



Research Development and Education of Systems Science and Cybernetics
NEW TRENDS ON SYSTEMS SCIENCE AND CYBERNETICS

EDUCATION FOR SUSTAINABILITY : LESSONS FROM LIVING SYSTEMS GOVERNANCE.

Pierre BRICAGE

pierre.bricage@univ-pau.fr



www.univ-pau.fr

<http://www.afscet.asso.fr/pagesperso/Bricage.html>

AFSCET

The French Society
for CyberSystemics



The International Academy for
Systems and Cybernetic Sciences



四川大学
成都市
中华人民共和国

IASCYS Chengdu conference, University of SICHUAN, PR China, 2017, October 20-21

Pierre BRICAGE

四川大学, 成都市, 中华人民共和国

long term guest Professor University of Sichuan, Chengdu, P.R. China

biologiste indépendant, enseignant-chercheur retraité

Faculté des Sciences et Techniques, Université de Pau et des Pays de l'Adour
UPPA, Pau, France, Europe <http://web.univ-pau.fr/~bricage>

Vice-Président Association Française de Science des Systèmes

AFSCET, Paris, France, Europe <http://www.afscet.asso.fr>

ex-Deputy Secretary General of European Union for Systemics

UES-EUS, Bruxelles, Belgique, Europe <http://www.ues-eus.eu>

Directorate World Organisation of Systems and Cybernetics

WOSC, London, UK <http://www.wosc.co>

Secretary General International Academy for Systems and Cybernetic Sciences

IASCYS, Wien, Österreich, Europa <http://iascys.org>

Président Association ALBA, Trésorier Association PELLEAS

Lasclaveries, France, Europe <http://armsada.eu>

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NEW TRENDS ON SYSTEMS SCIENCE AND CYBERNETICS

HOW TO DESIGN A LIVING SYSTEM ?

introduction

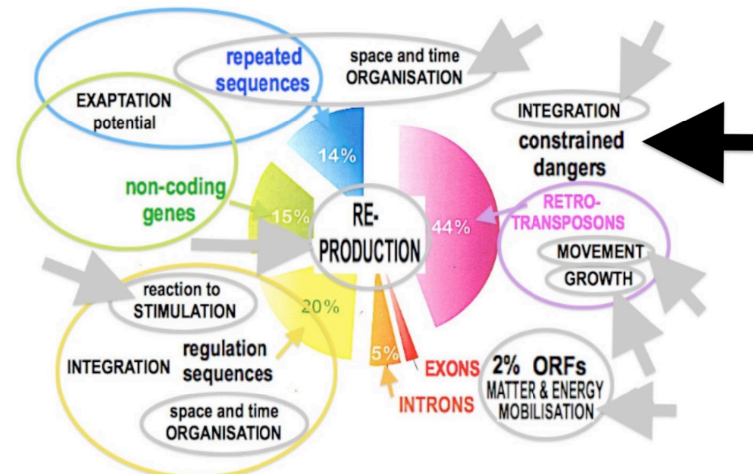
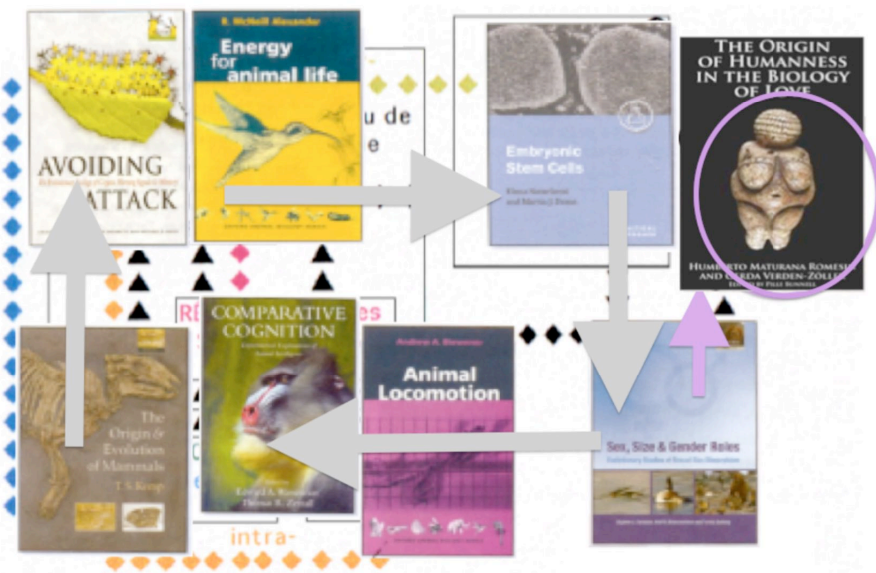
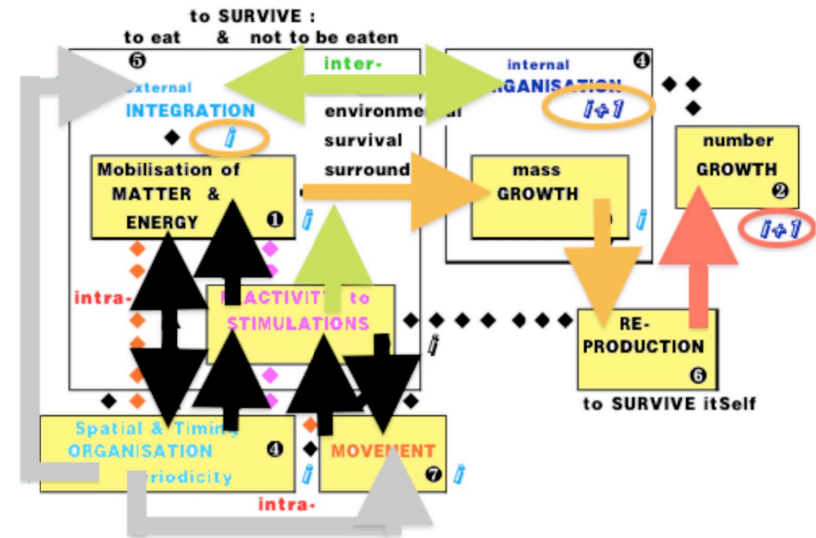
operational definition for a living system

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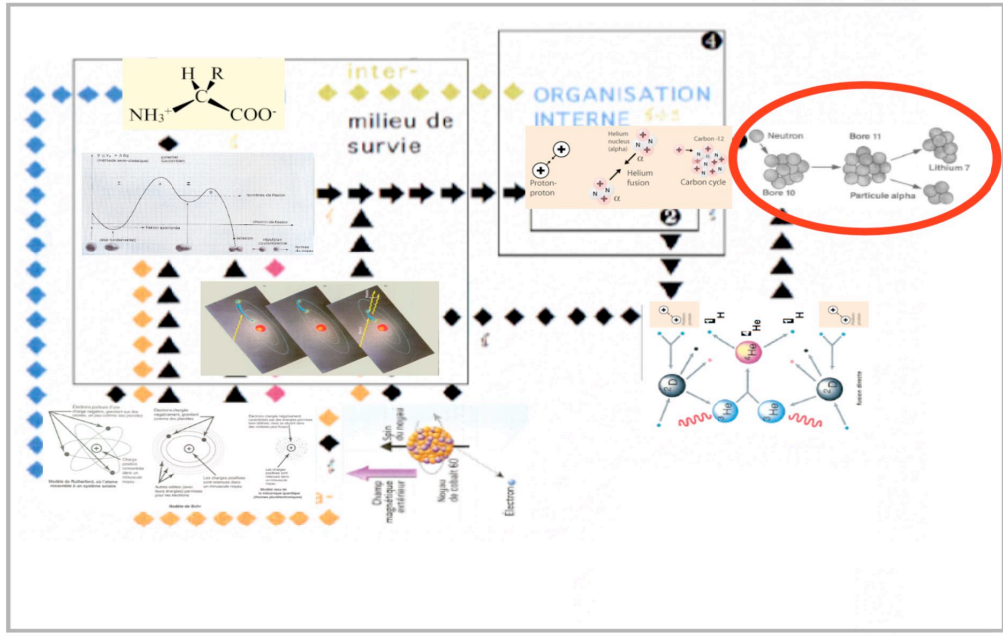
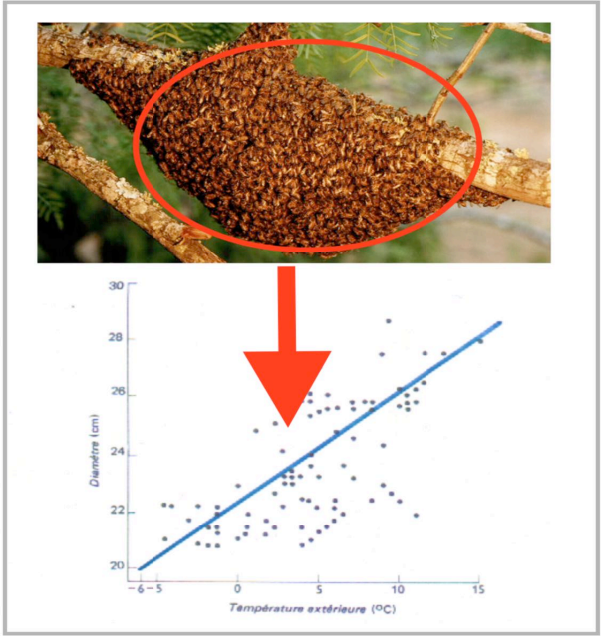
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- 1 **MATTER AND ENERGY FLOWS CONTROLS**
 - 2 **MASS GROWTH**
 - 3 **STIMULI RESPONSES**
 - 4 **INTERNAL ORGANIZATION** of the endophysiotope
 - 5 **EXTERNAL INTEGRATION** into the ecoexotope
 - 6 **MOVEMENTS**
- CAPABILITIES FOR TO SURVIVE** ←
- 7 **REPRODUCTION [NUMBER GROWTH]**
FOR TO ITSELF SURVIVE ITS SELF

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gauge invariance (new paradigm):
 the 7 functional capabilities of all living systems
 whatever the level of organisation
 (here at the cell genes level)



Associations for the Reciprocal and Mutual Sharing of Advantages and DisAdvantages

3.1. LIVING SYSTEMS 7 CAPABILITIES: GAUGE INVARIANCE OF LIFE

to SURVIVE : to eat & not to be eaten

Bricege P. (1991) Les Caractéristiques des Organismes Vivants. Fac. Sci. Univ. Pau, MOOC, UPPA, Pau, France, 44 p.

1991

2002

Bricege P. (2002) The Evolutionary "Shuttle" of the Living Systems. 5th European Systems Science Congress Hersonissos, Creta, Res. Systemica 2: 6 p. <http://www.afest.asso.fr/res/Systemica/Crete02/Bricege.pdf>

<http://armsada.eu>

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How to define a scale invariant level of organisation? : The gauge invariance paradigm.

**EndoPhysioTope and EcoExoTope,
hosting capacity and capacity to be hosted:
integration.**

THE KEY PARADIGM FOR SUSTAINABILITY

Systems Of Systems:

“a space for each one and each one in its space”

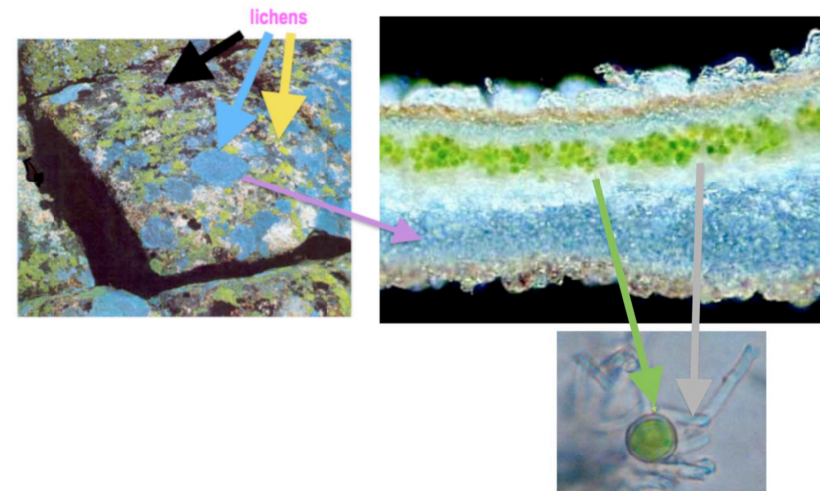
lichens: **The ARMSADA paradigm** ←

Systems of systems: embedment and juxtaposition

“interaction is construction, construction is interaction”

structuration between systems and within a system:

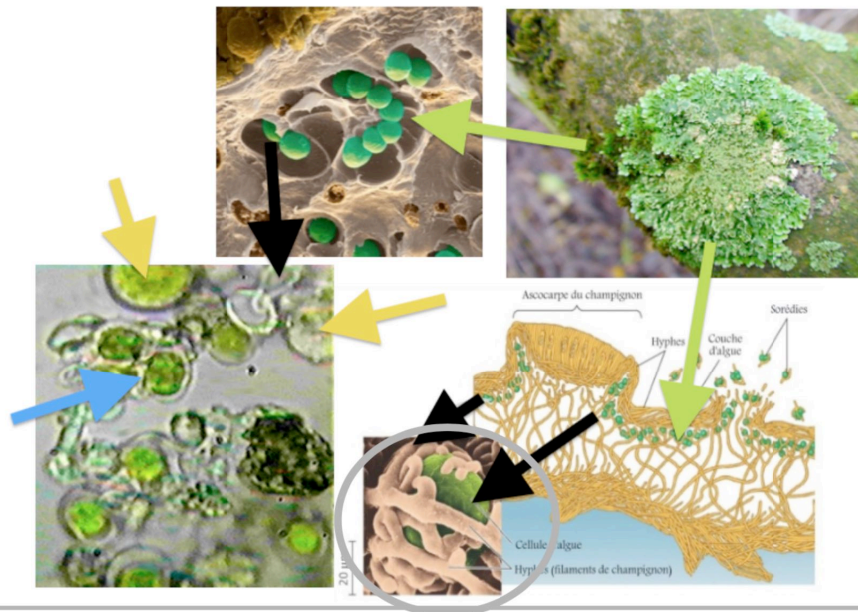
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a lichen
 AN ORGANISM MADE OF
 A MULTICELL ORGANISM
 A CELL ORGANISM POPULATION
 A BACTERIAL POPULATION

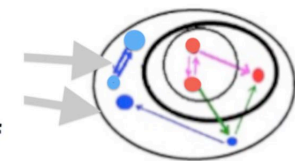


AN ECOSYSTEM
 WITH A FOOD CHAIN

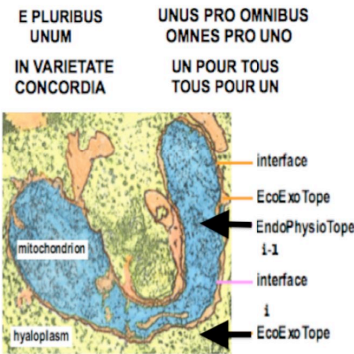
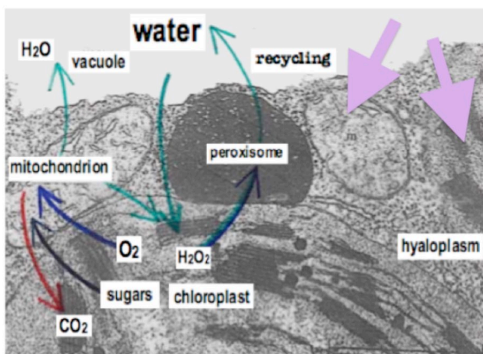
pierre.bricage@univ-pau.fr

Symposium 2 : Human Interaction with EcoSystems.

ARMSADA
 Association for
 the Reciprocal
 and Mutual
 Sharing of
 Advantages
 and DisAdvantages



A CELL IS AN ENDOSYNCENOSIS, AN ECOSYSTEM of ORGANISMS

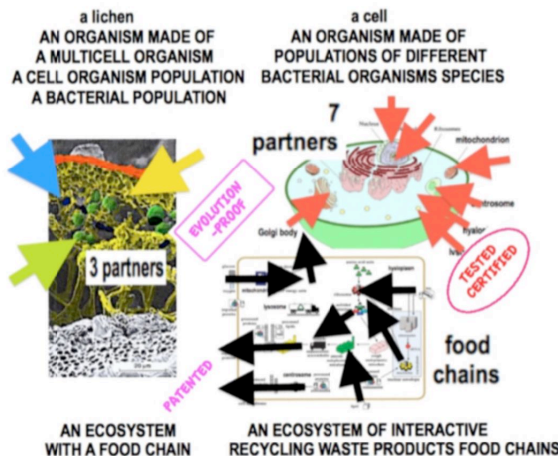


Bricage P. (1986) Isoperoxidases, markers of surrounding and physiological changes, in situ in leaves and in vitro in calli of *Pedicularis lithymaloides* L. variegatus: cell compartmentation and polyfunctionality, control of activity by phenols, specific roles. p. 261-265. *Biological & Physiological Aspects of Plant Peroxidases*. (Elsevier, ISBN 2-88164-001-X)

ISSS July 16-23, 2010, Wilfrid Laurier University, Waterloo, ON, Canada. Balancing Individualism and Collectivism: ARMSADA

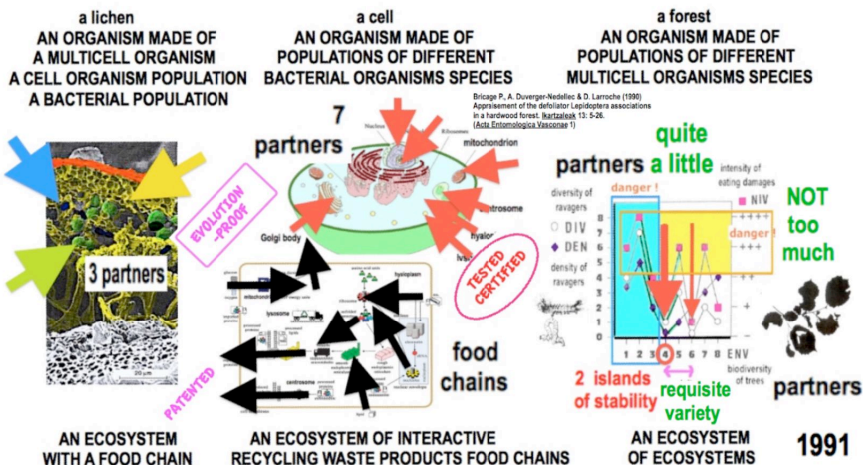
FOR THE ONE TO SURVIVE THE OTHER ONE MUST SURVIVE FIRST AND RECIPROCALLY 2000

I.B. La cellule



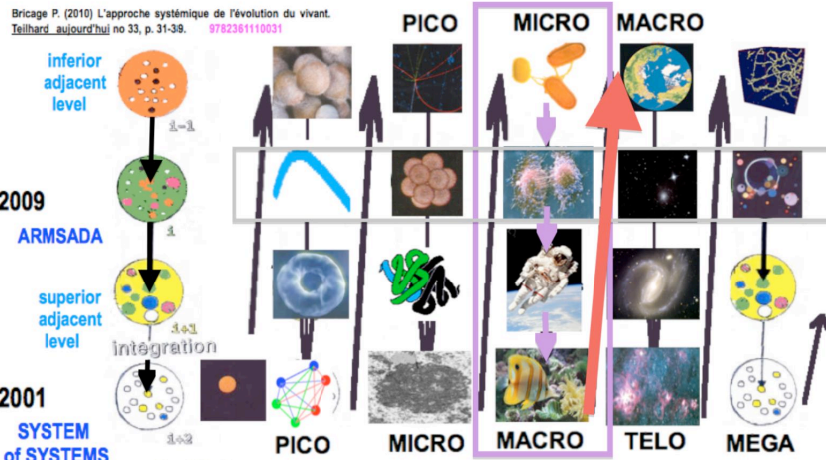
AN ECOSYSTEM WITH A FOOD CHAIN AN ECOSYSTEM OF INTERACTIVE RECYCLING WASTE PRODUCTS FOOD CHAINS

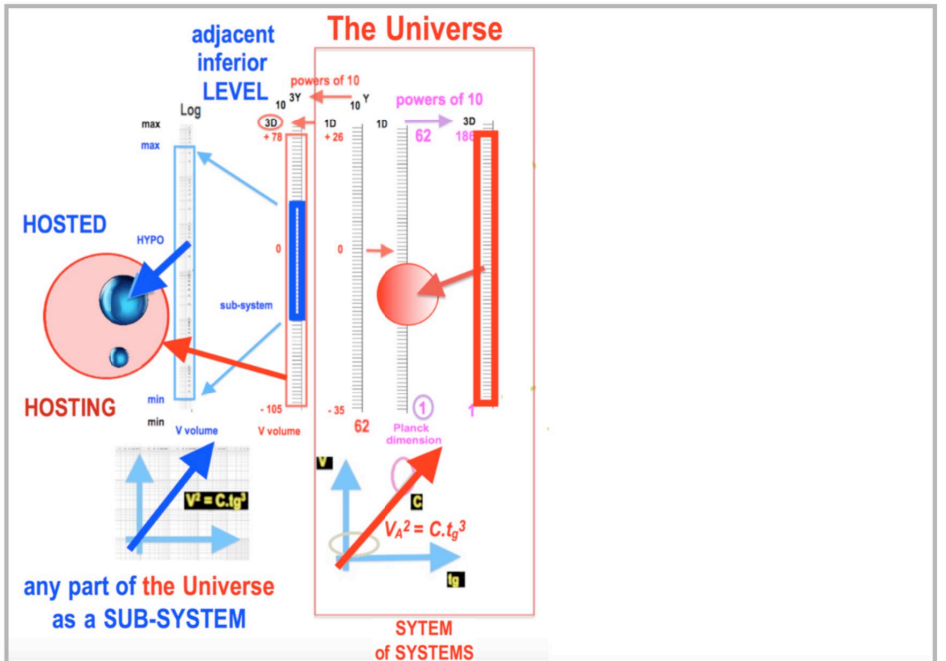
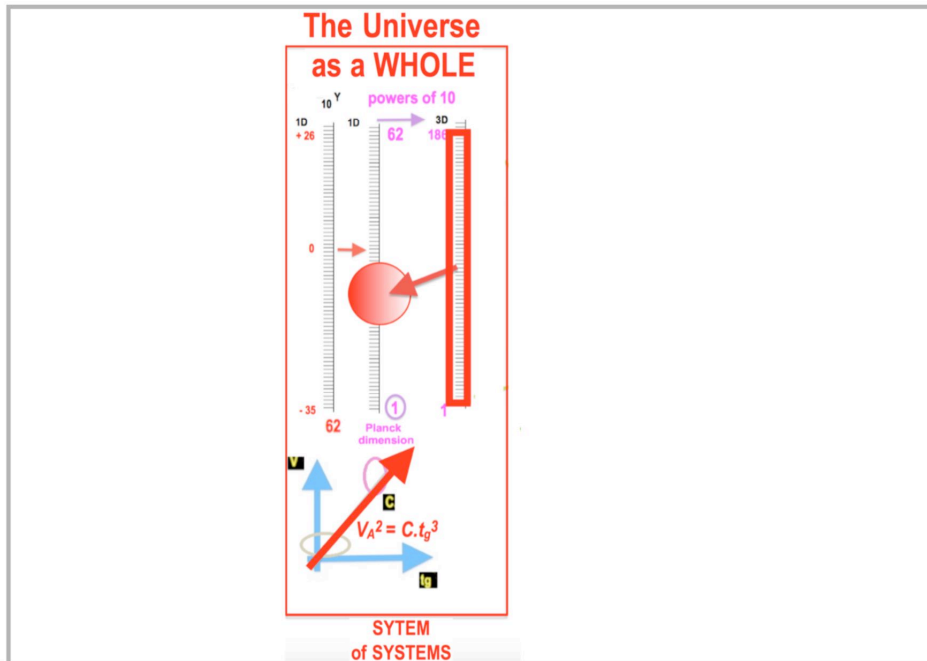
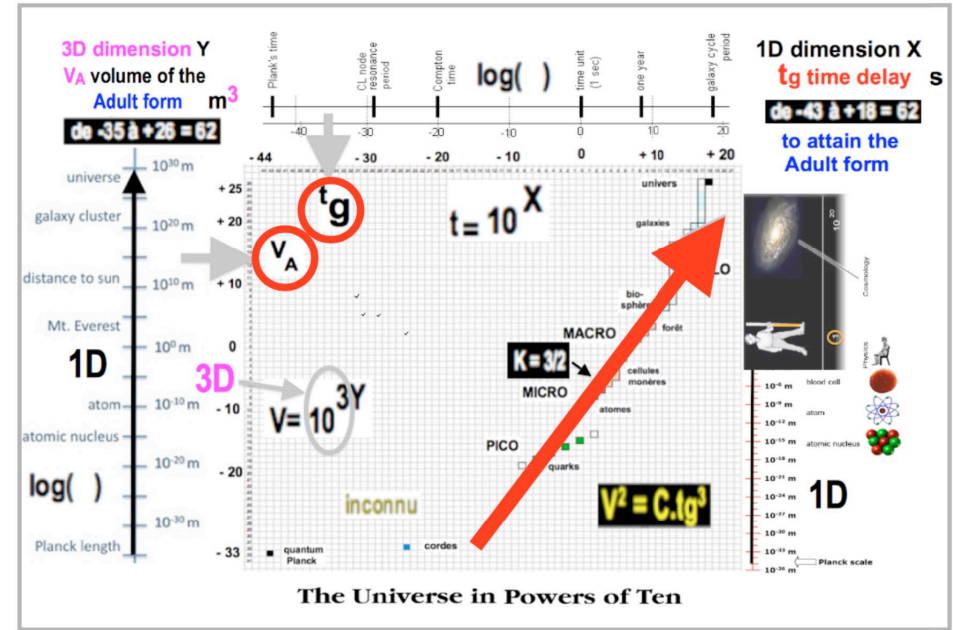
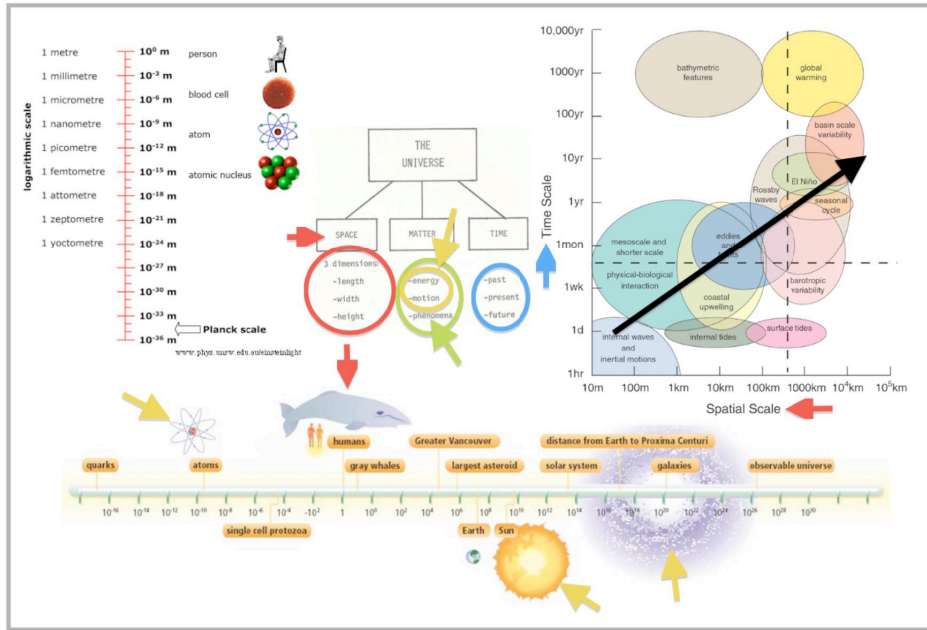
Associations for the Reciprocal and Mutual Sharing of Advantages and DisAdvantages

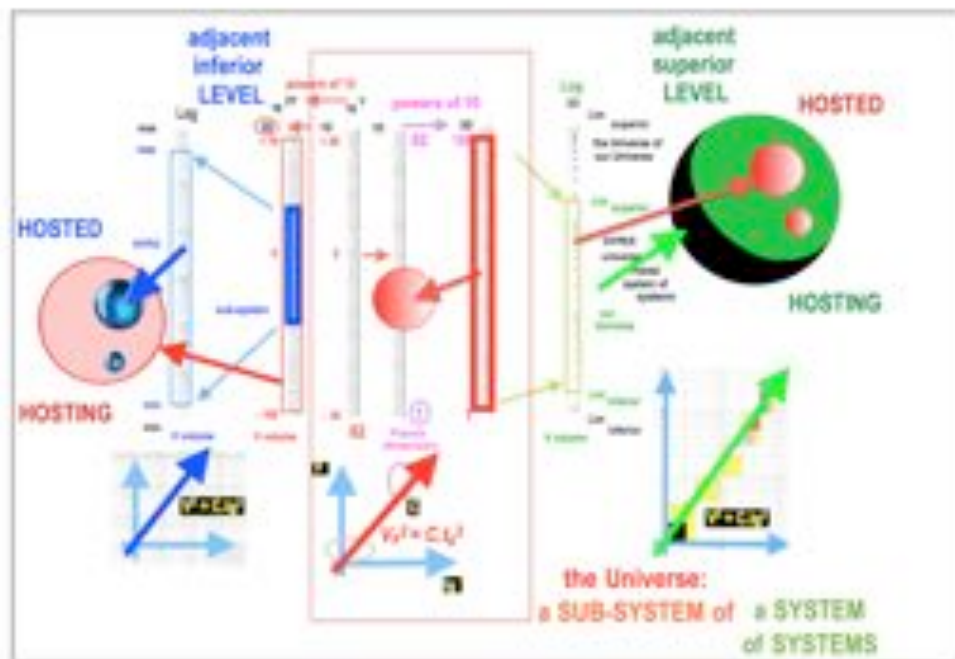


Associations for the Reciprocal and Mutual Sharing of Advantages and DisAdvantages

3.2. ORGANISATION LEVELS: PERIODIC CLASSIFICATION CHART







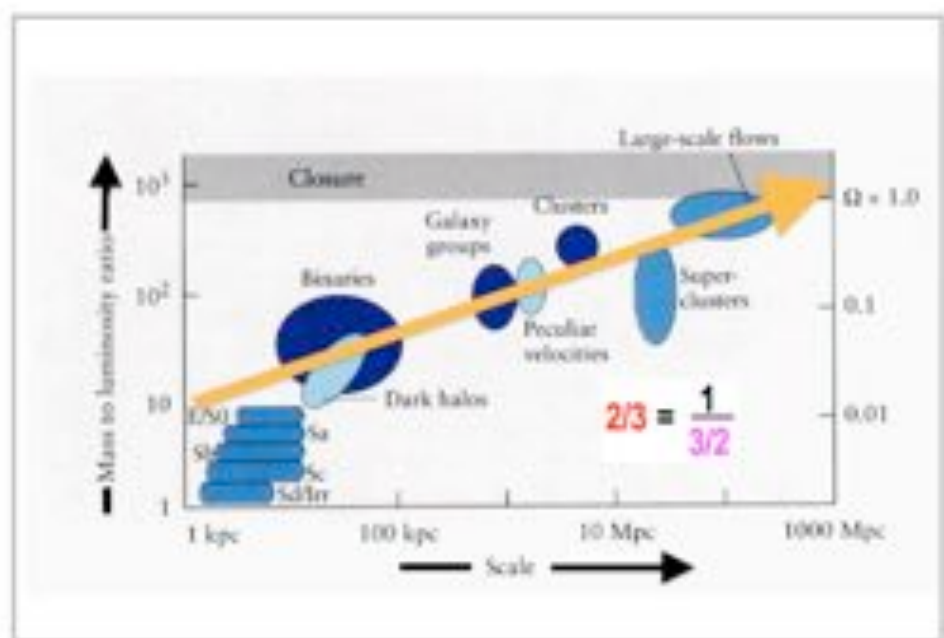
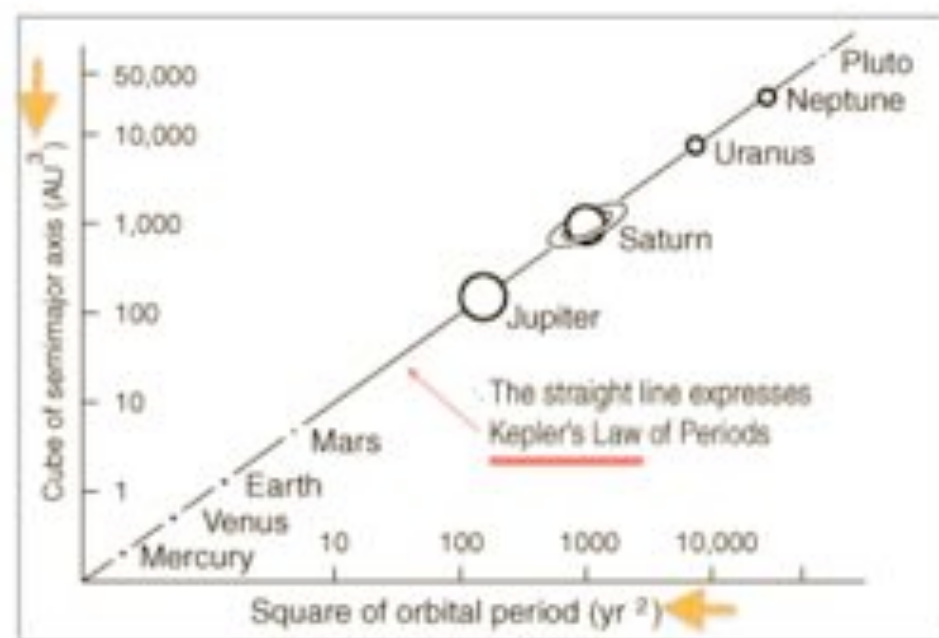
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LIVING SYSTEMS FRACTAL GOVERNANCE

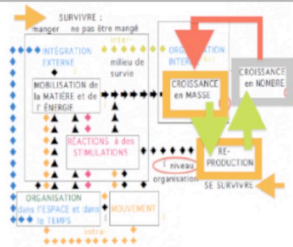
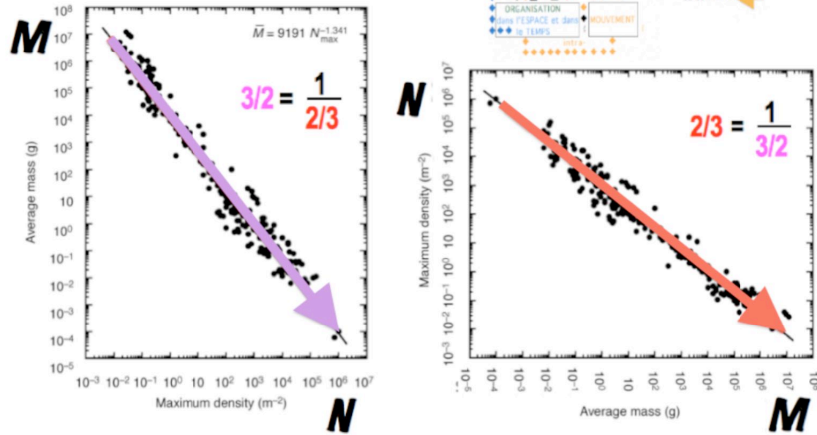
Origin, maintenance and evolution of Systems of Systems, emergence, invariance and maintenance

→ a scaling invariant power law: relationships between spaces and times of the parts and spaces and times of their whole

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Allometric scaling of plant energetics and population density



Science 4 September 2015: Vol. 349 no. 6252 DOI: 10.1126/science.aac6284

African large-mammal communities are highly structured.

In lush savanna, there are three times more prey per predator than in dry desert, a pattern that is unexpected and systematic.

The predator-prey power law: Biomass scaling across terrestrial and aquatic biomes

EndoPhysioTope and EcoExoTope, hosting capacity and capacity to be hosted: integration.

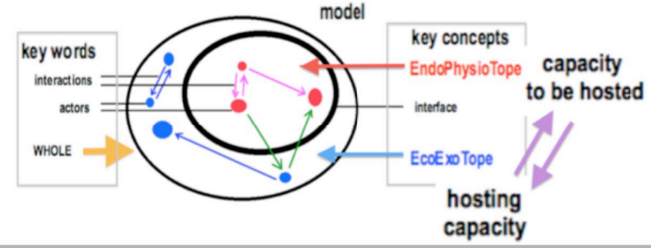


Fig. 5. Similar scaling links trophic structure and production. Each point is an ecosystem at a period in time (n = 2260 total from 1512 locations) along a biomass gradient. (A to P) An exponent k in bold (with 95% CI) is the least squares slope fit to all points n in each row of plots. Further details are in section M3 and table S1.

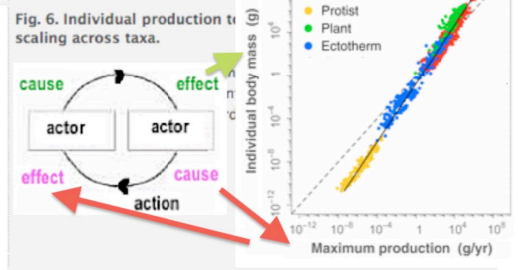
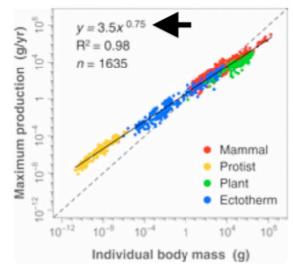
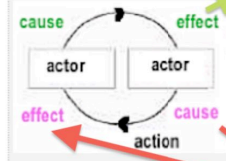


Fig. 6. Individual production vs maximum production scaling across taxa.



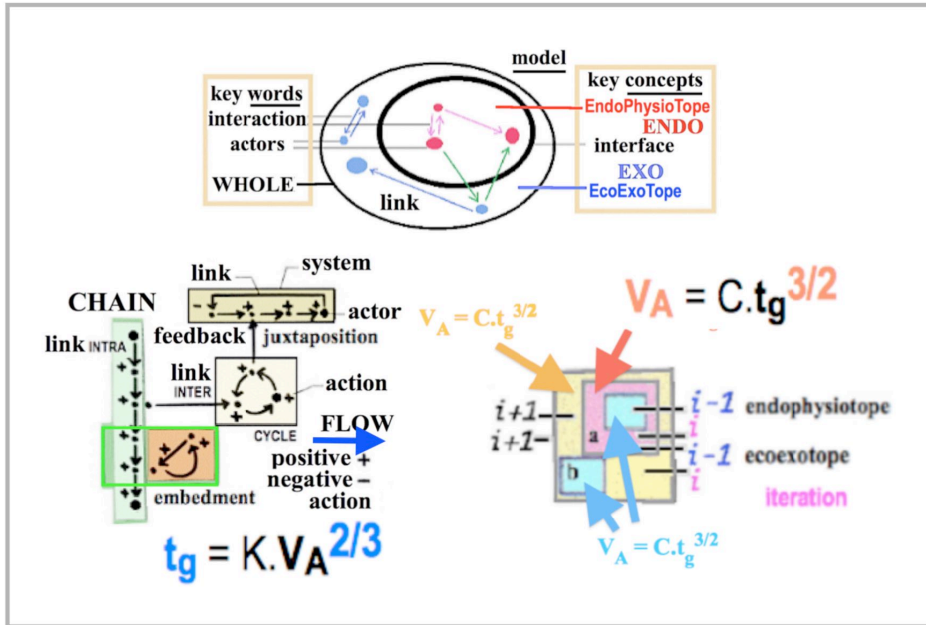
$$V_A^2 = C.t.g^3$$

$$t_g = K.V_A^{2/3}$$

larval stage duration in s 'generation time'

$$V_A = C.t.g^{3/2}$$

reproductive Adult volume in m³



On note $E_x(f(B_s))$ l'espérance de $f(B_s)$
 quand B est un Brownien issu de x . Cette quantité est égale à

$$E(f(x + B_s)) = \frac{1}{\sqrt{2\pi t}} \int_{\mathbb{R}} f(x + y) \exp\left(-\frac{y^2}{2t}\right) dy$$

où B est un Brownien issu de 0.
 Soit B un mouvement Brownien, b et σ deux constantes.
 Le processus **Brownien géométrique**.

(x, y) : space

Brownian motion

$$X_t = X_0 \exp\left\{\left(b - \frac{1}{2}\sigma^2\right)t + \sigma B_t\right\}$$

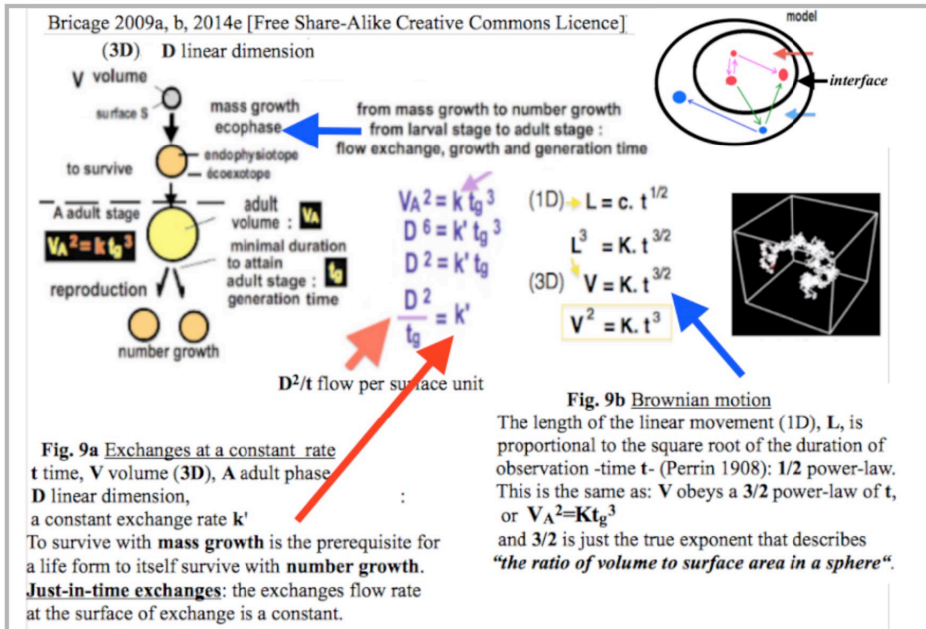
est aussi appelé processus "log-normal". **Log**

Temps d'attente T_a est un temps d'arrêt fini
 $E(\exp -\lambda T_a) = \exp(-|a|\sqrt{2\lambda})$.

Par inversion de la transformée de Laplace,
 on obtient la densité de T_a qui est, pour $a > 0$

$$\frac{a}{\sqrt{2\pi t^3}} \exp\left(-\frac{a^2}{2t}\right)$$

t time



Associations for the Reciprocal and Mutual Sharing of Advantages and DisAdvantages

Associations for the Reciprocal and Mutual Sharing of Advantages and DisAdvantages

ARMSADA

A Fruitful Predictive Paradigm

Pierre BRIGAGE

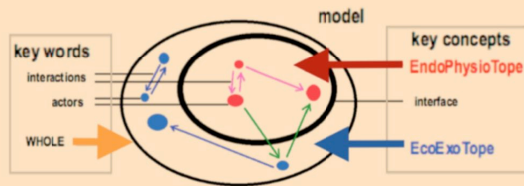
Université de Pau et des Pays de l'Adour UPPA, Pau, France
 Association Française de Science des Systèmes AFSCET, Paris, France
 European Union for Systemics UES-EUS, Brussels, Belgique,
 World Organisation of Systems and Cybernetics WOSC, Lincoln, UK
 International Academy for Systems and Cybernetic Sciences IASCYS, Wien, Österreich

UPPA AFSCET UES-EUS WOSC IASCYS

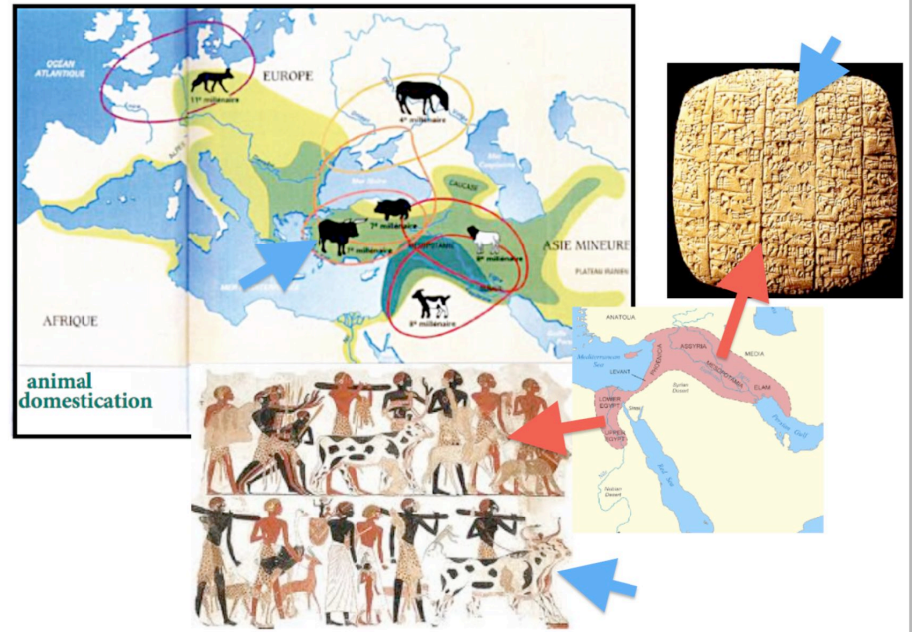
19/02/14 <http://armsada.eu> p. 1/23

symbioses are not associations for mutual benefits, but

ARMSADA



mass growth or number growth
is long-lasting (sustainable) **as long as**
supportable for every partner
and supported by every partner



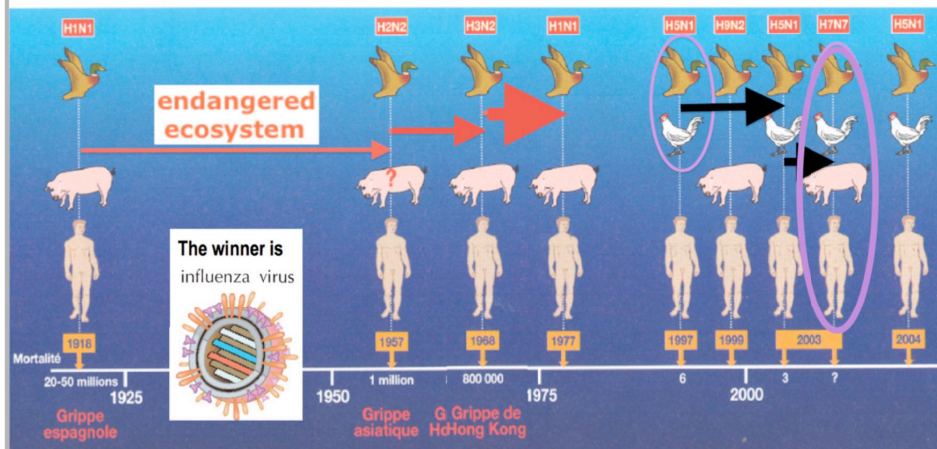
Congreso Internacional América-Europa sobre los Valores del Quijote
Villanueva de los Infantes, Campo de Montiel, Spain, 28 June - 2 July, 2017

To escape from their “who wins loses” game,
predators and preys must enter into an
Association for the Reciprocal and Mutual Sharing
of Advantages and DisAdvantages
-ARMSADA-

Every ARMSADA emerges

→ when all the partners simultaneously
lose the ability to kill the other ones.

<http://www.afsct.asso.fr/pagesperso/Bricage.html>
Current Systems Theory and Cybernetics



**“WIN-WIN”
is not the solution but the problem! ←**
What next?

Pierre BRICAGE

**ARMSADA
THE KEY PARADIGM FOR SUSTAINABILITY**

The European Meeting on Cybernetics and Systems Research,
Wien, Österreich, March 30th - April 1st, 2016

AFSCET UES-EUS IASCYS Pierre BRICAGE SCU UPPA

Associations for the Reciprocal and Mutual Sharing of Advantages and DisAdvantages

CURATIVE VACCINES

2 NEW WORDS: ECOEXOTOPE & ENDOPHYSIOTOPE

2 “TRIVIAL” CONCEPTS:

* **TO SURVIVE IT IS “TO EAT” & “NOT TO BE EATEN”**

* **THERE ARE NEVER ADVANTAGES WITHOUT DISADVANTAGES**

1 NEW PARADIGM:

**ALL THE LIVING SYSTEMS MERGED FROM AN ARMSADA
ASSOCIATION for the RECIPROCAL and MUTUAL
SHARING OF ADVANTAGES and DISADVANTAGES**

2 “EVIDENT” FACTS: MODULARITY & ERGODICITY

2 NEW IDEAS:

* **DANGERS HOSTED IN CELLS, ARE NECESSARY FOR THE SURVIVAL**
* **VIRUSES ARE REGULATORS & PROTECTORS OF LIFE THROUGH
THEIR CONTROL OF THE CAPACITY OF HOSTING OF THE ECOEXOTOPES
& OF THE CAPACITY OF TO BE HOSTED OF THE ENDOPHYSIOTOPES.**

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Associations for the Reciprocal and Mutual Sharing of Advantages and DisAdvantages

4.1. HIV CURATIVE VACCINE

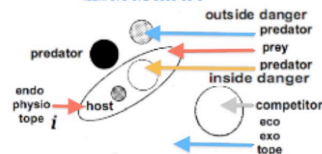
La technologie du prélèvement in vivo de cellules souches, de leur culture in vitro, puis de leur réimplantation in situ*, au même individu, est maintenant maîtrisée.* Cultivons une grande quantité, renouvelée, de cellules mères de la lignée lymphocytaire, saines, prélevées chez un individu contaminé (mais en dessous du seuil de contamination assurant l'existence de cellules viables* intactes, non infectées*), en présence d'une quantité limitée, contrôlée, de virus HIV. Tôt ou tard, les seules cellules survivantes, sélectionnées in vitro, seront des cellules souches modifiées génétiquement*, ayant intégré le virus (état 4, Figure 2) sous une forme endogène stable (état E, Figure 1). Réimplantées, chez le même individu contaminé*, elles donneront naissance à une lignée résistante* à la lyse par le même virus.*



Bricage P. (2005) The Metamorphoses of the Living Systems: Associations for the Reciprocal and Mutual Sharing of Advantages and of DisAdvantages. <http://abbayeslaiques.asso.fr/BIOsystemique/bibliographie/METAreferencesPB.pdf>
6^e European Systems Science Congress Proceedings workshop 4 Bio-Systemics, 10 p. <http://abbayeslaiques.asso.fr/BIOsystemique/bibliographie/PBmetamorphoses.pdf>

4.2. CANCER CURATIVE VACCINE

Bricage P. (2008) ARMSADA: Applicative Insights in Prevention or Cure of HIV Induced AIDS. Complementary Data, Figures & References. 7th European Systems Science Congress Proceedings, Lisboa. ISBN: 978-972-9059-05-6



2008
TO SURVIVE IT IS “TO EAT AND NOT TO BE EATEN”.
THE RELATIONSHIP BETWEEN HIV AND CELLS ARE THE SAME THAT THE ONES BETWEEN A PREDATOR AND ITS PREYS. HIV POPULATIONS EVOLVE AS DO OTHER BLOOD CELLS PREDATORS (LIKE IN TRYPANOSOMES DISEASES), WITH THE 4 FATES:
- THE PREY WINS, - THE PREDATOR WINS, - THE 2 LOSE, - NO ONE WINS OR LOSES AND THE 2 TOGETHER WIN AND LOSE.
A STEADY-STATE MUST INSTALL BETWEEN THE PREDATOR AND ITS PREY, LIKE IT HAPPENS BETWEEN A BACTERIOPHAGE AND ITS BACTERIAL HOST, FOR THE MERGING OF AN ARMSADA, WHICH IS A NEW BLUEPRINT.

19/02/14

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International Journal of Public and Private Management

Vol 1, No 1 (2014) > Bricage

An approach of organizations and management: Systemic ethics, democracy and sustainability

Pierre Bricage

To survive all living systems have **“to eat and not to be eaten”**. But, soon or late, every one is eaten (<http://tinyurl.com/surviepbafscet>). To partly escape from the dilemma of the predator-prey game, in which **“who wins loses”**, the predator must, as the prey, enter into an Association for the Reciprocal and Mutual Sharing of Advantages and DisAdvantages (ARMSADA) -like a lichen or a cell, which both are an organism and an ecosystem-. Every ARMSADA emerges when all partners simultaneously lose the ability to kill the others. In the new Whole everything which is an advantage for a partner is a disadvantage for the others (<http://tinyurl.com/pbsustdev>). They are merged together “for the best and for the worst”. “The benefits are only for their Wholeness” which get new “abilities” (<http://tinyurl.com/andesymbiosis>) -like the cell, which, with the help of a virus, emerged from a mat of Monera (<http://tinyurl.com/pbcellorigin>). In their new endophysiotope the **“Parceners”** are all interdependent. Through the iteration of the process of ARMSADAs' emerging, each new more-and-more complex “system-of-systems” is more-and-more independent of its ecoexotope (<http://tinyurl.com/phylogtagmotaphology>). The endophysiotope of a i level of organisation is the ecoexotope of previous i-n levels. Due to the parceners half-autonomy, abilities of the previous levels are lost while simultaneously new ones are gained: **“The Whole is both less and more than the sum of its parts”**(<http://tinyurl.com/anlea05pau>).