

# Seven signs that you might be a mammal

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Image 1: People may not be as furry, cuddly and aquatic as sea otters, but they are mammals just like us! Photo from: Wikimedia Commons.

You likely know that you're a mammal. You do not have feathers or a shell. You cannot breathe underwater. And you only have to look at an ant to feel the vast spans of evolutionary time that lie between you and insects. But are you absolutely sure? Are you 100 percent confident that you're a mammal, and not some exotic form of mollusk? Well, now you can be, with this easy-to-use guide!

## You Have Hair

We humans are no longer particularly hairy, but we retain patches of this uniquely mammalian structure in a number of places. Among mammals, only dolphins – after they've shed the few whiskers they're born with – are completely bald.

For most mammals, hair is elemental to their warm-blooded lifestyles. For the first mammals – tiny little creatures that lived about 200 million years ago – acquiring fur coats slowed down heat loss. This was necessary for the evolution of warm blood.

It is still uncertain how hair first evolved, though. The usefulness of a few straggly prototype hairs is hard to fathom. They certainly wouldn't have kept anyone warm. It's now thought that these fine protrusions may originally have acted as either sensory structures – like whiskers do today – or they may have been wicks for getting sweat-like secretions out of the sweat glands and onto the body. Perhaps only later did a thicker coating of them become insulating.

Retaining hair on our human heads makes sense. Given how much energy a brain devours, one wouldn't want to lose too much heat there. The hair beneath our arms is more surprising. One theory is that it helps waft body scents around between members of our species.



## **You Did Not Depart Your Mother Inside An Egg**

Nope, at birth you were screaming and wriggling and ready to go. That said, a little too much has been made of mammalian live birth. Entering this world unencased in an eggshell doesn't necessarily make you a mammal. Numerous reptiles and fish have dispensed with laying eggs. Meanwhile, platypuses and their spiny cousins, echidnas, still lay eggs, as all mammalian ancestors did, and as the first mammals also did.

You, though, are a placental mammal. A placenta establishes a very dynamic relationship between fetal mammal and its mother from the get-go.

## **Your First Meal Was Milk**

When you were born, you were unable to digest anything other than this vital mammalian invention. Indeed, mammals are named after the glands from which we all take our first meals. Marsupials are born at a ludicrously early stage of development. They then spend weeks or months permanently attached to one of their mother's teats.

How exactly mammals evolved lactation is another murky subject. If you look closely, it's clear that a mammary gland is a hypertrophied sweat gland. Most researchers now believe that before there was nutritious milk, there was a sort of sweated abdominal secretion that pre-mammalian mothers used to coat their eggs. Such a procedure may have protected against dehydration or fought off infections. Some of today's milk proteins are suspiciously like naturally occurring antimicrobials.



## **As An Infant, An Adult Looked After You**

Despite the absence of an eggshell, as a baby you couldn't really do anything for yourself. Some newborn mammals are way more capable than others. For example, baby wildebeests are up and running with the herd within minutes. Still, all of them rely on their mothers for some initial postnatal care. Having all your dietary needs met by your mother's mammarys is a very privileged upbringing. Contrast that to the majority of young reptiles. They crack themselves free from their egg origins and immediately have to fend for themselves. Birds are one exception. Birds are not mammals, but like mammals, they are very diligent parents.

The close bond between mother and young that was founded on milk also allowed the possibility of cultural exchange between generations to evolve. And the neurobiology of these bonds may have provided the foundations for further social bonds between mammals.



## **You Have A Diaphragm**

As a mammal, you have a sheet of muscle across the bottom of your ribcage. Leonardo da Vinci thought the diaphragm functioned to keep your body's spiritual parts – your heart and lungs – separated from your baser parts – such as your stomach and guts. But what the diaphragm actually does is make you breathe far more powerfully.

Being a mammal is a demanding task. Your organs demand constant fueling. So, you need to breathe and eat six to ten times more than a cold-blooded animal. Given this cost, the advantages of being warm-blooded are actually pretty hard to pin down. Some have suggested it's actually just a byproduct of being able to occasionally run hard, fast and long. Others have said the demands of parenting might have required warm blood.

## **Your Brain Is Strikingly Large**

You're a human, so of course you consider your abundance of cranial contents a zoological triumph. That said, whales and elephants have substantially bigger brains than you do. What makes yours special is its size relative to that of your body. It is about four-times bigger than a

chimp's and three times bigger than a gorilla's. Their body-sizes are roughly comparable to yours. However, while ancient hominids made quite the cerebral leap forward, the evolution of mammals saw an even greater hike in brain size.

As mammals first emerged, becoming increasingly warm-blooded, fossils of their craniums reveal a quite rapid expansion. Today, compared to a similarly sized reptile, a mammal's brain is 10 times larger.

There's clearly something unique about human brains. However, it's actually quite difficult to identify stark anatomical or genetic differences between our brain and those of other primates. But the grey matter that covers a human brain is a tissue that exists only in mammals. Grey matter is the wrinkled mass of microscopically layered cerebral cortex. It's thought to have evolved just before the arrival of true mammals as a new way of building a brain. Made mainly of this grey-matter tissue, and dependent on warm-bloodedness for its high running costs, the human brain is very, very much a mammalian brain.

## **Human-Only Traits Are An Evolution**

You are an animal whose biology was profoundly shaped by a 100-million-year stretch of evolution that ran from about 300 million to 200 million years ago. This evolution from some reptile-like ancestors (who'd recently evolved from the earliest-ever land-living vertebrates) sculpted a new type of animal – a mammal – that possessed a suite of traits that continue both to define how you live today and enable the emergence of all the quirky traits that make your human life so very interesting.

Yes, to understand what makes our curious species tick, you need to understand the evolution of human-only traits — like our brains and complex language, our nimble hands and upright posture. But to fully understand how we got to where we are today, it's good to acknowledge our mammalian heritage. We share it with the other 5,500 species of mammal that also live on this planet.

## Quiz

- 1 Which sentence from the article would be MOST important to include in a summary of the article?
- (A) And you only have to look at an ant to feel the vast spans of evolutionary time that lie between you and insects.
  - (B) Leonardo da Vinci thought the diaphragm functioned to keep your body's spiritual parts – your heart and lungs – separated from your baser parts – such as your stomach and guts.
  - (C) However, it's actually quite difficult to identify stark anatomical or genetic differences between our brain and those of other primates.
  - (D) You are an animal whose biology was profoundly shaped by a 100-million-year stretch of evolution that ran from about 300 million to 200 million years ago.

- 2 Read the following detail from the article.

*For the first mammals – tiny little creatures that lived about 200 million years ago – acquiring fur coats slowed down heat loss.*

How does this detail develop the central idea of the article?

- (A) It suggests that modern mammals do not need fur to help them stay warm.
  - (B) It describes the appearance of the earliest mammals.
  - (C) It helps explain why hair was important to mammals' survival.
  - (D) It shows why warm-blooded animals have an advantage over cold-blooded animals.
- 3 Read the section "You Have A Diaphragm."
- What does this section explain that other sections do NOT?
- (A) the food that most mammals require when they are first born
  - (B) examples of several body parts that mammals need to survive
  - (C) why mammals might have such high demands on their bodies
  - (D) how humans have evolved from the earliest mammals on Earth

- 4 Why does the author include information about wildebeests and reptiles in the section "As An Infant, An Adult Looked After You"?
- (A) to explain what causes certain species to abandon their young
  - (B) to outline a common problem that mammals encounter in the wild
  - (C) to give examples of animals that lay eggs instead of having live births
  - (D) to contrast with human babies' dependence on their mothers for survival