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Robert R. Reisz – Renaissance paleontologist

Robert R. Reisz – Paléontologue de la renaissance

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ABSTRACT

Robert R. Reisz has published some 157 papers over 40 years, mostly on Permo-Carboniferous stegocephalians (sensu Laurin; "tetrapods" in traditional usage), especially amniotes, but also on other taxa and periods, from Devonian dipnoans to Neogene primates. He has been a leader in the study of early amniote phylogeny, publishing one of the first cladograms of these taxa in 1980. His work has proposed new hypotheses about the origin of turtles, extant amphibians and therapsids. His classical work on Paleozoic synapsids provided the basis for currently accepted taxonomies. He has also tackled several major evolutionary innovations, such as the origin of herbivory among tetrapods and the use of venom in mammals. Finally, he has proposed new calibration constraints for molecular dating. He has trained a number of postdoctoral fellows, doctoral and masters' students.

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RÉSUMÉ

Robert R. Reisz a publié au moins 157 articles dans les 40 dernières années, surtout sur les stégocéphales permo-carbonifères et spécialement sur les amniotes, mais il a également abordé d'autres taxons et périodes, des dipneustes dévoniens aux primates néogènes. Il a été un pionnier de l'étude de la phylogénie des amniotes et a publié un des premiers cladogrammes des amniotes paléozoïques dès 1980. Ses travaux ont proposé de nouvelles hypothèses sur l'origine des tortues, des amphibiens actuels et des thérapsidés. Ses travaux classiques sur les synapsidés paléozoïques sont à la base des taxonomies présentement acceptées. Il a également abordé plusieurs innovations évolutives, telles que l'apparition de l'herbivorie chez les tétrapodes et l'application du venin chez les mammifères. Finalement, il a proposé de nouvelles contraintes de calibrations pour les datations moléculaires. Il a formé nombre de post-doctorants, thésards et étudiants de niveau maîtrise.

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1. Childhood and studies

Robert Rafael Reisz was born on August 27, 1947 in Oradea, Transylvania (Romania), where he spent his childhood. As a teenager he moved with his parents to Montreal, where he subsequently obtained his BSc (1969) in zoology and his MSc (1971) and PhD (1975) in biology at McGill University. He enjoyed Robert L. Carroll's lectures on paleontology for undergraduates, prompting him to pursue his graduate studies in Carroll's lab. His master's thesis was an analysis of the earliest known synapsids from the Upper Carboniferous of Nova Scotia (Canada) – *Protoclepsydrops* from Joggins and the stratigraphically slightly younger *Archaeothyris* and *Echinerpeton* from Florence (Reisz, 1972). His doctoral thesis was a detailed anatomical study of *Petrolacosaurus kansensis*, which is still the oldest known (Late Carboniferous) diapsid, and which was published both as a short report (Reisz, 1977) and a monograph (Reisz, 1981). These theses were the prelude to a long scientific career dedicated largely to the study of Permo-Carboniferous amniotes and, to a lesser extent, of other Paleozoic limbed vertebrates. After defending his doctoral dissertation, Robert briefly taught as a visiting lecturer at the University of California at Los Angeles (1974–1975) before accepting a faculty appointment in the zoology department of the University of Toronto at Mississauga, where he still remains as active as ever, even during a demanding term as chair of the department (2005–2012).

2. Core research interests

The first half of Robert's scientific career was almost entirely devoted to research on Paleozoic tetrapods. He established his reputation largely on his work on Permo-Carboniferous synapsids, which he still fondly refers to by their traditional designation "pelycosaurs", and about which he has published many papers and two influential monographic reviews (Reisz, 1980, 1986). These papers laid the foundation for the now-established phylogeny of Permo-Carboniferous synapsids, which differs substantially from the classic view of Romer and Price (1940). In the latter, the Order Pelycosauria was divided into three suborders–Ophiacodontia, Sphenacodontia, and Edaphosauria. Ophiacodontia included families Ophiacodontidae, which was thought to include amphibious, possibly piscivorous forms (Romer and Price, 1940: 172–173), and Eothyrididae. It was explicitly recognized as a provisional group and has not stood the test of subsequent phylogenetic analyses. Sphenacodontia included the presumably more terrestrial carnivorous varanopids and sphenacodontids. Edaphosauria included the probably herbivorous forms, comprising Edaphosauridae and Caseidae. Reisz (1986) showed that Edaphosauridae was actually more closely related to Sphenacodontidae, and that Ophiacodontidae, Varanopidae, and Caseasauria (a taxon comprising Eothyrididae and Caseidae) are successively more remote sister-taxa of that clade. Thus, herbivory evolved at least twice in Permo-Carboniferous synapsids, and ophiacodontids are no longer considered the ancestral stock of synapsids, even though some authors still held on to this idea well into the 1980s (e.g., Carroll, 1988: fig. 17-1). Robert also showed that the enigmatic synapsid *Tetraceratops*, formerly considered an eothyrid, is probably the oldest known and basalmost therapsid (Laurin and Reisz, 1996).

Robert's work has always emphasized careful, well-illustrated anatomical study (e.g. Reisz et al., 1982). Indeed, one of the first things that students to his lab learn, with precious help from Diane Scott (Robert's remarkably skilled lab technician), is how to recognize, prepare, and illustrate bones properly. However, Robert did not merely describe a fascinating Paleozoic bestiary over the years. He has long been interested in elucidating their phylogeny, both at a low taxonomic level (e.g., Reisz et al., 1992) and a high taxonomic level (e.g., Laurin and Reisz, 1995).

In addition to working on early amniotes, Robert studied other Paleozoic limbed vertebrates, such as temnospondyls, often together with his long-time research collaborator David S. Berman from the Carnegie Museum of Natural History (e.g. Berman and Reisz, 1980), but also with younger scientists, especially his students and post-docs (e.g. Anderson et al., 2008). Robert has also studied seymouriamorphs (Berman et al., 1987; Sullivan and Reisz, 1999), amphibians (Anderson and Reisz, 2003; Reisz and Modesto, 1996) and stem-amniotes (e.g. Laurin and Reisz, 1999; Reisz and Sutherland, 2001; Kissel and Reisz, 2004).

3. Additional research topics

During the second half of his career, Robert has expanded his original research program by also tackling a remarkable diversity of other vertebrate taxa, which attracted his ever-curious mind. He has worked on paleobiological issues concerning Paleozoic dipnoans (e.g. Krupina and Reisz, 1999), sphenodontians (Sues and Reisz, 1995), dinosaurs (e.g. Reisz et al., 2005, 2012), anomodonts (Rybczynski and Reisz, 2001), and mammals (Folinsbee et al., 2007), to name but a few. In these papers, Robert presented important new data and interpretations, such as the oldest known dinosaurian nesting site, pertaining to the Early Jurassic sauropodomorph *Massospondylus* from the Upper Elliot Formation of South Africa (Reisz et al., 2012). The latter study presented evidence of nesting site fidelity, also the oldest such record in dinosaurs to date, and suggested that some form of limited parental care was primitively present in dinosaurs. Robert also discovered evidence that the basal anomodont *Suminia getmanovi*, from the Upper Permian from Kotelnich (Russia) is the oldest (and only Paleozoic) vertebrate with unequivocal cranial and dental specializations (such as defined dental wear facets) suggesting a high-fiber plant diet (Rybczynski and Reisz, 2001). He also showed that the characteristic dipnoan dental growth pattern has remained fundamentally unchanged for at least 360 million years (Ma). Indeed, the Late Devonian dipnoan *Andreyevichthys epitomus* from central Russia developed dental plates on the dentary at the hatchling stage, but subsequently lost both the dentary and its dental plate in later growth stages, much like its extant relative *Neoceratodus forsteri* (Reisz and Smith, 2001). In both taxa, the prearticular dental plates (like the palatal dental plates) grow by the addition of new teeth labially, which fuse with the dental plate, contrasting