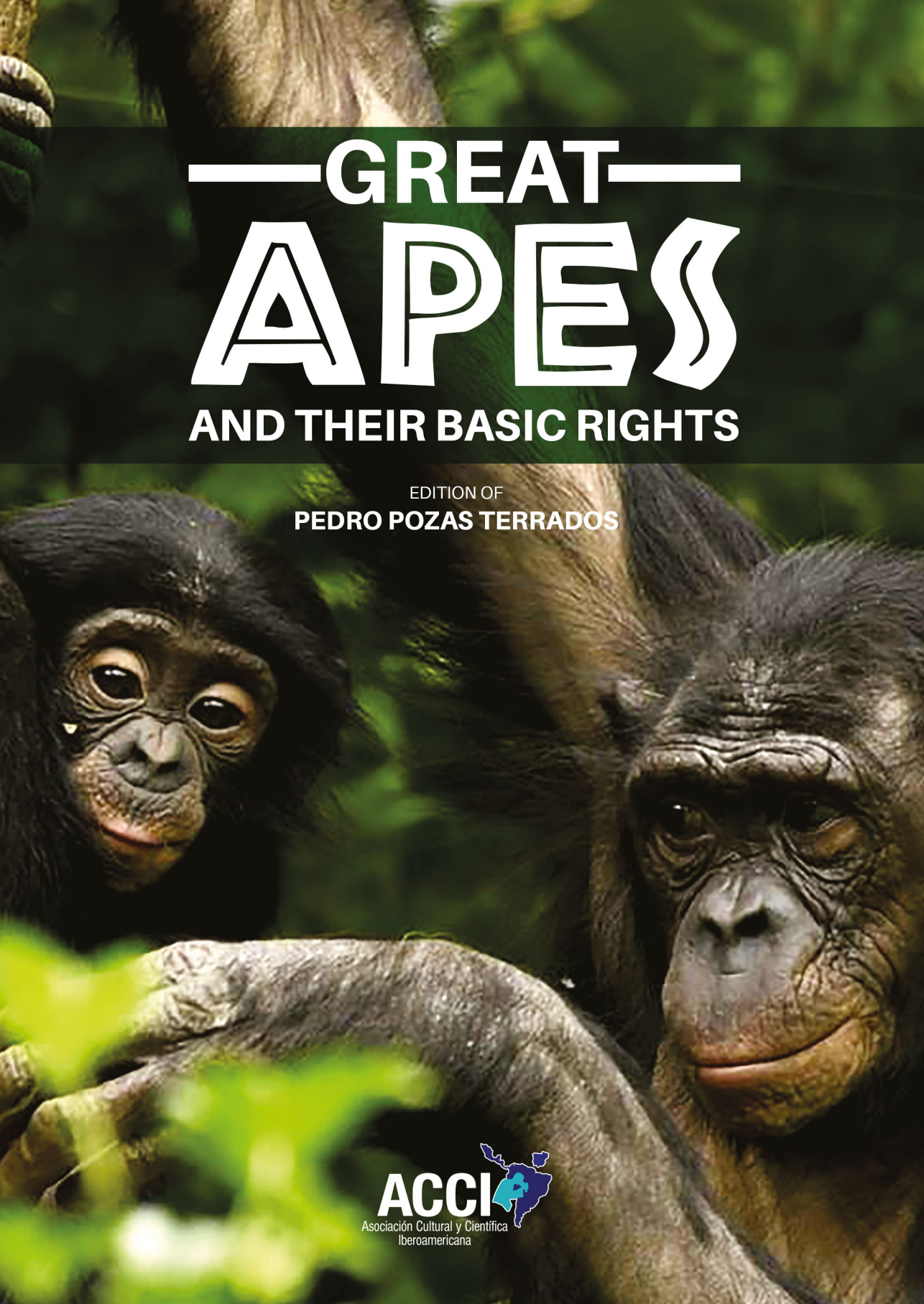




—GREAT— APES

AND THEIR BASIC RIGHTS

EDITION OF
PEDRO POZAS TERRADOS

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This book is dedicated to my wife Leonor, the heart of my life who left for another universe while I was preparing this work. From up there I hope that she guides my steps in my walk.

To my daughters Yaiza and Sara, whom I love madly and who are the fruit of my love with Leonor.

To Pedro A. Ynterian, a great person, defender of the great apes who built a city of chimpanzees, all of them rescued from circuses, zoos and other exploratory activities. A beautiful work and legacy for humanity. Currently he is the General Secretary of Great Ape Project International.

To Paco Cuellar, great fighter and defender of the great apes, founder of the Great Ape Project in Spain and an essential person in this fights for the basic rights of the great apes.

To all the authors involved in this work, for their generosity, courage and love in defending the truth.

To all partners and supporters of the Great Ape Project from Brazil, Mexico, Uruguay, Argentina, Ivory Coast, Portugal, Germany, United Kingdom, Japan, France and Spain, for their support. Without them, the struggle for our hominid brothers could not have been seconded.

To all the readers who have purchased this fundamental work for putting the defense of the basic rights of great apes on the table

To all the great apes of the eight species including humans, because together we have walked evolutionarily for millions of years, and I hope we will always continue to do so.

COAUTHORS

PEDRO POZAS TERRADOS

JOSÉ MARÍA BERMUDEZ DE CASTRO RISUEÑO

JORGE RIECHMANN

EMILIANO BRUNER

BIRUTÉ M. F. GALDIKAS

MIGUEL ANGEL VALLADARES

ISAAC VEGA

PEDRO A. YNTERIAN

KAREN ALTAMIRANO HERNÁNDEZ

MÁXIMO SANDIN

FERNANDO VALLADARES ROS

KEPA TAMAMES

ROSA MONTERO

FRANCISCO GARRIDO

MARÍA DE LAS VICTORIAS GONZALEZ SILVANO

FEDERICO MANUEL RODRIGUEZ PANIAGUA

CARMEN MÉNDEZ

JOAQUIN ARAUJO PONCIANO

GRACIELA REGINA ADRE

ITAI ROFFMAN

MIGUEL GALINDO SÁNCHEZ

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TABLE OF CONTENTS

INTRODUCTION THEIR FUTURE IN OUR HANDS

Pedro Pozas Terrados17

CLASSIFICATION OF GREAT APES.....29

CHAPTER I THEIR LINEAGE

1. A TOUR OF HUMAN GENEALOGY

José Maria Bermúdez de Castro35

2. SYMBIOETHICS: HOMO SAPIENS IN THE WEB OF LIFE

Jorge Riechmann77

3. ZIRA'S KISS

Emiliano Bruner97

CHAPTER II THEIR HABITAT

4. LIKE TWO MIRRORS: THE DEEP CONNECTIONS BETWEEN HUMANS AND ORANGUTANS

Biruté Mary Galdikas.....113

5. BIOLOGY, THREATS AND STATE OF CONSERVATION OF NON-HUMAN HOMINIDS127

6. THE GREAT APES: A ANNOUNCED GENOCIDE THEIR POPULATIONS BECOME EXTINCT AS MAN WATCHES WITH INDIFFERENCE

Pedro Pozas Terrados153

7. THE TAPANULI: THE LAST HOMINID

Pedro Pozas Terrados175

CHAPTER III THEIR CHAINS

8. CAPTIVITY

Dr. Pedro A. Ynterian.....183

9. PHOTOACTIVISM AND GREAT APES.

Stories of primates in captivity.....263

CHAPTER IV THEIR FUTURE

10. THE LOSERS

Máximo Sandín.....279

11. THREATENED COEXISTENCE291

12. WHY IT IS RELEVANT TO CONSIDER THE GREAT APES ‘SPECIAL BEINGS’

Kepa Tamames297

13. CITES IN SPAIN UNDER SUSPICION

Pedro Pozas Terrados.....317

14. IN DEFENSE OF THE EARTH

Pedro Pozas Terrados329

15. A SILENT GENOCIDE IN PROGRESS

Rosa Montero339

CHAPTER V THEIR RIGHTS

16. A MONKEY TRAVELS ACROSS EUROPE: ARGUMENTS OF A PARLIAMENTARIAN IN TROUBLE

Francisco Garrido Peña.....351

17. BASIC RIGHTS

María de las Victorias González Silvano.....355

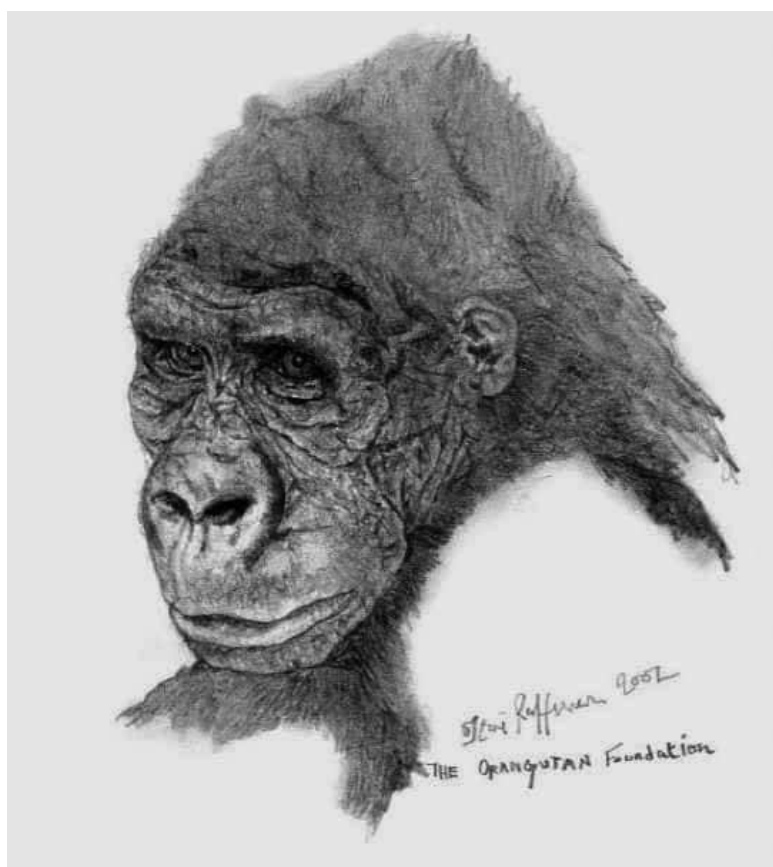
18. GREAT APES IN DEFENSE OF LIFE

Federico Manuel Rodríguez Paniagua365

19. SIMIAN BROTHERS	
<i>Carmen Mendez</i>	375
20. NON-HUMAN PERSONS	
<i>Pedro Pozas Terrados</i>	385
21. THAT LOOK	
<i>Joaquín Araujo</i>	397
22. THE GREAT APES: LIVING HERITAGE OF HUMANITY	
<i>Pedro Pozas Terrados</i>	399
23. THE QUANTUM LEAP IN CASE LAW ARGENTINA”.	
<i>Graciela Regina Adre</i>	407
24. MATTER OF CONSCIENCE	
<i>Miguel Galindo Sánchez</i>	445

CAPITULO VI THEIR MANIFESTS

25. PLEA FOR A GREAT APE ACT	
<i>Pedro Pozas Terrados</i>	453
26. GREAT APE ACT	461
27. GREAT APES LIVING HERITAGE OF MANKIND MANIFESTO IMPLICATIONS AND ANSWERS	505
28. WE RECOGNIZE THE GREAT APE AS NON-HUMAN PERSONS - MANIFESTO	515
29. HUMAN EVOLUTION	
<i>Pan Survival in the 21st Century: Chimpanzee Cultural Preservation, Rehabilitation and Emancipation Manifesto</i>	519



INTRODUCTION

THEIR FUTURE IN OUR HANDS

Pedro Pozas Terrados

When I set out to coordinate this book, I considered the urgent need to make society in general, and political, legal and scientific leaders in particular, aware of the importance of discussing the rights of our evolutionary brothers, of passing a Great Apes Act, and the reason for the growing support in the scientific community for non-human hominids to be protected and not exhibited in zoos or circuses as mere objects; that together, we have the same common ancestor and that we can perfectly master living fossils and, as such, have a protection equivalent to that of indigenous peoples.

For 20 years, my life has been devoted entirely and altruistically to the defense of great apes, their habitat, and the indigenous peoples within the Great Ape Project Association that was born in Spain in 1999. For 20 years we have been ridiculed by politicians, by shameless columnists who attack without knowledge by lying and by mandate everything they say without investigating, attacked even by animalist and ecologist groups, by speciesists, as well as by all the institutions that advocate having captive animals as if they were lifeless stickers in their facilities. But in spite of all this, the Great Ape Project is still standing, in constant struggle, entering the field of ecologism in general, defending their basic rights.



It is unthinkable that today many minds behave obtusely without knowing or valuing our evolutionary brothers who have so much to teach us in order to understand the very essence of humanity. Darwin was also ridiculed not only for his shared theory of evolution, but for showing us how close all species are to great apes, to one another, sharing gestures, aptitudes, cultures, feelings, sweetness and love. Hominid-like gestures. Many people are surprised by the videos that sometimes circulate on the internet where you see a mother gorilla or chimpanzee rocking her son, kissing him, taking care of him like we do with a baby.

These people do not know, or do not want to know, that we share all this tenderness and knowledge of life with great apes.

That shouldn't surprise us. What should strike us is that despite all these similarities with them, we hold them captive without their having committed any crime and solely for the enjoyment and benefit of one species over another. Perhaps no one knows Giulio Cesare Vanini, an intellectual and free thinker of the Italian Renaissance, born in 1585 in Taurisano (Italy). There he studied many disciplines including physics, medicine and astronomy, and also studied ethology and philosophy in Rome. His real name was Lucilio Vanini, signing his writings as Giulio so as not to be recognized for his controversial views and to protect himself from the condemnations of the church.

But all his strategy to go unnoticed was in vain, and the Roman Inquisition stopped him by condemning him to the stake and being burned alive in the city of Toulouse in 1619. Among other claims and theories, he already proposed the idea that men were descendants of monkeys.

He was perhaps the first martyr in the defense of primates and certainly the great forgotten one, and that is why in these pages and in this book where we talk about the rights of great apes, he deserves a memory and a place as a reference in his fight.



It should not be forgotten also that in 2008, the Congress of Deputies, in a session of its Environment Committee, approved that the Spanish Government had to adhere to the objectives of the Great Ape Project, to pass a Great Ape Act and to take the fight for their basic rights to international events. A Green Paper approved at the House of the People, being the first parliament in the world to support the rights of great apes and to adhere to the Project. But politics unfortunately has various ways of combating what has been agreed upon and of deceiving the people, of weaving webs and undoing them as it pleases, despite the fact that this Green Paper was approved in parliament. It seems that, according to dubious standards, an approved Green Paper may or may not be enforced depending on whether the government wants it to or not. It still remains hidden in a drawer in Moncloa where everything is piled up that the government decides not to put into practice in dictatorial fashion. So I ask myself, what is democracy?

In my book *Defensores de la Igualdad* [Defenders of Equality], I explain in detail what happened, and many politicians and the media slandered our organization, the great apes and myself. That book is in the Library of Congress where I hope that in the future, when someone researches our struggle, they will be able to understand the great injustice that was done to us, in the style of Darwin where, no doubt, some would have applauded had what happened to Lucilio happened to us. A book that the reader can download for free on the Internet by entering the Bubok publishing house.

José María Bermúdez de Castro, who is collaborating in this book, told me that: “We share a lot with great apes, and that idea has to resonate with the readers. Their defense is to understand that we share the same origin, an enormous amount of genes and a very similar behavior. Our outward appearances deceive and that is a problem, a barrier that must be broken down”. And yes, we have to break the barrier of the species, show that our non-human evolutionary brothers deserve to be protected, both their habitat



and those held in captivity, that they belong to our own lineage and that we have to learn a lot from them in numerous aspects in which man still wanders lost in his own ego.

Recently, when this work was about to be closed for submission to a publishing house, I came across a serious, courageous, novel manifesto written by Itai Roffman, Evolutionary Anthropologist and professor and researcher at Jezreel Valley College in Israel, titled “Cultural Preservation of Chimpanzees, rehabilitation and emancipation manifesto”, supported and signed by several scientists from Israel, Italy, Mali and the United States, in which they demonstrate with numerous references that chimpanzees and bonobos must belong to the genus *Homo*, as Morris Goodman, father of Molecular Biology, had already announced before his death.

The evidence is present before the eyes of anyone who has reasonably approached the life of great apes. Said manifesto could not be left out of this work that you, dear reader, have in your hands.

In the course of these twenty years, it is true that we have managed to advance in the knowledge of great apes, their social life, their customs and their culture thanks to studies such as those of Jane Goodall, Dian Fossey or Biruté M. F. Galdikas, pioneers in the study of great apes in their natural environment. Today, no more than 48 hours pass without the networks showing us a study published in scientific journals about our approach to the great apes, their similar behaviors, their cultures, or comparative studies with humans (laughter, gestures, family, empathy, sadness, sign language, symbol language, their fear of death, friendship, companionship, love, learning, use of tools, their visual retention, their search for medicinal herbs, etc). Even primatologists today admit that we have with them a biological and psychological proximity in their capacities and cognitive abilities and that it is therefore important and necessary to preserve and protect beings so similar



to humans. However, despite this, they do not criticize their captivity as they recognize that their studies are based on primates in captivity and in freedom. There are very few primatologists or studies that show the captivity of animals, especially primates and great apes locked up in zoos. Mistreated because they are in a closed area and at night are locked in cages or in small spaces, exposed to noise, music, laughter and blows on the glass. Aren't they human-like beings? Aren't they members of our family? How would we feel under those same circumstances? This book aims to clarify and defend their rights, not by a single author, but by a group of brave scientists, writers and defenders of the natural environment, who openly expose their thoughts and thus show a diversity of ideas that undoubtedly reinforces the fundamental objective of our fight for the basic rights of great apes.

In June 2019, the primatologist Tetsuro Matsuzawa who gave a conference in Madrid and who has dedicated his life to studying the intelligence of chimpanzees, said in an interview published by "Sinc - La ciencia es noticia", that when you start to analyze these primates, you realize that they are very similar and close to humans or even surpass us in some aspects, as has already been shown by his most famous research "the visual memory of chimpanzees". As Jose Maria Bermudez de Castro or Itai Roffman also says, according to Tetsuro. "One big difference is that his body is covered with black hair. However, if you look at dogs, a Chihuahua or a Saint Bernard are different breeds but their genetics are the same. It's a unique creature called *Canis lupus familiaris*. In humans, in one generation, the hair or eye color can be changed, the external appearance is easy to manipulate. The study of chimpanzees shows us that we cannot allow ourselves to be carried away by physical appearances. Humans and chimpanzees are almost the same creature".

As also explained in this book by different authors, the free populations of great apes are disappearing at a rapid rate, with-



out effective policies to stop the destruction of the rainforests, also endangering the indigenous populations. That is why at the end of this publication we also include a series of manifestos, among which are that great apes should be declared a World Heritage and thus be protected in their habitat, and those who are often psychologically ill in captivity due to their loss of meaning in life. We can also find a draft of the Great Apes Act that can be discussed or rectified, but that serves as a base document for a law to be passed for them, as already agreed and voted in Parliament.

In 2016, we managed to get Judge Alejandra of the third District Court of Mendoza (Argentina) to accept a Habeas Corpus from chimpanzee Cecilia, who was locked up in Mendoza Zoo in deplorable conditions, presented by AFADA, an Association of Animal Defense Attorneys, together with our reports and support. The judge's sentence, besides accepting the Habeas Corpus that is only presented for human persons illegally detained, understanding by our reports that Cecilia was a non-human person, ordered her immediate release and her transfer to the sanctuary owned by the International Great Ape Project (GAP) in Sao Paulo (Brazil). The sentence, which is the first in the world and which has made international news, is worthy of being read and applauded in its entirety. Among other statements, the sentence says that:

“It is undeniable that great apes, among which the chimpanzee is found, are sentient beings and therefore subjects of non-human rights”

“Great apes are subjects of rights and are holders of those that are inherent to the quality of being sentient...”

“Neither animals nor great apes are objects to be displayed as a work of art created by man”



“The majority of animals, and specifically great apes, are also flesh and bone, they are born, they suffer, they drink, they play, they sleep, they have the capacity for abstraction, they love, they are gregarious, etc. Thus, the category of subject as a center of imputation of norms (or holder of rights) would not only include human beings, but also great apes - orangutans, gorillas, bonobos and chimpanzees”.

“Great apes born in freedom are captured and sold for large sums of money, that is, they are an involuntary object of law. Consequently, animals are unwitting actors in the theater of human rights. Recognizing great apes as holders of rights is the best act of inclusion as involuntary actors in the field of law that human beings can carry out, not as a narcissistic entity but because of the dignity of the human person, who stands as a being who knows that he feels and thinks and as a thinking being who reacts and acts in the face of this great phenomenon that is observable and also evident that animals are not things”.

“A new question arises: Is a cage, even a large one, the adequate place? And the negative response comes immediately. The right and proper thing to do is for men, with the degree of reason that assists us, to cease the captivity of animals for their exhibition and entertainment of people, since they are holders of non-human rights and as such have an inalienable right to live in their habitat, to be born free and to preserve it”.

In light of these and many other arguments, Judge Alejandra decided in Case # P-72.254/15 to declare the chimpanzee Cecilia, currently living in the Mendoza Zoo, a holder of non-human rights and to order the chimp’s transfer to the Sorocaba Sanctuary of the Great Ape Project (GAP), located in Brazil.

Today, Cecilia, who has been famous for her world-first sentence and for being declared a non-human person, lives in semi-freedom with her great friend Marcelino, another chimpanzee who was already in Sorocaba.



It is certain that these great steps mentioned are important for the existential debate on the basic rights of our evolutionary brothers. This book will no doubt contribute to further reaffirming the need to treat great apes as they deserve, as members of our family, of our lineage.

In an interview conducted by Alian Leauthier (Liberation, January 19, 1999), Galdikas was asked whether there were any scientists and primatologists today who consider great apes to be almost human. She answered that: *“It would be fairer to say that men belong to the genus of the great apes and not the other way around. Although in proportion the human brain is three times larger than that of orangutans, one and the other are quite similar in the expression of their emotions, their worldview, and the lessons they draw from their experiences. His brain is organized like ours. Only it’s smaller. Great apes are almost human and deserve the same rights as us. Killing one of them should be considered murder. Human beings are unquestionably unique, but our culture, our technology and its benefits we owe to a developed pongid brain, to a heritage forged in the trees, to a time when our ancestors were no more than a group of great apes among many others”.*

My daughter Sara, when she was four years old, had an ongoing relationship for a year with a young chimpanzee named Kika, who was six years old, within the Madrid Safari where she lived with her caretaker. The contact between the two was incredibly friendly, and they became very close and played like two girls with the ball, painting and chasing each other. Whenever they saw each other each week, they would hug, hold hands and walk together. A relationship of tenderness and friendship between two species worthy of being shown as an example and as a break of the virtual barrier that exists between the species and that we have built many times under ignorance and our eagerness to be different. However, they, Kika and Sara, understood each other perfectly despite not communicating through speech, where gestures, contact and games were enough to create a lasting and unique friendship. Sara knew that Kika was a



chimpanzee, that she was not her own species, but it was clear to her that she was her friend and whenever she wanted to see her, she would tell me that she wanted to visit her friend Kika. On behalf of the Great Ape Project, we began talks to build a sanctuary for Kika in the Madrid Safari. But its Director one day decided to break relations and send Kika to the Fuengirola Zoo (Málaga). Seven years later, we went to the abovementioned zoo to see Kika. When we arrived at the pit where the chimpanzees were, it was impossible to know who he was. Besides, it had already been years and Kika would be older. But my daughter began to scream her name, and among all the chimpanzees that were there, one of them ran out of the group screaming, jumping for joy, climbing the trunk of the tallest tree there was, and extended her hand to my daughter. We all cried, they were tears of sorrow, of joy, of emotion but above all of helplessness. Kika still had Sara in her heart and Sara had Kika in hers. A beautiful story that further reaffirmed my fight for the rights of great apes: their freedom, the defense of their lives and that they not be tortured either physically or psychologically.

One day I came across a two-volume encyclopedia of 600 pages each with colored photos and graphics titled: “Los orígenes de la humanidad” [The origins of humanity] published by Espasa Forum Publishing House and under the direction of French Paleontologists Yves Coppens and Pascal Picq. A publication in which constant reference is made to humans and great apes, especially in the second volume “Lo propio del hombre” [Man’s own] which is a monograph on the great apes, their references, their culture, their cognitive capacities. A broad description of the behavior of our evolutionary brothers that should undoubtedly be a volume of study and understanding in our universities, which lack a more open and not so channeled vision of things with ideas that are often imposed and outdated.

In these volumes, we are shown how great apes should be considered part of the history of humanity and therefore members of



our family and even with reference to chimpanzees and bonobos, of the same genus “Homo”. Speaking precisely of this, in one of his tables on animal classification, he tells us that: *“With regard to genetic and behavioral data, we now know that chimpanzees and bonobos should be classified in the same genus Homo. But the resistance is still alive despite the few proven genetic differences between the two species and humans, less than those existing between the horse and the zebra, both classified in the genus Equus”*. Why so afraid to show the truth? Why so much resistance since the time of Lucilio or Darwin? What are we afraid of? Isn’t our ego already at rock bottom as we are destroying our only home on Earth?

In the conclusion, Pascal Picq writes: *“Great apes sit at the gates of the human sciences, but many authors continue to preach in favor of a fundamentalist humanism. However, how to think and build man based on ignorance? One must understand that describing what we share with certain species called <<animals>> or <<non-humans>> is not part of an attempt to deny man. He does not fade away, but he is approached by those whom he has long kept apart because of arrogance, an arrogance that no longer has any legitimacy. Man is not reduced to what he shares with great apes, but he builds on this common state.”*

From my perspective and struggle of so many years in the conservation of the environment, both professionally and altruistically in the Great Ape Project and in other Associations, it is evident that besides the great apes, other special and intelligent beings such as cetaceans, elephants or animals in general, also need a respect for life and rights that the government itself fears to legislate because of the existence of abusive traditions against species and if it does so, it would take away their votes when it comes to governing in ignorance and, as Pascal said, in absolute arrogance. How can we allow us humans to have fun watching an animal suffer? Why do we have to consent to it? It is a very hard fight for the rights of great apes, but it is the only hope for them and for all other sentient living beings, because once we succeed with



those closest to us, we will be able to understand and act in favor of the others.

I hope that this book will be one more window, a hope to end the aggressiveness towards non-human hominids, to achieve their rights, to protect their populations in freedom and equally protecting their habitat and the local human populations that live with them, to end their captivity and to look at non-human living beings with empathy. We are all in the same ship that sails through time and that we can, if dignity permits, live together on a planet that is plural in species but welcoming in its surroundings.

It must be recognized that we are walking blindly before a massive destruction of all the ecosystems of the Earth, and that is why human beings must get off their centrist ego, take off the mask that prevents them from seeing reality, take note of their acts of looting and vandalism towards what belongs to everyone, and put in place immediate solutions based not on partisan interests, but on a common interest that protects our climate and the essence of life on our planet.

I humbly thank all the authors who collaborate on this book for their participation and patience, for their words, their approaches, their questions and answers, their ideas and support, their time and their friendship. Without them this work would not have been possible and without them the defense of our evolutionary brothers would no doubt have remained without a brilliant flame of hope.

Underneath the title of each writing is the author and a small, not to say minimal, *curriculum* of who each is. All of them have personally contributed to enriching me as a person. The wisdom they give off makes it an honor for me to have invited them to this project and they would have accepted in spite of the little time available to them. To speak of each of them would perhaps take too long in this introduction, but they all make up a legion of women and men who undoubtedly seek to strengthen the bonds



between our evolutionary brothers who are today being exterminated in an incomprehensible but real genocide.

May this book touch the heart, sensibility and empathy of many people and be a standard to obtain the basic rights of great apes.

Pedro Pozas Terrados



CLASSIFICATION OF GREAT APES

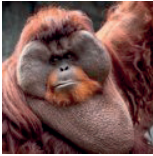
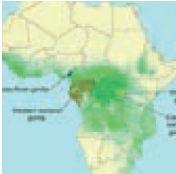
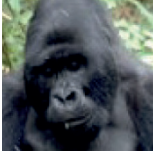
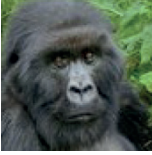
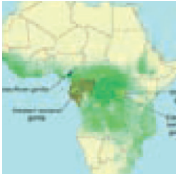
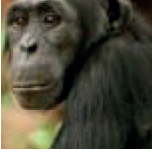
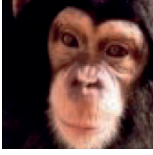
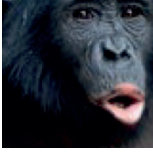
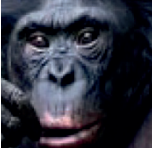
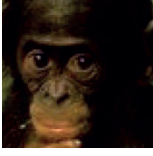
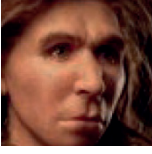
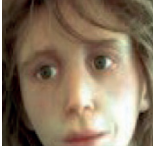




The eight living species of hominids are classified into four genera. The following classification is the most accepted:

FAMILY	SUBFAMILY	TRIBE	GENUS	SPECIES	SUBSPECIES
Hominidae (Hominids)	Ponginae		Pongo		Pongo pygmaeus pygmaeus
				Pongo pygmaeus Bor- nean Orangutan	Pongo pygmaeus morio
					Pongo pygmaeus wurbii
				Pongo abelii Sumatran Orangutan	
				Pongo tapanuliensis Tapanuli Orangutan	
	Homininae	Gorillini	Gorilla		Gorilla gorilla gorilla
				Gorilla gorilla West- ern gorilla	Gorilla gorilla diehli
					Cross river gorilla
					Gorilla beringei beringei
				Gorilla beringei Eastern gorilla	Mountain gorilla
					Gorilla beringei graueri
		Hominini	Pan		Pan troglodytes troglodytes
				Pan troglodytes Chim- panzee	Pan troglodytes verus
					Pan troglodytes vellerosus
					Pan troglodytes schweinfurthii
				Pan paniscus Bonobo	
			Homo	Homo sapiens Human	



Name	Males	Females	Infants	Habitats
Pongo pygmaeus				
Pongo abelii				
Pongo tapanuliensis				
Gorilla gorilla				
Gorilla beringei				
Pan troglodytes				
Pan paniscus				
Homo sapiens				

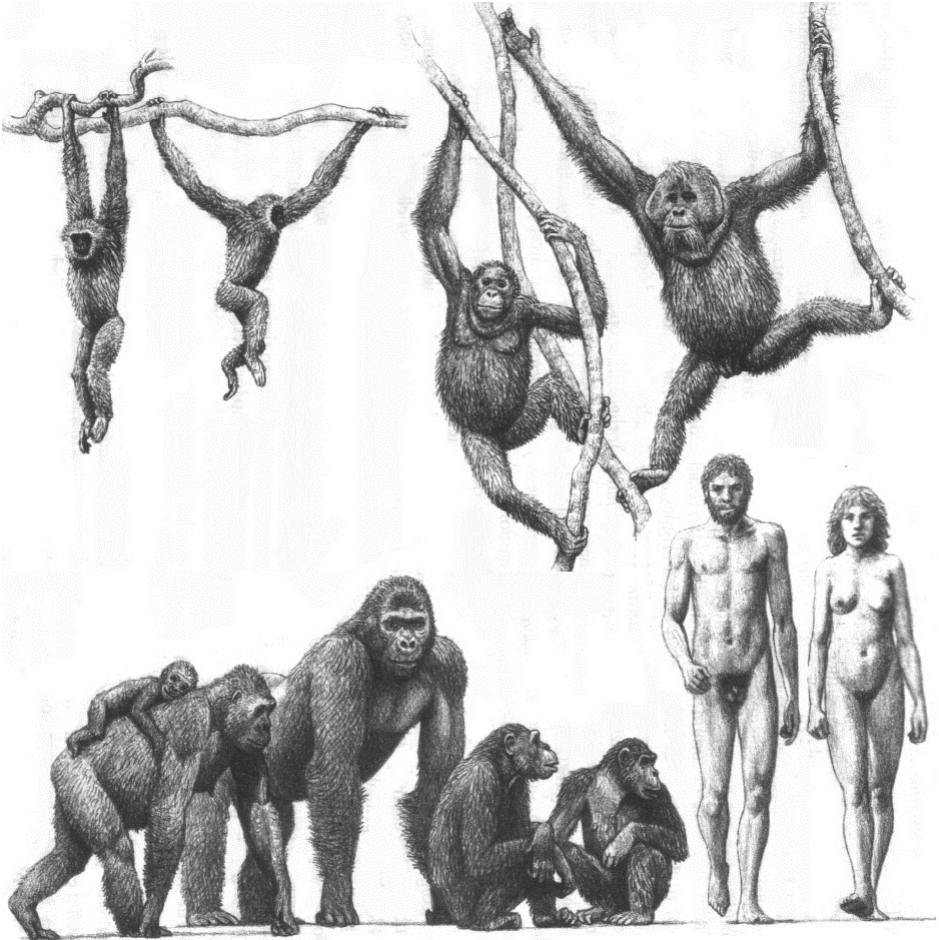


“**Hominids**” (Hominidae), in turn, are part of a much larger taxonomic group of about 180 species known as “Primates”. This group also includes the two superfamilies: Ceboidea and Cercopithecoidea.

The term “monkey” is occasionally used for members of the superfamilies Ceboidea and Cercopithecoidea who can be easily identified because they have tails.

CHAPTER I

THEIR LINEAGE



1.

A TOUR OF HUMAN GENEALOGY

José Maria Bermúdez de Castro

National Center for Human Evolution Research

Avenida de la Sierra de Atapuerca 3, 09002, Burgos

■ looked into his eyes, big and bright, far apart; somehow they seemed to express his whole personality, his quiet self-confidence, his dignity. Most primates interpret a direct look as a threat; but chimpanzees do not. David had taught me that as long as I looked into his eyes without arrogance, without demands, there would be no problem for him. And sometimes he looked back at me, like he did that afternoon. His eyes were like windows inviting me to look into his mind... if only I knew how.

Jane Goodall, Gracias a la vida

Together with the chimpanzees (genus *Pan*), we form part of the Hominini tribe and are included in the hominid family (Hominiidae). Our species, *Homo sapiens*, is the only living representative of the subtribe Hominina. Following a purely conventional terminology, I will refer to *Homo sapiens* and all our ancestors indistinctly as human genealogy or human lineage.

To find the origin of this genealogy, we have to trace the African continent and go back to the end of the Miocene. Between seven and eight million years ago, a primate with unknown morphological characteristics lived in Africa, but whose existence is inferred from the comparison between the human genome and the chimpanzee genome. The evolution of this hypothetical primate would



be decisive in the emergence of two sibling lineages. The volume of his brain would not have exceeded 350 cubic centimeters and his height would not have been more than 100 centimeters. It is quite possible that this species covered a wide range in African forests. The groups would move easily through the dense vegetation moving from branch to branch, but they would also descend to the ground to move from side to side. Knowing that these primates gave rise to the lineage of chimpanzees and the lineage of mankind today, it is hard to imagine what the bones of the pelvic girdle would look like. Chimpanzees are able to remain upright for a certain time, although the bones of the pelvis reveal that they are quadruped primates. On the contrary, the few fossil remains that have been preserved of presumed ancestors of humanity reveal that their locomotion was bipedal and their habitual posture was fully upright. Perhaps our common ancestor with chimpanzees was bipedal and the latter may have reverted to quadrupedal locomotion. This hypothesis is not very parsimonious, but we cannot rule it out. In any case, we must rule out intermediate situations (impossible from the point of view of elementary physics and biomechanics) between standing position and the habitual posture of the quadrupeds, as suggested by those drawings that try to recreate our ancestors in an informative way.

Although the planet's climate was cooling and the ice masses of Antarctica were forming, the African continent was not yet covered by a dense forest mass. In this warm and humid environment, the remains of plants and animals were recycled very quickly. That is why no fossils of this common ancestor have been found, which would answer one of the most transcendental questions of human evolution: what did the ancestor we shared with the chimpanzees look like? We tend to think that this African ancestor would have a similar appearance to chimpanzees. This idea is based on the fact that these primates have remained throughout their evolution in an environment very similar to that which prevailed at the



end of the Miocene. In fact, the forests of West Africa represent the last remaining part of a landscape that was disappearing as the planet cooled. That's why we tend to think that chimpanzees would have barely changed in the last seven million years. However, this hypothesis may be wrong. The ancestors of chimpanzees may have looked different from their current descendants.

The rest of Africa was left under the domain of the desert and the savannas. In the latter, human genealogy was forged. But before that happened, the population of our common ancestor was able to fragment into a huge territory covered with dense vegetation. Only thus would the genetic separation of two sub-populations, which would have evolved differently, have been possible. When the respective genomes of *Homo sapiens* and *Pan troglodytes* are compared, experts find that the difference between the two species is just over one percent. Of course, we cannot just stick to that figure, but rather try to understand the changes from a qualitative point of view. Let's not forget that there are more than 30,000 genes in our species, so one percent of that amount represents a respectable number of genes. We will leave it to the experts to clarify this issue, which is not easy to explain.

And it's not just a matter of finding the differences, as if it were the familiar visual and static game, but of finding out the consequences of each of the changes. The earlier each of the gene variants is expressed during ontogeny, the greater the cascade of events in development. For example, the very morphology of the pelvic girdle bones and the consequent insertion of certain muscles conditions a very important and essential difference in locomotion. It may not be necessary to invoke a radical change in the genome to explain the differences, which can already be detected in the first months of embryonic development. Although the behavioral patterns of chimpanzees are dealt with in other chapters of the book, throughout the following pages we will see how many of the characteristics related to behavior have hardly changed throughout our evolution. The differences between chim-



panzees and species of the human lineage may be more a matter of quantity than quality.

Human genealogy, like that of other living beings, can be symbolized by a well-branched tree. However, the branches that have emerged over time stopped growing at a certain point due to the extinction of the species that were part of them. This fact should not confuse us. Each of these branches has had great evolutionary success for thousands of years; but the terrestrial environment is subject to profound changes and the adaptive capacity of all species living in the aerial environment is limited. Using a very visual metaphor, geneticist Sewall Wright introduced the concept of adaptive landscape in 1932. In these metaphorical landscapes, there would be peaks and valleys representing the optimal and less favorable regions, respectively. The highest regions would be associated with high biological efficiency, that is, higher reproductive success. If species are not able to ascend and remain in these regions due to abrupt changes in the adaptive landscape, extinction follows. This is what has happened repeatedly during human genealogy.

As we will see below, the first branches of the tree of our evolution are not well known and we may lack information about some of the species that were formed in the early days of human genealogy. One of the tree's branches is still standing, although only one green shoot remains, clinging to a peak in the hominin's adaptive landscape. Their disappearance would mean the end of our genealogy, as has happened to hundreds of lineages since the origin of life on Earth.

The genealogy of chimpanzees, on the other hand, followed its own path in the intricate jungles of Africa. Like I said before, there is no known trajectory of this genealogy. The genus *Pan* has two species: *Pan paniscus* and *Pan troglodytes*. Several subspecies of the latter are known, distributed in West Africa. Genomic studies conducted during the first decade of this century at the Max Planck Institute in Germany show that *Pan paniscus* differed from



the common stock of chimpanzee genealogy less than a million years ago. Despite such a short period of time in evolutionary terms, the differences in social behavior of the two species are very noticeable, as explained in other chapters of this book.

The origins of human genealogy

Some fossil remains found in Africa in the early 21st century and assigned to the species *Sahelanthropus tchadensis*, *Orrorin tugenensis* and *Ardipithecus kadabba* have been attributed to our genealogy. The first of these species, dated between seven and six million years ago and found in the current state of Chad, is represented by a distorted skull. The foramen magnum of this skull appears to be located at its base rather than on its posterior part. If the data is correct, this species would be bipedal because the spine would be under the skull, as it is in our species. But this is the only argument to link *Sahelanthropus tchadensis* to human genealogy. The remains of *Orrorin tugenensis* (6.2–5.6 million years old) were found in the current state of Kenya. This species is represented by several remains of the postcranial skeleton and some teeth. The morphology of these fossils also points to a bipedal locomotion, which would place *Orrorin tugenensis* in human genealogy. *Ardipithecus kaddaba* (5.8–5.2 million years old), on the other hand, was found in the current state of Ethiopia and is represented by fragments of the postcranial skeleton and teeth. The discoverers and authors of this species presume to have found the oldest known representative of our genealogy. However, the data for proposing this hypothesis is as weak as in the previous cases.

In 1994, the name *Ardipithecus ramidus* was described and formalized, a species that lived in East Africa for at least 4.5 million years. For more than a decade, the findings enriched the knowledge of this species, which walked upright and lived in a warm and humid environment under protection of the forests. *Ardipithecus ramidus* is well known thanks to the discovery of a very complete



skeleton, which may have belonged to a female of the species and was “Ardi”. In addition to a pelvis not very different from ours in terms of general shape, Ardi’s most outstanding morphological features are related to the proportions of her upper and lower limbs, her cranial capacity and the arrangement of her toes. The arms were proportionally longer than the legs, the volume of the brain barely reached 350 cubic centimeters, the fifth toe was arranged almost perpendicular to the rest of the fingers and the height did not exceed 100 centimeters. In addition, Ardi did not have superciliary arches developed above the orbits and her canines were slightly above the incisors. This species may have disappeared some four million years ago and undoubtedly belonged to the human genealogy. In the absence of additional data, *Ardipithecus ramidus* is the best evidence we have at the moment to imagine what the common ancestor looks like with the genealogy of chimpanzees. No doubt, the *Ardipiths* walked perfectly upright. But the morphology of the bones of the foot suggests that individuals of this species were not good runners and would have preferred to live under the shelter of the forest, away from possible predators in more open areas.

The *Australopithecus* reigned for a long time in East Africa and much of southern Africa just over four to two million years ago. Together, the different species of the genus *Australopithecus* form one of the branches of human genealogy. Up to seven different species have been defined in this genus, which lived in forest environments, in more open areas and in savannas. All these species share a brain size similar to that of the anthropoid apes, which in no case exceeded 400-450 cubic centimeters. The postcranial skeleton not only reveals that they walked on their two legs in a perfectly upright manner, but that they were also well adapted to climbing easily. The phalanges of the feet and hands had a somewhat different morphology from ours, with a characteristic curvature. It is clear that these hominins did not distance them-



selves definitively from the protection of the forests, even though they were already capable of covering long distances as good walkers. Their ontogenetic development was similar in duration to that of the anthropoid apes. This fact became known in 1985 and made it clear that the essential difference of *Australopithecus* with chimpanzees or gorillas resided only in bipedal posture and bipedal locomotion.

The oldest stone tools found to date come from the Lomekwi 3 site, located near Lake Turkana in Kenya. They were discovered by the team led by Sonia Harmand and Jason Lewis in 2011. The number of tools is less than two hundred and their manufacture is very simple. Some archaeologists think that these are naturally fractured rocks and deny that the *Australopithecus* were capable of producing a technology based on the intentional breaking of stones. In contrast, the stone tools found in the Gona region (Afar Province, Ethiopia) have all the blessings of the archaeological community. If at this time the first species of the genus *Homo*, had not yet appeared, there is no doubt that a species of the genus *Australopithecus* could have started the technology race. In the field of archeology, this term implies the transformation of the raw material with the aim of achieving properties necessary for a specific purpose.

However, it is important to highlight two important issues. Firstly, the use of stones for a particular purpose is not exclusive to human genealogy. It is well known that other primates, including of course chimpanzees, use stones to break certain seeds and get the desired food. We have recently learned that the capuchin monkeys (*Cebus capucinus*) of Brazil's Serra da Capibara National Park are capable of breaking stones to use as tools. Chimpanzees also leave a kind of recognizable archaeological record when they use stones to break the hard shells of the seeds they feed on. That is why when we speak of the lithic industry in human genealogy, we enter into the debate of the quality of the records rather than the simple fact of tool production. On the other hand, we must



know that technology is not synonymous with culture. Primates are social and capable of integrating certain patterns taught to us by other members of the group into our normal behavior. We can debate that this form of culture is very elementary and we would continue in the debate of quality, but the behavioral patterns of several primate species are still a peculiar form of culture despite its apparent simplicity. For all these reasons, we can still expect important surprises in the study of the sites where the *Australopithecus* have left their mark.

Among the *australopithecus* species, it is worth noting the discovery in the 1970s of the remains of the species *Australopithecus afarensis* in the region of Hadar (Ethiopia) and Laetoli (Tanzania). In this last location, the footprints printed in volcanic ash moistened by the rain of a couple of *australopithecus* were located along with those of other animals. The impressions obtained from the fossilized footprints give us the image of a foot practically identical to ours. About 3.7 million years ago, the fifth toe had already aligned with the others. This is an important detail in the anatomy of *Australopithecus afarensis*, because the entire body weight is transmitted right to the big toe. Members of this species, to which the famous female nicknamed Lucy belongs, walked perfectly upright and were possibly able to reach a certain running speed. For the first time, a species from our genealogy had been able to become independent from the usual protection of the forest.

More recent are the species *Australopithecus africanus* (South Africa), which lived between 3.0 and 2.5 million years ago, *Australopithecus garhi* (approximately 2.5 million years ago) and *Australopithecus sediba*, whose chronology has been estimated at about two million years. All these species had small brains and lived in open spaces. The planet's climate continued to cool and Africa's forests were rapidly disappearing. This branch of the human family tree had its decline in the Lower Pleistocene, after having had great evolutionary success, as is shown by its own diversity. Moreover,



Australopithecus afarensis could be the origin of another successful branch of human genealogy: the paranthropus.

For years all African fossil remains from the Pliocene and Lower Pleistocene were grouped together in the genus *Australopithecus*, a name coined by Raymond Dart in 1925 to include his famous “Taung child”. However, in the 1930s, Robert Broom warned that the variability of the specimens of this genus was very high, grouping very robust looking specimens, with large molars and much smaller incisors and canines. That is why in 1938, Broom introduced the genus *Paranthropus* to include specimens that did not fit the characteristics of *Australopithecus*. Three species of this genus are currently known: *Paranthropus aethiopicus*, *Paranthropus boisei* and *Paranthropus robustus*. The first two lived in East Africa, while the third lived in Southern Africa. Its time range has been estimated at between 2.5 and 1.5 million years; that is, some of the representatives of this genus coexisted with species of the genera *Australopithecus* and *Homo*.

Not only is the morphology of the fossil remains of the *Paranthropus* known, but some aspects of their biology have been discovered. They possibly occupied a different adaptive landscape than other hominins, avoiding competition among them. Its cranial capacity exceeded 500 cubic centimeters, although the relationship between its body and brain size remained unchanged from that of the *Australopithecus*. Simply put, its body and brain size were larger, without any allometric changes in brain mass growth. By the size of their premolars and molars, a jaw of exaggerated proportions and highly developed insertions for the muscles related to mastication, we can infer that the paranthropus were able to consume food of a certain consistency. If these foods were preferably of plant origin, they would have avoided competition with omnivorous hominins. The life of the paranthropus was able to develop in open fields, surviving the attacks of the great predators of the savannas thanks to their sociability. Their extinction coincides with the expansion and development of the genus *Homo* and with an increasing cooling of the planet. It is possible



that many of the territories they occupied were transformed into arid and semi-desert areas.

The *Homo* genus

Some evidence points to an origin of the *Homo* genus in the period between three and two million years before the present. Perhaps the most relevant figure from that long period of time is half a jawbone found in 2013 at the Ledi Geraru site in the Afar region of Ethiopia. The study of the LD 350-1 jaw, which retains five teeth in-situ, points to some differences with *Australopithecus* and has been included in the *Homo* genus. Its age has been estimated at 2.8 million years and coincides with the appearance of the stone tools in the same territory of East Africa. In this light, work continues on the idea that technology is a very human characteristic. It is customary to consider that only those species capable of possessing technology should be included in the *Homo* genus. This idea was born with the discovery of the first fossil remains associated with stone tools at the Olduvai site in Tanzania. Richard Leakey, Phillip Tobias and John Napier described the remains and created the species *Homo habilis*, which was published in 1964 in the journal *Nature*. The oldest and most well recognized remains of *Homo habilis* do not exceed the barrier of two million years, so once this time limit has passed we enter almost unknown territory. The LD 350-1 jawbone and some isolated fossil remains attributed to the *Homo* genus are a very poor testimony to know the origin of our own genus. Prior to the two-million-year limit, however, there is consistent evidence, such as the remains attributed to the species *Homo rudolfensis*. Fossils of this species were also found in East Africa. The type specimen is the skull KNM-ER 1470 (acronym for “Kenya National Museum-East Rudolf”), which is estimated to be 1.9 million years old. Its face is very flat, a feature that differentiates this skull from *Homo habilis* specimens that have a more forward-projected face (facial prognathism).



A fundamental characteristic in the recognition of the *Homo* genus is related to an evident increase in brain size. The volume range of the endocranium is estimated to be between 550 and 690 cubic centimeters in *Homo habilis*, while the interior of the skull of KNM-ER 1470 reaches a capacity of 700 cubic centimeters. In other words, the endocranial volume of the oldest species in the *Homo* genus is approximately 30 percent greater than that of the *Australopithecus*. This fact is important and requires an explanation. But before reflecting on the increase in brain size, it is worth remembering that in 1985 the researchers Timothy Bromage and Christopher Dean showed that the first representatives of the genus *Homo* had an ontogenetic development time similar to that of the *australopithecus* and of hominids such as chimpanzees. His work was published by the *Nature* journal and had an enormous impact. This article was the origin of a very fruitful line of research about the development of species of the *Homo* genus and gave rise, among many other debates, to different hypotheses about the processes that allowed the increase in brain volume.

Bromage and Dean based their conclusions on the study of the teeth, whose daily (circadian) growth leaves indelible marks that can be counted. This counting allows us to find out with very little margin of error the time of formation of the teeth, which is closely related to the duration of the somatic development. The first representatives of the *Homo* genus had the same development that characterizes all mammals, in which there is an infantile phase and a juvenile phase prior to sexual maturity and reproductive capacity. We will see later that throughout the evolution of the *Homo* genus, development has not only been prolonged, but has also been complicated by the insertion of two new phases: childhood and adolescence.

Bromage and Dean's research was corroborated by themselves and other colleagues in numerous scientific articles. All these works came to the same conclusion: the first representatives of the



Homo genus had not yet entered the new adaptive landscape that characterizes other more recent species in the human genealogy. In 1999, paleoanthropologists Bernard Wood and Mark Collard reviewed the characteristics that should define the *Homo* genus. Among them, the prolongation of somatic development should be a fundamental feature. That is why these researchers proposed the exclusion of *Homo habilis* and *Homo rudolfensis* from our select club. These species should belong, according to Wood and Collard, to the genus *Australopithecus*. Perhaps as a simple matter of habit and to avoid substantial changes in geometry of the human lineage, Wood and Collard's reflections have not been properly addressed by the experts. However, it seems to me that Wood and Collard are not wrong. The ontogenetic changes that would come later led to profound changes in hominins, and the adaptive landscape changed significantly during the last stretch of human genealogy.

But let's get back to the important issue of the brain. In the case of *Homo habilis*, the increase in volume of this organ was not accompanied by an increase in body size; that is, this species experienced a process of encephalization, measured as the relationship between body size and brain size. It is understood that the volume of the latter in a mammal must take into account, among other things, the mobility and coordination of the different regions of the body. That is why, roughly speaking, a larger body size requires a larger brain. If we add new cognitive capacities to the functions of the brain of any mammal species, the volume of this organ must increase. Chimpanzees, for example, have a privileged brain that allows them to have many skills, probably very similar to those of the australopithecus and other ancestral species of human genealogy. In *Homo habilis* and *Homo rudolfensis*, the brain is significantly larger and we must assume that these species increased their cognitive abilities, many of them associated with a larger cerebral neocortex.

There may be a temptation to attribute this increase to higher meat consumption. Indeed, life in open environments necessarily



had to condition the diet of our ancestors. The archaeological record shows us that the processing of carcasses of different species of mammals from the savannas of Africa was a fact. Numerous flesh marks are observed on the joints of the fossilized bones of these species, which accumulate in certain sites presumably originating from the activity of Lower Pleistocene hominins. The edges of the stone tools made it possible to dismantle the carcasses of large species of cattle or giraffes. Given the size of species like *Homo habilis*, it is surprising that they were able to capture such prey. That's why some archaeologists like Lewis Binford and Richard Potts suggested some decades ago that the first representatives of the *Homo* genus were scavengers instead of active predators.

Indeed, the body size of *Australopithecus* or habilines does not seem to be the most appropriate for hunting elephants or rhinos, even when acting in well-organized groups. That's why Binford and Potts suggested the possibility that the hominids could get their meat from these animals either by taking advantage of abandoned carcasses or by disputing resources with other scavengers. This hypothesis has been actively debated at conferences and in scientific journals, with both supporters and opponents of the scavenging habits of *Homo habilis* and *Homo rudolfensis*. It is possible that members of these species only had access to the carcasses of large mammals killed by other animals. This view of our ancestors has remained a robust hypothesis for years. Vultures and hyenas represent the best example that comes to mind to define the ecological niche of active scavengers, which feed on complete carcasses or half eaten by predators. Some scavengers, such as hyenas, can kill their prey by taking advantage of an animal's weakness due to illness or old age. But the most common thing is to take advantage of the meat that is still in the carcasses of the animals killed by carnivores.

Since many are unable to imagine small members of *Homo habilis* competing for food with vultures and hyenas, variations



of the scavenger-hominin hypothesis have been proposed. Some have chosen to assign a role of passive scavengers to our ancestors. This hypothesis assumes that our ancestors were attentive to the slaughter of saber-toothed tigers (*Homotherium* genus), whose enormous canines prevented them from completely devouring their prey. The rest would be consumed by the members of *Homo habilis*. The key to this hypothesis lies in the fact that saber-toothed tigers hunted in relatively closed forests, where their prey was not exposed as real traffic lights to the visual acuity of scavengers in the sky.

Some doubts can be raised as to whether we would have actively fought for small amounts of meat adhering to the bones of the prey. And not only because of the difficulty that the fierce struggle to get a bite would entail, but because much of the meat found in the savannas would be in a state of decomposition. Vultures have a digestive system perfectly adapted to consume carrion, despite its high content of highly toxic bacteria, such as anthrax or fusobacteria. Other vertebrates and ourselves could die from ingesting organic matter infected by these microorganisms. An inevitable question then arises: did the first representatives of the *Homo* genus have this type of adaptation in the digestive system? And if so, why did we lose them?

In my opinion, we cannot rule out the possibility that our ancestors were fortunate enough to have access to naturally dead prey or to the remains of animals hunted by other predators, but still with meat and fat in certain healthy conditions. However, surely we were also able to capture other vertebrates, including juvenile specimens, as well as enrich the diet with a multitude of invertebrates on the banks of lakes and rivers, which would be added with less danger to our menu. We cannot rule out the capture of fish, which provide a remarkable amount of docosahexaenoic acid (DHA) and which could have contributed to the construction of a significantly larger brain than that of the australopithecus. There



is no logical reason to think about the need to adapt our digestive system to consume rotting organic matter and lose that capacity in a short time when we come to share part of the ecological niche of the large predators of Africa and Eurasia. In that light, it is illogical to think that we would adapt to eating carrion and then abandon these habits as soon as we had the corresponding hunting skills. The scavenger-hominin hypothesis is therefore not very parsimonious, because it involves several complex and contradictory evolutionary steps.

The fact that we are social primates was perhaps one of the keys to our ability to acquire our own prey. This behavior requires strategic skills, which could have been the selective force capable of driving the growth and complexity of the brain of those hominins. That growth could have happened without the changes in ontogeny, which are discussed later in this chapter. Leslie Aiello and Peter Wheeler proposed a few years ago that the bill for the energy cost involved in the brain increase of the first *Homo* was managed by reducing the digestive system. In fact, the digestive tract must have a certain length and complexity in vegetarian species, while the trend towards a more omnivorous diet allows the reduction of this organ, which is vital for the assimilation of food. But the cost of developing and maintaining the digestive system does not seem to be enough to justify the enormous cost of a brain like the one that we humans have developed. As we will see later on, our development continues for several more years than in our Pliocene ancestors. During the early stages of life, our growth in height slows down. And the reason lies in the high energy cost we need for brain growth, as was recently demonstrated by a team of scientists led by Christopher W. Kuzawa using data on glucose demand for the brain and the rest of the organism. Furthermore, Herman Pontzer and his colleagues have observed that the basal metabolism of humans is increased relative to that of gorillas and chimpanzees. Their data reinforces the idea that our evolution has



needed more energy from the environment to achieve a primate with a much larger and extremely costly brain. This fact can be worrying in a planet with limited resources, which must host a humanity with an exponential population growth.

On the other hand, today's humans have a highly developed thumb, with shorter fingers that end in very wide fingertips. These fingertips are highly irrigated by numerous vessels and capillaries and have abundant nerve endings, which provide the fingers with extreme sensitivity. We humans have developed the so-called precision grip. Our fingers have an appropriate length and musculature to handle objects with force and in a very precise way. This is one of the foundations of our ability to create art and technology. In other words, the brain uses this anatomical tool for the development of culture, which defines our ecological niche.

We can assume that the precision grip appeared between three and two million years ago, when we hominins were able to modify raw material and manufacture instruments from different rocks (quartzite, flint, etc.). This evolutionary process was marked by subtle changes in the origin and insertion of certain muscles, as well as in the power that those muscles are capable of generating. The fifth finger (the thumb) of human beings is not only longer than that of chimpanzees (and presumably that of *Ardipithecus* or *Australopithecus*), but has much more strength. This finger took on a prominence that it did not have in the Pliocene hominins. From the need to hold on tightly to the branches by means of the pressure grip, we moved on to the need to manipulate objects using the precision grip.

In our hand we have the same muscles as a chimpanzee, but we also have something new. The so-called thenar eminence consists of a muscle mass that protrudes into the palm of the hand and is located at the base of the thumb. The opposing thumb muscle (*opponens pollicis*) originates from the trapezium bone and is inserted along the entire lateral length of the first metacarpal. Its func-