

# Why preserving biodiversity?

*Biodiversity is life*



Note: Some of these texts is extracted from the exhibition on Biodiversity (presented in 2010 in the tube station of Sèvres-Babylone metro line 10 in Paris, France).

Benjamin LISAN

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### 1. The Tree of Life

Living species ("Life") would have appeared on Earth, there are 3.6 billion years, all from originally single-celled species (bacteria or virus?).

- There are between 5 and 30 million species on Earth. [11] But only 1.5 to 1.8 million plant and animal species have been described / listed scientifically worldwide (this number, itself, remains unclear).
- Marine species represent only 13% of all described species, about 275 000, 93 000 for the only coral reef ecosystems [12].
- There are about 1.25 million species of animals are known and recorded on Earth.
- It lists almost 10 000 species of birds and 5,100 species of mammals.
- Currently, it has been found between 250,000 and 300,000 species of plants in the world, representing 14% of animal species.
- **Approximately 20,000 living species are threatened with extinction.**
- The vast majority of undescribed species of insects (4 to 100 million species according to estimates, which live mainly on the canopy of tropical forests [13]), the Nematelminthes (or roundworms: 500 000 to 1 000 000 species), and unicellular eukaryotes: protozoa or protophytes some oomycetes (ie mold viscous, formerly regarded as fungi).

Source : *Près de 8,7 millions d'espèces vivantes peuplent la Terre*, Le Monde & AFP, 23/08/2011, [http://www.lemonde.fr/planete/article/2011/08/23/pres-de-8-7-millions-d-especes-vivantes-peuplent-la-terre\\_1562713\\_3244.html](http://www.lemonde.fr/planete/article/2011/08/23/pres-de-8-7-millions-d-especes-vivantes-peuplent-la-terre_1562713_3244.html)

## Why preserving biodiversity?

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### 1. The Tree of Life

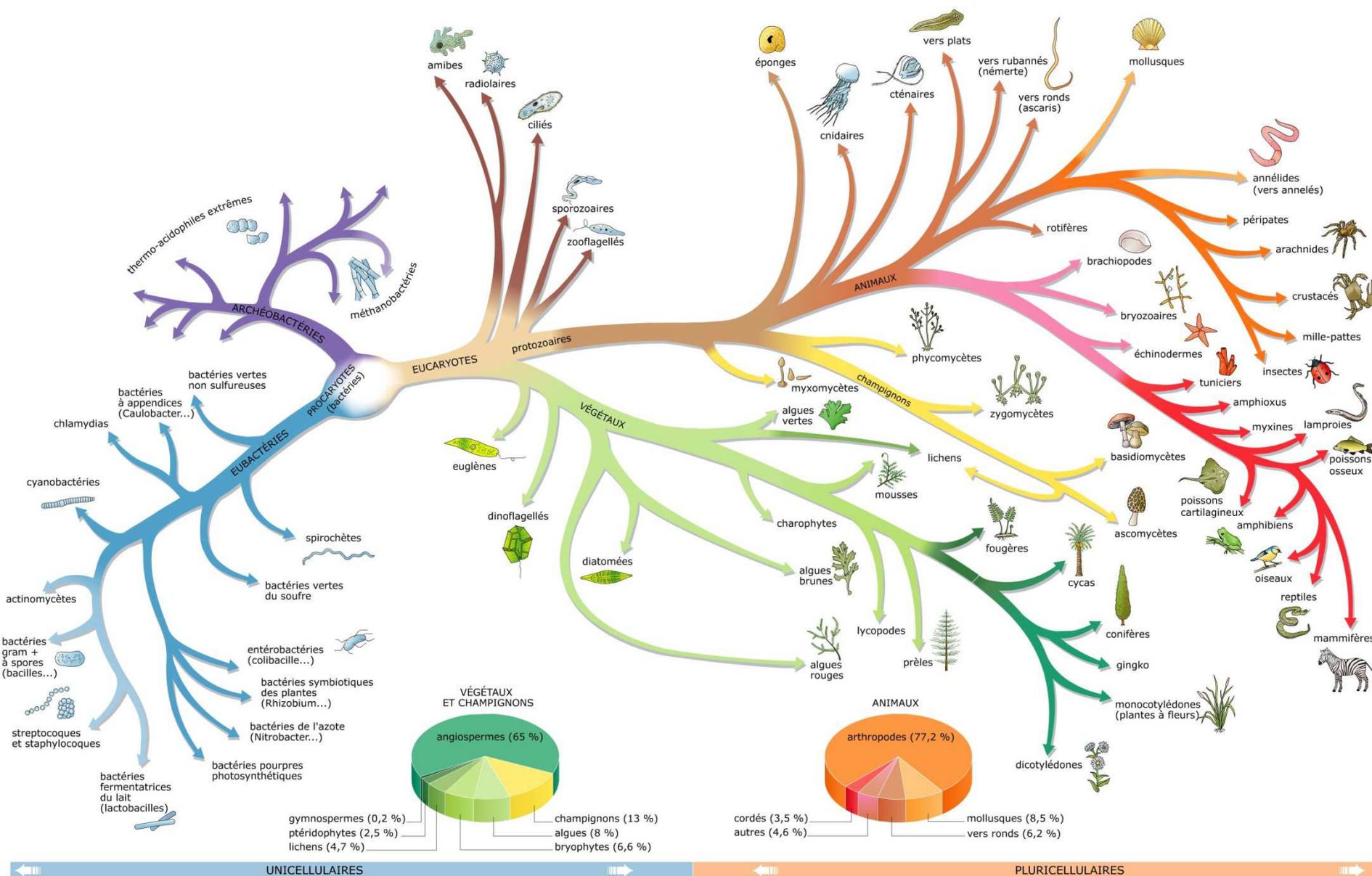
Despite their extreme diversity, living species all share the same basic components and the same core activities, indicating a link universal kinship. They have evolved from ancestors whose microscopic current representatives, bacteria are the strain of the tree species classification, often represented as a family tree (see next page).

Source : [http://www.larousse.fr/encyclopedie/cartes/Classification\\_des\\_esp%C3%A8ces\\_vivantes/1309193](http://www.larousse.fr/encyclopedie/cartes/Classification_des_esp%C3%A8ces_vivantes/1309193)



# Why preserving biodiversity?

## 1. The Tree of Life



## 2. definitions

### What is biodiversity?

Biodiversity is the diversity of living things and your wildlife ecosystems, flora, natural habitats, but also the man.

### Other words:

Biomimicry or the art of living copy.

Biomimicry is the transfer and application of materials, forms, processes and remarkable properties observed at different levels of life, to human activities [1]. It is emerging research that includes sub-fields such as bionics and bio-assistance the biomimetic architecture [1] a domain.

It is an inspired Life engineering that seeks to leverage solutions and inventions produced by nature (ecosystems, ecosystem services, selected among many others since 3.6 billion years, effective solutions to nano-scale to macroscopic scale and ecosystem.

Bionics is the science research in plants and animals, models for technical achievements.

### 3. Importance of biodiversity

What is the importance of biodiversity?

- A) Generation of soil and maintaining soil quality.
- B) Maintenance of air quality.
- C) Maintenance of water quality.
- D) Control of invasive species.
- E) Detoxification and decomposition of waste.
- F) Pollination and agricultural production.
- G) Biodiversity increases food security.
- H) The provision of health care (drugs / medicine).
- I) income generation.
- J) Spiritual / cultural values.

## 3. Importance of biodiversity

### Biodiversity ... that's life

- Preserving biodiversity is to preserve species, ecosystems and what they can bring to the human race, is to devise a sustainable use of resources (food, wood, natural medicines ...).
- Biodiversity is the basis of our food, our health and our activities. It provides us with many resources (food, clothing, medicine, energy, construction ...).
- It is the guarantee of proper functioning and balance of our planet (each species has its place and live in interdependence with others.).
- She is beautiful and a source of inspiration and wonder for humans.



### 3. Importance of biodiversity

#### Biodiversity is necessary for the health ... thanks to molecules produced by nature, sources of drugs

- For millennia, people familiar with the medicinal properties of some plants.
- Today, much of the molecules used in our pharmacopoeia has been identified in animals and plants.
- 55% of marketed drugs have a natural origin.
- Living organisms develop molecules whose complexity exceeds the imagination of chemists.
- According to the WHO, 80% of the world population depends on traditional medicine based on wildlife. In the Amazon, indigenous peoples use more than 1300 medicinal plants.
- In Madagascar, there are more than 950 medicinal plants listed (°).

(°) Source : CD-ROM plantes médicinales de Madagascar, Lucile Allorge & Pierre Boiteau, Editions île rouge, 2004.



Madagascar periwinkle (*Catharanthus roseus*), a plant native and endemic to Madagascar, discovered in the 1970s by researchers, contains alkaloids helping remission in patients with Hodgkin's disease and childhood leukemia. However, the other five species of periwinkles that are found on the island of Madagascar, one of which is endangered. So unfortunately this species were extinguished, medicinal properties, it closes disappear, too. Sources : <http://www.huiles-essentielles.pro/pervenche-de-madagascar.html> & <http://camgauthier.wordpress.com/biologie/la-diversite-genetique-ou-specifique/>

## 3. Importance of biodiversity

### Pure water - water purification

- The fauna and flora play an important role in water purification ...
- Through their role in the water cycle, wetlands have a capacity of natural treatment, if they are preserved!
- The quality of water is essential to our health.



### 3. Importance of biodiversity

#### Biodiversity is necessary for tourism

- Present on two continents and three oceans, our country (France) is a variety of wild animal and plant species.
- This is an important asset for the tourism attractiveness.
- In France, natural environments welcome every year nearly 5.5 million tourists.
- France is home to a large number of known endemic species (often rare). they live
- and reproduce only on its territory!

Ecotourism is not binding or boring.

Practice ecotourism is:

- explore the world without leaving a trace,
- enhance our natural and cultural heritage,
- cultures meet and share with local people,
- protect nature for future generations,
- together build tomorrow's tourism.

## 3. Importance of biodiversity

### Importance of the sea: Biodiversity is everywhere in the sea

- Oceans cover about 72% of the surface of the planet but they are fragile ecosystems.
- France is home to 10% of coral reefs in the world and ranks 4th in global range.
- These reefs are the most complex ecosystems in the world.
- The sea is the true lungs of the Earth! These are micro-algae forming phytoplankton that provide us with most of our oxygen!
- But many pressures threatening biodiversity (fishing, driftnets, pollution, global warming ...).



Sinking of the Torrey Canyon tanker

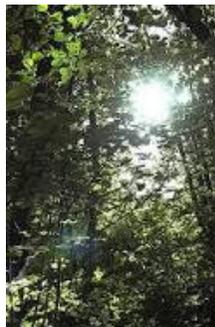


### 3. Importance of biodiversity

**Importance of the forest: Biodiversity is everywhere in the forest.**

Forests provide us with a number of invaluable services:

- balance of our atmosphere.
  - quality of surface waters.
  - fight against erosion, desertification, avalanches and landslides.
  - saving countless animal and plant species.
  - wood.
- 
- Forests are terrestrial ecosystems that support and nourish the most living beings.
  - **13 million hectares of forest land are lost every year in the world !**



## 3. Importance of biodiversity

**Importance of the forest: Biodiversity is everywhere in the forest.**

An ecosystem in turmoil :

- Each plays a vital role in the cycle of life in the forest: Plants producers of food, animals consuming plants, predators players balance of the ecosystem, decomposers that transform all that is dead: Plants, mammals, birds insects ... the forest is permanently inhabited by millions of living beings.
- Some animals disperse the seeds of trees and plants. The crow, brown bear, red squirrel, for example, and contributes to the efficient balance of the forest.



#### 4. Inventions of nature are sources of inspiration for human inventions

##### La biodiversité est nécessaire à la recherche scientifique

En observant l'inventivité de toutes les formes de vie, les chercheurs trouvent dans la biodiversité une fabuleuse source d'inspiration que les entreprises utilisent pour innover.



## 4. Inventions of nature are sources of inspiration for human inventions

### 4.1. Bio-mimicry

- robots swimmers fishtail and robots "insects") mechanisms propulsion fish with their fins and tails have been observed and used to improve the sculls. The aquatic propulsion by reaction with the *Nautilus Pompilius*, cuttlefish, squid, jellyfish, scallops, Jacques or dragonfly larva is equivalent to the diving saucer of Captain Jacques-Yves Cousteau uses two nozzles opposite directional, providing both jet propulsion and guidance of the saucer.
- self-cleaning coatings based on studies on lotus leaves
- the hydro-or aerodynamic coatings inspired by shark skin
- Aeronautics also from its inception was inspired by nature: especially with duck wing;



Lotus leaves



#### 4. Inventions of nature are sources of inspiration for human inventions

##### Invention of Velcro:

1941. Small hooks on a burdock fruit which, accidentally clinging to the hair of the dog during walks, led George de Mestral invented, by chance discovery and observation skills, Velcro (Velcro or tape) .



burdock



Fruit of burdock



Hooks of leaf formation, causing the invention of Velcro.



Velcro was inspired hooks propagule containing the seeds of burdock.



← velcro →



## 4. Inventions of nature are sources of inspiration for human inventions

### Models based termite for bioclimatic buildings

How cool cheaply? By observing the mounds. A building built on this principle, Zimbabwe, a saving of 90% on energy consumption.

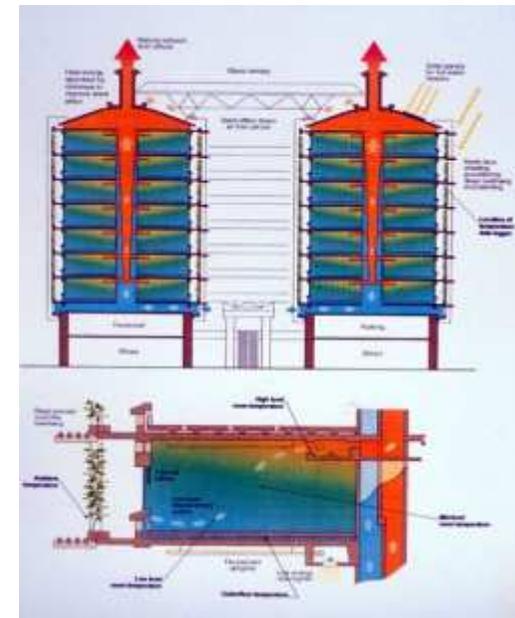
His secret: a tunnel system that remains at a constant temperature by the air flow and heat transfer day / night.



Eastgate Building, Zimbabwe, built on the model of termite nest.

Blackouts (common in Zimbabwe) have no impact on the operation and ease of use of the building as little Eastgate continue to function properly.

Land area: 9313 m<sup>2</sup>  
Construction costs: 23M euros

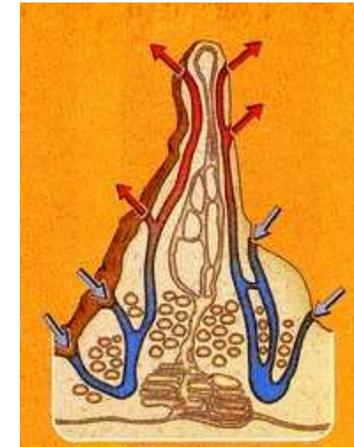


The Eastgate Centre in Harare, Zimbabwe, reproduced the structures of vertical ventilation of termite nest.

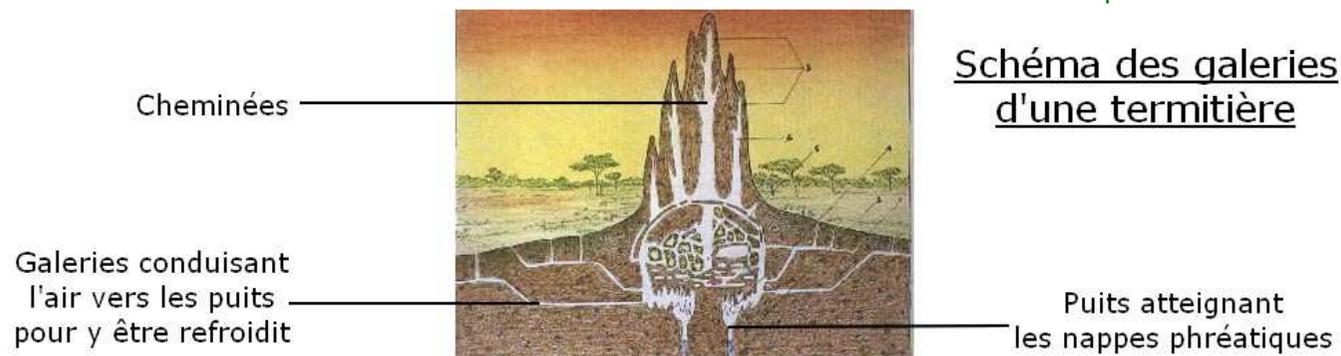
Sources : <http://biomimetisme.eklablog.com/ventiler-et-isoler-grace-a-la-nature-c17270649>  
<http://tpe-biomimetisme.1eres.over-blog.com/article-les-termitieres-62858101.html>  
<http://www.planetseed.com/fr/relatedarticle/des-termites-bien-au-frais>

## 4. Inventions of nature are sources of inspiration for human inventions

### Models based termite for bioclimatic buildings (next)



Scheme for regulating the temperature of a termite nest.



Termite nest walls are made of a material (soil, wood dust and saliva mixture termite) that mimic the properties of the cement. Sources :

<http://biomimetisme.eklablog.com/ventiler-et-isoler-grace-a-la-nature-c17270649>  
<http://tpe-biomimetisme.1eres.over-blog.com/article-les-termitieres-62858101.html>

### 4. Inventions of nature are sources of inspiration for human inventions

#### System temperature control bear copied to the Singapore Arts Centre

The fur of the polar bear and its ability to regulate heat exchange can be found in the Singapore Arts Centre in Singapore. Its surface is covered with aluminum lozenges playing the role of the fur hair. Their orientation is controlled by photoelectric light sensors. In bad weather, the diamonds open to let the direct sunlight and heat the building. If sun, diamonds are closed to reduce direct sunlight while allowing sufficient indirect light that reaches the interior reflecting on the aluminum surface of diamonds.



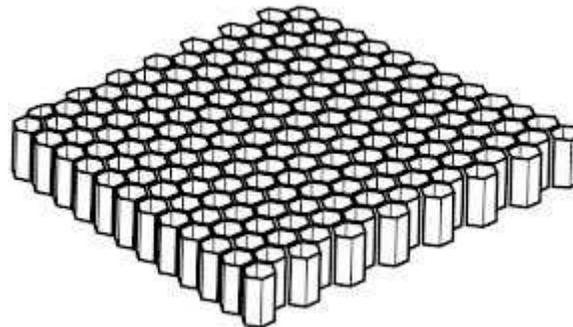
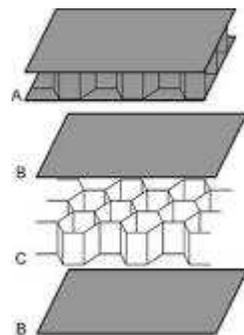
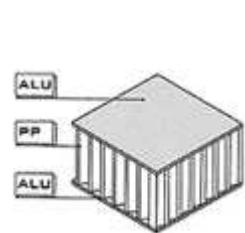
## 4. Inventions of nature are sources of inspiration for human inventions

### The bee honeycomb, solid in nature

Honeycombs →



The honeycomb structure, inspired by bee hives, is particularly light and strong. Thanks to these qualities, it has many applications to everyday products and been innovative developments, particularly in the building and industry (space, aeronautics ...).



### 4. Inventions of nature are sources of inspiration for human inventions

#### The gecko inspired making new tapes

gecko, a small lizard is able to climb a wall of glass. But his feet are not covered cups or any adhesive. In reality, these lizards use the properties of intermolecular bonds called "**van der Waals forces**" (°). The feet of geckos are covered with millions of tiny hairs per square centimeter, which bind to the surface with which they come into contact. This discovery has helped design a prototype tape that has the same properties. The applications of such a discovery are endless: the transformation of rescuers men spider, or the development of new construction methods.



(°) Electrostatic in nature, these attractive forces are responsible for intermolecular bonds of low intensity. But thanks to the number of hairs, the gecko has, they are large enough to largely support the weight of the animal.

Source : <http://tpe-biomimetisme.1eres.over-blog.com/article-les-geckos-62860966.html>

#### 4. Inventions of nature are sources of inspiration for human inventions

##### Like a bear - finding solutions to obesity

- The brown bear is a mammal capable of mobilizing its melt fat without his muscles during hibernation.
- The scientific study of this phenomenon could be very useful in the fight against obesity in humans.



#### 4. Inventions of nature are sources of inspiration for human inventions

##### Food tomorrow (°)

##### Seaweed on the menu!

Seaweed is known for its richness in vitamins and important trace element content. Mustard algae, the broth with seaweed, the seaweed in vinegar or simply mashed samphire are marketed today.



salicornia



Edible seaweed



(°) For the Japanese.

## 4. Inventions of nature are sources of inspiration for human inventions

### 4.2. Drugs

#### Invention of penicillin:

1936. *Penicillium* mold Alexander Fleming was shocked to find on his return from holiday. He realizes that the culture of *staphylococci* on which he worked was dissolved in the vicinity of a mold that had contaminated incidentally. It conducts experiments and discovered that the bactericidal substance produced by mold is extremely effective in killing many germs of diseases. He gives her the name of penicillin. It will take a second chance innovation (or serendipity) for Pfizer reaches the manufacture on an industrial scale in 1943.



*Penicillium chrysogenum*,  
syn. *Penicillium notatum*

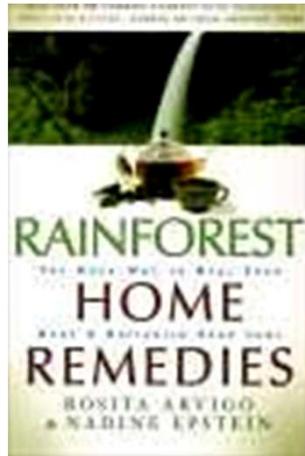
- Antibiotics derived from fungi and bacteria.
- More recent research has focused on marine species, including enzymes and molecules of interest to the medical community (poisons of cones, sea snakes ...).

## 4. Inventions of nature are sources of inspiration for human inventions

### 4.2. Drugs

Potential value of plants and other species:

- Prospect, now, the unknown species that will provide benefits to future generations  
=> Drugs derived from micro-organisms and plants.



*Cinchona* spp-- source of quinine



Curare



### 4bis. Other inventions of nature are sources of inspiration for human inventions

- The phytopurification and fongoremédiation or most treatment plants are based ecosystems to purify water, air and soil;
- Integrated Multi-Trophic Aquaculture ( IMTA or for Integrated multi- trophic aquaculture for English ) is particularly tested in Norway and Canada . [5] It is based on the fact that , seaweed , filter and animals are complementary, each consuming the waste of others, water purifying filter . It may be associated with an artificial and / or a device for concentrating the reef ;
- Spider silk is a polymer whose molecular configuration may vary and adapt quickly to the temperature and humidity. It is especially capable of " supercontraction " (10 to 140 MPa tension ) when she gets wet (in several minutes when the relative humidity exceeds 70% ) and faster when it is suddenly wet [6] ;
- Turbojets created on the model of the Nautilus ;
- Shower walls , windows, self-cleaning coatings and some of the aviation industry [7] have been created thanks to the discovery of the " lotus effect " ;
- Some types of eco-housing reflect the principles of termite mounds ;
- Creating pantographs wing forms reproducing the structure of those owl Shinkansen noise is reduced for passenger comfort . In addition, the profile of the drive train is similar to the beak of the kingfisher ;
- micro-robots walk on water as gerris , using the surface tension of water ;
- CNRS researchers have developed artificial micro- swimmers [8] moving through biomimicry , this finding suggests possible innovations in the field of medicine because these micro- swimmers can carry small amounts of drugs through the vessels blood ;
- The metal structure of the Eiffel Tower has similarities with that of the femur [9] [ref. insufficient ] ;
- Wetsuit Fastskin is inspired by the skin of mako ;
- Tests from Lufthansa to improve slip in the air [ 10] fuselage Airbus A340- 300 with a varnish effect " shark skin" ;
- The chitinous exoskeletons of beetles Stenocara inspired water recovery systems in air ( dew collector )
- Researchers are trying to develop biocatalysts for the production of proteins or polymers minerals ( biomineralization ) cold at ambient pressure and in water . It also attempts to create systems to produce hydrogen or electricity imitating the process of photosynthesis . A filter with ultra -pure water could be composed of membranes and doors protein mimicking systems at work in nature . [11]
- This list is not exhaustive ...

## 5. Hazards on biodiversity

The biodiversity is highly threatened by :

- the destruction of natural habitats
- overexploitation of natural resources
- the water pollution, air or soil
- the spread of invasive alien species
- the expected effects of climate change.

An estimated 10 species disappear naturally (that is, outside of the intervention of the human species) each year. [37] According to the Millennium Ecosystem Assessment Millennium 2005, the rate of extinction of species, for two centuries, is 10 to 100 times the natural rate [40] (excluding major extinctions).

An ecosystem is an interactive and complex set of live actors, is gradually putting in place over thousands of years. If you try to restore the population to extinction, which was taken too dangerous, it may be that it is no more, because other live actors, predator / prey, replace it quickly. Eg., April 24, 2003, the Canadian government banned fishing for Atlantic cod in northern Newfoundland, following its overfishing. Now 7 years later, the cod resource still is not recover.

## 5. Hazards on biodiversity

### Danger on the fishery resources (fish ...)

The population of large fish (cod / cod, haddock, halibut, etc..) Dropped 90% in a few decades. More than 75% of world fish stocks are exploited to the limit of their capacity, beyond or recovering from depletion.



**Wetlands in danger**



Biological invasion in aquatic ecosystems is a real threat.

## 5. Hazards on biodiversity

### Danger on corals

Hot shot on corals!

It is estimated that 54% of coral reefs are threatened.

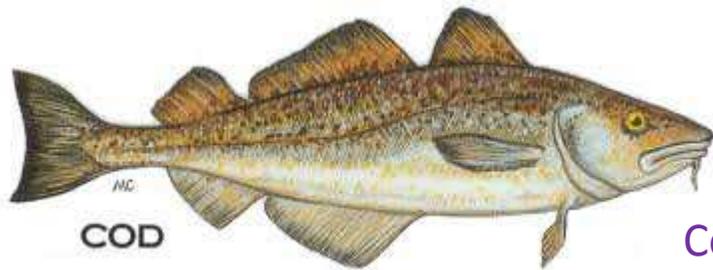
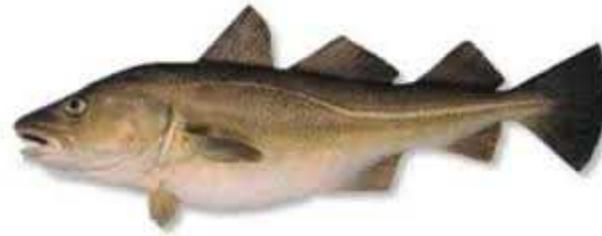
Increasing ocean temperatures cause bleaching and death of corals.



## 5. Hazards on biodiversity

### The disappearance of cod in Newfoundland

Overfishing with modern led to the virtual disappearance of the resource cod on the Grand Banks of Newfoundland, off Canada, and a ban on fishing by Canadian authorities. **Despite the ban on the fishing of cod resource never reconstituted off Newfoundland.** Another species, herring, now occupies the ecological niche of Atlantic. There has also been a proliferation of seals due to the ban on cod fishing. They are also sensitive to pollution (hydrocarbon leaks ...).



Cods → herring



## 5. Hazards on biodiversity

### Bluefin tuna endangered

Several countries (including France ...) support the ban on international trade of bluefin tuna. The aim is to protect species and allow the recovery of populations.



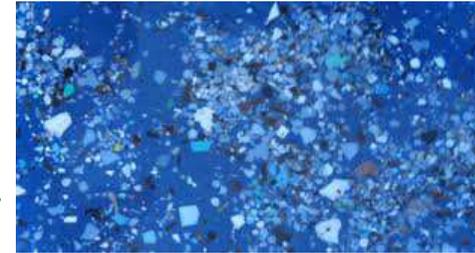
Bluefin tuna is prized by the Japanese. It trades in Japan over 3000 Euros / kg.

## Why preserving biodiversity?

### 5. Hazards on biodiversity

#### Marine debris Alerts

Suspended →  
marine fragments.



The most common marine debris are made of plastic and synthetic materials that take between 400 and 450 years to decompose.

They have disastrous effects on marine fauna and birds that ingest them.

Marine fragments →



#### Play the sorcerer's apprentice / Go against Nature

A protein can produce more snow and better.

But use this protein in the natural environment generates controversy because it comes from a bacterium which is not known all the impacts on local flora and fauna (?).

Source : *Neige de culture et SNOMAX™ : quels impacts sur l'environnement ?*, [IRSTEA](http://www.irstea.fr),

[http://www.notre-planete.info/actualites/actu\\_342\\_snomax\\_impacts\\_environnement.php](http://www.notre-planete.info/actualites/actu_342_snomax_impacts_environnement.php)



Invasion of many ecosystems  
(Australia ...) by the buffalo toads



## Why preserving biodiversity?

### 5. Hazards on biodiversity

#### Introduction of exotic species

##### Invasive alien species

The Brazil green iguana, introduced in the 60s, is a real threat to the local species in the Caribbean, the Lesser Antillean iguana (*Iguana delicatissima*). There is, indeed, a high risk of competition and hybridization. Control measures of proliferation (destruction of nests, information ....) of this invasive species has been committed.



*Iguana delicatissima*



green iguana

## 6. solutions

### Protect wetlands

Jacinthes d'eau , espèce invasive →



Network warning and **specific control are in place to protect wetlands** of invasive alien species introduced by man.

### Green and blue frame (in France)

Implementation at the national level, the green and blue aims to halt the loss of biodiversity.

The preservation and restoration of the "ecological continuity" easy moving species (restoration of ecological corridors for the passage of animals etc..).



Jussie, espèce invasive.



Jussie

## 6. solutions

### Campaigns

- Displays and classes in schools.
- Exhibitions (on the subway ...).



**Sentinel turtles**

Luth turtles



**WED2010**  
JOURNÉE MONDIALE DE L'ENVIRONNEMENT • 5 JUIN  
DES MILLIONS D'ESPÈCES UNE PLANÈTE UN AVENIR COMMUN

Marine turtles attract the attention of researchers.

Their migration, the variety of their lives, their diets and their types of reproduction are very good indicators of ecosystem health.

### 6. solutions

#### responsible travel

- Trade, especially international, is a major cause of species extinction.
- On the occasion of a trip abroad, let us not bring an animal, plants.
- a plant or a product (Remember, decorative object, ...). It could be made of an endangered species (CITES).



Fennec (Desert Fox)



Madagascar radiated tortoise



Orang-outang

## 6. solutions

### The right choice

Some wood from distant forests or protected.

Choose preferably a local wood and make sure it is certified **PEFC** or **FSC**.

**PEFC** (Pan European Forest Certification) and **FSC** (Forest Stewardship Council) label are assigned to sustainably managed forests.



Other label

## Why preserving biodiversity?

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### 6. solutions

#### Fluid traffic !



- the ecoducts are secure passages built in a landscaped environment, to allow animals to cross the barriers built by man!
- The ecoduct is reserved for the hedgehog, the rabbit, weasel, fox ...
- The crapauduc is for amphibians (frogs, toads ...).
- The hydraulic passage is for the shrew, the European mink, the otter ...



## Why preserving biodiversity?

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### 6. solutions

#### The use of agricultural and biological control

In gardens as in the meadows and fields, the rich fauna and flora is significant and must be preserved.

To fight against "harmful" (pests), ravaging crops, the use of chemicals is not necessary.

Against aphids, ladybird, for example, is more effective than all the pesticides.

The green lacewing larvae (*Chrysoperla carnea*) attack eggs, larvae and adults of various insects (mealybugs, aphids and caterpillars of several species of Lepidoptera) and the mites (red among other spiders).

Other beneficial insects (*Trichogramma* ...) are useful allies for farmers.



trichogrammas



Lacewing and larvae



Ladybug and larvae



## 6. solutions

### The use of agricultural and biological control

Earthworms are essential to fertilization and maintenance of cultivated soils. By pressing more than one meter, they renew the mineral surface layer and improve their manure humus.



### 6. solutions

#### Keep all varieties of crops

- It is important to conserve the genetic diversity of plants that are useful to us, including rare or old varieties (to ensure food security and make plants more resistance to all forms of aggression (diseases, droughts etc. ....) ).
- It is important to keep all plant species (useful or endangered) and their varieties in gardens, arboretums and conservatories orchards.
- Mishmash of tomatoes: 438 tomato varieties are registered in the French catalog GNIS (Groupement National Interprofessionnel des Seeds and Plants). Tomato varieties are as diverse as the pineapple tomatoes, black of Crimea, pomodoris Corbara of Naple (Napoli) ...



There are a wide variety of tomatoes in the world



Example of the diversity of cultivated species of maize in Mexico

## 7. Appendix: The model of the "house of cards" of biodiversity

Primary forests are home to ~ 80% of terrestrial biodiversity.

What are the consequences in the event of their demise?

- The model house of cards: Biodiversity is like a house of cards. Each card is a living species. Too many cards go?
- The castle could collapse because of the interaction between species.



Model of the house of cards collapses.

Source : <http://never-surrender.over-blog.com/article-vers-un-krach-systemique-global-106021303.html>

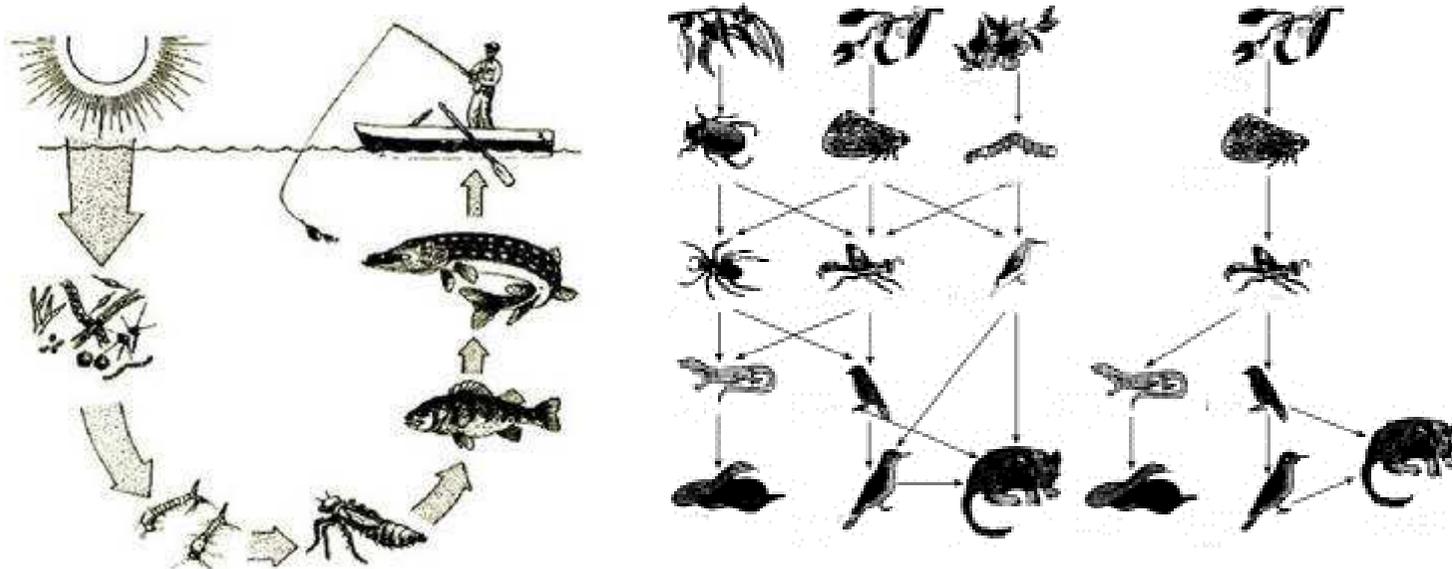


Image Castle map of biodiversity.

Source : <http://www.flickr.com/photos/sharman/4570412801/sizes/m/in/photostream/>

## 7. Appendix: The model of the "house of cards" of biodiversity

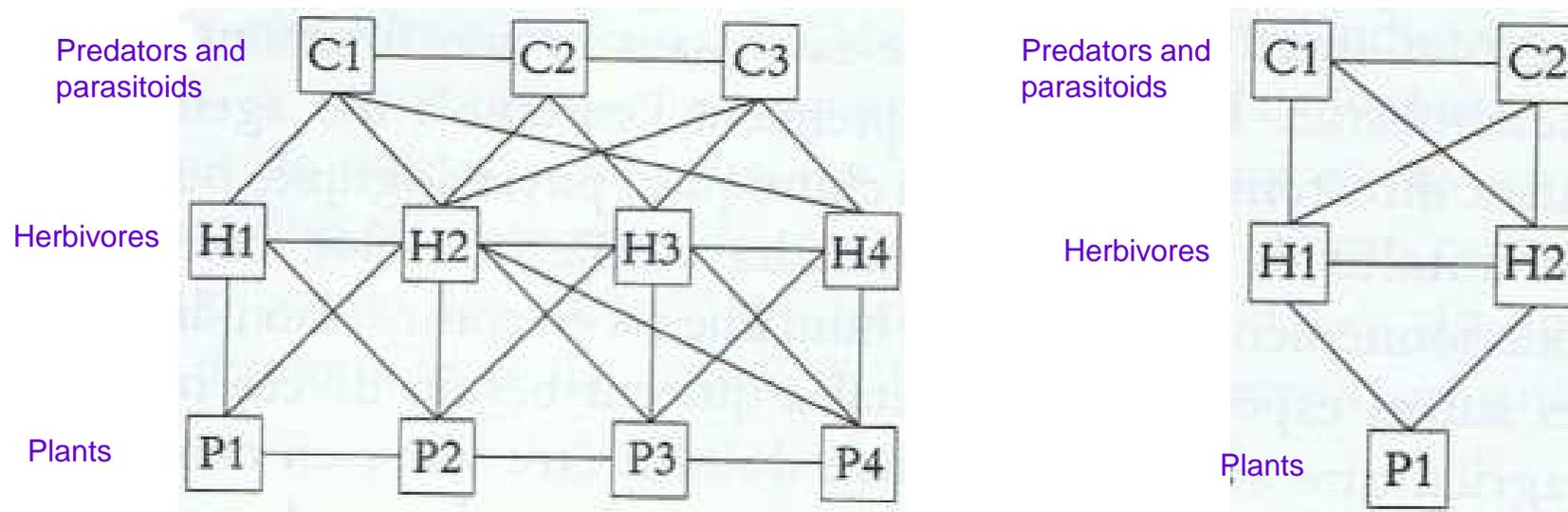
According to Peter Ward, paleontologist, Washington University "A biological scale, the species *Homo sapiens* is a card like no other. In a sense, each species supports another. The animal you eat (which gives you your energy) map below. Suppose we starts to remove a card, then another and so on ... This is what a mass extinction: it begins to eliminate a species, but many species are disappearing quickly. It is no longer just a matter of missing species: There is a snowball effect" (Source: *Vie et mort de la planète Terre*, Peter Ward, Donald Brownlee, et Michel Cabart, Editions La Huppe, 7 février 2008).



↖ Links between animals (food chain) ↑

## 7. Appendix: The model of the "house of cards" of biodiversity (next)

"Several authors (Goodman, 1975; Horn, 1988; Kimmerer, 1984) indeed argue that complex ecosystems with many trophic interactions (food chain) can lessen the effects of sudden changes in density of a component (elasticity and high resistance). The disappearance of a species can be compensated without major damage to the network. In simplified as agricultural monocultures or single-species tree plantations systems, the number of interactions is greatly reduced [... see figure below]. Due to their low elasticity and strength, these systems are vulnerable to disturbance. The disappearance or, conversely, the marked increase in the abundance of a species will have direct effects on other components, leaving the system little opportunity to recover his balance. "



Pattern of horizontal and vertical relationships in the food network (web) of natural and disturbed systems (source: *La lutte biologique*, Daniel Coderre, Charles Vincent, Ed. Gaétan Morin, 1992, page 6).

### 7. Appendix: The model of the "house of cards" of biodiversity (next )

•A picture of the risks to biodiversity: that of an aircraft in flight, "*Take a bolt at random: it is likely that the aircraft will continue to fly. Then another, and another ... After how many bolts the plane he will eventually fall, with its passengers?*". Source : « *Comme un avion dont les boulons tombent* » [http://www.hubertreeves.info/chroniques/pdf\\_idm/20080420.pdf](http://www.hubertreeves.info/chroniques/pdf_idm/20080420.pdf)

- Quote of Jane Goodall, primatologist, "*the tattered web of life [of biodiversity]: if a wire is pulled, it destroys everything. [...] This is the web that sustains us.*". Sources: Jane Goodall, a lady of nature, 23-6-2010, metrofrance Sources : Jane Goodall, une lady de la nature, 23-6-2010, METROFRANCE, <http://www.metrofrance.com/info/jane-goodall-une-lady-de-la-nature/mjfw!vGklK5IDnv45g/>
- She speaks of « *The Tattered Web of Life* ».



## 7. Appendix: The model of the "house of cards" of biodiversity (next)

Some put the current proliferation of jellyfish in the seas, especially in the China Sea, on account of overfishing, the other on global warming.

One thing is certain: if there is loss of all fish in seas □ there is a risk of proliferation of jellyfish (pictured fishing giant jellyfish China Sea, Source : <http://www.maxisciences.com>).

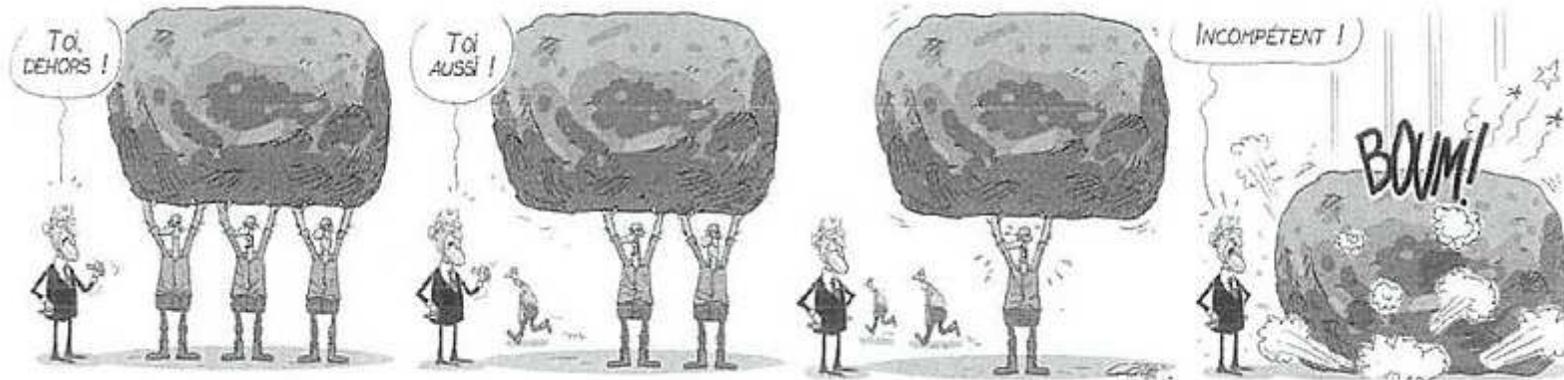


Proliferation of giant jellyfish, perhaps because of overfishing and climate change.

Sources : [http://www.lepost.fr/article/2009/03/11/1453683\\_des-proteines-de-meduses-pour-reparer-le-cartilage-humain.html](http://www.lepost.fr/article/2009/03/11/1453683_des-proteines-de-meduses-pour-reparer-le-cartilage-humain.html)  
<http://trefaucube.free.fr/index.php?id=40>

## Why preserving biodiversity?

### 7. Appendix: The model of the "house of cards" of biodiversity (next & end)



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## Why preserving biodiversity?

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