

Evolution of maximal endurance capacity: natural and sexual selection across age classes in a lizard

Jean-François Le Galliard^{1,2*} and Regis Ferrière^{1,2,3}

¹CNRS, UMR 7625, Laboratoire Fonctionnement et évolution des systèmes écologiques,
Université Pierre et Marie Curie, 7 Quai St. Bernard, 75005 Paris, France,

²Centre de Recherche en Ecologie Expérimentale et Prédictive, Station biologique de Foljuif,
Ecole Normale Supérieure, Rue du Château, 77140 St Pierre les Nemours, France and

³Department of Ecology and Evolutionary Biology, University of Arizona, Tucson AZ 85721-0088, USA

ABSTRACT

Hypothesis: One of the basic tenets of evolutionary physiology is that physical performances and fitness are tightly linked.

Question: Are phenotypes with exceptional locomotor capacity strongly favoured by natural and sexual selection?

Organism: A ground-dwelling, actively foraging and non-territorial lizard species, *Lacerta vivipara*.

Methods: We analysed the relationship between morphology (body size and condition) and maximal endurance capacity in three age classes (juveniles, yearlings, and adult males). We then tested whether morphology and endurance capacity predicted variation in annual body growth, annual survival, and reproductive success.

Results: The large variation in maximal endurance capacity observed at hatching has a genetic basis. Endurance capacity increased with body size in juveniles and with body condition in juveniles and yearlings. Endurance capacity was not correlated with annual body growth at any age class. Positive, directional viability selection on endurance capacity was detected for juveniles and yearlings, but not for adult males. Endurance capacity was weakly, positively correlated with male reproductive success. Natural selection in juveniles and sexual selection in adult males was non-linear and the strength of selection decelerated with endurance capacity.

Conclusion: In the common lizard, selection on maximal performances is non-linear and varies between age classes. This pattern of weak and inconsistent selection could explain the maintenance of considerable genetic variation of locomotor performance within populations.

Keywords: locomotor performance, microevolution, reproductive success, squamate reptiles, survival.

* Address all correspondence to J.-F. Le Galliard, Centre de Recherche en Ecologie Expérimentale et Prédictive, Station biologique de Foljuif, Ecole Normale Supérieure, Rue du Château, 77140 St Pierre les Nemours, France. e-mail: galliard@biologie.ens.fr

Consult the copyright statement on the inside front cover for non-commercial copying policies.



www.evolutionary-ecology.com

***Evolutionary Ecology Research* is delighted that you wish to consult one of its articles.**

You may if your library or laboratory subscribes.

Ask your librarian or library committee why your place does not already subscribe to the low-cost journal that is publishing splendid science in a socially responsible manner. *EER*'s low prices have helped librarians to rein in the indefensible cost increases that have reduced our access to science all over the world! Just ask our partners at [SPARC](#) — the Scholarly Publishing & Academic Resources Coalition of the Association of Research Libraries.

Or maybe you should just remind the folks who order your journals to contact us and subscribe! You need — and they should support — the journal that:

- Invented the instant publication of reviewed, revised and accepted e-editions.
- Vests the copyrights of all articles in their authors while preserving the rights of educational and research groups to use its material in classes, seminars, etc. at no additional cost.
- Maintains a unified data-base of articles, thus doing away with your need to worry about issue numbers, author order, and other such impediments to easy access.
- Provides *Webglimpse* so that you can search any word, place, species, variable, phrase or author in any article *EER* has ever published.
- Pioneered e-only subscriptions while maintaining, at the same time, a traditional print edition, too.

Some 10,000 readers per week have it right. *EER* is the place to go for great science, responsible publication policies and easy access!

[Click here for the Table of Contents](#) of the most recent issue of *Evolutionary Ecology Research*

[Click here for full access to a sample issue](#) of *Evolutionary Ecology Research*

[Click here for SUBSCRIPTION INFORMATION](#)