





# TAKE ME TO YOUR LEADER

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PERSPECTIVES ON YOUR FIRST  
ALIEN ENCOUNTER



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# **TAKE ME TO YOUR LEADER**



# PROLOGUE

**E**ver since childhood I've wanted to be abducted by Aliens. My interest in the night sky began at age nine, after a first visit to New York City's famed Hayden Planetarium, an attraction within the American Museum of Natural History. Growing up in the City, with persistent air pollution, light pollution, tall buildings, and endless evening distractions, were it not for the Hayden Planetarium, I'd have no relationship with the night sky at all.

After a few years, I joined the local amateur astronomer's club,\* and with my telescope, I'd look for occasions to

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\* The New York Amateur Astronomers Association is the oldest in the country, founded in 1927.

be alone, at night, under clear skies. The more alone I was and the more secluded the observing site, the greater my desire for a beam of light to come down from the sky and take me away. This sentiment was especially stoked at the summits of mountaintops, surrounded by low-lying clouds below, at observatories in the Chilean Andes, where I obtained data for my PhD thesis. Just me, my telescopes, and the universe. The desire to be abducted was driven entirely by my cosmic curiosity and not by some suppressed need to escape civilization and leave Earth behind.

As a professional astrophysicist, I am not alone in this interest. We've all done the calculations. We know the size of the observable universe—more than 90 billion light-years across. We know the age of the universe—13.8 billion years. We know how many galaxies it contains—as many as a trillion. We know how many stars populate those galaxies—approximately 10,000,000,000,000,000,000 (ten sextillion), give or take a few. We can estimate how many planets and moons might orbit those stars—multiply by ten. We know the chemical ingredients of life—hydrogen, oxygen, carbon, nitrogen, and of course “other.” We know how common they are—among the most common in the cosmos. And we know how quickly life began—organisms have thrived for 95 percent of Earth's timeline, starting when Earth was cool enough to sustain complex molecules.

We know these numbers well, which prevent any of us from imagining a universe not teeming with life. We desperately want to find them. Or maybe it is they who will find us. If that happens, and the space Alien demands, “Take me to your leader!” what will you do? What should you do? Our collective assumption is that the Alien wants to meet the person in charge of things: The President. The Prime Minister. The Monarch. The Pope. Or whoever happens to be the head of state. But plenty of other people are also “in charge” of things, especially multi-billionaires and captains of industry. Not knowing anything in advance about human civilization, but eavesdropping on our cultural norms before arrival, the Aliens might just as easily conclude that decade by decade, pop culture icons were also, or exclusively, in charge, such as Clark Gable, Walt Disney, Marilyn Monroe, Elvis Presley, the Beatles, Michael Jackson, Michael Jordan, Beyoncé, Taylor Swift.

For the Aliens to have reached Earth at all, from any place outside our solar system, we can reliably conclude they’re more advanced than we are, in every way. So, maybe you should not seek out your actual leaders, be they political, cultural, or religious. Perhaps you should instead seek out people who have high scientific and technological expertise. You might also hide from the Aliens everybody who thinks Earth is flat, as well as all others who deny what

science is and how and why it works. This would also be the wrong time to convince them that your God created the universe and that humans, not Aliens, are created in His image. We want to leave the friendliest impression possible on our space visitors, whatever their intentions, be they plunderous, nefarious, or simply curious.

In science, skepticism is foundational to our profession, so we uphold standards of evidence that some interpret as disinterest or even denial. Don't take it personally, it's how any and all objective truths have ever been established in this world. Think of *Take Me to Your Leader* as a book of etiquette and insights for your next close encounter, or perhaps a scientifically infused user's manual with helpful hints from an astrophysicist who wants to meet the Aliens as badly as you do.



## ALIEN TO US

**I**f an Alien approaches you with multiple appendages, one of which looks like an extended hand, resist grabbing and shaking it. You don't know in advance what part of the Alien's anatomy you just touched, and you probably don't want to find out. Furthermore, the handshake is not even a worldwide custom, so it's surely not universal. Nor do you know if raising your hand in a "Hi!" gesture can be construed as an act of kindness or aggression. And what if the Alien chooses to greet you the way Earth dogs greet each other, and it simply wants to come around and sniff your butt? You don't know anything about your new friend's customs, so on a first encounter, it's probably a good idea to leave all your habits at home, until you learn a thing or two about theirs.

We're taught in biology class that humans share 99 percent of our DNA with chimpanzees, accounting for our common physical features and serving as evidence of a relatively recent common ancestor, living a mere 6 million years ago.<sup>1</sup> Because all life on Earth has a common origin, that means any two species will have a common ancestor somewhere in the tree of life. The more different you are from each other, the further back in time you need to look. For example, the common ancestor between humans and bananas lived approximately one and a half billion years ago. A time in Earth's tree of life that we could justifiably call the "banana split."<sup>2</sup> As long ago as that was, humans nonetheless share 25 percent identical genes with bananas.<sup>3</sup>

Don't be upset. We evolved on the same planet.

But if a space Alien arrives from across the Galaxy and has no genes in common with humans—or no genes at all—then we might expect it to look at least as different from all life on Earth as humans and bananas look from each other. Yet most film renderings don't even try, with Aliens looking identically human—on the outside. If they're also identical on the inside, then we can ask what it means to think of them as Alien at all. If, however, they're different on the inside—organs, physiology, biochemistry—a medical professional equipped with no more than a stethoscope would know immediately. If visiting Aliens never got ill or if they

never required medical attention, then they could easily be living and working among us, hiding in plain sight. Otherwise, to blend in safely they'd need to hang out at cosplay festivals where dressing like Aliens is common, such as Galacticons and Comic-Cons around the world.

Without good evidence of what actual Aliens look like, we're stuck imagining them. And imagine them we do. The Internet Movie Database<sup>4</sup> lists no fewer than three thousand films, TV shows, video games, and documentaries with "Alien" in their title or description—both friendly and evil. Mostly evil. Many carry irresistible titles, such as: *My Stepmother Is An Alien* (1988), *Sex and the Single Alien* (1993), *Cowboys & Aliens* (2011), *Alien Surf Girls* (2012), and *Aliens, Clowns & Geeks* (2019). In all these portrayals, the humanoid form persists. And none of them look like bananas. Add to these Aliens the mythical-magical places on Earth that creative writers have conjured, such as Brigadoon, Narnia, Gondor, Hogwarts, Arendelle, and of course the Emerald City of Oz, and you've encountered Aliens while never leaving the planet. Aliens may have reached a pinnacle of pop culture in the 1996 animated film *Space Jam*, when a team of five humanoid, trash-talking monsters—one each in the colors blue, green, purple, orange, and red, collectively named the "Monstars"—arrive on Earth to play basketball with live-action NBA great Michael Jordan, along with Bugs Bunny

and every other Warner Bros. Looney Tunes character that old-timers will remember, from Daffy Duck to Porky Pig.\*

Yes, the Aliens are among us, and they're here to stay.



In spite of the humanoid bias, Hollywood offers important starting points, however flawed, for us all to think about our first (or next) encounter with actual Aliens. On the matter of size, movie Aliens don't tend to be extremely small, nor extremely large. In the 1987 film *Predator*, the ugly humanoid Alien stands about a foot taller than his human adversary, played by Arnold Schwarzenegger. Pegging Arnold at five foot ten<sup>†</sup> puts the Predator around six foot ten. One in six NBA players is at least that tall,<sup>5</sup> so the Predator's human proportions are not entirely off scale. And it bleeds. Perhaps they're scarier when they can look straight in your eyes, rendering the human-sized velociraptor equally terrifying as *Tyrannosaurus rex* in the 1993 film *Jurassic Park*.

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\* You are surely eager to learn that Porky Pig's full name is Porky Cornelius Washington Otis Lincoln Abner Aloysius Casper Jefferson Philbert Horatius Narcissus Pig, as revealed in the 1936 cartoon *Plane Dippy*.

† Private communication with Terry Crews, a friend of Arnold Schwarzenegger.

One might also wonder whether an entire race of Aliens can be no larger than an insect. The question is not whether Alien life could be that small, it's whether Alien life could be that small and build spaceships that cross the Galaxy. While there's no law of physics that prevents it, the forces of Nature manifest differently on small scales. It's the realm of biophysics, and it's why insects can walk up vertical walls and you can't. It's why fleas can jump 150 times their own height<sup>6</sup> and you can't. It's why ants can carry up to fifty times their own body weight and you can't. It's also why spiders have spindly legs, but hippos, rhinoceroses, and elephants have thick, chunky legs.

The culprit here is that your weight is proportional to the cube of your size, while the strength of your bones is proportional only to the square of your size. So, if you make an animal twice as big, it will weigh  $2 \times 2 \times 2 = 2^3 = 8$  times as much as before. But the animal's capacity to carry that weight increased by only a factor of  $2 \times 2 = 2^2 = 4$  times as much as before. This places a practical upper limit on the size of living beings, lest they collapse under their own body weight. Note that the weight of whales is commonly reported as though they live and work on land. By that measure, the blue whale checks in at 150 tons. But, of course, whales don't hang out on land. They live in the ocean, where the buoyant force of salt water on their bodies renders them functionally

weightless. That's why they can grow so large with no stress to their physiology and why a beached whale is as good as a dead whale. When life is small, strength wins relative to body weight, granting insects and other small critters their record-setting properties—in their own world.

In our world, however, insects can't do much. You'd need the weight of 100,000 ants to bend a paper clip.\* And that's only if they all piled on, like college cheerleaders, in just the right configuration. So, how would they manipulate raw materials to fashion a space-worthy launch vehicle? The laws of physics greatly restrict the likelihood of Earth being visited by, much less invaded by, tiny Aliens.

The biggest-ever land animals on Earth come from the age of dinosaurs. Not quite as large as Godzilla, but they weighed upward of a hundred tons. Jumbo Aliens can surely bend our paper clips, and nothing prevents them from visiting us in outsized ships of their own design. But really big, mega-Aliens pose a problem. How about one the size

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\* In an experiment performed at home, an average paper clip requires a force of about 10 ounces to bend. An average ant weighs one ten-thousandth of an ounce. If 100,000 ants piled onto a paper clip, they might just succeed in bending it.

of our solar system? A beam of light requires eight hours to span the diameter of Neptune's orbit. Life-forms of that size would be neither nimble nor responsive to stimulus. If the Alien's proverbial bald head itched, the signal would take eight hours or more (at the speed of light) to reach its fingernails and trigger a scratch response. This time delay would afflict any and all decisions our jumbo Alien would make. One might also ask on what mega-planet might such a mega-Alien live, if not just free-floating in space, and how it got to be that size. Not impossible, just unrealistic.

After decades of unimaginative-looking intelligent Aliens in pop culture, the 1977 film *Star Wars: Episode IV—A New Hope*\* featured a memorable scene in a dive bar, on a planet, in a galaxy, far, far away. Patrons were comprised of impressively varied Alien-creatures, ranging in size from five feet tall to seven and a half feet tall. Each one weirder than the next—drinking or smoking or both. The bar also featured an Alien jazz band with each performer playing a different wind instrument. This scene broke many molds for what Aliens could look like in films and paved the way for even more creative Aliens in the film's sequel, and beyond. Yet nearly all

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\* The first film made in the franchise, originally titled simply *Star Wars*.

Aliens depicted had a head, two eyes, a mouth, shoulders, two arms, two hands, and ten fingers.

I suppose we shouldn't be surprised that most Hollywood Aliens are humanoid, with faces and bodies that resemble our own—an enduring feature of land vertebrates in Earth's animal kingdom and of human actors paid to don Alien costumes. Even the xenomorph\* creature, birthed in the 1979 film *Alien*,† starring Sigourney Weaver, sports an (oblong) head, eyes, mouth, teeth, neck, shoulders, arms, torso, legs, fingers and toes, and a tail. But vertebrates occupy just one trunk in the tree of life's foliage. What of other life-forms? How about spineless invertebrates? Ubiquitous fungus? Photosynthesizing plants? If Earth life is what your Alien models must mimic, then why limit creativity to humanoid vertebrates?



A good place to see what's biologically possible on Earth is the fossil fields of the Burgess Shale in the Canadian Rockies of British Columbia, Canada. Most animal fossils of the world

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\* A fictionalized word invented to describe the class of Aliens portrayed in the film.

† Between 1979 and 2026, nine films have been produced in this franchise, plus a TV series.

are the mineralized remnants of animal bones and exoskeletons. The unique composition of the Burgess Shale enabled it to preserve records of soft tissue in countless aquatic animal species from 500 million years ago, just after the Cambrian Explosion of life. This special place on Earth was the focus of the 1989 bestselling book *Wonderful Life*, written by evolutionary biologist Stephen Jay Gould. A sampling of the Shale's mostly extinct creatures reveals all manner of squiggly appendages, spikes, random eyeballs, legs, fins, other means of locomotion, and tentacles. Any one of them would make a more inventive Alien than what Hollywood tends to produce.

Once, just once, I want to see a gray Alien portrayed with a full head of coiffed hair. The 1996 farcical sci-fi film *Mars Attacks!*, with an all-star cast, had a curvaceous femme Alien with big hair, but she was costumed by the invading Martians to look entirely human. So that doesn't count. What they've gotten right from the beginning, however, is flying saucers with ramps that extend down to the ground. When not otherwise beaming you or themselves in or out of their craft, their use of ramps means that Hollywood flying saucers were wheelchair-accessible long before such accommodations were legally mandated in the United States.

Derived from eyewitness accounts, often under stress, including hypnotic revelations, Aliens tend to sort into twelve archetypes:<sup>7</sup>

1. *Grays*—bald, gray, almond-eyed
2. *Nordics*—beautiful, white-skinned, blue-eyed Aliens with long, flowing blond hair
3. *Reptilians*—humanoid reptiles
4. *Pleiadians*—hailing from the Pleiades star cluster and resembling the Nordics
5. *Insectoids*—greatly resembling an oversized praying mantis
6. *Little Green Men*—little green men
7. *Tall Whites*—pale, towering, and fragile
8. *Hybrids*—part Alien, part human
9. *Arcturians*—luminous mystics, from the Arcturus star system
10. *Sirians*—from the star system Sirius, the brightest in Earth's night sky. Tall, luminous, wise, with subtle aquatic features.
11. *Annunaki*—deities in ancient illustrations, with modern interpretations as visiting aliens
12. *Lyrians*—cat-eyed humanoids from the constellation Lyra, the Harp