

ÉVOLUTION DES LÉZARDS DU PALÉOGÈNE EN EUROPE by Marc Louis Augé 2005. Mémoires du Muséum national d'Histoire naturelle, Tome 192, Publications Scientifiques du Muséum, Paris, 369 pp. + compact disc, ISBN: 2-85653-588-7

Fossil lizards have been known from Europe for almost two centuries. Paul Gervais (1816–1879), arguably one of France's earliest, and most important, vertebrate paleontologists, only overshadowed by the more famous vertebrate anatomist and paleontologist George Cuvier (1769–1832), was the first to adequately illustrate, and describe, fossil lizards from Europe, specifically France. Gervais is perhaps best known for his work *Zoologie et paléontologie française* published in 1848–1852. A revised edition of this work appeared later in 1859. In it, Gervais (1848–1852) characterized a number of fossil lizards species belonging to the extant genera *Lacerta* and *Anguis*, as well as establishing a new species of fossil lizard *Dracaenosaurus croizeti* (Lacertidae) and the new genus and species *Placosaurus rugosus* (Glyptosaurinae: Anguinae). Decades later, fossil lizards from France, and other European countries, have been the subject of research by a number of workers, most notably Robert Hoffstetter, Richard Estes, Jean-Claude Rage, and Marc Augé.

Most of the lizard material known from Europe comes from fissure-fill deposits or other geographically restricted sedimentary environments (such as the famous Phosphorites du Quercy) that mostly yielded isolated dentaries, maxillae, parietals, and osteoderms, many of which are fragmentary. The exceptions to these fossil localities are the fabulous Lagerstätten of Geiseltal and Messel, noted for their exquisite preservation of whole animals (from fishes to mammals). So, the European record of many fossil lacertilians is based largely on very incomplete evidence, but it is from this scanty evidence that conclusions regarding taxonomic identification, taxonomic diversity, and evolutionary patterns have been, and continue to be, made.

Augé's (2005) work, *Évolution des lézards du Paléogène en Europe*, is perhaps the most important study on fossil lizards to have been published for some time. The focus of the work is the taxonomic diversity of fossil lizards in Europe during Paleogene (Paleocene through Oligocene) time. Briefly, three tenets are posited by Augé: (1) that the Paleocene lizard fauna in Europe was "impoverished," (2) that the Eocene fauna is richer, and (3) that there was a major faunal turnover, the "Grand Coupure," at the Eocene-Oligocene boundary in Europe (more on these three points shortly).

This work, which is largely in French, contains an abstract and an extended abstract in English. The remainder of the text is in French, not counting the figure captions, each one appearing in both French and English. The main sections include a materials and methods section, a systematics and biostratigraphic section, followed by major taxonomic sections (Iguania, Gekkota, Scincomorpha, Anguimorpha, Platyota, Amphisbaenia and Lacertilia *incertae sedis*). The monograph closes with an extensive conclusions section, acknowledgments, bibliography and index. A compact disc, containing the entire work, accompanies the volume.

Within the aforementioned taxonomic groups, numerous new taxa, mostly genera and species, are named. These include *Geiseltaliellus grisolli* and *Pseudolacerta quercyi* (both new species of iguanid); *Cadurcogekko rugosus* (new species of gekkonid); *Quercycerta maxima*, *Cernaycerta duchaussoisi*, *Escampcerta amblyodonta*, and *Mediolacerta roceki* (all four new genera and new species of lacertid); *Brevisaurus smithi* (new genus and species of ?teiid); *Berruva louisii*, *Ayalasaurus tenuis* and *Orthoscincus malperiensis* (all new genera and species of scincid); *Eocordyla mathis* (new genus and species of ?cordylid); *Hugueneysaurus globidens* (new genus and species of Scincomorpha *incertae sedis*); and *Dopasia frayssensis* and *Dopasia coderetensis* (both new species of anguid). Also, Augé establishes two new tribes within the Anguinae (Ophisaurini and Anguini). In all, we are presented with a total of two new tribes, nine new genera and 15 new species! It should be noted here that a number of these taxa are established on very incomplete material,

but, for the most part, what is preserved seems to be distinctive. One exception (and there may be others) is the holotype of *Cernaycerta duchaussoisi* (MNHN CR 17403, an edentulous left dentary, fig. 79); it bears little resemblance to a referred specimen (MNHN CR 17402, a posterior fragment of a left dentary with part of the splenial attached and bearing a single tooth). The tooth attachments of the holotype are considerably narrower than the wide single tooth in the referred specimen, and the medial shelf is deeper in the former, suggesting that this taxon is a *nomen dubium*. Taken at face value, assuming the remaining taxonomic identifications are correct, and that there are no synonymies to be made, the diversity of European Eocene lacertilians has certainly mushroomed with the publication of this volume. Clearly, the Eocene lacertilian fauna is richer largely because the fossil record is better when compared to the Paleocene. Few Paleocene terrestrial sequences are preserved in Europe, so it's not surprising that fewer fossil taxa are known from this age, a direct result of inadequate samples. The Paleocene squamates are not well-known in North America either, largely because of limited exposures and possible collecting biases, but what little is known does suggest a diversity of taxa (see Estes, 1983; Sullivan, 1979, 1985, 1991; Sullivan and Lucas, 1996).

The larger issue in this monograph is the significance, and timing, of the faunal turnover dubbed the "Grand Coupure" that marks the Eocene-Oligocene transition in Europe. The "Grand Coupure" with regard to lizards has received attention before, notably by Rage (1988a, 1988b), Rage and Augé (1993), and Sullivan and Holman (1996). In this work, Augé presents various graphs in order to compare patterns of lacertilian diversity for species, genus, and family levels using different methods. The results are generally consistent. There is a high diversity of lacertilian faunas in the early Eocene (MP7-9), followed by a decrease in the middle Eocene (MP11-14), then another increase in diversity during the late Eocene (MP15-17), followed by a general (somewhat sharp) decline (MP17/18-25), the later event marking the "Grande Coupure." One could argue that the low diversity seen in the middle Eocene of Europe and that at the "Grand Coupure" are somewhat comparable.

Larger questions loom, however. Modern lizard families are largely taxonomic conventions defined by extant taxa. From a phylogenetic perspective, these families become increasingly difficult to identify as one progresses further back in the fossil record as there are few preserved autapomorphies (Good, 1988). So, how meaningful are these observations? Moreover, can the average duration of genera and species be adequately gleaned from such incomplete material? Augé's comparison between the average duration of lizard and mammal taxa at the species and generic levels strike me as meaningless because the criteria used to discriminate taxa differ greatly. There is no inherent rationale to conclude that rates of evolution differ among lizards and mammals, instead this is just our inability to detect them in the fragmentary fossil phenotypes of the lizards. Immigrant lacertilian taxa increased species (as well as generic and familial) diversity during Eocene time in Europe. Although climatic deterioration is identified as a possible culprit for the profound decline in the diversity of taxa during the Eocene-Oligocene transition ("Grande Coupure") it is the immigrant taxa that are implicated. The "recovery" from this decline is perceived to be slow.

The work is well-illustrated, the photographs are superb and the volume is printed on high quality stock. No doubt, there will be changes to some of the taxonomic identifications (some have already been made), while new taxa have already been added (Augé and Sullivan, 2006; Sullivan and Augé, 2006). Reinterpretations on the significance of the incomplete stratigraphic record, the fragmentary nature of the numerous named lacertilian taxa, and how that might affect our interpretations regarding taxonomic diversity at all levels, remains to be seen. What is

clear, however, is that this is certainly an important contribution to the annals of paleoherpetology.

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## LITERATURE CITED

- Augé, M. and R. M. Sullivan. 2006. A new genus, *Paraplacosauriops* (Squamata, Anguinae, Glyptosaurinae), from the Eocene of France. *Journal of Vertebrate Paleontology* 26:133–137.
- Estes, R. 1983. Sauria terrestria, Amphisbaenia. *Handbuch der Paläoherpetologie*, 10A. Gustav Fischer Verlag, New York, 249 pp.
- Gervais, P. 1848–1852. *Zoologie et Paléontologie Françaises (animaux vertèbres)*. (1st edition) Arthus Bertrand, Paris, 1: 271 pp.
- Good, D. A. 1988. The phylogenetic position of fossils assigned to the Gerrhonotinae (Squamata: Anguinae). *Journal of Vertebrate Paleontology* 8:188–195.
- Rage, J.-C. 1988a. Le Gisement du Bretou (Phosphorites du Quercy, Tarn-et-Garonne, France) et sa faune de vertébrés de l'Éocène supérieur. I. Amphibiens et reptiles. *Palaeontographica. Beiträge zur Naturgeschichte der Vorzeit. Abteilung A: Paläozoologie, Stratigraphie* 205:3–27.
- Rage, J.-C. 1988b. Le Gisement du Bretou (Phosphorites du Quercy, Tarn-et-Garonne, France) et sa faune de vertébrés de l'Éocène supérieur. X. Conclusions générales. *Palaeontographica. Beiträge zur Naturgeschichte der Vorzeit. Abteilung A: Paläozoologie, Stratigraphie* 205:183–189.
- Rage, J.-C. and M. Augé. 1993. Squamates from the Cainozoic of the western part of Europe. A review. *Revue de Paléobiologie* 7: 199–216.
- Sullivan, R. M. 1979. Revision of the Paleogene genus *Glyptosaurus* (Reptilia, Anguinae). *Bulletin of the American Museum of Natural History* 163:1–72.
- Sullivan, R. M. 1985. A new middle Paleocene (Torrejonian) rhineurid amphisbaenian, *Plesiorhineura tsentasi* new genus, new species, from the San Juan Basin, New Mexico. *Journal of Paleontology* 59: 1481–1485.
- Sullivan, R. M. 1991. Paleocene Caudata and Squamata from Gidley and Silberling quarries, Montana. *Journal of Vertebrate Paleontology* 11:293–301.
- Sullivan, R. M. and M. Augé. 2006. Redescription of the holotype of *Placosaurus rugosus* Gervais 1948–1852 (Squamata, Anguinae, Glyptosaurinae) from the Eocene of France and a revision of the genus. *Journal of Vertebrate Paleontology* 26:127–132.
- Sullivan, R. M. and J. A. Holman. 1996. Squamata; pp. 354–372 in D. R. Prothero and R. J. Emry (eds.), *The Terrestrial Eocene-Oligocene Transition in North America*. Cambridge University Press, New York.
- Sullivan, R. M. and S. G. Lucas. 1996. *Palaeoscincosaurus middletoni*, new genus and species (Squamata: Scincidae) from the early Paleocene (Puercan) Denver Formation, Colorado. *Journal of Vertebrate Paleontology* 16:666–672.