THE EVOLUTIONARY THEORY AND THE SCIENTIFIC METHOD

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Contents

1 INTRODUCTION 5

2 GENERALITIES 9
- 2.1 The scientific method . . . 9
- 2.2 Cells and viruses . . . 10
- 2.3 Evolution . . . 11
- 2.4 The Evolutionary Theory (ET) . . . 12
- 2.5 Natural Selection . . . 16
- 2.6 To have or not to have a goal . . . 22
- 2.7 Evolution and progress . . . 23
- 2.8 The origin of our species . . . 35
- 2.9 Somatic mutation . . . 36
- 2.10 Evolution and violence . . . 39
- 2.11 Religious Questions . . . 43

3 PRE-MECHANICISM 51

4 OF THE INVENTION OF THE DNA 57

5 THE ET AND SCIENCE 65

6 DARWINISM vs. LAMARCKISM 69

7 THE MILKMAID 79
- 7.1 The idea of saving . . . 79
- 7.2 The fable of Aesop . . . 80
- 7.3 Mechanicism . . . 82
- 7.4 Academic Rebuttal . . . 83
- 7.5 A simulation in JavaScript . . . 91
- 7.6 Reading the rebuttal . . . 92
- 7.7 Flashback . . . 94
- 7.8 Quality control . . . 99

8 THE GENOME IS SOFTWARE **103**
8.1 Enzymes and DNA 103
8.2 Relationship with computers 105
8.3 Evolutionary implications 121

9 CONCLUSION **131**

Chapter 1

INTRODUCTION

The **ET (Evolutionary Theory)** pretends to explain my existence and demands to be the light and the organizing principle of all truth.

By instinct, I do not believe in ET. The problem is that my instinct does not explain why. But there is no problem because to put the ET to the test, nothing better than the **Scientific Method**, which formalizes the right to logical doubt. The purpose of this document is to present a contextual overview of my efforts in this regard.

In the first chapter, *Generalities*, we discuss questions of general interest. It is necessary to take into account that I am a religious man, which means that I am tied to God and his Christ. This interpretation is due to the fact that *religion* comes from the Latin *religare* which means *to bind, to tie*. But I also really enjoy Science. Very much. Therefore, my mind is like a troubled sea. This document is one of its results. It presents a global context of how I see the ET, its relationship to modern culture, and how the Scientific Method can be used to falsify it. A **falsification** is an irrefutable proof that a theory is false. We have proposed a falsification of the **ET** in

Falsification of the Evolutionary Theory by Flipp (2021).
https://ejristos.com/GPfalsifiesEvo/FalsificETwithFlipp.pdf

The programs that support the text can be downloaded from
https://ejristos.com/GPfalsifiesEvo/FlippETfalsification.zip

You might unzip and run them in your preferred browser: open a tab in the browser, click on it, press `CTRL + O`, with the `O` for Open-files, and select the program from the saved files. On the cell phone, everything comes out of common sense.

The cited work has been difficult to understand, so it was necessary to write an adequate contextualization, and this is it.

Darwin proposes to use *Evolution* to explain our existence through his ET which is usually called *Darwinism*. We find it very beautiful how scholars turned it into a key piece of Science. We discussed that historical aspect in the chapter on *Pre-mechanicism*.

Total mechanicism is associated with DNA. It is customary to say that DNA exists in reality and that it was discovered, but it is more serious to say that it was invented through creativity and a lot of work based on the Scientific Method aimed at answering objections. We will discuss that in the *Of the Invention of DNA* chapter. In the next one, *The ET and Modernity*, we expose how Science has used the Scientific Method to put the ET to the test. Something very important is that Evolution can be simulated in computers and that what the ET predicts is verified: Evolution produces progressive improvement. Such simulations are called *Genetic Algorithms*, **GAs**. These are everyday tools in modern culture. Since they work quite well to find approximate solutions to optimization problems in Engineering and Science, it seems obvious to every scholar, as something born of his or her own experience, that the ET is true.

Our invitation is to look a little further. We elaborate in three parts on our own ideas to falsify the ET:

In the first, *Darwinism vs. Lamarckism*, we review several common sense refutations of the ET but read through the lens of the Scientific Method. Interestingly, Darwinism is easy to refute, while Lamarckism is practically natural and justified. However, no one has proposed a modern mechanistic formulation of such a theory, so we cannot speak of falsifying it. Although, we already expressed our objections in the first chapter.

In the second part, we analyze with the Scientific Method a popular opinion that is given as a reason to accept the ET: *gathering information in DNA is like gathering wealth in real life*. And since one sees that many people become rich, one imagines that it is inevitable that the Evolutionary Process gathers Perfection. The first warning against this illusion was given to me by the culture that educated me through the fable of *the Milkmaid*, composed by Aesop. Our analysis, which includes a simulation, invites us to conclude that explaining Perfection by Evolution implies predicting that there must necessarily be an *Evolution of Perfection*. That is, there must be in first place incipient solutions, then mediocre, then good, and finally perfect. The Scientific Method requires contrasting this prediction with what is observed. That is a task for everybody.

In the third part, we explain where our official falsification comes from. It all follows from the fact that *The Genome is Software*. That means that the DNA of an organism can continue life thanks to the fact that it contains a program with verbal instructions that need an interpretation code, which is the *Genetic Code*. Universal experience in computer program development shows that the ET is false. Indeed:

What is observed is that software developers earn a living making all kinds of programming errors, the correction of which makes them commit more errors. These are called *bugs*, and there is a whole saga of them and the huge problems they have created. From this, we infer that random mutation must have made myriads of anti-survival errors that must appear everywhere in the fossil record as well as in ourselves and every living thing. Nothing could be further from the truth: living beings and their fossils are perfect. We have a falsification that is quite obvious.

But since humans are part of the newly presented falsification, it may not be accepted. So we concocted another falsification entirely based on simulations and objective observations. The result is the same:

Every perfect solution to a problem implies a bunch of imperfect proposals. They could be mediocre, approximate, or even very good. And that must happen at all times. Consequently, the ET predicts that throughout the Evolutionary Process everybody must be full of imperfections. To contrast such a prediction with what is observed, I look at my own body. And how do I see it? I rate it as perfect -even though I have some complaints. Consequently, the ET is irremediably false.

Chapter 2

GENERALITIES

`Educating the common sense`

We formulate the **ET (Evolutionary Theory)**, connecting it with the advances of modernity and with basic questions of common sense and religion.

2.1 The scientific method

We have inborn machinery to observe, a brain to discriminate, a thought to generalize, and a logic to test the beliefs we invent. That is the basis of science.

1 *What is the Scientific Method?*

The **Scientific Method** is a formal implementation of the instinct that prompts us to compare what is said or believed with what is seen. It has been very fruitful in the study of Nature. A common formulation is

1. Report some observations.
2. Formulate a generalization or *null hypothesis*, H_o.
3. Object H_o.
4. Design and carry out an experiment or set of observations under specific conditions that embody the objection.
5. Calculate the predictions about the experiment of what is believed in the H_o.
6. Compare the observed results with the predicted ones and reject or do not reject the generalization or null hypothesis.

When an experiment or set of observations cannot reject a null hypothesis, confidence in it is strengthened and more severe tests, experiments, and screening programs are designed to test it. Depending on the reasonableness of the null hypothesis and the severity of the tests, many people may come to believe that it is true and thus declare a **dogma**, an unquestionable belief. Dogmas are important because they save questions and define a context that can identify a group.

The ET is the most important dogma of Modern Science and gives identity to all who believe in **Materialism**. This philosophical school grants objective observations, independent of the observer and reproducible, the essence and reason for knowledge. What generates objective knowledge is called **Matter**.

Every human being applies the Scientific Method at all times, as illustrated by the following story that has been adjusted to the proposed formalism:

A lady notices that *her husband is lazy and uncooperative*. She complains to a wife in her neighborhood, who backs it up by saying that *my husband is the same*. They generalize by saying that *all husbands are lazy*. They make a specific prediction: *since the spouses are lazy, neither of them will go outside in the morning*. So they decide to be careful to see who is on the street when it is their turn to leave early to take the children to the route. As they do so, *they meet several husbands who wave in a hurry*. *Their observation contradicts the prediction*. Therefore, *the proposed generalization is false*. Perhaps the wives have the patience to rehearse some reformulation taking into account, for example, that the behavior of the husbands depends on their working conditions and the agreements in the family.

After reviewing some prerequisites, we will use the Scientific Method to test various evolutionary theories about the origin of our species.

2.2 Cells and viruses

Like a wall made of bricks, a living being is made up of cells.

2 *How are living beings characterized?*

Living beings are those that have cells, which have genetic information, associate, reproduce and have autonomy. Dogs and cats are living beings. Bacteria too because, although they are unicellular, they are autonomous, reproduce, exchange genetic material, and some form transient multicellular organisms to move and hunt for food.

3 ***Are viruses living beings?***

Although they have genetic material, viruses are not living beings, since they do not have cells. The cell is the most elemental entity that can live and reproduce by itself. Viruses cannot reproduce independently. They have to take over a cell by hijacking its molecular machinery to reproduce. Viruses can be understood as an interchangeable part of living beings. This exchange or transfer is called horizontal, as opposed to vertical, which involves the transmission from parents to offspring.

4 ***Why are viruses so bad?***

Virus is a Latin word meaning poison and is a very appropriate name to describe the cause of hemorrhagic fever that makes the skin bleed. But it is not true that all viruses are bad. On the contrary, there are some viruses specialized in killing bacteria and they are part of our natural defense system. They are called bacteriophages or phages. Because bacteria adapt to antibiotics, phage-based therapy is the hope of modern medicine. However, our phages could be harmful to other species if they start interfering with their functions. Likewise, it seems very possible to us that any virus that is harmful to us is a good virus for some other species that would be its natural host. High co-adaptation between the two would be expected. Therefore, many mutations are required for them to change hosts, as is the case with bat coronaviruses when they cross over to humans. However, there are flu viruses that coexist between humans, chickens, and pigs. The H1N1 flu virus is of that type.

We now turn to consider the implications of reproduction in more detail.

2.3 Evolution

To create the genetic material of a living being, it is necessary to duplicate that of its parents. Such duplication may include some changes in the copy. That is the primary cause of Evolution.

5 ***What is Evolution?***

Evolution is the change from generation to generation of genetic information and the relative frequencies of its variants. The change has two sources: the *mutation*, which consists of the genetic material being copied from parents to children but not faithfully, and the *recombination* or a mixture of the genes of the ancestors. The mutation causes the clones to be somewhat different from their

mother. Recombination allows a person to resemble the maternal grandfather from the front but the paternal grandfather from the side. Both operations, mutation, and recombination happen randomly, which implies that while some create progress, others create failure.

Evolution is a fact of Nature that is necessary to explain why we are so beautifully different.

6 *If heritability exists, why do pretty women give birth to not-so-pretty daughters?*

Elucidating the beauty of a woman is something too ambitious. Let us simply consider the nails. They have to be wonderful, form a perfect arch, be resistant to disease and wear, and come out precisely at the top of the fingers to serve as a tool. All this is possible thanks to a huge gene pool. And they all have variability. For example, some nails do not look perfectly straight, nor exactly centered. But, if the consumed rice or wheat are whole grains, nails of some women are strengthened to such a degree that they become dangerous. Now, when there is variability and many genes, not everything is perfect for everything. Therefore, recombination puts something good together with something that is not. It follows that it is rare for someone to be good at many things. And, the children of someone good at something are probably not so good at the same thing.

Two terms allow for succinct language. The first is **genotype**, what is in the genes, and the second is **phenotype**, which is observed as a product of the genes. Regarding heritability, the official language says that when the phenotype is determined by a complex genotype whose elements have variability, recombination destroys all types of arrangements, including those that give a perfect phenotype, and there is no heritability.

There is a battle between heritability and mutation. What could be the result?

2.4 The Evolutionary Theory (ET)

It is dreamy to consider what happens when changes are added to changes.

7 *What is the ET (Evolutionary Theory) about?*

The **ET**, says that the evolutionary changes from generation to generation are chained forming the **Evolutionary Process** and through which some species beget others, and in particular that we come from the monkeys and, specifically,

that we have recent common ancestors with the chimpanzee, the bonobo, and the gorilla.

8 *Are Evolution and ET the same?*

Evolution is a reality that, as the viruses have shown, can turn into a nightmare. The ET is a proposal about what Evolution can achieve. No one can deny the existence of Evolution, but everyone must question the ET no matter what it says. The relationship between the two is similar to that of money with life. Money is a fundamental fact of our life. But to say that *lots of money is a guarantee of happiness, peace, and security* is a theory about money and a philosophy of life. Each person determines the degree of adherence to that theory.

Warning: In the literature, Evolution and ET are used as synonyms, so one must be attentive to the context to determine what it refers to, whether it is the evolutionary fact or one of its theories.

9 *Is not it enough to look at a monkey to realize how nearly the same we are and therefore deduce that the ET is true?*

No, it is not enough.

The ET is transcendent because it tries to explain our existence. As a result, it is not to be believed simply because it seems true, plausible, respectable, and because everyone believes it. It is necessary to put it to the test with the Scientific Method.

10 *Why do scientists believe in the ET?*

Because they think that the ET explains our existence, perfection, functionality and complexity by recurring to matter alone.

11 *How do you define perfection?*

Perfection is a subjective concept that awakens immense joy in the observer, a high sense of admiration, and great bewilderment because it is associated with enormous complexity and functionality. My hand, my eye, my heart cause all that in me. Indeed, I see them as miracles. In keeping with this sentiment, our definition is:

Perfection is what exists as a norm in a species.

12 *How does the ET explain perfection?*

According to the ET, every form of life that exists is the result of gathering small progress for about 600 million years, which are counted from the origin of life that can be equated with the origin of Evolution.

13 *Could you give a concrete example of how the ET explains the human body or at least some of its parts?*

Supporters of the ET might think of the following terms to explain how our eyes evolved:

First of all, the eye can exist because there are inert substances that react to light. Thus, modern video cameras conceptually have the same structure as the eye. It is about changing each point of the image by a light or color sensor.

We can now propose an evolutionary path from bacteria to the human eye as follows:

1. Spots first appeared on the bacteria that were sensitive to light.

2. Then we have endosymbiosis, which consists of a light-sensitive cell becoming part of another that does not see anything, and they all help each other. There we have the chloroplasts.

3. Next, multicellular beings are formed, which some bacteria already do temporarily. There are colonies of bacteria of various species in the soil that cannot live isolated from each other, since they need each other. To be organisms they only need to stick together, as it happens in the hydra.

4. Right away you have to form a tapestry of seeing spots. We have this in giant cell algae, *Nitella syncarp*a, whose membrane is lined inside by chloroplasts. These cells see the red laser light because when illuminated they respond with an electrical discharge. Exactly like our retinal cells in response to light.

5. To get from there to our eye, we have to increase the sensitivity of the sensors to the different colors, decrease the activation and recovery times, and add a set of lenses, which is not a mystery because many substances refract light.

6. We close our story by considering that each evolutionary step makes its carriers more likely to survive and leave progeny than less evolved specimens. Let us think of a bacteria that sees the light and captures energy for its processes.

14 *The preceding explanation seems acceptable. Is it missing something?*

It is an explanation in the air that invents an eye in a text of half a page.

In contrast, the culture that educated me used *the fable of the milkmaid* composed by Aesop, but in a version by the Spanish writer Samaniego, to show me the difference between thought in the air opposed to the complexity of life (that will be elaborated below).

Since I took this fable seriously, I took care to study and understand. Understand: that is the key. Understanding means that one can relate what one learns with what one already knows or wants to know and thus everything is integrated, the concepts, the similarities, the differences, the new, the important, the unknown, and its questions. Hard. When you say you understand something, you are usually up in the air, but life shows you how slow and dreaming you are.

15 *Does the ET contradict God?*

God has revealed Himself extensively so it is very clear that He and the ET repel each other. Let us see why.

On the side of Science, it preaches that materialism is sufficient to understand every facet of Nature, including our existence. Therefore, God has nothing to do with Science because, according to it, Nature is sufficient to explain itself.

We see that Science does not prove that there is no God, but rather requires God to give objective evidence of his existence. Since Science does not find it, that ends what it can talk about. However, the religious phenomenon is a social fact and, therefore, of Nature, and for this reason, Science studies it assiduously.

On the other hand, the greatest longing of God is the same as that of every father and mother: to be with their children as a family. This is seen in the Gospel since the Son of God is given the title of *Jesus Emmanuel* which means *the Salvation of God with us*. And it is that the closeness of God has been revealed as his obsession, so much so that He claims to have made us with his own hands and to continue to be present almost always to be the only consolation of the poor and the widow. If the ET were true, it would render the message of God nonsense, and in his honor, it would be better for God if he ceased to exist.

Let us now take a step toward the Scientific Method: let us gauge the power of Evolution to explain life as it is.

2.5 Natural Selection

It is easy to say that Evolution is this and that. But, how easy is it for it to explain our perfection? In response to this question, the ET proposes an automatic mechanism to create wonders.

16 ***How does the ET explain perfection and complexity?***

Mutation and recombination are the sources of change. But changes in the genetic material have effects on the ability to survive and reproduce.

We emphasize that **mutation happens randomly**. This implies in the first place that some changes could be favorable and their carriers would multiply more than the others. But at the same time, other changes could be unfavorable and their carriers would not be viable or would have defects and as a consequence, they would have fewer children than average.

By chaining changes to changes, we have the Evolutionary Process, which turns out to be, unintentionally, a cooperative contest between individuals, which creates perfection:

It is a contest won by the one who leaves the most children, which is called **the best** or **the fittest**. And it is cooperative because the genes come from the recombination or mixture of the genes of their ancestors. In other words, progress, when it occurs, is a collateral result of the genes serving to survive and that leave more children. The term **Natural Selection** is used to denote the phenomenon of leaving more children than others, due to some heritable trait.

For example, some people die of anemia but others do not, although everyone is bitten by the mosquito. There is a half-heritable trait, linked to the hemoglobin gene complex, that makes it possible to predict when a baby will survive anemia. Those who die are branded as weaker and it is usual to say that Natural Selection kills them. These are anthropomorphic ways of speaking. The only thing that exists is that some die less than others and that some reproduce more than others and that this might depend on having or not having certain heritable traits.

In tropical areas where malaria-transmitting mosquitoes abound, there are human inhabitants because those who survive, transmit their quasi-immunity to half of their children. Likewise, any genetic information that is useful for something and that is heritable has the possibility of changing, and some changes may mean an improvement. In this way, a small change is transformed into perhaps not small progress that, being heritable, is evolutionary. The Evolutionary Process accumulates, by inertia, such successes and the ET proclaims that both **high complexity** and **excel functionality**, that is, **perfection**, come from there.

Let us note that Natural Selection does not exist, but rather it is a way of saying that there is death and reproduction to a varying degree depending on the response to the challenges that the environment presents. We can compare the role of that abstract entity to that of the master that selects racehorses. In both cases, with the passage of time and generations, the populations will be more perfect, they will adapt better to the environment or to what the master seeks.

We say that Natural Selection is an emergent evolutionary master, not given from outside, but born from the relationship of the population that evolves with the environment. That evolver has a posteriori an objective: to perfect the population so that it **adapts to the environment**, that is, to establish a relationship with the environment that is favorable to its reproduction. The objective is **a posteriori** because it is observable by a being with subjectivity, but only after the phenomenon has passed.

17 ***Why do you underline that Natural Selection does not exist?***

Because if Natural Selection existed, it would take the place of God, the Creator, and Judge.

But since it does not exist and yet seems to explain my existence, my life has no purpose and therefore cannot be judged. In the ET, one defines what is good and what is evil without being accountable to anyone -unless there is a mutual agreement with our peers.

18 ***Do you think that the ET is true?***

No. I think the ET is false.

19 ***On what basis do you say that the ET is false?***

I think that the ET forgets that things are complex. This idea is very human and means that when you have a project and you start executing it, things do not work out for you, instead, you produce something very incipient and also have errors. If one perfects it by making changes and involving improvements, along with the good things there will be a sea of defects. And only with a lot of suffering, one can come to something worthwhile. I am witnessing it now that I see how two small children learn to add, but I am impressed by the mother, who adapts the complexity of her exercises to the situation of the children so that they improve with the least possible trauma.

Now, seeing my body so complex, an immediate prediction is born: If a human being, who is so intelligent, makes so many mistakes against his happiness, how

much more does Evolution have to make mistakes against adaptation! That would imply that the fossil record and my own body should be full of genetic problems, but on the contrary, I see that my dwarf body is wonderful. And the same thing happens to me with the fossils in museums: I see them as perfect. That explains my whole refusal to believe that I appeared by Evolution.

20 *Were you able to use the Scientific Method to support your rejection of the ET?*

Yes. And it follows naturally from what the ET supposes:

Evolution or the chaining of small favorable changes creates great things. True. But since changes in the genetic material happen randomly, the Scientific Method makes the following prediction: when Evolution manages to solve an adaptation problem, there should be a massive presence of imperfections. Because otherwise, the changes would not be random but guided by an intelligence that knows where it is going. That would be Lamarckism instead of Darwinism. Now neither the fossil record nor my body is massively plagued with imperfections. Therefore, **a lethal discrepancy is observed between what is predicted by the ET in light of the Scientific Method and what is observed.**

21 *Does the absence of imperfections in the fossil record and your body prove that the ET is false?*

Yes, but not directly because there is one way out to examine. It is that the imperfections could have happened, but they were fixed too quickly and there remained no trace of them. So computer simulations are required to know for sure whether Evolution is going fast or slow. What they say is that Evolution walks very slowly when faced with common problems. Link that with the absence of blemishes on both my body and the fossil record, and the ET is pretty much guaranteed to be fake.

22 *Is there anyone else outside of you who does not believe in the ET?*

Yes, no archaeologist believes in the ET. The proof is that the glory of every archaeologist is to show a fossil so perfect that it can be compared with the skeletons of living beings. A fossil of a dinosaur that looked exactly like a chicken, albeit six feet tall, comes to mind. It was so well armed that when it saw me, it almost ran out of the scare I caused it. But if archaeologists believed in the ET, they would adjust their fossils to the Scientific Method that predicts massive

imperfections throughout the Evolutionary Process. Therefore, the skeletons in museums should be misshapen, something that no archaeologist would think of. And if it occurred to them it would be in vain, since the bones of the fossils fit in only one way and immediately project an idea of absolute perfection. The reason is that the joints are congruent with each other and come together to form a whole from which movement flows.

23 *How is it possible that Evolution is frightened by complexity since it has no mind and Natural Selection does not even exist?*

Evolution makes its best to beat troubles. **Complexity** is an a posteriori measure of the required resources to do a task, to solve a problem. Therefore, in Evolution, the task is done first, and then its complexity, the resources in memory and time, are measured. In that sense, complexity is an emergent quality of problems. But, the concept of problem is also emerging. In ET there are no problems to solve. There are changes, death, and the one who survives. But when it is possible to add mutations to mutations that in the long run allow reproduction with many children, a structure is obtained that in our eyes is complex and perfect.

24 *What does the Scientific Method say about that?*

In many cases, the simulations support the belief that Evolution can attack complexity, but with one caveat: Evolution does not create complexity or perfection in one generation. It can take billions of generations to solve a not difficult problem. And, if the final product is called perfect, all intermediate states must be called imperfect. Therefore, perfection can only result as the fruit of a bitter struggle of Evolution against imperfections. In our terms: **There is no Evolution without Evolution of Perfection**.

25 *Viruses seem more and more effective for their destructive function. Is not that another proof of the ET?*

Viruses adapt to antibiotics thanks to Evolution, and during that process, they can appear to evolve into highly dangerous ones. Well, that is not necessarily true: they evolve from being a defeated enemy to standing as they are. It is restorative Evolution, but it is not progressive.

In general, being destructive or not is not a property of the virus, but of the relationship between the virus and its hosts. The same thing happens with a relationship: a man can say of a woman: How unbearable! But another man might find her wonderful. Now, in the space or world of variants of the same

virus, some are more virulent than others for the general human population. Virulence, relative to most, comes and goes with mutations, and sometimes you find a very virulent one, and sometimes there is another mild. But, is there a trend that is due to Evolution, specifically to Natural Selection? Let us discuss it with an example:

Flu viruses tend to subside when they are going to go away. This is compatible with the Theory of Darwin, which predicts that the beings that tend to fill the earth are the ones that have the most children that can reproduce. For a virus, those that survive and reproduce the most are those that are most transmissible and of minimal virulence. For the flu, the minimum seems to be total harmlessness, but for HIV the minimum is high lethality. This implies that we have many pests of all kinds among us at all times. But at the same time, there is rarely more than one strain with high virulence. This can be maintained as long as the transmissibility is suitably high. But since the high virulence scares many, not all, people seek to protect themselves and, as in the case of HIV, the dead are not many.

26 *Why do not we evolve full immunity?*

There are various reasons:

1. The ability to resist a plague is not inheritable. In general, the heritability of complex traits, such as immunity, is low. The reason is that the battle against a virus depends on many genes, their variants, and how they work together. A good genetic arrangement in someone can be useful against one variant of the virus, but not against another, much less against another type of virus. And recombination redistributes the arrays and since these are complex characters they are not inherited. Therefore there is no heritability. However, the immune system of any person is so good that a pandemic is not expected to kill more than 30% of the total population, as the black plague did in the middle ages. By comparison, covid-2019 has killed some 15 million people, almost two per thousand in a world of 8 billion.

2. From the mere fact that we do not have full immunity, it follows that the ability of Evolution to attack high complexity is very limited.

3. With so many vaccines and so many remedies, we are at risk of evolving into a species with too many small genetic flaws. Not in vain, about 30% of the population has refused to be vaccinated against covid, implying that the best thing for the species is to let Natural Selection act freely. Dear Reader: I ask you to take careful note that these people expose their own life in favor of natural death, but not that of others.

27 *Can you clarify whether vaccines and medicines are actually a sin against Evolution?*

There are three opposing positions:

1. Almost all mutations are lethal. And the few that are not, work more or less the same. That is why they are called neutral. Consequently, it is impossible to damage the genome in any significant way.

2. Medicines and vaccines affect systems that depend on many genes. Therefore, they have to do with genetic arrangements, but not with the genes themselves. Hence, they do not affect heredity.

3. Many genes operate in case of failure. For example, if you have a heart infarction, special machinery is deployed to help you recover. As the dogs fast and rest in such a situation, it is inferred that this is how the machinery works better, so they recover within two weeks. But today, some 5-year-old children suffer heart attacks, perhaps because of fights between their parents. If someone survives and is taken to the clinic, they will give him or her medicine instead of fasting and resting. That way, they stop testing their genes, and if they are defective, they will be multiplied in the offspring. The prediction is that the human species is becoming filled with deleterious mutations. As a result, the life of the people who survive thanks to technology, that is to say, of the whole world, will be harder and harder and more enslaved.

28 *You imply that people with genetic defects should refrain from reproducing. Are you in favor of this being done by law?*

Please, be very careful!

We have to consume vitamin C because our body does not produce it. But we have a pseudogene for such a task. The information is there, but it cannot be used. We infer that ancestral humans had such a gene activated and functional, but it was deactivated over time. In Nazi terms: *everyone, without exception, is genetically crippled, and using modern DNA-editing technologies is just the natural path to our restoration*. This point of view is not reliable because it is not excluded that the agent that silenced the vitamin C gene was Evolution itself. In other words, whoever restores that gene may have cross-reactions that would cause more harm than good. The reason is that the vitamin C pseudogene serves as a regulatory signal for another gene.

We see that there is no accepted definition of what a genetic defect means. Therefore, I do not think it is wise to legislate on the matter. I decide that if a

baby with notorious genetic deficiencies is accepted by a mother, I also accept it. For instance, I see that many mothers accept progeny, who suffers from Down syndrome. But, what if a mom rejects her baby? This has happened. If you are there, do your best to counsel the mother, for her suffering is intense.

We have seen how Natural Selection is a tremendous biological reality. But being that we like to anthropomorphize so much, we take the risk of confusing the concepts unless we watch over ourselves. It is good to review that Natural Selection is an emergent result of death, survival, and reproduction when linked to heritable traits. Let us look at another anthropomorphism.

2.6 To have or not to have a goal

Natural Selection has the sole objective of improving the adaptation of living beings. In saying that, we are using anthropomorphism. Still, in some cultures, including mine, having goals is something to be tirelessly celebrated. Although some targets can be fearsome.

29 ***What technique do the labs use to make their human killer viruses?***

The easiest is Applied Evolution. There is the possibility of relying on Genetic Engineering, but that is much more complicated. In general, all of this is so broad and so complex that it is a Science that is manufactured day by day. But it is a lie to say that everyone that evolves viruses is to make weapons. It remains to be seen what great therapies this line of medicine will produce. It is already routine to evolve a coronavirus to control some agricultural pests. We are waiting to see how reliable this technique is. My opinion is that it is very little because pests also evolve and adapt to whatever. We have already seen it with Genetic Engineering applied to agriculture: in the genome of tomato, they inserted the genetic information that allowed a herb to be immune to insects. It served perfectly during one harvest, but beyond that it became questionable.

30 ***What is the difference between genetic engineering and Applied Evolution?***

In Genetic Engineering, you set a goal, calculate the necessary changes, and do it with your own hands. Ingenuity is required and that is why it is called Engineering. It is very difficult: despite all preventive measures, there are dead persons. In contrast, Applied Evolution resembles the process of teaching children. A goal is set, and the child guesses an answer and is applauded when he

has traces of hitting. With the feedback from the instructor, he gradually improves. The process ends when the goal is reached. We emphasize that Applied Evolution has objectives.

Let us now see an example of Applied or Artificial Evolution whose objective is to produce racehorses:

Individuals, males and females, good at running are selected. They are interbred to produce foals and fillies. The best ones are kept for running (this can already be known at two weeks of age) and the rest are sold. With the chosen ones the procedure is repeated, and in the end, we hope to have magnificent career exponents. It is not superfluous to note that its speed does not become supersonic but by far 70 km / h for distances of half a kilometer. With that, we already can have races where the horses can compete and win for a nose. In modern times, multivariate analysis is used to define the best exponents, i.e., everything is measured and its impact on velocity and resistance is assessed.

31 ***What is the difference between Applied and Natural Evolution?***

In Applied Evolution there is an objective that is imposed by the coach. In Natural Evolution there is neither selector nor target:

The Modern ET is framed within materialism. Now, inanimate matter lacks intention and will. That objective observation is extrapolated to the entire Universe, including Evolution. Indeed, and according to the ET, the changes in Evolution are at random, nobody is thinking about choosing what works best. They also have no objective, there is no one behind imposing any purpose.

Now let us look at the same subject but from another angle.

2.7 Evolution and progress

Having a goal, striving for it wisely, and making progress are terms closely associated with and celebrated in my culture. However, there is also a certain mockery of such ideology by encouraging people to play, for example, the lottery and the like. In the study of Evolution, the corresponding discussion is very instructive.

32 ***Would we speak of Evolution as a synonym for programmed adaptation of our genes?***

Scheduled adaptation? That would mean that there is a program in our genes whose objective is that we adapt to the environment in life. Yes, there is. Example:

A person who lives on a high mountain has rosy cheeks because his genes have programmed him to produce more hemoglobin when the oxygen pressure in his blood drops. So you can run at 10000 feet high. But if you go to live on the beach of a tropical sea, where there is a lot of oxygen, the same programming causes a decrease in the production of hemoglobin and the person turns pale since he or she no longer spends resources on the over-production of hemoglobin.

This type of programming is due to what is called *gene regulation* and is very widespread, as it is essential for ontogenesis, which is the formation of the body from a fertilized egg, which is a single cell. Other examples of gene regulation are the adaptation to darkness, the change in body shape as a result of physical exercise, and the appearance of supernumerary bones in the hands and knees when there is over-training.

Gene regulation helps people adapt throughout their lives, but the adaptation discussed in the ET is of the species and is based on mutation: random mutation in the germ cells of the parents produces inheritable changes, and as a consequence, some children may be a little better adapted to their environment. Over time, comes a total adaptation. So says the ET.

33 *Would we speak of Evolution as a synonym of change directed toward progress?*

Lamarck, in the eighteenth century, believed in alchemy and its forces of progress that guided Evolution. Theilard de Chardin, 20th century, thought similarly, but he was an evolutionist, a Christian, and a cheat. However, current Biology is materialistic and does not accept that Evolution has a guide that makes it progress. Rather, the ET proposes that Evolution is a machine to create progress, not because it is guided, but because progress is an emergent result of the Evolutionary Process, which consists entirely of mutation, recombination, reproduction, inheritance, and Natural Selection. This formulation is called the **Darwinian ET**.

34 *What example does Lamarck give to encourage the acceptance of his theory?*

Lamarck dressed his progressive philosophy with mechanisms such as the transmission of acquired characters. Example:

The giraffe can reach the branches of the acacia trees, 3, 4, or 5 meters high. Where did their extra-long necks come from?

Lamarck considers that the ancestors of the giraffe had a normal neck, but after searching for the high branches so much, their necks became longer and such

improvement was inherited. Cumulative changes from generation to generation produced modern giraffes with extra-long necks from animals with normal neck lengths. How does a character that was acquired during the life of an individual become something inheritable for the species? Could not it be because of an alchemical force that works through the nervous system?

35 ***What does the Scientific Method say about the example of Lamarck?***

First of all, giraffes are not essential. What matters is that his theory predicts that characters acquired through use are heritable. Therefore, we have a prediction:

In Ndebele South Africa and since childhood, women wear rings around their necks to stretch their necks and over time they augment their natural length. Lamarckism, in the light of the Scientific Method, predicts that their daughters will also inherit the long neck. The boys do not if it were a character linked to sex. What do we observe? For centuries it has been observed that the mother with a stretched neck has a daughter with a normal neck. So one can see the girl with a normal neck next to the mom with a long or extra-long neck. And therefore, the mother has to dress her from an early age with rings around her neck.

We conclude that the Scientific Method rejects the idea that acquired characters are inheritable. Hence, that is not a theory that represents a possibility of Nature to create progress mechanically.

Attention: The Scientific Method falsifies the theory that beneficial acquired characters are inherited. But that is not a falsification of the idea that *life is guided towards progress, something we identify with* **Lamarckism**. This idea is rejected a priori by the philosophical mandate of Materialism. However, it is compatible with Biology: one can have a biased mutation and external Natural Selection. It is compared with the beliefs of Darwinism: mutation is random, Natural Selection is emergent, and does not exist in reality, since it is only a posteriori abstraction.

36 ***The elongated neck of women in African and Asian cultures is indicative of beauty and wealth. Consequently, this acquired character increases the probability of marrying and having children. That is to say, the elongated neck is rewarded by Natural Selection. Does not the non-heritability of the elongated neck prove that Darwinian Evolution is also false?***

No. Modern Darwinian Evolution does not accept that acquired characters are heritable. What it preaches is that mutations in the hereditary material are random and that those that are beneficial for having more children are those that spread through the population. But craning the neck with rings does not cause a mutation in the genetic material, and thus the example does not contradict Darwinian ET.

37 *How does the Darwinian ET explain the long neck of giraffes?*

It seeks to demonstrate that the gradual evolution of the neck of the giraffe is a fact. For this, living beings such as the okapi, and various fossils, such as the giraffokerix, are organized to demonstrate that there is a continuous and ascending trend of neck lengths. Thus, Evolution connects an ancestor of normal neck length with a modern giraffe that has an extra-long neck. They then explain that some random mutations in the ancestors produced shorter necks, but others produced slightly longer necks. The latter allowed their carriers to feed better, and those who were male were victorious in the fights for the females. As a consequence, these mutations spread to the population. That means that the following generations of giraffes had a higher relative frequency of long necks. Over the generations, extra-long necks were formed.

38 *What does the Scientific Method say about the explanation by Darwinian Evolution of the origin of the extra-long neck of giraffes?*

Let us develop a general point of view:

Darwinian Evolution is based on random mutations, some work in favor and others do not, those that work allow their carriers to reproduce more and thus spread throughout the world.

Now, enlightened with the Scientific Method and based on that explanation, let us make some general predictions:

- Since mutation is random, the fossil record must be filled in structures that hardly make sense.
- When the Evolutionary Process is starting, any change can be an improvement. Therefore, we have a prediction: the fossil record must be full of mutations to which an incipient function could be ascribed.
- When there is already a good degree of perfection, a random mutation would generally be harmful to survival. And the greater the perfection,

the more the mutations that impair survival. For that stage, Darwinian Evolution predicts that the fossil record of the giraffe, its putative recent ancestors, and its own body must all be full of imperfect, misshapen skeletons.

As we see none of this anywhere, we deduce that the origin of the giraffe has nothing to do with Darwinian Evolution.

39 *How do you go from a general refutation to a particular one based on specific elements of the giraffe?*

We first report several specific and highly relevant observations for the study. In the case of the giraffe they could be:

- Giraffes have the same number of vertebrae as zebras, and their extra-long neck is due to excessive growth of their vertebrae (the mechanics in women is different).
- Giraffes not only have extra-long necks, but they are gigantic. Also, the hands are much longer than the legs. And their tongue is long and adequately protected from the thorns of the acacias by a thick and strong membrane.
- To supply blood to such a large and lofty body, an extra-strong heart is required, and evidently, it has one.
- An extra-strong heart causes high blood pressure. If the giraffe lowers its head, that tension increases and could burst an artery. The remedy could have been to insert stop valves in the arteries. These should not stop the blood when the giraffe has its head up, but only down to eat grass or drink water. They have to be pressure-sensitive valves. I am sorry to say they do not exist. What does exist are extra-thick arteries, accommodations to the jugular valves, and an elastic braking structure in the carotid artery upon arrival in the brain. In addition, its entire body, including the extremities, is covered with extra-strong skin, resistant to lion bites, and interior membranes that protect the arteries against excessive pressure, for example, when the giraffe raises its head from the ground to several meters in the air.
- Giraffes eat the leaves of acacias, which have poisons to defend themselves against insects. To neutralize them, the giraffe has appropriate mechanisms and thus can eat its leaves without being poisoned.

- The body of giraffes forms a structure that is easy to unbalance. Therefore, their balance system must be extremely fine, perhaps as fine as that of humans. That includes sensors, data processors, effectors, and stabilizers (like the head that has to wobble).

- Babies have many challenges. One of them is generated by tigers and packs of lions or hyenas that are looking for easy prey. The solution for the baby is to stay calm, very calm, close to the paws of the mother. That is because these are the only defensive weapons giraffes have. Therefore, babies should stay close to them, but without obstructing a possible kick or slap. And it must be feasible from the very moment of birth.

40 *What comes after listing the features we want to explain with the ET?*

Now, we apply the Scientific Method to the explanation that the Darwinian ET offers of those particularities:

- The Darwinian ET of the origin of the giraffe neck is so simple and so convincing that it is very strange that it has not been tested in mice. Bad mark to all Evolutionists. They will surely say that in Nature it took 25 million years and therefore they have no hope. Indeed, Natural Evolution is slow because as there is no predetermined goal, billions of incipient functions compete for resources to progress at all times. The answer that we must accept is to opt for artificial selection, which produces amazing results at great speed, as we see in agriculture and microbiology everywhere and at all times. Clarification: there are planned Genetic Engineering experiments that intend to transplant one of the giraffe genes associated with gigantism, about 70, into a mouse to see what happens.

- The gradualist project of imposing a continuous stretching of the neck of the giraffe throughout the fossil strata is a failure. Rather advances and retreats are observed, and mutations at great leaps.

- The resting position of giraffes is with the head up near the clouds. This implies a restructuring of small details of the entire skeleton and muscular architecture. From a design point of view, this is *a great project*. Since many details are small, there is no problem in assuming that they were accommodated little by little. Therefore, the corresponding fossil record is unavoidable. Where is it? Nowhere: the number of ancestors of the giraffe does not reach 20, but it would take millions to argue that there was Gradualistic Evolution.

- If the mutation is random, mutations could well have happened to lengthen the jaws of the giraffe, as in the crocodile, or its snout, as in the elephant. We predict the existence of such exponents for three reasons. First: random mutation has nothing to do with function and those that did occur were by chance that they acquired a role in neck lengthening or bone accommodation. Second: a giraffe is a big project, which means that it takes many, many mutations to turn an ordinary mammal into a giraffe. This demands a lot of time. Therefore, it is inescapable that the snout and jaws have been touched by the mutation. Third: Both snout and jaw elongations would have been good at reaching very high branches from childhood. Now, What is observed? Giraffes and all their fossils have jaws and lips of normal length.

- Extra-long arms would be of great help to all those beings that use their hands to survive. Where are they since the mutations are random?

- The extreme gigantism of giraffes is special. However, giants of 2.5 meters in height can also be observed among humans. But as a rule, they suffer from metabolic problems that Evolution has not remedied. What reason do we have, then, to believe that all the adaptations to the gigantism of the giraffe arose by Evolution?

- Mutations are random and as they occurred in giraffes, they must also have occurred in zebras, lions, tigers, elephants, hyenas, and all kinds of birds. And similarly as in giraffes, these changes must also have had adaptive value in them. So the Scientific Method predicts that many animals should have extra-long necks, hands, jaws, tongues, and snouts. Where are they? It is not uncommon for birds to have long necks. Other than that, I do not see anything else apart from Anteaters.

41 *Could you explain more about the elongation of the snout and jaws?*

In reference to figure 2.1, we have:

Null Hypothesis: The long neck, hands, and legs of the giraffe, first from the left, appeared by Natural Selection of random mutations, due to the chances of victory in the fight for females, the enlargement of food capacity, and the exclusivity of the ecological niche for tall trees. The lower branches are shared with zebras and elephants.

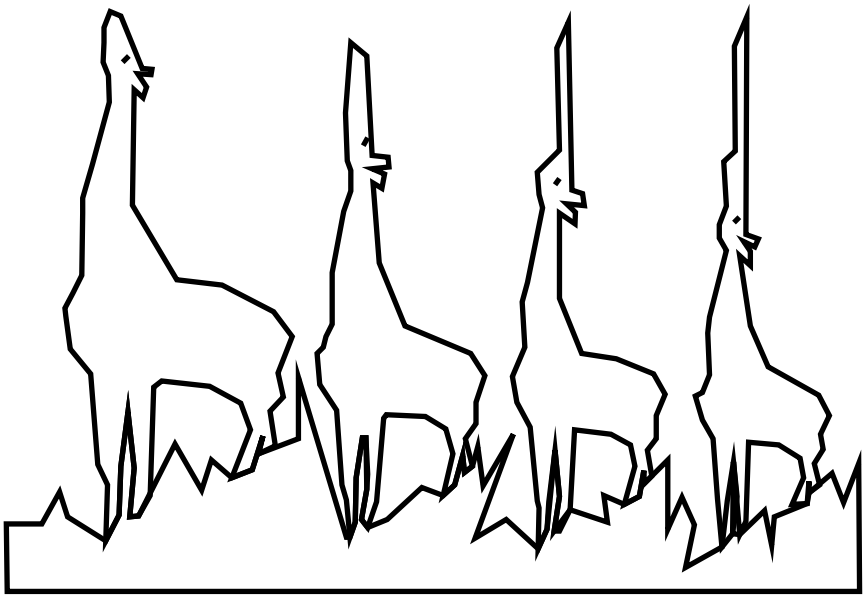


Figure 2.1: *From left to right: the* `giraffe` *with jaws and lips of normal length, the* `giradrile` *which is a variant with long jaws like a crocodile, the* `giraphant` *that has a long snout like an elephant, the* `giradriphant`*, whose jaws and snouts are long. According to the ET, all these variants must exist both in Nature and in the fossil record since they have exactly the same positive selective role as the tongue, neck, hands and long legs of the giraffe. All of them widen the food niche, allowing to reach the leaves of the acacias at 3, 4 or 5 meters high from an early age.*

Alternate Hypothesis: If the neck, hands, and long legs of the giraffe appeared by Evolution, then either the DNA mutation was not random, or Natural Selection was not impartial.

Analysis: If the mutation on the DNA is random, that implies that it happens regardless of aim, function, position in the genome, or its effect on survival. According to the H_o, some mutations produced a small elongation of the neck. That happened for a long, long time. And since the mutation was random, all possible channels facilitating the same target must have been stimulated. And given that they have a direct effect on the feeding capacity and are of the same type as their neck, hands, and long legs, we predict the existence of at least three exponents, all the fruits of Evolution, mutation, and Natural Selection:

- The *giradrile*, second from the left, which is a giraffe with long jaws like crocodiles.
- The *giraphant*, third, which has a very long snout, like an elephant.
- The fourth, the *giradriphant*, has long jaws and a long snout.

Each of these adaptations improves feeding capacity from an early age.

Let us notice that the *giraffe* represents a severe violation of the randomness of the mutation because, on the part of the genome that led to the modern giraffe, it did an enormous job of engineering and art. But on the snout and jaws, the mutation remained off for 25 million years. The *giradrile* and the *giraphant* represent a decrease in the severity of that violation. And the *giradriphant* has the least if any.

Mandatory prediction. The most probable of all these variants is the global one, which involves the tongue, the neck, the hands, the legs, the snout, and the jaws. This cannot be missing from the fossil record since it adjusts to the randomness of the mutation.

Comparing what is compellingly predicted with what is observed: Let us look at the fossil record and modern variants to see where the giradriles, giraphants, and giradriphants are. They are not here.

Verdict: The prediction is false, as the predicted specimens that should exist are nowhere to be found. **The evolutionary explanation for the elongation of the tongue, neck, hands, and legs of the giraffe breaks down before the Scientific Method.**

42 ***What is your conclusion?***

All the contradictions revealed by the Scientific Method emphasize that if mutation gave rise to giraffes, it could not have been random. Indeed: the mutations created a great project of gigantism, elegance, beauty, and strength, but without affecting the length of the snout or the jaws, which have the same positive selective value as the extra-long neck, and for which they had more than 20 million years. This completely contradicts the randomness of mutation and the impartiality of Natural Selection. Therefore, the Darwinian ET is false.

43 ***What does it mean for Natural Selection to be unbiased?***

It means that Natural Selection does not exist, rather it is something emergent from differential birth and death. Contrary to a human selector who does exist and who sees a different ear of wheat, he pulls it out, marks it, reseeds it separately, and studies it to see what it has, and if he sees a benefit, he multiplies it.

44 ***Challenge.*** *Develop a visual simulation that illustrates that if Evolution with random mutation and impartial selection elongates the neck of the giraffe, it also elongates its jaws and the snout.*

45 ***What would be the summary of the discussion?***

Darwin + Mendel = Lamarck

46 ***What does that mean?***

It means that to explain the giraffe using the Gradualism of Darwin in the light of the Genetics of Mendel, we must assume that the mutation is not random. It must have been guided. Else, Natural Selection was forced to follow a project of an agent that shall be external to Nature. Either of the two options is well associated with Lamarckism, which proposes that there are agents external to Nature that make it progress (whether it is an alchemical force, or anything else, is irrelevant at this moment).

47 ***Challenge: Solve the following objection.*** *The theory of Sexual Selection says that females select males to their liking and, therefore, they determine Evolution. As for giraffes, the objection says explicitly that mutations that lengthened snouts as well as those that lengthened jaws existed but were rejected by females, who preferred to mate with normal-looking males because they found them more beautiful, i.e. with higher reproductive capacity.*

48 *Small changes and gradualism have been emphasized, while Evolution in large leaps is seen as a problem. What is this discrimination due to?*

Imagine a remodeling of a building. If it comes to repainting it, anyone can do it meter by meter. But if the task is to infuse it with a modern style, it is required to hire specialists and make critical and universal modifications. The same in Genetics: mutations that produce small cumulative changes are much more likely than those that produce large changes and require a high degree of coordination. Therefore, the rate or speed of Gradualistic Evolution is in general much greater than that of Evolution by leaps. The difference is important because the time that Evolution has to solve all the problems is barely 15 billion years.

49 *Since random mutation on DNA does not explain our existence, should not we update the Theory of Lamarck and say that mutations in the genetic material are guided or that those serving the purpose of a big design project were selected?*

There are objections, some based on the Scientific Method and others on Design Theory. Concerning the Scientific Method, we have:

The idea of guided mutations has already been implemented today in Genetic Engineering thanks to gene editing using CRISP technology. The truth is that such an epic causes fear and the Scientific Community condemns those who want to appear daring. Why? Because the probability of making mistakes against the species is high. From here we predict that such type of Evolution will go in great leaps, but will still leave traces of its crass mistakes.

Our technology in all its aspects is created by people who globally run an Evolutionary Process guided by their intelligence and taking advantage of the blessings of the market. What the final buyers know is only the best that the whole world has been able to produce. And while the progress we see is very rapid, there is still a history of left tracks.

Example:

Fighter planes have a very clear history and everyone knows that an F15 is more modern than a Messerschmitt. Why is there a history? Because the fight against complexity is very hard. Suffice it to think that to make a variable geometry aircraft, it was necessary to test some 900 different types of materials to see which one performed best.

In conclusion, under Lamarckian Evolution, we should expect a history of leaps and bounds in the fossil record where the struggle against complexity is evident in myriads of fledgling projects that failed or were abandoned in favor of better ideas. Something we see in the industry but not in the fossil record.

50 *What is the complaint of Design Theory?*

That a giraffe is a great project and that great projects are conceived in toto, in their indivisible totality, and are made from scratch, ab initio, but never adding patches to patches. Or, could there be someone who makes a highway by concatenating pre-existing short streets?

Nor is remodeling used. Example:

Husband and wife bought a house and lived there happily with their sons and daughters. But the grandchildren arrived and to make room for them, they added a room to the house. The grandchildren grew up and added another room for their children, then another, and then another. And there they live. Some rooms have artificial light. That is Evolution in leaps and bounds but without a master plan.

What would a house that corresponds to a large project look like? It would be a building, with foundations and a basement, with columns and footings that support great weight, with weak walls. With beautiful architecture and with lots of light in all the rooms.

Now we ask ourselves: Can the beloved old house, consisting of patches upon patches, all filled in memories, be remodeled into the modern building that everyone has to admire? In real life, foremen refuse to work on traumatic remodeling. What they always propose is to destroy the old house, clear the space and start the new great project from scratch. But, why?

Because doing a big project has difficulty and a cost, and doing a traumatic remodeling increases the difficulty by disproportionately lengthening the list of conservationist restrictions. This results in a much, much higher cost, torture for workers, and announced failures.

Warning: Our great intelligence allows us to attack problems in toto and propose global designs. But in practice, there is a further process of optimization that is evolutionary. So, we have Software Architects that present their designs for implementation to specialist in Java, C++, Python or hundreds of other languages or APIS. Therefore, we claim

Evolution is immanent to great human enterprises.

51 *Is not it an Evolutionary History of great leaps that makes up the bacteria, the jellyfish, the fish, the amphibian, the lemur, the chimpanzee, and the human?*

No, it is not. There was a time, rather recently, when many would have answered yes to this question. But not today. Because in truth there was a time

when our ingenuity was considered so powerful that the challenge was not to make a bacterium, but a dragonfly. But that time has passed, because now it is clear that it is not enough to dream, but rather to do it, which is no longer feasible for the next week. Meanwhile, the listed history is not an Evolutionary History, but a history of the mystery, of our almost total misunderstanding, of how to design a living being despite how much is already known.

We have discussed many things. Have we perhaps forgotten the fundamental problem that is our existence?

2.8 The origin of our species

Natural Selection would perhaps explain why each species is perfect, but not that we came from the monkey.

52 *How does the ET explain the origin of species?*

A monkey is a monkey through and through. And so is a human being. That implies that at a certain moment there had to be a divergence for each one to take their course. These divergences are called **speciation events**. A very simple and very effective cause of speciation is the mutation of the fertilization master key. What happens is that sperm cannot fertilize an egg unless the key that the sperm has can open the door of the egg. It is because the two share a key, which is characteristic of their species. By mutation, the keys can change. But the changes of the two parts may fall by chance on the same key. Thus arises a line of Evolution isolated from the maternal line and all that remains is to wait to accumulate changes that mean an ethological, behavioral, or perhaps morphological differentiation of body shape.

53 *Is rekeying fertilization the only mechanism of speciation?*

No. Let us imagine that a geological catastrophe creates a mountain chain and that perhaps mighty rivers appear. We expect that the populations of each species will be divided and isolated from each other. Divergence of recognition traits causing ethological separation by odors or mating rites is not excluded. Side and side specimens will not attempt to interbreed with their neighbors, but artificial fertilization may be performed in the laboratory, perhaps resulting in sterility due to cumulative changes in ontological development, or physiology.

In general, it is easy to imagine the pervasiveness of speciation, for example along the following line of thought:

The species were born from the infinite variability of the relationship of all living beings with the environment, including their congeners. A small variation in the relationship can give rise to a huge divergence. It is the same as what happens with relationships between human beings, who can make very drastic decisions at a single glance. When relationships evolve, we have different friendships among human beings and different species among living beings.

54 ***Are the mentioned cases theoretical possibilities or biological realities?***

I accept speciation by fertilization key, as well as speciation due to chromosomal rearrangements, as it happens among flies. It seems that they take the risk of becoming speciated with each laying of eggs. In such cases, a barrier to fertilization is established, but no morphological change is observed.

The Evolution about which we have spoken seems rather distant. Is it so in general?

2.9 Somatic mutation

Because all cell divisions involve mutations, the Evolution in the human body becomes possible due to the 52 divisions that occur from the zygote, the fertilized egg, to the adult.

55 ***How common is mutation in cell divisions in the body?***

The mutation rate is low and detection of a single mutation may require a study of millions of cells, which is especially true for plants. However, our cells have an ensemble of enzymes destined to cause housekeeping mutations, as the following case shows. There is a group of recombination enzymes in charge of making cuts off the excess DNA. For example, an eye cell needs different elements from another ear cell. The trimming group ensures that each cell has what is proper to its target function, without leftovers.

On the other hand, from the fact that no cloning method produces perfect copies, I infer that there is another machinery in charge of creating variability by chaining insertions and deletions. We know that this is a basic mechanism for the evolution of human languages, it is very simple and effective, so I see it as plausible for Biological Evolution and somatic mutation.

56 *What happens to the mutation of the cells of the body while the person lives?*

Our body comes out of ontogenesis from a single cell which is a fertilized egg. That original cell divides, and from its daughters come other daughters and so on until we are complete. Each cell division has the possibility of creating mutations and its effect is suffered on sight, be it good or bad.

For example, the asymmetry of our body could be due to **somatic mutations**, that is, they occur in the cells that build the body and are not inherited from parents to children. Although there are results that support that idea, the whole picture is complicated and mysterious to me. The proof is that the part of the eyebrow that is over my right eyelid is a bit fallen concerning the left one. That is a point in favor of a somatic mutation. But it turns out that one of my sisters also has the same trait. That is a deciding point in favor of a germline mutation, which happens in the reproductive cells, the gametes, and is inherited from parent to child. Therefore, it seems that there is separate information for our right and left sides, and not a simple mathematical transformation of reflection. Very mysterious to me.

57 *As there is somatic mutation, can we talk about Somatic Evolution?*

In general, everything in ontogenesis is coordinated and there is no trial and error, i.e. no selection. Therefore, there can be no Evolution in general. However, there are at least three exceptional cases:

1. **The biome** is made up of a world of bacteria, fungi, and viruses that coexist in our body, many for good. The biome is so terrifyingly abundant that it weighs about two kilograms. It is under great pressure for survival, as there is great competition, there is a high replacement rate of the victors, and many of its members are persecuted by the immune system. Therefore, there is a strong Natural Selection and the one that survives has a lot to defend itself with, or perhaps it is useful.

   The biome is something very dynamic because all the microorganisms in the world can come to visit us and invade us. Science has proposed since long ago to defend ourselves against harmful microbes and recommends the use of antibiotics. Not so much anymore because Science has found itself fighting against a very powerful enemy: Evolution. In effect, this has several work fronts: when a microbe is confronted with an antibiotic molecule, it can close the door on it, it can let it into an enzymatic trap,

sequesters it inside some organelle, or ultimately takes it out to expect degradation. None of this is done for free and any advancement in defense is due to some change. A very common one is the importation of war material from other microbes. In them, it has already been tested and if it works, its carriers have multiplied, so mutations can perfect it. In the long run, the microbes acquire resistance against the antibiotic and the patients no longer get better. The ultimate embarrassment is when resistant microbes infect a clinical room, which becomes an epidemic multiplier. The hero of this black crusade has been *Staphylococcus aureus*. Therefore, try to be attended at your own home.

But Science has not lost hope because it still has much to learn from the biological warfare of plants and mammals against microorganisms, and of these against phages. There is a lot of expectation and a great challenge: putting Evolution to work for and not against.

2. **The immune system** is in charge of our security against all sorts of pathogens. Part of the system consists of weapons prepared in advance. For example, women have a better immune system than men because they have among their fatty tissues a world of reservoirs of defense weapons, immunoglobulins, and others. But sometimes a new pathogen arrives for which there are no ready weapons and they have to be made. That takes time. How is it done? By Evolution: If a cell of the immune system produces by recombination and mutation of its genetic material a weapon that appears to work, it gains the right to reproduce. Its daughters make other changes and perhaps one of them proposes an improvement, so it will reproduce. When that is repeated, there is an Evolutionary Process that in the end causes the cure of what attacks us. But why are some healed and others not? Because there are small differences in the basic elements of building weapons. And those small differences in the base cause huge differences in the final result. We call this phenomenon **chaos**: the genetic material is chaotic because every little difference in the DNA or genotype can cause huge differences in the outcome or phenotype.

3. **Cancer** is the result of unrestrained multiplication of cells in our own body. This does not happen in an instant but as a consequence of a long process of gathering mutations, which is why we call it evolutionary. In this way, the cells lose the mechanisms of self-regulation of reproduction. If I bite my lip, it repairs itself and remains intact, that is, the tissues with their various cells return to their initial state. But a cancer cell in the process of metastasis does not obey the corresponding rules. On the other hand, the immune system goes after cancer cells. So these have to have an evasion

mechanism. As if that were not enough, they consume a lot of resources and create too much garbage, but that does not affect them because they develop a highly efficient blood supply network. All this means complex requirements. How much?

Some 35,000 mutations are required for healthy skin to become cancerous due to ultraviolet radiation. But 35,000 mutations are a lot. That is why an alternative thesis is widely accepted: some cancers, such as human papilloma, can be triggered by a virus.

Having 35,000 mutations working on a project is too much. Therefore, it seems pertinent to make two comments. First: random mutations in the germ line may seem harmless, but in fact, they support carcinogenic ones. That is one of the reasons why we have genes that make us prone to cancer. Second: many people claim the Blood of Christ over cancer, implying that they believe that this disease is strongly influenced by demons. In our terms, these people believe that the Evolutionary Process responsible for cancer is guided by evil spirits, that is, it is Evolution in the literal sense of Lamarck. Though not in the progressive direction he expected.

This is how Evolution is operating at all times on various fronts in our bodies.

Let us now see how Evolution can have social effects.

2.10 Evolution and violence

There is too much violence in the world, at all levels of social organization. Is it for genetic reasons or perhaps because there are already many of us?

58 ***Is there Evola / HIV to mitigate the spread of humans?***

No: the proportion of deaths from these pests is minimal. In 100 years of HIV, some 33 million have died, with an average of close to 300,000 per year. But conceptually, this type of question is not formulated within Science, which is guided by materialist philosophy, since Natural Selection is considered sufficient to explain demography and there is no reason to believe that the Universe or any of its parts may have a purpose.

However, it has been observed in some birds breeding on small islands, that there is a strategy to regulate overpopulation, and that is not to mate. Nevertheless, some individuals do not have that brake and that is why the population continues to have children and to exist. That is contrary to Darwinism because the most complex and perfect, those in which the brake works well for them, are

the ones that reproduce the least, and vice versa, the less perfect, that have no brake, are the ones that reproduce.

About pests in general, overpopulation accentuates their transmissibility because contacts are closer, and more effective for contagion.

On the other hand, the term overpopulation in humans is not absolute but relative to the possibilities of manufacturing survival goods. In ecology, it is known as the r-K relationship. For example: in Ancient Rome there was already overpopulation, and abandonment of babies was practiced under a bridge or in the forest. Girls were affected because men were not considered a nuisance but something valuable. In contrast, the r-K relationship is improving in Africa and the result is a population boom.

59 *Is Science to be blamed for so much violence in the world for proclaiming with its ET the victory of the best?*

The ET is complex and can lend itself to anything you want. I highlight the vision of Natural Philosophy, based on the observation of Nature, which says that the goal of Evolution is the survival, first, of own genes and clan, and second, of their congeners. For this reason, this philosophy encourages all human cultures to respect life even beyond borders, be they racial, ideological, geographical, or of any other Nature.

60 *Is there a genetic predisposition for aggressiveness?*

One point in favor of such a thesis is the following: men commonly have an X and a Y chromosome, while women have XX. Thus we infer that the Y chromosome is responsible for many characteristics of men. But a sensible proportion of inmates had the XYY chromosomal arrangement, from which it is natural to infer that high masculinity results in violence. But other observations insinuate that masculine hormones, such as testosterone, are not intended to strengthen oppression, but, quite the contrary, to create security that protects and cares, like the one that every shepherd has with his sheep.

61 *Can we infer that we are robots of our genes, and therefore someone who is XYY is innocent of his crimes?*

I join those who deny this thesis.

In the same way that money does not program anyone, neither do genes. But money enhances the intentions of the person. Similarly, I am in favor of believing that genetics enables people to feel impulses, but not that it forces them to their execution. The reason is that genes number in the thousands, but neural connections in the billions. What is more, a great many people have distinguished

themselves by having changed, shall we say, from being bad husbands and fathers to being excellent ones. Thus, we have the case of a young man who found out that he was going to be a father and was so moved that he decided to stop being drunk and preferred to use marijuana, which he considers harmless.

More mechanically and from the point of view of physiology, hormones have a hierarchy. In particular, the glands that remain in the brain determine the behavior of the others. And those glands, the pituitary, and the pineal are regulated by the hypothalamus, which has two types of control, one instinctive which depends on genetics, and the other mental which depends on personal thoughts. Mental control is exercised through the connections that go from the prefrontal area, where the will and consciousness reside, to the hypothalamus.

In conclusion, I join all the ancient cultures of the world that hold human beings responsible for their actions, whether they are good or bad. Still, I have one hesitation in favor of the idea that genes may have more power than we are capable of tolerating:

As usual, the father wolf took his pups out for air and sun and brought them a few meters from the mouth of his den. They were already big and could show their personality. The largest of them was also the most aggressive towards his siblings. Dad scolded him. There was calm for a few moments and then the same big pup caused another disorder. The father wolf killed him with one bite, and he jumped away into the bushes. All the babies ran screaming towards their home. Mom came out, took a look, and came back.

62 *Is our ability to be conflictive among ourselves a measure of self-control of the population through wars, serial killers, psychopaths, hitmen, and mercenaries?*

Murder deaths worldwide are about 300 thousand a year. Suicides are in the same range. The last wars have produced deaths of the order of 10 to 30 thousand per year. In the 10 years of the war in Syria, promoted by Russia, there have been 230 thousand deaths. In the Colombian civil war between 1958 and 2013, the number of deaths is estimated at 220 thousand. Road fatalities are responsible for the death of 1.3 million people each year. In contrast, abortions can be of the order of 22 million a year throughout the world.

All this shows that in the world, with 140 million births per year, our ability to kill ourselves reduces population growth by 14% and the vast majority of it is due to abortions. It is also quite clear that those who reproduce the most are the poor since sex is one of the few recreational activities to which they have access. And because children are wonderful to almost all moms. Although there are exceptions that give to think. In conclusion, violence is a factor in population control, but not impactful.

63 *Why do you count abortions as murders when many abortions happen spontaneously?*

Because every fetus is a person. Moms know this instinctively, as one of them showed me with the following anecdote:

Once we were with my husband waiting for a bus. I was pregnant. A homeless man came and asked us for money. Since we did not help him, he got angry, pulled out a knife, and threatened my belly. I shivered and felt the baby shrink inward. My husband negotiated the ransom and the man left. At night, the baby was still cowering in his cave and did not react to the greetings of the father, who likes to talk to him and caress my belly. It lasted like this all night and all the next day despite my caresses and words of encouragement. But on the third night, he did respond to the love of his dad and was able to relax, take up all his space and kick.

64 *Why do you want to enslave women regarding abortion when they are free and owners of their bodies?*

Women are not the owners of their bodies. If they were, they would be able to decide when to adjust their physiology to become pregnant else to become temporarily sterile.

According to the ET, the inability of women to manage their bodies was favored early in Evolutionary History because it allowed humans to multiply despite high infant mortality.

In Christianity, women are wonders who were designed and made by God to whom they will give account for the way they manage their bodies. However, the coldness of my judgment is that of a man who does not carry the immense weight of being a woman. It is so overwhelming that the Bible considers it the effect of a curse. Therefore, the problem is not attacked or resolved with dogmas, but with wisdom. In particular, I join the protests of all those who claim that the ban on abortion does not significantly lower its rate, but instead increases the mortality of women who abort because they no longer have access to professional care. A pathetic case is when the doctor knows that the fetus can kill the mother, but says nothing to avoid problems.

65 *An abortion is a great torture for women. What can be done to help them?*

First of all, combat machismo. The second measure is prevention.

As for machismo, it declares the man as the owner of the woman to use her as a sex toy whenever he wants, but exempts him from any guilt in an abortion.

To change this culture, it is necessary to penalize the man by forcing him to pay all the costs of the abortion, paying for the days of convalescence together with treatment and compensation for the woman for the psychological flaws that cause her to feel guilty for killing her child.

Regarding prevention, women should be educated so that they stop being dolls of pleasure and promote themselves as companions on the path of life. Because for women who live alone, their periods come at any time. But when the woman lives accompanied by her man, the male pheromones act on the endocrine glands of the woman, and her menstrual cycles are regularized, allowing much better prediction of when ovulation is going to happen, which determines the fertile days. But still, the possibility of an unwanted pregnancy remains. Indeed, it has been estimated that 44% of abortions are done by married women. I think that this happens because the husband assumes that since he is not the one doing the abortion, nothing matters. Nor does he seem to know that he will give an account for every murder.

Having worked the logic of Evolution, we are left alone with ourselves and facing our problems.

2.11 Religious Questions

The certainty that the ET is false raises questions that touch the very soul.

66 ***You have implied that without simulations you could not be sure that the ET is false. Do you put some monkeys to evolve in your simulations?***

No. For the technology of today and the future, that is impossible.

67 ***What do you simulate?***

We propose an abstraction that confronts Evolution against Complexity and looks at the generic behavior of the results. We use the same idea of computer games: we start with an easy case, if it passes, a more difficult problem is proposed, and if it passes, the complexity increases, and so on until the player can no longer stand it.

It is observed that Evolution has the power to overcome complexity, but that it infallibly leaves traces of its struggle in the form of mediocre and incomplete solutions. That always happens, permanently, in huge quantities, and if the complexity grows, the number of imperfections increases more and more.

Therefore, the ET predicts that when there is Evolution there must also be an **Evolution of Perfection**. Now, look at the fossil record and your body itself, and if you see mediocrity and/or incomplete work there, then the ET is a good explanation for your existence.

But if you see almost everything perfect, even though you have some complaints, then the ET is false.

68 *What do the people that complain say?*

Two examples.

First: Some doctors claim that we are carelessly designed because they see the prostate as very poorly positioned and it forms a serious problem when one gets older. This is because it grows and, with age, obstructs the urethra, so urinating becomes torture.

Second: Women feel very uncomfortable having to bleed every month and when that stops, it is not something to be thankful for.

In general, it is easy to criticize any structure of living beings. All one has to do is propose a maximization function and show that the given structure represents a suboptimal solution. For example, an arm does not maximize thermodynamic efficiency, since the hand has too many fingers, therefore, there is a lot of useless expense, so the humans of the future will only have 3. We answer that energy efficiency is not the most important thing for the design of an arm. Instead, there are two priority conditions: that it be a great tool and that its use is unlikely to cause harm to the body. As such, the arm is magnificent.

69 *What do you propose instead of the ET to explain our existence?*

I do not propose anything. Since the ET is false, I simply accept what my Christian religion says.

70 *Is your acceptance of your religion blind?*

My religion is very complex and lends itself to everything bad. That is why everyone today is very critical. However, I accept it because it commands me to pray for the persons that make me feel fear. And I have seen that this gives me peace. Immense peace. It is because of that peace that I believe in Jesus and his Good News.

71 *What do you think about the refutations that there is God?*

There are several refutations of the existence of God, many proofs of the falsity of the Bible, and a computer program that has detected more than a thousand contradictions in it. Of all that, the objection that concerns me the most is the following:

Why does God, being good, allow so much evil? As there is too much evil, there is no God to defend us, much less to judge us. Therefore, let us eat and drink, for tomorrow we will die.

I see a lot of logic in the above reasoning, but even so, I walk in the fear of the God of Jesus the Christ. And amid so much trouble, I am happy.

72 *How does your refutation of the ET relate to Intelligent Design?*

The ET says that species come out of each other. Intelligent Design ensures that the Universe in all its facets was designed by an intelligent being. Both are inferences, extrapolations, from observable facts.

The ET is based on the fact that living beings reproduce by undergoing slight changes. Intelligent Design is based on the observation that the entire Universe is organized according to Systems Theory, that is, each object in this world consists of elements that sacrifice part of their individuality in favor of group cohesion and that form a structure that may have a minimal probability of appearing by the laws of Nature. In our body, the Systems Theory is evident, since the organs have specific functions and are separated by membranes that pack them. All of them make up a great project.

In Science, interesting inferences cannot be proved. Some very well formulated ones can be refuted by the Scientific Method or come out stronger when they resist some crucial test.

To relate Intelligent Design to my work, we must bear in mind that what I have done is to show that the ET is false since it breaks down before the Scientific Method. My falsification is not an objection. It is a demonstration. And if Intelligent Design supporters accept it, they will feel very empowered.

On the other hand, if it is alleged that there was a design, one is interested in the designer. They say nothing about it. Therefore, the idea of Intelligent Design combines very well with those who believe in aliens. It is also compatible with those who propose that our universe is one among an infinity whose whole they call the multiverse.

For me, the idea of Intelligent Design becomes interesting in the only case where the designer is the God who made us and who is with us.

73 *There are many Christians who believe in the ET. Why do you care so much about falsifying it?*

Because if the ET is true, God is superfluous, whether he exists or not, it is irrelevant. What would matter would be that we are children of the stars, that we appeared aimlessly. But if the ET is false, as it is, then let every one fear the Judgment of God and, therefore, treat his neighbor with justice and respect, starting with his wife.

74 *Does your refutation prove that there is God?*

Proving that the ET is false does not prove that there is a God who judges. The only thing that results for the materialists is that Science has to strengthen some of its other options or put forward some other proposal. Science could even opt for Intelligent Design because that idea is materialistic and not religious: the Universe could be, as they have said, a computer simulation made by some graduate student in some other universe.

In general, there is too much research trying to strengthen the ideology of digital physics. It has surprising proposals like that the physics we see is the result of computations made by automata, specialized computers. But they are far from offering an alternative to Realism, which says that our universe is not virtual, a simulation, but is real and fundamental.

As for Christians, and extrapolating what I feel when I see that the ET is false, the need to live in the fear of God is strengthened. But my reaction cannot be said to be supported by the Scientific Method, since I cannot catch God to subject him to objective experiments. My reaction is based on a personal, intangible, and powerful faith.

75 *Why do you demand that the logical refutation of the ET be accepted when you do not accept the logical refutation of the existence of God?*

Because I am not a logical system.

I am a human being. And as such, I am irrational and self-contradictory. The individuality of each person is implemented in the way he or she chooses which feelings must polarize his or her mind, and which contradictions to accept else to ignore. My individuality develops the intense and violent impression caused by seeing my body so extremely complicated and so perfect. For example, my eyes and the ability to understand what I see never cease to amaze me, despite their flaws. That is why I fabricated my falsification of the ET.

76 ***You accept the contradictions as something irremediable, just like death. Would not it be better if you studied a little more about what mathematics can do for you? Note that Modern Science is already studying how to get rid of death.***

Does mathematics serve to remove contradictions? Well, if it is something simple, like keeping the accounts of the house or a country, mathematics is the remedy. But when it comes to complex things, like escaping death, the math assures us that contradictions are inevitable. To understand it, simply ask yourself: Live long to get sick of seeing so much evil and finally recognize that the heart of the best is ultimately just as bad as that of the worst?

The rigorous support for the immanence of contradictions was made by the mathematician and logician Gödel in 1930. Nobody expected it because the idea was that if one was careful enough, one could elaborate an all-encompassing language that was free of contradictions. But Kurt Gödel showed that this is impossible. That is why Philosophy continues to exist, to propose platforms that guide the construction of knowledge, deciding what is important, what is secondary, and what is inadmissible. In this way, it is determined how to annul and/or coexist with the contradictions.

77 ***Can you give a concrete example of using philosophy to resolve contradictions?***

Consider the Materialistic Philosophy. It denies the abundant transcultural and transtemporal testimony of the existence of souls, angels, demons, goblins, fairies, and ghosts. For it, spirits are just inventions of the brain. With its denial, it saves itself from all the self-consistency problems of the idea of a good god. And since there is no god, there can be no contradictions about him.

78 ***Could you give an example of how you resolve the contradictions in your religion?***

An important contradiction of my Christian religion was discovered by Nietzsche:

The Bible says that God is Almighty. If so, he should be able to make a stone that he could not lift. We have a contradiction, therefore there is no God.

Our answer: The reasoning of Nietzsche shows that the language used is inconsistent, but says nothing about God. If exceptionally, someone is interested in using a consistent language, he or she could opt for an alternative I picked up

from the German Catholics: Instead of saying *God is Almighty*, you can say *God Has All Power*, which means that if some power exists, then either it is His, or it is under His control. That way there is no contradiction.

However, there are many contradictions in my religion. For example: in the Old Testament there are two and even three contradictory versions of the same event, one right after the other. Similarly, all four Gospels tell the same story but have contradicting elements. But there is no Christian who wants to get rid of any. Why do we live with these contradictions? Because they make their study interesting, as evidenced by the many academic studies about it.

79 *Have you been able to solve the problem of the excessive tolerance of God towards evil?*

The pain I see is so intense that my soul refuses to accept a logical solution to that contradiction. However, my mind says: *Before you judge God, decide if you want to be part of the problem or its solution. If you choose to be part of the solution, the challenge is to be a blessing to the people around you*.

80 *How can one be a blessing?*

We have a very simple rule: *Treat others the same way you want them to treat you.*

81 *What is the result of applying such a rule?*

That the memories come to the mind of so many times that you have done things that if they did them to you, you would create hell. These things are generically called *sin*.

82 *What is the problem since we are all sinners?*

The problem is our eternity. That is why it is urgent to ensure that this problem is perfectly resolved. The correct solution must attack both your sins and your inclination to evil, which appeared in mankind after the first sin.

83 *You speak of your god as if he were the only one. Do not you happen to know that there are gods galore, and that, in many parts of the world, like in India, many families worship an exclusive and nearby god?*

The uniformity of physical law throughout the Universe immediately excludes the existence of more than one Creator. That is, if there is a Creator, it is unique. But, I adhere to those who think that neither logic nor Science can guarantee that it exists. Still, my own very long experience with the Gospel of Jesus of Nazareth is that having peace with God, the Creator, and Father, is a good idea.

84 *What about the other gods? Do you doubt they exist?*

I accept the anthropological witness of the existence of more gods than mine, the Creator. But how could I worship someone who did not make me? I would be giving glory to a usurper. Each of these beings is an enemy of the Creator, which is why the Bible calls them Satan. Their strategy is to do some good to next take the soul, and with it, the eternity. They have done so much damage that Jesus came into the world to undo their works.

85 *Is there any reason to believe that the risen Jesus will come again?*

Yes: God was able to make my body, likewise, He can make Jesus return so that he may give to each one according to his or her works.

Chapter 3

PRE-MECHANICISM

`Less speculations, more mechanics.`

We will discuss the most salient ideas in the history of the view of heredity and evolution up to the 1940s, before DNA. They are very varied, but three points concern us greatly. We have first of all the Genetics of Mendel which developed into a mechanistic theory of heredity. Then came de Vries who declared that the mutation, the cause of the changes, is random. We have next the mathematicians Fisher, Haldane, and Wright to organize thoughts and clean up a pre-mechanistic view of Evolution. Now, let us look at a sample of the collateral work that allowed these geniuses to reach their achievements.

86 *Bacon, Galileo, van Leeuwenhoek invented the microscope*

These three characters fought to make flourish the appreciation for experimental study and the construction of instruments to expand the natural capacity to make objective, reproducible observations. Bacon in the thirteenth century invented the magnifying glass and carved its lenses. In addition, he insisted on valuing observation and devaluing speculation. Galileo in 1609 invented the microscope with two lenses, one of the ancestors of those we have today, and struggled a lot to globalize the use of the Scientific Method. With a single-lens microscope, Leeuwenhoek made a name for himself by applying his instrument to the study of biology, most particularly the study of the cell, around 1670. He is also credited with the art of staining specimens, or objects for observation. It is something very important because different tissues are dyed differently and the contrast increases. Chromosomes are so named because they allow themselves to be stained by various dyes.

Example: Galileo observed that when passing through a prism, a ray of sunlight became a fan of lights of different colors. The problem that arose was:

Does the prism create the colors or does it simply scatter them? Instead of solving the question with speculation, Galileo experimented: If the prism scatters colored lights, when they are brought together, white light, like that of the sun, should be obtained. To figure it out, he made a circle and filled it with radial sectors with the colors he saw. And then he set it spinning. What is perceived is that the rotating circle loses its colors and appears white. Therefore, of the two explanations, the one that agrees with the experiment is the scattering theory.

Challenge. Solve the following intrigue using the Scientific Method: In sunlight come rays of all colors that together seem like white. Are all colors necessary? Help: Your solution must allow for the design of modern television screens.

87 *Bernoulli explained to us what chance is*

To objective and expanded observations, clear concepts had to be added. A critical one was that of **chance** which was decided as follows.

The mathematician Bernoulli proposed a notion of chance towards the end of the 17th century that has come to be accepted in Modern Science. We say that a data source is random when we can predict what the relative frequency of the various events will be, but not what the next datum will be, given that the experiment is repeated many times. When you have random events, there is no individual prediction but statistics. He gave us as an example the experiment of tossing a coin. For a coin that is well balanced and flipped in such a way that it makes many turns in the air, the probability of heads is one-half, which predicts that the relative frequency of heads is close to 0.5. Just close. That is why in modern tests there is a margin of error given by the statistical significance. Thus, the Bernoulli distribution was born and was published around 1685. **Science** is reduced to measuring and weighing the difference between what is believed, in this case, the probability of heads, and what is observed, the relative frequency of heads. If the difference is small, what is believed is accepted. Otherwise, it is rejected. Note that a straightforward mechanical process is used as the random data source. Bernoulli also studied the problem of tossing a coin n times and assigning the probability that k heads will come up. Thus the Binomial Distribution was born.

88 *The situation in the time of Darwin: uncertainty*

When Darwin published his theory of the origin of species in 1859, he did so without having an acceptable theory of heredity. It was believed that this was linked to blood and that reproduction mixed its variants. Darwin recognized that such a view was incompatible with his theory because mixing liquids erases

variability, without which there can be no Evolution. What to choose, the mixing theory or the imperative need for variability? In making up his mind, he sees her theory as highly rational, and therefore rejects the mixed-blood belief and raises several objections to it. One of them was a white spot on the skin of a dark-skinned lady, something inexplicable with the mixing theory. But Darwin does not propose something that works for him.

89 *Genetics was the contribution of Mendel*

Because of his intellectual gifts visible from his childhood, Mendel was able to have access to outstanding academic communities that included those of the monastery where he was affiliated. From them, he learned the rigor of Nascent Science, which he applied to his hybridization experiments on peas that he published in 1865. It was difficult for his contemporaries to understand him because there were too many questions, that is, too many doubts born of too much ignorance. In hindsight, using the accepted wisdom of today, we can understand him much better:

Mendel postulated that each character came in two versions. In modern terms: simple characters are encoded on chromosomes, and since there are two chromosomes, there are two variants that are also called alleles. Human beings have 23 pairs of chromosomes, but the onion has only 8, which are very large and very different from each other, and that is why it was the object of study of the pioneers. The peas have 7 pairs. But the germ cells, which form the gametes, egg, and sperm, only have one copy of each chromosome, that is, they have 23 chromosomes for humans, 8 for onions, and 7 for peas.

Mendel also said that the two versions of characters went into the gametes independently and randomly. That is true and it is because when each character comes on a chromosome, the carrier chromosomes are randomly distributed. Therefore, the same thing happens to all the characters encoded in them. But there was a problem unknown to Mendel: he studied 7 characters, which were in 4 chromosomes, and this created correlations between the way they are distributed. That is why modern researchers are not afraid to claim that Mendel cheated to make his data say that the characters are distributed independently. And in general, his data fit too well than expected: For Example, where a ratio of 3 to 1 is expected, he found 3.01 to 1, or 2.98 to 1.

Mendel used the hypothesis of random events to calculate the probability of two simultaneous independent events that must be the product of the probabilities. It is incredible that something so in favor of Darwinian Evolution has not been valued at the time of its publication because to say that something is random is to say that Nature does not need exogenous elements to govern itself. But a possible question would have been: what is the mechanism to produce chance in inheritance?

90 *De Vries: mutations are random*

This great scientist worked mostly with plants. He inherited us around 1900 an important explicit concept: changes in characters along a lineage are discontinuous, random, and directionless. This resounding assertion was a tremendous blow to all spiritualist lines, some heirs to the thought of Lamarck, who believed in directional alchemical forces that operated in living beings. Discontinuity means that previously there was no certain trait and now it exists. It is the first big step to the digital genetics of today.

91 *Morgan associated characters to stripes on the chromosome*

Going from traits to genetic information was a momentous leap in the direction of which Morgan published a result around 1916: he found a white-eyed fly born from a lineage of red-eyed flies, and began to study its inheritance. It perfectly obeyed the teaching of Mendel for recessive genes, so-called because their effect is not seen when they are in the company of visible alleles, the dominant ones. The clearest interpretation was that the mutations damaged the genetic information, while a normal, healthy gene expresses itself normally.

Another contribution: Mendel tried to choose characters that were distributed independently, which was clear if they were on different chromosomes, but Morgan studied the inheritance of characters on the same chromosome. From there, *genetic linkage* was born. He also taught us how to use it to map chromosomes, that is, to associate a position on the chromosome with each character. What happens is that a chromosome looks like a worm under the microscope and when it is stained, circular stripes appear. The stripes do have not the same thickness but are so different that they allow certain cartography to be determined. The challenge is to discover which slot corresponds to which character.

92 *Fisher, Haldane, Wright laid the axiomatic foundations*

These mathematicians put an order in the Science of Genetics and Evolution thanks to their models that began in 1915 with a heyday in the 30s and 40s. Fisher proposed a statistical test, the analysis of variance F test, for the comparison of means in quantitative experiments. It is something so cool that it will never go out of style. The works of this group gave rise to the modern Population Genetics that imposes the pre-official vision of Evolution. Its characteristic feature is the great academic void of not relating its vision to complexity since for them Evolution was simply the change in the frequencies of alleles that already exist. For us, mutation gives rise to alleles, but the important thing is where the genes come from.

93 *Theodosius Dobzhansky put Evolution as the axis of Science*

This Ukrainian by birth emigrated to the United States where he worked with fruit flies until the day he died. From the laboratory, they took him that day almost by force to the hospital where he died. He combined the biology of his professor Morgan, the mathematics of Fisher, and the Genetics of Populations. In 1937 he published his book *Genetics and the Origin of Species*, in which he proposes an update of the ideas of Darwin in terms of Population Genetics. It is considered in the Great Science that its objective was fully achieved. He is responsible for a saying published in 1973 that has become a dogma of identity among evolutionists: *Nothing in biology makes sense except in the light of Evolution.* His broad vision allowed him to apply his research and ideas to very human problems. His writings on the matter were sold by the handful, as he was a scientific authority speaking of how very brothers we all are.

He is the prototype of people who believe in God and Evolution. Curiously enough, he resorts to Evolution to resolve his question of why God made some inexplicable creatures. In general, most human feel repulsion over flies, stinging insects and poisonous snakes. His example is that of a fly that poses its eggs inside the abdomen of a living warrior ant that is always on guard.

94 *Mayr linked the species concept to Evolution*

In 1942 Mayr redefines the concept of species in evolutionary terms: it is a maximal group of living beings that can survive and reproduce among themselves. Maximal means that it is the largest group that can do that and therefore excludes all other beings that cannot interbreed with them. For example, dogs and cats form two different species. There is a problem with dogs, some are too big and some are too small. One could argue that there are already two different races evolving towards divergence in the same habitat. However, there may be interbreeding between them thanks to many intermediaries who would have no problem mating. With his definition of species, which is made knowing that there is mutation, he identifies Evolution and life and opposes Linnaeus who postulated in 1751 that species, defined in terms of biological similarity and mating, are fixed and cannot evolve.

95 *The evolutionary theory of the 1940s*

By comparing chromosome maps, one realizes that the evolutionary phenomenon is real and supremely rich in variety. All this was summed up by mathematicians in *mutation + recombination*. The first creates net variability, the second creates different arrangements of existing variability. It was postulated that these phenomena happened by chance.

Having a permanent source of variability, the ideas of Darwin could be expressed without gaps: natural variability was scrutinized by both environment and overpopulation, and the winners, those who produced the most offspring that could reproduce, were called the fittest. This qualifier indicated that it was already believed that different variants of alleles could have different selective values (this idea can be traced back to Maupertuis of the 18th century). However, in mathematical models, Evolution was defined as the change in the frequencies of the various genetic variants that shift smoothly. That school of thought is called Gradualism, adopted and taught by Darwin. It was not known how to accommodate protests about saltationism. The problem of complexity does not appear either, since it was tacitly assumed that by chaining small changes added one after another, all the perfection, complexity, and functionality of the structures of living beings were obtained.

Chance appeared explicit in the mathematical models of Population Genetics in the form of probabilities of mutation, recombination, and as an effect of sampling or genetic drift, which says that by pure chance the frequencies of genetic variants can change, due to the random distribution of chromosomes. By adding Natural Selection, Evolution takes another big step toward total materialism.

Chapter 4

OF THE INVENTION OF THE DNA

`The DNA is an idea. Or, maybe, is it a reality?`

We intend to support the following proposition in this chapter: DNA was a very abstract idea that gained popularity thanks to the fact that it passed various and critical tests of the Scientific Method. Therefore, Science is fair in giving DNA the status of undeniable reality.

96 ***Griffith***

If a living being is nothing more than matter, it must have a mechanism responsible for heredity, thanks to which the baby of a cat becomes a cat and meows. Here we see the Scientific Method turning a philosophical idea into a program of experimentation. Still, the result is too fuzzy to be of value.

But it was thanks to Griffith that such a program was finally able to set foot on the rock in 1928 because he carried out a very specific and decisive experiment. He worked with pneumococci, of which he had two strains. An innocuous, non-virulent one, when injected into a mouse, nothing happened to it. The other was virulent, and deadly, when injected into the mouse, it developed pneumonia and died. If the virulent pneumococcus was killed with heat, it lost its virulence, because when injected, it produced nothing.

What might happen if a mouse is injected with a mixture of non-virulent but live pneumococcus attached to virulent but dead pneumococcus? In doing so, the mouse died. When repeated, the mouse died. When repeated, the mouse died. We have no other way out than to recognize that the dead pneumococcus

has something material that transforms the non-virulent into virulent. What could that be?

97 *Avery, Lacleod, and McCarty*

At the time of the Second World War, the components of a living being were divided into 4 parts: proteins (the red meat), lipids (fatty tissues), polysaccharides (cassava starch), and nucleic acids (taken from chromosomes that are in the nucleus of the cell).

The fight to find the bearer of the inheritance had been refined to the point that there were only two candidates left. The first was proteins because they are structured and contain many different elements, which made them precious for storing information. The second was nucleic acids, because of the strange and wonderful behavior of chromosomes at the time of cell division. The problem with nucleic acids was that they had only 4 types of components, noted ATCG, while proteins had more than 20. A variant of the experiment of Griffith ended the strife and uncertainty.

Avery and his colleagues 1944 disintegrated virulent pneumococci and fractionated their components into the four phases mentioned. In the company of harmless pneumococci, each phase was injected separately into mice. Three mice were left alive and one died: the one with the nucleic acids. Thus it was inferred that these acids are the carriers of inheritance. But it remained to be seen what they had inside and how they became characters, for example, whether the pea seeds would come out smooth or rough. The search for a pure mechanism led us to molecules, and what was a fairy tale was turned into unquestionable reality by the Scientific Method. The path was to use the advances in Physics for the study of Biology.

98 *Röntgen, Thomson, Bragg and X-rays*

Has to be seen to be believed. Whoever takes this saying seriously has to invent new instruments for observation. We owe a great avenue in this direction to Röntgen for his discovery of X-rays in 1895. Thomson published 1907 his theory of the diffraction of electromagnetic waves. Bragg in 1913 applied these rays to the study of crystalline samples. The idea is that when a crystal is illuminated with X-rays, a shadow is projected, which is two-dimensional. To rescue the three-dimensional information of the crystal structure, the theory developed by Thomson and Bragg is applied. Then this was used in Biochemistry on purified and crystallized substances. It was not easy to reproduce its three-dimensional structure. But it was done.

99 *Wilkins, Rosalind Franklin, Gosling, Watson, Crick, and the DNA*

This team scored the greatest goal in the entire history of Molecular Biology. Wilkins was the one who did the hard work in midfield, sitting in his lab with his X-ray diffraction machines, and seeing their effects on DNA crystals. Rosalind played the role of a technical adviser because she was the supervisor of Gosling, the student who took a critical photo, the 51st. Watson and Crick were well positioned near the goal and received the pass-goal, the so-called photo 51. Although the ideas of Pauling about the helical structure of DNA were known, Watson and Crick took about two more years, between 1951 and 1953, to cleanly and completely unravel the structure of DNA.

What emerged was that DNA resembles a zipper, with complementary teeth, and forms a spiral. Instead of saying zipper, the literature says *double helix,* and instead of saying teeth, it says *base pairs.* That is why the zipper is known by the name of the *model of the double helix*. This structure allowed DNA to be seen as a carrier of information if each tooth, which could be of 4 types, was interpreted as a symbol. In addition, it was immediate to explain how DNA was the carrier of inheritance since it could be duplicated: by separating the zipper tapes, each tooth could mate with another loose one that was swimming in the environment, but complementary. When the loose teeth were glued together, they formed the complementary tape, leaving a complete zipper to create a DNA of a daughter cell.

100 *Fairy Tales vs Scientific Method*

The whole story of the double helix and its duplication was very attractive. But it had traces of being a fairy tale since it had been built on the great physics of X-ray machines, with Wilkins at the head, and the high mathematics of their diffraction on helical structures studied by Watson and Crick. In reality, without mathematics, an X-ray diffraction photograph is nothing more than a collection of fuzzy dots that resemble some tile pattern. This is where the Scientific Method comes to help: if the zipper model is correct, if it is not a tale of physicists to fool biologists, there must be many ways to corroborate it. Many. What has to be done is simply to formulate objections that lead to observational studies and experiments. And if instruments are needed, they must be built.

101 *Kornberg and polymerase*

If loose teeth swimming in the cytoplasm stick by complementation to one of the bands of the zipper, what glues those teeth together so that instead of loose, nested teeth, a two-band zipper is formed? Bonding teeth may simply be the result of making a chemical bond. And that is the task of an enzyme.

Therefore, there is a strong prediction: there must be an enzyme that glues the loose but aligned teeth onto one of the DNA strands. In this way, two tapes will be obtained, glued by complementarity.

We owe this important corroboration to Kornberg, who discovered in 1956 the enzyme that is called DNA polymerase. There are three types of such an enzyme: one that starts the job, at the edge of the chain, and two others to follow it. This verification of the Scientific Method gave wings to the Academy to award a Nobel Prize to Watson and Crick in 1962.

Something surprising is the following: the polymerase is like a worker who uses a scaffold that is assembled, disassembled, and transported to do the job. The scaffold has several sections, it is a trimer, and it is called PCNA, discovered in 1992 by Leonardi and colleagues. Polymerases are also aided by RNA fragments and associated enzymes.

102 *Abdel-Monem, Dürwald, Hoffmann-Berling and helicase*

Is not it a fairy tale to say that DNA zippers open themselves so that they can be duplicated? But if not, there must be a molecular machine that separates the bands as a pre-work for cell division. The verification of the existence of the predicted enzyme was made in 1976 by the aforementioned team. It was called helicase, or destroyer of helices and only helices because the zipper bands must be left intact. Another victory for the Scientific Method: either all the pieces of the puzzle fit together, or there is nothing. But, if the helicase pulls the DNA strands apart, what prevents them from coming back together? The SSB proteins that were discovered by Meyer and Laine in 1990.

103 *Nirenberg, Matthaei and the Genetic Code*

In 1961, these laboratory mice gave us the key to understanding how to pass from DNA to characters. The ultimate in mechanicism. The first thing to do is to understand that DNA works like a library of genes. When the sequence of a certain gene is required, a photocopy is made of it and it is with it that one works. The photocopy comes in RNA, which is almost identical to DNA, but instead of T(Thymine), U(Uracil) is used. They used synthetic RNA to find out what a chain of several uracil units did: one triplet of them, UUU, coded for phenylalanine. With many combinations, the Genetic Code was determined that made an amino acid corresponding to triplets of DNA bases. In general, a gene encodes for an enzyme or a carrier polypeptide. Enzymes accelerate chemical reactions. Note that many reactions occur spontaneously in the cell, but it is the enzymes that determine, due to their great speed and high specificity, the identity of the whole. That is why we say that enzymes create life.

104 *Wu and Sanger were the first to sequence DNA*

Well, what does all the DNA of a cat say? We owe the first DNA sequencing method to Wu, who taught it to us in 1970. Sanger improved the method in 1977. But, what the DNA says is almost unknown.

105 *Ruska and Knoll invented the electron microscope*

If DNA exists, why can not it be seen? Thanks to the advances in fundamental physics and the concatenation of many ideas of great thinkers, these two geniuses gave us 1931 the prototype of the transmission electron microscope. Instead of light to illuminate, this microscope uses accelerated electrons that reach the specimen, pass through it to a greater or lesser extent depending on the obstacle that the specimen puts in their paths, and will create a shadow on a detector. Another electron microscopy model of great value for Biology is the surface one, whose electron beams do not pass through the specimen, but rather bounce, much like the light with which we see. The specimen should be very dry and covered by a properly vacuum vaporized metal film, the particles of which settle wherever they can, including the specimen.

106 *Monica Marini et al. photographed the DNA*

Using electron microscopy, this researcher and 15 other colleagues photographed a DNA zipper. Its helical structure was seen in photographs taken in 2015.

107 *Kossel and the histone*

A DNA zipper can be anywhere from several microns long for a small virus, to almost a meter long for the human genome. But one chromosome is only 10 microns. That is, a chromosome represents a degree of DNA packaging of about 100 thousand times. But beware, any part of the DNA must be ready at all times to be read, and its instructions executed. And let us not talk about the mess at the time of DNA duplication. Is all this true? If it is, how is it done? The first key to solving this enigma was given to us by Albrecht Kossel, who reported in 1884 a substance similar in its properties to peptone and called it histone and predicted that it had something to do with DNA. It was not until the 1970s that it became known that this molecule was at the center of the DNA packaging mechanism. Electron microscope photographs were key to understanding the basic mechanism: DNA wraps around a packet of histone molecules, loops around two to three times, and then moves on to another. All those little tangles form a super-helix that can vary in its degree of compaction, from being almost free to be read at any time, to being compacted at the time of cell duplication. The set is called *chromatin*.

108 *Wang discovered the topoisomerase*

A DNA helix is super-coiled, and chromatin super-helices are obtained. And is all that free? Is not it an art to wind and unwind braid ties, which are also helical, to form coils and rolls? What happens is that when winding or unwinding an extra twist appears or disappears. How is that done in the cell? Wang in 1970 proposed that this hard work was done by the topoisomerases. Their job consisted of cutting and pasting the thread, and twisting it to the right or left. All these complications are resolved by a group of about 10 topoisomerases.

109 ***Challenge.*** *Explain how chance is generated in heredity by studying the mechanics of cell division.*

110 *In hindsight*

The belief that DNA is a double helix, with a zipper structure, is just that: a belief. But with long and hard work focused on the Scientific Method, the scholars transformed it into a robust and creative truth. That idea allowed an intense elaboration of objections that led to the formulation of predictions. The strategy was to recognize a problem, formulate a prediction of how the problem had to be solved, and look for the existing solution in Nature. The first example was that of the teeth that swim freely in the cytoplasm, and that adhere by complementarity to one of the bands of the zipper. The problem is that loose teeth are not a zipper. That is where the prediction comes from: there must be an enzyme that sticks the teeth together. Screening experiments pointed to polymerase as the culprit. And so on, until discovering a very complex but elementally logical world, totally mechanical. And the generated observations were all reproducible at will.

111 *The Official Evolutionary Theory*

Who or what made all this wonder of DNA with all its awesome machinery of enzymes? The ET answers: Evolution is responsible for the content of the DNA, the cell, and all living beings. The process began with pre-cells and with very incipient machinery. They were formed by chemical-physical effects from ordinary matter. With DNA, the Evolutionary Process was already possible, and the resulting theory is called the **Synthetic ET**. Its basic elements are:

DNA has information for enzymes, which are the working class of the cell. They catalyze reactions whose products define the characters that we observe. DNA replication occurs as a prelude to cell division and the formation of gametes, or germ cells. This duplication is not completely faithful because two of the four types of bases do not have a fixed geometry but a variable one. That produces

spontaneous and random mutation, which is the origin of the species. Recombination of genetic material also occurs in cell duplication, making a new strand from the two versions inherited from the parents. Recombination has random variable elements. Which alleles go to which gamete is something that happens at random. All these random changes and arrangements are chained from generation to generation and are filtered by the perhaps changing environment: those that best allow having more children spread and diversify the most. But not with total certainty, because a gamete with given information may or may not appear in the next generation. This is called *genetic drift*. Evolution is the change in the relative frequency of genetic arrangements: the more they reproduce, the more they are represented. They are called the fittest. Perfection, functionality and complexity, is a collateral result of the Evolutionary Process, the chaining of mutations that by chance turned out to be perhaps not so small progress.

Chapter 5

THE ET AND SCIENCE

To believe or not to believe? Yes, but in something serious.

The example of DNA allowed us to see that the Scientific Method fills with power those who love it. It simply consists of testing what is believed. For this, the belief is elaborated, objections are raised, predictions are formulated and tracking experiments are made. Finally, the results obtained are compared with what the predictions say. If there is agreement, the belief is strengthened. If not, it weakens, and a correction is looked for. All of this is given the name of test. When the belief has stood up to many crucial tests, everyone respects it and many even believe it. Such is the case of the Materialistic ET, which has within its treasures the DNA with all its biochemical paraphernalia that makes it work. Everyone believes in the ET, but there are a few who do not. We adhere to the requirement that no suspicion against a great scientific belief is relevant, unless the Scientific Method compulsively demands to do so. Let us see, then, how the Scientific Method is applied to the ET.

112 *The case of Covid19*

The variants of Covid may have different dangerousness and transmissibility. If the ET is correct, we have a prediction about which variants will be victorious: the variants that will dominate in the long term will be those that are less dangerous, less virulent, and the most transmissible, because they will be the ones that give the greatest number of children. If the minimum of danger is nothing, then Evolution will make the plague end because only harmless and highly transmissible viruses will remain. They will continue like this for some time until a virulent mutation appears and conditions are right for it to spread throughout the world. The ET prediction seems valid for Covid19 and also for HIV, with the difference that the minimum possible virulence for the first is almost zero, but for the second it is high, deadly.

113 *Billions of Verifications*

The Gradualistic ET predicts that chimpanzee DNA must be very similar to ours. Real. Thus, the difference between chimpanzee and human DNA is close to 1% and mostly refers to the brain. Like this one, there are thousands of predictions that are summarized in the *evolutionary trees* that present the Evolution of the species, and that are verified in the genome sequencing programs. This fact is very important for those that believe that the ET is correct.

114 *Artificial speciation*

The species à la Mayr number in the millions. That implies that for Evolution it is very easy to make a species. But if it is for Evolution, how much more so for us! We could use the peasant methodology: *donkey + mare = mule*. The problem is that the mule is sterile. But, will it always be like this in Nature? No. A case for plants was already known by Linnaeus, the *Linaria vulgaris*. Modernly and for insects, a species was created in captivity, and, therefore, in a reproducible way. The procedure consisted of crossing two species of butterflies, obtaining offspring, verifying that they interbreed with each other and that they are fertile, but that they do not interbreed with members of the parental species. These 2006 results use satellite DNA paternity verification technology. This represents an effort of an international collaboration that fought to convert an idea of the Colombian Mauricio Linares into a truth in tune with Modern Science.

115 *Genetic algorithms*

I am pleased to present one of the most beautiful, powerful and productive predictions in all of Science. It is a stunning confirmation of the ET. It is like this:

If the ET is correct, and if Evolution is responsible for everything, then let us define life as that which can evolve. Therefore, we predict that we can make life in a computer. And really, without much effort, because changing one letter for another in a text, or combining two expressions to make a third, is immediate. So we have the source of variability. Well, but what are we going to feed our creatures with, since there is no grass or anything there? How are we going to define Natural Selection? Who will survive? The same Theory gives us the answer:

The perfection of the species came from adding small advances, progress upon progress. And to achieve this, problems of all kinds were solved: how to digest food, how to grow, how to understand what is seen. Therefore, what we have to do is give our evolvers a problem to solve. It can be anything, like finding the roots of a fifth degree polynomial. The individuals who propose the

best solutions will survive. You start with random solutions, but by mutation and recombination, others will come that are a little better, and so on until the problem is solved.

What resulted was called the **Genetic Algorithm**. It is a program that simulates Evolution to solve everyday problems. These must be rewritten as problems to be optimized, that is, in which it can be said that an approximate solution is better than another so that the competition for being better is born.

Example:

Consider the problem of finding a root of a fifth degree polynomial $p(x)$. Since its degree is odd, it has at least one root. That is, there is a number r such that $p(r) = 0$. Therefore, the function to be optimized is simply $|p(x)|$, because when it is minimal $|p(x)|$ is equal to zero, therefore, $p(x) = 0$, and we got a root.

In my experience, no one can claim to understand the ET unless he or she can develop or at least run a Genetic Algorithm, even with dice.

Genetic Algorithms were born around 1950, had their heyday around 1970 and today they remain as a daily work tool. They represent a great verification of the ET. And, paradoxically, they allow to prove very easily that the ET is false.

116 *DNA is incompatible with gradualism*

Both human and chimpanzee DNA have about 3 billion base pairs. There is a difference of 1%, which corresponds to 30 million base pairs. Some of these differences are due to the fact that the Genetic Code is degenerate, which means that there are mutations that do not cause any change. Imagine, then, that there are a million significant base pairs to distinguish chimpanzee from human. According to Gradualism, that distance was gradually covered. It is predicted that there are billions and billions of interpolants or intermediaries with any chimpanzee-human combination, that is, there must be a highly varied continuum.

The abundance and continuity of interpolants between the chimpanzee and human hands is illustrated by the program

`HandChimpToHuman.html`

Where is the predicted continuum? The fossils that could be assigned to the interpolants between the chimpanzee and the human do not exceed 30. There

is a deficit of a billion intermediaries to be able to pretend that the prediction of the continuum is fulfilled. The same is true for the other several million species.

To save the ET we must assume that such interpolants did exist but evolved so fast that the corresponding fossils were so few that they disappeared. And that also happened for millions of species. In our terms: according to ET, Evolution is magical. This directly contradicts the experience with Genetic Algorithms that say that Evolution is real, and as such, they find approximate solutions to complex problems at the cost of spending a lot of electrical energy and a lot of computing time and not infrequently of super-computing.

We are forced to declare that interpreting DNA as a chain of bases that evolves by Gradualism has nothing to do, in general, with the origin of species. If we say that DNA is not a chain of bases but of, for example, genes that evolve by gradualism, the same objection and the same type of falsification result.

117 *How do you run the program* `HandChimpToHuman.html`*?*

Click here. Try also double click and `ctrl + click` and wait for some few seconds. For programs, precautions are higher than for ordinary files so, this may fail. In that case, click here 2., else go to

https://www.ejristos.com/GPfalsifiesEvo/ScientificMethod/IndexGPFalsifiesET.html

In the opening page, search for the title THE EVOLUTIONARY THEORY AND THE SCIENTIFIC METHOD. Look below it for the required program. Once you click over its name, the program should run immediately on the browser. Else, enable your browser to run `js` programs.

118 *Is there something else outside of Gradualism?*

Perhaps we are tempted to close the door on Evolution. That is not very smart. To understand it, let us list some important points: We already know that mutation is spontaneous and cannot be stopped. And as for recombination, it is carried out by a group of enzymes. They are known as Rec1, Rec2,... there are already about 20, and they are well characterized because they are used in recombinant DNA biotechnology. Natural Selection is unquestionable because to leave children you need to be very well done. Genetic Algorithms say that Evolution is a good tool to solve problems. For all that, we wholeheartedly accept Evolution, but reject ET based on a Gradualist interpretation of DNA. So we must ask ourselves: Is there a reformulation of ET that is compatible with DNA? The answer is yes. We owe the correct point of view to Computer Science. This will be elaborated below.

Chapter 6

DARWINISM vs. LAMARCKISM

`Is mutation random?`

Modern ET postulates that the mutation is random. It is an idea in tune with Materialism, which emphasizes that the randomness of mutation has its reason for being in Brownian fluctuations and Quantum Physics.

Our goal for this chapter is to show how the Scientific Method is used to test this postulate. We assume here that we exist by Evolution, which results from chaining mutations, each one random.

What we have before us is a fight between two ancient ideologies: Darwinism and Lamarckism. The first seeks to support the idea that Nature explains itself. The second alleges that Nature is too wonderful and to explain it, it is necessary to invoke the spiritual reality, which for Lamarck was alchemical, which guides the Evolutionary Process. In the light of Molecular Biology, Lamarckism implies that the mutation is not random but biased, and/or that Natural Selection is not impartial.

119 ***What does it mean that the mutation is biased***

It means that the data pushes you to think that there is a Guide. When the Guide wants to make one specimen from another, he makes the necessary changes to the genetic material. Therefore, on one side it will do some things, and on the other, it will do nothing. Therefore, we will be attentive to see if on one side there is a positive mutation rate, but on the other, zero (apart from spontaneous mutation).

Let us illustrate the situation with some examples framed in the Scientific Method.

120 *Teeth*

Let us examine the following Null Hypothesis H_o, and its alternate or negation H_a:

H_o: the Dentition appeared by Evolution.
H_a: the Dentition did not appear by Evolution.

Discussion:

According to the ET, life originated in the sea and later colonized the land. The protagonists of such Evolution were the lungfish, which have gills, like all fish, and lungs, like us. When they came out of the sea into the puddles, those specimens that were born with signs of legs instead of fins were able to reproduce more than the others. There we have an amphibian, an ancestor of us and frogs. Frogs do not have teeth, but some fish do, like piranhas. Suppose, however, that our common ancestor with frogs did not. Our choice is because neither the turtles nor the platypus has teeth.

Imagine that the teeth grew out of the bones. It is a good task to try to imagine other options and to develop the idea as shown here. If anything, the teeth appeared randomly. So our amphibian ancestor grew a tooth project in one leg. And that gave it more power for survival and reproduction. But why? Well, because the bearer learned to use it as a weapon against other competitors in the fertilization of the eggs. Later came more changes, all random, some were of some use and others were not, but those that allowed having more children were those that spread throughout the world.

In the end, but a little before the appearance of mammals, the teeth that were born scattered on the palate were used for chewing and that was indeed useful. Therefore, the teeth in the mouth multiplied. But nothing to do with the beautiful arched architecture that can be seen everywhere. Then came an architectural evolution guided by a single principle: the future belongs to whoever leaves more children. Thanks to this, the mammals acquired their arched teeth together with all the necessary elements to struggle for life against the great competitors that filled the earth: the dinosaurs.

So far we have formulated the Ho that says: teeth appeared by Evolution. We can stay here and take it as dogma. This is how it is done everywhere. Or we can derive some observable prediction from such a hypothesis. In that case, the alternative Hypothesis says that Dentition did not arise by Evolution. Let us now turn to consider the role of the Scientific Method.

Suppose Ho is true. In that case, it predicts that there must be an abundant fossil record of the Evolution of the Dentition, from the appearance of a hint

of a tooth in various parts of the body, followed by migration with a clear tendency toward the palate, and then an accommodation towards and architecture in arched form. This happened in some cases in both jaws, as in primates, and others in only the upper jaw, as in the cow, and in others with the lower jaw divided, as in snakes, which eat tremendous eggs.

Let us now look to see if there is evidence in the fossil record for such Evolution.

No, there is not.

We have a compelling question: Why is the fossil record of the Evolution of Dentition missing when it is a compelling and massive prediction of the ET?

Let us save the ET by saying that the Evolution predicted by the ET did exist, but that it happened so quickly that the fossils were so few that they disappeared.

What do we do now? Take the objection seriously and study the speed at which Evolution solves problems. This quantitative study has been already done and was cited in the introduction.

The answer is: Evolution can solve any problem if it has no time limits. Otherwise, any solution will bear the hallmark of the struggle of Evolution against complexity, which is an overwhelming number of flaws that will show up both in the fossil record and in the anatomy and function of any specimen. Or in a catchphrase: *the Evolution of Perfection is an obligatory and massive prediction of the ET.* It lacks here.

There is therefore no reason why anyone should believe that mutation is random or that Natural Selection is impartial or that Evolution is Darwinian.

121 *The Hand*

Chimpanzees and bonobos have hands with opposable thumbs, and so do all their ancestors up to the lemur. But our hands have some differences from those of chimpanzees. These are, among others, three muscles associated with the thumb and used for very fine movements. Thanks to them, the first humans were able to carve bones artistically, and we could play the guitar in a perhaps captivating way. Chimps do not have them.

The corresponding H_o says that the muscles of the hand that are exclusive to humans arose by duplication from those of the hand of the ancestor that we have in common with the chimpanzee. The alternate hypothesis denies such a thing.

Suppose H_o is true. Our mandatory and massive prediction says that since muscle duplication happens randomly and without any purpose, we must have evolutionary branches with duplicated muscles, some without function, others with dysfunction, and such events must appear in any of the more than 600 muscles that we have.

Nothing to do with Nature.

Is that a falsification of the ET? No. It remains to be considered that the predicted Evolution did happen, but that it was so fast that there is no reason to expect that there would be a fossil record of such a thing. To respond to this complaint, we did the aforementioned quantitative study. The answer is: Evolution cannot solve any problem unless it leaves behind massive evidence of the Evolution of Perfection. Therefore, we do not consider the ET to be serious.

122 *The carpal tunnel*

The primate hand has the following design: it is powerful but subtle. The solution to this contradiction is to put some powerful muscles and also some not-so-powerful muscles, perhaps small ones, in the same place. The powerful muscles that move the hand are in the forearm. Some are used for primates to hold on to branches, or to hold their babies tightly. If a baby falls from a tree, nothing happens to it, but if the panther is nearby, a male comes down, picks it up, and climbs with it. The small muscles are out there without making much noise. Thanks to them we can open our fingers to play the piano, and adapt the shape of the hand to various grips.

It happens that the fingers are connected to the powerful muscles employing tendons passing through the carpal tunnel. The ET explains that wonder like this:

H_o: the carpal tunnel appeared by Evolution, that is, by chance, and the Evolution that created it happened so fast that it did not leave a fossil record of such a feat.

H_a: Lie.

Prediction of the H_o: The bones change shape as quickly as if they were made of hot clay. Some changes are useful, others are not, because everything is by chance and without purpose. Therefore, there must be a fossil record of an immense amount of bone deformation everywhere. And multitudes of deformations must also appear in our body, some meaningless, and others with some incipient meaning.

Observation: Such a prediction does not come true. All our more than 200 bones have a function as clear as any square centimeter of a warplane.

Verdict: Without the Evolution of Perfection, the ET cannot be true. This massively obligatory prediction failed here. Therefore, the ET is false. More specifically, if the carpal tunnel appeared by Evolution, the mutation was not random, since it did what was necessary for the tunnel to appear, but left everything else intact.

123 *Foot retinacula*

The foot is a support structure that, like the hand, is managed by powerful muscles that are connected to the tibia by very resistant tendons. Why do not these tendons go in a straight line forming a bower above the foot, but instead do so in a very elegant way, glued to the foot thanks to a set of tendinous ribbons called retinacula? The ET tells us:

H_o: Retinacula appeared by Evolution.

H_a. Lie.

Compulsory massive prediction: If the retinacula appeared by Evolution, that is, by chance, without purpose or meaning, they must have appeared anywhere in the body and with varying structures.

What does Nature say? That there is no fossil record about it.

Possible explanation: Everything happened at high speed.

Reality: Evolution runs very slowly.

Verdict: The ET is false.

124 *Joints*

We have 360 joints, some with little or no movement at all. The more than 250 mobiles obey 6 different patterns:

1. On pivot: rotation around an axis.
2. Hinge: an axis moves internally on a cylindrical surface.
3. Saddle: one component rotates in one direction, and the other rotates perpendicularly.
4. Plane joint: Two flat bones move over each other.
5. Spherical: a sphere rotates on a spherical receptacle.
6. Condyloid: is an oblique version of the spherical.

We can dance and practice Olympic Gymnastics because each joint enables fluid and persistent movement. How was that achieved? The ET says:

H_o: By Evolution. That is, each joint appeared by chance and without purpose, so all had a natural dysfunction. Where today there is a spherical joint, there was a pivot. Everything backward. But changes were made randomly and without purpose and those that allowed to have more children were fixed and gave the joints that we know.

H_a: Lie.

Massive and obligatory prediction: There must be an extremely rich fossil record of the Evolution of Perfection. It must be abundantly seen in it how Evolution makes mistakes over and over again, making changes to the type of articulation until it finally succeeded.

Remark: There is no such record.

Sorry: The predicted Evolution of Perfection of the joint type change did happen, but it all was so fast that there is no fossil record of it.

Abstract study on the speed of Evolution to solve problems: Evolution solves problems very slowly and each new step towards perfection costs it much more (the marginal cost is exponential).

Verdict: The Evolution of Perfection must leave an abundant fossil record, and imperfections must invade our bodies. Since none of that exists, the ET is false.

125 *The eye muscles*

We have 12 muscles in the eyes, 6 in each one. They form a complementary and perfect setting to focus the vision at any point of the visual field.

Let us not forget that focusing is a coordinated operation of the two eyes, including the iris muscles. Something surprising is that one of the eye muscles passes through a trochlea, which allows it to change the direction of pulling, just like a pulley.

Development: exercise.

126 *Physiognomy*

Exercise

127 *The nails*

Exercise

128 *The veins of the face*

Apes do not have veins on their faces that warm them when it is cold. Humans do. Thanks to them we can climb the very high mountains and inhabit the North Pole.

Exercise.

129 *Coronaries*

The coronary arteries must supply the heart with oxygenated and nourishing blood. They stem from the aorta. But such a mission could have been done in many ways, for example, by taking arteries directly from the left ventricle or atrium.

Exercise.

130 *The vertebral arteries*

They are two arteries of the neck that leave the subclavian arteries, go up protected by the apophysis of the cervical vertebrae, and just as they reach the skull, they pierce it and enter to irrigate the brain, the cranial entrails.

Exercise.

131 *What will the Evolutionists say?*

Seeing that the Scientific Method routinely shows that the mutation is not random, they will respond in the usual way: they will make many low-probability assumptions. His strategy is known in Finance as `Too many ifs` and is indicative of an announced failure since successful transactions have desirably zero conditions. But each condition, each `if`, lowers the probability of its occurrence.

132 *Can you give an example of an answer with* `too many ifs`*?*

Consider the case of joints. We have seen that the ET makes a fool of itself if we assume that Evolution permanently exchanges the type of articulation to see which one works. A proposal that seems to remedy the situation is the following:

Nature never worked out separate joints. Instead, Evolution elaborated the project of the movement. This implies that the entire set that allows movement was developed very gradually. Therefore, bugs were fixed as soon as they appeared. And because they were small, they left no trace in the fossil record. With the passing of the generations, we got a great project that sounds to us like a miracle.

133 *Where are the* `too many ifs`*?*

They were inserted when it was said: *Evolution elaborated the project of the movement.* The reality is that Evolution has no goals. But if one imposes movement as a goal, one is ignoring the billions and billions of nascent and unborn goals that would enter into the competition.

134 ***Where are here the `too many ifs`?***

For every competing target there is an `if` that says:

If this goal was lost in the struggle for being developed and disappeared because the goal of the movement conquered all the resources, then the movement was established as the emerging purpose of Evolution.

135 ***Aren't you saying that all the ifs were solved?***

Yes, I am, because the movement remarkably enlarges the survival niche. And it does that critically, and for that very reason, it silences many distracting purposes: *if the food does not come to me, I go to the food, and I forget about the blue star that was appearing on my arm and that made everybody feel envy.*

136 ***Therefore, the ET is correct.***

No, the ET is false: Would not there be among the billions and billions of silenced targets even a few thousand that left a fossil record of structures of unknown function? Where are they? A prized candidate in ancient times was the appendix. Another slightly more modern one was junk DNA. But nowadays that is no longer believed: the appendix is a reservoir of antibodies, and junk DNA is full of regulatory signals and structures of cellular logistics. Nevertheless, the role of many DNA segments continues to be investigated, since our ignorance is very great. But the tendency is to classify this ignorance as pertinent to Molecular Biology, but not to Evolutionary Biology. That is, we ignore the ordinary role of every part of the DNA. But, anyway, some people solve our ignorance by saying that junk DNA is an evolutionary residue.

137 ***All of this seems confusing. It is not determinative. Is there any exit?***

There are two solutions:

First, collect 7000 examples, which is a task for everyone, and use simulations to calculate the predictions of H_o. This strengthens the accusation that everything Modern Science believes to be Darwinism is nothing more than Lamarckism.

Second: abstract and look from above forgetting the details. We offer below a proposal in this regard.

138 *Conclusion*

We have presented some examples that show that mutation in the genome is not random. We believe that it is possible to add examples by the thousands. Therefore, the Darwinian implementation of the materialist idea that Nature explains itself is false, it does not serve to explain our existence. But if we blindly accept that we exist by Evolution, the view of Lamarck that Evolution needs exogenous elements to explain Nature seems much more sensible. But after all, this type of discussion is fatiguing because it generates more fights than solutions. For this reason, we recommend abstracting, forgetting about the details, and looking from above. Below we show how it is done.

Chapter 7

THE MILKMAID

Common sense and the Scientific Method

People believe in ET because they find it reasonable. An argument can be the following: *evolving towards perfection in the ET is like getting rich in real life.* And since one sees many people who get rich, then one believes that evolving towards perfection is something similar and therefore inevitable. Our goal in this chapter is to see how the Scientific Method can be used to test such a belief.

7.1 The idea of saving

In all the cultures of the world, the concept of private property exists, although in some places it is much more restricted than in others. Therefore, the dream of saving is universal. Hence, people very quickly grasp the idea proposed by Darwin, because wealth is similar to information and becoming rich in money is like evolving towards perfection in the ET.

139 ***In a nutshell, what is the idea of Darwin?***

That if changes that are favorable to the species are continually saved, any level of functionality and complexity can be reached. Perfection denotes a state in which the function is executed at its best and any change makes the function worse.

140 ***Is that all?***

No. Darwin proposes an automatic mechanism that plays the role of the will of the saver and of the economic environment that allows profits.

141 ***What does this mechanism consist of?***

In modern terms, the mechanism is as follows: DNA mutates spontaneously from generation to generation, some changes increase the probability of having more children that reach reproduction, others not so much, others less, others not at all, and others are detrimental or perhaps deadly. If favorable changes are heritable, subsequent traits will fill the land and serve as a platform for further changes. When these are linked, there is a tendency to improve that is accompanied by increasing complexity. Therefore, everything that amazes us is the result of the automatic saving of changes in favor of the species.

142 ***What is wrong with the reasoning that says that Evolution saves or accumulates small favorable changes and that, therefore, reaching perfection is inevitable?***

The problem is that it does not use the Scientific Method to explore and verify the repercussions and observable implications of what is believed. For example, if a father believes his son all he tells him to explain why he arrives after midnight, he will be raising a delinquent. But if he investigates where the son gets the money for so many expenses that the night demands, he will find that the boy has the grandmother fooled with lies. At that moment the father has created the serious problem of showing her the harm he is causing him. How will you do it? With the Scientific Method: he will call the teacher to see what that constant demand for money is. Then you can compare the amounts and programming of the money requested with what the young person says every Friday afternoon. And that is how it is: what is said is compared with what exists in reality. If there is an agreement, what is said gains credibility, but if not, the lie is unveiled.

How is that implemented in the ET?

7.2 The fable of Aesop

Cultural heritage has treasures that teach us to doubt every idea that comes to mind.

143 ***Why should anyone suspect that the Savings Theory is flawed?***

Because of the fable of the Milkmaid, composed by Aesop in the sixth century before Christ. It describes what often happens to every human being: he dreams that he will do well saving little by little, but reality shows him how clueless he is. Aesop illustrates it with a maiden carrying a pitcher full of milk to sell in

the market. She begins to dream that she will do very well with that pitcher of milk and with her ability to work saving little by little, but she trips over a stone, falls, breaks the pitcher, and with it all her dreams. Because this situation is so common and current, this fable is adaptable to endless cultural lines. A very common version for the girls of today is the following:

A young girl decided to work to raise money to take a journey to the distant country of her choice. Although she was working hard, she could never do it because she always spent the money on buying something in the latest fashion.

For women, our version reads: She saved every dime she could to fulfill her dream of buying a house. But, the economy of the World was so bad that she also was frequently forced to retire money. Up to date, she is far from reaching the necessary sum to ask for a credit.

144 ***What does this fable have to do with calling the Savings Theory into question?***

The fable ensures two things:

1. Plans often fail no matter how realistic they may be.

2. The causes of failure are not extraordinary things, but habitual.

145 ***But there are many cases of people whose plans work out and they become very, very rich. They are precisely the ones that inspire us to put together great plans and dreams. Are not they a demonstration that the Savings Theory is true?***

The Savings Theory is true for those who have already become rich. But what about those who are trying?

It is not that the fable of the Milkmaid has condemned them to failure since it is only a description of a frequent statistical fact: it is usual for plans to fail precisely because life is complex and we love to buy things.

As the fable is not a curse, we gladly accept that many people can become very rich by overcoming the mistakes they may make. But the fable demands to take into account that alongside the few who become very rich, there are multitudes of hard-working, intelligent, know-it-alls, and bold people who do not make it.

We conclude that the Saving Theory does not apply to get rich. What is true is that it is possible to become rich and that there are decisions and ways of living that help, but that, in general, and as the fable of Aesop says, it does not work for the vast majority of people.

146 ***What are the implications for the ET?***

The fable of the Milkmaid embodies the Scientific Method since it generates an immediate prediction based on the ET:

If the ET is the correct explanation for our high complexity, then alongside us there must be multitudes of living beings and fossils representing the frustrated who never made it up the ladder of complexity. Therefore, functionality problems must abound and abound in both extant and fossil species.

Comparing what is predicted with what is seen, one realizes that the ET is the dream of someone intelligent and judicious but inexperienced. Because what you see is an unstoppable and unbearable storm of perfection on all sides without traces of an Evolution of Perfection.

Let us involve DNA in our reasoning.

7.3 Mechanicism

DNA is at the root of all mechanics.

147 ***What would your argument look like if you take DNA into account?***

DNA has been involved in the modern version of the ET, the Synthetic ET, as it is the synthesis of everything that is accepted. Let us review its components:

1. Genetics elaborates the ideas of Mendel according to which the transmission of inheritance occurs through material objects similar to the wealth that is inherited through coins and titles. All that information is, it is believed, in the DNA. Inheritance results from duplicating that information.

2. The ideas of de Vries from the 1900s that the changes that occur in reproduction are random. From here comes the variability necessary for Evolution.

3. The Theory of Darwin of gathering up one penny after another. That is called Gradualism. There is no force of progress. This comes about as a result of some heritable traits working better than others to survive and leave children. In mechanistic terms: DNA is duplicated, some random changes are included, some in favor, and others against the ability to have children who reach reproductive age. Winners will fill the earth. Each new round increases functionality and complexity. With the passing of generations, perfection is reached.

148 ***Do you deny that the refinement mechanism proposed by the Synthetic ET works?***

The Scientific Method neither accepts nor denies the hypothesis or belief that it wants to test. What it does is study the observable collateral repercussions that what is believed may have. We use this method in many different ways. For example: Why did they release MR when a video showed him stealing the diamond? Because the man in the video was without gloves but the fingerprints that appeared everywhere were not his. We can formalize the application of the Scientific Method in this case as follows:

Premise: Where MR goes, his footprints always go. Prediction: If MR stole the diamond, his fingerprints should show up at the crime scene. Observed fact: there were no traces of MR anywhere. Verdict: MR was not the thief. Doubt: And the video? A review of the video indicates that the thief looks like MR, and that was why he was blamed for the misdeed. But precisely because of this resemblance, they already caught the thief.

Applying the Scientific Method to the Synthetic ET is something that the fable of Aesop already did. There is no need to change or adapt anything. The fable does not directly deny that the Synthetic ET prediction can occur. What it claims is that if that were the case, then the fossils would have to be riddled with construction and gear defects, and the living things that accompany us would have to be crippled and have all sorts of malfunctions in their physiology. Fake.

Modern technology allows us to complement the wisdom of Aesop.

7.4 Academic Rebuttal

We are allowed now to use mathematics and make simulations, computer programs that mimic a world that functions just as we want.

149 ***Should we settle for literary comparisons to reject the ET on the grounds that it predicts massive failures that are not observed, or is there something more academic?***

Our task is to demonstrate that when the conditions foreseen in the Synthetic ET are given, for each indication of perfection there is massive and inevitable production of imperfection. With this goal in mind, we are going to use a language of zeros and ones, the binary or two-symbol language. Keep in mind that this brings us closer to DNA, which uses a language of 4 symbols, ATCG.

Let us pay attention to a story appropriate to the Penny-for-Penny Theory of Saving, that is, to Gradualism.

Consider a child who saves coins to buy an action figure that represents his favorite hero and is worth 100 coins. He brings them together one by one, from nothing to 100. Now, let us rewrite the same story in the promised language:

Each of the 100 coins is marked with either a zero or a one. In the beginning, they all have a zero which means that none belongs to the child. When he manages to save the first coin, he puts a one on it and never takes it off. All other currencies have zero. When he saves the second coin, he marks it with a one and never deletes it. And so on with all of them. In addition, the child can save one coin per week. His income, guaranteed by his aunts and his willpower, is enough for that and nothing else.

Our game with coins is interpreted in terms of Genetics and Evolution like this: we make a list of genes that make a living being work. Each gene is represented by a coin. If its mark is zero, it indicates that the gene in question has not evolved, but if it is one, it indicates that Evolution has already managed to make it work. This binary classification of to be or not to be was used by Carolus Linnaeus of the eighteenth century for his taxonomy, which served as the basis for launching the ET of Lamarck and later that of Darwin.

Let us note about the thrifty child that by collecting coin by coin, there is only one future: to obtain enough purchasing power to fulfill dreams. That is our reading of the idea that Darwin sold to the world: by bringing together small, indestructible changes in favor of the species, there is only one future, which is to reach perfection. Let us draw a parallel between Darwin and the boy. This can save because he has a large income thanks to his aunts, and it is secured by his tremendous willpower. Darwin implements the same thing in his ET: the variability of the population ensures that there will always be someone better than what exists. This is the equivalent of a secure income. The genes that turn out to be better will spread throughout the world. That is equivalent to marking the saved currency as personal property and never unsealing it. The newly achieved genes are the basis of a new step that, when joined to all the following ones, lead infallibly to perfection.

150 *What happens when the changes are random?*

Let us now look at the consequences of the changes being random. To do this, let us simulate randomness by a roulette wheel with 100 subdivisions, and that does not stop before spinning many times. That spinner is a source of random numbers from 1 to 100.

Let us now consider the same boy as before, who already has 99 coins out of 100. The 99 that belong to him are marked with a one. The one that does not,

with a zero. Let us define that the mutation is such that it affects only one coin out of 100 and that if the coin had a zero, it puts one on it, and vice versa, if it was on one, it puts zero on it. We use the spinner to determine which coin to change, and we make a move, that is, we spin the spinner and see if it landed on a coin with a one on it or if it landed on the only coin with a zero on it. The roulette has nothing to envy and, precisely, coin number 100 came out, which was at zero and now at one, that is, the boy randomly completed his 100 coins.

Now we repeat the experiment many times. What happens is that in an overwhelming majority of cases we go from 99 saved coins to 98, because the roulette wheel landed on a coin marked with a one, between coin 1 and 99 inclusive. Anyway, a few times we go from 99 to 100.

From here we make two inferences:

1. It can happen by pure chance that a series of mutations appear, all towards perfection.

2. Mutation most likely degrades perfection rather than enhances it. This disproves at once the savings theory: mutation in the population is no guarantee that a better variant will emerge than the ones that exist.

Now we organize our argument according to the Scientific Method:

The life we see is extremely perfect in every respect. The ET proposes a mechanism to explain it. At the root of such a mechanism is random mutation. Our study cannot disprove such a theory directly, since chance can produce anything. But if one believes that this has happened by chance, there is an inescapable, observable, and simple prediction: the world must be full, filled with imperfections, because for someone who takes a step towards perfection there is a world of congeners who take a step towards imperfection.

This prediction is massive and infallible and applies to the Evolutionary Process.

151 *How would we sum it all up?*

We can say everything in a very concrete saying: **There is no Evolution without Evolution of Perfection**.

The Evolution of Perfection has two axes, one temporal or vertical, and the other populational or transversal.

The populational or cross-sectional aspect was what we have already discussed. It says that along with the few who make progress, there is a multitude of those who do not. That crowd is the embodiment of imperfection.

As for the temporal, or vertical, aspect, we are interested in knowing how long it takes for Evolution to climb the ladder of complexity under certain given conditions. What we see is that the temporal aspect is so slow that the age of the Universe, about 10^{16} years, is not long enough.

152 *Could you explain better what the vertical or temporal direction of the Evolution of Perfection consists of and why it has no salvation?*

Let us see the Evolutionary Process in retrospect:

Let us consider an evolvable function, which supports all shades of functionality between total imperfection and total perfection:

Since the changes are random, almost any change is initially an improvement. But as perfection increases, the proportion of changes that represent an improvement decreases while that of those that represent a worsening increases. And the closer you are to perfection, the greater the proportion of party-damaging changes, and the longer you wait for a perfection-enhancing change to appear. The net result is a massive and inescapable prediction of the ET: there must be a very long, clear, and abundant trace of the struggle of Evolution against imperfections, especially in the stages close to perfection. This is how the ET predicts that there must be an **Evolution of Perfection**. Specifically, the fossil record must be full of misshapen skeletons, and my own body must be imperfect in both anatomy and functionality.

153 *What would your argument about Perfection on its temporal axis translate into the language of ones and zeros?*

The topic is understandable if we discuss it in several steps.

Let us first estimate the cost that chance pays to reach mediocrity, that is, half of the total work. Suppose we have 100 coins which must be marked with a zero or one. A coin with a one means that it is our property, that we are on the way to perfection, but if it has a zero, it means that it is not our property, or that it does not add perfection.

If our procedure for marking the coins is random, we expect 50 and 50, except for a small difference. That shows that mediocrity, half of the work, is free for randomness. Is not this a reason that explains why it is so respected?

154 *How much does it cost to abandon mediocrity?*

Suppose we have 100 coins, 50 marked with one and the other 50 with zero. We spin our 100-sector roulette wheel. It can land on any coin, which can have a zero or a one. If it falls to zero, it becomes one, and we understand it as progress

that takes us out of mediocrity. In this case, the task would be finished with the cost of one move and with a probability of 1/2. If it lands on one, it makes it zero and we understand that as a drawback, and 49 coins would be ours while the other 51 not. If we play a second time and win, we would go back to 50 and 50, but we would not reach 51. If we lose, 48 coins would be ours and 52 not.

155 ***¿What would happen in the third move?***

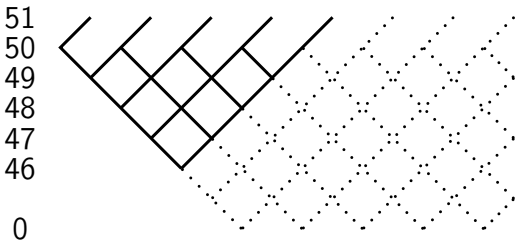


Figure 7.1: *We start with 50 coins in our possession and the task is to go to 51. We play: if we win, we go to 51 and the game is over. If we lose, we go down to 49. Second move, in case of losing: if we win, we return back to 50, if we lose, we go down to 48. Third move: we can go from 50 to 51 else 49, or go up from 48 to 49, or go down from 48 to 47. Note that the price that must be paid 50% of the time to get out of mediocrity is one move, but in the other 50%, it is to dive into the sea of sub-mediocrity, which is infinite.*

We summarize what happens until the third move: we complete the task of getting out of mediocrity with a cost of 1 move with a probability of $1/2$. Or, with a cost of 3 moves and a probability of $(1/2)^3$. The cumulative probability of finishing the task on or before the third move would be $1/2+1/8$ =0.625. From this, we can make the following prediction: half the time the game is almost certainly over (probability one) on or before the third move.

156 ***Exercise.*** *Prove or disprove: you can not finish the task on the second move, nor on the fourth, nor the sixth, nor the eighth. The probability of finishing the task on the fifth move is* $2\times(\frac{1}{2})^5$ *and on the seventh* $5\times(\frac{1}{2})^7$. *The probability of finishing the task by the ninth move is* $14\times(\frac{1}{2})^9$. *The cumulative probability values are respectively* $0.656 for$ *5 moves and* 0.695 *for 7 and* 0.697 *for 9. The next coefficients in the series are* 41 *and* 122. *The general formula of the coefficient is derived from the following set of equations:*

$$1=1+0$$
$$2=1+1=1+3^0$$
$$5=2+2+1=2+3$$

$14 = 5+5+4 = 5+3^2$
$41 = 14+14+13 = 14+3^3$
$122 = 41+41+40 = 41+3^4$
$C_{k+1} = C_k + C_k + (C_k - 1) = C_k + 3^{k-1}$

The geometric meaning of these equations is that the number of paths leading from a left-hand side node in the sea of sub-mediocrity to the solution is equal to twice that of the side node immediately above it plus that number minus one. This is inferred by direct counting, and we expect the extrapolation to hold until a node representing zero heads is reached. From then on maybe everything will change.

157 ***Challenge.*** *Find the formula of the general term, the series of all the terms, and their sum. The result would be the probability of finishing the task starting from a symmetric situation and finishing as soon as 51 is reached. Find the expected number of moves needed to finish the task, getting out of mediocrity, which is* $\sum kp(k)$.

We see that getting out of mediocrity by pure chance is perfectly possible and its probability is given by:

$$1/2 + (1/2)^3 + 2 \times (\tfrac{1}{2})^5 + 5 \times (\tfrac{1}{2})^7 + 14 \times (\tfrac{1}{2})^9 + ...$$

But to get some security, it is necessary to plunge into sub-mediocrity, creating poor quality on a large scale. Indeed, one can spend an eternity diving into the sea of failures, which are 50 moves deep in a row. Also, if you start not at 50 heads out of 100, but at, say, 80, now the sea of failure is deeper, and therefore it is much more difficult to leave away.

We already have an idea of what can happen, but trying to make an exact calculation makes us very scared. And let alone generalize it for any initial number of coins, and any proportion of heads. And do not even think about the difficulty of adding Evolution by Natural Selection to the problem. Frankly, I see it as too cumbersome and too dangerous to make a mistake.

158 ***And how do you plan to overcome fear?***

I will apply what I learned in college.

159 ***And what did they teach you?***

Professor Su Oh Van told us and repeated it to me: *If you see a frightening bull on your way, take a detour and do not risk being killed by the bull.*

160 *And how will you apply that teaching?*

With a simulation, that is, we explain to the computer the rules of our game with coins, roulette, and Natural Selection. The computer executes it and keeps the accounts without getting tired, or getting annoyed, or making accounting errors.

161 *Why should we believe in simulations?*

The simulations work mainly for two reasons. First, the ET has a very clear formulation on which there is no disagreement, and likewise, how to simulate our game with roulette is something simple. A simulation starts from there, and its results are unappealable. Second, complex systems obey laws that are generally simpler to describe than their behavior. Ashby taught us this in his book about cybernetics. That implies that the simulation is easier than the general combinatorics since the former is based on the laws of the system and the latter on its unfolding. Therefore, the former is more reliable than the latter against the human error of wrong accounts.

162 *And what would be the purpose of the simulation?*

We are interested in verifying what we have thought:

1. The exit from mediocrity is given on the third move or earlier at least half the time. And the initial number of coins does not matter.

2. To have some security of getting out of mediocrity, the price to pay is to plunge into sub-mediocrity, creating wholesale garbage, i.e. large-scale failed attempts. More officially: For any k, the probability of finishing after k moves is non-zero. It will come as no surprise that the corresponding distribution is exponential, with a rapidly decaying silhouette, because each step involves multiplication by $1/2$. But we doubt it because the number of paths is bounded by an exponential in base 3, although somewhat delayed.

163 *And what are your results?*

The program LeaveMediocrity.html counts the cost in moves of leaving mediocrity for 100 coins. It shows us that

1. The task, without exception, ends on an odd move. Otherwise, the program would be wrong.

2. It is certain that in the 50% or more of trials, the task is finished on move 3 or earlier.

3. The distribution is always and everywhere rapidly decreasing and ends with a tail of scare events that are more and more spaced. Events with more than 200 moves are rare but anyway excursions beyond 2000 also happen. This is compatible with the prejudice that the distribution is exponential.

164 *How do you get a copy of all 4 programs?*

You can get a copy of all four programs together with all the accompanying material. To that aim, click here. Or, open your browser and go to

`https://www.ejristos.com/GPfalsifiesEvo/ScientificMethod/IndexGPFalsifiesET.html`

In the opening page, search for the title THE EVOLUTIONARY THEORY AND THE SCIENTIFIC METHOD. Look below it for the file

`Zipped file with latex sources, pdfs, and 4 js programs.`

Click over it, download and save it, expand it, and open containing folder to see everything. Choose a program and click over it. If your system associates the suffix `.html` with a browser, it will open and run the file. Otherwise, open a tab on your browser, click over it, and press `Ctrl + O`, with `O` of Open. A dialog will appear showing all available files. Choose the one you recently saved, and it will run automatically. If not, the possibility of running JavaScript programs must be activated in the menu of the browser.

165 *What are all these results good for?*

In the first place, to test what is expected according to our previous considerations. Second, the results allow us to invent a completely homemade ET ourselves.

166 *What would such a homemade ET look like?*

The idea is simply to get out of mediocrity, and repeat the same procedure to climb to the next step, reaching 52% of the task, and do the same thing over and over again until you reach total perfection.

167 *Does this homemade theory have anything to do with Science?*

We have a chilling prediction: Our theory says that the described process manages to reach any level of perfection very quickly. In effect, since it is almost certain that with 2000 moves a step will be advanced, it is very likely that in 100 thousand the perfection will be reached, which consists of having all the 100 coins marked with one.

We already have a prediction. What we will do now is put it to the test with a simulation.

7.5 A simulation in JavaScript

Every cell phone is a powerful computer and therefore can run programs. JavaScript is a language that allows you to run programs in any browser, either on a cell phone or on a desktop computer.

168 ***What would such a simulation consist of?***

We put Evolution to work on a population of individuals through mutation, recombination, and breeding by merit. Specifically, we would have the following steps:

1. Initialization: Starting from a population of 100 individuals or players, each with 100 coins. Mark the 100 coins of each player either with one or with zero but randomly and with equal probability.

2. Find the winner, the one with the most number of ones.

3. Write down the data of the winner, his information of ones and zeros.

4. Clone the ones and zeros data of the champion over the entire population.

5. Apply recombination and use the spinner to make mutations, as we have already seen until a number of ones greater than that of the last champion appears for the first time in any player.

6. Repeat steps 2-3-4-5 until you reach total perfection.

7. Report the cost of the entire process, which is the number of moves accumulated over all players and from start to finish.

8. Verify that perfection is reached with about 200 thousand moves in total.

9. Because the human genome is over 3 billion base pairs, verifying perfection with 100 coins is not that much. Therefore, it is required to calculate the overall cost of reaching perfection for any number of coins. This is done by regression, which is used to extrapolate from low to high values. The results are shown by the program with the help of 3 pictures towards the end of its report.

We need now to interpret the results.

7.6 Reading the rebuttal

The simulation does not report anywhere neither that our homemade theory is true or false. What is happening?

169 ***What would be the criteria to accept or reject the idea that our homemade ET would be the explanation for our existence?***

If the number of moves is realizable in our Universe of 15 billion years since it exists, the theory is declared feasible. But if the number of moves is much larger but very much larger than the feasible ones, the theory is declared wrong.

To decide whether or not it is true that there must be an Evolution of Perfection, we ask ourselves a question: How many individuals are required to reach perfection? If they are few, the theory is declared to be correct. If there are many, the theory predicts that there is an Evolution of Perfection on such a large scale that it must appear in the fossil record through all kinds of misshapen skeletons. If they are too many, another much stronger prediction appears: we and every living being must be filled in every kind of anatomical and physiological defects.

By comparing the predictions with what is observed in the fossils and ourselves, a decision can be made as to the falsity of the theory.

170 ***What did you get by simulating the process?***

The program `HomeMadeTheory.html` shows that the cost of matching a sequence of ones is exponential over the length of the sequence:

If x is the number of coins, the cost in moves to find perfection is

$151.3e^{0.08x}$ found for the range 1-60 of the number of coins.

171 ***You predicted that the cost of reaching perfection with 100 coins is around 200 thousand individuals. Is the prediction verified?***

If we replace x with 100 in $151.3e^{0.08x}$ we get 451018.9434. We consider that the prediction is fulfilled.

172 ***Can we declare the ET to be true?***

Not in any way. Exponentials are associated with very large numbers. For example, for a number of coins of one million, the cost to reach perfection would be

$151.3e^{0.08\times 1{,}000{,}000} = 151.3e^{80{,}000} = 10^{34000}$

This number is too large compared to the realizable numbers in the Universe, which are of the order of 10^{1000}. Therefore, the ET, presented to explain our existence, is similar to the child who wants to buy a spaceship with what he saved yesterday.

On the other hand, 10^{34000} is the number of tries needed to get perfect over a million coins. That number is so huge that it would be guaranteed that every Evolution is very incomplete, with products of high variability in quality, mediocre, good, very good, and why not, excellent. That variability must be present in our bodies. As none of this can be seen, we conclude that the ET of the origin of our complexity is the dream of a child. Anyway, we consider that Evolution is a good tool to produce approximate solutions of about 90% perfection when the problem is not very complicated.

173 ***All those numbers are big because the exponents are so high. But the simulation says that the exponents are going down. Therefore, your rebuttal of the ET is incomplete and you must complete it by simulating a high number of coins.***

To satisfy that quality control demand, we ran the program on interval 1-100. The obtained results were:

We ignore the first stage, up to 20 when the exponent was 0.14, to neutralize the role of the initial conditions. It is seen, in effect, that the exponent goes down monotonously to 0.06, which it reaches at 61 and 62. But at 63 it gets the value 0.07, and it keeps going up so that from 91 to 94 it is worth 0.11. From 95 to 98 its value is 0.12. At 99 it ended up at 0.13. This trend is reproduced with very little variation. It should be noted that the exponent tends to vary monotonically, but that of the coefficient is to suffer ups and downs. We conclude that the proposed falsification of the ET is not only maintained but also strengthened.

Two CPU seconds are enough to run the $1-60$ range, and the 59 instance costs 3500 individuals. But running the $1-100$ range took 12 hours and the cost for the 99 instance is in the order of a few billion individuals. To run this range it is necessary to close the latent tabs of the browser, and also all applications. Still, the program may crash, but one is guided by the results posted to the *console*. A desktop computer with 8 cores and 8GB of RAM was used.

174 ***What is the console and how to use it?***

The JavaScript console is a panel or text area where the results that are scheduled to be viewed are posted in plain text.

The console should be made visible for programs that do not terminate within a minute because the program does not post results to the tab page before termination. That is unbearable. The way out is to open the console.

Each browser has its way of opening it. The general rule is to look in its menu for the way to activate more tools, and there one looks for the one that corresponds to developers. The console is activated with a click and unfolds in a small space that one can enlarge by moving the borders. The program `HomeMadeTheory.html` publishes the cost that had to be paid to reach perfection for each number of coins in the chosen range.

7.7 Flashback

Let us take a closer look at what we have done.

175 ***We expected that perfection can be achieved within around 200 thousand moves regardless of the number of coins, that is, regardless of the complexity. Is our expectation fulfilled ?***

The expectation was created by saying that it is almost certain to get out of mediocrity in 2000 moves or less. And since for the case of 100 coins there are 50 steps from mediocrity to perfection, we have 2000 times 50 which gives 100 thousand. We believe that the assumption was sensible because the probability of getting out of mediocrity in one move is 0.5, and, surely, the half of time one leaves mediocrity in 3 moves or less.

This is how we assumed that the dynamics of moving from one step to the next on the ladder of Perfection are independent of the complexity, given by the number of coins, and of the degree of perfection achieved, given by the number of ones.

Well, that is not true.

176 ***And, what is the truth?***

We have defined Perfection as high functional complexity. Complexity is implemented in our model by a large number of coins representing a large number of variables whose value must be determined for the system to acquire a function. In the story of the thrifty boy, what we want is that all the variables end up being worth one. But in another case, the functionality condition could be anyone.

Now, first of all, the cost of increasing perfection grows with the achieved perfection, because the more perfection there is, the greater the probability that a change will be regressive, decreasing perfection.

Secondly, the cost also depends on the complexity, given by the number of coins, because the more coins, the greater the probability that what is done on one side will be undone on the other, and, therefore, no progress is made.

For a quantitative study, we must take into account, first of all, that the number of possible arrangements is exponential in the number of coins:

A coin has two possibilities, one or zero. Two coins have $2 \times 2 = 2^2$ odds, noted 00, 01, 10, 11. Three coins have the following odds, 000, 001, 010, 100, 011, 101, 110, 111. Total $8 = 2^3$. In general, for n coins we get 2^n chances, which is an exponential function. It represents *the worst case cost* of obtaining a specific event, in which all the arrangements have to be reviewed.

When it comes to finding perfection by Evolution, our simulations say that the cost in moves also increases exponentially with complexity, but not as high as 2^n. What that means is that the 2^n arrangements form a practically irreducible set, that is, if there is a list of all but two, there is no way of knowing which one of them will come out next, if sampling is at random.

177 ***What happens to the cost of perfection if instead of targeting a sequence of ones, you target a random binary sequence?***

The cost varies very little. In my terms: the cost does not vary.

178 ***How do you explain such cost stability?***

Because the engine of Evolution is chance and this is just as far, or as close, to any long binary sequence.

179 ***What would be the cost of perfection for chance?***

The probability of hitting one coin is $1/2$, two is $1/4$, and n coins is $1/2^n$. That means that the expected value of the cost for one coin is 2, for two it is four, and for n, it is 2^n.

180 ***Does that mean that the cost for the worst case is the same as for chance?***

No. The difference is that the expected value is a statistically significant projection, valid for many repetitions, but a particular experiment can have a cost ranging from an amazing coincidence of drawing all ones on the first move to another amazing coincidence of never taking out all the ones and have infinite cost.

181 *But if everything can turn out well on the first play, why is randomness not given due importance?*

This longing could be that of someone who preaches that chance can explain everything. But that is not the philosophy of the ET, which insists that preferential breeding of the best guarantees time after time progress toward perfection. **The ET claims that Evolution is an infallible machine for creating perfection.** Such a guarantee of reproducibility cannot be claimed or offered by chance.

Now, since it is about guaranteeing reproducibility, we cannot be guided by good luck, but by ordinary and massive results. That is precisely what our simulations offer.

182 *What would be the cost if Evolution consisted only of mutation?*

Let us first prove that since the mutation is random, what it does on one side, it undoes on the other. Therefore, the Evolution based on random mutation has a force that drags it towards mediocrity. More formally, we have:

- The number of ones converted to zeros is proportional to the number of ones. The greater the perfection, the greater the number of ones, and the greater the expected value of this type of change. That is, the greater the perfection, the greater the probability of a change towards failure.
- The number of zeros converted to ones is proportional to the number of zeros. The lower the perfection, the higher the number of zeros, and the higher the expected value of this type of change. That is, the less perfection, the greater the probability of a change towards success.

Therefore, the birth of ones, of successes, predominates when there is imperfection. The birth of zeros, of failures, when there is perfection. It is a fight between exponentials and the net result is another exponential that depends on the initial conditions and that tends towards an equilibrium that under symmetry parameters is half ones and half zeros. Technically, this type of phenomenon is called a birth-death process.

Now in equations.

What happens when there is only mutation?

Consider that in a certain individual the proportion of ones is U, and the proportion of zeros is $(1-U)$. There is a mutation rate μ. Therefore, the number of zeros created by mutation is μU. And of ones is $\mu(1-U)$. When they balance, you have

$\mu U = \mu(1-U)$

$U = (1 - U)$
$2U = 1$
$U = \frac{1}{2}$
This shows that the mutation turns mediocrity into a law.

183 ***But if chance causes the Evolutionary Process to tend towards mediocrity, can random mutation produce perfection?***

Random mutation can indeed produce perfection because the tendency towards mediocrity is not deterministic, nor is it a priori, but rather a posteriori, it is an emergent quality. It is more unlikely to keep going up when you have some degree of perfection or to keep going down when you have some degree of imperfection. But nothing prohibits reaching the limits on any side.

184 ***And what happens if we add recombination?***

The mutation we have considered affects different sites independently. Recombination affects many sites at once. Therefore, recombination fuels chance. Besides, it concatenates small solutions into bigger ones. It is not excluded, therefore, that perfection is reached faster. There is a tradition among engineers that complex problems cannot be solved without recombination. For mathematicians, the difference is not important, for although recombination can produce lower exponential functions, they are still unbearable for high complexity.

If one wanted to see quantitative results, nothing better than simulations. In them, all you have to do is turn the recombination function on or off, by adding or removing a couple of slashes. Save, run the program and look at the results.

185 ***What happens if we add the whole Evolutionary package, including selection?***

Our simulations say that the ET is better than chance and the worst-case search. But all three costs are exponential.

186 ***Do engineers consider such an improvement to be important?***

A less expensive exponential is obtained, something that is transcendental in engineering. And, finding good approximations by Evolution is less expensive.

187 ***Do mathematicians consider such an improvement to be important?***

As the cost is exponential with or without Evolution anyway, the improvement is irrelevant for the high complexity values typical of Nature.

188 *Is there any way to model Lamarckism?*

We can cover both Lamarckism and Darwinism with the same primitivist model as follows:

The Evolution we have programmed uses mutation and recombination to generate variability and then selects the best individual to clone it over the entire population. We can model the effect of selection as a directional drive to mutation that adds more ones to the entire population. This interpretation of selection is a reading inspired by Lamarckism which says that Evolution is guided by a force of progress. That is simple and effective. Let us implement it and get some predictions:

We have used up to now random mutation. As such, the probability of a change from zero to one is the same as from one to zero. We model the favorable role of Natural Selection in Darwinism in the same way that we model the favorable role of guidance postulated by Lamarckism: we make the rate of mutation toward progress greater than the rate of mutation toward failure. We do that like this: the deleterious mutation rate, from one to zero, is μ, and the progressive one, from zero to one, is $\mu + s$, where s is a positive number, surely small. We have:

Let U be the proportion of ones in a clone, and $1 - U$ the number of zeros. We have that the process of generating zeros is balanced by that of generating ones when the lost ones μU are equal to the gained ones $(\mu + s)(1 - U)$:

$\mu U = (\mu + s)(1 - U)$
$\mu U = \mu + s - (\mu + s)U$
$\mu U + (\mu + s)U = \mu + s$
$(2\mu + s)U = \mu + s$
$U = \frac{\mu + s}{2\mu + s}$.

If there is no selection, this gives:
$U = \frac{\mu}{2\mu} = \frac{1}{2}$
which says that mediocrity is the balance of mutation when it acts alone.

If we let $s = \mu$ in
$U = \frac{\mu + s}{2\mu + s}$.
we obtain:
$U = \frac{2\mu}{3\mu}$.
$U = \frac{2}{3} = 0.666$
which ensures that when there is selection or guidance, there is a force that pulls towards an incipient perfection.

If $s = 8\mu$ we get:
$U = \frac{9\mu}{10\mu}$.
$U = \frac{9}{10} = 0.9$
which says that when there is a great discovery, a force appears that leads to near-perfection.

189 ***If selection cannot ensure perfection, is it impossible for Evolution?***

Our simulations say that perfection is possible.

190 ***Your great feat is to go until*** $x = 100$***, and nevertheless you make a positive extrapolation to large numbers, How is that possible?***

We believe that beneficial mutations sometimes happen in series, which are reproduced on a large scale and that makes Evolution towards perfection possible and faster than chance. However, chance has an exponential cost, which is transferred to the cost paid by Evolution as a whole. Adding what has been said, Evolution has an exponential cost, although a little less than chance. We emphasize that being a little cheaper is invaluable in applications.

Let us revise our work to make sure that it has been done right.

7.8 Quality control

The Scientific Method requires that experiments must be repeatable and results reproducible. Therefore, everyone must know how to run the aforementioned simulations.

191 ***How can I run this program to reproduce the results?***

Before going the long road, try one click to open the link

HomeMadeTheory.html

In response, the browser pulls it down and puts it on the screen. However, this new program does not run automatically because the User must choose a range of the number of coins. A short-range is chosen, for example, between 1 and 12. One selects it in the dialog indicated in red. One runs it, and one can next choose a wider range.

On a desktop with 8 gigs of RAM, the range 1-30 took less than a minute, but the range 1-50 took 10 minutes. The range 1-100 needs a day, and you have to take special measures: turn on the computer, refrain from activating any application other than the browser, activate the browser, immediately open the console, and close as many web pages as possible. That way the memory is all available for the program. The program is opened in a separate tab, and it is run by choosing the desired range.

192 ***Challenge.*** *The program allows us to compare the performance of Evolution with that of chance, which makes blind trials. To activate this option, one opens the program code with any text editor and looks for the expression*

//nTrialsByChance = guessByChance(password);

which is deactivated by the two slashes. What you have to do is activate it: the sticks are removed and you are left with:

nTrialsByChance = guessByChance(password);

the new program is saved with a somewhat different name because it usually happens that when you change something, without realizing it, you change other things.

To run the program, it is best to start with a small range and gradually increase it.

Would you say that there is any reason for Science to prefer Evolution to chance?

193 ***Challenge.*** *The program publishes not only the cost of reproducing a given binary sequence but also the cost of guessing one more bit. To see it, go to the Text Area* `PASSWORD LENGTH, SOLUTIONS OF EVOLUTION`*, and search for* `Trials of improvement.` *For example: for a problem of hunting a key of 38 characters, it was obtained:*

Trials of improvement = 700,1100,1200,1400,2000,2200,2300,2500,2600.

That means that with a cost of 700, the first jump was achieved from the initial situation that was randomly generated. The next jump costs 1100, and the next 1200. Explain why there are not 35 jumps but only 9. Is the next jump cheaper or more expensive than the present one? Is it a little more or a lot more? If we call this value the marginal cost, is the marginal cost exponential? What implications does your result have?

194 ***How can I know that the program is well done?***

By comparing what it promises with what it produces. The program promises to simulate Evolution and produce perfection. If it does, and if it does so much faster than chance, the program is correct. If it did not produce perfection, it

would be necessary to review its components, function by function, to see where the fault lies.

To review the functions, nothing better than commanding them to write all the steps. This can be done by setting the binary printing flags, true-false, for each function. These appear in the same block with variable declarations. Thus we apply the proverb of the Gospel of Jesus that says: *By their fruits you will know them*. It is in this way that we adhere to the directive that the possibility of verifying a program must be an expedited activity of the public domain.

The most important inference that the program makes is that the cost is exponential. To check it, one looks at the regression plot, the last one presented, and it should be noted that the cost values by Evolution should fit the line very well. If not, confidence in that inference is weakened. The same happens if from one run to the other there is a big difference in the exponent of the exponential.

195 *Could you give an example of a quantitative check analysis?*

The program publishes the exact cost and also an exponential function that projects the cost by regression. Is this calculation well implemented? How are we to know it if we do not compare what the regression promises with the actual value? We expect the exact values and those given by the regression to be close to each other. The problem is that when dealing with an exponential, the differences between the exact values and those predicted by the function can be very large, and yet everything is fine. That is why we use the following test: we look at the graph and observe that some points are below the regression line, and others are above it. Such observation must be consistent with numerical comparisons based on the regression formula. Let us check it for a run in the interval 1-60, in which the returned exponential function was $191.1e^{0.07x}$.

We see the results on the next page, 102.

196 *How robust, resistant to attacks, is your falsification of the ET?*

The falsification that we have discussed is based on a Genetic Algorithm or Simulation of Evolution. It has a weakness and that is that those algorithms do not reflect all the majesty of Evolution. That problem is better solved by presenting a faithful and transparent vision of the Genome and Evolution and studying its repercussions. How such a task is solved is something that we will show in the next chapter.

x	CReal	CProy	SignNum	SignGraf
59	3400	11882,2010728328	"-"	"-"
58	5200	11078,8908471891	"-"	"-"
57	11100	10329,8893573317	"+"	"+"
56	8900	9631,52499708832	"+"	"="
55	8900	8980,37438355481	"-"	"="
54	3600	8373,24557566819	"-"	"-"
53	3800	7807,16242730784	"-"	"-"
52	14200	7279,34999822376	"+"	"+"
51	7100	6787,2209512762	"+"	"+"
50	2700	6328,3628693061	"-"	"-"

Table 7.1: *Checking the regression function that projects the cost in individuals to achieve perfection. The data was from a run in the range 1-60. To check that the regression is programmed correctly, we compare the sign of the difference between the actual cost and the cost projected by the regression by two methods: direct calculation (fourth column), and graphical calculation (fifth column). The number of coins is N, CReal is the real, actual cost, CProy is the cost that is projected by the regression function* $191.1e^{0.07x}$*, SignNum is the sign of (CReal -CProy) calculated numerically. SignGraf is the "+" sign if in the graph the point is above the line, and it is the "-" if the point is below it, "=" means that the point is practically over the line. The conclusion comes from comparing the values of the fourth column with the fifth. What could it be?*

Chapter 8

THE GENOME IS SOFTWARE

`Computers were born with life itself`

In this chapter, we are going to look in some detail at the relationship between DNA and computers, together with the evolutionary implications. We do it, not for sport, but out of necessity. And for elegance: what happens is that everything has to be taught to matter if we want it to behave like a living being. The entity responsible for such a tremendous task is the DNA that works like a mother who takes her little daughter by the hand around the world and tells her, with words, how to do things.

197 ***Our task***

We have seen that in the light of gradualism, DNA predicts a terrible falsehood, namely that there is a continuum of interpolants between some ancestor of the chimpanzee and human beings. And the same for any possible speciation event. Fake. Obviously false. So we ask ourselves: what is wrong? Gradualism or DNA? Our choice is that they are both wrong. This means that DNA cannot be interpreted as a list of base pairs and that if an interpretation of DNA does not rule out gradualism, it cannot be valid. We have, therefore, a task: Formulate the correct interpretation of DNA! Let us go step by step.

We start by looking at how the working class of the cell functions.

8.1 Enzymes and DNA

DNA contains instructions for making enzymes, the cellular workers.

198 *How does DNA govern?*

To govern, the DNA orders the synthesis of machines that do exactly what it says. Those machines are called enzymes.

199 *What do enzymes do?*

Enzymes speed up specific biochemical reactions at the required time, place, and rate. More details:

Thousands of chemical reactions are taking place spontaneously in the cell at all times. If any reaction can occur, it occurs without a second thought. That is the only law. But all of them occur at a very low speed. The result is a huge mess in very, very slow motion. On top of such disorder, enzymes speed up precisely the reactions required under the given circumstances. The speed increase can vary from a few times to thousands of times. It is the coordinated work of the enzymes, over some 3,000 accelerated reactions at any given time, that creates the identity of the species to which they belong.

200 *What determines the identity of an enzyme?*

An enzyme is a chain of amino acids. The identity of the enzyme depends on what amino acids and in which order they go into the chain. The way the enzyme wraps around itself to form a globule depends on this order. Although the chain is linear, its amino acids have a volume and when coiled, they occupy a volume in **3D** (in three-dimensional space). This volumetric structure is the first determinant of enzyme function. The second depends on the specific physical-chemical properties of each link. And thirdly, when the molecules visit the enzyme, this must react appropriately, changing its conformation.

201 *Where do so many enzymes come from?*

As the structure of enzymes is highly complex, a small mutation can change the identity of the enzyme entirely. Actually, in most cases, any change renders it unusable. But not always, and that is what makes room for there to be biochemical diversity at all levels among the members of a species, and for the evolution of enzymes to be a little feasible. Well, since every change counts, different polypeptides, or chains of amino acids, coil up differently in 3D space and exhibit different physical-chemical properties. So we ask ourselves: How many different polypeptides can there be? Since 20 amino acids make up polypeptides, for a chain of 300 links there are 20^{300} different chains. That is more than the atoms of the entire universe that are much less than 10^{100}.

202 ***How can the DNA contain so much information needed to make enzymes?***

It turns out that each amino acid is represented in the DNA strand by a triplet of 3 bases. And since DNA has 4 letters, then the triplets allow us to encode for 64 amino acids. But since there are only 20, each one has 3 or 4 ways to encode. The coding is usually reported in a table or diagram that bears the name of *Genetic Code*, and which says, for example, that the amino acid *alanine* is encoded by the triplets *GC**, where * represents any of the 4 bases. If we have the case of a polypeptide chain with 300 amino acids, the corresponding DNA has 900 bases. All this consumes material: human DNA has more than 3 billion base pairs. It is also believed that there are between 10 and 100 thousand genes, some for enzymes and others for supporting proteins such as collagen, keratin, and elastin. Intrigue: 20 amino acids appear in the Genetic Code, but there are about 25 that appear in the enzymes: How is that possible?

The cell has too many enzymes, and any change can cause a loss of function. How do you control such a complicated world?

8.2 Relationship with computers

To control a world where any change is transcendent, there is a solution: language. That is the key to computers and that explains their importance in the modern world.

203 ***What is the relation of enzymes and DNA to computers?***

We need to take a detour to understand it better. Let us first note that we too could have invented computers.

204 ***Where did the idea of programmable computers come from?***

It came from everyday language. Indeed, human beings use language, the verb, to transmit information and give orders that can be very complicated and incredibly precise. And all this in the midst of an almost infinite diversity of possibilities. The invention of writing allowed us to understand that the verb can be represented by strings of symbols, which also have their interpretation code, and that is what children learn in their course of learning to read. The way of operating the verb, for simple cases, is summarized as follows:

`Verbal command, perhaps written → Interpretation according to language→ Action`

For example, the girl hears that they say `Run!`, she gets the message, interprets it according to her culture, and executes it, that is, she runs away. Computers accomplish the same thing for programming languages. The interpretation of the programs is done utilizing another program that can be quite extensive and complicated and that is called *interpreter*, if you execute command by command, or *compiler,* if you execute programs as a whole:

`Verbal order → Interpretation according to the compiler of the language → Action`

For example, in Java, the command

System.out.println("Hello World!");

means:

`Type on the screen, in the pane called console, "Hello World!"`

The action for a computer can be called generically, *print*. It can be to paper, removable memory, or to RAM that serves as working memory. We also have 3D printers that print in three-dimensional space the object that their microprocessor orders them. Today the coverage of the Internet of Things is spreading, its objective is to control artifacts from anywhere in the world. This technology handles many types of sensors and actuators. And everything is controlled by numerical sequences that come from some microprocessor. We could say that its action is to *print on a cable that transmits signals*.

205 *Can we see an example of a computer and its language?*

Let us see how a very simple computer works.

We have all used our fingers to count. I recently did it at a bank. Fingers function as a memory that can be rewritten and read. Above them, the brain comes to say what was read and what should be written. Note that when counting, each finger can be in one of two states: `YES` state, which means that the finger in question is included in the count, and `NO` state, which means that it is not included in the count.

The program

LittleFingers.html

realizes that idea and presents a simple computer that allows us to solve the following task: `write a sequence of any numbers.`

206 ***How does Little Fingers work?***

Little Fingers can print any sequence of numbers. It works for binary sequences, of zeros and ones, and numbers in base ten, with digits 0123456789. How does it do it? Since it is a machine, it does exactly what it is told and only that. Therefore there are quite a few specifications:

Little Fingers is a computer that consists of a linear array of five memory cells on which you can navigate circularly, that is, after the fifth cell follows the first. Each memory cell can store a binary element 1 or 0, or a number in base 10. There is of course a mechanism to change the state of the cells: it is the cyclic sum, which says, in the binary case, that $0 + 1 = 1$, and $1 + 1 = 0$. But, for decimal mode, $1 + 1 = 2$, but $9 + 1 = 0$. The User can print the value of the desired cell to get strings of numbers. At startup, each memory cell stores a zero and the active cell is the first. Only one cell can be active at a time. The active cell is the only one that supports arithmetic operations. The game is to be able to print the desired string of numbers by navigating over the cells and giving each cell an appropriate value and then printing specific cells in the required order.

207 ***Objection: Little Fingers is very simple, it does not look like a computer, rather it is like a calculator.***

Every calculator has a microprocessor, which does the math. Little Fingers is a simulation, a JavaScript program, that simulates a very specific calculator, and the accounts are done by the resident computer that runs the simulation.

208 ***What is the mystery of microprocessors? How are they different from ordinary circuits?***

The public lighting lamps are automatically turned off when the day comes. They work like this: they are plugged to direct current, so they could always be on. But they also have a light sensor that during the day generates a current that, when amplified, closes a switch, which interrupts the current to the lamp and thus turns it off. At night, no light reaches the sensor, it does not generate

current, it is not amplified, and no switch is closed. This is how the light turns on when the day is over. That circuit works like the reflexes in our body: you get hit below the knee with a hammer, and your leg goes up. Computers are very different because are programmable.

209 *What does it mean to be programmable?*

Little Fingers can be programmed to print any string of numbers, be it binary or digits. Any. And you cannot do anything else. But to be able to do that, it has a characteristic that identifies computers: it accepts verbal commands. For example, a program for little fingers is

$+>.$

which means:

$+$ add one to the active cell,
$>$ toggle it off, move to the next cell to the right and toggle it on,
. print the contents of the active cell.

This is how Little Fingers has its programming language, with which programs can be made to print any sequence. Its language consists of several symbolically represented commands. Every computer works the same way: its programs are divided into simple commands, each one of them is interpreted according to the specific rules of the language used, and then it is executed.

210 *Is the DNA a computer?*

No. But the cell is. Without the cell, DNA is nothing. But with a cell covering it, the DNA contains enough information to continue life and, eventually, to reproduce it. We emphasize that the DNA does not contain information for life, but only to continue it. The DNA is like the manager of a big business that was already running and making a profit before he came in.

211 *Why does the DNA have information precisely to be interpreted by a computer?*

What we want to argue now is that the information contained in the DNA is *software*, instructions for a computer and that the cell contains a super-computer.

DNA contains encoded instructions for making proteins, some of which are enzymes, such as polymerase, and others that serve as structural elements, such as collagen. In addition, it has elements that make it possible for the chromosomes to function as a gene library with all the necessary logistics for very fast

and correct consultation, packaging, and unpacking procedures. This is so complex that I understand a person I knew, with a postgraduate degree in agronomy, who refused to accept all these complications.

To understand why the DNA is software, let us look at its definition:

Software *is a list of instructions to be executed by a processor that has been previously instructed in the used language.* Let us look at an instruction in *Assembly*, which is a language that speaks directly to the integrated circuits of a CPU:

```
MOV AL, 11h
```

means to load the memory register AL with the hexadecimal number 11 which in decimal is 17.

The operating scheme in that language is the same as in all the others:

```
Verbal order → Interpretation according to a specific
table of each language→ Action
```

We have the same thing in the cell: the DNA has 4 symbols or bases, noted ATCG. Specific messages in the DNA are transcribed to RNA which also has 4 letters which are AUCG. Each RNA base is a *symbol*, 3 symbols make a *word or codon*, and many codons make a *program or gene*. Example:

`UUU` is a codon or word.
`AUG-...-UUU-CUC-...  UAG` is a gene or program.

Each program is interpreted by the ribosome that is guided by the Genetic Code, which gives the correspondence between words or RNA codons and orders that the ribosome must execute. Thus, the above program means:

```
 Start a chain with methionine- ....  -add phenylalanine
- add lysine -...end and release the chain.
```

The ribosome plays the role of a CPU core of a super-computer, which is parallel, as there are many, many ribosomes operating at all times, about 10 million for a mammalian cell.

DNA allows you to print any sequence of amino acids in 3D space. And within the world expanded by its alphabet of 20 amino acids, DNA is all-powerful. In that, it looks like Little Fingers.

212 *Is it good to be almighty?*

Being all-powerful causes a lot of problems. The reason is that verbal communication allows giving a lot of very specific information. As a consequence, verbal communication is chaotic. That means that a small change in the signal produces a huge change in the response. Just think about how difficult it is to learn a language. Every language of any culture is complex and it cannot be otherwise because it must allow survival in a world that is so extremely complicated. The complexity of language is implemented in chaoticity. For example, the sequence 000000 for an Internet of Things controller device might mean *turn on the crockpot*, while 000001 might mean *turn on the alarm*. All human languages in the world are chaotic and almost all programming languages are included here.

The chaos of a language is not total, but it permeates almost everything. It is not complete because there are small sectors that are relatively easy to learn, for example, the conjugation patterns of regular verbs. But it takes time to learn the hard way that `permeate, permanent, pentameter, and temperate` are very different things, each one with its meaning. The learning curve is softened if one learns to discern the etymology of words, which says that words are combinations of roots, which function as super-alphabets. But the roots usually form a group of high chaoticity.

213 *Is the chaoticity of the language something fortuitous or is it a necessity?*

That depends on the complexity of the world to be controlled. If all you have to do is turn on the crockpot, which has a dry sensor and turns itself off, and if you have a million sequences at your disposal, they all mean the same thing: turn on the pot. There is not and cannot be chaos.

But when it comes to controlling a company that produces, transports, and operates chemical elements, it is better to make sure that the communication fidelity is perfect and that the control capacity is total. Otherwise, one could be blown to pieces (it happens from time to time with those who manufacture or operate explosives), or a component could go out into the atmosphere and cause discomfort (one such case was reported last night on the local news).

All of this can happen in the cell, where there are thousands of types of enzyme-catalyzed chemical reactions going on at any one time. And each catalyzes the assigned reaction. Almost all changes or mutations cause loss of function. This is why DNA is highly chaotic. In short: *The high specificity of enzymes is equivalent to the high chaoticity of the DNA.*

214 *How is such a high specificity of enzymes implemented?*

When an enzyme wraps around itself to form a globule, a small cave with a very specific geometry appears on its surface with physical-chemical properties that vary from point to point. Suppose that the enzyme catalyzes the reaction A+ B $\rightarrow$ C + D. All kinds of molecules arrive at the cave, or *active center*, but when a type A molecule arrives, it finds a certain attraction that seizes it and accommodates it. The same thing happens with B. And when A and B are together, the enzyme induces the pair AB to join in a complex that is one step away from forming the products. In the total process, energy is lost, but the products are not generated immediately, since it is necessary to surpass an activation barrier. Once it is overcome, the products detach from the enzyme and continue on their way. It is a geometry and affinity operation that changes over time and must be tailored to your specific task. It is amazing that this is possible. That seems to imply that the 20 amino acids of the genetic code make up an immensely unlikely selection. For all this, it is clear that the intracellular chemical world that must be controlled is immensely complex and that, therefore, the specificity measures must be maximum. That implies a high degree of chaoticity.

215 *What repercussions does the chaoticity have?*

To control a chaotic world there is only one hope: the verb, whose chaoticity must be no less than that necessary to control the world. When the verb is automated, the result is called *Software*. We have shown that **DNA is Software and that it necessarily has to be chaotic -although not totally.**

216 *How do you automate the verb in the cell?*

There are several steps to describe how the cellular computer works.

217 *What is the first?*

The first thing to notice is that the DNA is not used directly, but works as a library. When something is required, a photocopy is made of it to work further. Photocopies of DNA sectors are called mRNAs, messenger RNAs. RNAs are strings consisting of symbols from the alphabet AUCG. The photocopying rule from DNA to RNA is by physical-chemical pairing:

A -> U, T-> A, C $\leftrightarrow$ G

For example, if the DNA says
AATTCCGG
the RNA will be
UUAAGGCC

218 *And the Genetic Code?*

We know the Genetic Code in table or diagram form, but in the cell, it is laid out in a way that is appropriate for robotics. There are two code representations in the cell. The first is based on the tRNA system, transfer RNA. Let us imagine by abstraction that these molecules are like rods. At one end they carry the signal for a codon, and at the other, they carry the corresponding amino acid. The codon signal is an anti-codon, which is established by the correspondence A $\leftrightarrow$ U, C $\leftrightarrow$ G. For example, if the triplet or codon ATA appears in the DNA, the UAU codon appears in RNA, and the transcriptional t-RNA molecule that interprets it has at one end the anticodon AUA, and at the other a molecule of the amino acid lysine.

219 *What are these rods for?*

They enable the operation of the ribosome, the microprocessor of the cell. This is in charge of reading the RNA codons, interpreting them, and executing them.

The ribosome is made up of about 50 proteins. It receives the photocopy of DNA, the mRNA, with a certain message. The ribosome puts it on its work table and exposes the first codon. All the tRNA rods arrive there to prove complementarity and the one that is complementary stays stuck. The ribosome cuts off the amino acid it carries, releases the tRNA, and lines up the amino acid. Next, the ribosome makes the mRNA move forward one codon, and the cycle repeats, adding a new amino acid to the one that was in line, and so on until the task is completed by a stop codon.

Each released t-RNA is left swimming without its amino acid, but there is an enzyme that is ready to stick the corresponding amino acid to it. Each codon has its specific enzyme, for example, the lysine codon has lysine-RNA-transferase, which recognizes lysine tRNAs, and attaches a lysine molecule to them. These transferases carry a second implementation of the Genetic Code. For the DNA language to be all-powerful, there must be at least 20 different types of t-RNA and as many transferases.

220 *Is the DNA language ultimately as simple as Little Fingers?*

Little Fingers is not too simple. Since it is almighty to write any sequence, it must have some complexity, namely, an implementation of the verb with its command interpretation table. But Little Fingers is a simulation, which means that it lives as a parasite on a resident computer. In contrast, DNA has its microprocessor, namely the ribosome. As if that were not enough, DNA, being one-dimensional, prints chains of amino acids that act three-dimensionally. That power infinitely increases the capacity of DNA expression.

221 *What does it mean that one language is more expressive than another?*

Let us understand it with an example. Little Fingers can print a binary string that means *turn on the fire shower*, but it cannot understand or execute the following command: *turn on the fire shower when and only when there is a fire*. Little Fingers is enough for the task of printing any sequence, but it lacks expressive power in the world of the Internet of Things.

Something very similar happens with GAs, Genetic Algorithms, which are simulations of Evolution. They solve optimization problems, such as finding the number x that minimizes the difference between $4x$ and 8. Or, find x that solves the equation $4x = 8$. In this example, we can get the answer by inspection: $x = 2$. Which says that we are in the world of integers. Therefore, we have to encode numbers as sequences of letters that can mutate and recombine. Digits are used but interpreted as letters, not numbers. Such encoding is an association between strings of letters and numbers. This correspondence defines a specific Genetic Code. In other words, each GA expands a computational world that, being simple and specific, must be sufficient to solve the proposed problem. Achieving this is not easy and requires experience. The procedure that translates sequences of letters into numbers is what acts as the compiler of a programming language.

222 *Is it always possible to increase the expressiveness of a language?*

As you extend a language, quite soon you reach a situation where everything else is more of the same, but expressed differently. We can fix ideas if we think of the brain. This one has too many tasks to calculate: how to move your body, how to get to a place faster, figure out what people are saying, figure out what to say to someone aggressive. Each problem implies a different solution. But all tasks can be described employing language, the analysis of which has been reverted to the base elements of the recipes or algorithms that we use. Interestingly, there are not many. The complexity comes from using them in combination and one after the other and on different data or effectors. In this way, the following algorithm for going from the park to the house could have almost everything necessary:

1. I am at the park and I want to go home.
2. If I am alone, take the short and dangerous way. Otherwise, go the long and safe way.
3. Take steps and more steps along the chosen path.

4. Do nothing while it is sunny and there is no rain. Take action if night falls or if it rains. Turn on a flashlight and keep it on if night falls and until you get home. Use the umbrella in case of rain and while it rains.

5. Terminate when you get home.

A little more schematically, we get:

- Acquire or read, memorize and use this and that data.
- If such a condition is met, do this. If not, do that.
- As long as the third condition is true, do this and not that.
- Repeat the following task as many times.
- Terminate under such condition.

Formalizing this program of classifying the expressiveness of computer languages has given us the following definition: **a language is Turing complete** if it has maximal expressiveness, and can express any recursive function, which calls itself. Another classification is due to Chomsky, who uses grammars that differ in complexity. Thus, all human languages use metaphors, parables, and hints, which represent elements whose interpretation depends on the context. Therefore, every human language is a good candidate for being a context-sensitive language, that is, a highly complex language. It cannot be said ipso facto that this is the case because Chomsky gives for each of his complexity classes constructive definitions that must be verified.

223 *Does the DNA language have all the basic patterns?*

Yes. It has all the basics.

In addition, engineers have extended the power of DNA computing to everything necessary to be Turing complete. For example, programming languages allow you to define recursive functions. Now we ask ourselves: What does a cell do every time it divides, duplicating its DNA, creating life from life? Is that equivalent to, simpler, or more complex than what a function does by calling itself? I think it is more complex, since self-replicating machines, already in progress, are a great milestone in technology. Instead, commercial programming languages with recursive functions have been around for more than 50 years.

224 *What can you say about data acquisition?*

Living things have sensors for many things, for example, eyes and ears. But there are incredible cases: goats have been reported that predict with their behavior that it is going to rain (they stay in the lower part of the hill, close to home).

225 *Can you give an example of how the DNA language processes a negation?*

Every gene must be locked up when not required. And it must be available to be photocopied when required. The logic reads like this:

`If required, make yourself available. If not, make yourself not available.`

To implement this logic, the first codon of the gene is discovered, which usually codes for methionine. When it is discovered, the enzymes that make photocopies can land on it and get caught doing their job. To interdict this, a molecule is placed on top of the methionine codon. But be careful, such a switch must be able to be released when a signal arrives that says `this gene is needed`. All this is done utilizing proteins that work in the company of small segments of RNA since the basis of everything is complementarity.

226 *Can you give an example of how the DNA language processes an OR clause?*

When a response must be triggered by at least one of two signals, an OR clause is used. Example:

Capping the first codon of a gene can be carried out by several molecules of different origins. Here we have an OR not only of two signals but of many.

227 *Can you give an example of how the DNA language processes an AND clause?*

When two conditions must be met at the same time, an AND clause is used. Example:

Consider an enzyme that processes the reaction $A + B \rightarrow C + D$. For this to happen, the enzyme is required to respond in the one and only case where the two molecules are each at their corresponding checkpoint.

The same idea can be implemented to create a gene expression switch that requires two signals to fire. The difference with the enzyme that accelerates a

reaction is that the conformational changes must affect not the molecules A, B, but the part responsible for the complementarity of the entire conglomerate with the gene to be photocopied.

228 *Can you give an example of how the DNA language implements and processes an IF clause?*

The DNA language that we have seen allows us to print any polypeptide, for example, insulin, which, when rolled up on itself, transports glucose to the interior of the cell. But, so far, we have not seen if it can understand and execute the following command: *print an insulin sequence that helps transport glucose molecules into the cell when and only when there are not enough glucose molecules inside*.

Let us try to imagine how to solve that problem knowing that DNA can print 3D machines, proteins, or enzymes, which can be sensitive to specific molecules. We assume that each cell can execute the task. This does not happen in humans, in which insulin synthesis is done by the pancreas. The proposal is:

The insulin synthesis gene has a start codon, AUG, that codes for methionine. If that codon is free, the gene can be read to make a photocopy of it in mRNA. But if the start codon is capped, there is no photocopying and there is no insulin synthesis. How is it covered and how is it uncovered? It is covered by putting a protein and uncovered by removing it. Such protein would be a glucose concentration sensor, which we note S. Its logic must operate as follows:

When there is no glucose in sight, S is empty, it swims into the cytoplasm, the reading start of the insulin gene is free, photocopies are made into messenger RNA, and insulin production begins. But if there is glucose in the environment, S picks up a glucose molecule, changes its conformation, and sticks to the reading start of the insulin gene. Production stops. To ensure perfect gluing, the enzymes use anticodons, which are complementary to the codons and stick to them tightly, but not so tightly that they cannot unstick themselves. In fact, the gluing forces are Van der Waals, i.e. , weak.

Therefore, the ADN language accepts, understands, and executes programmatic phrases of the form:

```
If such a condition is met, do the following. Otherwise,
continue doing what you were doing.
```

Enzymes are so excellent that they even have the ability to be accelerated or slowed down as required.

229 ***Does the DNA language have the ability to understand and execute loops?***

One case concerns the tail length of bacteriophage lambda. Everything indicates that this can be decreased by deleting part of the intermediate region of the so-called H gene. Similarly, the length of the tail is increased if a small duplication is made in the same region of the same gene. The H gene codes for the protein called Rule and the result is that the length of the tail is proportional to the length of said protein. That means that each elementary duplication in the H gene is interpreted as a loop or repeater of an instruction that says: add a segment to the tail of the bacteriophage.

Additionally, the DNA can through enzymes create periodicity like the menstrual period, which is verbalized like this: `for each month make a period`. And the verbalization corresponding to breastfeeding would be `create milk for each baby and vary its content according to its growth so that its nutritional efficiency is always optimal.`

230 ***Challenge.*** *Verbalize in programmatic terms the activity of the Ribosome.*

231 ***The examples cited are good for robotics. But, are there mechanisms that directly affect DNA and produce Evolution?***

With insertions and deletions, one can obtain any transformation of the DNA if one assumes compatibility with gradualism. Both of these things can be achieved with recombination: one can start with two strings we noted `ab` and `AB` and end with a`B` and A`b`. If a and A are the same lengths, and so are b and B, we have *homologous recombination* and everything can pair. But when the elements have different lengths, it is called *non-homologous recombination*. With it, you can achieve anything.

If gradualism is not assumed, everything can be achieved, but the time required can be infinite.

Modern *DNA Computing* includes this and much more. It was imagined by Feynmann around 1950 and first implemented in 1994 by Adlemann, who used DNA to solve the problem of visiting, without repetition, a group of cities connected by one-way roads.

For all that has been said, we dare to say that the DNA language is no less expressive than the programming languages used in modernity.

232 ***Objection: Anything can be verbalized. For example, if you kick a stone, it executes a conditional command that says:*** **`If the stone is kicked, move. Otherwise, stay where you are.`** ***What is the difference with DNA?***

Indeed, any fundamental detail of the DNA language is ultimately due to a physical-chemical process. The great thing is that the cell uses physical laws to fully implement the verb in all its complexity.

I find it very amazing and inspiring that the Word, *the logos*, is considered the basis of Creation in my religion. That directive was perhaps adopted from the Egyptian religion, which also gave the Word the same function. I like that very much.

233 *A stone moves continuously. How is it possible that something discontinuous, digital, like the verb comes out of physics?*

Computers are based on the transistor, which has 3 legs. Through leg one the current enters, through leg 3 it leaves. But leg 2, in the middle, plays the role of a switch: when it has current, it is like someone who puts a big stone on the road: nobody circulates. But, when there is no current, it is like someone who removes the stone, the cars circulate freely. Before transistors, vacuum tubes operated on the same principle. This is how the all-or-nothing processes are born, the basis of the discontinuity of the verb in computers.

In the cell, the verb is implemented thanks to the nature of molecular interactions. The electrical forces, which appear when an electron or a proton is missing or in surplus, are very strong. They are used as initial triggers of some processes. The forces that are commonly used for the implementation of the verb are the Van der Waals forces between electrically neutral molecules. They are very weak from a distance, but somewhat strong from very close and favor a weak bond. The molecules stick together, but it is easy to unstick them. The result is that for one molecule to interact with another, very high geometric complementarity is required. As a consequence, molecular recognition works all-or-nothing but with an alphabet, which can be as large as desired. The next step in Molecular Engineering is to transform the molecular pairing into a conformational change that has the desired effect. Astonishing!

234 *Is the DNA language more expressive than our programming languages?*

Our programming languages are complete in the sense of Turing. Therefore, in reference to discrete elements assimilable to natural numbers, they cannot be improved or surpassed. But a language that handles real numbers, that is, the continuum of real numbers could have more expressive power and more computational power than computers and their discrete-element-based languages. And

if you have complex numbers, it would be even more so. What is the case in Biology?

Some birds can navigate using the magnetic field of the earth. Lovers of Quantum Mechanics, or complex numbers, propose that such birds have sensors that use quantum elements as part of mechanisms to amplify very small differences in signals. This would say that they already use quantum computing, not completely, but only for what they need. In any case, such a type of computation would not be cheaply simulatable with discrete elements.

235 *Which language is more complicated, DNA or human?*

DNA is much more difficult. The reason is that human languages are exquisitely tolerant of errors, whereas such tolerance is minimal in the DNA language. For example, I have seen mothers who perfectly understand their babies even though they speak gibberish which is incomprehensible to me, while the mother speaks the same language as me. A less complicated case is that of automatic spell checkers. All they do is decide if a given word appears in the local dictionary. In that case, it is well written. If not, the most similar words in the dictionary are looked up and reported as candidates for correction. For example, if the acronym DNA does not appear in a local dictionary, the system may propose `and` as a candidate for correction, which is obtained from DNA by a permutation of two not neighboring letters.

In contrast, DNA is too little tolerant to change. Let us see:

The project of reading the human genome from many donors allows us to say that the vast majority of the genome comes in a single variant. DNA sites that support variants are called SNP, single nucleotide polymorphisms.

SNPs whose frequency in the population is higher than 1% occur throughout the human genome about one in every 300 nucleotide base pairs. This translates to about 10 million SNPs within the 3-billion-nucleotide human genome. Let us read this in terms of languages:

We say that a sequence makes sense in the DNA language when it can be executed and allows its carrier to survive. It is deleterious if the reproductive capacity decreases. It is lethal if the change results in the death of the wearer. Most observed point mutations in DNA are neutral, causing no changes or if they do, they are not deleterious. But mutation is random. What that implies is that out of a thousand DNA symbols, only three sites support mutation. The other 997 give lethal mutations, and, therefore, appear as monomorphic, that is, with a single variant, without any variability. What is the cause of lethality? It is that in the molecular world no one plays the role of the mother of a baby, who is learning to speak.

For example: for a sequence encoding an enzyme to be understandable and not deleterious, the enzyme created by the sequence must function as expected. Otherwise, death occurs. Not always. That is why there are people with genetic defects, such as not being able to metabolize a certain substance, say phenylalanine. This defect causes mental retardation in children and is prevented by avoiding foods with that amino acid. But be careful, if you do not consume phenylalanine, you will not be able to live either, because many proteins need it. Mutation intolerance can go as far as loss of function. But if several mutations are made, a new function could appear, so the language would be highly chaotic.

236 ***Why do enzymes lose their function with just one mutation, given that the active center is relatively small?***

The same thing happens to enzymes as to airplanes, the entire fuselage feels the pressure that arises at any point. The reason is that an enzyme performs one reaction and only one, but nothing else, for which the whole body is necessary.

First problem: chemical reactions represent a destabilization of a chemical system, which is followed by a restructuring. That implies that there is an energetic barrier that separates the initial and final states. Solution: to overcome the activation barrier, the active center changes its conformation to propitiate the formation of a reactant-activated complex that favors the creation of the desired products.

Second problem: in many cases, the restructuring does not have a single end. Solution: the path to various final products is filtered by adapting the conformation of the active center of the enzyme to a sequence of intermediate states, activated, of the reactants.

Third problem: the enzyme must cause the preset reaction and no other. Solution: Apart from its active center, rarely more than one, no other part of the enzyme must process any other reaction. However, many enzymes have accelerator-sensitive centers that do not coincide with the active center.

Life forms on Earth show that all of this is possible. Astonishing. But the overwhelming lethality of mutation tells us that none of this is easy because each change has an effect at every point in the enzyme structure, and most notably, at the active site.

Let us return now to our main topic.

8.3 Evolutionary implications

Our abstraction that sees a super-computer in the cell is very much in tune with modernity. This vision is necessary and sufficient to perfectly study our questions regarding Evolution.

237 *Do genes have any biological significance?*

A gene encodes for a protein, but it also has logistics signals: to turn off or on its transcription to RNA, to be exported or not outside the nucleus or outside the cell, and to facilitate its location at the time of requiring its expression. That seems very abstract, but it is the modus vivendi of the cell. Therefore, the biological significance of genes is real: the cell clearly understands and manipulates genes.

238 *Do genes have any meaning in Gradualism?*

Genes are verbal instructions, that is, they allow to be very precise and turn out to be highly chaotic, in such a way that a small mutation loses its meaning or acquires a different one. All contrary to Gradualism, where all functions are evolvable and their quality fills the whole span from being incipient to being perfect.

239 *Do genes have any evolutionary significance?*

The instantaneous answer is that Natural Selection kills or multiplies entire organisms. So the genes are invisible to it.

In contrast, the delayed response of Nature is sophisticated, and, to me, difficult to understand, if not mysterious. Let us see:

On the one hand, we have the laws of Mendel which tell us that chromosomes are distributed randomly, independently of each other. That would imply that Reproduction can distinguish chromosomes one from the others. Now, a chromosome can have thousands of genes. They no longer partition randomly, but Morgan proposed a Genetic Linkage theory to find the corresponding correlations: the farther they are from each other, the more independent is their partitioning due to recombination.

On the other hand, we are intrigued to know how powerful recombination is in making Natural Selection see genes separately. If its power were infinite, as I believe Official Literature assumes, we could say something like the following:

Evolution offers us the necessary theoretical framework to consign in objective terms the concept of perfection that is summarized in high functional complexity:

The mechanism of Evolution is to make changes of mutation and recombination to obtain variants. These are classified according to the number of children who reach reproductive age.

Next comes Systems Theory, which goes on in the minds of scientists. It associates the successes or failures of the made changes in terms of genes, the components of the language of the functions of DNA. Evolution does not do that analysis directly, because all it can do is test entire genomes without being able to discern what is due to what.

However, given enough time and a large population, recombination can bring gene variants together and apart and put them to the test. Thus was born, perhaps by force, the theoretical possibility of saying that Evolution seeks to optimize specific functions, such as vision, apart from its default function, which is to leave survivors who reach reproductive age.

Breaking the big task of laying down viable children into specific sub-tasks increases the rate of Evolution noticeably. This is because Evolution can work in parallel on many fronts. Over time and across generations, we expect a lot of complexity, a lot of non-redundant information, and high functionality. We expect perfection.

240 *What does the Scientific Method say about that?*

What we have to do is look for objective predictions. To do this, we base ourselves, first of all, on our own experience with complexity:

Operationally, human beings perceive complexity evolutionarily. That means you start doing something, and you get something. You make some changes, some work for you but others do not. Sometimes one begins to understand everything and can make transformations and improvements that take one up a ladder to achieve something acceptable. And one stays there. In the language of Optimization, one reaches a local maximum. To get out of there, one is trapped in ecstasy because every small change that comes to the mind creates more harm than good. So one either makes big changes or starts something new because one already believes that one has a more expanded understanding of both the problem to be solved and the possibilities that one has. And so on one continues until getting something competitive.

Additionally, Genetic Algorithms show that the further you go towards perfection, the longer the stagnation or lag in local maxima. The overall result is that for complex problems, with many local maxima before reaching quasi-perfection, the time and resources of the entire Universe are not enough to solve it.

We do not doubt that given the infinity of time and resources, Evolution could solve any problem under any set of constraints and at any level of perfection.

But in our case, that of an earthling, the resources are extremely limited: therefore, the Evolutionary project will always be unfinished and every specimen will be full of defects. That is observed neither in my body nor in Nature. Therefore, the ET is false. Consequently, our conclusion is:

The power of recombination to ensure that genes have their own identity in the face of Natural Selection is rather small. In other words: Natural Selection is practically blind and hardly sees genes or the functions they carry out. As a consequence, any claim that Natural Evolution improves particular functions is nothing more than pure imagination.

241 ***Why is there such a discrepancy between what you say and what everyone believes?***

Because the perception of the world is very different:

Everything is hard for me, as a Christian writer. I have written the same idea, that the ET is false, thousands of times seeking to appease the claims of both my intuition and my mind.

In contrast, Science believes that Evolution works at such a low cost that no cosmological constraint is of concern.

242 ***What is Evolution fighting against that it cannot achieve what it wants?***

Against complexity. This is an a posteriori anthropomorphism that is very well established in all Engineering and that has very extensive mathematical support, firm although with open, pivotal questions. The basis of everything is that doing tasks demands time to do various operations. For GAs, complexity can be measured as the number of individuals required for the Evolution to reach perfection. And the technique of video games is used: pose an easy problem and then increase the difficulty by one level. As we saw in the example of the thrifty child, we give a sequence of ones of length n, then $n+1$, and so on until we obtain several points. They allow us, by regression, to abstract a function that gives the cost of perfection, of perfectly matching a given password, depending on n. In all cases and variants, we have obtained an exponential dependence.

243 ***Does complexity have any biological meaning?***

Yes. Changes are the engine of Evolution. But since almost all of them produce lethality, the cell takes them as errors. Because of that, it has powerful

error-repairing machinery. Everyone who sunbathes is enriched in vitamin D, but ultraviolet rays damage his or her DNA: with some 35,000 mutations, skin cancer occurs.

This means that the cell recognizes that the DNA contains a large volume of information, that if it is lost it is harmful to the organism, and that it cannot be easily recovered, and, hence, it is better to preserve it. In effect, any segment of DNA that is not being used must be packaged to prevent any unscheduled mutation.

Furthermore, the germ line that produces gametes is different from the somatic one that produces the cells of the body. On the other hand, many enzymes do not tolerate the slightest change. That shows up as protein monomorphism and as invariant loci at almost every site in the DNA. This brings back what human software developers know: a program must be perfect to work, otherwise it either does not work or works, but causes more harm than good.

244 *At what time did complexity become so important that it is now the cause of all evil?*

Complexity is not recognized by Gradualism because the achievements are not undone, they do not produce false illusions, they do not cause frustrations, they do not create traps, they do not generate inconveniences, and they do not lead to stagnation.

Nothing to do with what we experience daily due to complexity, whose modern example is Software development. Despite the incredible aids of modernity, the design of computer programs remains among the most difficult and, therefore, the highest paying tasks in the industry.

245 *Does the fact that the Genome is software have any evolutionary implication?*

As the Genome is Software, each specific Genome is a programming language. Almost all are the same, but a few are a little different. And like almost all human programming languages, none of them is gradualist, but instead, all of them are chaotic, and they are so to such an extent that a very high percentage of mutations is lethal.

The chaotic Nature of the DNA language does not exclude that the Evolutionary Process can gather progress, which may well be very great. But, it assures us that all progressive tendencies will be destroyed by some mutation. Therefore, every Evolutionary Process will be plagued with approximated solutions that do not represent local maxima.

246 *Does the fact that the Genome is software have any scientific implications?*

We have an infallible prediction: since every Evolutionary Process is plagued with stalls at local maxima and sudden lost of function, imperfections will necessarily leave traces galore in the fossil record.

Second, we can reformulate the ET as follows: **The Genome is software, Evolution is a Software developer, and Evolution has been the only software developer responsible for the existence of all genomes.** The last assertion is a theory that we have called the **Verbal ET**, which is the update of the ET to the world of Software.

Third, testing the Verbal ET requires computing its predictions. That is done in simulations, but it is not enough to just use any GAs. It is necessary to use **Genetic Programming**, which is composed of GAs that are aimed at developing computer programs that in turn solve specific problems.

247 *And what is the task to do?*

We have to ask ourselves: How expensive is Evolution in the DNA language? We have dodged that question and taken on a much easier one: How expensive is Evolution, Genetic Programming, in the language of Little Fingers and its sophistication on the way to completeness?

This is how we set ourselves the task of measuring the cost of developing programs that guess a random binary sequence. Our simplification, from DNA to Little Fingers, is not traumatic. The reason is that according to experience in programming languages, the cost of solving a problem in different languages does not change the complexity class: if it is exponential in one, it is exponential in all the others, and if it is polynomial in one, it is so in all the others.

248 *And what was the result?*

We find that the cost of perfection, completely guessing a binary string of length x that should be the output of computer programs, is exponential in x. The same happens with the marginal cost, the additional cost that must be paid for one more level of difficulty. Those two results guarantee that there must be an Evolution of Perfection. Therefore, it is predicted that our bodies, like the fossil record, must be riddled with imperfections. That prediction has nothing to do with reality. We have an irrefutable falsification of the Verbal ET.

249 ***That the cost of perfection was exponential, we already knew. Where are the new results concerning the Verbal ET?***

We got a clear and sharp falsification that cannot be objected to:

We knew that for Genetic Algorithms the cost of perfection is exponential in the length of the chains that have to be guessed. But the Genome is not just any sequence, the Genome is software, that is, the Genome is a set of verbal instructions, which need an interpretation code, which form programs to create the bodies of living beings, keep them alive, and make them reproduce. Therefore, what we did was use Evolution to create computer programs that solved a family of specific tasks with increasing levels of difficulty. That project is classified as Genetic Programming in the official literature. It transparently and faithfully reflects the majesty of the Genome and Evolution. That is why the refutation obtained is incontestable.

250 ***Frequently you demand to look at and judge your own body. That is a highly subjective operation. Is there a remedy, an objective solution?***

If someone considers that Science does not authorize him to be the judge of his own body, what he has to know is how to reduce perfection to objective and quantifiable descriptors. We propose the following reduction:

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Perfection = high complexity + functional excellence
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The high complexity is fulfilled when the length of the Genome is enormous, with more than one hundred pair bases.

Functional excellence implies several things:

- It is easy to ascribe a dominant function to each structure: the eye is for seeing, the ear for hearing, and the Golgi apparatus for making proteins and lipids.
- Each particular function is executed in a way that is very well co-adapted to all the others. With our eyes, we see forward and with our ears backward.
- Evolution cannot improve function: every mutation, big or small, makes it worse.
- The function gives the wearer a lot of satisfaction and joy of life. That is why we love dogs so much because their joy of life is contagious.

251 *Is the joy of life something objective?*

Yes, absolutely. There is nothing more objective for every subjective being than the joy of life.

252 *Natural Evolution has no goal, but all simulations of Evolution you use have a very specific goal, namely to guess a sequence of numbers. Therefore, your falsification has no scientific meaning. Do you have something to say?*

According to Materialism, Natural Evolution has no objective imposed from outside. But it must have an emergent one if we want to use it to explain the perfection of my eyes to see, my hands to grasp and my heart to beat. According to Science, such an objective could emerge like this:

A fledgling function has much potential sophistication to evolve into. For example, a light-sensitive speck can evolve in an eye to see light visible to humans, or ultraviolet light, or infrared. You can see it in black or white, or in various shades of gray. Or in green. Or in two colors, yellow and green. Or in three, coffee, blue, orange. In general, not all variants can be listed. Therefore, we can say that Natural Evolution is made up of an infinity of functions competing to emerge towards perfection. Chance brings proposals, but what will reproduce more than the rest depends on the interactions with the environment. As Evolution progresses, the various functions are filtered according to their reproductive fitness until only one or a small well-co-adapted set remains.

What is said is more mythological than scientific, because the many incipient functions can exhaust the resources and there is nothing left for the functions that are already on the way to perfection. But if we ignore this, we can say in hindsight:

The goal of Evolution is to sacrifice many possible functions in favor of one, or a few, which must lead to Perfection. In reality, the tendency toward Perfection appears only when a random mutation does more harm than good to the evolving function. When the function is close to Perfection, almost any change results in deterioration. As we see, the emergent goal produces the same observable result as a goal imposed from the outside: every step towards Perfection is accompanied by multitudes of failed attempts. Thus, the ET inescapably predicts that both the fossil record and my own body must be riddled with errors. Fake.

253 *How do you imagine the future of Genetic Programming?*

Today, Genetic Programming is an esoteric discipline. But its relation with the Evolutionary Theory will cause it to be renown. Indeed, our daily life is so

complicated because it consists mostly of creating procedures, recipes or know-how. In our terms, we are permanently busy developing Software. And, everyone uses Evolution, maybe in an incipient form, to do that. So, Genetic Programming is everywhere and everywhen. The recognition of this fact will take some time, but at last it will happen.

Now, Genetic Programming is discontinuous and burns too many resources, memory and computer power. Our results imply that the future of Genetic Programming in the Academy and the Industry is not on the side of brute force, but of wisdom to help Evolution to achieve results, to lower the exponential cost even a bit. Precisely, we have some points to consider and to put into practice:

- Human beings are to a great extent the best in Software development.
- This activity is tremendously complex.
- We love to attack complexity with Evolution. Thus, Software Development largely coincides with Genetic Programming by Humans.
- There is a style of writing programs that makes it easy to modify them to fit new purposes or requirements. That is why, it is called Evolvable. That is no mystery at all, say, write clear programs and explain in the comments more things that you can forget.

254 *Is there something to polish, add, or something impossible?*

The remaining work is infinite. We have shown that the ET is false in general, but all particular cases remain. To fix ideas, let us consider the ape-human case. Thanks to the Scientific Method we can ensure that there is not a single reason under the sun that leads us to believe that the human being came from the monkey by Evolution. But since we have the DNA from them and us, that has to be justified until all the experts agree unanimously. The same is valid for every speciation event that has been proposed.

Closer to home, we already knew what happens if the ability to understand and execute loops is added to Little Fingers: the cost of perfection is also exponential but higher. It remains to expand the expressiveness of our language and repeat the tasks already done to verify that their cost remains exponential. An immediate challenge is to implement the ability to understand and execute an `if-else` conditional. Mathematical models are also required to explain the results of the simulations and to justify the extrapolations to unattainable values, which are the ones used to declare that the ET is false.

We need many examples of tasks that are more expensive by Evolution than by chance. My previous work indicates that to get one, it might be enough to

add restrictions to any complex problem. They would be a powerful criticism not against evolutionary procedures but to the careless encoding of problems. It would also explain why experts prefer to attack difficult problems in toto and not by Evolution, that is, thoroughly using reforms and patches.

There is a wonder whose Evolution deserves to be simulated in 3D: the spine. Because spinal defects cause severe problems, I expect Evolution to be highly chaotic. That is, the effect of any mutation must cause a terrible problem. I also expect that thousands of coordinated mutations will be required to achieve something different and functional.

A problem that seems titanic to me is the faithful and transparent simulation of Natural Evolution. Anything that comes to mind is Artificial Evolution, with objectives imposed from outside and with too many aids that do not exist in Nature. For example, if we consider that life must necessarily arise from a soup of amino acids and nitrogenous bases, we are already giving a gigantic help that there is such a high concentration of each chemical species that one can speak of substances instead of isolated molecules. A possible way out would be to understand Natural Evolution as the limit of Artificial Evolution when aids are removed until there are none left, and when the number of targets grows from one to infinity. I see it as a very complex and very expensive task to study.

Chapter 9

CONCLUSION

There are so many reasons to believe in the Evolutionary Theory that it is strange that it is false.

We are so incredibly similar to dogs, chickens, fish, and plants, that each person has the sacred duty to reinvent the Evolutionary Theory, which must say that all living beings are brothers because we come from the same ancestor. But if that were true, says the Scientific Method, then the Genomes, which contain the DNA, must be all the more similar the greater the morphological similarities. True. And the differences should allow us to postulate who came out of whom, which can be corroborated by morphological studies and fossil strata. True: the result is recorded in the evolutionary tree, which represents the pinnacle of our scientific culture. There we see that we have recent ancestors with the chimpanzee, the bonobo, and the gorilla. And that it is most likely that our closest brothers are chimpanzees.

However, a puzzle is not complete until the last piece falls into place, forming a great artwork in which everything fits together and there are no gaps. That is why the Scientific Method never stops asking questions. Precisely, since we have the DNA, we can formulate a very simple one: Is it true that mutation is random? It is so important that this be the case because, without random mutation, materialism would succumb.

We resolve that question in the context of particular evolutionary explanations. A very traditional one is that of the giraffes. The Theory of Evolution says that the long hands, legs, neck, and tongue of the giraffe appeared by mutation. Those that caused elongation of the aforementioned organs were gathered by Natural Selection. In fact, they represented the expansion of the food niche, more power in the fights between males, as well as exclusiveness for acacia trees that are higher than 3 meters. The Scientific Method assumes this is true and

asks why did not the jaws and snout did not get longer. The answer is that mutation is not random or that Natural Selection is not impartial. This implies that Darwinism is not good at explaining Nature, while Lamarckism is better suited because it welcomes the work of unnatural agents.

Nevertheless, one can always invent objections to the reasoning above, which will always be debatable. The problem is that adding fights to fights is very frustrating. Will there be any way out?

We have two.

The first is to recognize the essence of the Genome: DNA is a string of nucleic acid bases. But our Genome, the DNA integrated into our cells, is a set of verbal instructions, which use an automatic interpretation code, the Genetic Code, and therefore is classified as a computer program or Software.

Recognizing that the genome is Software immediately enables us to understand why the Evolutionary Theory is false. The Theory of Evolution preaches that Evolution gathers small progress that sums up to Perfection. This can be broken down into complexity + functional excellence. The former implies long and specific programs, while the latter means that if the eye is to see, it does so magnificently, and Evolution cannot make any improvement.

But since the Genome is Software, instead of finding a highway to perfection, what Evolution finds, in reality, is that all progress has the possibility of being destroyed by a mutation. It is similar to what happens with the texts of human languages, in which the change of a letter makes them lose their meaning or perhaps obtain a very different one that does not combine with the context. This produces lethality or notable damage or change to function. We call chaoticity this property of computer programs and all human languages. However, given enough time, Evolution can overcome all of that. Therefore, the only sure thing is that every problem solved by Evolution leaves behind innumerable proposals that were lethal, or deleterious, useless, or of little use. We summarize this in a catchphrase:

There is not and cannot be Evolution without there being Evolution of Perfection.

This points, in the first place, to the failures of Evolution that must have been committed massively. A failure is a defect that is defined by comparison with the final and perfect products. That is why, we have an inescapable prediction: given that anatomy is an extremely complex affair, the Fossil Record must be full of misshapen skeletons. What have archaeologists reported? They pride themselves on a multitude of perfect and wonderful fossils that they display in

museums. This is how they teach us, in light of the Scientific Method, that the Evolutionary Theory is false.

Our second exit is to adopt the point of view of someone looking at a landscape from a high mountain: the details may be lost, but the general geography is completely clear. With this objective, we base ourselves on an abstraction that puts Evolution, something real and undeniable, to fight against complexity, the natural enemy of all creative entities. More specifically, we have:

We can simulate Evolution on computers. The result is known as Genetic Algorithms. But, be careful, as the Genome is Software, the Genetic Algorithms that must be used to test the Theory of Evolution cannot be just any. Instead, these must be aimed at synthesizing computer programs that solve specific problems. This line of research is called Genetic Programming.

To put the Evolutionary Theory to the test, we give these algorithms the task of solving a family of problems that are classified by levels, just like in video games. When Evolution solves a given problem, to reproduce a binary sequence of length x, it is given another of an immediately higher level, of length $x+1$. What we are interested in measuring is how many resources, counted in the number of individuals or chromosomes, are necessary for each level and from there we can extrapolate to high levels, unattainable in the simulations. The result is that the Evolutionary cost to solve a problem is exponential in the level x. This is so high that in one day a desktop computer hardly exceeds level 100. Extrapolating to billions, as is the number of base pairs in our DNA, we conclude that the resources of our Universe are negligible. As an observable prediction we have that at any time in its history, Evolution should exhibit incomplete products galore, where mediocrity and suboptimal quality are abundantly represented:

Chronic imperfection is the hallmark of Evolution.

Therefore, to decide if the Evolutionary Theory is false, it is enough for each person to look at his or her own body in search of structures or functions that leave him very dissatisfied. If there are no complaints, or if they are tolerable, the verdict is that the Theory of Evolution is false. But if they are intolerable, the fight continues, for which we have already extensively shown how it is done: the Scientific Method is applied, which seeks that all the observations, with all the questions and all the answers, form a self-contained, self-explanatory, and consistent artwork. If that is not possible, and there are contradictions, the theory under study is false. This is precisely what the Author feels: living beings in every detail are astonishing marvels that lack any sign of the Evolution of Perfection. Therefore, the Evolutionary Theory is obviously false.