Literature Cited

Arnold, E. N., J. A. Burton, and D. W. Ovenden. 1978. Field Guide to the Reptiles and Amphibians of Britain and Europe. Collins, London. 272 pp.

Capula, M., and L. Luiselli. 1994. Reproductive strategies in alpine adders, *Vipera berus*. The black females bear more often. Acta Oecol. 15:207–214.

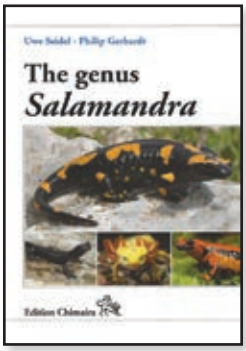
Ghielmi, S., M. Menegon, S. J. Marsden, L. Laddaga, and S. Ursenbacher. 2016. A new vertebrate for Europe: the discovery of a range-restricted relict viper in the western Italian Alps. J. Zool. Syst. Evol. Res. 54:161–173.

Luiselli, L. 1992. Reproductive success in melanistic adders: A new hypothesis and some considerations on Andrén and Nilson's (1981) suggestions. Oikos 64:601–604.

Herpetological Review, 2017, 48(2), 465–466.

The Genus *Salamandra*

Uwe Seidel and Philip Gerhardt. 2016. Edition Chimaira, Frankfurt am Main. (http://www.chimaira.de). 543 pp. Hardcover, US $94.00. ISBN 978-3-899735-23-9.



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The firelight glowed over the countless squashy armchairs where people sat reading, talking, doing homework or, in the case of Fred and George Weasley, trying to find out what would happen if you fed a Filibuster firework to a salamander. Fred had "rescued" the brilliant orange, fire-dwelling lizard from a Care of Magical Creatures class and it was now smouldering gently on a table surrounded by a knot of curious people.

Harry was at the point of telling Ron and Hermione about Filch and the Kwikspell course when the salamander suddenly whizzed into the air, emitting loud sparks and bangs as it whirled wildly round the room. The sight of Percy bellowing himself hoarse at Fred and George, the spectacular display of tangerine stars showering from the salamander's mouth, and its escape from the fire, with accompanying explosions, drove both Filch and the Kwikspell envelope from Harry's mind.

"Harry Potter and the Chamber of Secrets"
J. K. Rowling
pp. 130–131

Fire Salamanders (*Salamandra salamandra*) and congeneric species, with their striking yellow and black patterning, are the most widely recognized salamanders in Europe. They have a long history of cultural associations from Lurchi (a German comic character) to fantastic references in Harry Potter. Moreover, scientific studies on the genus have made important contributions to our understanding of aposematic coloration, the evolution of viviparity, and other topics in organismal biology. It is fitting that such an iconic group be the subject of a book length treatment summarizing all that is known about the genus.

In the genus *Salamandra*, there are 6 species and about 25 subspecies. As a genus, they are geographically widespread, extending from Central and Southern Europe southward into North Africa and eastward into the border region between Iraq and Iran. The most wide ranging species is *S. salamandra*, which includes 14 subspecies assembled into a distributional patchwork, like a quilt. Three other species, *S. algira, S. infraimmaculata,* and *S. atra,* also exhibit considerable geographic variation, with fragmented distributions and three to five recognized subspecies each. Finally, two species possess limited ranges: *S. corsica*, which is endemic to the island of Corsica, and *C. lanzai*, which occupies a limited range in the Cottian Alps between France and Italy.

The authors of *The Genus Salamandra* put forth two aims for their book: to summarize the scientific literature on *Salamandra*, and to be a resource for those interested in keeping individuals in captivity (terraria). The book begins with a preface by S. Steinfartz followed by a brief Introduction. Next there is a chapter "On the early research history of the genus *Salamandra*" by J. F. Schmidtler. Most of this chapter is concerned with the history of the taxonomy of *Salamandra,* from Pliny the Elder through Aristotle, Linnaeus, Laurenti, Goldfuss, and Gray, among others. Unfortunately, the taxonomic history of *Salamandra* after about 1850 is barely covered, rendering the review unbalanced. This historical chapter also briefly summarizes several important works produced in the 1800s that are of relevance for our understanding of *Salamandra*, and the best element of this chapter is the high quality reproduction of many figures from these works. The end of the chapter touches on the role of terrariums in studying the biology of *Salamandra*.

A number of chapters follow this historical review, including General Biology, Salamanders in their Natural Habitats, Opportunities for Field Observations, Threats and Conservation, Husbandry in the Terrarium, Propagation in the Terrarium, Feeding in the Terrarium, Diseases and Health Aspects, Outdoor Terraria, Species Accounts, and Colour and Pattern Morphs in Salamanders. The book ends with Further Information and References. An index is not provided, which makes sleuthing out some topics challenging.

The largest sections pertain to husbandry techniques (109 pp.) and species accounts (242 pp.). The sections on husbandry are well presented, authoritative, and complete, providing the reader with everything they need to engage in terrarium studies. I highly recommend this book to anyone interested in keeping *Salamandra* (or really any salamander) in captivity. The species accounts are organized by subspecies, and include sections on the Original Description, Type Locality, Distribution, Description, Habitat and Ecology, and Husbandry. There is a nice distribution map for each species, including the ranges of each subspecies (the range of *S. lanzai* is on the map that also includes *S. atra,* which took me some time to realize). The species accounts are far less authoritative than the section on husbandry. I found them to be a cursory overview. Their length is due less to thorough scholarship than the number of included photos.

Indeed, the photos are the strongest element of the book. Color patterns in *Salamandra* are lovely, and many are shocking. Most species possess bold black and yellow patterning, but some express red colors, and others are entirely black. With 760 figures, most of them photos, this is one of the most visually decadent books I have ever read. In contrast with many books and field guides, where more than a few out-of-focus clunkers detract from the sense of quality, nearly every photo in this book is a masterpiece. It is porn for lovers of *Salamandra*. I can hardly imagine how much time was spent taking photos, or how many photos were taken over the years. I particularly appreciated the

photos of larvae and ventral surfaces. My favorite photographs are figures 106–111, which show females giving birth to offspring, though the legends provide little detail. The final chapter of the book summarizes color patterns and how they are formed, including novel color patterns discovered by those engaged in animal husbandry.

A strong conservation theme runs through the book. *Salamandra* are long lived, with individuals in the wild surviving to at least 25 years of age, and individuals in terraria living up to at least 50 years! It is generally true that salamanders live longer than many suspect (Staub 2016), and populations with low juvenile survivorship are usually sensitive to adult mortality. This is one of the problems with roadway mortality, which I believe is underappreciated in herpetology in general. Disease is also a focus. The chapter on "Emerging infectious diseases in *Salamandra* spp." by F. Pasman and A. Martel stands out as well written and informative. We are repeatedly reminded throughout the book that terrarium populations may be the only sources for reintroducing populations or species into the wild should diseases such as *Batrachochytrium salamandrivorans* wipe them out. It makes me sad, but the authors are likely correct. Appropriately, much stress is placed on the importance of not collecting from wild populations for the pet trade or private collections.

Overall, this book is an excellent resource for those interested in animal husbandly, color pattern variation, and the natural history of *Salamandra*. This alone makes the book of value, and I am happy to own it. However, the book is not without faults. First, it was not carefully edited. I stopped keeping track of typos early on because they are too numerous, and in many places the translation from German into English is awkward. In the section on systematics, we are told there are five species of *Salamandra*, but six are presented in the species accounts. We are also told there are close to 600 species of salamanders, yet AmphibiaWeb (www.amphibiaweb.org) recognizes 695. One heading in the table of contents is in German, and even in German it's not the correct heading. When reading, one must constantly bear in mind that "salamander" does not usually mean salamanders in general, but salamanders in the genus *Salamandra*. For example, it is not the case that "salamanders have no webbings between their toes" or that salamanders are able to obtain "up to 40% of their oxygen needs via their skin," because some salamanders do have webbed toes, and every species in the family Plethodontidae lacks lungs entirely. Not all of the papers cited in the text can be found in the bibliography. Finally, the nonstandard use of concepts concerns me. For example, "paedomorphic" is used to refer to larvae that fail to reach sexual maturity, but for most paedomorphosis is the evolutionary process by which juvenile characters in an ancestral taxon are retained in the reproductive forms of descendant species. Also, the authors interpret taxa that branch off at the base of a clade as representing the ancestral form (e.g., "*Salamandra infraimmaculata* appears to be the most original species of *Salamandra*, forking off from the base of the phylogenetic tree of the genus"), but this is false because all the extant descendants from a node have had the same amount of time (and potentially opportunity) to diverge in phenotype.

To me, some topics do not receive sufficient treatment. One of them is reproduction, as *Salamandra* is famous for its reproductive biology. Unlike most salamanders, *Salamandra* do not lay eggs. Rather, females either retain their eggs in their oviduct and deposit larvae into aquatic habitats (a mode they call larviparity), or they give birth to metamorphosed juveniles (a mode they call juviparity). Juviparity is thought to have evolved repeatedly. Unfortunately, while reproductive modes are discussed, they are not developed in detail. Another topic that does not receive sufficient attention is taxonomy. The taxonomy of *Salamandra* is controversial, which is not surprising given that it is widespread and characterized by a large amount of phenotypic and genetic variation (this is also what makes *Salamandra* so much fun!). An explanation for the taxonomy employed is thus warranted, yet a careful explanation of the species concept featured is not provided. In particular, are subspecies phenotypic groupings, or are they incipient evolutionary linages (and if so, why aren't they species?)? Finally, the book would have benefited from an explicit phylogenetic perspective. The section on "cladistic relationships" is entirely verbal (no phylogenetic hypotheses are illustrated) and difficult to follow. A detailed consideration of how color pattern correlates with phylogeographic groupings would likely have helped us to better understand patterns of variation.

Finally, given the focus on patterns of variation within and between species, I think it would have been natural to extend the presentation to feature species formation, though admittedly this is my wheelhouse (Kuchta and Wake 2016). The manifold patterns of variation in *Salamandra* perfectly illustrate the knotty and time extended nature of Darwinian species formation. In widespread taxa with limited vagility, such as *S. salamandra*, species-wide gene flow is nonexistent. Populations originate, expand their range, then slowly disintegrate on the landscape. Under this scenario, biological diversity is forged not by some tidy speciation process, such as ecological speciation, but via fragmentation–including local adaptation, but also repeated instances of isolation, differentiation, expansion, and secondary contact. As Wake (2004) observed, species that form by fragmentation are "born" in possession of geographic variation, and may never have constituted a cohesive evolutionary unit. The creation of diversity by way of fragmentation is one of the grand evolutionary lessons we are taught by old, widespread, phenotypically and genetically diverse taxa. And, to me, this is good keep in mind when considering the exciting and extensive variation in *Salamandra*, which Seidel and Gerhardt do a superb job of literally showing us.

In summary, this visually stunning book is best at husbandry and natural history. Salamander aficionados will love *The Genus Salamandra*. As a scientific volume, however, it is not on par with erudite works such as Losos (2009) or Grant and Grant (2011). Those who view salamanders as the pinnacle of the evolutionary process, like myself, will have some quibbles.

Literature Cited

Grant, P. R., and B. R. Grant. 2011. How and Why Species Multiply: the Radiation of Darwin's Finches. Princeton University Press, Princeton, New Jersey. 224 pp.

Kuchta, S. R., and D. B. Wake. 2016. Wherefore and whither the ring species? Copeia 104:189–201.

Losos, J. B. 2009. Lizards in an Evolutionary Tree. Ecology and Adaptive Radiation of Anoles. University of California Press, Berkeley. 507 pp.

Staub, N. L. 2016. The age of plethodontid salamanders: a short review on longevity. Copeia 104:118–123.

Wake, D. B. 2004. How species arise. Am. Sci. 92:558–561.