds of years later. This casual little comment arguably be Dryden's most *enduring creation*. It's a little bit sad.

## Lightning Safety Awareness Week

Lightning Safety Awareness Week, celebrated in June, sparks crucial conversations about a powerful natural phenomenon. This week is vital because lightning strikes can be deadly, causing significant injuries and fatalities each year. Despite its potential dangers, lightning often doesn't receive the attention it deserves compared to other weather-related threats. The purpose of *Lightning Safety Awareness Week* is to educate the public on the dangers posed by lightning. It also promotes safety measures that can reduce the number of injuries and fatalities.



## Weird Place

Following the death of Oliver Cromwell, England was in a pretty weird place, and the English language was in a weirder one. The monarchy had been restored, but during Cromwell's reign, an awful lot of English writing had been stunted, and for a time, plays were even banned, for fear of public political criticism. That's a bigger deal than it sounds, because during the latter half of the 17th century, literacy rates in London, by far the highest in the country, were only around 20 per cent. The language evolved on the stage, and that development was paused for a few decades.

At the time, there was at most a handful of what are called *English grammars*, basically books instructing the proper way to use the English language. In the Restoration period, when Dryden was a star, the discussion of exactly what the English language was (and, in turn, who the English people were, and what England was) began to really rapidly evolve.

Dryden is not very well-known today but at the time, he was the leading literary rockstar, and his words carried a huge amount of weight. He wasn't really one of the leading

grammarians of his time, being focused more on his plays and criticism, but "he did," says Zwicker, "have very firm opinions about what he considered good writing and what he considered bad writing." Other writers of the time were hostile to Dryden, attacking him for changing his religion from the Church of England to Roman Catholicism, his political affiliation, for his ambition, and, it seems, because he was sort of a boring and witless conversationalist. You might expect that the guy to ban preposition stranding would be a pithy Mark Twain or Oscar Wilde type, full of great bawdy quotes. But Dryden wasn't that at all. "No one admired him for his verbal wit," says Zwicker. "Certainly his writing is wonderful and clever, but he had practically no verbal presence at all." It is a really weird bit of a mystery why he was so loathed at the time. Zwicker suggests that some of it was probably envy at Dryden's success, some was legitimate criticism of his style, and some was vague personality stuff. But a lot of this stuff seems like subtext, as if Dryden was attacked because he was Dryden and the reasons given might not have been telling the full story.

## Love for Classics

Dryden loved the classics. He was easily the most prominent translator and critic of Ovid, Horace, and Virgil, although his translations (like a lot of his own writing) were sort of bombastic and larger-than-life.

He was fluent in Latin and worshipped the classics. And English was in a place where it was about to accelerate, it had been paused and now it was un-

settled. Dryden's ideas about "what English should be" were heavily motivated by Latin and Latinate ideas. It's believed that this is where his preposition thing comes from. In Latin, the preposition, as indicated by the first three letters of the word 'preposition,' always comes before the noun. It is assumed that this is what motivated Dryden to make this case.

This is kind of a paradox as well. Dryden worshipped the classics, and was motivated by classical Latin, but was a defiant modernist, maybe even a

progressive. He critiqued Shakespeare and Ben Jonson, applauded the newer writers of his own era, invented new forms, which he then sought to popularize. But that's the hold that the classics have. Even when you're trying to push things forward, the classics are always there.

What's so frustrating about this whole preposition thing is that there doesn't appear to be an easy answer as to how it became so completely lodged in formal English grammar.

There are all these little hints as to why it might have taken hold. It is an easy-to-understand *grammarian rule* that came about at a time and place when English grammar was rapidly taking form, and it came from the mouth of the biggest literary figure of the time. But like Dryden himself, it's a hard rule to get a hold of. Of which to get a hold.

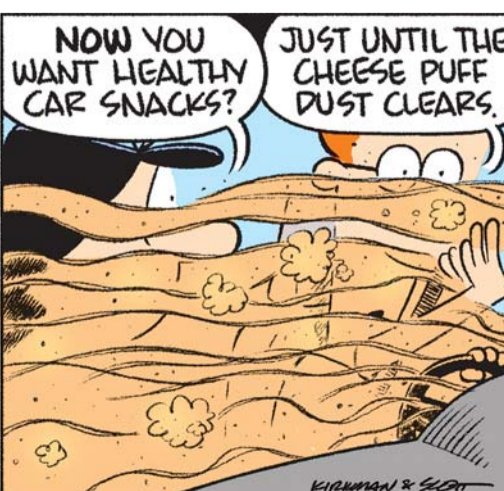
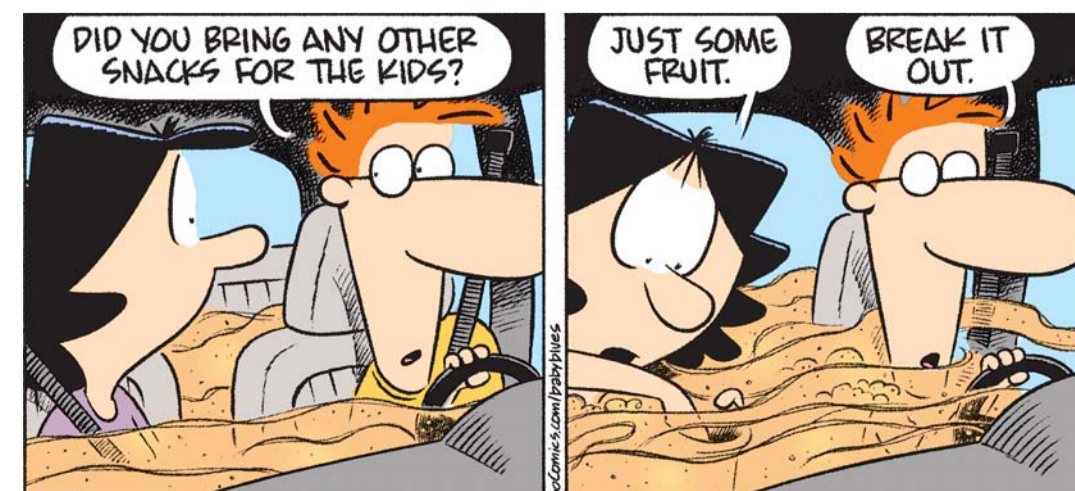
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University of California Press.

By Rick Kirkman & Jerry Scott

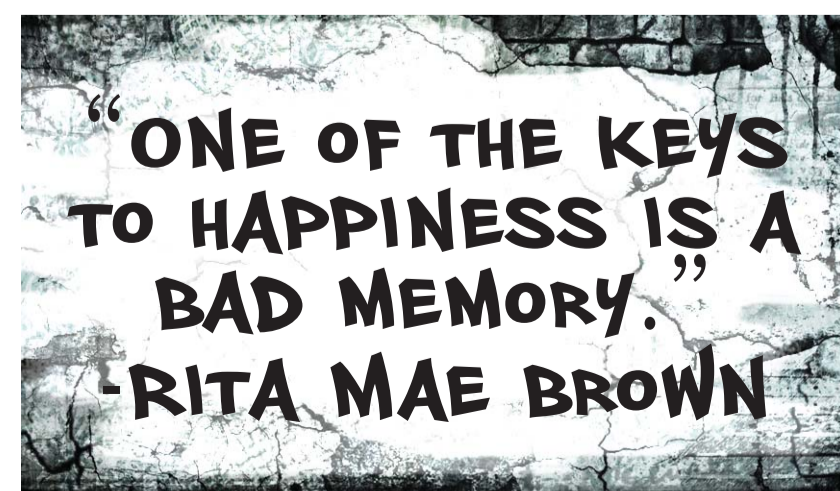
## BABY BLUES



## ZITS



By Jerry Scott & Jim Borgman



## #FITNESS

# Healthy Habits

It may be in your best interest to trade five minutes of scrolling in favour of one of the five science-backed, health-boosting activities listed below.



### Focus On Your Breath

If you feel like you don't have enough time for daily self-care beyond the basics, you aren't alone. Many people cite their busy schedules as barriers to having healthier lifestyles. But what if you only need five minutes?

Believe it or not, there are quick, practical activities that you can do in five minutes or less to make a measurable positive impact on your health and wellness.

If you're still not convinced that you can find the time, consider reclaiming those minutes from a less productive, time-consuming activity. How often do you check social media accounts, mindlessly scrolling through posts only to look up and realize 5, 10 or even 20 minutes have passed? With excessive social media use linked to negative mental health implications, if you're one of the 7 in 10 who use social media, it may be in your best interest to trade five minutes of scrolling in favour of one of the five science-backed, health-boosting activities listed below.



### Take A Quick Stroll

Research has shown that 10,000 steps a day can reduce your risk of cancer, heart disease and early death, but newer research has found that any amount of walking helps. So just one *five-minute walk* around your neighbourhood or inside your office building has health-boost-

ing benefits. Taking it a step further (pun intended), walking for five minutes every 30 minutes produces an immediate measurable reduction in both blood pressure and blood sugar, according to a recent study.

Unlike lofty resolutions for better health, such as giving up

cheese or chocolate forever, the five-minute activities listed above are more practical. With consistent practice, they can become sustainable healthy habits that deliver wellness-boosting benefits over your lifetime, a potentially *longer lifetime* because of those five-minute habits!

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### Connect With A Friend

Take five minutes to *feel seen and heard* each day, and return the favour for someone else. If you can't meet up with a friend or loved one in person, screen time can actually work in your favour by enabling video chatting. It's always better to talk in person, but socializing in any way that helps you feel supported can ward off loneliness and feelings of isolation, which are associated with declining cognitive skills, depression, heart attack, stroke and early death. If scheduling makes it difficult to connect with friends daily, make a point to strike up conversations with others as you run errands.

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