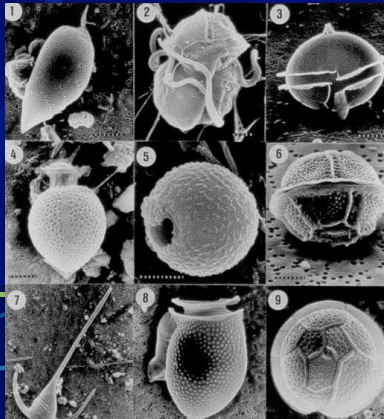


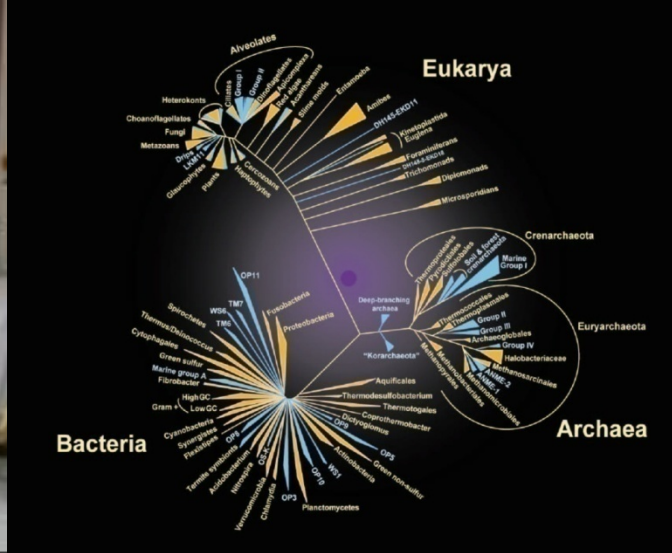
Dans le changement global, les grandes questions environnementales

- Energie,
- Eau,
- Biodiversité,
- Climat
- Pollution,
- Les interactions de l'humain avec la nature



Can a collapse of global civilization be avoided?
Paul R. Ehrlich and Anne H. Ehrlich
Proc. R. Soc. B 2013 **280**, 20122845, published 9 January 2013

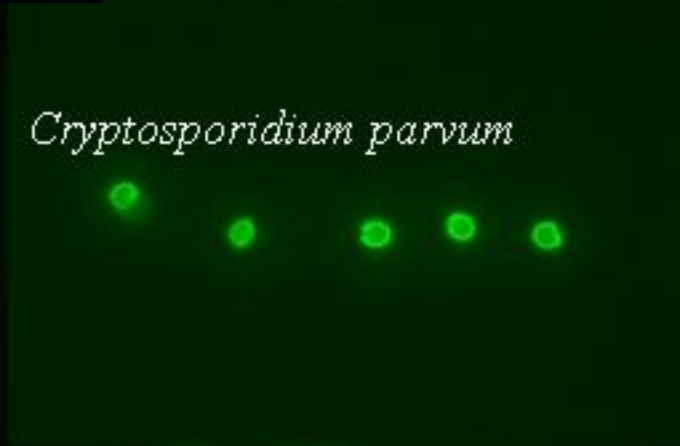




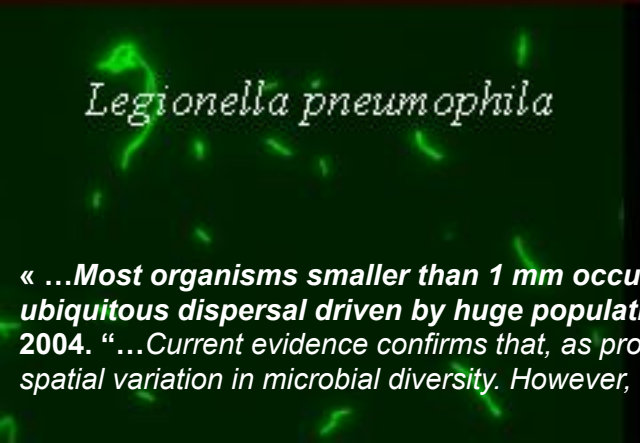
Naegleria fowleri



Giardia spp.



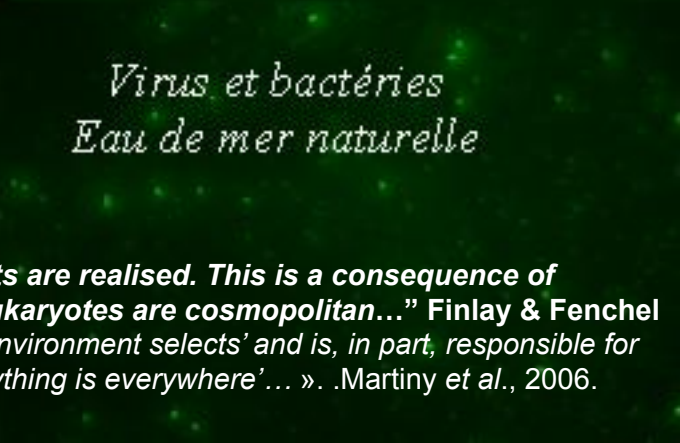
Cryptosporidium parvum



Legionella pneumophila



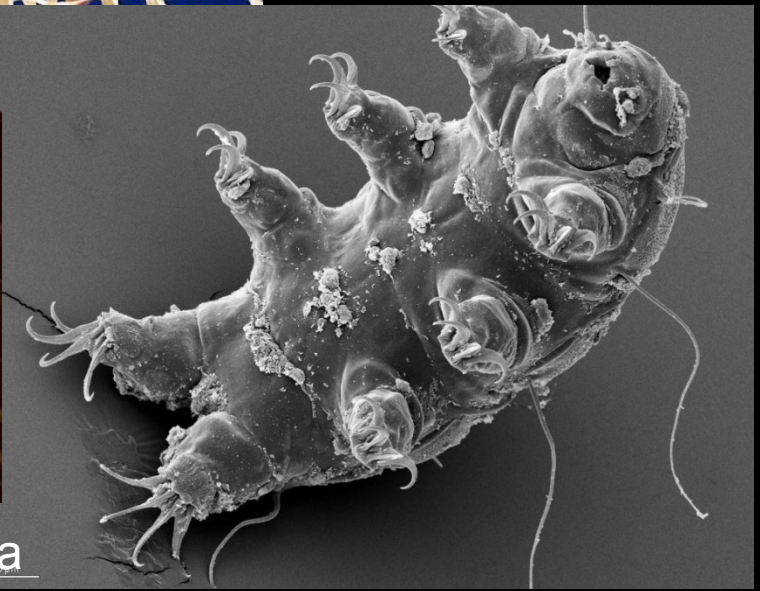
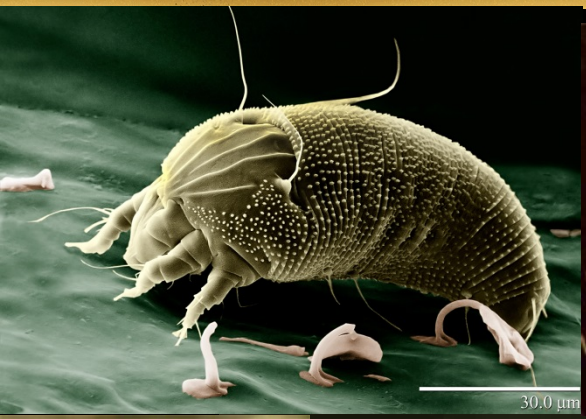
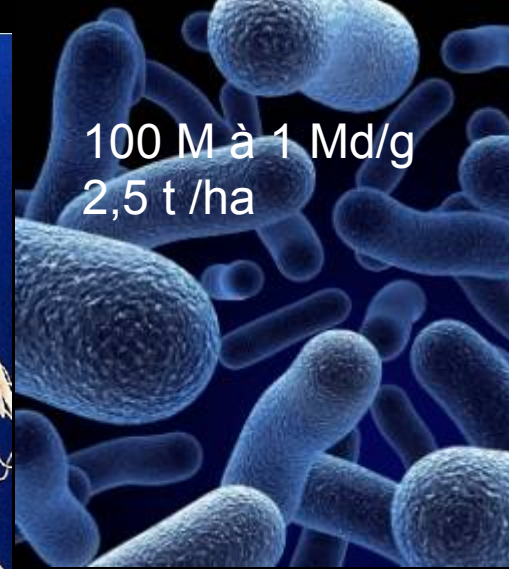
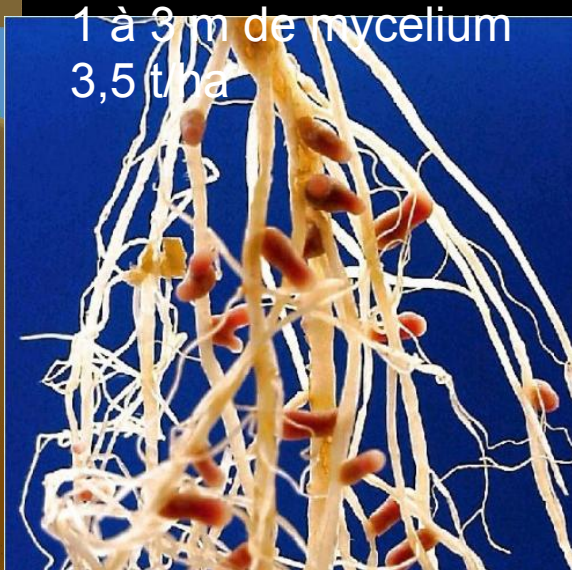
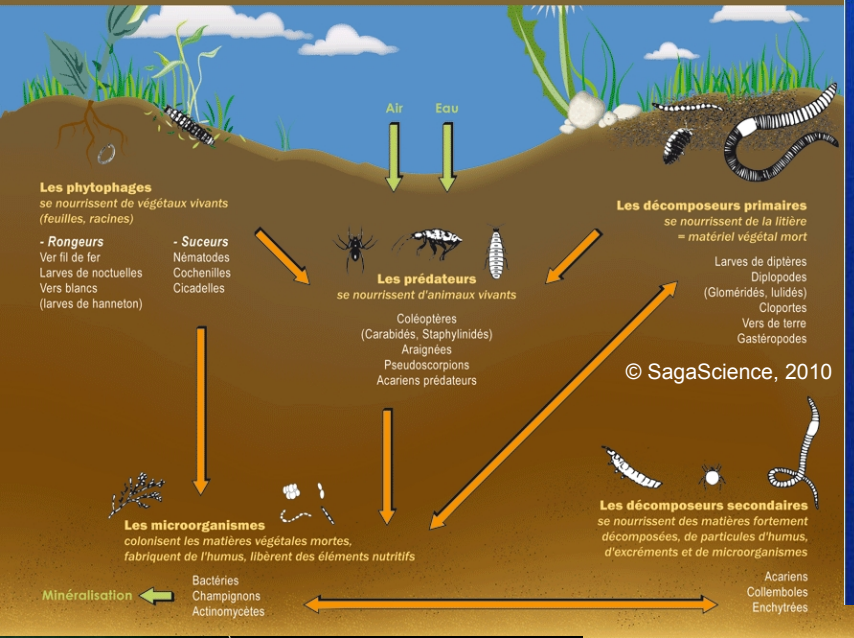
Escherichia coli



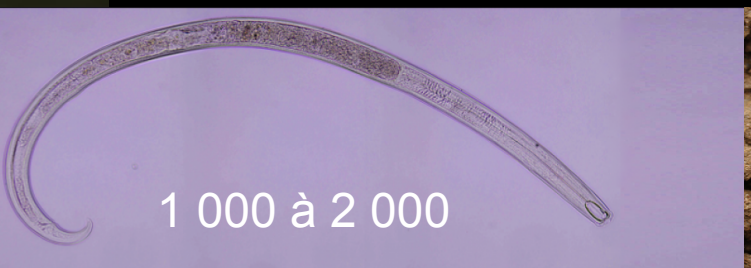
*Virus et bactéries
Eau de mer naturelle*

« ...Most organisms smaller than 1 mm occur worldwide wherever their required habitats are realised. This is a consequence of ubiquitous dispersal driven by huge population sizes . Metapopulations of microbial eukaryotes are cosmopolitan...» Finlay & Fenchel 2004. «...Current evidence confirms that, as proposed by the Baas-Becking hypothesis, 'the environment selects' and is, in part, responsible for spatial variation in microbial diversity. However, recent studies also dispute the idea that 'everything is everywhere'... ». .Martiny et al., 2006.

Les fonctions de la faune du sol

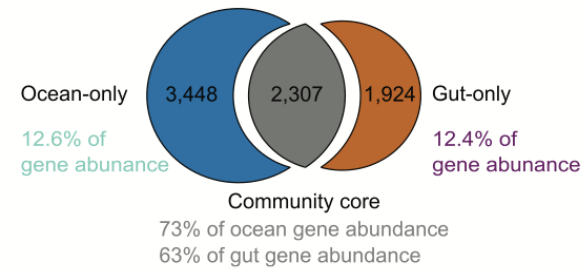


Tous animaux : 1 à 5 t/ha

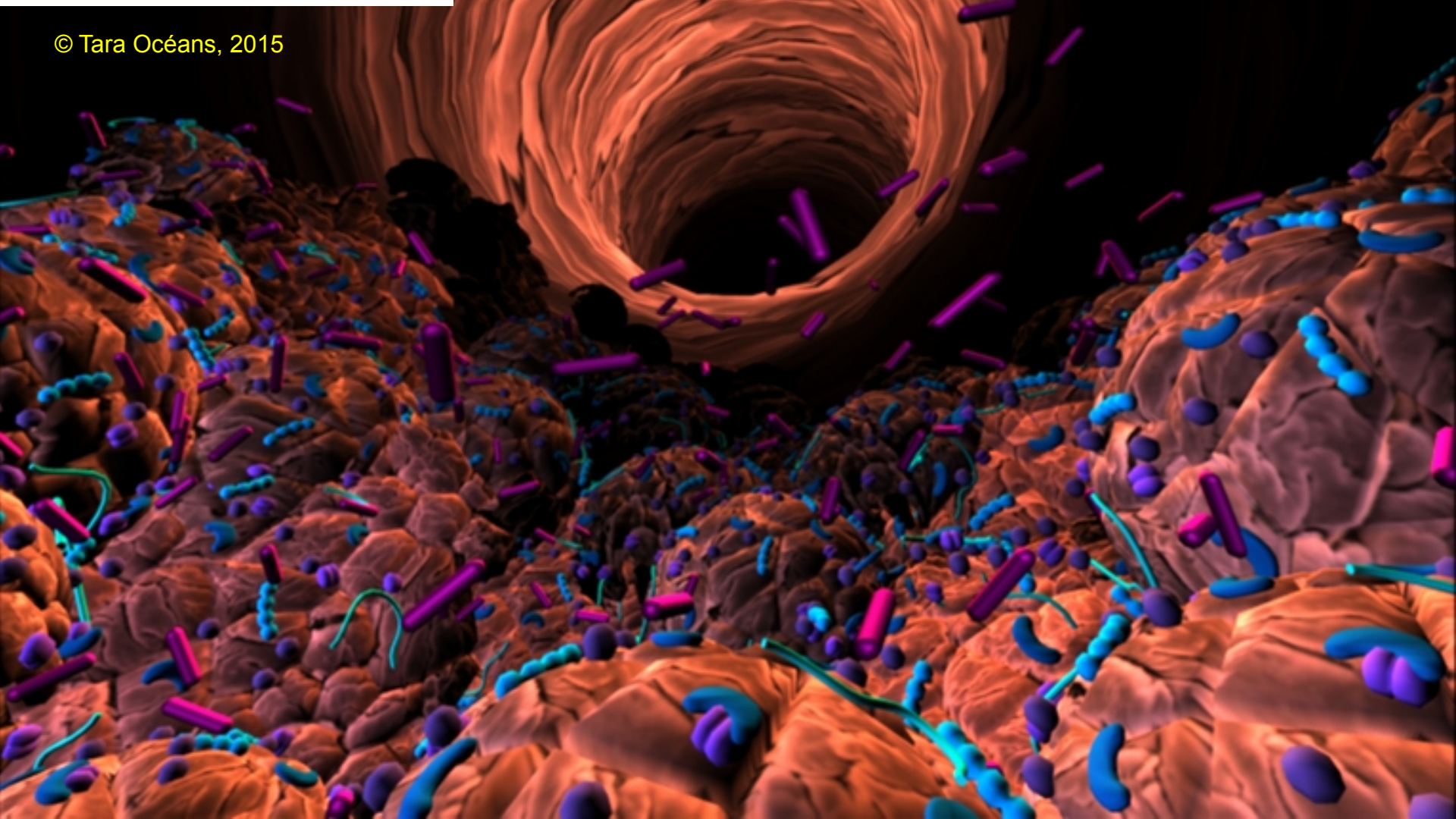


C Ocean core vs gut core orthologous groups

© Biocodex, 2008



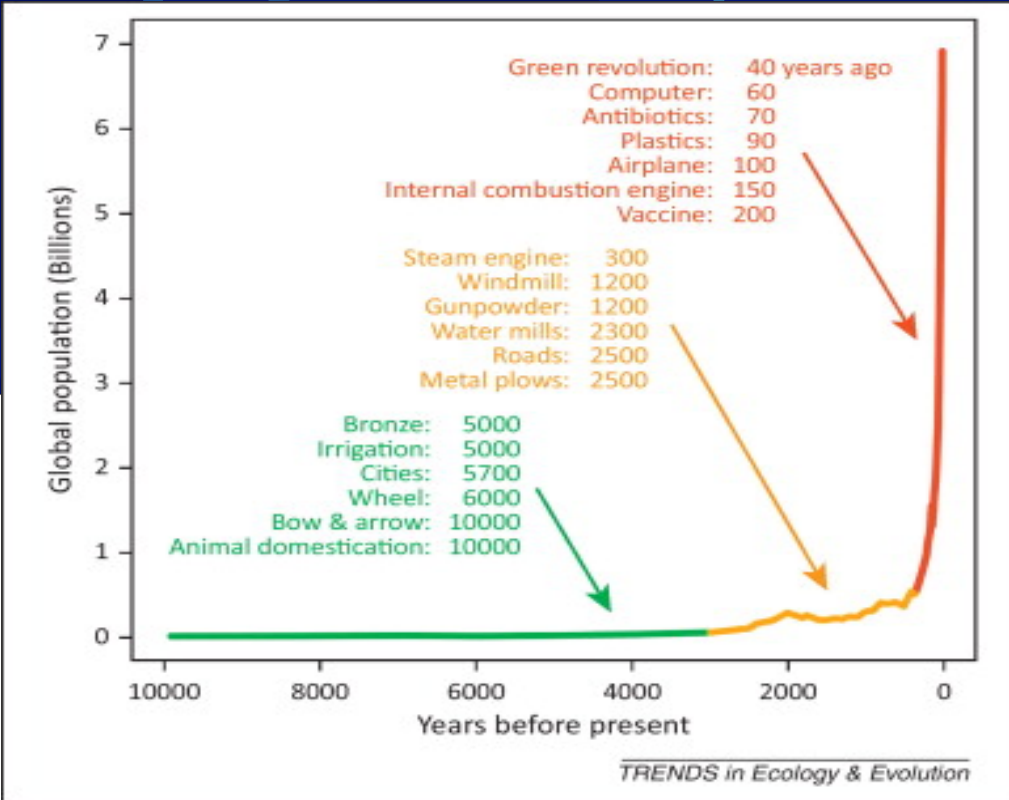
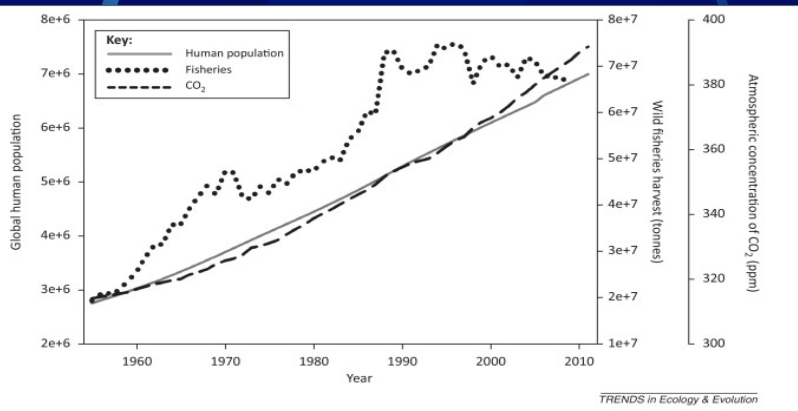
© Tara Océans, 2015



1 Negative population growth for a number of generations, followed by zero growth;
 2 A steady-state economy based on sustainable use of renewable energy and material resources;
 and 3 New social norms that favour the welfare of the entire global population over that of specific individuals and groups. **The authors largely rely on biological and/or cultural evolution to attain such goals.**

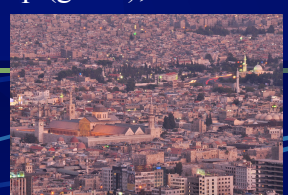
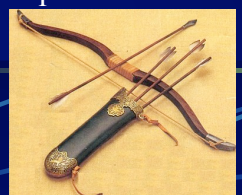
The Malthusian–Darwinian dynamic and the trajectory of civilization

Nekola *et al.*, TrEE, March 2013



The trajectories of atmospheric CO₂ and wild fisheries harvest in relation to global population since 1955. Note that the increase in CO₂ concentration has accelerated, whereas fisheries harvest reached a peak in the 1990s and has since declined..

Global human population over the last 10 000 years. Examples of major innovations that have helped to expand human carrying capacity are listed for three time periods in years before present (ybp): 10 000–3000 ybp (green), 3000–300 ybp (orange), and 300 ybp–present (red).



Les sept plaies de la crise écologique

- La crise du productivisme agricole,
- La pénurie d'eau potable,
- Les ressources halieutiques s'épuisent,
- La déforestation progresse toujours,
- La biodiversité s'effondre,
- Des produits toxiques de plus en plus disséminés,
- Le changement climatique s'accélère.

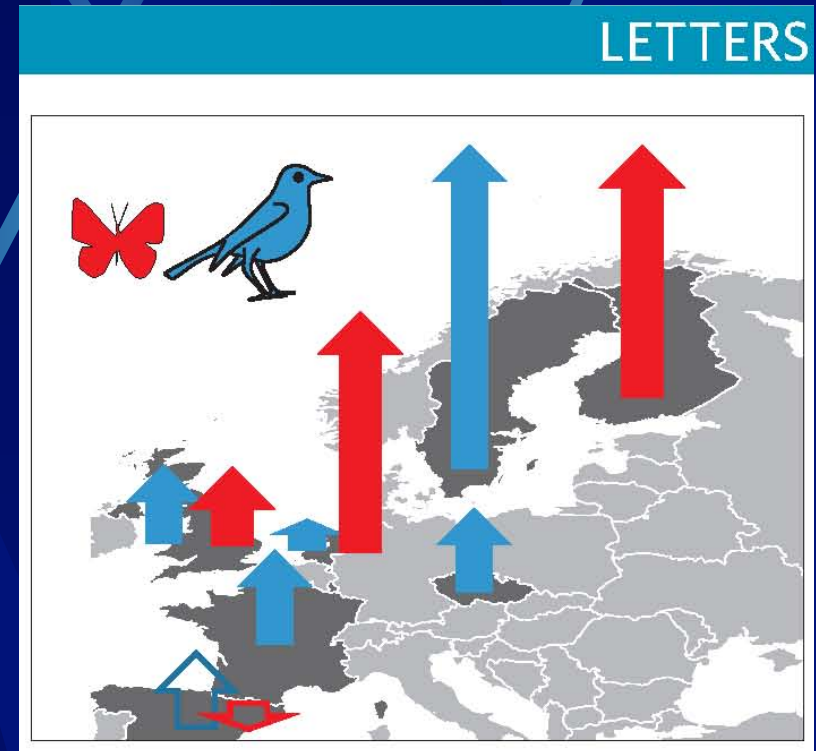


Les derniers rapports en France...

Differences in the climatic debts of birds and butterflies at a continental scale

Devictor *et al.*, *Nature Climate Change*, Jan 2012,

Figure 3 | European variations in the temporal trend of bird and butterfly CTI. The map shows the temporal trend of bird and butterfly CTI for each country. The height of a given arrow is proportional to the temporal trend and its direction corresponds to the sign of the slope (from south to north for positive slopes). The arrow is opaque if the trend is significant.



Oiseaux et papillons volent moins vite que la température : la traque à l'habitat !
33km pour les oiseaux, 114 km pour les papillons, sur 18 ans. 1°C vers le N, 249 km en Europe, accumulation de la « dette climatique ».

Tendon élastique (résiline)

Supporte des fréquences jusqu'à 42Hz

20 millions de cycles de battements par vie sans dommages

Capable d'accélération de 30 G

Un sang remué en permanence par un cœur en forme de tube, qui flotte dans le liquide avec les autres organes.

Ailes résistantes,

Flexibles, légères

Vol à 80 km/h

Performance aérienne

9 techniques de vol



Info @biomimesis.fr
Olivier Allard

Sonde de vitesse de vol

Capacité de vol pendant des heures

avec quelques milligrammes de

« carburant »

Un corps aérodynamique, exosquelette résistant pour un minimum de poids chitine + calcaire

Vue à 360°

Capable de voir 300 images par seconde

Transformations nécessaires et adhésion des populations

- Admettre l'indissociabilité du couple humain/nature,
- Adapter le calendrier politique aux questions de très longue durée et prendre en considération l'avenir plus lointain,
- Ouvrir de larges débats avec la société civile et les ONG, un « Grenelle » encore plus ambitieux et suivi de décrets appliqués,
- Amplifier les efforts vers les sciences participatives et la bioinspiration,
- Revoir la transversalité dans le système éducatif, y habituer les enfants.