



CREATOR

VOLUME 30

NUMBER 2

I AM FEARFULLY AND
WONDERFULLY MADE

RENAL BEAUTY

*“Blessed are the pure in heart,
for they shall see God.” Matthew 5:8*

When you think of your kidneys, do you see Christ’s ineffable beauty? Many folks probably don’t. It is our humble hope in this *Journal* to delve deeply into the Lord’s creation of these renal¹ organs and get a sweeter understanding of His splendor, love, and purity! Ever since the Garden of Eden, humanity has faced physical stresses of various kinds. Having preordained these challenges from eternity past, our gracious God also supplies us with ways to cope with stresses, one of which is His amazing gift of our kidneys.

Asparagus
proves . . .



Christ’s
incredible
love!

JENNY’S KIDNEYS

*Your hands made me and fashioned me;
Psalm 119:73*

Hi, we are Jenny’s kidneys.² Chief among the many jobs Jesus has given us to do, we help keep her body and bloodstream free of impurities. God immersed all living things in an ocean of chemicals. For Jenny, this encompasses her body’s own chemistry and potentially harmful substances in the world. Other organs inside Jenny assist in this purifying task: the liver makes toxic chemicals less harmful, the spleen filters out dead and dying blood cells from circulation, the lungs rid the body of excess carbon dioxide, the lining of the digestive tract prevents bacteria from entering the body, and Jenny’s immune system helps fight off germs.

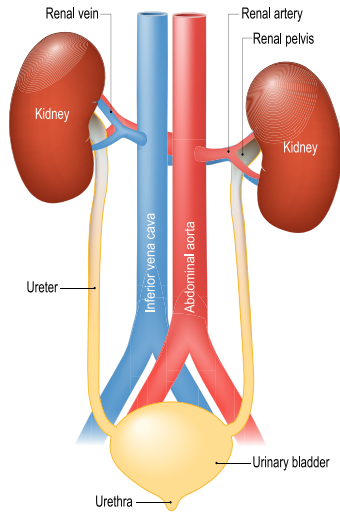
Our gracious Creator began forming us in her mother’s womb when Jenny was only *five weeks old*. Most everyone has been blessed with two kidneys, one on either side of the vertebral column in the back of the abdomen. Our God-given mission is to *filter* Jenny’s blood *continuously*. As her hidden vanguards, we perform three basic tasks:

- 1) Remove toxins from her blood,
- 2) Reabsorb water, salt, and nutrients to maintain the health of her body,
- 3) Secrete (eliminate) filtered toxins via urine.

¹ From the Latin word *renalus*, meaning “kidney”

² Jenny is eight years old and a fictitious character.

The Excretory System



This work of keeping Jenny's body pure is so important that Creator Jesus causes 25% of the blood pumped by her heart to go through us—more than any other organ.

Kidneys are members of a larger community of tissues known as the *excretory system*³ or urinary tract. Below is a list of major organ *systems* in the human body:

- *Excretory*: two kidneys, two ureters, bladder, urethra
- *Cardiovascular*: heart, blood vessels
- *Pulmonary*: lungs, larynx, trachea, bronchi
- *Nervous*: brain, spinal cord, nerves
- *Immune*: spleen, lymph nodes, liver
- *Digestive*: esophagus, stomach, intestines, liver, gallbladder, pancreas
- *Skeletal*: bones, ligaments, tendons, cartilage

As blood flows through us, the waste materials produced by normal metabolism, and a small amount of salty water, are removed from circulation, forming urine. Thin muscular tubes called *ureters* then propel the urine downward and into Jenny's *bladder*, where it is stored.⁴

The task of cleansing the body of waste and helping maintain its salt and water balance is something we share with all living

3 Jesus gave every living thing a way of ridding itself of metabolic waste products in a process called excretion.

4 Read about smooth muscles in the *CREATOR Journal* Vol. 28 Num. 2.

things. Our Creator, Christ Jesus, is very concerned about the purity of His creations because . . . *purity* greatly shines His incomparable beauty.

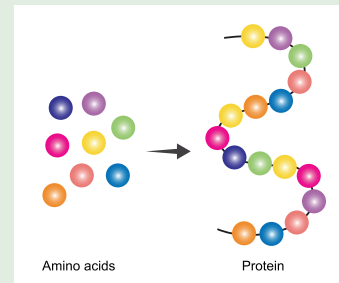
PURITY IN PLANTS

It was given to her to clothe herself in fine linen, bright and clean; Revelation 19:8⁵

God carefully constructed plants using proteins, carbohydrates, and fats. Many of these proteins show up in the grains, vegetables, and fruits we eat. Plants, like all living things, exist in a world negatively impacted by widespread sin. Plants and animals are not sinful themselves but are under the curse of our sin (Romans 8:19-22).

WHAT IS A PROTEIN?

Proteins are huge molecules manufactured in the cells of our bodies. The Lord creates them using a long string of smaller molecules called *amino acids*.



The exact sequence of these amino acids is determined by the DNA of a cell's nucleus⁶ and built upon an RNA blueprint. Proteins are crucial to all living things, including tiny bacteria. They form the framework of cells and organs, help transport chemicals, and function as enzymes that speed up essential chemical reactions.

5 Christ's purity is compared to fine, white linen, which comes from the flax plant. Plant purity also shows up in clothes made of white cotton.

6 Read about proteins in the *CREATOR Journal* Vol. 26 Num. 1.

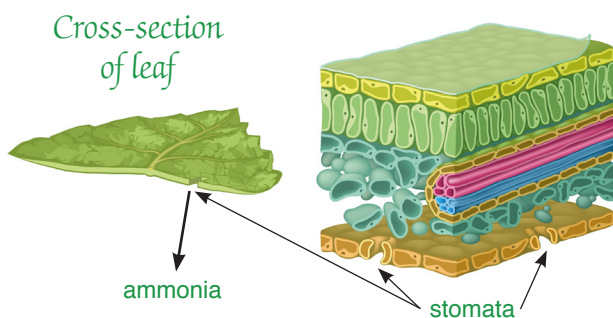


Ammonia can cause damage to flowers and plants.

As such, protein molecules—essential to all life—wear out quickly and need constant replacing.

When plant proteins break down, they can form toxic *ammonia*. Because of its harmful effects, ammonia must either be incorporated back into newly formed protein or eliminated (excreted) from the plant before it does harm.⁷

Our Lord Jesus provides most plants a fairly simple way of dealing with toxic chemicals. In green plants, ammonia passes (diffuses) through tiny openings, called *stomata*, on the underside of a leaf. Most leaves are thin, and ammonia doesn't travel far before it's eliminated, thus preventing it from building up to harmful levels in a plant.



Ammonia passes out of a plant through these openings.

⁷ In this way, ammonia is a double-edged sword—it can do harm or be used to build new proteins.

PURITY IN CREEPY CRAWLIES

He hath made every thing beautiful in his time.

Ecclesiastes 3:11 KJV

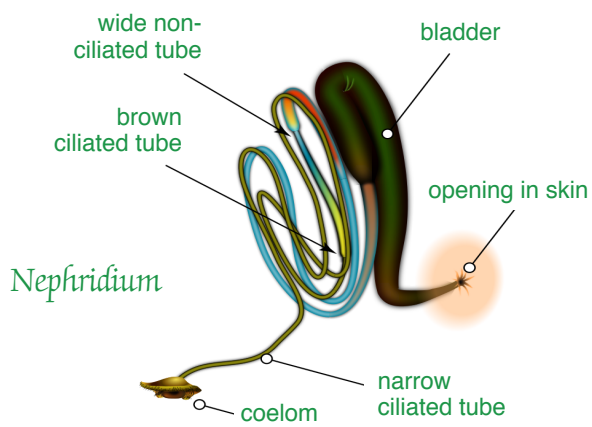
It is our settled conviction that few things on Earth simultaneously herald the beauty of Christ and the fear of the Lord like invertebrates.⁸ Some of the most physically stunning and visibly terrifying creatures are insects. But in order for these captivating attributes of our Lord to shine through these creatures, the delicate chemistry of their bodies must be kept pure.



Flowing from His vast heart of love, Jesus supplies even the humblest of living things with a means to readily eliminate ammonia and other metabolic wastes from their bodies. All organisms produce ammonia, and ammonia is very poisonous to all organisms. Invertebrates like insects, spiders, worms, snails, and crustaceans do not possess kidneys as such, but equally amazing organs that keep them free of toxins.

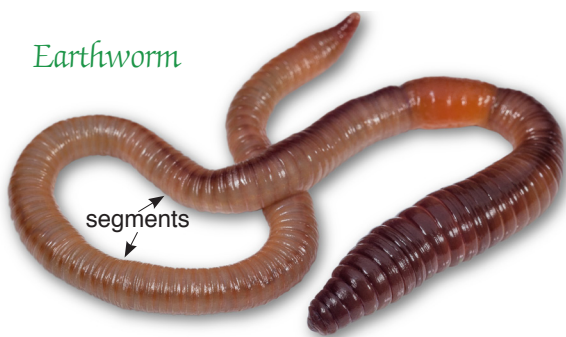
The different types of tissues that eliminate ammonia in Christ's "creepy crawlies" are vast and would be impossible to fully cover in this issue. Incidentally, the names scientists have given these organs are both colorful and often difficult to pronounce: contractile vacuoles, flame cells, renal glands, nephridia, antennal and coxal glands, and Malpighian (mal - PIG - ee - uhn) tubules. In this section, we'll highlight just two of them—the *nephridia* of earthworms and the *Malpighian tubules* of insects.

⁸ In addition, read about the beauty of the Lord seen in lightning—*CREATOR Journal* Vol. 25 Num. 4.



The structure of earthworm nephridia is very similar to the tissue found in human kidneys. Only our Triune God, who creates “unity in diversity,” can design amazingly similar organs in vastly different organisms!

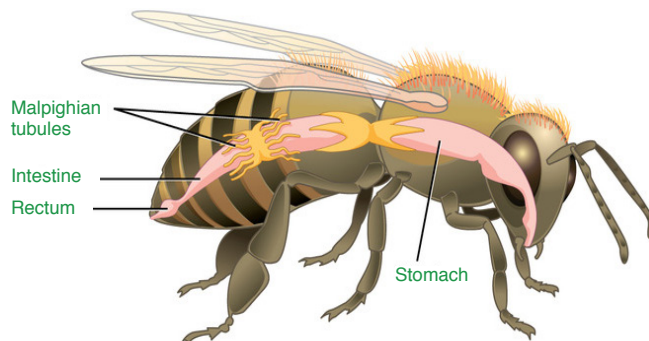
A nephridium (singular for nephridia) is a finely constructed and delicately coiled tube with one end opening into the body cavity or coelom of the earthworm (pronounced SEE - luhm), and the other end into a tiny bladder. Fluid containing ammonia and other waste products is pumped through this tube. Valuable nutrients and salts/electrolytes are then reabsorbed by the tubule and transferred back to the coelom. Urine is temporarily stored in the bladder and excreted to the outside of the earthworm through a tiny opening in the skin.



Jesus provides an earthworm’s body with two nephridia for each segment. These worms⁹ possess 100 to 120 segments for a total of 200 to 240 nephridia.

⁹ Not all worms have segments. The ones that do—like earthworms—are known as “segmented worms.”

Malpighian tubules in insects perform a similar function but are constructed differently. These tubules hug the intestine and actively filter or purify the hemolymph of an insect, which is similar to our blood, except it is not found in blood vessels, nor does it contain hemoglobin. Amazingly,



insects can convert the byproduct of protein breakdown—ammonia—into *uric acid* in a way similar to that of birds and reptiles.¹⁰ Uric acid is transported by the Malpighian tubules to the gut, where it is eliminated. Vital salts such as sodium and potassium, as well as water, are reabsorbed to preserve salt/water balance and internal pH of the insect.

PURITY IN VERTEBRATES

You shall offer a male lamb one year old without defect for a burnt offering to the LORD. Leviticus 23:12¹¹

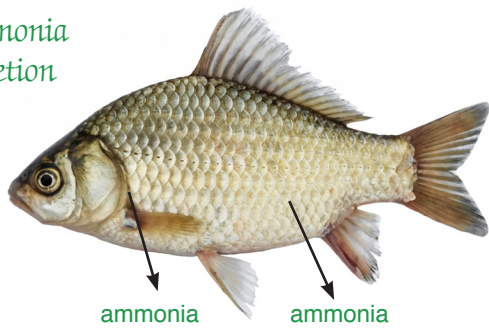
In bony animals, disposing of ammonia is somewhat more complicated. “Simpler” vertebrates like fish and aquatic amphibians excrete ammonia, produced by the breakdown of proteins, into the surrounding water either through their gills or the skin. Ammonia is poisonous to aquatic animals, even in low concentrations, and must be eliminated rapidly. Our Lord Jesus does this with splendid care!

As mentioned above, God changes the toxic ammonia of birds and reptiles into *uric acid*, a much less harmful chemical. This conversion

¹⁰ This is another example of God creating “unity in diversity!”

¹¹ God created kidneys and other organs in animals so that some might be pure enough for temple sacrifice.

Ammonia excretion



requires a great deal of energy and is a very complex process (showing us the beauty of His infinite wisdom). Creatures that produce uric acid require little water to eliminate it from the body.¹² This is a huge advantage for those animals living in dry, arid environments like deserts, where little moisture is available. Birds and reptiles also *lack a bladder* and, therefore, must excrete their white extract of uric acid whenever and wherever they can. We're all too familiar with this phenomenon!

Mammals, terrestrial amphibians, sharks, and rays deal with deadly ammonia by converting it into *urea* within their livers. Urea is then transported in the blood from the liver to the kidneys and discarded in urine.

A mammal's ability to concentrate urine depends upon the species. Beavers, for instance, produce a very dilute urine. They don't need to concentrate it because they live in ponds and rivers. Mammals living in the desert must conserve water. Jesus thus gives the kangaroo rat of the American Southwest the ability to make extremely concentrated urine. It gets most of its dietary water from seeds and plants.



¹² Birds and reptiles excrete uric acid as a white paste along with feces.

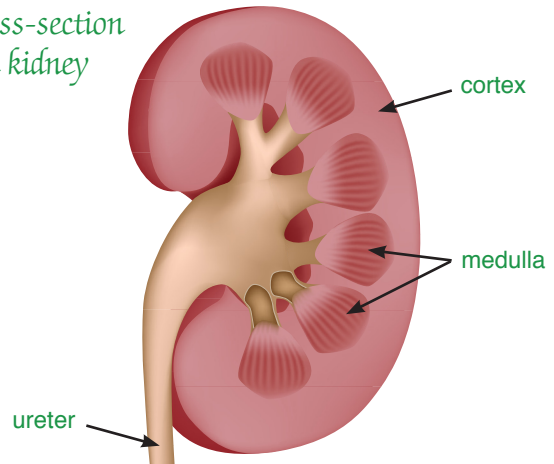
PURITY IN JENNY

I am fearfully and wonderfully made. Psalm 139:14

We ascend now to the pinnacle of Christ's purifying work—people. To the naked eye, we kidneys look like any other organ. It takes a special love for our Creator and a curious mind to peer deeply into God's fantastic design of us and behold His beauty!

Jenny's kidneys can be divided into two parts: the outer *cortex* and the inner *medulla*. Stretching between these two regions are

Cross-section
of a kidney

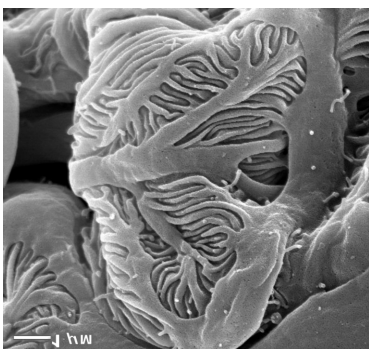
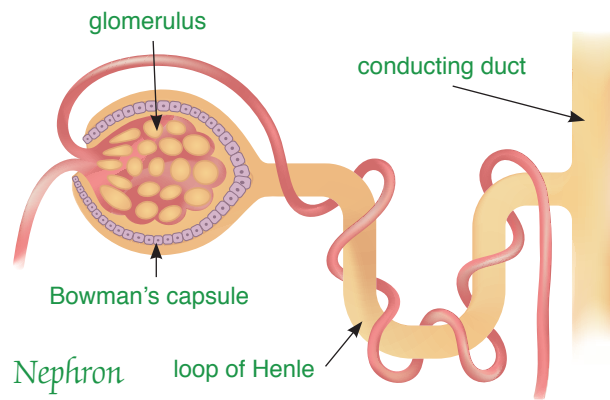


the microscopic "workhorses" of the kidneys, the *nephrons* (NEHF - rohns). Altogether, we kidneys possess two million nephrons, which is 10,000 times that of an earthworm. (As important as the nephridia are to a creature that lives its entire life in dirt and whose digestive tract is filled with dirt, Jesus takes human physical purity much more seriously!)¹³

All of Jenny's nephrons are exquisitely constructed by Christ and act as servants of God for our good (Psalm 119:91b). A nephron can be divided into different regions, each with a specific job. For our purposes, we will feature only four of these regions: the glomerulus, Bowman's capsule, loop of Henle (HEHN - lee), and the collecting duct.

¹³ Much of the body is dedicated to purity. Our liver, lungs, kidneys, immune system, spleen, blood, heart, inner lining of our intestines and stomach have been commissioned by the Lord to keep us free of harmful chemicals and germs.

Blood coming from Jenny's heart is first filtered by the glomerulus located in Bowman's capsule. The glomerulus is a compact ball of fine capillaries through which blood passes. It is here that a crude form of urine is produced. This occurs when the fluid portion of blood passes through the capillary walls and into the capsule. God places "fingers" around the capillary walls so that blood cells and large proteins cannot enter the urine . . . normally.



cells greatly magnified

Above is an electron micrograph of special cells surrounding the glomerulus, possessing "fingers." These help prevent blood cells and large proteins from passing into the urine.

The filtered fluid then flows to the loop of Henle. Before this happens, sugar (glucose) and water are reabsorbed back into the bloodstream. As urine moves through the loop of Henle and the rest of the nephron, salt is reabsorbed along with additional water. By the time this fluid reaches the end of the collecting duct, 99% of the water has been recovered. What remains is concentrated urine.

It needs to be repeated that ammonia is extremely toxic to all living things and must be dealt with quickly to prevent harm to the cells of an organism. The irony is that all cells produce ammonia when "worn-out proteins" are broken down into amino acids. Blood levels of ammonia in people must be kept very low because this chemical especially impacts the brain in negative ways. If Jenny's liver remains healthy, ammonia is readily converted into urea and transported to her kidneys for disposal.

As important as it is to keep Jenny's body free of harmful chemicals, we also regulate her body's electrolytes (salts), water balance, and blood pressure. If Jenny drinks a lot of fluids, we produce abundant dilute urine. If her water intake is limited and/or she is exposed to a dry environment like a desert, her body releases a hormone¹⁴ that triggers us to produce a highly concentrated urine, thus conserving water inside her.

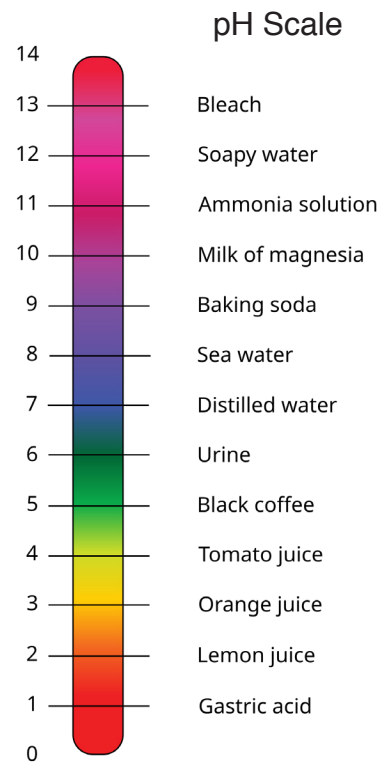


There exists a rare condition in some people known as *diabetes insipidus*. These folks cannot manufacture this urinary hormone or don't respond to it. They fail to make concentrated urine and, similar to patients with diabetes mellitus (insulin diabetes), void quite frequently. Thanks to our gracious Lord, those with diabetes insipidus can be treated with a synthetic hormone medicine that allows their kidneys to retain water in the body and prevent dehydration.

¹⁴ Antidiuretic hormone or vasopressin

Lastly and very importantly, we kidneys help maintain the acid/base balance of Jenny’s blood. Normally, her blood is slightly alkaline with a pH of 7.4.¹⁵ It is well known that people produce a wide variety of proteins and that many of these function as *enzymes*. Enzymes are critical for speeding up chemical reactions throughout the body. And each enzyme functions best at a very specific pH. In concert with her kidneys, Jenny’s lungs help keep her blood pH stable. Living in a fallen world puts stress on the body, and sometimes its acid/base balance is thrown out of whack. Our Lord Jesus uses us kidneys and her lungs to preserve Jenny’s health.

¹⁵ Read about acids, bases, and pH in the *CREATOR Journal* Vol. 23 Num. 3.



PURITY IN FAITH

Precious in the sight of the LORD is the death of His godly ones. Psalm 116:15

Many things can potentially injure our kidneys, and it’s important to be aware of them. The most common causes include chronically high blood pressure, diabetes mellitus, autoimmune diseases, certain types of chemotherapy, and misuse of pain medications. If the kidneys become inflamed, a condition known as nephritis results (from the Greek word *nephros*, “kidney,” and the suffix *-itis* meaning “inflammation”).

Even the best of souls can succumb to nephritis. The booming voice of the “Prince of Preachers” had faithfully proclaimed Christ and His Gospel for decades. It then became silent. On the evening of January 31, 1892, Charles Haddon Spurgeon died from complications of nephritis and a long struggle with the doctrinal decline of England’s Baptist

Union. The pastor who had preached spiritual purity to his congregation became the victim of failing kidneys and the theological impurity of his time. Disease is not necessarily caused by personal sin . . . often it’s not. Yet mankind’s disobedience has devastating and far-reaching effects on all of Creation, especially those who truly love Jesus.



PURITY IN A BRUISED KNEE

Heal me, O LORD, and I will be healed;
Jeremiah 17:14

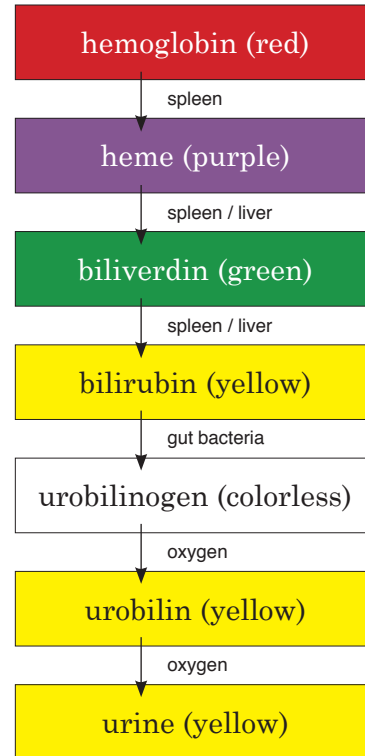


A bruised knee can be very painful and colorful. Believe it or not, the color transformation that often occurs is a window into the incredible love of Christ, our Creator!

Your red blood cells (RBCs) are vital—they carry oxygen to all 70 trillion cells in your body. But RBCs live only 120 days. Dying cells are removed by your spleen, and the heme of hemoglobin is released. Heme is the part of hemoglobin that contains iron (Fe²⁺) and is what holds oxygen tightly while traveling through your turbulent bloodstream.

Your body converts heme into biliverdin and then into bilirubin. Bilirubin is taken up by the liver and released into the small intestine as bile. Bacteria then change

How God deals with worn out red blood cells



bilirubin into urobilinogen, which is transported to the kidneys. As soon as the urobilinogen in urine is exposed to oxygen, it turns into urobilin, which is yellow. So, the kaleidoscope of colors seen in a bruised knee and in urine is a vibrant witness to our Lord's faithfulness in clearing our bodies from the "chemicals of decay" (dead red blood cells).

PURITY IN SOIL

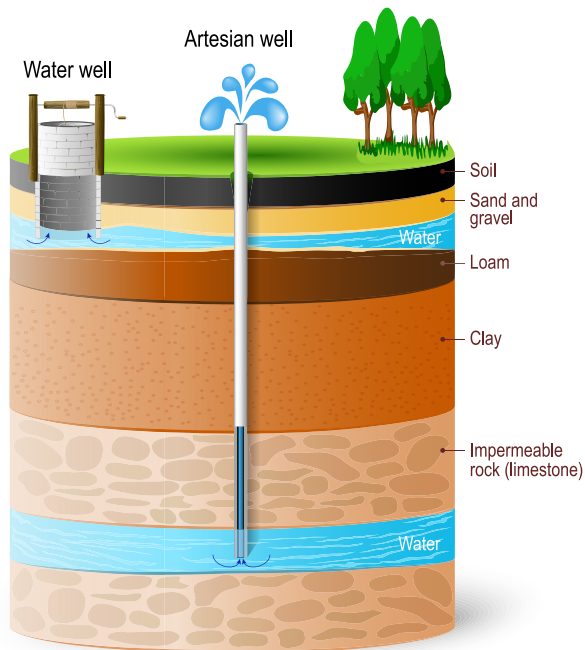
"Thus says the LORD, 'I have purified these waters; there shall not be from there death or unfruitfulness any longer.'" So the waters have been purified to this day.
2 Kings 2:21-22

Jesus lovingly equips plants, animals, and people with the means to keep their insides clean and pure. The importance of purity is not limited to individual organisms, however; He does the same for *ecosystems*.

Our Lord covered most of the terrestrial world with soil,¹⁶ which acts as a vast "water filtration system." Healthy dirt is composed of clay and sand, decomposing organic material called humus, and countless living creatures. Most soils are teeming with beneficial bacteria and other microorganisms.

Soil acts like a sponge, soaking up water and chemicals that come in contact with it through rain or other means. An ideal soil has been blessed with a fine and coarse

¹⁶ See the *CREATOR Journal* Vol. 30 Num. 1.



texture, which acts like a sieve to eliminate small and large particles from rainwater.

The ground also possesses numerous useful chemicals that adhere to soil particles (clay, sand or gravel, and humus). Some of these chemicals are negatively charged and remove acids found in rainwater. Others form bonds with pollutants washed out of the air. Bacteria and other microbes living in the soil decompose or chemically alter many types of harmful substances, thus preventing them from passing into the groundwater. (Scientists have recently discovered bacteria capable of transforming oil spills into harmless carbon dioxide and water!)

Christ, our marvelous Creator, uses all these things—physical, chemical, biological—to purify rain and other types of water entering the soil. This testifies loudly to the beauty of our Lord’s intimate care for all He has fashioned for the display of our Triune God’s glory.

PURITY AND BEAUTY

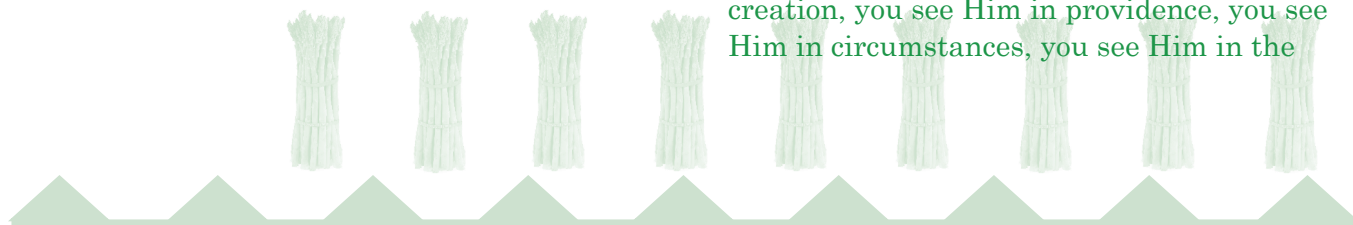
“Blessed are the pure in heart, for they shall see God.”

Matthew 5:8

Purity testifies greatly to Christ’s incomparable beauty. It is through Jesus *alone* that you shall see God if you are one of His own (John 14:6). But what exactly does it mean to be “pure in heart?” Simply put—it is to be purely Christ’s! “For you have been bought with a price” (1 Corinthians 6:20). And what is this “price?” None other than the blood of Jesus shed upon the Cross for the sins of His people. Only those who have been regenerated by the Holy Spirit can be pure in heart. It is impossible to see or experience the beauty of Christ without God’s Spirit.

Being pure in heart also means seeing life and eternity the way our Lord does. It especially involves treasuring *the beauty of our Triune God*. When God changes our hearts through His Gospel (Ezekiel 36:26), our natural relish switches from primarily the things of self and this world to the glory of our Heavenly Father and the good of others. It is in seeing God’s resplendent glory (Psalm 29:2) that we become truly happy (blessed). Genuine joy can only be found in His presence and in experiencing the beauty of our Creator, Redeemer, and Lord, Jesus Christ (Psalm 16:11).

Prior to conversion, we don’t see God, though we may enjoy His benefits—such things as sunshine, food, and friendship with others. When the Holy Spirit takes the blinders off our eyes (Luke 24:31) and unstops our ears, we see Christ as He really is—infinately holy and unspeakably beautiful! We also begin to experience His holy beauty all around us in everything He has created. “Purifying the soul cleanses the vision of the soul so that we see God . . . And all of a sudden you see God, you see Him in His creation, you see Him in providence, you see Him in circumstances, you see Him in the



scriptures, and you see Him working in the lives of people around you.”¹⁷

Receiving Jesus into your life through His Gospel and becoming one with Him is no mere ascent to truth. The beauty of God in Christ “will melt and humble the hearts of men ... draw them to God and effectually change them.”¹⁸ If you desire to be a true Christian, you must be converted or born again (John 3:3) and be given new sight (Ephesians 1:18). Pray for the Spirit’s gift of repentance and faith—faith that Jesus died on the Cross for your sins (see Luke 23:39-43). “People without the Spirit don’t see the glory of God and Christ because they are not able to. Their eyes have not been opened to divine beauty, so they can’t see it or enjoy it. Just as many cannot see the beauty that is all around them.”¹⁹

The chief way we see divine beauty in Christ is through His perfect obedience to His Heavenly Father (Hebrews 5:8-9). We observe this same beauty in true believers who universally obey God’s Word, and in Creation as it obeys its Creator! The true Christian is not afraid of God (though he or she does tremble before the Almighty with a holy fear). We obey because we see triune beauty in Christ and are irresistibly drawn to Him.

“Grace is not just supernatural help to do the right thing, but seeing more and more of that beauty of truth and goodness in God. And it is not a one-time seeing, but a growing vision of the beauty of the depths of God—like going deeper and deeper into a cell with an increasingly powerful microscope, seeing more and more of its astoundingly ordered complexities.”²⁰

Our kidneys’ ability to purify our blood from the harmful chemicals of protein turnover and other toxins should remind us that Christ’s Spirit is renewing our spirits day by day (Titus 3:5). The sight of Christ (Hebrews 12:2) purifies our souls so that we may see forevermore the beauty of the Trinity.

17 “The Only Way to Happiness: Be Pure in Heart,” sermon preached by Dr. John MacArthur, Sunday evening, July 19, 1998.

18 Jonathan Edwards, “Religious Affections.”

19 Gerald McDermott, “Drawn By God’s Beauty: The Surprising Jonathan Edwards,” *Beeson* magazine, 2016.

20 McDermott, “Drawn By God’s Beauty.”

And God’s beauty can and will motivate us to live holy lives in obedience to our King, Christ Jesus. May His goodness and loveliness shine brighter and brighter in all our lives!

Pastor Gerald McDermott tells a story of a young man desperately seeking God. He asks advice from an older man, who replies, “Young man, I don’t think I can help you. For you see, I have a very different problem. I cannot *not* see Him!” May we all be so richly captivated by Christ’s beauty in His Creation!



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