

# REASON & REVELATION

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## THE BREATH OF LIFE—NOT A PRODUCT OF EVOLUTION

Brad Harrub, Ph.D.

Most people have heard the expression “like a fish out of water” at some time or another. This familiar idiom reflects the certainty that most fish cannot breathe or travel about on land. Nevertheless, those who espouse Darwin’s beliefs attest that all land-dwelling creatures owe their heritage to some water-dwelling, common ancestor. The respiratory system humans use to obtain oxygen is purportedly just an evolutionary by-product that was “tweaked” by natural selection over millions of years—after all, “necessity is the mother of invention.” General biology textbooks record the evolution of the respiratory system as though it were a process as simple as walking up a flight of stairs. Initially, single-celled organisms used diffusion to obtain oxygen. When multicellular organisms came onto the scene they needed a more efficient means to meet the increased oxygen demand, so a respiratory system resulted. Individuals who subscribe to the evolutionary theory maintain that gills represent an ancient respiratory system. From gills fish developed swim bladders, which then gave rise to lungs, allowing creatures to walk onto the land. Millions of years later, man has a complete respiratory system that is nothing more than an advanced swim bladder that has been optimized through natural selection and genetic mutations. Or so the story goes.

One example of this “just-so” storytelling can be found in Starr and Taggart’s *Biology* textbook. They noted:

Toward the end of the Devonian [allegedly more than 250 million years ago—BH] one of the lineages of lobe-

finned fishes succeeded in moving onto land. The fins of these animals, already thick and muscular, were perhaps adapted for moving slowly through shallow water and thick aquatic vegetation; their ancestors had long ago begun to rely on air-breathing, as do many fishes living in stagnant waters today.... Forty million years after the pioneering forays of plants, the vertebrate invasion of land was under way (1987, p. 559).

Biology textbooks are replete with chapters on the origin of life. While the pictures, charts, graphs, evolutionary trees, and specific sentences may vary, a common theme can be found throughout each one—the premise that life evolved out of the water and onto the land. This process would require a massive change in the breathing mechanics of organisms, but most textbooks treat it as a simple conversion that would be easily accomplished with colossal amounts of time. (Imagine for a moment evolving a boat into an automobile that can drive on the interstate. While this analogy is far removed from the respiratory system, it does help point out the magnitude of changes that would be necessary for converting from water-breathing to air-breathing.) The human body is too large to obtain oxygen by means of diffusion through the skin—thus, an elaborate respiratory system is required. Can evolution adequately explain the breath of life?

### THE CRUX OF CELLULAR RESPIRATION

Most individuals would be surprised to learn that the primary defini-

tion of respiration is not “breathing,” but rather, using oxygen to release energy that is stored in food molecules. Simply put, it is a means of acquiring cellular energy. *Stedman’s Medical Dictionary* defines respiration as “a fundamental process of life in which oxygen is used to oxidize organic fuel molecules, providing a source of energy as well as carbon dioxide and water” (McDonough, 1994, p. 880). There are actually two types of respiration that are intimately linked: organismic and cellular. Organismic respiration is the physical process of getting oxygen into the body, while

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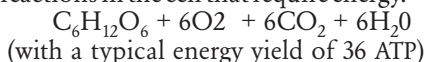
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cellular respiration involves a complex series of reactions using that oxygen to provide energy to the body. All cells carry out some form of respiration. This process allows a cell to transfer chemical energy stored in carbohydrates, lipids, and some proteins into carrier molecules such as adenosine triphosphate (ATP). Cells then use stored ATP as necessary in various reactions within the cell—especially in the production of cellular proteins. As the food molecules are broken down, energy is released that can be used to maintain the cell. This process is dependent, however, on oxygen. [NOTE: Anaerobic respiration or fermentation can occur in the absence of oxygen, but do not play a vital role in the human respiration system].

The critical role oxygen plays in providing cellular energy can be seen in the following equation. If one were to add oxygen to a glucose molecule (a simple sugar), the result would be carbon dioxide and water—with an overall yield of 36 adenosine triphosphate (ATP) molecules! Cells utilize ATP as the energy currency for most reactions in the cell that require energy.



This cellular process is known as glycolysis. Most evolutionists believe this process started by fermentation. From this, allegedly more complex forms of respiration evolved that require catalyzation by a large number of complex enzymes. But that is where a major problem arises. In order to break down the six-carbon sugar of glucose **enzymes are required**. Each

step within the chemical reaction of glycolysis is further catalyzed by specific enzymes, whose origin is still unexplainable by evolutionary assumptions. Enzymes are proteins that are made within the cell—**but their production requires energy**. Thus, cells require ATP to manufacture enzymes before glycolysis can even occur. (The old adage of “it takes money to make money” is applicable here—it takes energy to produce energy!) **As such, evolutionists have an enormous chicken-egg problem**. Which came first, glycolysis to make energy or energy from glycolysis needed to make enzymes? Without the enzymes, glycolysis could not occur to produce ATP. But without the ATP those enzymes could not be manufactured. This is strong evidence that the process of cellular respiration is not the product of evolution. As John Maina and John West observed: “Molecular oxygen is vital for generation of energy that in turn is fundamental to life” (2005, 85:838).

The other point that should not be missed is that glucose and other sugars are only present within living things in nature. This would require plant material or other life forms in existence as a food source. So how does this requirement affect the evolutionary timeline? Why would organisms evolve cellular respiration if glucose or other sugars were not available? This necessity puts restrictions on evolution and the alleged evolutionary appearance of plants.

Finally, we must ask the question of how the first living cells survived if they were

still evolving a mechanism to produce and store energy in the form of ATP? If a cell is unable to make proteins, get rid of waste, or successfully divide, then how long would it survive? The obvious answer is that cells have always possessed the ability to manufacture and store energy. Our bodies were **designed** in such a way that complex cascades of chemical reactions occur continuously in cells throughout the body without any conscious effort on our part. We know today that the absence of one of the steps involved in these complex cascades can have dire effects on cellular growth. The only logical explanation is that a Master Architect laid out these complex steps, and we are slowly uncovering the handiwork of that Designer.

## THE DEMANDS OF ORGANISMIC RESPIRATION

If neo-Darwinians believe the story gets easier outside the cell, they have deluded themselves. Evolving from gills to lungs is only easy in the pages of biology textbooks. For instance, air-breathing would require fish to be closer to the surface of the water, making them a great deal more vulnerable for predation. It has been documented that deep water species have fewer injuries and lower rates of disappearance than fish in shallow water (Chapman, 1995, 4:113). So would adapting to air-breathing be considered “survival of the fittest”? Additionally, **it has not been documented that fish can evolve a new means of respiration if placed into an environment that has too little oxygen**—for instance, a stagnant pond or drying lake. Consider the critical necessity of a fish in that situation. It would be required not only to evolve the new respiratory structure within its lifetime, but it must also be able to pass this new structure on to its offspring before dying of asphyxia. If true, this evolutionary survival tactic should be easily documented in a laboratory setting, where oxygen levels in the water can be manipulated at will. And yet, decades have passed without even a hint of evidence to support this theory.

Consider just a few of the changes that would be required if evolution truly were the mechanism that produced the human respiratory system. [NOTE: Space limitations prevent an exhaustive review of every necessary physiological component.]

- Respiration would have to change the chemical reactions necessary to go from anaerobic life to aerobic life.
- As life progressed from single-celled organisms into multi-cellular organisms, a circulatory system would be required to deliver oxygen to internal cells that were too far removed for diffusion.

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- A metal-based molecular carrier (hemoglobin) would be required to transport the oxygen throughout the circulatory system.
- Organs would be required to bring the oxygen into contact with the blood system (i.e., gills or lungs).
- Then a complete dependence on lungs would be required once animals had translocated onto land.
- However, the body would then be forced to convert to a dry environment. For instance, the “evolution” of tear ducts would be immediately required in order to keep the eyes from drying out.
- An advanced mucosal lining and nasal hairs would be required to protect the lungs from pollutants in the air.
- The evolution of a four-chambered heart and a double-circulatory system would necessitate pulmonary vessels and additional nerves.
- The alleged evolution of warm-blooded (endothermic) animals from cold-blooded (ectothermic) would require a higher metabolic state—bringing on a host of demands on the evolving respiratory system.
- A shift from mouth (or buccal-force pump) breathing to thoracic suction (aspiration pump) breathing would demand coordinated use of intercostal muscles and the diaphragm. The breathing mechanism for most amphibians is the buccal pump, in which muscles around the mouth and face force air into the lungs. Humans use thoracic muscles in an aspiration pump. In commenting on these two different breathing methods, Brainerd admitted: “**No extant animals possess an intermediate mechanism...**” (1999, p. 13).

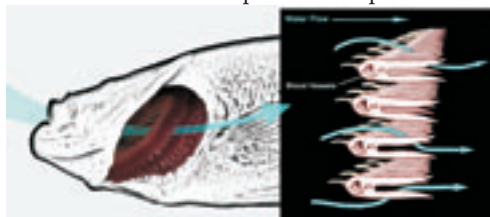
Keep in mind that some type of functional respiratory system would be required throughout all of these steps. Knowing that oxygen is **required** by all living things—including plants, insects, birds, fish, and land-dwelling creatures—evolutionists must surely find themselves overwhelmed at the thought of explaining such amazing sophistication and diversity. But not only is oxygen (a gas) required, but, in humans, it must be able to diffuse into a liquid (blood) without contamination from foreign material. Thus, an effective blood/gas exchange must be functional, and yet protective. **Knowing that mutations do not provide new raw material, it should be obvious that the only acceptable scientific explanation for the well-designed respiratory system is an Intelligent Designer.**

### EVOLUTIONARY VIEW OF THE ORIGINS OF THE RESPIRATORY SYSTEM

In 1764, Charles Bonnet explicitly launched a great challenge. He posited: “If organized bodies are not ‘preformed,’ then they

must be ‘formed’ every day, in virtue of the laws of a special mechanics. **Now, I beg you to tell me what mechanics will preside over the formation of a brain, a heart, a lung, and so many other organs?**” (as quoted in Barbieri, 2003, p. 24, emp. added). Precisely how does one form a lung, heart, or brain by evolutionary processes?

In fish, oxygen is primarily obtained by drinking. Water is forced over gill chambers found on each side of the head. Gills are located in gill clefts within the gill chambers, and they consist of fleshy, sheet-like filaments transected by extensions called lamellae. The basic functional unit of the gill is the filament, which supports rows of these lamellae. The lamellae are designed for gas exchange with a large surface area and a thin epithelium surrounding a well-vascularized core of pillar cell capillaries.



Commenting on the complex vascular system of fish, physiology professor Kenneth Olson admitted: “The fish gill is the most physiologically diversified vertebrate organ, and its vasculature the most intricate” (2002, 293:214). He continued describing this multifarious network stating:

Three vascular networks can be identified within the gill filament. The arterioarterial (respiratory) pathway consists of the lamellae and afferent and efferent segments of the branchial and filamental arteries and lamellar arterioles.... The interlamellar system is an extensive ladder-like network of thin-walled, highly distensible vessels that traverses the filament between, and parallel to, the lamellae and continues around the afferent and efferent borders of the filament.... In the filament body, nutrient capillaries and interlamellar vessels are often closely associated, and the former may ultimately drain into the latter (293:214).

While amazing, this complicated and multifaceted organ provides no clues as to the origin of human lungs, as the two are functionally and anatomically different.

In his book *Origin of Species*, Charles Darwin titled a chapter “Difficulties on Theory.” It was within this chapter that he dealt with this conundrum. Darwin noted: “We should be extremely cautious in concluding that an organ could not have been formed by transitional gradations of some kind.... Two distinct organs sometimes perform simultaneously the

same function in the same individual; to give one instance, there are fish with gills or branchiae that breathe the air dissolved in the water, at the same time that they breath free air in their swimbladders” (1985, p. 220). He went on to note:

All physiologists admit that the swimbladder is homologous, or “ideally similar,” in position and structure with the lungs of higher vertebrate animals: hence there seems to me to be no great difficulty in believing that natural selection has actually converted a swimbladder into a lung, or organ used exclusively for respiration (p. 221).

A cursory glance at this situation would appear ironic—fish suffocating if they are exposed to air for extended periods. The concentration of dissolved oxygen in water is about one-thirtieth that of air (Maina, 2002, 201:284). But even with this increase in oxygen, a fish will quickly succumb to asphyxia if it is taken out of water, in spite of being in an environment with increased oxygen. Gills are inoperable in dry environments and liquids physically destroy alveoli in the lungs (see Maina, 2002, 201:284).

Consequently, Darwin and his followers argue that the air bladder is the transitional missing link. In his concluding remarks, Darwin proclaimed: “For instance, a swim-bladder has apparently been converted into an air breathing lung. The same organ having performed simultaneously very different functions, and then having specialised for one function” (1985, p. 232). This generalized concept won the approval of many in the scientific community and was heralded as a reasonable response to inquiries on the origin of the respiratory system. One hundred years after Darwin aired his speculations, famed evolutionary taxonomist Ernst Mayr tried to fill in some of the gaps of Darwin’s broad speculation:

As the outer skin became increasingly unsuitable for gas exchange (partly owing to the development of dermal armor) and, even more importantly, as the gills became temporarily rather useless in oxygen-poor stagnant swamps during Devonian drought periods, active air uptake by “air-swallowing” became at times the most important source of oxygen. At this stage, any enlargement of the surface of the inner throat or esophagus, any formation of diverticles, etc., was favored by natural selection (1960, p. 366).

Thirty-six years later, H. Allen Orr found himself discussing this very topic as he tried to defend Darwinism. Orr maintained:

The transformation of air bladders into lungs that allowed animals to breathe atmospheric oxygen was initially just advantageous: such beasts

could explore open niches—like dry land—that were unavailable to their lung-less peers. But as evolution built on this adaptation (modifying limbs for walking, for instance), we grew thoroughly terrestrial and lungs, consequently, are no longer luxuries—they are essential. The punch-line is, I think, obvious: although this process is thoroughly Darwinian, we are often left with a system that is irreducibly complex (1996, p. 29).

Complex? Yes! As C.J. Brauner and his colleagues noted: “The transition from aquatic to aerial respiration is associated with **dramatic physiological changes** in relation to gas exchange, ion regulation, acid-base balance and nitrogenous waste excretion” (Brauner, et al., 2004, 207:1433, emp. added). But a Darwinian process? Hardly! Do some fish, such as the lungfish, survive in drought conditions with a specialized respiratory system? Yes. But does the swim bladder or lungfish provide evolutionists with answers for the presence of the human respiratory system? No.

In actuality, the presence of an air-bladder actually poses an even bigger dilemma for evolutionists. Darwin was not aware of the fact that oxygen entered the swim bladder of fish by the blood rather than a trachea! **Thus, oxygen is actually removed from the blood stream to inflate the swim bladder.** Jonathan Wittenberg observed: “Gases are brought into the swim-bladder of fishes through the combined action of a glandular epithelium, the gas gland, and a vascular structure, the rete mirabile, supplying blood to the gland” (1961, 44:521). He went on to conclude that “the active transport of oxygen into the swim-bladder by the gas gland is a transport of molecular oxygen” (44:521).

Swim bladders are used primarily by fish to achieve neutral buoyancy (see Berenbrink, et al., 2005, 307:1752). But if researchers are correct, swim bladders pushed fish further away from air-breathing and “lungs.” As Berenbrink, et al. observed: “The subsequent evolution of an O<sub>2</sub> secretion mechanism to inflate the swimbladder **removed the need to take in air through the esophagus at the surface**, allowing colonization of new habitats such as the deep sea” (307:1752, emp. added). Why would a creature purposefully remove oxygen from the blood stream if it were “evolving” a lung-type structure for respiration? It would not, even if such were possible.

Additionally, Marsh Tenney admitted: “Besides the paleontological argument separating the branch with swim bladder from the branch with lungs there are anatomical differences in blood supply. **The placement of the swim bladder dorsally is nec-**

**essary for its effective buoyancy function, while the lung develops ventrally**” (1979, p. 64, emp. added). Tenney further observed: “Although the mouth, gills, and air bladder can all serve more or less effectively to perform the function of gas exchange, the troublesome question of the origin of the tetrapod lung is not greatly aided by these observations. Although there is a large literature which seeks to identify a homologous relationship between the air bladder and the lung, such is probably not the case” (p. 64).

The conclusion is apparent: Darwin was wrong. The lung did not evolve from the swim bladder. We have observed that organic evolution falls short in explaining cellular respiration, and swim bladders produce more questions than answers. Now it is time to turn our focus to the intricacy and complexity of the human respiratory system as additional evidence against the evolutionary theory.

## ANATOMY OF THE HUMAN RESPIRATORY SYSTEM

**T**he primary task of the respiratory system is gas exchange. However, it is also involved in a host of other activities including ventilation (breathing), oxygen utilization, and the removal of carbon dioxide from the body. The principle structures involved in this process are the nasal cavity, pharynx, larynx, trachea, the bronchi, bronchioles, and alveoli of the lungs (see Netter, 1994; Agur, 1991). The respiratory system naturally divides into the conducting division and the respiratory division. The conducting division is comprised of all of the tubes and structures that transport gases to the respiratory division. Gas exchange occurs in the respiratory division which includes the bronchioles and alveoli.

### The Conducting System

Most individuals are familiar with the shock and pain that is experienced when humans leave a heated environment and walk out into frigid, sub-zero weather. The lungs oftentimes will feel like they are burning, and it occasionally becomes more difficult to breath. The problem is not the cold air—but rather, the **sudden change** in the temperature and humidity of the air. While the body will eventually acclimate itself, the body did not have sufficient time to condition the air entering the respiratory system. Part of the job of the conducting system is to warm and humidify the air before it reaches the lungs. In addition, it serves as a filter to cleanse the air before gas exchange occurs. Con-

sider what the result would be if the air was not warmed, humidified, and cleansed.

The two openings for air to enter the body are the mouth and nose. As air enters the nasal cavity it is warmed by the extensive network of blood vessels that cover the nasal cavity. Blood, which is maintained at normal body temperature, passes this heat on to cool air as it enters the body. (This extensive vascularization also explains why humans occasionally experience nose-bleeds, especially when the tissue within the nose dries out). No one would deny that radiators on automobiles are the product of design, yet the human nose possesses a vascular radiation system that makes car radiators appear primeval. From where did the nose originate and how did it become so vascularized? The nares (paired nostrils) of a fish were not designed to inhale and exhale air constantly as is found in humans. Are we to believe that this dense vascularization is the product of chance?

The nasal cavity is also covered in hairs called “vibrissae, which often extend from the nostrils and filter macroparticles that might otherwise be inhaled. Fine particles such as dust, pollen, or smoke are trapped along the moist mucous membrane lining the nasal cavity” (Van de Graaff and Fox, 1989, p. 751). Again, if this system is a product of gill-to-lung evolution, whence did these vibrissae originate? Fish certainly do not have a need for them, as they obtain oxygen through the water and thus do not need to filter air. Air leaving the mouth or nasal cavity is directed into a funnel-shaped passageway known as the pharynx. It is here that the hand of a Designer can clearly be seen.

### *Cilia and the Deafening Silence of Professional Literature*

The pharynx is lined with a mucus membrane covered with mucus-secreting goblet cells. The mucus helps trap dust, pollen, and other foreign debris. Without this special coating, these harmful particles would be transported to the area where gas exchange occurs, halting normal physiologic processes. But mucus in-and-of-itself is not a cure all. If left exposed on the walls of the pharynx, mucus would eventually dry up and provide no protection. Thus, the body must be able constantly to eliminate the old and apply a coat of new mucus. Enter a special group of finger-like projections known as cilia. These special projections beat in a uniform manner, sweeping away the old mucus and applying a “fresh” coat, allowing the proper pharyngeal conditions to be maintained. As Alberts and his colleagues described:



Ciliary beating is an extensively studied form of cellular movement. Cilia are tiny hairlike appendages about 0.25µm in diameter with a bundle of microtubules at their core.... The primary function of cilia is to move fluid over the surface of the cell or to propel single cells through a fluid.... On the epithelial cells lining the human respiratory tract, huge numbers of cilia (10<sup>9</sup>/cm<sup>2</sup> or more) sweep layers of mucus, together with trapped particles of dust and dead cells, up toward the mouth, where they are swallowed and eliminated (Alberts, et al., 1994, p. 815).

They continued:

Fields of **cilia bend in coordinated unidirectional waves**. Each cilium moves with a whiplike motion: a forward active stroke, in which the cilium is fully extended and beating against the surrounding liquid, is followed by a recovery phase, in which the cilium returns to its original position with an unrolling movement that minimizes viscous drags (Alberts, et al., p. 816, emp. added).



Coordinated, unidirectional waves? This sounds like **purposeful** movement! The fact that cilia are specifically located in large numbers in the respiratory tract, provide protection from dust and pollen, and act in a coordinated manner does not sound like a chance occurrence. Consider the microtubules and molecular motors that must be present for cilia to function properly. In their classic book *Molecular Biology of the Cell*, Alberts, et al., spend entire chapters discussing the mechanical properties of actin, tubulin, vimentin polymers, microtubules, microtubule-associated proteins, kinesin, and dyenin (pp. 803-820). Each molecular structure plays a specific role in coordinating these waves. For instance, dynein principally drives the movements of the cilia—but many accessory proteins are also needed. Yet, all of these parts must be present (and working) in order for cilia to perform their role in the respiratory system. **Evolution cannot explain this type of irreducible complexity!**

So from exactly where did these cilia originate? Why the need in the first place? After all, if one is to believe that organic evolution is correct, then this theory must hold the answer. We can easily deduce that the aqueous environment of fish would make these unnecessary in the uptake of oxygen as is found in humans. In his famous book, *Darwin's Black Box*, biochemist Michael Behe noted:

A quick electronic search of the professional literature shows more than a thousand papers in the past several years that have cilia or a similar word in the title. Papers have appeared on related topics in almost all the major biochemistry journals, including *Science*, *Nature*, *Proceedings of the National Academy of Sciences*, *Biochemistry*, *Journal of Biological Chemistry*, *Journal of Molecular Biology*, *Cell*, and numerous others. In the past several decades, probably ten thousand papers have been published concerning cilia.... [O]ne would expect that the evolution of the cilium would be the subject of a significant number of papers in the professional literature. One might also expect that, although perhaps some details would be harder to explain than others, on the whole science should have a good grasp of how the cilium evolved. The intermediate stages it probably went through, the problems that it would encounter at early stages, the possible routes around such problems, the efficiency of a putative incipient cilium as a swimming system—all of these would certainly have been thoroughly worked over. **In the past two decades, however, only two articles even attempted to suggest a model for the evolution of the cilium that takes into account real mechanical considerations. Worse, the two papers disagree with each other even about the general route such an evolution might take** (Behe, 2003, pp. 67-68, emp. added).

Behe concludes:

The amount of scientific research that has been and is being done on the cilium—and the great increase over the past few decades in our understanding of how the cilium works—lead many people to assume that even if they themselves don't know how the cilium evolved, somebody must know. **But a search of the professional literature proves them wrong. Nobody knows** (p. 69, emp. added).

Some might argue that these tiny projections are not really relevant, and so what does it matter? Exactly how important are these tiny hair-like projections? Ask someone suffering from Immotile Cilia Syndrome, or individuals who produce abnormally thick mucus and suffer from

cystic fibrosis—whose respiratory passages fail to be cleared. These cilia were designed for a specific reason to perform a specific function.

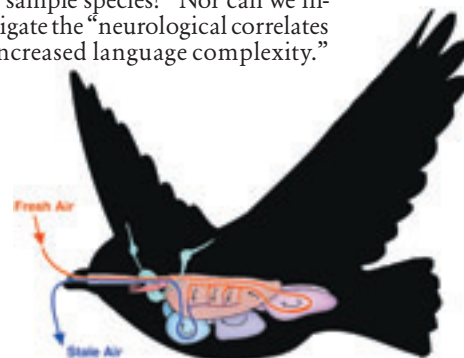
### Larynx and Vocal Folds

As air makes its way towards the alveoli of the lungs it passes from the pharynx into the larynx. The larynx is commonly referred to as the voice box, and it is the site of another major hurdle for evolutionists. The very existence of the delicate but intricate framework of muscles and cartilage that composes the voice box cries out "Creator." There are several small but precisely paired constrictor muscles that help change the length, position, and tension of the vocal folds, each one having a specific innervation (see Agur, pp. 597-598). The larynx has two functions: (1) to prevent food and fluids from entering the trachea; and (2) to produce sounds. **The mechanics involved in oral communication have anatomical requirements that are found only in humans.** We know of no living animal, nor one that has been observed in the fossil record, that possesses anything close to the larynx ("voice box") present in humans. While birds can make sounds, they do not use a larynx to communicate language. Werner Gitt admitted as much in his book, *The Wonder of Man*:

Only man has the gift of speech, a characteristic otherwise only possessed by God. This separates us clearly from the animal kingdom.... In addition to the necessary "software" for speech, we have also been provided with the required "hardware" (1999, p. 101).

Additionally, the lack of any "transitional" animal form (with the requisite speech hardware) in the fossil record poses a significant continuity problem for evolutionists. As Terrance Deacon remarked:

This lack of precedent makes language a problem for biologists. Evolutionary explanations are about biological continuity, so a lack of continuity limits the use of the comparative method in several important ways. We can't ask, "What ecological variable correlates with increasing language use in a sample species?" Nor can we investigate the "neurological correlates of increased language complexity."



There is no range of species to include in our analysis (1997, p. 34).

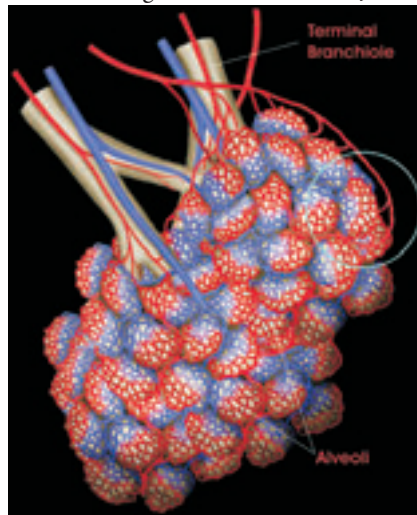
The lungs produce the initial air pressure that is essential for the speech signal. The pharyngeal cavity, oral cavity, and nasal cavity shape the final output sound that is perceived as speech. Can evolution explain the existence of the larynx and why other animals have not evolved the ability to speak? It cannot.

### *The Perfectly Designed Trachea and Bronchi*

Air leaving the larynx flows directly into the trachea or windpipe. The *Oxford Companion to the Human Body* noted: “The airways below the larynx consist of the trachea, a tube that extends almost to the middle of the chest; (ii) the bronchi (bronchial tree), formed by the trachea splitting into two and then each branch dividing again; (iii) the bronchioles—thin and short distensible airways that again divide many times to form (iv) the alveolar ducts from which (v) the alveoli arise” (Blakemore and Jennett, 2001, pp. 437-438). While many might assume the trachea is a simple tube conducting air from the mouth to the lungs, it, too, reveals the handiwork of God. For instance, the cartilage that composes the trachea is positioned in many C-shaped rings stacked one on top of another. The open part of the “C” is positioned next to the esophagus, allowing individuals to continue breathing even when food is being directed toward the stomach (Agur, 1991, pp. 68-69). Additionally, these cartilaginous rings provide a rigid framework that helps keep the lumen open continuously. All along the inside

walls of the trachea are more cilia and mucus-secreting goblet cells (see Van de Graaff and Fox, 1989, p. 754). If dust is carried into the trachea, the cilia sweep it up toward the pharynx where it can be removed by the cough reflex and/or by being carried down the esophagus. Is this well-designed, protective mechanism simply an apparent design without a designer? Exactly where did those cartilaginous “C” rings, cilia, and goblet cells originate? The evidence unequivocally points to an Infinite Designer!

The trachea branches into two bronchi and then continues to branch into a bronchial tree. Van de Graaff and Fox describe the process: “The bronchus divides deeper in the lungs to form secondary bronchi and segmental (tertiary) bronchi. The bronchial tree continues to branch into yet smaller tubes called bronchioles. There is little cartilage in the bronchioles, which



contain thick smooth muscle that can constrict or dilate these airways” (p. 754). Realize that branching in-and-of-itself is an amazing feat! How does the body know when to stop pulmonary branching? If the bronchioles did not branch enough, then there would not be enough surface area for the alveoli to perform sufficient gas exchange. Too much branching could be equally detrimental if space were not left for alveoli and gas exchange. What is more, this orchestrated branching system has no parallel in the gills of a fish.

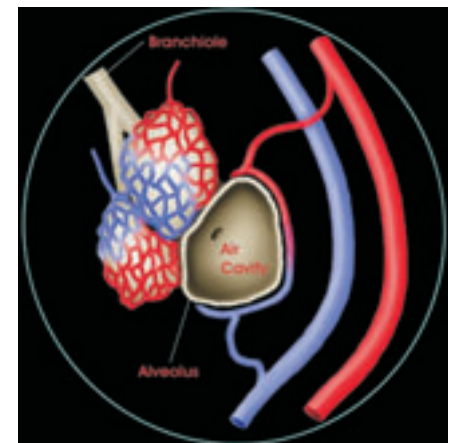
### **The Respiratory System**

Once the air has been conditioned, it is then ready to be passed on to the division that performs gas exchange which occurs in the lungs. In recounting the feats of the lung, Maina and West remarked:

Although compared with the closely located, visibly mechanically active heart, the lung may appear relatively inactive, for an organ that throughout life is subjected to changing internal and external pressures both by the pulsating heart and mechanical ventilation by the rhythmic contractions of the respiratory muscles, albeit passively, **the lung is inherently a dynamic organ.** Illustratively: in the human being, as much as 12,000 liters of air and 6,000 liters of blood per day are pumped into and through the lung (2005, 85:812, emp. added).

We know today that at rest an average-sized adult will take in about 250 ml of oxygen each minute, and exhale about 200 ml of carbon dioxide (see Blakemore and Jennett, p. 590).

It is within the alveoli of the lungs that true gas exchange occurs by simple diffusion. Detailing the functional significance of the alveoli, Maina observed: “In the human lung, there are about 300 million alveoli of an average diameter of 250  $\mu\text{m}$  giving an overall alveolar surface area of 143  $\text{m}^2$ ” (Maina, 2002, 201:288). Since each alveolus is only a single cell-layer thick,



## **SPEAKING SCHEDULES**

### **Dr. Brad Harrub**

February 10-12	Fredericksburg, TX	(830) 997-4632
February 24-26	Maryville, MO	(660) 927-3616

### **Dr. Dave Miller**

February 10-12	Conroe, TX	(936) 756-0207
February 24-26	Monroeville, AL	(251) 743-2646

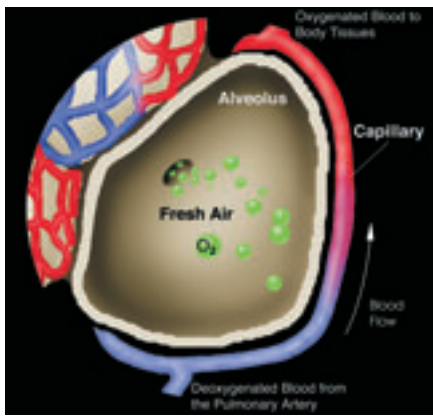
### **Kyle Butt**

February 17-19	Pigeon Forge, TN	(817) 282-6526
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### **Eric Lyons**

February 5	Clarksburg, TN	(731) 986-3130
February 12	Nauvoo, AL	(205) 384-6330
February 24-26	Raytown, MO	(816) 356-3758

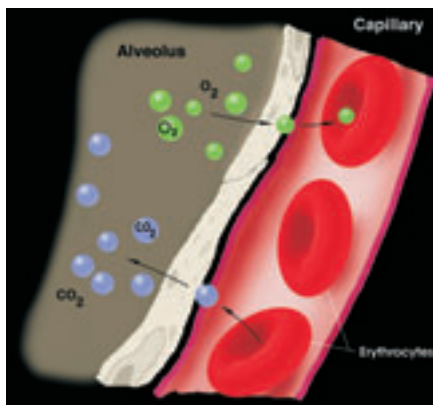




that means the air-blood barrier is normally only two cells thick—one alveolar cell wall and one capillary cell wall. In describing these special functional units, Van de Graaff and Fox commented: “Alveoli are polyhedral in shape and are usually clustered together, like the units of a honeycomb, in groups called alveolar sacs” (p. 759). They continued:

The enormous surface area of alveoli and the short diffusion distance between alveolar air and the capillary blood quickly bring the blood into gaseous equilibrium with the alveolar air. This function is further aided by the fact that each alveolus is surrounded by so many capillaries that they form an almost continuous sheet of blood around the alveoli (p. 759).

But this complex system is still dependent on hemoglobin to deliver oxygen throughout the body. Without it, oxygen would not be transported to internal organs efficiently. Hemoglobin is a complex protein that has two chains (referred to as alpha and beta)—it gives red blood cells their red color. An evolutionary origin of hemoglobin would require a minimum of 120 mutations to convert an alpha to a beta. At least 34 of those changes require changeovers in 2 or 3 nucleotides. Yet, if a single nucleotide change occurred via mutation, the result would ruin the blood and kill the organism.



The final hurdle that evolutionists have not (and cannot) overcome involves the co-dependence of the respiratory system and the circulatory system. The heart muscle requires oxygenated blood to remain alive. The respiratory system depends on the circulating blood to deliver oxygen and remove carbon dioxide. So which came first, and how was it able to function properly without the other? Yet, another chicken-egg problem for Darwinians! Evolution may continue to be taught as a “fact” in the classroom, but it has yet to answer such basic life-dependent questions as these. Does the human respiratory system owe its origin to some cosmological accident? An honest evaluation would surely indicate that such is not the case.

## CONCLUSION

Henry Petroski, a professor of civil engineering and history at Duke University, wrote an article in the *American Scientist* titled “Human Factors” in which he noted: “When something is designed, decisions are necessarily made. **Deliberate progress cannot proceed without choices**—as to whether a part goes to the right or the left of another part, whether a component is larger or smaller” (2000, 88:304, emp. added). He then went on to discuss the “evolutionary design process,” but his point is well made. Deliberate progress requires the input of an intelligent being. Decisions were made prior to the formation of the human respiratory system. Those decisions came from the Creator who breathed life into the nostrils of man (Genesis 2:7). As Susan Schiefelbein correctly assessed: “Lungs, heart, trachea, a bronchial tree, and connecting blood vessels all contribute to the **ingenious** breathing system that brings oxygen to the blood and removes carbon dioxide” (1986, p. 132, emp. added). Ingenious indeed!

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## NOTE FROM THE EDITORS



**AP** APOLOGETICSPRESS.ORG  
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### A.P. WEB SITE SETTING RECORDS

In 1868, an article appeared in a New York paper that informed the public:

A man has been arrested in New York for attempting to extort funds from ignorant and superstitious people by exhibiting a device which he says will convey the human voice any distance over metallic wires so that it will be heard by the listener at the other end. He calls the instrument a telephone. Well-informed people know that it is impossible to transmit the human voice over wires (Clemmer, n.d.).

Today this news item is almost comical as metallic telephone “land-lines” have given way to fiber optic cables and cellular towers. Incredible progress has been made in the field of telecommunications—with no signs of slowing down. One aspect of this field has been the tremendous growth of the Internet. Internet usage has increased exponentially in the last decade as more and more people take advantage of this new information medium.

We at A.P. are thankful to have played at least some small role in that growth. Many years ago we would never have dreamed that our Web site would be receiving thousands of hits every day, from countries all across the planet. But it is! **In fact, 2005 was a banner year for “A.P. on the Web,” as we exceeded the three million page-hit mark!** That is correct—we surpassed three million page hits last year! The Web site averaged 7,284 hits per day—which translates to five hits every minute! Like the telephone industry itself, we are making some serious progress—and we do not intend to slow our pace. Indeed, our goal is to shatter the 2005 record in 2006 by working even harder to provide the public with cutting edge commentary on the leading cultural, moral, scientific, and religious issues of our day.

If you are not familiar with our Web site, we update our site every Monday morning, with several new faith-building articles. In

addition, we archive all past articles, including past issues of *Reason & Revelation*. The Web site features several stimulating categories: Alleged Bible Discrepancies, Article Reprints, Bible Bullets, Decisive Designs, Defense Documents, Doc’s Dissections, E-Books, FAQs, In the News Archives, Research Articles, Sensible Science, Scripturally Speaking, Tough Texts, and Home Study Courses. You can even listen to A.P. radio spots by clicking on “Examine the Evidence.” One can also link to our children’s site, “Discovery for Kids.” All of the material contained in each section is easily searchable using our lightning fast search engine. What is more, these categories provide material that is free of charge. We invite you to take advantage of this vast array of free information.

For many years we have endeavored to be a leading resource that people go to in the field of Christian apologetics. If our Web statistics are any indication, we have, indeed, begun to accomplish that goal. In 2005, we launched a Spanish version of our Web site (<http://www.apologeticspress.org/espanol/>) that has already begun to mushroom, as our materials are swiftly being translated for the growing Spanish-speaking population. We are excited and encouraged by this tremendous growth. We look forward to making this year even better as we continue to offer valuable material to truth seekers all over the world. If you have not visited our site lately, we encourage you to “surf” on in. We think you will like what you find.

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**Brad Harrub &  
 Dave Miller**