

Soil and Culture

Edward R. Landa • Christian Feller
Editors

Soil and Culture

with Preface by Philippe Descola

 Springer

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Cover illustration: Artist, designer, and teacher Guy Pradel was born in France (Garches) in 1960. He specializes in marquetry (art made from pieces of wood veneer glued together to form a picture or pattern), and lives and works in Madagascar. Pradel studied art at “École du Louvre”, and marquetry at the famous French “École Boulle”. His marquetry furniture is known worldwide, and he has been a consultant for institutions, such as the German Society for Technical Cooperation (Deutsche Gesellschaft für Technische Zusammenarbeit; GTZ) and UNESCO, concerned with sustainable development.

The cover of this book is a photograph of a marquetry representing a soil profile that was done by Pradel in 2008. It is made from natural woods found in Madagascar, and is included in a leather binding made to cover a copy of Vasily Vasil’evich Dokuchaev’s 1883 doctoral thesis “The Russian Chernozem”, one of the founding books of soil science.

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Color Plates

Editor Biographies

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Edward R. Landa holds an M.S. and Ph.D. in soil science from the University of Minnesota, and has been with the U.S. Geological Survey since 1978. His research focuses on radionuclide and metal mobility in soil and aquatic environments, and has included studies of uranium mill tailings, radium processing residues, oil field brines, and indoor radon. He participated in the International Atomic Energy Agency's International Chernobyl Project, and in studies of radioactive contamination in the Arctic regions. His interest and publication record in the history of science spans from the late 1970's, with an early focus on the history of the radium processing industry—a spin-off of his research on present-day soil contamination at these sites. This historical research resulted in a paper in *Scientific American* (1982) and a monograph published by the Colorado School of Mines (1987). Ed's more recent focus has been on the history of soil science; he has co-authored papers on soil physicists Lyman Briggs and Edgar Buckingham in the *Soil Science Society of America Journal* in 2003 and 2005. His co-authored paper on Albert Munsell appeared in *American Scientist* in 2005. He is the Chair (2006-2010) of the Commission on the History, Philosophy, and Sociology of Soil Science of the International Union of Soil Sciences.

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Christian Feller is an Emeritus Soil Scientist and the former Director of Research at the “Institut de Recherche pour le Développement” (IRD) in Montpellier, France. He earned his MS (1969) and PhD degrees in organic chemistry (1972) from the Sorbonne University (Faculty of Sciences) in Paris, and his Doctorate of Science (1994) in Soil Science from the Louis Pasteur University in Strasbourg. His research focuses on soil organic matter studies applied to soil fertility and environmental services—in particular, the impact of agroecological practices on soil-plant carbon sequestration in tropical and subtropical areas; he has worked extensively in Senegal, French West Indies (Martinique), Brazil, and most recently, Madagascar. Christian is a member of the French Academy of Agriculture, and was the first recipient of the Soil Science Society of America's Nyle C. Brady Frontiers of Soil Science Lectureship in 2006. He has published extensively on the

history of soil science, including work on Charles Darwin's earthworm studies, Bernard Palissy's development of the soil auger, and the importance of French tropical research in the development of pedology. He serves as Vice Chair (2006-2010) of the Commission on the History, Philosophy, and Sociology of Soil Science of the International Union of Soil Sciences.

Prefacer Biography

Philippe Descola

Born in Paris in 1949, Philippe Descola obtained a master's degree in philosophy at the Ecole Normale Supérieure, before studying South-American anthropology under the supervision of Claude Lévi-Strauss. He received his doctorate in 1983 at the Ecole Pratique des Hautes Etudes. Most of his field-work was conducted among the Achuar Jivaro of the Ecuadorian Amazon with whom he spent three years (1976 to 1979) and where he has been returning ever since for shorter periods. Besides his field research, to which he has already devoted two books and many papers, Philippe Descola has published extensively on cultural ecology, contributing an original approach to the study of the social construction of nature. He holds the chair of anthropology at the Collège de France, where he heads the Laboratoire d'Anthropologie sociale, and he also teaches at the Ecole des Hautes Etudes en Sciences Sociales, Paris. He is the author of *Les idées de l'anthropologie* (Paris, 1988), *In the Society of Nature* (Cambridge, 1994), *The Spears of Twilight* (New York, 1996), *Par-delà nature et culture* (Paris, 2005) and the co-editor of *Dictionnaire de l'ethnologie et de l'anthropologie* (Paris, 1991), *Nature and Society* (London, 1996) and *La production du social* (Paris, 1999).

Preface

We tread upon the soil, and it feels unevenly dense, unevenly receptive to our steps, unevenly concerned with our balance; we lie upon it and, according to its compactness, to its texture and to the vegetation that covers it, it becomes more or less hospitable to our nonchalance; we dig it, and it meets our tearing with more or less open resistance. What goes for the soil also goes for all the other components of our life sphere. In other words, as with the wind that cools us or makes us shudder, as with the sun that scorches us or barely warms us, the soil is like an outer envelope of our body and an expansion of our muscles and senses. It is not within ourselves, obviously, but it is not entirely separate from us either; it is the accomplice of our body and that which anchors it to the world. This companionship is not really reflexive: even when the hardened clay resists our spade, even when the deep mud of a sodden path sucks in our steps, the soil does not for that become an external reality divorced from our actions, just a difficult partner which we have to contend with. The clod of earth that crumbles in our hand, the stony trail on which we stumble, the outcrop of rocks that break up the smoothness of a grassy patch, all of these acquires an autonomous existence only when, through a conscious decision, we convert them into objects worthy of reflection and susceptible to be subsumed under a generic category of phenomena. As a consequence, a notion of 'soil' emerges from the interface between our body and its setting, a domain federating a medley of ill-assorted facts that amalgamate impressions and degrees of resistance, specific kinds of knowledge and know-how, sensible qualities and types of genesis, facts that can be rearranged so as to render manifest the properties they share in common. The soil then becomes singularised as a particular kind of existent, endowed with specific qualities that are thus liable to be studied in themselves and for themselves.

The present book results from this movement of autonomisation. Dealing with the 'cultural' aspects of the soil, as the authors do, implies a dissociation between, on the one hand, an object—the plastic upper layer of the terrestrial crust—the limits and basic attributes of which would be universally perceived and, on the other hand, the myriads of ways in which this object is apprehended, represented, interpreted and partially objectified by humans according to their location in space and time and as a function of their social condition and personal dispositions. Such a dissociation between a natural object and the multiple cultural accounts given

of it has emerged quite recently and it is associated with modernity as it blossomed in the West. It can be traced back to the rationalist revolution of the 17th century and to the distinction introduced by philosophers, notably Locke, between primary qualities and secondary qualities. The primary qualities of an object are its geometrical, mechanical and chemical properties that can be decomposed and measured (number, mass, speed, etc.), while secondary qualities are the fleeting or lasting impressions that these properties leave on our senses. Thanks to this subtle distinction, objective can be differentiated from subjective, natural from cultural, science from art; in short, all the categories by the means of which the Moderns conceptualize their engagement with the world become available. On the one side, we have the soil of pedology, this layer of matter resulting from the alteration of the parent rock material, that can be defined by its physical and chemical properties, on the other side we have the soil of the poet, of the visual artist working with a variety of media (the painter, the sculptor, the potter, etc.), of the gardener and, above all, of the multitude of non-Modern peoples, a bewildering array of variations, of points of view, of interpretations, dealing in their own ways with the solid mass of facts and processes, the mechanisms of which pedology has set as its goal to elucidate.

As a result one can even practice ‘ethnopedology’, as I did myself long ago among the Achuar Indians of the Upper Amazon. It means studying the soils of a region with the (much-needed) help of pedologists and geomorphologists, measuring their fertility and evaluating their fragility, prior to describing the uses that the local population make of them, the different types into which they divide them, the knowledge they have developed about them, the myths and narratives that relate to them. As if, by a miracle of universal reason, the subject matter of pedology (the word itself only dates from the end of the 19th century) had been universally apprehended as such since the dawn of times, as if all humans had an intuitive foreboding of the existence of the soil as a class of autonomous facts clearly demarcated within the perceptual flux by the means of which we continuously become aware of our environment. This is highly unlikely. A more plausible alternative is that, before the great Modern shift which instituted a separation between nature and culture, soil figured according to circumstances, and for such or such a person in particular, sometimes as a sensation under bare feet, sometimes as a potentiality to grow a specific kind of crop, sometimes as a mass to dig out when building an irrigation ditch, sometimes as a pigment for body painting, in short, as qualities referred to persons and their experiences, not as a material abstraction referred to a quantifiable abstraction.

This said, one does not escape easily from one’s own cosmology. In that respect it has become quite difficult for us, Moderns, not to conceptualise the world as being distributed between natural objects and the multiple ways in which they are perceived, between the domain of plants, say, or the domain of animals, or the domain of soils, and the various ways in which they are apprehended, named, classified and used by peoples around the world. Seen in that constraining context which forces us to juxtapose a single nature to many cultures, the present book retains its originality. Although it is modernist in its inspiration, and perhaps inescapably so, it provides nevertheless a wealth of information on a topic that has

been neglected and which can now be dealt with in a truly comparative manner. For, if the available literature on the history and ethnology of the representations of plants, of animals, of colours, of climates or of celestial bodies is vast, the study of the cultural perception of soils is still underdeveloped. Relating, as this book does, a non- human matter with human concerns thus helps remind the reader that the domains of inquiry carved out by the sciences in the texture of things do not exist as transcendental kingdoms but are the results of a long epistemological construction. After all, let's not forget that in Latin 'soil' (humus) and 'human' (homo) come from the same Indo-european root meaning 'earth'.

Philippe Descola

Introduction

SOIL —beneath our feet
—food and fiber
—ashes to ashes, dust to dust
—dirt

As reflected in a special issue of *Science* (2004), soil is the final frontier of environmental research. The critical role of soil in biogeochemical processes is linked to its properties and place—porous, structured, and spatially variable, it serves as a conduit, buffer, and transformer of water, solutes and gases. Yet what is complex, life-giving, and sacred to some, is ordinary, even ugly, to others. This is the enigma that is soil.

It has been said that “scientific advances do not truly become the possession of a culture until these discoveries are expressed through that culture’s art and poetry” (Frodeman 2003). For soils, no such cultural history has been written—that is our goal here. The view of “culture” in our book is, however, more expansive, both temporally and topically, spanning to antiquity and beyond just art and poetry. As soil is a key consideration in the everyday life of many, rather than an abstract scientific concept to a few, *Soil and Culture* explores the perception of soil in ancient, traditional, and modern societies. It looks at the visual arts (painting, textiles, sculpture, architecture, film and comics), the written arts (prose, and poetry), religion, philosophy, anthropology, archaeology, stamp-design and wine production. Like soils, humans dwell in the dark, as well as the light. Thus we have extended the reach of topics to such as disease and warfare.

Soil and Culture explores high culture and popular culture—from the paintings of Hieronymus Bosch to the films of Steve McQueen. It looks at the work of ancient societies and contemporary artists. Our contributors delve into the mind of Carl Jung and the bellies of soil eaters. They examine Chinese paintings, African mud cloths, Mayan rituals, Japanese films, French comic strips, and Russian poetry. Like the biodiversity that characterizes soils, we have gathered a diverse pool of contributors—poets, studio artists, gallery owners, farmers, philosophers, historians, geographers, geologists, as well as soil scientists.

We are soil scientists, and between the two of us, our work has spanned from the geochemistry of radioactive waste disposal to the transformations of soil organic

matter in tropical areas. Our profession has a big tent, and as well as our specialization, most of us have enjoyed exploring the territories within that tent that are less familiar, as well as the surrounding biological, physical and earth science-realms beyond those tent walls. With *Soil and Culture*, we are now going further from familiar grounds—not on a path of dilution, but rather one of enrichment and new perspectives—to see the realm that we study through other people’s eyes.

We hope that our readership will include our professional kin and neighbors. But we also hope to attract others beyond the neighborhood, and to further the possibilities of dialog beyond those boundaries in the future—soil scientists talking with and working with sculptors, philosophers, painters and environmental historians. The list of human endeavors touched by the soil is immense, and such non-traditional linkages would seem to be fertile grounds indeed. The soil is truly a wondrous zone—it has been called “the earth’s ecstatic skin” (Logan 1995), and we close with just a few examples to whet the appetite of those still testing the waters—not with an all-encompassing discussion of the mega-issues such as food production and biodiversity, but with a few snapshots of how soils function, how they interact with various components of the environment, how soils have been perceived in various cultures, and how soils help shape elements of our existence:

- A network of polygonal desiccation cracks is commonly seen in fine-textured soils when they dry. The eye-catching landscapes they create have long attracted the attention of photographers, and the processes governing these crack patterns have recently become a focus of study of physicists who are using mechanical forces and electrical fields as experimental variables to modify these patterns (*Physics Today* 2007).
- Leaf-cutting ants in Louisiana excavate soils for the construction of below-ground chambers in which they grow fungi on the harvested plant material. Ant activity is often high near roads, and this has resulted in sinkholes that have swallowed cars (Hooper-Bùi and Seymour 2007).
- “Mud pickles” are a traditional food in Japan’s Hokuriku District. Eggplants kept in the wetted, reddish-brown acidic soils, known as “aka-beto”, for nine days show a brilliant cobalt blue color (Tazaki and Kurashige 2000).
- Animal blood has been mixed with soil for centuries, with the practice being investigated into the 20th century as a way to produce weather-resistant building materials (Winkler 1956). In the 16th century, King Agokoli, in what is today Togo, was said to have put spikes in the ground to cut the feet of pedestrians and thereby produce blood-soaked mud for building walls (Zimmerman 2005).
- On Pentecost Island in the South Pacific, “land divers”—young men who today leap from platforms as high as 35 meters with vines attached to their bodies in a ceremony coinciding with the ripening of the yam crop—must touch the soil with their shoulders in a fifteen-century-old ritual that is said to fertilize the soil (*Glimpse Quarterly* 2008). At modern Catholic churches in central Africa, soil is brought to the church by local farmers at planting time for blessing by the priest to ensure freedom from thorns and other hazards, and for high crop yields (Aguilar 2002).

- At a Catholic shrine (El Santuario de Chimayó) in New Mexico dating from the early 19th century and now widely known as the “Lourdes of America”, nearly 300,000 pilgrims a year come to collect soil that is said to have healing powers when mixed with water and then eaten or rubbed on the skin (Rossbacher and Rhodes 2007).
- During the 19th century, the ends of limbs of trees outside the homes of African Americans were sometimes capped with bottles containing soil from a grave. These “bottle trees” were said to ward off evil spirits. The practice is said to have come from the Bakongo people of west-central Africa (Old City Cemetery exhibit, Lynchburg, Virginia, 2006).

These examples show the complexity of physical-, chemical- and biological-processes operating in soils, and how soils touch people’s lives on a variety of levels—from the intellectual, to the pragmatic, to the spiritual. While scientists investigating soils can measure water infiltration pathways and rates, and use gas chromatography to investigate the release of volatile organic compounds, there is also a human component of such processes:

“To dig out the earth was to discover unusual treasures like pieces of colored glass, snail shells, and shard of pottery. To water the earth and see how it absorbs the water we provide is also a unique experience. To walk on the earth after a rainstorm is to be in touch with absolute fulfillment: the earth, satisfied, floods us with its well-being, while its many aromas saturate the air and fill us with life-creating impulses.”

Reinaldo Arenas
Before Night Falls

It is this interface of soil science and soil underfoot that our authors explore in *Soil and Culture*.

This book was neither conceived nor developed in a vacuum. It grew from a rich seedbed of interest in the heritage of soil science and the cultural importance of soil to society initiated in Commission 4.5 (History, philosophy, and sociology of soil science) of the International Union of Soil Sciences (<http://www.iuss.org>) by Dan Yaalon and Benno Warkentin. Their books (Yaalon and Berkowicz 1997; Warkentin 2006) continue to provide us guidance, and are indeed, lasting footprints in the soil.

Edward R. Landa
Christian Feller

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Part I
Soil and the Visual Arts

Chapter 1

The Representation of Soil in the Western Art: From Genesis to Pedogenesis

Christian Feller, Lydie Chapuis-Lardy, and Fiorenzo Ugolini

Preliminary remark on the word *soil*

Different people attach different significance to soil. Certainly this is the case for farmers as compared to typical city dwellers, and of course, for soil scientists compared to most other scientists and non-scientists. Consequently, the meanings and uses of the term *soil* are numerous. For the purpose of this chapter, *soil* when written with a lowercase letter, will be referred to the surface of the landscape. *Soil*, when capitalised, will refer to the Earth's surface layer—the pedological object—that if exposed in a vertical cut constitutes a pedological profile; a portion of that surface layer may include rock. A very large vocabulary is used for different Soils of the world and varies with the classifications. In this text the word “Lithosols” (French classification, Duchaufour 1982) is quoted, it refers to young Soils, mainly constituted from rocks debris by physical and chemical weathering of the initial rock; they are called Leptosols in the IUSS-WRB classification (1998).

1.1 Introduction

It is widely accepted that humans always have considered the natural environment a subject of great interest to art. Early pictorial examples include cave paintings done by Cro-Magnon man during the Upper Palaeolithic, about 30-40,000 years ago. However the vision of Soil, as an independent work of art, is recent and still extremely rare in the world of painting. For many years, artists have depicted

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actual or imaginary landscapes from which the trained eye of a pedologist, agronomist or geographer can recognise a schematic view of what is commonly called soil. The recognition of Soil must be restricted to surficial features, because deep cuts that exhibit the complete view of a Soil profile, as conceived by the pedologist, are rarely available. In fact, the three-dimensional view of Soil is not readily apparent on the landscape. What is commonly seen in the cultivated fields is what the soil specialist calls the “plough layer”, the upper 30 cm of Soil. This is the part that muddies your shoes and it is the reason why in English “soil” is called “dirt”! This image can hardly inspire an artist, except for a few such as Brueghel the Elder. What a Soil specialist, or more specifically a pedologist, has in mind is the Soil profile, a vertical cut at the surface of the earth that may show vivid, brilliant and contrasting colors. This is the sight that has inspired the abstract artists, so that Soil or soil has entered into art. In the scarce literature exclusively dedicated to soil and art, the work of the well-known Swiss-American pedologist Hans Jenny published in 1968 can serve as a basic reference to witness the evolution of the concept of soil in the figurative arts. Two other online publications are by Wessolek (<http://www.kunstundboden.de/>) and Hartemink (<http://www.alfredhartemink.nl/various.htm>).

While the lack of enthusiasm of artists for Soil is somewhat understandable, earth scientists in general, and soil scientists in particular, deeply regret that the Soil, as a physical entity in nature, is not given greater consideration within the entire education sector—from primary school to the college and university level. It is also regrettable that national and international policies do not systematically consider the soil as a natural resource to be protected; recently, however, some progress has been made at the European Union level, with discussion in progress on the “European Directive on Soils”. A good indicator of the current policy and of people’s perception of Soil is the absence of representation of soil in art, at least as a major focus in most artwork. There is also a lack of writing and documentation in art history on soil. As far as we know, no work dealing specifically with soil and art has previously been published, while there is abundant literature related to others natural objects and features, such as plants, terrestrial and aquatic animals, water, rocks and landscapes (Carli 1980). Famous artists of the past even specialized in such themes, like Brueghel de Velours with flowers and animals, or Paulus Potter with cows.

However, even if the Soil is not the chief subject of independent artwork, it is perceived and included as a part of the landscape. The depiction of Soil or soil can have either a symbolic or a realistic aspect in the context of religion, history, science, and art for a given historical period. This chapter will: (i) show representations of Soil or soil in Western Art from the Palaeolithic to the modern era, and (ii) show some recent artworks where the Soil is considered as the main subject, and has as its goal to present Soil in art from Genesis (the Bible) to Pedogenesis (the scientific approach of the Soil formation, from the Greek word *Pedon* meaning soil).

1.2 When Soil is Depicted by Chance in the Landscape: The Soil as a Surface

1.2.1 *Prehistory and The Bible*

Cave paintings were produced by upper-Palaeolithic artists about 40,000 years ago. These paintings are linked to Nature only through hunting or fishing scenes, with drawings of wild animals and sometimes with parts of human body, usually the hands. Scarcely represented are other natural subjects, such as plants, and features of the landscapes; to a larger extent, soils are neglected. However, one exception is observed on the web site “Memo, le site de l’histoire”, section “les cultures lithiques européennes” [http://www.memo.fr/Article.asp?ID=PRE_PAL_005 (in French)]. It concerns the Magdalenian and Hamburgian time periods (about 15,000 BP). Artistic representations from these periods, at Teyjat and Le Chaffaud in France, and Pekárna in Moravia, depicted herds moving on a landscape including a sketch of the soil surface. However, even if these depictions of hunting activities were extremely realistic, the specialists all agree that they were more symbolic than functional. In other words, except for the Lithosol of the pedologists which is the rock itself (!), no soil is represented in the caves.

In the biblical Genesis story of the World creation, the whole of humanity is “soil”. In fact, Adam (meaning “soil” in Hebrew) was created from red dust and returned back to it. In addition, Chouraqui (1989), in his literary translation of the Bible, called the first man “Adam the Glebe” (Glebe in the archaic sense of soil or earth, or dirt, mud or clay), so that the depiction of Adam can be considered as a “soil” representation. But without going so far back in history, it should be mentioned that numerous past engravings and paintings depicted Adam coming out of the soil. As descendants of Adam and Eve, people are “doubly soil”, since Eve (meaning “life” in Hebrew) was made from Adam, who in turn was made from soil. Thus, Adam and Eve were soil and life.

1.2.2 *Antiquity*

The few extremely schematic representations inherited from the Assyrian civilisation (11th to 7th BC) depict natural scenes in which the soil surface is represented by schematic rocks and hillocks, drawn as shaped curves (Parot 1961, p. 40). Such representations are also observed throughout the Middle Ages (see below). Although it is known that the Greeks made decorative paintings, very few traces have been found, except for frescoes of Aegean art coming from Santorini (also known as Thera), dating from the 5th century BC (Carli 1980, p. 21). Later on, paintings on pottery remains have aided in deciphering the Greek perception of soil. Landscape was seldom represented on the ceramic objects, so no soil appeared. In the representations

of agriculture and the goddess Demeter (Ceres in the Roman mythology), the only symbols displayed were those of the plough and the grain bundle.

Wall paintings were widespread in the Roman civilisation as decorative art designed in a truly realistic style that would never be seen again until the Early Renaissance. Beyond the pleasure of the flesh depicted at Pompeii, Nature was represented through flowers and birds, as well as other animals. However, relatively few representations of the landscape stood the test of time (Carli 1980, pp. 12 and 24). They were probably simply lost. It cannot be imagined that the Roman society with its large concern for agriculture (*e.g.*, agronomic writings of Cato the Elder, Pliny the Elder, Varro, Columella, Virgil and others) failed to have any pictorial representation of the landscape.

1.2.3 *The Middle Ages*

The Middle Ages period produced many representations of rural landscapes that included the soil surface. However, religious or mythological works presented in this section need to be distinguished from the secular ones, which could be considered rather as technical and pre-scientific representations. These latter illustrations came either from treatises on agriculture or the “Très Riches Heures”, a famous illuminated manuscript of the 15th century that will be discussed later in the chapter.

From the Byzantine period of the Early Middle Ages (6th century), many mosaics depicted rocky landscapes. Thus, at Ravenna in “Moses Receiving the Tablets of the Law on the Mount Sinai”, the schematic forms anticipated what would appear in the mosaics or paintings of the Late Middle Ages (Carli 1980, pp. 28 and 32), with soil represented only with a single line, and rocks and/or hillocks drawn as shaped curves. However, between the 5th and 12th century, the representations of soil surface or landscapes are very often strongly schematised with undulating lines or hillocks, as in religious miniatures (Fig. 1.1). During the Middle Ages, under the influence of Christian cosmology, the landscape painting styles inherited from the Romans and the Byzantines moved to an oversimplification, as the World vision of that period became more spiritual. Actually, Nature cannot be objectively represented unless is freed from its magical aspect; we have to wait until the Renaissance before this occurs (Lenoble 1969).

During the Roman period, rocky landscapes were drawn in a way that today would be described as either infantile or stark modern (Carli 1980, p.36: Nepi, Fresco, late 11th century, the three horsemen of the Apocalypse). An example is a detail of a miniature by Stephanus Garcia in “The Apocalypse of Saint-Sever”, a French Romanesque illuminated manuscript from the 11th century. In “The Fall of Hail, Fire and Blood On The Earth” soil and roots were simply depicted with an undulated line on a large yellow colored area (Carli 1980, p.35: The Apocalypse of Saint-Sever, a miniature from the collection of “Bibliothèque Nationale de France”). Until the 14th century, there was almost no realistic design in soil representation. Artwork from that period was meant to be read as a group of



Fig. 1.1 « Tentation du Christ » (*Temptation of the Christ*), 12th century, Anonymous, Bibliothèque nationale de France (Manuscrits occidentaux, Copte 13, fol. 9v), Paris, France (see as color plate following *Index*)

symbols, even representations that seemed realistic, such as animals on the decorated Romanesque capital letters written on parchment. This tradition has continued until the 16th century. Famous painters continued to depict soil symbolically in their work related to religion and mythology as in “Adam and Eve” and Cranach (1472-1553) in “Venus in a landscape” (Fig. 1.2).

1.2.4 The 14th Century and the Renaissance: Realism in Landscape and Soil Representations?

The Florentine painter Giotto (1266-1337) made a decisive break with the static Byzantine style, introducing realism. His paintings of rocky landscapes were among the first that included some perspective. Other Italian painters from the contemporary Giotto’s Sienese school developed a similar naturalistic style: Duccio di Buoninsegna (1260-1318), Simone Martini (1284-1344) and the Lorenzetti Brothers (1280/1285-1348). Duccio, and more than a hundred years later, Andrea Mantegna (1431-1506) were leaders realistic representation of rocky landscapes. For that period, Ambrogio Lorenzetti’s fresco “Good Government, Bad Government”



Fig. 1.2 « Vénus debout dans un paysage » (*Venus standing in a landscape*), circa 1529, Cranach the Elder, Musée du Louvre (Inv. 1180), Réunion des Musées Nationaux (RMN), Paris, France. Photo J.G. Berizzi (see as color plate following *Index*)

(1338) was a pioneering landscape representation, with striking realism in the depiction woody hills and fields surrounded by cypress trees.

A century later, realism in landscape painting was more fully expressed in the “Miraculous Draught of Fishes” (1444), a memorable work by Konrad Witz (1400-1446). With the artist-rendered landscape perfectly depicting the surroundings of Geneva, the painting is considered a landmark in the history of Western landscape painting. The representation of natural sceneries was afterwards more realistic and the soil surface was depicted with numerous forms. The landscape watercolors by Albrecht Dürer (1471-1528) became famous for their modernity, as did the summer and winter landscapes painted by Peter Brueghel the Elder (1527/28-1569). Dürer’s paintings were imbued with realism when depicting still

life rather than religious or mythological subjects, but like Cranach, his soil representation was elementary, as for example in “Adam and Eve” (1507) (http://en.wikipedia.org/wiki/Adam_and_Eve).

During the Renaissance, the soil, as a surface, is generally represented in a highly realistic way, even for symbolic and/or imaginary landscapes. Such realism sometimes allows one to discern the Soil profile with different colours given to the surface soil and to deep horizons, as, for example, in the works by Hans Memling (1430-1494) of “The Last Judgment”, *circa* 1470) ([http://en.wikipedia.org/wiki/The_Last_Judgment_\(Memling\)](http://en.wikipedia.org/wiki/The_Last_Judgment_(Memling))) and Hieronymus Bosch with his “St John the Baptist” (*circa* 1500) (see section 1.3.2).

1.3 When Soil is Depicted by Choice in the Landscape: the Soil as a Profile

Three reasons motivated the representation of a soil profile:

- to explain the resurrection of the dead,
- to display the roots,
- to show ploughing.

1.3.1 *Soil Profile for the Resurrection of the Dead*

In the “Last Judgment” by Rogier Van der Weyden (1432) [Fig. 1.3, detail (a)] the resurrection of dead required the artist to show the Soil profile. The complete painting exhibits numerous such soil profiles. A detail [shown in Fig. 1.4, detail (b)] is so true to reality that it might be titled “Birth of a Pedologist”, and can be compared to a photograph of a desiccated and polygonally cracked clayey soil surface (see photo in lower right corner, Fig. 1.4).

1.3.2 *Soil Profile for Displaying the Roots*

In the paintings of the Renaissance, the representation of a ditch or a soil cut in a painting served very often as an excuse to picture roots. In the “St John the Baptist” by Hieronymus Bosch (1450-1516) the figure of St John leans towards a sharp vertical exposure of soil which includes a strange large root. (http://en.wikipedia.org/wiki/St._John_the_Baptist_in_the_Wilderness).

A large root also appears in “The Tempest” painted by Giorgione (1477/78-1510) ([http://en.wikipedia.org/wiki/The_Tempest_\(painting\)](http://en.wikipedia.org/wiki/The_Tempest_(painting))) and in “The Fall of Icarus” (Fig. 1.5) by Peter Brueghel the Elder (1525-1569), just at right and behind the



Fig. 1.3 Detail (a) from « Le Jugement Dernier » (*The Last Judgement*), circa 1432, Van der Weyden R., Musée Hôtel-Dieu, Hospices Civils de Beaune, Beaune, France (see as color plate following *Index*)

ploughman. These works were just some examples of paintings in which large forked roots were made evident.

The representation of roots was not due to chance, but chosen for its symbolic value. The root presented in detail in the foreground of the “St John the Baptist” painted by Bosch or “The Fall of Icarus” by Brueghel (Fig. 1.5), could be from the mandragora as suggested by Marjnissen and Ruyffelaere (1987). The roots of *mandragora* genus (mandrake) were extensively used in magic rituals.

The famous French dictionary Le Robert (1966, p. 250) gave the following definition (translated from French):

Mandragora- n., Bot. A dicotyledonous plant, of the *Solanaceae*, family with generally forked roots showing a basic similarity to a doll (Fig. 1.6); it produces yellowish fruits with an unpleasant smelling and taste. *Mandragora officinarum* has narcotic and purgative



Fig. 1.4 Detail (b) from « Le Jugement Dernier » (*The Last Judgement*), circa 1432, Van der Weyden R., Musée Hôtel-Dieu, Hospices Civils de Beaune, Beaune, France. The box in the lower right corner is a photograph of a desiccated and polygonally cracked clayey soil surface (see as color plate following *Index*)



Fig. 1.5 « La chute d'Icare » (*The Fall of Icarus*), circa 1568, Bruegel P.I., Musées Royaux des Beaux-Arts de Belgique, Brussels, Belgium (Inv. 4030). Photo : RoScan, J. Geleyns (see as color plate following *Index*)



Fig. 1.6 « Flore Mandragore » (*Mandragora flora*), 15th century, Anonymous, Bibliothèque nationale de France (Manuscrits occidentaux français 12322, fol. 180v), Paris, France (see as color plate following *Index*)

properties. Formerly used as a talisman when carved. (French) vernacular: Main-de-Gloire, aphrodisiac and fertility properties were assigned in past times to the mandragora...

“Transcendental Magic, its Doctrine and Ritual” is a treatise written in 1855 by French occultist Eliphas Levi; chapter 16 therein (Levi 1896; in English) is concerned with mandragora and can be consulted for more information on the subject.

The perception of mandragora as the subject of superstitions is presented in the “Encyclopédie des Symboles” (1996) through the following comments (translated from the French):

Mandragora is a plant with a high symbolic value, inspiring both fear and fascination. Its forked root which crudely resembles the human form has been credited since ancient times with a divine origin. It is considered as a universal medicine. The mandrake grows only at night, releasing some toxins (hyoscyamin, atropin, scopolamin) with a narcotic effect. For this reason, the root was used by medieval witches to concoct potions, and it played a remarkable role in the occult practices. According to the legend, the root grew only beneath gallows trees as it was believed to be produced from the semen involuntarily ejaculated by a hanged man. It has to be gathered with high caution, and it was said that the mandrake gave forth an extremely piercing and fatal cry. It was uprooted, therefore, by a dog that died immediately after. During Antiquity, the mandrake was considered as one of the attributes of the sorceress Circe. The root was used by the Jews to overcome infertility. In general, mandrake was associated with black and supernatural forces that man would approach with many precautions.

The book by Jeanne Bourin (1990) on “The Rose and the Mandragora” provides additional information on the supernatural powers ascribed to mandragora. A history of the scientific properties and medical usage (pharmacology and anaesthetic effects) of mandrake was recently published by Hotton (2003).

The short book by Gustave Le Rouge (1912), one of the pioneers of science fiction, is a well-documented source, providing additional some useful information on beliefs about mandragora:

- The perfume of the mandragora’s flowers can resulted to giddiness and a death-like sleep for anyone who inhaled it (p. 8), while the root has erotic and aphrodisiac virtues (p. 18).
- According to the alchemists and physicians of the Middle Ages, the first men were gigantic mandragores. In other words, humans originated from the mandragora that in an evolutionary sense, was a transition between the plant and animal (human) worlds.
- Snakes are especially loathed to mandragora, and its root can serve as an antidote for their bite; in fact, Eve could have used the mandragora as an antidote for the serpent (p. 22).
- Its root is thick, hairy and forked (p. 13), in a humanoid form;
- According to rabbinic traditions, the mandragora has grown in the Terrestrial Paradise in the shadow of the Tree of Knowledge of Good and Evil. Man has come from the silt of the Earth, so that he was probably molded at an early stage in a root.
- The fame of the mandragora reached its apogee during the Middle Ages. Just the mention of the *mandragora*’s name sent men trembling, and people avoided thinking of the “plant-human”. When gathered, the root shrieked, and beads of blood squeezed out on its rootlets. But the one who got it became rich and happy forever...and stored it safely in a moneybox. Therefore, the mandragora became the source of a thriving trade. The mandrake could worth 2 to 3 times its weight in pure gold, especially if its form perfectly resembling the human body or attributes (p. 23-24).
- The mandragora was associated with Saturn (p. 29-30).
- It is associated with, or even mistaken for, other magical creatures such as “Teraphim”, “Androids”, “Golem”, “Homunculus” (p. 35). The alchemists tried

to produce such viable creatures, and numerous narrations reported the production of an artificial humanoid in an alembic after mandrake distillation.

- Finally, many pages of Le Rouge’s book (p. 117-144) described in detail the process of gathering the root beneath a gallows, either by the alchemist himself, or by a virgin. The young lady used her blond hairs to braid a rope that she tied to a dog’s tail. She attached the other end to the plant stem, and then she scared the dog, so that in running away, it pulled out the sought-after root. The root was replanted in a red soil, and to maintain its vitality, it was doused with the blood of an animal whose sacrifice was dedicated to Saturn. Many details are presented above to underscore the importance of the symbolism surrounding the mandragora root, not just in the realm of magic and the hidden forces of nature, but also for the link to the Bible, and in particular to Genesis.

The mandragora was depicted in manuscript illustrations dating to the Middle Ages (Fig. 1.7). Inherent symbolism in paintings that pictured the mandrake is well established:

- It was associated with people closely related to the life of Jesus, such as in “The Worship of the Shepherds” by Peter Brueghel the Elder or in the “St John the



Fig. 1.7 « Récolte de la Mandragore » (*Mandragora harvesting*), 15th century, Anonymous, Bibliothèque nationale de France (Manuscrits occidentaux français 14969, fol. 61v), Paris, France (see as color plate following *Index*)

Baptist” by Hieronymus Bosch. In such cases, the mandrake might be the symbol of the fight against sin (antidote for the serpent). Moreover, the figures often wore red fabrics, the red being the colour referring to Adam and to Christ. For instance, during the mid 18th century, Johan Gottschalk Wallerius (1753) mentioned “Adamic Humus”, meant to be refer to a reddish earth, in his “mineralogical” classification of “humus”.

- The painted figures associated with mandrake are generally presented as having a melancholy temperament. Moreover, according to popular belief, “melancholia” is a disease affecting the artists. But the mandrake is also a symbol of Creation; its positive and negative aspects, as depicted in Bosch’s “St John the Baptist”, show that mandrake might be associated with both melancholia and the creation (in reference to Christ). As a last example, in his painting “The Magpie on the Gallows” (1568), Brueghel the Elder felt a need to depict a soil profile as well as a mandrake under the gallows (http://en.wikipedia.org/wiki/The_Magpie_on_the_Gallows).

In conclusion, the mandrake as an edaphic (and telluric) object is a significant symbol in the paintings of the Middle Ages and Early Renaissance. A more complete study of its symbolic importance in the arts is needed. That is also the case in literature; the mandrake is a central subject in the book “Vendredi et les limbes du Pacifique” by Michel Tournier (1972).

1.3.3 Soil Profile Displayed by the Ploughing

From the 14th and during the 15th century, especially in the “Très Riches Heures” and the “Calendriers” (calendars), we see representations of agricultural tasks and tools. Here, the soil is depicted with a clear concern of realism and technical specificity (Fig.1.8), including the tilling of the soil. Herein is an early artistic and technical representation of what agronomists and pedologists describe as an agricultural profile. In addition to this example, Peter Brueghel the Elder (1525/30-1569) might be newly cited for “The Fall of Icarus” (Fig. 1.5). Icarus is the tiny figure at the bottom on the right-hand corner, with only his legs visible, while in forefront of the canvas, attention is centered on the good Flemish ploughman tilling furrows. That was the triumph of daily working life over Utopia (“falling from the sky”). Beside the ploughman serving as a reference for agriculture, Brueghel the Elder did not fail to symbolize other of the world’s riches—animal husbandry in the form of the shepherd leaning on his staff, and the wealth of the sea shown in the form of a busy fisherman. It should be also noticed that forked roots are included in the agricultural profile—perhaps meant to be mandrake!

The symbolism associated with mandragora, in line with the heavenly utopia of Icarus, might be related to the earthly utopia that includes a desire for wealth and power. Nothing is better than a good ploughing to obtain resources from the Earth, rather than expecting those from Heaven. Icarus is seen flailing in the water, but is ignored. Other explanations were given, such as an illustration of an ancient Flemish proverb “No plough stands still because a man dies”. Brueghel the Elder