SCIENTIFIC NEWS

Editorial. Duplomb Law : An unprecedented mobilisation for science and ecology

The adoption of the Duplomb law marks a worrying setback for environmental protection by facilitating the use of pesticides, mega reservoirs and industrial livestock farming, sometimes in defiance of scientific knowledge accumulated over decades.
But for the first time, the reaction has not been limited to expert circles: more than two million citizens have signed a petition denouncing the reauthorisation of acetamiprid, a neonicotinoid recognised as harmful to biodiversity. Their mobilisation, relayed by the scientific community, has found -had political repercussions with the Constitutional Council's decision to censor this reintroduction. This strong signal reminds us that science and society can together influence democratic debate. Faced with mistrust and the temptation to prioritise productivity, it is more important than ever to maintain this common front in order to put knowledge back at the heart of political decisions. Efforts to popularise and communicate scientific results to the general public are therefore essential.

Christelle Lopes and Pauline Vuarin (Evolutionary Ecology Department)

When chemistry self-organises : the origins of evolution

Understanding the origin of life through autocatalytic cycles. How did the first forms of life appear in a world dominated by physicochemical processes? This work explores the key role of autocatalytic cycles, sub-parts of self-amplifying reaction networks. However, searching for them in large reaction networks remains a real challenge. In this study, the researchers combined mathematical evidence (demonstrating that the problem is NP-complete) and developed appropriate analytical tools to detect these cycles. However, these cycles only have a potential existence, as constraints such as those imposed by the laws of thermodynamics could prevent their activation. This work initiates a programme aimed at understanding the interactions between autocatalytic cycles and their potential role in the emergence of natural selection. For Sylvain Charlat, co-author of the study, these results *'pave the way for a better understanding of its role in the emergence of Darwinian dynamics, at the origin of life'*.

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Authors : Thomas Kosc, Etienne Rajon (département écologie évolutive) et Sylvain Charlat (département coévolution) & al. From : *PNAS*

Evolution of genome size in Drosophila : testing the neutral hypothesis on a large scale

Why do some species have larger genomes than others? Annabelle Haudry explores the role of genetic drift in the evolution of genome size in Drosophila flies. By analysing the genomic content of 76 species, the study tests the neutral hypothesis that the accumulation of transposable elements is favoured by a relaxation of natural selection (evidenced by an average decrease in the ratio of non-synonymous to synonymous mutations across 2,400 genes).The results indicate that when natural selection is less effective, transposable elements can accumulate in the genome, leading to an increase in genome size: slightly harmful mutations can persist by chance, highlighting the major role of genetic drift in genome evolution. *'We need to look at the right evolutionary scale to detect the impact of drift on the evolution of genome size,'* insists Annabelle Haudry, paving the way for new work on the impact of horizontal transfers of mobile elements.

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Authors : Annabelle Haudry (département GECO Génomique Computationnelle et Evolutive) & al. From : *Molecular Biology and Evolution*

An integrated strategy to curb dengue in urban areas : a look back at the first cluster randomised trial conducted in Malaysia

How can dengue fever be effectively combated ? Faced with a lack of rigorous assessments measuring the impact of vector control interventions on the incidence of dengue fever in humans, a team of Malaysian and European researchers conducted the first randomised cluster trial in Kuala Lumpur. The intervention combined community mobilisation and the deployment of two tools targeting adult mosquitoes and larvae, in addition to routine measures. Conducted over two years between 2020 and 2022, the study observed a 14% reduction in the incidence rate in the intervention arm compared to the control arm, without reaching statistical significance. The COVID-19 pandemic limited community mobilisation efforts and led to a significant reduction in the incidence rate of dengue fever, affecting the power of the trial. However, given the geographical expansion of Aedes mosquitoes, Muriel Rabilloud, in line with WHO recommendations, believes it is *'necessary to conduct further trials of this type'* in order to *'identify effective interventions to reduce the transmission of dengue and other diseases transmitted by Aedes mosquitoes'*.

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Author : Muriel Rabilloud (département Statistiques et modélisation pour les Sciences de la Santé) & al. From : *The Lancet*