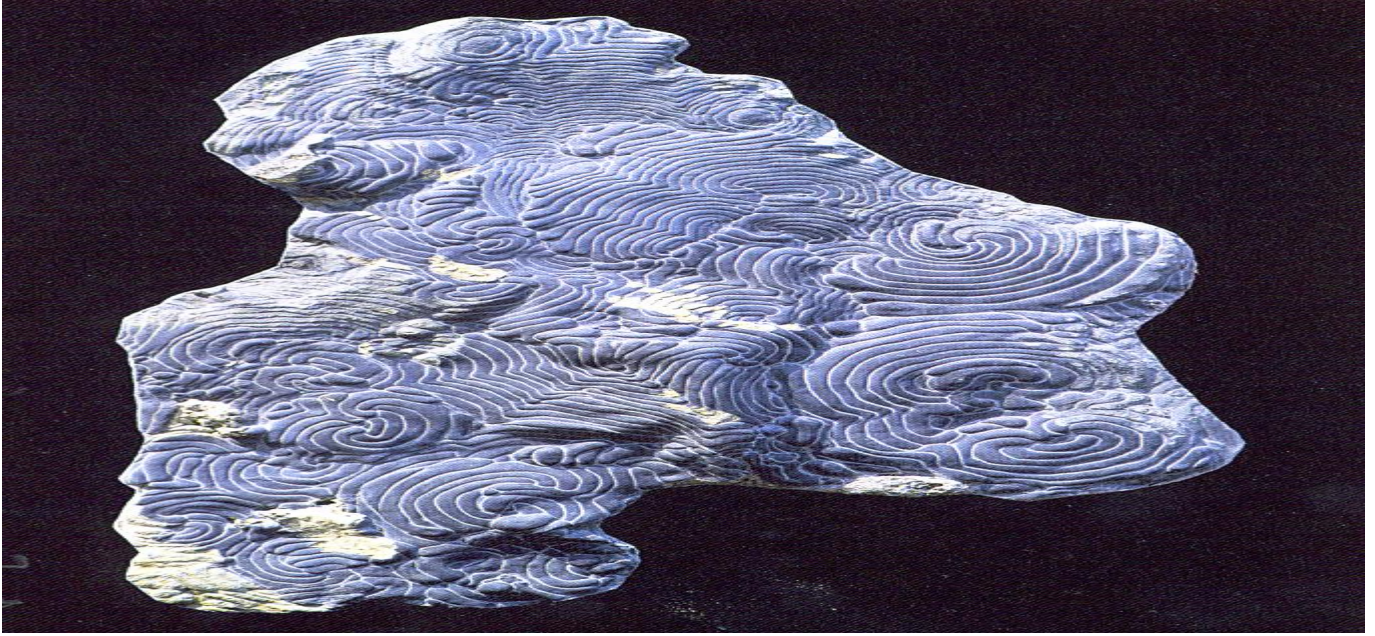


LIESEGANG RINGS and Natural Art in SELF – Organization Phenomena

- Paper in preparation of the meeting on SELF ORGANIZATION PHENOMENA Florence NOV/14/2008

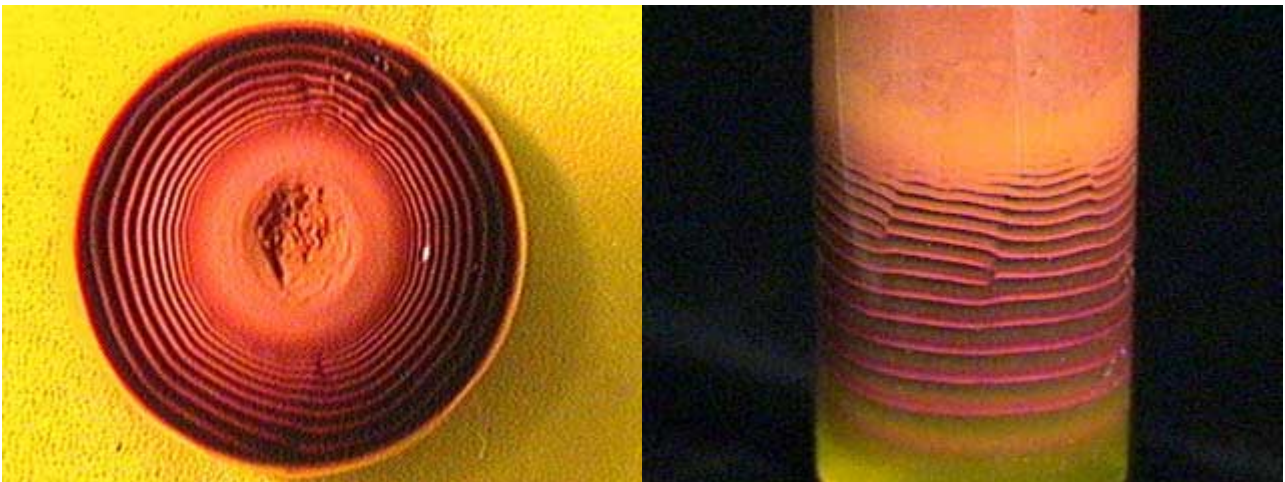
By: pmanzelli@gmail.com; www.egocreanet.it; www.edscuola.it/LRE.html; www.wbabin.com

<The love for science and art does not based on the utility but for both is driven by the curiosity>

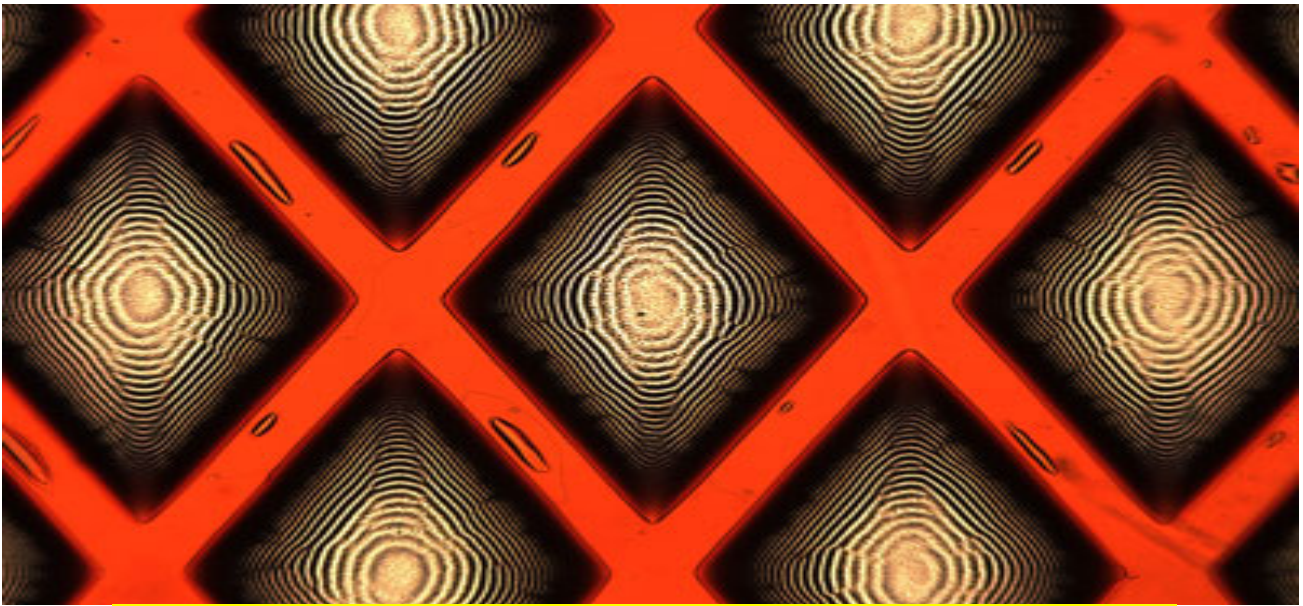


Stone waves in fossil. www.fossil-art.dk/Paneler/spor34.html

“In antique science “petrified fossil’s stones” are considered **“jokes of nature”**; similarly mechanistic science till today considers periodic precipitations or Liesegang fossils as very mysterious events.” In fact the formation of regular chemical patterns in oscillating reactions was a physical paradox for more than a century. As a matter of facts Liesegang rings (1), (2), are easily visible structures of self organization phenomena that develop spontaneously in a chemical reaction systems working far from equilibrium with a slow kinetic of the reaction. (3)



LIESEGANG RINGS IN GEL : cps-www.bu.edu/ogaf/html/chp62exp1.htm



<http://www.nikonsmallworld.com/gallery.php?grouping=year&year=2007&imagepos=24>

Alternating series of regular precipitating zones demonstrates a not chaotic behavior of the development of “**bonding and not bonding**” rings in an stabilized oscillating Liesegang reactions as it is easily shown in natural –artistic structures like the Liesegang Rings in Agate. (4)

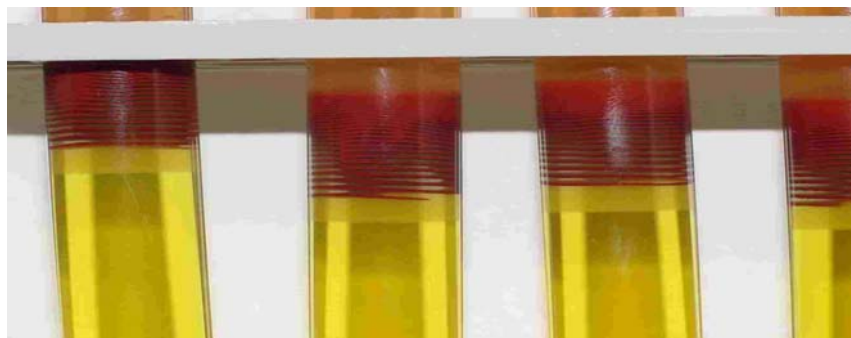


www.horo-achate.de/entstehung/entstehung_eng.shtml ; www.agate-nodule.com



Ring AGATE - Collection: www.marbelalan.com/nonglass

The dynamic of formation of rhythmic pattern of precipitates giving the growth of Liesegang rings in gel inert medium, is very easily to reproduce in a test tube ; in spite of this experimental reproducibility mechanistic science is no able to understand why Liesegang patterning develops through a series of “bonding” and “no-bonding” bands in a space-temporal progressive ordering events. (5)



Liesegang Experiment in test tube : [www.chiralitaet.de/mh\(imag.html](http://www.chiralitaet.de/mh(imag.html)

A lot of interesting experiences can be made with rhythmic banding precipitates in colloids that are not expensive and do not need of very complex instrument to detect.

- 1) introducing a flaw in the symmetry of formation of the rings that imperfection is being reproduced as a mirror in subsequent circular patterns
- 2) also we can see the developing interference of matter-waves in meeting between the fronts of diffusion of two periodic reaction starting from different centers spreading the construction of Liesegang rings.

Ultimately Liesegang periodic space-temporal ordering phenomena, are also common events miscellanea in biology. A set of examples are: the lamellar rings around the Haversian canals in bone;... the pigmentation of the iris;... the color of butterfly's wings; the growth rings of trees; ...the agate structure of crystals; ...the shells of mollusca; ...the bands of starch grains and of many seeds, the fungi and bacteria organizations ... and so on .. all those experiments demonstrate that the formation of "**bonding/no-bonding**" Liesegang patterns, are a general phenomena for implementing the studies of **self-organization in nature**.

In spite of this large amount of experimental knowledge , Liesegang rings are often at the border line of the mechanistic knowledge; so that normally are excluded by formal science teaching. As a matter of fact, in the context of mechanical science , there is not a shared a theory of *simultaneity of communication at distance* , as it is seriously necessary for understanding any self-organizing cooperation in spontaneous auto-organization of natural phenomena.

Finally the endless array of beautiful patterns and shapes in nature has long been a source of joy and wonder to artists and scientists alike. Therefore discovering how such patterns emerge spontaneously in an order space-time environment, nowadays is becoming a cultural and societal enterprise for advancing future knowledge economy.

Certainly a good solution-model , for interpreting at distant communication can be found in the Quantum-entanglement based simultaneity of communications (6) .(7).

About this problems would be possible to advance with an open dialog at the meeting on Self-Organization Phenomena organized by EGOCREANET/ON-NS&A in Florence the → Nov/14/2008 . (8)

Biblio on line

- (1) - Liesegang Rings : www.insilico.hu/liesegang/; www.sas.org/tcs/weeklyIssues/2004-04-30/chem/
- (2) - *Raphael E. Liesegang (1869-1947)*: <http://science.birkenheadschool.co.uk/middle/index.php?id=Liesegang%20Rings>
- (3) – Catalytic time : http://www.edscuola.it/archivio/lre/tempo_di_catalisi.htm (in italian)
- (4) – Liesegang Rings in geology : <http://irma.lautre.net/Tout-ce-que-la-nature-ne-peut-pas,150.html>
- (5) – Chemical bases : http://www.edscuola.com/archivio/lre/chemical_bases.htm
- (6) – Entangling Information Theory : <http://www.wbabin.net/science/manzelli18.pdf>
- (7) - Entanglement in Bidimension of Space-Time : http://www.edscuola.it/archivio/lre/bidimensional_space_time.pdf
- (8) – Self Organization Meeting : www.egocreanet.it ; www.wbabin.it ; www.quantumbionet.org