

# PhyzGuide: The Why-How Tree

**Learning to think like a four year-old. With thanks to Walt Scheider.**

When you were four years old, the world was a strange and wonderful place. Everything seemed so new and mysterious. And at four, you had a vocabulary large enough to begin asking questions (just ask Mom or Dad). You asked questions about everything and were never satisfied by the answers.

“Mommy, why do cats meow?” “Because that's their way of talking.”  
“Why don't they sound like us?” “Well, because their mouths are different from ours.”  
“Why?” “Well, that's just the way it is.”  
“But why?”...

Chances are that you drove many adults up the wall with all these questions. To you, these were important questions; you really wanted to know why cats meow, or why it rains, or why your eyes are blue. To many grown-ups, these were questions they didn't have the time or patience to answer, or didn't know how to answer.

From that time on, you have probably been discouraged from asking so many questions. And that's unfortunate. Discouraging such questions dulls one's curiosity.

In physics, you will do better to think like a four-year old. Why? Because all those questions you asked as a youngster have their ultimate answer in physics. Even the cat's meow is ultimately explained in terms of the Rules of the Universe.

To see how everything we see is related ultimately to physics, let's examine the question of why one's eyes might be blue.

**WHY/HOW did you come to have blue eyes?**

*You inherited them.*

**WHY/HOW?**

*Through your genes.*

**WHY/HOW?**

*The DNA in your genes carries the blueprint for your whole body.*

**WHY/HOW?**

*The DNA molecule forms base-pair bonds with its four types of building block molecules allowing the DNA to make exact chemical copies of itself.*

**WHY/HOW?**

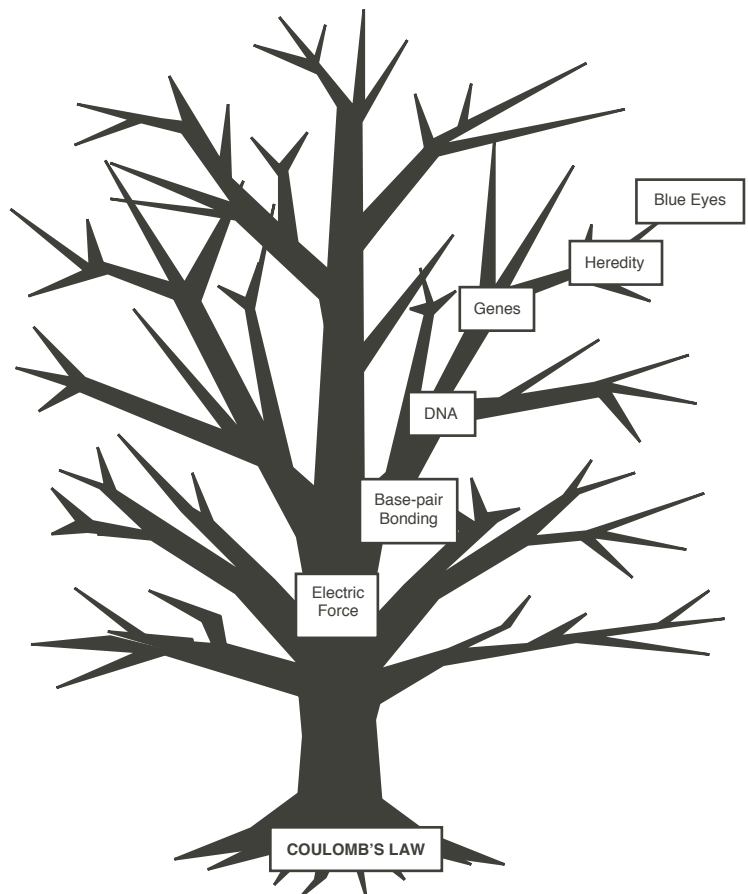
*Electric forces make the base-pair bonds.*

**WHY/HOW?**

*Coulomb's Law of Electric Forces.*

**WHY/HOW?**

*At this point, we don't have an answer to that question. We can answer no more “Why's” or “How's.”*



We started with a **biological** question and have traced it to a **chemical** explanation which, in turn, we traced to the **physics** of chemical bonds.