Every Christian young person will eventually encounter scientific explanations about our origins and destinies that address deep questions about our existence. Fr. Paulinus F. Forsthoefel, S.J., a geneticist and fellow of the American Association for the Advancement of Science, wrote in the introduction of his 1994 book, *Religious Faith Meets Modern Science*, that he often encountered young men and women at Ohio State, the secular university where he made public appearances as a Fellow of the American Association for the Advancement of Science, who could not justify their religious beliefs when challenged by scientific theories.[2] What did they do? Many abandoned their religious practices.

Twenty years later, students heading off to universities may encounter even more difficult challenges. In 2014, Prof. David P. Barash published an opinion column in the *New York Times* titled "God, Darwin and My College Biology Class."[3] He explains in his essay "The Talk" he gives undergraduate students. If the scientific theories were not challenging enough, he goes further and tells students that as evolutionary science has progressed, the "space" for faith has narrowed. He tells them that we are all animals "produced by a totally amoral process, with no indication of a benevolent, controlling creator." He tells them it is not the duty of science to do the mental gymnastics to reconcile faith and science. On the last claim, I agree that difficult questions posed by science to theology should not be settled in a science class, but if students are not prepared to understand science in the light of faith, they will be left in dismal confusion by the rest of Prof. Barash's teaching. It seems obvious that we evolved from atoms if we are made of atoms, but if we leave the question of our existence at materialism's door, we shut out any deeper meaning and purpose.

Let us sort it out. We see a single evolutionary step every time we see a baby. Biological evolution is the progression of a series of events by which living organisms accumulate changes over successive generations due to genetic inheritance and adaptive variation. Babies are born to parents, generation after generation. Every child is genetically like its parents but also genetically unique as an individual. As such, every child responds to his or her environment in unique ways,

however slight the differences may be. Those environments change over time, further affecting genetic expression.

A son may look more like his mom than his dad. He may have inherited dad's allergies but may grow out of them if the family moves to the country. A daughter may have her mom's long legs so she can run fast, but she may also have her dad's brown eyes. Because offspring are not genetically identical to parents, and because offspring do not mature in exactly the same environment as parents, evolution occurs. And evolution involves atoms. These are facts. There ought to be nothing remotely troubling to our faith in considering that life emerged from elements and evolved to the present day.

Now take a mental journey further back in time. Evolution occurs generation by generation. Conceptually, if we followed generations back far enough, we might find the most recent common ancestor, defined as an individual who is a genealogical ancestor of all present-day people. Computational models of human genealogy suggest that this ancestor might have lived a few thousand years ago.[4] If we keep traveling back through ancestry, we can arrive at the first human population some 50,000 to 200,000 years (or longer) ago, but no evolutionary model implies a first pair of human individuals.[5] Evolution is understood in terms of populations giving rise to new species.

Even if the remains of the first man were found, there would be no way for radiometric dating, genetic dating, or any other analytical system to ascertain that a particular sample came from the first man. This is because dating techniques rely on comparison. When a new specimen is found, it is compared to other samples that have been found and dated. The genetic molecular clock, which uses the rate at which molecular changes accumulate during the evolution of genes or proteins to estimate the timing of evolutionary events, must be calibrated with independent dates from the fossil record.[6] Radiocarbon dating is the most precise method because carbon 14 has the shortest half-life among isotopes used in radiometric dating. Isotopes with longer half-lives can be used to measure longer timescales at the expense of resolution. Even if there were a technique that could resolve down to a single generation, there would be no way to know if the oldest

generation found was the oldest generation ever to be found. Speaking of evolution in terms of individuals is like using a bulldozer to pick up the first grain of sand that ever existed on a beach. Not only is it the wrong tool, it is the wrong expectation because we do not think of beaches in terms of first particles of sand.

But neither can genetics rule out a miracle. So if indeed Adam and Eve began to live, literally, as a fully grown man and woman through a miraculous act of God, science can only shrug and keep on digging. If they came to exist some other way, who can ever know? The digging in science is good, though. There is a lot to learn about the history of life, and it is good that scientists explore our physical origins because whatever they discover about our bodily evolution from atoms tells us more about ourselves.

If we imagine a first man existed, even if we stretch the understanding of evolution and assume a first human existed in a population fractions of a second before any other, then we can ask where he came from. He had to be either created miraculously at some point after conception or conceived in a maternal womb. There are no other options. If we said that he dropped from the sky, we would have to call that a miracle. If we said he was born of a nonhuman, we could call that nonhuman a mother. We are left with the conclusion that a first man started out like the rest of us—a highly organized organism made of atoms—and that description applies whether he began as a zygote (a fertilized egg) or an adult lying on the sand. Either way, we can still ask where those atoms came from.

Atoms constitute the matter that makes us up, and every atom in our bodies came from the earth, whose matter seems to have come from supernovas, whose matter probably came from the earliest moments after the Big Bang. As the universe expanded in the fraction of a second after the event, the lightest elements—hydrogen, helium, and some lithium and beryllium—formed. The rest of the elements formed in stars. A star is born when gravitational forces collapse gases and dust into a nebula. At the dense core of the nebula, the high temperatures cause nuclear fusion (the nuclei of atoms fuse) to form helium, also called hydrogen burning.[7] These fusions

release energy—lots of it—and this constitutes most of a star's lifetime, including that of our sun. When the hydrogen supply is nearly gone, there is less hydrogen burning, and the star becomes a red giant. The core of the star contracts, and the exterior regions cool so that the star emits red light.

Using helium as its fuel, the star produces beryllium, which either decays or collides with another helium nucleus. If the unstable beryllium and helium collide, they produce carbon. If the carbon reacts with helium, oxygen forms. Hence, there is a high abundance of the elements (hydrogen, carbon, and oxygen) necessary for life on earth. As the stars cool, they become white dwarfs with even denser and hotter cores. This is when fusion processes produce heavier elements until the core is mostly iron. As the core continues to grow in density, the extreme gravitational forces cause the star to collapse, otherwise known as a supernova explosion. The heavier elements in the periodic table form in these times.[8]

It is fun to consider what journey the particles of our bodies have traversed in the last 4.5 billion years on Earth and through the universe in the last 13 billion years. Did you ever wonder how many other bodies all the uncountable particles in your body have occupied? You and I will never know that answer, but nevertheless the particles that make us up have traveled the universe. What supernova have they come from? What cloud did they touch? What rock did they sit in? What river carried them? What other child held them?

The point of this exercise is to show that a Catholic can both explore what evolutionary science has to reveal and, simultaneously, believe in the existence of Adam and Eve. What a Catholic, or anyone else, cannot do is expect evolutionary science to find them any more than chemistry or physics can find a pair of electrons on your nose. Catholics should not be grimacing when people say humans evolved from atoms. They should be holding up a finger and adding, "We evolved from the beginning."