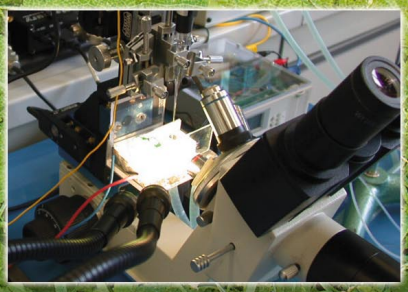
A sensational discovery that will change the way we look at our planet for ever!

The intelligence of plants

A documentary of 52 minutes
by **FABIO TONCELLI**
& **FRANCESCO TANZI**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The intelligence of plants

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THE INTELLIGENCE OF PLANTS

"Look out, that bean is watching us!"

by

Fabio Toncelli
& **Francesco Tanzi**

We have always searched for new forms of intelligent life in the universe, prompted by the hope of discovering that we are not alone in the apparently infinite time and space of the cosmos. But are we sure that if this long-awaited encounter ever occurs, we humans will be able to recognise an intelligent life form? In other words, the fundamental and rather ironic question is: do we really understand what intelligence is?

The intelligence of plants

▶ INTRODUCTION

For the first time, this documentary tells the story of the extraordinary scientific research project that could revolutionise the way we look at the world around us. Perhaps we don't need to explore the far reaches of the galaxy to discover other forms of intelligent life. These forms are here under our very eyes, growing silently everywhere, even in our own homes. These "aliens" live in a kind of parallel world. And you know what the most embarrassing part is? They've been here for quite a while, several millions of years before us! So, what do you think: do you want to meet the aliens? Do you want to cross the threshold that separates us from this mysterious dimension?

Ultra-modern microchips capable of revealing the tiniest electrical signals within roots in search of the electroencephalogram of a plant;

Spectacular high altitude parabolic flights on a giant European Space Agency Airbus to study the how plants react to a lack of gravity.

The first moments in the life of a cybernetic "plantoid", an ingenious robot plant designed to colonise space;

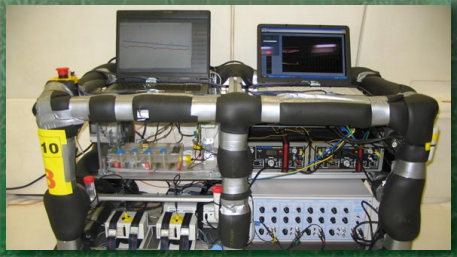
The very latest electron microscope used in a "Fantastic Journey" to follow the exchange of chemical substances within plant cells;

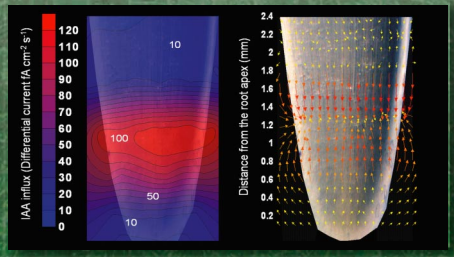
The administration of substances active at the human neuron level to test similar reactions in plants;

The proof that plants can do two things that we believed only animals were capable of: remember and rest.

All this, and more, is part of an extraordinary scientific adventure that starts in a laboratory in the University of Florence, in Italy, and in Bonn in Germany; the search for the final proof that the plant world contains intelligence. In other words: "the discovery of plant brains".

This documentary tells the story of this extraordinary discovery, one that forces us to completely rethink the way we look at the biosphere and the very concept of intelligence.





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▶ A BRIEF HISTORY OF A REVOLUTIONARY IDEA 4

Professor Stefano Mancuso of the Faculty of Agriculture at the University of Florence has created a completely new scientific discipline: "plant neurobiology".

Based on an intuition of Charles Darwin, Mancuso studied a particular area of plants that contains the "plant brain": the "root apex".

In 1880, the great British biologist and his son Francis published *The power of movements in plants*, which contains the following passage: *"It is hardly an exaggeration to say that the tip of the radicle thus endowed, and having the power of directing the movements of the adjoining parts, acts like the brain of one of the lower animals; the brain being seated within the anterior end of the body, receiving impressions from the sense-organs, and directing the several movements."*

Darwin was struck by the extraordinary ability of the root apex to perceive many environmental stimuli at the same time, and to be able to take a decision and move in reaction to these stimuli.

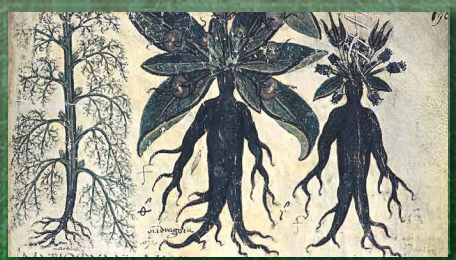
Over a hundred years after Darwin's intuition, the presence of an information processor at the apex of the root is now an established fact.

"A plant is like an animal standing on its head", and thus the roots are the main organ.

The entire root system guides the plant like a kind of collective brain.

Plant neurobiology studies the way in which plants memorise information deriving from the surrounding environment and work out a coherent response to a stimulus.

The theory that the root apex could be the processing centre for the whole plant needed to be proved by comparing plant cells and neural cells from animals and seeing if plant cells functioned like synapses. Working in this area Prof. Mancuso's lab has been able to prove the existence of a neuronal-like activities and plant synapses. That means that thinking, deciding, remembering and resting are concepts that are beginning to appear in the study of plant life.



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▶ A BRIEF HISTORY OF A REVOLUTIONARY IDEA 5

Experts in this new scientific discipline have set up a Society for Plant Neurobiology, and a journal, *Plant Signaling & Behavior*. The world's first laboratory specialising in this subject is located in Tuscany and is destined to become a leading centre in this field.

"It's time to welcome plants to the list of intelligent organisms," according to Peter Barlow from the School of Biological Science at the University of Bristol. Further proof of "plant intelligence" comes from how they cope with problems. In fact, plants act using the same trial and error system as animals: when they have a problem they try to find the best solution, which they then remember when faced with a similar situation.

At the end of our story, we will discover that these strange beings with their odd shapes, with stalks, leaves, flowers, stems and roots are living organism that we do not yet fully understand. They are life forms that are revealing themselves to us for the first time in mankind's long history.

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A first draft treatment

1. A small internal terrace among the rooftops of Florence. In the background the dome of Santa Maria del Fiore, the Giotto belltower and that of Santa Croce.

Some boys are playing with a ball on the terrace's restricted spaces. Their feet and legs move in strange shapes as they try to get the ball. Their mother and perhaps the grandmother and little sister are sitting at a small marble table shelling the beans they are going to cook for lunch. Suddenly, the ball hits the table, causing pandemonium. The beans fall on the ground, scattering everywhere. Just one of them falls into a large flowerpot near the table.

The boys stop playing and leave the ball on the terrace.

Silence.

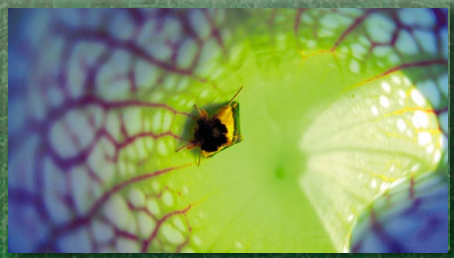
Our bean's adventure has begun.

2. Opening titles. Zoom inside the vase, down to the soil. Using time-lapse photography we see the roots beginning to explore the soil.

Hidden in the pot is a stone, Even though it is a small, it is a difficult obstacle for our little plant to overcome. Little by little the root grows and gradually feels its way over the surface of the stone until it is able to pass it and find its way to the nutrient-rich soil.

Opening titles finish zooming out of the plant pot. Thick black clouds gather in the sky over Florence.

It's goingto rain.



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▶ TREATMENT

3. Professor Stefano Mancuso enters the Florence laboratories of the International Plant Neurobiology Laboratory (LINV).

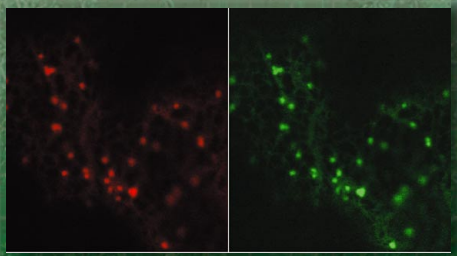
Eleven researchers from various European countries currently work there. It is a rare (if not unique) example of a "brain drain" *towards* Italy.

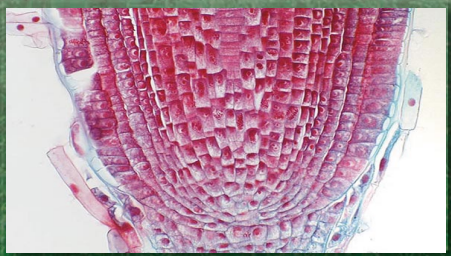
Prof. Mancuso introduces us to a crucial experiment: *"After a number of experiments on the root apex, my colleagues and I realised that this part of the plant (the first 5 mm. of the root) consumed more oxygen than necessary for the functions that it was thought to perform. This could be a sign that the root apex was performing functions that we were not yet aware of."* But why did it need all this oxygen? What could the secret activity of the root apex be?

4. A nineteenth century laboratory with plants in Victorian style greenhouses. Charles Darwin and his son Francis wrote The Power of Movements in Plants in 1880. The book describes the great biologist's surprise at the behaviour of root apices: *"It is hardly an exaggeration to say that the tip of the radicle thus endowed, and having the power of directing the movements of the adjoining parts, acts like the brain of one of the lower animals; the brain being seated within the anterior end of the body, receiving impressions from the sense-organs, and directing the several movements."* Francis carries out experiments, guided by instructions from his father.

5. Excited by these results, the LINV staff carry out a further experiment. The root apex area is subjected to a variety of stimuli. Each time they find that in situations of stress it is this area which responds first to external stimuli. Could the root be performing neuronal-like activities? Could there be a plant brain?

6. Not far from a still-active volcano, such as Stromboli, it is possible to reconstruct how plants conquered territory. We can identify specific areas with different types of vegetation. First there is the sterile zone where lava has recently been deposited; then an area with a little vegetation; and then an area where the volcanic material has been present for four years and vegetation is flourishing. Capraia. The island on the Tuscan archipelago has a rich variety of plant species. The spring flowering season is a wonderful display of every type of shape and colour. But the island has one particularity: it is made up of volcanic material. It is thus extremely hostile to plant life. If the soil is sterile, we can be sure that the first living organism to explore it will be a plant.





7. PLANTOID – The discovery of plants' great ability to explore is giving rise to new possibilities in the field of robotic science. The Plantoid is the first robot designed along the lines of a plant brain. It is a seed that, placed on any kind of soil, will develop roots with sensors that explore the subsoil and a tree-like plant whose leaves consist of solar panels. Stefano Mancuso and the Micro-Engineering Research Centre (CRIM) in Pisa are working on the prototype. The CRIM is part of the Scuola Superiore S. Anna . The CRIM laboratory it is a world's leading center in the field of robotics and has already carried out advanced projects in collaboration with the ESA and other European bodies. The Plantoid could be ready by the end of 2007 and the roots already visible by 2007. This plant robot could be used to explore new territories (in particular on planets within our solar system) with considerable advantages over robots based on animals. It could also be used for minesweeping.

8. The little bean plant is beginning to develop. Some shoots are growing rapidly and head out into the surrounding area to explore.

The children on the terrace are playing blind man's bluff. Blindfolded, they trip over, and bump into each other. They search for something to hold on to. The bean shoots are also moving in search of something to grab onto and climb up. Shot using time-lapse photography, they seem to move rapidly. Finally, one of the shoots becomes aware of the wrought iron fence around the terrace. It rapidly begins to wind round it. The children also find something to hold on to. One of them grabs onto the fence right next to our bean. The way the bean develops is very odd. It is a type of liana. In a tropical forest, for example, these plants dominate those with stems, since they waste no energy forming a resistant stem, but exploit the strength of other plants.

9. On the terrace on the rooftops of Florence, our bean is in good company. The plant community it belongs to not only includes other types of bean but also tomato plants and sweet peppers. Jorge Vivanco is plant ecologist at the University of Colorado. Plant neurobiology arose as a result of work carried out in the field of plant ecology. Prof. Vivanco shows us a very complex plant community.

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10. Results of the research so far seem to confirm the presence of a plant brain. That is why Prof. Mancuso and his colleagues are about to try a new experiment. They want to see what happens if the root apex of a (bean?) plant is brought into contact with an animal neurotransmitter. If the root reacts, we have shown that plants have cells that behave like ours. And, as expected, the most common animal neurotransmitters are recognised and used by the cells of the root apices. In a way, they behave in a very similar fashion to the neurone of the brain.

If we then go even further and increase the amount of neurotransmitters we administer, the roots begin to twist around themselves and go crazy.

11. A large vineyard in Montalcino.

Two glasses of wine. The owner of the vineyard, Signor Cignozzi, and a colleague are testing the bouquet, aging and the flavour of the wine. As they drink, they talk of the long, hot summer.

The grape vine is a rare example of a domesticated plant. It is a kind of "farm plant", just like farm animals. In fact, the wild version of this plant (also a liana) exists as separate male and female plants, while the cultivated version grown in vineyards is hermaphrodite, with both male and female sexual organs on the same plant. It is as if the vine has adapted to living "on the farm".

12. The British plant biologist Peter Barlow opens an original copy of Charles and Francis Darwin's *The Power of Movements in Plants*. He stops at a page where the famous English biologist is excited to observe that plants move. Barlow explains how Darwin used repeated measurements to check the imperceptible movements of plants. During his explanation we can return to the Victorian greenhouse where the experiment is being carried out. (Plants that can be used for the experiment: *Cassia and Desmodyum girans*).

13. We observe a *Mimosa Pudica* plant. An insect is buzzing round it. It could disturb or attack it.

At a certain point, our potential attacker tries to land one of the plant's leaves. The response is immediate. And surprising. The leaf closes in the bat of an eye. The insect is frightened and flies away. The plant responds in the same way to rain and wind.

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14. Stefano Mancuso explains the movement of plants.
Such a rapid response to a stimulus as that of the *Mimosa Pudica* requires an enormous communicative ability between peripheral sensors and the brain. How can this exist in the absence of neurons and synapses? Let's do another experiment. Let's chloroform a *Dionea Muscipula* plant. Commonly known as the "Venus flytrap", this is the most famous of the carnivorous plants. It uses its leaves to capture insects. The leaf that closes rapidly when an insect touches it for a second time is usually kept open. This requires a continuous effort on the part of the plant (the natural rest position for the trap is closed). Once chloroform is administered, the plant sleeps and therefore begins to close all its traps. The chloroform has acted in its usual way and caused the plant to go to sleep. But we know that this substance only acts on the receptors of the brain. So how can it work on a plant?

15. While we wait to find out how all this can happen, let's enjoy one of the great spectacles of nature. A true plant ballet. Their natural movements (not speeded up) could be set to music (a waltz, for example). Some plants have movements so rapid that there is no need for stop-motion photography to make them visible. The dance will be made up of the movements of the *Mimosa Pudica*, the *Desmodium Gyrans* (the so-called "dancing plant") and the *Dionea Muscipola* (a carnivorous plant).

16. The idea that plants have a kind of brain made a fundamental step forward at the end of the 19th century and the beginning of the twentieth. In the course of his experiments the Indian physicist Jagdish Chandra Bose demonstrated that there was a profound similarity between the plant and animal world. He personally constructed some extraordinary machines to use in his experiments. These machines are now in the Bose Institute (with a number of centres in India and the United States). Among his many achievements, Chandra Bose made some fundamental discoveries that enabled Marconi to invent the radio.

17. Attack and defence are two of the most common types of behaviour in the natural world. We will analyse their principles. We will discover that plants also struggle for survival, often fighting violent, bloody battles. Our bean on the rooftops of Florence is not safe from

attack by insects and disease. A predator's attack takes it by surprise. It immediately activates its defensive strategies. At the same time, it uses a chemical language to warn other members of the community on the terrace. After a few hours the all clear can be given. The defence systems these plants are able to use are very interesting. A large worm attacks a tomato plant. It begins to systematically devour the leaves. Immediately, the plant begins to produce an enzyme that the aggressor is unable to digest. There are even more sophisticated defence systems where plants produce a chemical signal to attract the enemy's natural predator.

18. DARWIN: reconstruction, using a yet to be selected extract from *"The Power of Movements in Plants"*, of one of the Darwins' most fundamental discoveries. It came about when they realised that plants have a sense of gravity. If a plant is tipped over and the reciprocal position of the roots and stem is measured, we discover that the plant continuously tries to find a position in line with gravity.

19. PARABOLIC FLIGHTS – ESA experiments into how plants behave in the absence of gravity. Our bean could enjoy a unique experience, it could fly. The experiment consists of a series of parabolic flights. At the apex of the flight we experience a few seconds without gravity. This situation overturns the most absolute and fundamental fact of life on earth, the fact that we each have weight and carry the weight of the atmosphere on our shoulders every day. The sudden lack of this requires the brain to make significant adjustments. In this situation plants respond immediately with what is known as the Oxidative Burst, a sudden burst of oxygen.

20. Stefano Mancuso explains, showing us a series of experiments he is supporting. The particularity of the cells walls of plants is their neuronal-like function. Using the LINV's powerful microscope (with a laser focus) we can observe the movements of the proteins through the cell walls. In particular, we can observe how the intercellular traffic occurs in a particular way, a process known as vesicular traffic. This way of exchanging substances between cells is much more present in the root apex. But vesicular traffic is also the main form of intercellular transmission in the brain of animals. Once again, is this merely an analogy?

21. The time has come for our bean to reproduce. We can observe its reproductive strategies.

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▶ TREATMENT

22. Capraia. The island on the Tuscan archipelago has a rich variety of plant species. The spring flowering season is a wonderful display of every type of shape and colour. In this season, it is clear that the symbiosis between plants and insects has reached a very sophisticated level. The strategies used to attract insects that will then move on to pollinate other flowers, are some of the most amazing. (Scents – chemical substances, pheromones – nectar – mimesis).

23. In the Max Planck Institute in Jena, Professor Wilhelm Boland (entomologist) shows us his world of little creatures. The communal life of insects could function as a collective brain. By studying insect colonies (ants and bees) we can start to understand how a collective brain works. Each root apex is a specialised, autonomous processor. The concept of a collective brain borrowed from insects can help us to understand how the plant brain works.

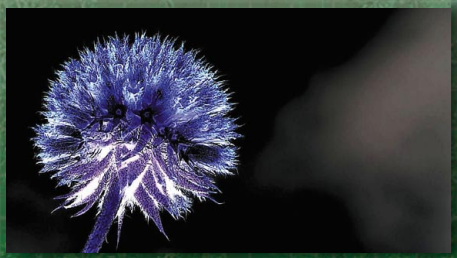
24. A much larger plant has been placed on the terrace next to the pot containing our bean. The bean now finds itself in the shade. This is serious because it will prevent our little plant from growing. We will observe the strategies our bean uses to reach the light. We can create a simple analogy with sunflowers.

25. On the terrace the mother is feeding the youngest of her children with a spoon.

26. Parental nurturing in the beech woods of the Casentinesi Forest. Newborns have no access to light and are therefore fed by adults by means of the symbiotic fungi that grow among the roots of these plants.

27. The struggle to reach the light is one of the most common forms of behaviour among plants. This is the way that dominant, gregarious individuals are created.

In the Casentinesi Forest National Park two beech trees are trying to grow in the same place. The competition between the two plants is evident. Each of them tries to grow higher than the other to ensure that it has light. In the end, one of them will win, but all is not lost for the other tree. There are alternative strategies it can use, apart from growing tall.



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28. In the LINV we are experimenting with plants' ability to memorise information. When a blue light is shone on a plant (simulating shade), the plant tries to grow (believing that another plant is putting it in the shade). If we try the same experiment a few days later, the plant's responds much more rapidly. The problem and the solution have been memorised. Does this indicate a memory equivalent to those of animals?

29. We can hear music coming from the window of an apartment next to our terrace. Does the bean have sensors to listen to music? We can see certain positive responses to aural stimulus.

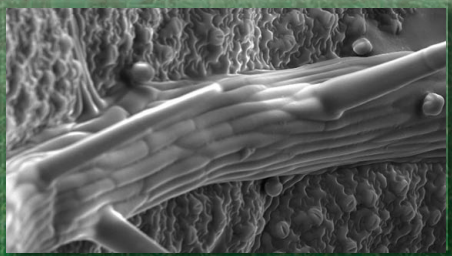
30. In Mr. Cignozzi's vineyard in Montalcino there is audio system alongside all the vines. Stefano Mancuso has studied and noticed certain changes in behaviour in the vines.

31. Do plants have senses like animals? We have seen that they can feel light, but does it make sense to talk of plants seeing?

At the LINV in Florence we reproduce a laboratory experiment that shows that plants have receptors to perceive blue light.

32. From the terrace among the rooftops of Florence we see the sun low on the horizon; it is sunset. The light slowly decreases and turns to blue. We look through the window and we see one of the children we saw playing on the terrace earlier getting ready for bed. His mother switches off the light and the child is soon asleep. The bean also makes several movements that seem to indicate it is ready to sleep.

33. We zoom out from a close-up of our now adult plant to the adjacent rooftops, then the neighbourhood, the city, the region and even wider. As the camera moves we explain a new concept of the biosphere in which plants once more play a central role.

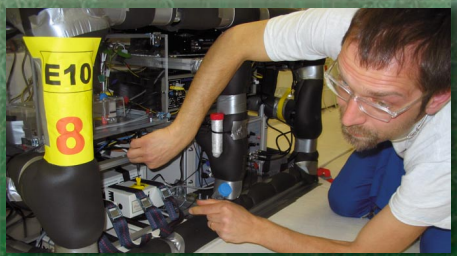


The intelligence of plants

Prof. Stefano Mancuso

PROFESSIONAL EXPERIENCE

- Lecturer in "tree cultivation" and "tree physiology" in the Horticulture Department of University of Florence.
- "Principal Investigator" of the "Perception of gravity, signal transduction and graviresponse in higher plants" programme at the European Space Agency. He led three of the ESA's parabolic flight campaigns (39th, 41st, 43rd) and one for the German Space Agency.
- Director of the LINV (International Plant Neurobiology Laboratory), the world's first laboratory specialising in the study of plant neurobiology.
- *Editor-in-chief* of international journal *Plant Signaling and Behavior,* published in America by Landes Biosciences.
- Referee for the following international journals: *Journal of Experimental Botany, Tree Physiology, Advances in Horticultural Science, Functional Plant Biology, Planta, Plant Cell and Environment, Cellular and Molecular Life Science, Physiologia Plantarum, Journal of Horticultural Science and Biotechnology, Seed Science and Technology, Plant and Cell Physiology, Plant Physiology, and Analytical Biochemistry.*
- He organised the "First International Symposium of Plant Neurobiology" in Florence in 2005, and was in the scientific committee of the "Second International Symposium of Plant Neurobiology" in Beijing in 2006 and the "Third International Symposium of Plant Neurobiology" in Strbske Pleso (Slovakia) in 2007.
- In 2002 he was elected a member of the Accademia dei Georgofili.
- In 2002 he won the *European Award for Research and Innovation* 2002.
- In 2003 he won the "Antico Fattore" prize.
- In 2005 he became a founding member of the *International Society for Plant Neurobiology.*
- Associated fellow of numerous international scientific organisations.
- Has published four books: "Plant Communication – neural aspects of plant life", "Rhythms in Plants", "Plant Bioinspiration" and "Plant Signaling and Behavior" published by Springer-Verlag, as well as over 150 scientific papers on plant physiology.



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Fabio Toncelli

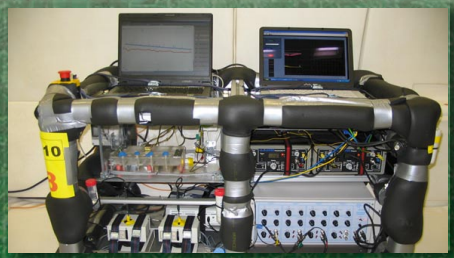
PROFESSIONAL EXPERIENCE

CINEMA

- 2001, script of the film ***"Se fossi in te"***, Cattleya Film
- 1998, director and writer of documentary film ***"Quando comincia il giorno: Tosamaganga, un ospedale africano"*** (Tanzania).
- 1995, script of the film ***"Cirano e i suoi fratelli"***, by Antonello Aglioti, selected for the 52nd Venice International Film Festival in the section "Finestra sulle immagini".
- 1992, script with Luca Morsella of the film ***"Non nobis: lo scrigno"***. Balcar Film
- 1990, script of the film ***"Nessuno mi crede"***, by A. Carlucci, Surf Cinematografica MDL
- 1988, script with Sergio Leone of the film ***"Un posto che solo Mary conosce"***. Leone Film.

TELEVISION

- 2005/2006 writer and director of the documentary ***"Andrea Doria"***, for **PBS** (USA), **RAI** (Italy) - **ZDF** (Germany) **SD Cinematografica**
- 2003/2004, writer and director of the documentary ***"Flying over Everest"*** for **BR** (Germany), **ARTE** (France), **RAI** (Italy) - **SD Cinematografica**
  - 1° prize at Chamois International Film Festival (Italy 2004)
  - Prix de l'exploit al St. Hilarie - Coupe Icaro Film festival (France 2004)
  - 1° prize at Festival internazionale del cinema naturalistico e ambientale - Teramo (Italy 2004)
  - Prize "Politecnico di Bari" at Catellana Grotte International film festival (Italy 2005)
  - **Prize "Sport Extreme" at Moscow Filmfestival (Russia 2005)**
  - **Prize "Best adventure Film" at Wildsouth Film Award (New Zeeland 2005)**
  - Prize "Silver Screen" at US International Film e Video Festival (USA 2005)
  - **Prize "Best adventure Film" at Mountainfilm in Telluride (USA 2005)**
  - Special award at Cervino International Film Festival (Italy 2005)
  - **1° Prize "Man and Mountains" at Film Festival Teplice nad Metujì (Czech Republic 2005)**
  - Special award at Jonio International Film Festival (Italy 2005)
  - Special award at Festival International du film d'aventure de Dijon (France 2005)
  - **1° Prize at Montreal International Adventure Film Festival (Canada 2005)**
  - Special award at Sport Movies & TV 2005 (Italy 2005)
  - Prize "Most Inspiring Adventure Film" at Wild scenic environmental film festival (USA 2006)
  - 1° prize "Leggimontagna" (Italy 2006)
  - Special prize at Festival Internazionale del documentario ornitologico (Italy 2006)



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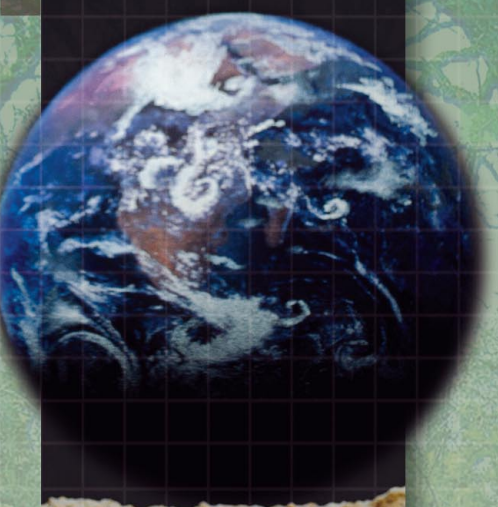

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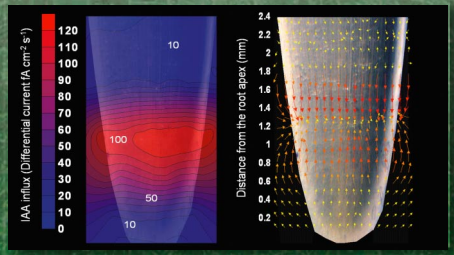
▶ THE DIRECTOR

- 2002, writer and director of the documentary ***"Il Mistero del Lupo"***, for National Geographic Channel – SD Cinematografica
- 2002, writer and director of the documentary ***"Sfida nella foresta"***, for National Geographic Channel – SD Cinematografica
- 2002, writer and director of the documentary ***"Potosì: l'ospedale più alto del mondo"***, for Minstero degli Affari Esteri – Progetto Hospital Daniel Bracamonte, Bolivia
- 2000-2003, author of the programme ***"Cominciamo bene"***, Raitre
- 1999, scriptwriter of the television film ***"Millennium Bug"***, an Italo-American co-production Andrea Leone Film
- 1999, author of the programme ***"Alle falde del Killimangiaro"***, Raitre
- 1998/99, co-author of scripts by Tullio Solenghi, ***"Domenica In '98-'99"***, Raiuno
- 1998, author and director of the advertising spot ***"Campagna Acqua"*** promoted bythe Ministry of Public Works and the European Community, RAI – Direzione Promozione e Immagine
- 1997/98, author of the programme in 216 episodes ***"Speciale Rai International"***, daily television, arts and culture magazine, Rai International.
- 1997, author and director of the RAI promotional film ***"Verso il futuro con la Rai"***, produced with RAI - Direzione Promozione e Immagine.
- 1997, director and author of the programme in 8 episodes ***"Il dilemma: storie di famiglie allargate"***, FORMAT, Raitre.
- 1997, director and author of ***"Un giorno a Londra con Gianfranco Zola"***, FORMAT, Raitre.
- 1996, director and author of the programme in 10 episodes ***"Compagni di banco"***, FORMAT, Raidue.
- 1995, scriptwriter of the serial in 40 episodes ***"Davvero"***, FORMAT,Raidue.
- 1994, director and author of the documentary film ***"Agostino Di Bartolomei: morte di un campione"***, MIXER, Raidue.
- 1993-94, drafts of subjects and treatments for the series ***"Colt"***, from an idea by Sergio Leone. Italo-Franco-American co-production CanalPlus/ Solaris/ Andrea Leone Film /Propaganda.
- 1993, writer on the daily programme ***"Cocktail di scampoli"***, Telemontecarlo.
- 1991-93, author, with Enrico Vaime, of the live weekly programme ***"La più bella sei tu"***, Telemontecarlo, for three consecutive series.
- 1990-91, author of the live weekly programme ***"Ho fatto 13!!!"***, Telemontecarlo.
- 1984-85, producer-director of the live weekly programme ***"Il gioco dei mestieri"***, Raiuno.



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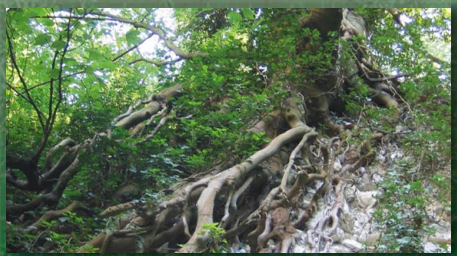
SD Cinematografica is an independent production Company founded in 1961.

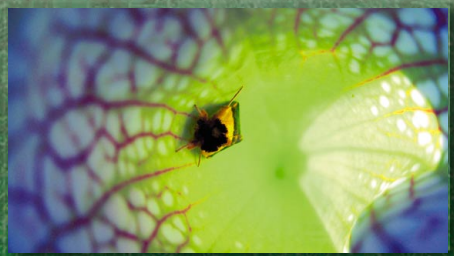
It has worked with RAI and International Broadcasters since its foundation, co-producing films, variety programs and, above all, documentaries. **More than 500 hours of programming have been produced and broadcasted.**

Several nature documentaries have won major prizes at international Film festivals and have been sold worldwide. The documentary "La Pietà", on the restoration of Michelangelo's masterpiece, was **nominated for an American Academy Award**. The recent *"Flying over Everest"* won **18 prizes** at the main international festivals. In 2006 with "The sinking of Andrea Doria" SD Cinematografica is proud to include the American **PBS** and the German **ZDF** in its list of **international coproducers**. The documentary has been submitted to the **Emmy Awards**.

Clients are:

RAI, Mediaset, National Geographic Channels, Discovery Channels, TF1, ARTE, NHK, TSR, ARD/BR, PBS, ZDF.





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Most significanthe PRODUCTIONS of recent years

DOCUMENTARY:

THE SINKING OF ANDREA DORIA *75 min. and 52 min.*
RAI / PBS / ZDF / ISTITUTO LUCE

FLYING OVER EVEREST *60 min. and 2 x 45 min. RAIUNO / BR / ARTE*

- 1° prize at Chamois International Film Festival (Italy 2004)
- Prix de l'exploit al St. Hilarie - Coupe Icaro Film festival (France 2004)
- 1° prize at Festival internazionale del cinema naturalistico e ambientale - Teramo (Italy 2004)
- Prize "Politecnico di Bari" at Catellana Grotte International film festival (Italy 2005)
- **Prize "Sport Extreme" at Moscow Filmfestival (Russia 2005)**
- **Prize "Best adventure Film" at Wildsouth Film Award (New Zeeland 2005)**
- Prize "Silver Screen" at US International Film e Video Festival (USA 2005)
- **Prize "Best adventure Film" at Mountainfilm in Telluride (USA 2005)**
- Special award at Cervino International Film Festival (Italy 2005)
- **1° Prize "Man and Mountains" at Film Festival Teplice nad Metuji (Czech Republic 2005)**
- Special award at Jonio International Film Festival (Italy 2005)
- Special award at Festival International du film d'aventure de Dijon (France 2005)
- **1° Prize at Montreal International Adventure Film Festival (Canada 2005)**
- Special award at Sport Movies & TV 2005 (Italy 2005)
- Prize "Most Inspiring Adventure Film" at Wild scenic environmental film festival (USA 2006)
- 1° prize "Leggimontagna" (Italy 2006)
- Special prize at Festival Internazionale del documentario ornitologico (Italy 2006)

THE MYSTERY OF THE WOLF *52 min.* *NATIONAL GEOGRAPHIC*

- Special award at Bergfilm Festival Tegernsee (Germany 2004)
- Special award at Festival Internazionale della Lessinia (Italy 2004)
- Prize "Best Italian documentary" at Festival of Cogne "Stambecco d'oro" (Italy 2005)

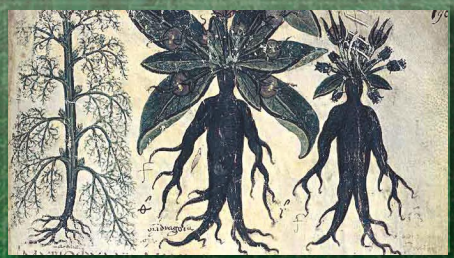
HUNTING FOR NGOTTO *52 min.* *NATIONAL GEOGRAPHIC*

FOCUS IN ITALY *30 x 4 min.+ 20 x 2 min.* *NATIONAL GEOGRAPHIC*

LA PENISOLA DEL TESORO *(for GEO&GEO)* *30 min. each* *RAITRE*

Including:

- Cilento: un paradiso della natura
  - Special Award at International Festival of Lessinia (Italy 2000)
  - Special Award at International Festival de cinema Vila de Torellò (Spain 1997)
  - Prize "Parco Nazionale del Gran Paradiso" at Eco Film Festival of Canavese (Itali 2000)
- Le ultime superstiti
- Monti Sibillini: magica armonia



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- Tra incudine e martello

- Finalist at International Festival of Sondrio (Italy)

- Ritorno all'ombellico d'Italia
- Fragole e sangue

- 2° Prize at International Festival of Sondrio (Italy)

- Un parco scolpito dal vento
- Il respiro della foresta
- La valle dei Walzer
- Domus de Janas
- Mont Avic: una montagna d'acqua
- Rosso di sera
- Risvegli e precipizi

- Finalist at International Festival of Trento (Italy)

- Lo sperone dello stivale
- Yellowstone d'abruzzo
- Miraggi d'inverno
- Circeo: Natura e magia
- Sulle tracce dell'orso
- La montagna sacra
- Sorprese d'inverno

- Prize "Partha Sarathy" at International Festival of Sondrio (Italy 2002)
- Prize "Cerro D'Argento" at International Festival of Lessinia (Italy 2003)

- Il soffio del vulcano
- La leggenda dei Fanes
- Sinis: acqua, terra e rosso porpora
- L'arte di Arrampicare

- Prize "C.O.N.I." at International Festival of Trento (Italy 2002)

- Mi chiamano Aspromonte
- Matese, magico intreccio di storia e natura
- Ostinatamente appassionati
- Pierino, il lupo e i segreti del tufo

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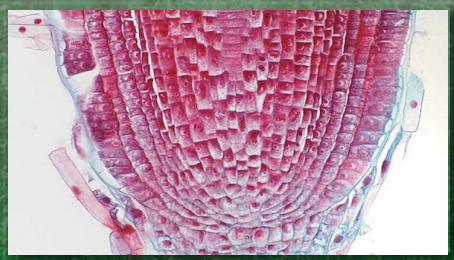
FORESTA FOSSILE DI DUNAROBBA	*12 min.*	*RAITRE*
ALBERI DI CITTÀ	*12 min.*	*RAITRE*
MEDICI DEGLI ALBERI	*12 min.*	*RAITRE*
ARBORETO DI VALLOMBROSA	*12 min.*	*RAITRE*
UOMINI SCOIATTOLO	*12 min.*	*RAITRE*
OSPEDALE DEI RAPACI	*12 min.*	*RAITRE*
IL VETRO UNA RISORSA ECOLOGICA	*12 min.*	*RAITRE*
BURNING MAN	*60 min.*	*RAIDUE*
IL RISO DELLE API	*60 min.*	*RTSI*
SCUOLE D'ARTE	*4 x 30 min.*	*RAI EDUCATIONAL*
AMMINISTRARE NELL'ANNO 2000	*30 min.*	*REGIONE LAZIO*
VESUVIO: UN PARCO IN PRIMA LINEA - Finalist at International Festival of Lessinia (Italy 2000)	*32 min.*	*PARCO VESUVIO*
UN PARCO DA SCOPRIRE	*30 min.*	*PAR. DOLOM. BELL.*
IL PARCO DEL GARGANO	*30 min.*	*PARCO GARGANO*
MAJELLA	*30 min. e 3x15 min.*	*PARCO MAJELLA*

AND DURING THE YEARS:

SD Cinematografica credits also include the following major Italian television programmes:

FEATURE FILMS:

LA TECNICA E IL RITO	*by Miklos Jancso*	*RAI*
LA SCONOSCIUTA *(4 episodes)*	*by Daniele Danza*	*RAIUNO*



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SHORT FEATURE FILMS:

PASSIONE MIA: EXIT	*by Stefano Reali*	*RAIUNO*
PASSIONE MIA: IN CERCA D'AMORE	*by Aida Mangia*	*RAIUNO*
MI MANDA LUBRANO *(11 Episodes)*	*by Gino Cammarota*	*RAITRE*
ULTIMO MINUTO	*by Lorenzo Hendel*	*RAITRE*

VARITY SHOWS:

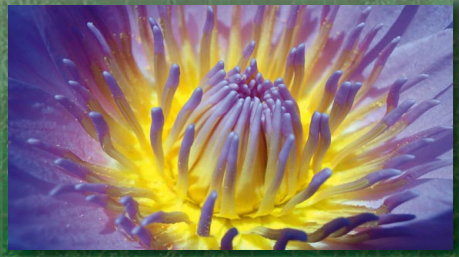
MOVIE MOVIE	*33 episodes x 60 min.*	*RAIUNO*
ITALIA SERA MODA	***daily***	***RAIUNO***
ODEON	*Series*	*RAIDUE*
COLOSSEUM	***Series***	***RAIUNO***
GIROMONDO	*Series*	*SACIS*

ANIMATION:

I SAURINI - *The young dinos*	*Pilot*	
FARHAT - *Prince of the desert*	*Pilot*	***RAIUNO***

DOCUMENTARIES:

LA VIOLENZA E LA PIETÀ	***60 Min.***	***RAIUNO***
- Nomination at Oscar (USA)		
PAN - ***Animals of the Mediterranean***	***27 Eps. X 30 min***	***RAIUNO***
- Best Exploration Film at International Festival of Trento (Italy 1987)		
- Special Prize "Progetto Natura" at Festival of Cogne "Stambecco d'oro" (Italy 1987)		
- 1° Prize at International Festival of Trento (Italy 1987)		
QUARK	*Some episodes*	*RAIUNO*
IMMAGINA	*Series*	*RAIUNO*



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For further information don't hesitate to contact:

PRODUCTION

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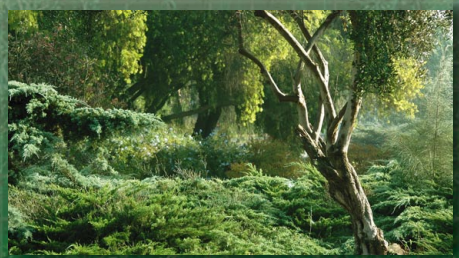
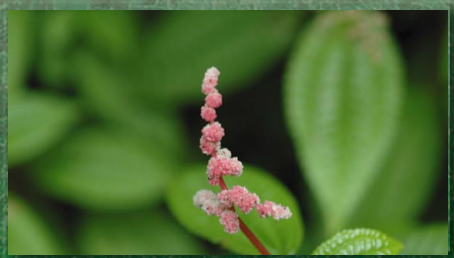
www.sdcinematografica.it





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