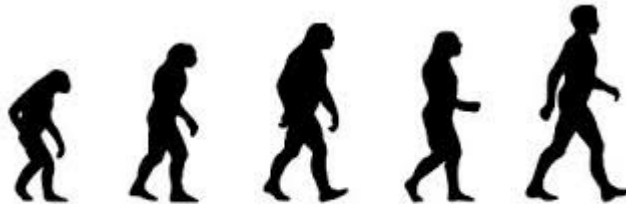


THE LEAKEY FOUNDATION Origin Stories Episode 2 Why Do We Get Hiccups?
June 8, 2016



THE LEAKEY FOUNDATION

Origin Stories Episode 2: Why Do We Get Hiccups?
June 8, 2016

Meredith Johnson

0:00:04

This is Origin Stories, the Leakey Foundation podcast. I'm Meredith Johnson.

Today's story is from producer, Ben Nimkin and it's about something we've all experienced, but don't usually think much about. Hi, Ben.

Ben Nimkin

Hey, Meredith.

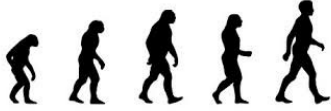
Meredith Johnson

So, why hiccups?

Ben Nimkin

Yeah. So, my girlfriend, Anna, pretty much always gets the hiccups when she goes outside on a winter day.

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Meredith Johnson
That's pretty weird.

Ben Nimkin

I know, right? And they totally drive her crazy, because hiccups are annoying and they're also super wacky and they don't seem to serve any purpose. And it got me thinking—you know—there's something else going on here. You know, there needs to be some reason for humans to have hiccups.

Meredith Johnson

And it turns out there is a reason—an ancient reason. There's a lot more to the hiccup than you think. For most of us, it's a temporary annoyance, gone in a few minutes. But some people aren't so lucky.

Ben Nimkin

Charles Osborne was a farmer living in Iowa, 28 years old, 5'4" tall, and pretty muscular. And one day in 1922, he was feeling pretty sure of himself and he lifted up a 350-pound pig for slaughter, but the pig got the best of him and he fell to the ground. Osborne picked himself up, dusted himself off, and got back to work. But a little while later, he began to hiccup. His hiccups continued for several days, then months, then decades.

Terry Anthoney

Charles Osborne—yeah well, to me he was Charlie.

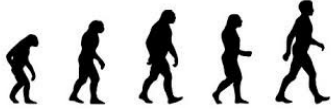
Ben Nimkin

That's Charlie Osborne's doctor, Terry Anthoney. Osborne traveled as far as Alaska to try to get treatment for his hiccups. A friend even fired a shotgun right behind Osborne to try to scare the hiccups out of him. Fifty years into his bout of hiccups, he sought the help of Dr. Anthoney. Anthoney specializes in neuroanatomy. At the time, he was teaching at Southern Illinois University and researching the biological background of behavior.

Terry Anthoney

One of my favorite lectures to give is "The Honorable Heritage of the Humble Hiccup."

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Ben Nimkin

Would you describe yourself as a hiccupologist?

Terry Anthoney

Yes, yes.

Ben Nimkin

You don't have to say anything. Okay.

Ben Nimkin

Osborne hiccupped continuously for sixty-eight years.

Terry Anthoney

His hiccups were intractable. That's the word that we use in medicine when it seems very difficult to have them go away, to be cured.

Ben Nimkin

But Osborne also didn't necessarily want to be cured.

Terry Anthoney

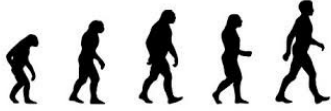
We tried some therapies but one of the problems—Charlie was already in his seventies, I believe, when I started working with him. On the one hand, he would say he would do anything to get rid of the hiccups, but on the other hand, the hiccups were really a very important social tool for him to get attention.

Ben Nimkin

His hiccups brought him over four thousand letters of sympathy. He was featured on the *Johnny Carson Show*, *People Magazine*, and made the *Guinness Book of World Records*. Anthoney can only speculate the exact cause of Osborne's hiccups, but he believes that at some point between when he picked up that pig and when he fell, a tiny hemorrhage had formed in his brainstem, specifically, a part of the brain that can be traced back to our earliest air-breathing ancestors.

Meredith Johnson

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The ancient Greek physician Galen thought hiccups were the escape of violent emotions fleeing the stomach through the mouth. Modern doctors see hiccups as more closely related to the breath.

Jeff Laitman

We are air-breathing mammals. The most important thing we have to do is breathe.

Ben Nimkin

This is Dr. Jeff Laitman. Dr. Laitman is an Anatomist and a Physical Anthropologist at the [Icahn School of Medicine at Mount Sinai](#).

Jeff Laitman

I'm a Professor of Medical Education and a Professor of Otolaryngology and also a Professor of Anthropology at the City University Graduate School.

Ben Nimkin

That's many things. What else are you into?

Jeff Laitman

What else do I do? Well, according to my daughter, I'm the third most boring person on the planet.

Ben Nimkin

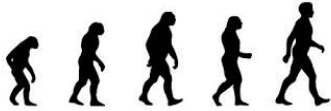
No. That first sound of the hiccup, the (gasps) is the sound of a super-quick intake of breath. It's caused by a sudden spasm of the diaphragm—that's the big muscle under your lungs. Almost as soon as you start breathing in, the doorway to your lungs closes. That doorway is called the larynx.

Jeff Laitman

That's what I work on. So, the larynx is a super-special structure that deserves all our respect and love. And inside this wonderful house is given our vocal folds, or vocal cords as the general public knows them, which open and close to protect. It's a key protector.

Ben Nimkin

Okay. So, you've got the diaphragm, the big muscle below your lungs; you've got the larynx, that wonderful house that protects your lungs and the vocal folds inside. And they all do something really



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weird when you hiccup. Your diaphragm spasms and immediately afterward, your vocal folds shut tight.

Jeff Laitman

So, I'll give you a little example. If your vocal folds weren't working correctly, you couldn't lift a heavy object, you couldn't poop if you were constipated, and you couldn't give birth to a baby.

Ben Nimkin

Why?

Jeff Laitman

Because when they close, they increase the pressure in the thoracic or abdominal areas. Next time—I don't want to get inelegant—but when you go to the bathroom, if you're constipated, you're not going to sit there and sing.

Ben Nimkin

You have this (making grunting noise).

Jeff Laitman

That's right. That sound you're hearing, that's the vocal folds coming together. They allow you to increase intraabdominal pressure and they allow you to use muscles to help nature do its duty, so to speak.

Ben Nimkin

What?

Jeff Laitman

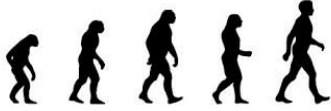
So, if your vocal folds weren't working, you couldn't do that and you couldn't lift a heavy object.

Ben Nimkin

For the same reason.

Jeff Laitman

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Same reason.

Ben Nimkin

All these parts of the hiccup—the diaphragm and the lungs, along with the larynx and the vocal folds are controlled by the brainstem, which is where Dr. Terry Anthoney suspects Charlie Osborne had his injury.

Meredith Johnson

Hiccups present a challenge to researchers. You can't just make someone hiccup. Osborne, with his intractable hiccups, was the perfect test subject.

Ben Nimkin

Anthoney started bringing Osborne into his research lab.

Terry Anthoney

In humans in general, the major drive for breathing—one might think it would be lack of oxygen, but it's not. The major drive and the one that kicks in first is increased levels of carbon dioxide.

Ben Nimkin

When your CO₂ levels go up, your brainstem and your lungs go into overdrive to try to get those CO₂ levels to get back to normal. And this is the crazy part: When Anthoney brought Osborne to the lab—

Terry Anthoney

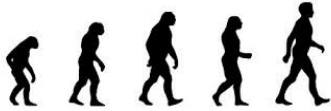
We did a treatment that had to do with giving him increased amounts of carbon dioxide in the air he was breathing and the hiccups went away.

Ben Nimkin

They went away because that major drive to get rid of CO₂ went crazy and it overpowered the part of the brain that was giving Osborne the hiccups. But the results were only temporary.

Terry Anthoney

After an hour or so they came back.



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Ben Nimkin

Anthony also wanted to see how Osborne's hiccups were affected by oxygen levels.

Terry Anthony

We gradually increased the amount of oxygen in the air that he was breathing and as we increased it, he breathed more and more slowly. And when we got to somewhere between thirty-five and forty percent oxygen, he stopped breathing and he simply sat there hiccupping. And I asked him how he was doing. He said fine, so we just let him sit there and hiccup and not breathe for five minutes or so. And then we started decreasing the oxygen and sure enough the breathing came right back in without any problem.

Ben Nimkin

Osborne was getting all the oxygen he needed from the hiccups, which show that hiccups are actually a type of breathing. That hemorrhage in Osborne's brainstem affected the part of the brain that regulates breathing. In other people with this type of damage, the hiccups usually go away after a week or so. But in Osborne, the damage was so uniform across the brainstem and he went so long without treatment that the neural pathways of the hiccup behavior became ingrained. This part of the brainstem that controls breathing and hiccups is super, super old—like hundreds of millions of years old. This has led some evolutionary biologists to theorize that the hiccup may go back to our earliest air breathing ancestors. I'll let Dr. Richard Wilson explain.

Richard Wilson

Hello, Ben. My name is Dr. Richard Wilson from the University of Calgary. My lab investigates the neural control of breathing and how breathing evolved.

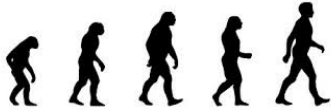
Ben Nimkin

So, somewhere around 400 million years ago, breathing fish began to move onto land and they also started breathing air. But there was a period when you had creatures that could breathe both air and water, kind of like amphibians do today.

Richard Wilson

In mammals, there are two rhythm generators.

Ben Nimkin



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This is what Wilson and his colleagues call the neurons in our brains that regulate our breathing.

Richard Wilson

One for inspiration and one for expiration. The inspiratory rhythm generator is located in the tail end of the brainstem. We call it the [pre-Bötzinger complex](#), named after—believe it or not—a bottle of wine. This is the only part of the brain that’s labelled after an alcoholic beverage. It clearly demonstrates that respiratory physiologists like to party.

Ben Nimkin

All right, all right. Dr. Richard Wilson has been trying to identify and understand exactly how and when these neurons, or rhythm generators evolved.

Richard Wilson

To address this, my lab has been studying the neural control of breathing in frogs and tadpoles. In these fascinating creatures, we can see the transition from water breathing, to water and air breathing, to air breathing, a journey that likely took millions of years of evolution.

Ben Nimkin

The pre-Bötzinger complex, this bundle of neurons that controls the way we breathe, is also what governs gill breathing in fish and tadpoles. And millions of years ago, it just got repurposed from seeking oxygen in the water to seeking oxygen in the air.

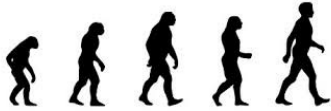
Richard Wilson

Our work in frogs suggests that lung breathing is controlled by a rhythm generator in the nose end of the brainstem.

Ben Nimkin

This part of the brain has yet to be named, but I would like to suggest the Pinot Grigio complex, just to stick with the theme. Wilson and his research team figured out that this pre-Bötzinger complex and the other rhythm generator that he saw in frogs and tadpoles might have something to do with the human hiccup.

Richard Wilson



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While mammals use their diaphragm to suck air into their lungs, frogs pump air into their lungs using their mouth. In the frog, as the lung inflates, the animal must clamp shut the valve to the lung to stop the air escaping. There are only two occasions when this occurs in mammals. The first is as a defensive reflex, where food threatens to enter the lung.

Ben Nimkin

That's the gag reflex.

Richard Wilson

The other is the hiccup. It's the closure of the valve to the lung during inspiration that produces the peculiar sound.

Ben Nimkin

Charlie Osborne's brainstem injury somehow woke up this ancient breathing circuit, a circuit that once allowed amphibians to breathe and gave Osborne the hiccups. Once that circuit turned on, it became part of his regular breathing rhythm generator. It was only when he was exposed to a high level of CO₂ that the other part of his brain—the breathing circuits that evolved later—took hold and forced him to breathe normally.

Meredith Johnson

Hiccups seem to be a vestigial trait, something that evolved into existence long ago that's lost its original function. So, why have hiccups persisted for so many millions of years, when we've evolved new circuits to control our breathing?

David Lahti

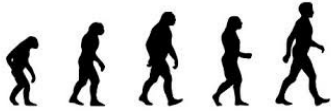
A classic idea in evolutionary biology, a classic prediction with regard to trait evolution is that behavior should evolve faster than morphology.

Ben Nimkin

This is Dr. David Lahti. He's a Behavioral Biologist at the City University of New York.

David Lahti

Morphology, body parts, behavior is what you do.



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Ben Nimkin

The hiccup probably evolved very quickly because it's a behavior. It certainly evolved faster than animals evolved tails. But humans don't have tails anymore and we still have hiccups. Behaviors often stick around because they don't pose a threat to our survival. Think about it, useless physical traits are more dangerous than behavior. What's going to slow you down more if you're running from a tiger: a tail or a hiccup?

David Lahti

A behavior you can turn off when you don't need it. You only exhibit it in certain circumstances. And so, a behavior is more likely to persist over evolutionary time, even without function.

Ben Nimkin

Hiccups don't come around too often. It doesn't impact reproduction. I mean, even Charlie Osborne managed to get married and have kids with his hiccups. And the hiccup may actually still have some value like another vestigial trait, the appendix.

David Lahti

The appendix may still retain some function, for instance, immunologically or in maintenance of the intestinal flora, despite the fact that its original major function was to digest cellulose in plant matter.

Ben Nimkin

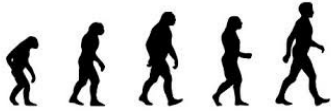
And just like the appendix, in 400 million years of evolution, the hiccups also picked up a few new functions. Dr. Terry Anthony did a lot more research into breathing and hiccups besides just working with Charles Osborne and it turns out hiccups play an important role in early human development.

Terry Anthony

And so each time there is a hiccup, there is a sudden and just transient increase in abdominal pressure.

Ben Nimkin

Which is the same thing that happens when you make that grunt sound (making grunting sound), like when you're really exerting yourself. Babies don't have the muscle control for this.



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Terry Anthoney

And so, until those reflexes occur, the hiccup is going to occur more frequently, in order to help the baby to get the food through the intestines.

Ben Nimkin

Which is one reason why babies hiccup more than adults.

Child

Got hiccup. I think it's—it's from everything I ate.

Ben Nimkin

Most of us actually hiccup daily. One might just sneak out and they can be caused by a million different things. You could hiccup because you ate too fast or you drank too much, because of a change in temperature, or because of a cancer treatment. Some people even start to hiccup when you scratch a certain spot on their chin. Charlie Osborne's hiccups stopped mysteriously in 1990 after he'd hiccupped an estimated 430 million times. He died a few months later.

Female Speaker

So it's like (making hiccups sounds).

Male Speaker

So (hiccups), there you go. I got the hiccups.

Female Speaker

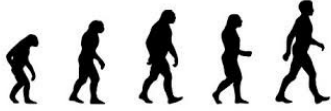
(Hiccup).

Ben Nimkin

Oh my God. Was that a hiccup?

Female Speaker

Yeah. (Laughing).



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Male Speaker

I think it's about over. (Hiccups). Nope.

Meredith Johnson

Wait. Ben, we can't end this story without hearing Dr. Anthony's favorite hiccup cure.

Terry Anthony

You can use a hiccup buster.

Ben Nimkin

That's right. Dr. Terry Anthony has created himself a hiccup buster. And you can make your own. Here's what you do.

Terry Anthony

What I used initially was a milk jug and I cut out the bottom.

Ben Nimkin

Then you'll need a few plastic bags, like a narrow trash bag. And you put it over the bottom of the milk jug.

Terry Anthony

I duct taped it very, very carefully around and I put another bag over that bag. Then I went to the hardware store and I bought a piece of plastic PVC pipe—

Ben Nimkin

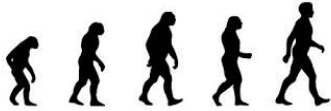
And you tape that pipe to the mouth of the jug to use as a mouthpiece.

Terry Anthony

The apparatus is complete. Now what you have to do, is you lie down, comfortable position—

Ben Nimkin

Okay. Then you clip your nose shut and you start breathing into the hiccup buster.



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Terry Anthoney

And you just breathe normally. You don't try to breathe hard or anything. You just breathe and as the CO₂ builds up, you find yourself breathing more deeply, you're going to be breathing more frequently, until it's really work. And what will happen is that the hiccups will get less and less frequent and then they will stop.

Ben Nimkin

Basically it's the same idea as breathing into a paper bag, but more effective. Really, anything that can disrupt your breathing has a good chance of disrupting your hiccups. Drink from the far side of a glass of water; have someone really scare you; suck on a lemon wedge; or my personal favorite, stick out your tongue and pull on it. Whatever method you choose, Dr. Anthoney says that if you can stop them within the first five hiccups, that should keep them from coming back. For "Origin Stories," I'm Ben Nimkin.

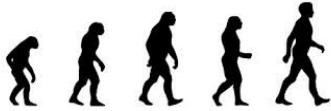
Meredith Johnson

And I'm Meredith Johnson. I used the drinking water upside down method. We'll have show notes for this episode on our website, originstoriespodcast.org. We tweet at [@originpodcast](https://twitter.com/originpodcast) and we'd love to hear your hiccup cures there or on our [Facebook page](#).

I want to thank all of you for listening, sharing, tweeting about, rating, and reviewing our show. The response to the first episode was overwhelming and so exciting. We really can't wait to share more stories with you.

Origin Stories is a project of the Leakey Foundation. The Leakey Foundation's mission is to increase public understanding of human origins, evolution, behavior, and survival. You can learn more about the Leakey Foundation at leakeyfoundation.org. That's L-e-a-k-e-y foundation.org. You can find and follow us on [Facebook](#) and [Twitter](#) too.

Our show is made possible with support from [Wells Fargo Bank](#). And we have a new sponsor, [Adept Word Management, Intelligent Transcripts](#). They are a wonderful service, and thanks to them, you can now read transcripts of all our episodes on our website.



Thanks to producer Ben Nimkin for bringing us today’s story. Our editor is Audrey Quinn. Music in this episode is by David Osip. Thanks for listening.

Transcript and pre-production transcript by AdeptWordManagement.com.

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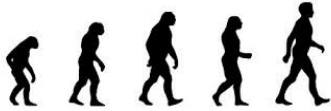
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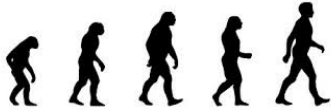
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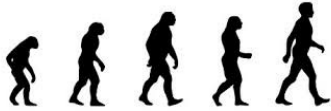
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