



CREATOR

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I Am Fearfully and
Wonderfully Made

THE BREATH OF GOD

In Jenny

*In His hand is the life of every creature and
the breath of all mankind (Job 12:10).*

Hi, I'm Jenny's¹ lungs. God's faithfulness, love, tender care, and wisdom resonate within me. With the air Jenny breathes, I faithfully harvest oxygen (O₂) for her needy cells—I do it more than ten million times a year! From blowing a fair-sized bubble with the gum she sometimes chews, to calling out when Jenny is hurt, Creator Jesus tirelessly applies me to the all-important work of breathing.

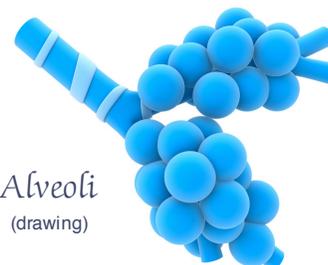
As Jenny draws in a breath, her nose humidifies, filters, and warms the air before it reaches me. I prefer that Jenny breathe through her nose—not through her mouth—because I am very sensitive to the condition of the air I receive. (Have you ever experienced an

ache in your lungs in winter? Cold, dry air irritates lung tissue if you inhale deeply.)

From her nose, air passes into Jenny's *pharynx* (FAIR - inks), which sits in the back of her throat, then enters a small hole at the top of the *larynx* (LAR - inks)—see *kids' kreation* #65. A special “trap door” called the *epiglottis* (ep - ih - GLOT - tis) seals off this hole when she swallows, preventing food and liquids from invading me. Jesus thinks of everything! The larynx is also known as the “voice box” because Jenny's vocal cords are located there.

Air next passes through the larynx and into a large corrugated tube, called the *trachea*, located smack-dab in the middle of me. Smaller and smaller tubes (bronchi and bronchioles) spread out from the trachea—like the branches of a tree (see image on page 2)—and penetrate my tissues.

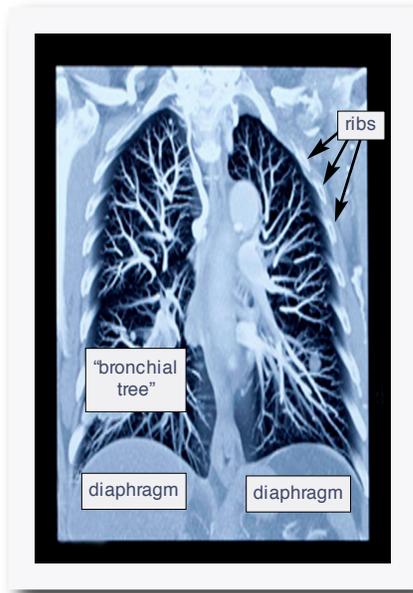
Inhaled air eventually reaches tiny air-filled sacs or *alveoli* (al - VEE - oh - lie). Under a microscope, they look like countless “clusters of grapes.” Collectively, her alveoli are lined with *hundreds of miles* (kilometers) of itsy-bitsy blood vessels called capillaries, and it's here



Alveoli
(drawing)

¹ Jenny is eight years old and a fictitious character.

A special image of Jenny's lungs



that oxygen enters Jenny's bloodstream. To insure that Jenny absorbs enough of this gas, God provides me with an incredible number of alveoli—300 million in total. Wow! Hemoglobin in her blood then carries oxygen to each of the 37 trillion cells² of her body.

The easiest way to understand what I do all day long is to think of your lungs as a “big sponge.” I soak up oxygen from the air Jenny breathes and “scrub” her blood clean of deadly carbon dioxide (CO₂)... actually, it's a bit more complex than that!

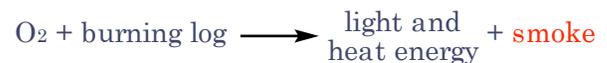
For years, people thought that the movement of oxygen from the lungs into the bloodstream was relatively simple. But little in Christ's creation is easy to comprehend—it takes hard work (Job 26:14). A few scientists now realize that the swap of “oxygen for carbon dioxide [in us lungs] is so complicated that it is more difficult to exchange O₂ for CO₂ than for a man shot out of a cannon to carve the Lord's Prayer on the head of a pin as he passes by.”³

Oxygen “fans the flames” of Jenny's metabolism, providing her with the energy to

live. But if this “fire” went out, Jenny would die; thus, oxygen is essential to her survival. On the other hand, if her cells were allowed to “burn out of control,” she would experience a raging fever. Thankfully, Creator Jesus carefully monitors and constantly tends to Jenny's energy needs.

The peanut butter sandwich Jenny ate for lunch is now being digested in my good friend, the stomach.⁴ Soon it will become fuel for her body—“tinder” to help maintain her metabolism. Sugar in peanut butter, for instance, is converted into energy by countless cells.

As food is utilized, oxygen (O₂) is consumed in much the way a campfire needs air:



Food is “oxidized” and energy released, and Jenny's cells give off carbon dioxide (CO₂) much like smoke produced by a burning log.

Now what happens to a campfire if there isn't enough wind? The campsite becomes engulfed with smoke, right? In a similar fashion, Jenny's cells can become “choked” with carbon dioxide, which is poisonous to the body. Creator Jesus designed Jenny's bloodstream as a means of removing excess CO₂ from the “campfire” of her cells, whisking it away to the lungs and then releasing it into the atmosphere.

Jenny moves air in and out of her lungs about 20 to 25 times a minute. Over her lifetime, she will exhale 600 million times! That's enough air to fill 65 buildings the size of London's Big Ben!



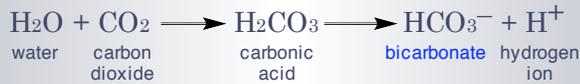
Big Ben in London

² Bianconi, E., et al, “An estimation of the number of cells in the human body.”
³ Quote by Dr. John Medina, affiliate Professor of Bioengineering at the University of Washington School of Medicine.

⁴ Read about Jenny's stomach in the Sept/Oct 1995 issue of **CREATOR**.

FOR THE EXTRA CURIOUS

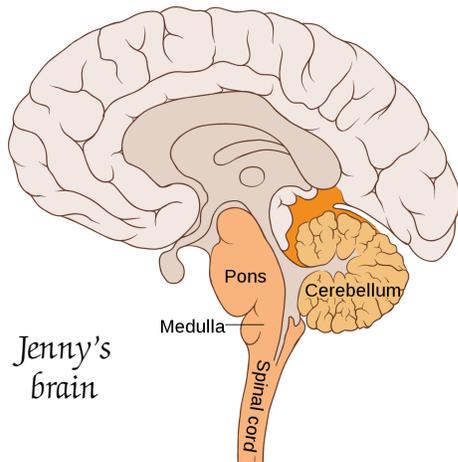
Carbon dioxide (CO₂) is carried in the blood as *bicarbonate*:



I rely upon muscles in Jenny's diaphragm and the muscles between her ribs to draw air into my alveoli. As she takes a breath, the ribs in the chest wall are pulled upward and her diaphragm contracts, flattening out. This creates a slight vacuum inside of me and air rushes in through Jenny's nostrils in order to fill the void. She exhales by relaxing the muscles in the diaphragm⁵ and between her ribs—I then deflate like a balloon. (When I push air out through the vocal cords, Jenny frequently sings to Jesus—I help her worship God!)

At night, Jenny doesn't breathe as deeply as during the day, and her respiratory rate⁶ slows down a little. Her sleeping body uses less energy compared to when she is awake.

God leaves nothing to chance and has ingeniously constructed my best buddy, the brain, to precisely control the amount of air Jenny uses each day. (He's so smart!) Jesus accomplishes this by monitoring the amount of



⁵ The diaphragm is a large muscle forming the floor of the chest cavity.

⁶ The respiratory rate is the number of times a person or an animal breathes in one minute.

carbon dioxide in Jenny's blood. If carbon dioxide increases, so does the rate of my breathing.

The control center for respirations lies at the base of Jenny's brain in a region with a funny-sounding name—the medulla oblongata (mah - DOOL - lah ob - lon - GAH - tah) or “medulla” for short. The carbon dioxide detector for Jenny's body is located here in the medulla.

The medulla oblongata also regulates her heart rate and blood pressure. And it does all this automatically, without her even thinking about it. So she doesn't need to worry that she'll stop breathing when she sleeps. Creator Jesus takes such good care of His precious child (1 Peter 5:7)!

*I lie down and sleep; I wake again,
because the LORD sustains me (Psalm 3:5).*

In Animals

*“But ask the animals, and they will teach you,
or the birds of the air, and they will tell you...
(Job 12:7).*

A few of the tiniest creatures on Earth can live without oxygen (they're called anaerobes—AN - ah - robes), but the vast majority of plants and animals need it to survive. Our Maker, Jesus Christ, richly provides oxygen to His creation (Job 12:10).

Animals usually breathe by one of three ways:

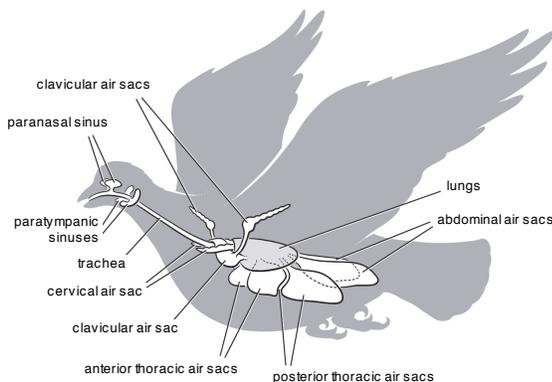
- lungs
- their skin
- gills

A few creatures use two or more of the above organs in order to obtain the oxygen their bodies need. Christ designed an immense variety of *respiratory systems*, demonstrating His unlimited

ingenuity. No artist or engineer is so creative!

When God fashioned vertebrate lungs,⁷ He made some more complex than others. And all possess alveoli—with the exception of birds.

Because they fly, birds have high oxygen demands and require a lot more energy than other animals. The avian⁸ respiratory system is quite beautiful in its unique construction.



Instead of alveoli, Jesus connected the lungs of birds to a series of air sacs that allow them to extract oxygen *as they inhale and as they exhale*. (People absorb oxygen when they breathe in, but not when they breathe out.)

Mammals draw air into their lungs using their diaphragm as a “suction device.” Birds, reptiles, frogs, and salamanders, however, all lack diaphragms. Amphibians *push air* into their lungs, instead, using their mouth like a kind of “bellows.” (The next time you get a chance to observe a frog, watch its throat move up and down as it moves air in and out.)

Did you know that many snakes have *only one lung*, and that several species of salamanders (Plethodonidae) breathe entirely through their skin because *they have no lungs*? On the other hand, most frogs do possess lungs.⁹ Jesus wove an extensive network of fine blood vessels throughout the body of a frog, so it also receives oxygen and releases carbon

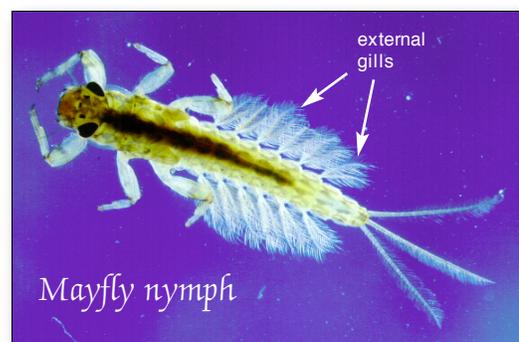
dioxide via its skin and its mouth. In winter, hibernating frogs breathe solely by their skin.

When you think of lungs—mammals, birds, reptiles, and frogs probably come to mind. But some snails and spiders, and all scorpions, are blessed with lungs¹⁰ as well. God equipped several species of lungfish (*Polypterus* sp.) with lungs, which can be employed during seasons of drought. He’s an amazing Creator!

Aquatic creatures face a different challenge. Water is much thicker than air and contains only five percent as much oxygen (air has 21 percent oxygen and water less than one percent). Fish must work 10 to 20 times harder than land animals to obtain needed oxygen from their environment. Therefore, God provided many aquatic creatures with *gills*, which are the most efficient way to extract dissolved oxygen from water.

Christ Jesus invented two basic kinds of gills—*external gills* and *internal gills*. Fish have internal gills. They take water into their mouth and continuously pump it across these highly vascular tissues on the sides of their head.

Many immature amphibians (tadpoles) and insects possess external gills—which often look like feather dusters stuck to their body.



You’ve probably heard the old saying, “Don’t wear your heart on your sleeve?” Well, some crustaceans have gills attached to their feet

7 Vertebrates with lungs include mammals, birds, reptiles, and amphibians. Fish are also vertebrates, but most lack lungs.

8 “Avian” is an adjective meaning “bird.”

9 Recently, a frog in Borneo was discovered that has no lungs!

10 The lungs of spiders and scorpions are known as “book lungs” because under a microscope, they appear as the pages of a book.

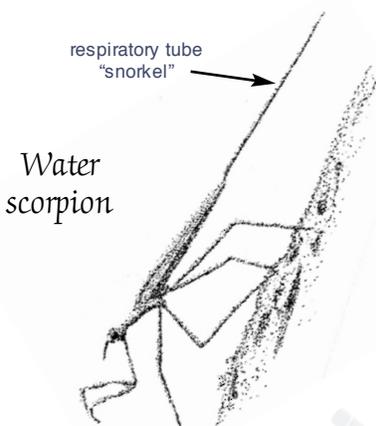


Bees pump air in and out of their body by moving their abdomen like an accordion.

and they simply wave their legs around when they need to breathe!

God’s design of an insect’s respiratory system is very different from other creatures. An adult insect possesses no lungs and doesn’t breathe air through its mouth. Instead, air is taken in through several holes, called *spiracles*, located on the sides of its body. Thin tubes, known as *tracheae* (TRAY - kee - ee),¹¹ penetrate deep into the insect and carry oxygen from the spiracles to every one of its cells. These tubes are delicate and exquisitely designed, clearly demonstrating the infinite skill and gentleness of our Lord’s creative hands. A number of insects pump air in and out of these tracheae using a method known as “telescoping,” which is the familiar back and forth “accordion” movement of a bee’s abdomen.

Our Lord Jesus further proclaims His *sovereign goodness and love* (Psalm 36:6b-7a) by



providing several species of adult pond insects with ingenious means of respiration. When submerged, the water scorpion gets oxygen through a long snorkel located at the tip of its abdomen. This tube reaches above the surface. Another type of insect—the diving beetle (*Dytiscus* sp.)—can stay underwater several hours by trapping an air bubble under its wings and using it like a scuba tank.

...which of all these does not know that the hand of the LORD has done this (Job 12:9)?

In Plants

Then God said, "Let the land produce vegetation: seed-bearing plants and trees on the land that bear fruit with seed in it, according to their various kinds" (Genesis 1:11).

As a child, I learned that plants use carbon dioxide (CO₂) and produce oxygen (O₂), which is true. All the oxygen in our atmosphere comes from green plants. And the place that produces most of the world’s oxygen—believe it



or not—is the Taiga Forest (pronounced TIE - guh) of Canada and Siberia, *not the rainforest!*

But plants also use oxygen and produce carbon dioxide as animals do, just in smaller amounts. It’s well known among “plant lovers” that house plants will suffocate if overwatered since their roots need oxygen to breathe.

¹¹ Centipedes, millipedes, and some spiders also possess tracheae.

In His People

*And He is not served by human hands,
as if He needed anything,
because He Himself gives all men life
and breath and everything else (Acts 17:25).*

The verse above teaches us that God is self-sufficient¹² and that we desperately need His tender care (Acts 17:28). Our body's ongoing demand for oxygen illustrates this truth. We are as reliant upon our Creator as a fish is dependent upon water. But this sweet reliance does not stop with our physical needs. We require *spiritual oxygen* as well.

Sadly, the world is an "air-tight tomb" filled with the decaying stench of sin—a deadly poison. People are like little wax candles trying to shine without the oxygen of God's Spirit. On our own, our flame has gone out—we are dead in our sins (Ephesians 2:1,5) and destined to be melted down (Pslam 68:2) in the great furnace of God's wrath (Malachi 4:1; Matthew 13:42, 50).

But this doesn't need to be our eternal end! We can yet shine God's beauty and become a lovely, cherished lamp adorning His house forever (Matthew 5:14-16). We must first recognize that each of our sins is an *infinite offense* against an *infinitely holy God* demanding *infinite punishment* (the great furnace).

And we must realize that Jesus alone is able to open the sealed lid of our stale and lifeless hearts, letting in the fresh air of His Word (2 Timothy 3:16) so that we can become a glorious lantern for God!

The good news is that our Creator came to Earth as a brilliant light (John 1:3-4) and lived a perfect life as a man. Then on a cross, Jesus shed His blood and died—ultimately succumbing to oxygen deprivation and suffocation. He willingly did this to take upon Himself the unavoidable punishment for the sins of His people (1 John 4:10). But Christ also rose from the dead and showed the world

that He alone is the unfading source of Life and Light for men (John 1:4). Jesus absorbed the wrath of His Father against our sin, without being extinguished Himself.

Please examine yourself right now to see what is true of you (2 Corinthians 13:5). We are all guilty of sin and only Jesus can save us from God's wrath. If you receive Jesus as the gift of Eternal Life, then God has begun to shine in you with the vital "flame" of His Son and the holy "breath" of His Spirit (John 20:22).

"Oh, Father in Heaven, I recognize that I have lived my life in rebellion against You and that you consider this sin. Please forgive me through Your Son, Jesus Christ—because of His death on the cross. Jesus, I trust You and believe that what You did on the cross paid the penalty for my sin. I want You to become my King and my God. I receive You as the gift of Eternal Life. Show me how to live the way You want me to live, and allow me to see and hear Your praises throughout the universe! In Your name, Lord Jesus Christ, I pray. Amen."



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¹² Another term for God's self-sufficiency is His "aseity" (uh-SEE-ih-tee).