Convergent evolution: concepts, database, roadmap and case studies
Isabelle Hue, Justine Dardaillon, Pierre Pontarotti, George Mc Ghee

To cite this version:
Isabelle Hue, Justine Dardaillon, Pierre Pontarotti, George Mc Ghee. Convergent evolution: concepts, database, roadmap and case studies. AEEB: Evolutionary Biology Meeting, Sep 2017, Marseille, France. pp.189, 2017, 21st Evolutionary Biology Meeting. hal-02734433

HAL Id: hal-02734433
https://hal.inrae.fr/hal-02734433
Submitted on 2 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Distributed under a Creative Commons Attribution 4.0 International License
Convergent Evolution: concepts, database, road map and case studies
Isabelle Hue, Justine Dardaillon, Pierre Pontarotti & George McGhee
UMR 1198, BDR, INRA; I2M, UMR AMU, CNRS 7373; Rutgers University, USA

Abstract
Most of the authors studying convergent evolution think about the apparition of a similar phenotype in two evolutionary independent lineages (Conway Morris 2003, McGhee 2011, Losos 2011, Gordon et al 2015). From this broad definition authors focused on case studies: echolocation (Parker et al 2013) or repetitive adaptations of marine mammals (Foote et al 2015). However, cases of “repetitive similarities” should be defined in a better way.

We so far: 1) proposed neologisms that can apply to any biological level: allo-convergent, iso-convergent and retro-convergent evolution (both retro-iso and retro-allo). This is important since, in the case of iso-convergent evolution, one can suspect that the underlying molecular mechanism(s) could be similar (Stern and Orgozozo 2008). Such cases could then be used as meta-models (Kopp 2009) to decipher biological mechanisms at genetic, epigenetic, transcriptional or any biological level, 2) initiated the development of the LEIA database to store reported cases of convergent evolution at the phenotypic level and sort out cases of iso-convergence, 3) developed a road map to study these cases at different biological levels, and 4) illustrate cases of: dorsal or pectoral fin re-evolution, cuticule evolution and ovi-/vivi- parity transition (in mammals or amniotes).

LEIA Database :
Leveled Events of Iso and Alloconvergence evolution Database

The LEIA Database is a multi-level database, its different levels spread from the genotype to the phenotype, each one can be linked to one another.

With an interactive and easy-to-use visual interface, the user can search for iso- and alloconvergences at morphological and/or genetic level and see the potential link between these two levels.

Pre-attachment, attachment, parturition (Opposum)
Pre-attachment, implantation, extended pregnancy, parturition (Human)

The ancestor was oviparous and laid eggs with a solid shell (still evidenced by birds, crocodiles, chelonians).
The same evolutionary events occurred repetitively in the evolution of Amniotes (Morphological Iso convergence): the eggs became retained until mid-gestation and the egg shell became softer (ER: Egg Retention).

* earliest fossilized embryos along each branch of the tree