

Veronika Bond

HUMUS

the black gold of the earth

(excerpt)

*“The importance of this book cannot be overstated
- after all without humus there would be no life!”*

Prologue

If the soil is ill, all living beings suffer. The remedy must start there.

~ Maye Bruce ~

In October 2017 a firestorm swept across Central Portugal. Approximately two thirds of the area was burned, most of it in one single night. Within a few hours, miles and miles of countryside, forests, houses, people, animals, livestock, small holdings, gardens, livelihoods were consumed by flames.

How could that happen? Apparently '500 fires started on Sunday night independently of each other and got out of control because of Hurricane Ophelia coming over the Atlantic'. But 500 fires don't start spontaneously like that, not even in soaring temperatures at the height of summer.

Was it human negligence? Was it arson? Are the eucalyptus plantations in this area the root cause of the problem? Many questions remain open.

Then the second wave of questions came: *Will this happen again? Can we do anything to stop this and protect ourselves? What, if anything, can we do to prevent this from happening in the future?*

The morning after the firestorm I built a new compost heap. The air was filled with smoke and ashes. In the woodlands next to our house and across the road small 'volcanoes' were still smouldering, spewing fumes and flames. Arranging organic materials from piles which had miraculously survived the fire was the most comforting activity of the moment.

They say, the soil is more fertile after a fire. But, what if there is no soil left? We see black pines and olive trees stripped bare, collapsed on top of the skeleton of rocks, the naked bones of the earth mother exposed.

Two months after the fateful night I read a headline in The Guardian – **Mass starvation is humanity's fate if we keep flogging the land to death.** In the article, George Monbiot points out that "the trouble begins where everything begins: with soil. The UN's famous projection that, at current rates of soil loss, the world has 60 years of harvests left, appears to be supported by a new set of figures."

In other words, when 'the world has no harvests left' there will be no fertile soil, no crops, no food, no fodder, no animals, no trees, no materials to burn. The earth will be 'burnt out'.

Fires of increasing ferocity and voracity are flaring up all over the world. Think of Australia, California, Italy, Spain, Tasmania... These are not 'natural wildfires'. They contribute to the loss of fertile soil in many ways. Other causes for soil erosion are the use of chemical fertilisers and pesticides, deep ploughing, deforestation, overgrazing and last but not least our personal food habits.

10 years ago my husband and I bought a Quinta in Portugal, partly because we wanted to have a go at growing our own food. In the night of the firestorm, many lives were changed. For us, it catalysed a fundamental change of perception. An old key question had been: *How can we grow more food during more months of the year?*

From the ashes of disaster a more burning question has arisen: *How can we help our soil mother recover and heal her suffering?*

This book is written in response to that new question. The soil is the mother of all living creatures. The olive trees, sheep, farms, humans who lost their lives in the fire and those who survived that tragic night – we are all her children. What can we do to make sure our soil doesn't get reduced to ashes – or dust – as the case may be? Our very existence depends on finding answers to this question, fast.

The Buddhists say, *'all suffering can be healed through understanding.'* This book is a contribution towards *a better understanding of soil as a living organism.* An improved understanding of another living being is the foundation for any healthy relationship. *'HUMUS, the black gold of the earth'* is primarily about earth, soil, compost and of course *humus*, the lifeblood of the living soil. Paraphrasing Amy Stewart, *'there is more to humus than what we can see, much more. To know the soil mother for what she is, to find her heartbeat, to expose her soul, you have to go underground where she lives and breathes.'*

'HUMUS' is also about humans as guardians of the soil. Humans are intimately related to humus in more ways than most of us currently realise. Researching materials for this book, following the trails of many pioneers and visionaries who knew about this inseparable link, has been a true eye-opener and an inspiration.

I don't have all the answers to the questions listed above. I did, however, find valuable information from sources which are not easily accessible to many readers. Several 'humus-pioneers' from German speaking countries (published 50-100 years ago) have not been translated into English. Several important ecologists from English speaking countries (also writing in that era) have almost been forgotten. To keep their voices alive is one of the aims of this book.

In 2015 the FAO (the United Nations Food and Agriculture Organisation) declared that, *"the main problem humanity is currently facing is not global warming, extinction of species or any other environmental crisis – the main problem we will have to face is the degradation of our soils. The world population continues to increase while we destroy more and more topsoil. If this is allowed to continue there won't be enough fertile soil left to feed a growing world population."*

Can you imagine the Earth 60 years from 2015, with no soil left to grow any food at all? I like to imagine sparks of inspiration flying across the humus-sphere, lighting cozy fires in winter all over the Earth and ensuring that our grandchildren and great-grandchildren can still cook a healthy, nutritious soup in 2075 and beyond.

Veronika Bond, Portugal, January 2018

Introduction

Put your faith in the two inches of humus, that will build under the trees, every thousand years.

~ Wendell Berry ~

It's not petroleum, nor a rare mineral or a noble metal. The most precious substance in the earth is humus. Humus gives life to the earth. It keeps the soil healthy. Good humus produces strong healthy plants, and healthy plants provide food for healthy animals and humans.

What exactly is humus?

Why is it so precious?

How is it made?

How is it lost?

What is the secret of healthy humus?

These are some of the questions we explore in this book. Of course, almost every gardening book has a section about humus. Do we need another book on such a basic topic?

Gardeners and farmers usually describe humus from a material perspective. They talk about its composition: well-rotted plants and animal manure, rich in minerals and trace elements, with lots of microorganisms in it etc. Such a description gives the impression that humus is mostly 'dead matter', inhabited by relatively insignificant tiny creatures. This idea is confirmed when contemporary soil scientists call humus *'the very dead'*.

Not everybody sees it that way. Lady Eve Balfour, the founder of the British Soil Association, was convinced that humus is *"far from dead...It is still organic matter, in the transition stage between one form of life and another."* And Sir Albert Howard, founder of the organic movement, taught that *'humus is alive, and it makes the soil alive.'*

Is it very dead, or very alive? – such fundamental disagreements can only be explained by radically different perspectives. Some people look at humus through the lens of a microscope and try to grasp it 'objectively' by identifying its chemical and physical components. Others experience its miraculous life-giving and fertilising powers and understand the crucial part humus plays in the life-cycles of the Earth.

This book explores humus as a living organism, a vital organ of a living earth. Humus plays an essential role in the health of our soil and all life on our planet. Many people concerned about their health want to eat 'healthy organic food' and drink 'pure healthy water'. Not so many think about the key role of healthy soil.

We are so used to defining humus as a material substance – an 'end product of the

decomposition process of plant and animal matter’ – that seeing it as a ‘living organism’ is not easy. On the other hand, if we define humans in terms of their material composition – bones and muscles, organs and nervous tissue, blood and lymphatic fluid etc. all enclosed in a bag of skin, partially covered in hair – we can readily accept that this clearly doesn’t capture the essence of humanness. A living organism is far more than the sum of its parts. A description of it in purely chemical elements, physical structure and physiological functions can never do it justice. This is partly because our language often lacks the right words to convey the difference between aliveness and deadness.

In this book, we want to get to know live humus a little better. We look at its functions as a ‘soil-organism’ and the effects it has on plants, animals and humans. We want to find out why it is important for *our* survival, and how we can protect it and ensure *its* survival. We’ll meet a number of ‘composting artists’ who have dedicated their lives to the regeneration of the soil and know a thing or two about how to stimulate the creation of humus. We shall discover that humus is not ‘very dead’ – at least not yet...

Most importantly, we want to get to know humus as a living being, or more accurately, as a *species of living creatures*. Humuses (plural of humus) can live for millions of years. They can be very young, mature, or ancient. They occur in all climate zones, and their geological background is quite diverse. What makes us assume that an ancient humus of a Russian grassland, a medieval humus in a German monastery garden and a ‘young’ 70-year-old humus on a biodynamic farm in Australia are ‘*the same beast*’? Depending on their maturity, nourishment and living conditions, humuses show distinctive personalities and behaviour. They vary in appearance, stability, resilience and fertility.

Humus should be considered an endangered species. According to the *Global Agriculture Report*, “More than 24 billion tons of soil are lost each year through erosion – that is more than 3 tons of soil per inhabitant of the planet!” It is true, the soil currently erodes much faster than it regenerates itself. Moreover, the authors of this report call fertile soil ‘*our most significant non-renewable geo-resource*.’ This means we should be very concerned about the disappearance of the soil altogether. It almost sounds as if a major ‘soil crisis’ is inevitable.

However, ‘*non-renewable*’ can be a misleading description. Our ancestors knew how to regenerate and renew the soil. People have done this for thousands of years all over the world. If a major soil crisis is looming, everyone should know what they can do to promote the renewal of our most indispensable, most precious geo-resource! In chapter 4 we’ll examine why soil – and humus – are lost, how this happens, and what we can do to protect and cultivate it.

Humans are certainly capable of destroying fertile soil, but *we can also help to renew it*. We can learn about the re-creation of humus, and what our recycling habits have to do with it. Anyone who has a garden and wants to ‘do something for the environment’ can collect their kitchen waste and start a compost pile. This book includes tips and recipes for building a *healthy compost* because creating healthy humus often starts with a skilful arrangement of the materials you want to decompose.

The actual making of healthy humus is the work of billions of microorganisms and thousands of earthworms. Whether you have a garden or not, you can start your own worm farm. Or you can learn about *fermenting* your kitchen waste, or try other simple composting methods and find out what works for you. Almost anyone can contribute to the regeneration of rich fertile soil.

Last but not least, we want to understand – and hopefully improve – the intimate relationship

between *humus* and *humans*, because “*understanding the soil is the key to sustainability*,” as Howard-Yana Shapiro and John Harrison write in their book *Gardening for the Future of the Earth*. The love affair between *humus* and *human* begins with the name. Both words come from the same Latin root, meaning *earth*. As living organisms, the two have a lot more in common than one might think. When we realise that humus is not only a vital part of our food cycle and a critical basis for our health, but also our distant relative, inseparably tied up with our destiny, perhaps it helps us rebuild the relationship we once had with our ‘*mother substance*’.

Chapter I

The Earth Kingdom

When a gardener takes a handful of earth from one of his beds, he holds a world in his hands.

~ Marie Luise Kreuter ~

A brief history of humus

The word *humus* has been around for more than 2000 years. The Roman poet Virgil (70 – 19 B.C.E.) used it in the sense of ‘earth’. Not much later the Latin-speaking people abandoned the term and replaced it with *terra*, which is still the common name for *earth* in Portuguese.

In the 18th century, the word *humus* reappeared in German, when the physician and agronomist Albrecht Thaer began to use it in the sense of a part of the soil: “*The usual name for this substance is mould,*” he explained. “*Humus is the residue of animal and plant putrefaction.*”

By 1925 the term was in common use in other countries too. The Ukrainian-American microbiologist Selman Waksman wrote that “*several theories have been proposed at various times to explain the origin of the black-coloured organic substances, ... which are commonly known as ‘humus.’*” The Austrian philosopher Rudolf Steiner spoke about humus in his lectures on biodynamic farming, and the English botanist Sir Albert Howard recognised the significance of humus for soil fertility and health while managing an organic farm in India (1924 - 1931).

During the 20th century, organic and biodynamic farmers put new ‘humus-theories’ into practice. They opposed the so-called ‘green revolution’ – promoting the use of artificial fertilisers and pesticides – and developed new methods for producing humus from organic materials.

The substance itself, of course, has been around for millions of years. Planet Earth is ‘girdled by a *humus-belt*’ which covers large areas in Eastern Europe and Asia, stretches across North American prairies and reappears briefly in Morocco before fading into the Saharan desert. Moldova and Ukraine belong to a part of the world which can be considered the ‘*cradle of the humus-belt*’.

To raise awareness of our rich and diverse soils, the *International Year of Planet Earth* was established at the turn of the millennium. *The Black Earth* (published in 2011) is a contribution to this program. The book was written by Igori Krupenikov, a renowned soil scientist from Moldova, and his Ukrainian colleague Boris Boincean. Before humans began to plough the land, most of Moldova was covered in black humus-rich soil, often 1 metre deep. The virgin soil was famous for its fertility and used to produce an abundant and diverse variety of crops. Today Moldova is the

poorest country in Europe, and the humus-belt is vanishing.

In recognition of the worldwide soil crisis, the *International Year of Soils* was declared by the UN in 2015. Many initiatives sprang up in response to this call, as if many seeds had been lying dormant in the soil.

In June 2015 a group of 60 seasoned ecologists, scientists and soil-pioneers got together in Costa Rica and founded an international alliance called *Regeneration International*. In December 2015 the IUSS (International Union of Soil Science) saw the need for a longer period and declared the *International Decade of Soils*, to last until 2024.

During the first meeting of *Regeneration International* in Costa Rica, Ronnie Cummins, director of the American *Organic Consumers Association*, expressed the need for a “massive grass roots army of earth-regenerators: 3 billion small farmers, villagers, ranchers, shepherds, forest dwellers, urban gardeners and indigenous communities – assisted by several billions of conscious consumers and urban activists.”

Before we can do anything to help stop, and maybe even reverse the rapid degeneration of our soils, we need to understand what this ‘stuff under our feet’ actually is. “We know more about the movement of celestial bodies than about the soil underfoot,” Leonardo da Vinci famously pointed out several centuries ago. Unfortunately, this still seems to be the case, generally speaking. But now there are many people who have studied the soil, and we can learn from them.

Humus gets mixed up

The term *humus* is often confused with topsoil and compost. Even experts write about ‘compost’ and ‘humus’ as if they were the same thing. Deploring this mix-up, Lady Eve Balfour stated, “the term ‘giving the land humus’ is too often taken as a synonym for treating it with any form of organic matter, such as ploughing in green crops or grass or applying farmyard manure. But all these substances are merely some of the raw materials from which humus can be made. They cannot become humus until they have been metabolised by soil organisms.”

To add to the confusion, the word ‘composting’ is often used synonymously with *humification* – i.e. the transformation process of organic materials into humus. *Composting* has a wide range of other meanings too. It can be used in the sense of *putting organic waste into a compost bin*. Or it can mean *taking decomposed substances from the compost pile and digging them into the garden soil*. Moreover, it is not uncommon for experienced gardeners to talk about *humus* (or *compost*) when they actually mean *fertile topsoil*. Not surprisingly, this can leave the gardening novice floundering.

So what exactly is *humus*, and how is it different from *topsoil* and *compost*?

Lady Louise Howard explained it like this: “Humus is a Latin word meaning soil, but in science its significance is a little narrowed to indicate that part of the soil spread over the surface of the earth which is the end product of the decaying fragments of organic matter.”

Humus – in the sense used by Thaer, Waksman, Howard and Krupenikov – is considered a *living substance*. It is *transformed compost*, the product of a *healthy decomposition of organic matter*. The use of the term *humus* in contemporary literature is inconsistent. German humus experts

make a distinction between *Nährhumus* (nutritional humus) and *Dauerhumus* (permanent or durable humus). Lady Balfour's writings give the impression that the word *humus* entered the English language in both senses despite the lack of precise terms for these different stages of humus development.

American humus experts use the term *compost* in the sense of the German *nutritional humus*. The word *humus* (on its own) is reserved for the so-called *permanent humus*. In this book, we take the European approach and use the word *compost* for the *accumulation of organic substances in earlier stages of decay*.

Inevitably, due to the continuous cycle of dying and living, the boundaries between *compost* and *humus* are blurry, and the better we get to know this creature, the more we'll understand why. To illustrate the fundamental distinction between *compost* and *humus*, we can draw a comparison with the difference between a caterpillar and a butterfly. Compost is the creature in the state of the caterpillar, humus is the same creature in the butterfly stage. Both *humus* and *compost* are present in the *topsoil*. Topsoil, compost and humus do have a lot in common, but they differ in their functions, colour, texture and behaviour. One could argue that they are 'the same beast' at different stages of its development. Let's take a closer look at the 3 terms.

Topsoil

Soil often gets mixed up with another word: *dirt*. This is interesting because the word *dirt* originally meant 'excrement', and fertile soil does have a lot to do with the excrements of many creatures. However, *dirt* has negative associations with uncleanliness, in-significance and humiliation, which can get in the way of appreciating the true value of the soil.

When you dig a hole to plant a tree in the garden you should see various horizontal layers in the earth. The upper cover of healthy soil consists of rotting organic matter. The second cover can be regarded as the actual humus layer. Both layers are populated by beneficial bacteria, earthworms, soil fungi, micro-organisms and many other small creatures. The third layer is composed of many minerals and serves as a reservoir for water and soil nutrients. The first two layers of earth are the topsoil.

Krupenikov and his colleague describe the topsoil as 'the Earth's living skin' covering the Earth's crust and protecting it. "*Far from being an inert membrane, the soil creates local conditions for an immense variety of physical, chemical and biological processes.*" These layers of living tissue are the existential basis for all living creatures, including plants, earthworms ... and humans.

Compost

Compost is literally a composition of many different materials from the plant, animal and mineral kingdoms. In nature, compost occurs as a mix of fresh and decomposing organic matter: autumn leaves, wilted flowers, dead insects, broken twigs and branches, urine and faeces from animals, small stones, rock dust, empty snail shells, etc. This means, compost is not homogenous. Being an accumulation of mainly vegetable and animal matter in various stages of decay it has a mixed texture.

Christa Weinrich, Benedictine nun and head gardener at the Abbey of Fulda (Germany) – calls

the compost heap the '*heart of the garden*'. At the same time, compost often relates to 'a collection of organic waste': vegetable scraps from the kitchen, grass clippings from the lawn, hedge cuttings etc. In other words, it refers to a particular type of '*recyclable rubbish*'.

For a clearer understanding of compost, we must differentiate between the *random accumulation of organic waste* and the *skilful composition of decaying organic materials*. Both can be called '*compost*'. A random accumulation of scraps from the kitchen can fester, attract unwanted animals and turn into a stinking, repulsive mass. Surely, this doesn't happen in the '*heart of the monastery garden*' at Fulda (!) which has been cultivated organically by Benedictine nuns for 500 years.

A skilful composition of vegetable matter, animal manure and minerals attracts desirable creatures which stimulate a healthy decomposition process. A '*good compost*' doesn't smell bad. It becomes a valuable production-plant for humus which regenerates the lifeblood of the topsoil. This compost is a very valuable resource, treasured by all gardeners.

Humus

Humus has the colour of dark chocolate. It is homogenous, it has the texture of a moist and crumbly cake and a characteristic earthy smell. Humus is *transformed compost*, metabolised by earthworms and other microorganisms living in the soil. Waksman described humus as a '*natural body*'. "*It is a composite entity, just as are plant-, animal- and microbial substances; it is even much more complex chemically, since all these materials contribute to its formation.*" Because humus is '*made up*' from so many different sources and occurs in very different environments, it can vary a lot.

Sir Howard knew that, "*humus cannot be exactly the same thing everywhere. It is bound to be a creature of circumstance.*" Some soil scientists have tried to nail down humus by defining it as a '*stable substance*', the '*end product of a metabolic process*' but this turned out to be incorrect. In Sir Howard's understanding "*humus in the natural state is dynamic, not static.*"

Soil scientists and farmers have difficulty in agreeing what humus is because the interpretation depends on a fundamental outlook on life itself. The American soil specialist Paul Sachs suspects the problem might be due to a lack of precision. "*Humus is complex, and even after hundreds of years of research, no one really knows exactly what it is.*", he explains. "*The term humus doesn't really describe anything specific. It's like using the word 'dog' to describe a German Short Haired Pointer or a Russian wolfhound.*"

As previously mentioned, German humus experts distinguish between nutritional humus and permanent humus. Let's call them '*nutri-humus*' and '*perma-humus*'. These terms describe two different stages of humus development. Nutri-humus is a younger version of perma-humus. The upper layer of the topsoil contains more nutri-humus, while the second layer is saturated with the older, more mature and '*stable*' perma-humus. Nutri-humus is rich in nutrients which are released quickly for plant growth. In cultivated soil, it only lasts for one growing season and needs to be replenished on a regular basis. Perma-humus can survive for hundreds of years.

Marie Luise Kreuter, Germany's '*organic gardener of the nation*', explains it like this: "*The two upper soil layers are not only distinguishable by their different populations and their ways of working. Also, the humus in these two parts is of a different kind. Fertile soil is produced in the*

upper rotting layer, which always regrows. But it is relatively short-lived... under unfavourable conditions, this humus can be destroyed. By contrast, the so-called perma-humus occurs in the lower actual humus layer...The soil crumbs are smaller here, more intensely connected and more stable... When in rich supply, they produce a nitrogen reservoir in the soil which mineralises the nutrients gradually to pass them on to the plants.”

The very alive

Taking into account the vitalising effects humus has on soil, plants, animals and humans, it is hard to understand why anyone would call it ‘very dead’. Humus seems very alive. In some schools of soil science, it is even classed as a species. Many eminent scientists, expert farmers and master gardeners talk about the black gold in the topsoil as if it was a kind of living creature. Vasily Dokuchaev, a Russian geologist and deemed the founder of soil science, perceived humus-rich soils as ‘*individual natural bodies*’. He even suggested to classify them as “*the ‘4th kingdom of nature’, in a league with minerals, plants and animals.*”

It is a valid suggestion. Humus has some characteristic features of a living creature:

- Humus goes through distinct stages of development, from the fetal composting phase, through the infantile and adolescent phases of nutri-humus, which still has some resemblance with compost, to the adult phase of perma-humus.
- As humus grows and matures, it becomes more resilient, it is able to store, manage and share its resources better, and it becomes a more ‘stable creature’.
- Humus is very fertile and has the ability to reproduce. It regenerates itself unless its fertility is destroyed through adverse conditions.

As a species, humus has many breeds. Different breeds of humus have their own personalities, dispositions and dietary requirements. Like other life forms, not all breeds of humus are at home in the same climate, and they respond to specific environmental factors.

Moreover, *humus is full of life*. It provides a home for millions of species of microorganisms. This is why we can read in many gardening books that ‘*a handful of fertile soil contains more living creatures than the whole human population of planet Earth*’.

About the Author

We do not inherit the Earth from our ancestors, we borrow it from our children.

~ proverb ~

Veronika Bond was born in a small village in Germany in 1955. Three years later, her family emigrated to Bethlehem (Jordan at the time), and she grew up in a boarding school for Palestinian orphans.

Back in Germany she studied Arabic in Berlin, German literature in Münster, and received a degree in Applied Linguistics from the university of Mainz. She went on to work as a freelance translator of modern Arabic literature for several years. After completing a second degree in classical homoeopathy in England she discovered that her translation skills were in great demand in this field, and she launched a successful career as a translator for homoeopathic literature.

In 2007 Veronika and her husband Joshua Bond visited Central Portugal for the first time. Soon afterwards they bought a 'Quinta', following a dream to live 'closer to the land', and grow their own food. Gardening in Portugal was more difficult than expected, partly because of their lack of experience as vegetable growers and partly because of the poor quality of the soil on their farm.

Cultivating an 'edible landscape' on degraded soil is a challenge as well as a unique opportunity to get to know the soil kingdom first-hand. Through her research, Veronika discovered how little known this important topic is today.

We owe our current knowledge of *humus as a living organism* to the pioneering work of men and women who dedicated their lives to understanding the soil. Many of them lived in the nineteenth and twentieth centuries. Some of their writings were hard to find and their names nearly forgotten.

Several eminent authors in this subject area, such as the microbiologist Raoul Francé, wrote in German, and their books have never been translated into English. Much of their contributions would have been lost, if it hadn't been for the increasing interest in permaculture and the urgent need to recover dying soils worldwide. Veronika's linguistic skills, combined with a personal interest in the developing field of eco-culture, provide the fertile soil from which this book has grown.

HUMUS

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About this Book

It's the little things citizens do that will make a difference.

~ Wangari Maathai ~

Humus is the most precious resource on earth. Our survival depends on it, and it is running out. Dramatic losses of fertile soils are caused mostly by human activities. But *humans can also help regenerate humus.*

We have lost our relationship with the earth and forgotten how to take care of our soils. Humus has become a commodity, sold in garden centres and supermarkets. However, the familiar brown substrate in plastic bags is a far cry from the living organism described in this book.

HUMUS, *the black gold of the earth* is an invitation to become Earthkeepers. If we want to take care of Mother Earth – and perhaps grow our own healthy food – then we must get to know her better. We must learn to feed the soil first.

What makes the earth come alive?

What kinds of food does the soil need?

In what environment can the soil-population thrive?

These are some of the questions explored in this book.

Everybody can do something to take care of our soils and keep the earth alive. It is easier than you might think.

“This book is a riveting journey into where it all begins, the centre of life, the humus in the soil, this great mystery that feeds and protects us all. The book goes deep and sheds light on how life is created right under our feet. It gives clear examples, showing how to nurture humus and sustain the soil.

The importance of this book cannot be overstated – after all without humus there would be no life!”

Asa Mark & Hilary Bain,

the makers of the film **The Worm Is Turning**