

Oil Addiction

The World in Peril

Pierre Chomat

Foreword by Jean-Michel Cousteau

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Oil Addiction: The World in Peril

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*To the children of Hilla, Mosul, Dawaniya,
Baghdad, Tehran, Baku, Groznyy, Lagos ...
who face the possibility of paying with their
lives to ensure the comfort of the children of
the West.*

Oil Addiction

The World in Peril

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Foreword

Oil Addiction

The World in Peril

a deeply compelling work

Our planet Earth, the vessel that contains us all, is teetering on the brink.

During the past 100 years, Man in the Northern Hemisphere has developed an industrial society based on the production and consumption of mass consumer goods. Produce, consume, discard – and produce even more so we can consume even more: that is the societal model of the world's great powers, with North America leading the way followed closely by Europe and Japan. But to fuel this great machine, we need energy, lots of it - more and more, in fact. And so we burn our “black gold” with a reckless abandon that will ultimately destroy us.

To maintain this absurd way of life, the Western world - or “Empire of the Oil Addicts,” as Pierre Chomat so aptly calls it - is willing to place the Earth's very survival in jeopardy.

For the Earth is growing dangerously warmer due to a greenhouse effect that is directly linked to increased fossil fuel consumption. But the dangers do not stop there. In order to guarantee sufficient oil supplies, the West

subjects oil-producing nations to the economic and political pressures of a de facto colonialism that is now a dangerous source of conflict. Led by the United States, which is facing dire circumstances with respect to domestic energy supplies, the West has begun declaring war ...

The meaning behind recent events has not been accurately explained to us. What is now taking place is, in fact, the beginning of the energy wars. We have devoured our black gold at so fast a rate that our available reserves will be depleted during our children's lifetime. Yet 55% of this precious energy is being consumed by only 14% of us. Will we burn and bleed the planet to death for the comfort of a small minority?

With remarkable boldness and clarity, Pierre Chomat relates the dramatic story that is ours, a story that is now unfolding, a story in which we each play a part. His professional experience with major multinationals in the energy field lends depth and credibility to this well documented and passionate work. His expertise as an engineer enables him to unravel complex energy policies. His love of humanity is the platform from which he lays out the immediate problems now facing us as a species. Are we going to allow our Earth to be devoured by the "Empire of the Oil Addicts"?

If we urge radical changes to our energy policies, if we abandon nation-based selfishness, founded on individual greed, for human solidarity, we can slow the senseless depletion of our energy resources. We can forge agreements that respect the rights and dignity of the Third World. And we can sustain the delicate ecological balance of the Earth on which we all depend for survival. Despite the extreme urgency of our situation, it is not too late. There is hope!

*Jean-Michel Consteau
President, Ocean Futures Society*

30th of August 2003

*At Dar el Safa
the Bedouin no longer hears the gusts of wind
nor the call from afar of his peregrine falcon.*

*Hypnotized by fumes and Western world racket
he holds in his hands a pile of gold coins
and carefully counts his day's worth of earnings.*

*On the endless blue waters a boat has set sails
carrying his Safanyia ergamines away
towards unknown more industrious places.*

Anne Marie Chomat

Part I

Man's Egosystems

1. Oil Addicts
2. Ergamines
3. The Saqqara Pyramid
4. Raising the Giolettis to the Clouds
5. The Oil Addicts Go to Market
6. The Earth's New Cloak
7. The Ohlone Ecosystem
8. The Sardine Egosystem

CHAPTER 1

Oil Addicts

The ability of the first humans to make fire is at least partially responsible for their survival among other animals better equipped physically to succeed in the competition for life. But we, *Homo sapiens*, have not stopped at mere survival. Control of fire has allowed us to develop technologies that make us the dominant species. Fire has become our primary force.

Many theories have been offered to explain how human beings got their “fire genes,” but one thing is certain: since the end of the 19th century, the industrialized world has run on fossil fuel. It has consumed, without restraint, the coal, petroleum and natural gas that the Earth had been quietly storing for millions of years, resources the Earth would need as many years to regenerate. It descended upon these resources, its fountain of power, like a plague of locusts on a cornfield, selfishly and without qualms. And it does not intend to leave the smallest scrap, the slightest drop, the tiniest bubble – as if the very future of humanity depended on this great scouring-out. Our world has gone energy-mad. Who can deny it?

And yet, not so long ago – less than six thousand years for the early inhabitants of Mesopotamia, but barely two centuries for the natives of California and Australia – our species, *Homo sapiens*, was still living in the wild with only a few sharpened rocks for tools. Our *sapiens* ancestors were in all likelihood predators, who, like other predators, were content to take what they needed and no more.

But it did not stay that way. When Man began domesticating animals on the banks of the Euphrates, he was in reality beginning the domestication of Nature itself. His conquest of the horse still fell within the bounds of the natural realm. But when he harnessed the forces of fossil fuels just a few centuries ago with the invention of the steam engine, Man suddenly took off on a new trajectory. He had discovered an unprecedented means of advancing. Since then, the energy that he has drawn from the Earth's natural resources has been a sort of magic potion, to which, there is no doubt, he has become utterly addicted.

This story is better known under the grand title of the “Industrial Revolution,” which began first in England around 1850, then spread to continental Europe, the United States, Japan, and a few other nations, all of which became its great adherents and promoters. Other countries beyond this circle of “haves” have followed the movement more reluctantly and are still debating how much materialism they can accept without losing their identities. These are the so-called “developing nations,” in which such debates have, in some cases, even sparked civil wars. Still others have been left out of the race entirely and live as they always have; these countries are relegated peremptorily to the “underdeveloped nations” club.

As a result of this revolution, *Homo sapiens* made a giant leap forward. Our desires however have become immoderate. In order to satisfy them we plunder the Earth of its riches. The advent of energy ushered in the “Age of excess,” in which our species revels. The desire for more propels us to acquire significantly more than we need. Our excess is a form of collective insanity, which is at the same time unacknowledged and

encouraged. Yet our way of life, built on a foundation of exhaustible natural resources, is transitory. The blind excess and materialism to which we have succumbed now threaten our very existence.

If we stop and seriously consider our Western way of life, the mind reels. It is as if life cannot be just life, without all the material trappings. Not very often, but sometimes, when we pause to catch our breath a little, we ask ourselves existential questions such as, “Who are we really?” or, “Where are we going?” But our unshakable belief in human infallibility, or perhaps simply our limited intellectual capacity, prevents us from questioning the oil-addicted lifestyle that the West has adopted.

The term, “oil addict,” is obviously not a flattering one, and many will have difficulty accepting it. It conjures up the smell of heating oil, the grime of coal, the danger of gas explosions. How far it removes us from the grand adventures of Don Quixote, tilting with such panache at the windmills that taunted him so insolently with their great sails! We need to be reminded that without fossil fuels we would not be who we are. The magic of electricity, were it derived solely from the force of wind and rivers, would certainly have brought us some new glimmers of enlightenment, but it would not have transported us into the amazing world that we know now. It might have inspired architects to erect stones in new patterns, but it would not have enabled them to build to the sky. Engineers would have been left with nothing but the wind to move their boats across the water and it is unlikely that they would ever have gotten their planes off the ground. Without fossil fuels, physicians would still be prescribing leeches for wine-congested livers. And scientists, scorned for displacing the Earth from the center of heavenly orbits, would themselves still be circling around a few radium atoms assembled with difficulty in dimly lit laboratories.

Clearly, without fossil fuels, the Western world would not be what it is today. Energy has made all the difference. The grand Industrial Revolution – a revolution is always grand to

those who make it – is perhaps not as perfect as we have painted it. Our standard of living, and that of other nations, depends entirely on the amount of energy our societies consume. Without this energy we would still be mountain shepherds, calling our dogs to gather the flocks; or farmers, prodding our lethargic oxen across the fields; or blacksmiths, pumping our bellows to revive a meager charcoal fire; or millers, waiting for a good rain to swell the river and turn the millstone; or town criers, warning the local populace of an ill wind. We might also be comfortably seated next to a roaring chimney fire, listening to grandmother spin tales about the deep, dark mysteries of the nearby forest, or grandfather striving to solve the world's problems and re-enacting old battles.

But we are no longer any of these things in the West. We are oil addicts, human beings who have created an industrial empire that can exist only so long as it can continue to guzzle vast amounts of energy. It is time we face up to the truth and its consequences.

How did we become addicted? Must we remain so? Can we remain so?

These are stark questions. Their impact is staggering. To answer them, we are forced to realize that we are living under an illusion of power that is, in fact, as temporary as it is artificial. Our daily life has become disconnected from reality. Not long ago, half asleep, I was confronted by images of a bizarre world, which was nonetheless all too familiar. Two great processions stretching off into the distance were moving toward one another. One was made up of millions of motorists driving fleets of shiny cars, thundering tractors, and gas-powered lawnmowers. They held up signs proclaiming, "Oil is Life!" and were demanding that it be found and brought to them "wherever it may be!" The other was an endless parade of thousands and thousands of pilgrims declaring that the Earth should be populated entirely by Man; they were heading toward a "Be Fruitful and Multiply!" rally. With a deafening roar, the two sides converged and became one gigantic throng, jammed together on an endless expanse of asphalt. Unable to

advance any farther, men, women and children got out of their vehicles and began milling around in disarray. People waved banners proclaiming, "The Earth is Ours!" with as much conviction as those who affirmed, "I Vroom, Therefore I Am!"

And I realized that we might not find any way out of this.

A hundred years ago, such a dream would have been highly unlikely. Not even Jules Verne could have imagined the hallucination we are living in now. He would not have dared to imagine that, in order to live in luxury, one part of the world would be willing to sacrifice the other without a qualm.

The situation today is serious. We, in the West, can no longer afford to simply remember to fill up on gas and heating oil. It is time for us to wake up. Everyday, the children of Hilla, Mosul, Dawaniya, Baghdad, Tehran, Abadan, Khorramshahr, Baku, Groznyy, Lagos, ... face the possibility of paying with their lives to ensure the comfort of the children of the Northern hemisphere. Surely not even the need for energy can justify such callousness. It in no way justifies madness.

CHAPTER 2

Ergamines

In 1980, during a long stay in the Middle East, I once distracted myself by calculating the actual amounts of energy that human beings derive from oil, or black gold, as I like to call it. Maybe my subconscious was prompting me to justify my presence there. At any rate, through these simple calculations I discovered that one drop of oil, weighing just one gram, or one thirtieth of an ounce, contains as much potential energy as a hard-working ditch digger can offer over the course of an entire day! As we know, all it takes to reap the benefits of this easy energy is a cleverly designed machine. I now clearly understood how, with so many drops of oil being burned in so many of our machines, we can perform work that we would have never dared to undertake using only human power.

Bowled over by this discovery, I decided then and there to bring the drop of oil out of its obscurity by giving it a name: I called it the **ergamine**, from the Greek “ergon,” meaning work, and the French “gamine,” or “little girl.” I began using this word to refer not only to the drop of oil, but also to its

esteemed cousins, the natural gas bubble and the lump of coal, all of whom are little Cinderellas at work.

Physical work cannot be performed without some form of energy consumption. Therefore, energy represents potential labor and is measured in the same units as work: calories, kilowatt-hours, or Joules, for example. Energy is available in numerous forms and can be generated in a variety of ways. When fossil fuels are burned, they generate thermal energy. Until recently, energy was provided primarily by human beings or animals. However, with the advent of fossil fuels – mainly oil, coal, and natural gas – “labor-saving” devices can take over many of our tasks. Fossil fuels offer tremendous work potential. For instance, the thermal energy available in one drop of oil, weighing just one gram (or 1/30th of an ounce), is approximately 10,000 calories, or 10 kilocalories (kcal). This is equivalent to the amount of work a laborer can accomplish during a full work day.¹

Nothing before had ever led me to make the connection between the human being and the drop of fossil fuel, between the master and the slave. Not the tons of gasoline I had burned on the highway, not the years I had spent as an oil industry professional, not even my years as a student, although they had been almost entirely devoted to this precious liquid.



This revelation changed the way I perceive our entire society. Although previously I had made the connection between energy and petroleum, I had never appreciated the full capacity of its power. Since then gasoline and natural gas are no longer

just mere necessities to me, available for mass consumption. I began to understand black gold's intrinsic value, a value much greater than that of yellow gold. I also began to understand the meaning behind numerous events in recent history.

Unfortunately, as we know all too well, in order to exploit the potential of this little drop of oil we have to burn it. Its two-legged counterpart, on the other hand, can always renew his energy potential with a hearty meal – something he takes pleasure in besides – and a good night's sleep. But our ergamines must be consumed in order to release their energy, and they do not exist in infinite supply. Ergamines were formed from organic matter which accumulated at the bottom of lakes or inland seas and was buried under sediment in oxygen-deprived environments. This process took millions of years. Ergamines cannot be renewed at the same rate at which they are presently being consumed. The few sites at which hydrocarbonsⁱ are currently being formed, such as at the bottom of Lake Kivuⁱⁱ in Africa, are only able to supply fuel in quantities that are insignificant when compared with the need generated by our oil-addicted appetites.

But, consuming too many ergamines has created another problem for humanity. As they burn, ergamines release carbon dioxide, or CO₂, into the atmosphere, where it remains too long, causing global warming. I will return to this truly inconsiderate gas later and spell out the case against it.

ⁱ Most substances that we encounter in our day-to-day lives are made up of small units called molecules. A molecule is a combination of two or more atoms held together in a specific shape by physical forces. Hydrocarbons consist of those molecules that are composed solely of hydrogen and carbon atoms. This class of chemical compounds is comprised essentially of fossil fuels (e.g., oil, natural gas) and their derivatives.

ⁱⁱ Lake Kivu. The rivers that feed Lake Kivu, which straddles the border between Rwanda and the Democratic Republic of the Congo, contain large amounts of organic matter. These impact the lake by depleting it of oxygen and forming CO₂. In addition, methane gas, CH₄, is continuously generated within the lake, making the place a localized source of hydrocarbon formation.

The bottom line is that ergamines have become our source of physical power, our slaves, to whom we assign most of our material tasks. They transport us – everywhere. They run most of our industries. They heat our buildings. They feed us – agriculture is one of their major domains. They carry our products to market, often to distant continents. In many places they produce the electricity needed to run our machines. They even sweep our streets. They are also transformed into chemicals used in cleaning and gardening products, or paints and plastics used to decorate our homes and clothe us. They are also used in some of our medicines. In short, without them, what would become of us?

But ergamines give us more than goods and services. They mean much more than that to us. They are our source of economic strength and political power, and in this regard ergamines become supremely important to industrialized societies. A nation's economic power is directly proportional to the amount of energy that it consumes². Although the United States contains only 4.5% of the world's population, it consumes 25% of the world's energy, and we all know how powerful America has become. The twenty-five countries belonging to the European Union represent just 7.5% of the world's population but consume an additional 19% of the world's energy. At the other end of the spectrum, India, home to 17% of humanity, uses only 3% of Nature's energy reserves³. Paradoxically, it is not the size of these nations' populations that determines the relative strength of their leaders' voices; it is the hidden power of their energy slaves. The president of France, who speaks for sixty million people (and the four hundred billion ergamines that assist them daily), is heard constantly around the world, while the president of Bangladesh, who speaks for a population of Bengalis that is twice as large, is almost never heard at all. His people are served by only a handful of ergamines capable of putting on only a tiny industrial show that impresses almost no one.

The number of energy slaves at a nation's disposal also determines its standard of living. Obviously, not all of the

Earth's inhabitants are equally served. The countries of North America, with, on average, more than 20,000 ergamines assisting each citizen daily, are the best off, followed by the other industrialized nations. And although the Brazilians may be far behind with their mere 2,000 ergamines per person per day, they are still well-off compared to the Madagascans, each of whom has only 200 little energy fairies to assist them daily on their beautiful island, and the Ethiopians who, with only 30 ergamines per capita per day, cannot do much more than build small fires with a handful of straw to cook their meals. But the record for simplicity and natural living probably goes to the Afars of East Africa's Rift Valley. They have no ergamines at all. Sometimes they are lucky enough to have a donkey for company, with whom to watch the stars, discuss the weather and extol the beauty of the night sky. And yet their country is probably the one in which the first hominids began to walk on two legs.

Ergamines are a force sought after by many nations. To guarantee a supply of hydrocarbons the industrialized world has imposed its will on many oil-producing nations, particularly in the Middle East. America went ahead with its war against Iraq. Although it cannot be minimized, chances are that this conflict is only one small episode in the great drama that will unfold when our dear little ergamines become rarer and can no longer be consumed as rapaciously as they are now.

For now, it is certain that the people of the Northern hemisphere have yet to realize the extent of the power that they derive from Nature's little Cinderellas. Nor do they realize the awesome responsibility their ancestors assumed some two hundred years ago when they took the deliberate step of binding human progress ever after to the ergamine.

CHAPTER 3

The Saggara Pyramid

We are no more aware of the energy we use than we are of the oxygen we breathe. We may notice some indirect effects – the warmth of a furnace fueled by heating oil, for instance, or the speed of a car – but we rarely associate them with energy. I have often thought that birds are probably unaware of the air that holds them up and makes their amazing acrobatics possible. It is the same with human beings and energy. We do not think about it, any more than we do about the number of angels that can fit on the head of a pin.

During my career I have had occasion to apply the greatest principles of thermodynamics. I have calculated the enthalpy of petroleum constituents and their entropy variations during combustion. I have worked with calories, kilowatt-hours, and Joules. I have applied the laws of physics set forth by our greatest scientists. I have even tried to analyze the behavior of hydrocarbon molecules, atoms, electrons, and protons. All without ever becoming aware of energy per se.

I have also counted the gallons of gas I have pumped into my car. I still did not become sufficiently aware of the

preciousness of energy. I have worked with many people employed at oil refineries. None of them ever demonstrated any real awareness of the true value of energy either.

To help us become conscious of the ergamines existing all around us and, more importantly, to grasp the extent of their amazing capabilities, I have devised some simple exercises. The first involves a journey by plane.

Even if you have never flown on a plane, this exercise will be easy for you. Imagine for a moment that aircraft manufacturers designed planes so that jet fuel was stored in 42-gallon barrels among the passengers instead of hidden in fuel tanks in the wings. The number of barrels required for each trip would be loaded before departure, just like in-flight meals. Now, imagine that you are sitting on a plane traveling non-stop from San Francisco to London. Look around you! What do you see? If you are flying coach, you will see three barrels of jet fuel on your left, and three more on your right. The entire compartment is arranged this way, with three barrels of jet fuel on either side of every passenger. If you are flying first class, you take up twice the amount of space and will therefore see six barrels between you and the passenger on either side of you.



When you arrive in London, the barrels will be almost empty. And, of course, the airline will have to fill them again for the return flight. If you would rather not travel as far as London, try a shorter flight, between San Francisco and Montreal, for example. On the outgoing journey you will need two barrels for yourself. To travel to Mexico City, you will need only one.

Since I first devised this little exercise, I have been unable to take my seat on an airplane without thinking of the ergamines who boarded before me. From San Francisco to London, for myself alone, the equivalent of five hundred thousand (500,000) man-days of work are consumed through the ergamines. And I often travel purely for pleasure.

Imagine now, if you will, that you are flying from New York to Cairo with three hundred other tourists, all of whom are going to visit the pyramids of the ancient pharaohs. On the outbound journey alone, the aircraft will consume, in the form of jet fuel, an amount of energy roughly equivalent to the energy expended in physical labor by all the tens of thousands of Egyptian *fellabs* who erected the Saqqara step pyramidⁱ. Visitors to this monument almost certainly do not make this connection. They only know that the ancient *fellabs*, through enormous effort, were able to give their monarch, King Djoser, a tomb fit for a god. Like the rest of us, these tourists are unaware that they belong to an oil-addicted society.

Now I would like to share an experience that is more concrete. During the 1960s, I was working in Paris and traveled several times to Bangladesh, then known as East Pakistan, to assist with the construction of an oil refinery. The facility was being built near the city of Chittagong on a narrow strip of land bordered by the sea on one side and the Karnaphuli River on the other. Once on site, I felt as if I were more on water than on dry land. The earth was so saturated that measures had to be taken to prevent the ground from sinking under the weight of the refinery once it was completed. To accomplish this, we constructed a mound of earth about 25 feet high on the site of the future refinery. Its weight exerted enough pressure on the soil to force the water underneath to rise to the surface through wells that had been dug previously. Once the site had been “dewatered,” the mound of earth was removed. Although these very deep wells were drilled by machine, the

ⁱ The Saqqara step pyramid was originally 200 feet high and rested on a base approximately 394 feet long by 360 feet wide.