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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.

Mots clés :
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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

sharply with the lingual tooth addition sequence prevalent among gnathostomes.

4. Analytical methods and achievements

Unlike many of his peers, Robert recognized the value of parsimony as a criterion for establishing phylogeny early in his career and adopted it as a key element in his research program. He published a cladogram generated by Hennigian argumentation in his first review of basal synapsid evolution (Reisz, 1980: fig. 17) and his first computer-assisted parsimony analysis based on a data matrix in 1992 (Reisz et al., 1992). More recently, Robert has added other research methods. For instance, he published the first study of Permo-Carboniferous tetrapods using Bayesian phylogenetic analysis, in a review of the interrelationships of early eureptiles (Müller and Reisz, 2006), and an evolutionary study of genome size in early tetrapods (Organ et al., 2011). Robert works mostly with morphological data, but has occasionally drawn on histological information to study, among other structures, the tooth plates of the Early Devonian dipnoan *Ichnomylax* (Reisz et al., 2004).

Robert's scientific achievements are too numerous and varied to review here comprehensively, but a few examples will illustrate their impact. He has published influential papers tackling the origin of many major vertebrate taxa, such as turtles (Reisz and Laurin, 1991; Rieppel and Reisz, 1999), therapsids (Laurin and Reisz, 1996), and lissamphibians (Anderson et al., 2008; Laurin and Reisz, 1997). Over the years, his always open mind has led him to explore and support successively sometimes mutually incompatible hypotheses. For instance, he has suggested that turtles were deeply nested within parareptiles (Laurin and Reisz, 1995; Reisz and Laurin, 1991) and that they were lepidosauromorph diapsids (Rieppel and Reisz, 1999). In another instance, he has suggested that extant amphibians were monophyletic and nested within lepospondyls (Laurin and Reisz, 1997, 1999) and that they were polyphyletic and derived from both lepospondyls and temnospondyls (Anderson et al., 2008). Robert has published several monographs providing detailed anatomical data on Paleozoic tetrapods (e.g. Reisz, 1977) and morphological studies of various skeletal elements (e.g. Campione and Reisz, 2011). His papers document several major evolutionary innovations in tetrapods, such as the appearance of the dipnoan tooth plates (Reisz and Smith, 2001), origin of the amniotic egg (Laurin and Reisz, 1997), development of bipedality in reptiles (Berman et al., 2000), acquisition of herbivory in amniotes (Reisz and Sues, 2000a; Rybczynski and Reisz, 2001; Sues and Reisz, 1998), and dental features possibly connected to venom use in mammals (Folinsbee et al., 2007). Finally, he has worked on reproductive biology and ontogeny of Paleozoic and Early Mesozoic tetrapods (e.g. Laurin and Reisz, 1997; Reisz et al., 2005, 2012). Without deliberately seeking controversy, he has not hesitated to tackle challenging problems when he was in a position to offer a robust alternative interpretation. One such problem concerned the elongated dorsal scales in the enigmatic Middle or Late Triassic diapsid *Longisquama* that had been interpreted as the precursors of avian feathers. He pointed out that these appendages were unlikely to be homologous with bird feathers based on their detailed structure (Reisz and Sues, 2000b).

He has also tackled the timely problem of how to use the fossil record to date the Tree of Life and especially the diversification of amniotes (e.g. Müller and Reisz, 2005; Reisz and Müller, 2004). He has argued that the frequently used appearance datum of Amniota, typically 310 or, more appropriately, 315 Ma, is poorly constrained because terrestrial environments where we could expect to find the closest relatives of amniotes have a poor fossil record in the Carboniferous. Consequently, we know very few stem-amniotes, and those that we know postdate the origin of Amniota. Thus, the age of Amniota is poorly constrained by the fossil record, a conclusion also reached by other recent studies (e.g. Marjanović and Laurin, 2007) that conclude that the origin of Amniota can be constrained only to the relatively long interval of 310 to 345 Ma. Because of this, Reisz and Müller (2004) proposed a better-constrained event to be used to calibrate molecular trees, namely the divergence between Lepidosauromorpha and Archosauromorpha, which they dated in the 252 to 257 Ma range. Müller and Reisz (2005) expanded upon this theme by proposing three other well-constrained divergences for molecular dating studies, namely the cladogeneses between dipnomorphs and tetrapodomorphs (419–408 Ma), between Pseudosuchia (pan-Crocodylia) and Ornithodira (pan-Aves) (251–243 Ma), and between Crocodylinae and Caimaninae (71–66 Ma).

To date, Robert's research efforts have generated some 157 scientific papers (appended list of publications) and at least 92 presentations at scientific meetings, most of which resulted in published abstracts. This impressive output has been cited 3020 times, giving him an h-index of 30 (see his Google Scholar profile at http://scholar.google.com/citations?user=S-32ORcAAAAJ&hl=en, consulted on 27-7-2012), which is an impressive bibliometric score for any vertebrate paleontologist.

5. Students and postdoctoral fellows

Robert has trained many students and postdoctoral fellows, several of whom remain active in the field, and a few have become distinguished researchers in their own right. His postdoctoral fellows include (in chronological order) Malcolm J. Heaton (deceased), Stephen J. Godfrey (Calvert Marine Museum, Solomons, Maryland), Jason S. Anderson (U. of Calgary), Johannes Müller (Museum für Naturkunde, Humboldt-Universität, Berlin), and Nadia B. Fröbisch (Museum für Naturkunde, Humboldt-Universität, Berlin). His former doctoral students include (Figs. 1 and 2) (in chronological order of year of thesis defense and with current affiliation in parentheses), David W. Dilkes (1992; U. of Wisconsin at Oshkosh), one of us (M. L., 1994; CNRS, Paris), Sean P. Modesto (1996; Cape Breton University, Sydney, Nova Scotia), Michael deBraga (2001; now a high school teacher in Toronto), David C. Evans (2007; Royal Ontario Museum, Toronto), Kaila E. Folinsbee (2008; Iowa State University, Ames), Jörg Fröbisch (2008; Museum für Naturkunde, Humboldt-Universität, Berlin), and Richard A. Kissel (2010; Paleontological Research Institution, Ithaca, NY). Current doctoral students in Robert's lab include

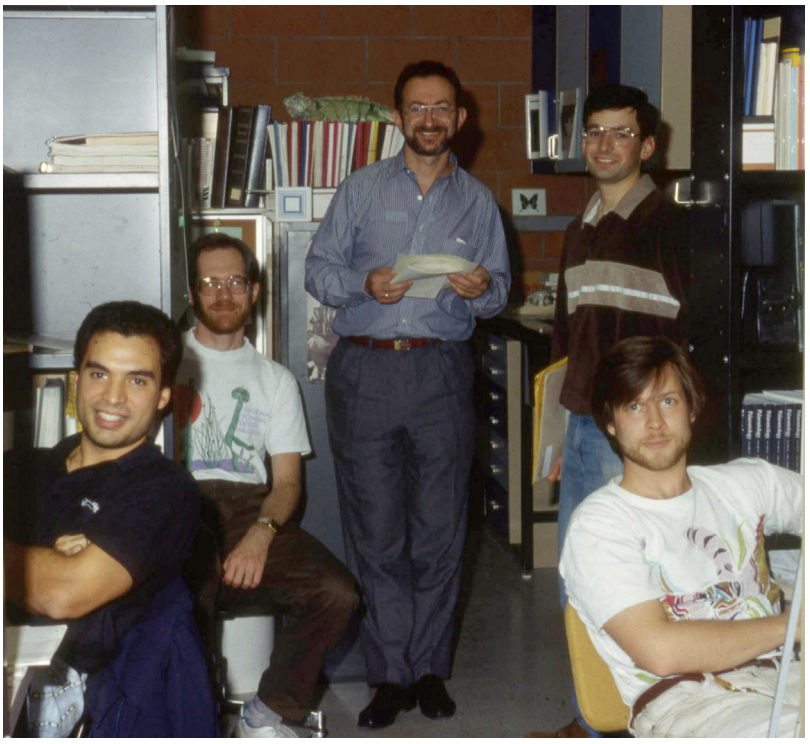

Fig. 1. Robert R. Reisz and his doctoral students around 1990. From left to right, Michael deBraga, David W. Dilkes, Robert R. Reisz, Michel Laurin (in the back), and Sean P. Modesto (in front).
Fig. 1. Robert R. Reisz et ses thésards vers 1990. De gauche à droite, Michael deBraga, David W. Dilkes, Robert R. Reisz, Michel Laurin (au fond), and Sean P. Modesto (devant).
Picture by Diane Scott.

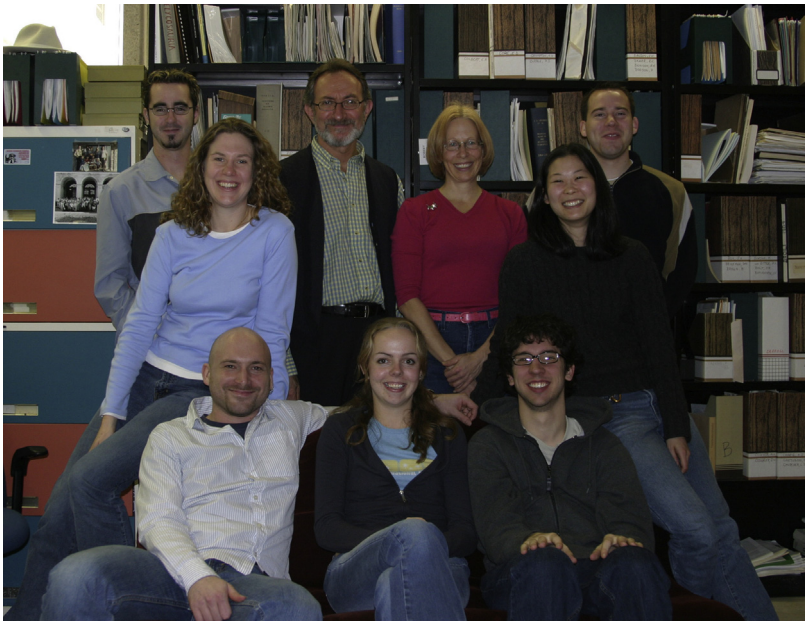

Fig. 2. The Reisz lab in 2004. From left to right, in the back, Kevin Dupuis, Kaila Folinsbee, Robert R. Reisz, Diane Scott, Linda A. Tsuji, and Jörg Fröbisch, and in the front, Johannes Müller, Hillary C. Maddin, and David C. Evans. Picture by Nadia Fröbisch.
Fig. 2. Le laboratoire de Reisz en 2004. De gauche à droite, au fond, Kevin Dupuis, Kaila Folinsbee, Robert R. Reisz, Diane Scott, Linda A. Tsuji, et Jörg Fröbisch, et devant, Johannes Müller, Hillary C. Maddin, et David C. Evans. Photo par Nadia Fröbisch.

Kirstin S. Brink, Caleb M. Brown, Jessica R. Hawthorn, Aaron R. H. LeBlanc, and Mark J. McDougall. Masters' students supervised by Robert (except for those who subsequently pursued a doctorate in the same lab) include Robert W. Hook (1982; now a consulting geologist in Austin, TX), Heather Wilson (1989; no longer active in the field), Jeffrey Dodick (1990; Hebrew University, Jerusalem), Catherine De Almeida (1995; no longer active in the field), Natalia Rybczynski (1996; Canadian Museum of Nature, Ottawa), Brian Moore (1999; U. of California, Berkeley), Corwin M. Sullivan (2000; Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, Beijing), Linda A. Tsuji (2005; U. of Washington, Seattle), Hillary C. Maddin (2006; Harvard U.), Nicolás E. Campione (2008, U.

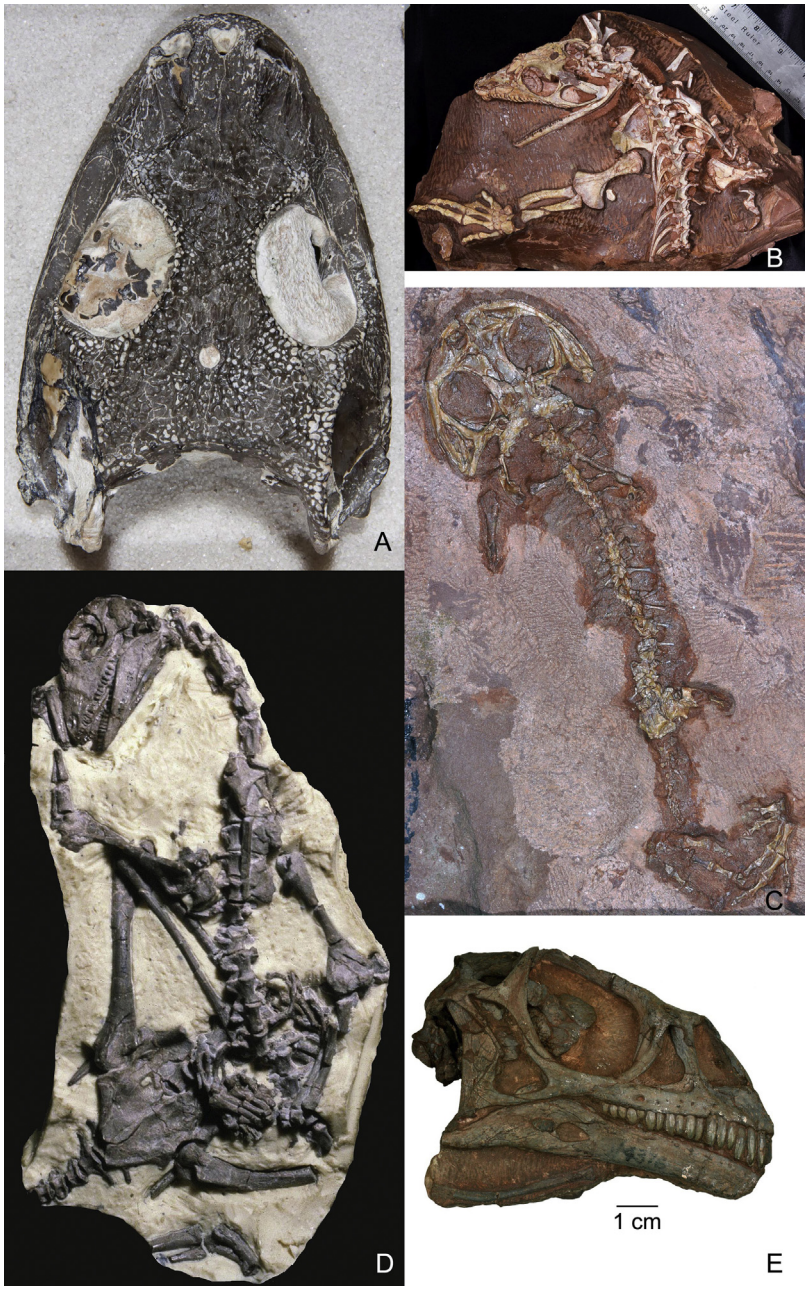

Fig. 3. Some of the exquisite vertebrate fossils studied by Robert Reisz and his students and associates. A. Skull of the dissorophid *Cacops morrisi*. B. Skeleton of the varanopid *Aerosaurus wellesi*. C. Skeleton of the amphibamid *Gerobatrachus hottoni*. D. Skeleton of the basal diapsid *Araeoscelis casei*. E. Skull of a juvenile of the sauropodomorph *Massospondylus carinatus*. Each figure part is at a different scale (scales shown only for parts B and E).
Fig. 3. Certains des exquis fossiles de vertébrés étudiés par Robert Reisz et ses étudiants et collaborateurs. A. Le crâne du dissorophidé *Cacops morrisi*. B. Squelette du varanopidé *Aerosaurus wellesi*. C. Squelette de l'amphibamidé *Gerobatrachus hottoni*. D. Squelette du reptile diapsidé *Araeoscelis casei*. E. Le crâne d'un jeune dinosaure sauropodomorphe *Massospondylus carinatus*. Chaque partie de la figure est à une échelle différente (échelle visible seulement dans les parties B et E).

of Toronto), David M. Mazierski (2008, U. of Toronto at Mississauga), and Brendan Polley (2009, now a science teacher in Toronto). The taxa and periods covered by these students and postdocs and range from those close to Robert's core interests, such as Permo-Carboniferous basal synapsids (Brink, De Almeida, Hawthorn, Mazierski, Maddin), procolophonoids (deBraga), other parareptiles (McDougall, Müller, Tsuji), mesosaurs (Modesto), captorhinids (Dodick, Heaton), diadectomorphs (Kissel), seymouriamorphs (Laurin), dissorophoids (Anderson, N. Fröbisch, Polley) and colosteids (Hook), to some a little more afield, such as dicynodonts and their relatives (J. Fröbisch, Rybczynski, Sullivan), and farther afield still, hadrosaurine dinosaurs (Campione, Dilkes), ceratopsians (Brown), and Neogene primates (Folinsbee). In addition to graduate students and postdoctoral fellows, Robert has also mentored many undergraduate students. He is an exacting supervisor, holding his students to his own high standards, but he always takes a kindly interest in both their personal welfare and their career advancement.

Robert enjoys fieldwork and has prospected two classical Carboniferous localities of Nova Scotia, Joggins and Florence (1970–1973) as well as numerous Paleozoic localities in the American Southwest and adjoining regions such as Garnett, Kansas (1970–1973, 1980–1985), Rio Arriba County, New Mexico (1986–1994), Texas, and Utah. On several of these field trips, he was accompanied by his students and postdocs, and, in New Mexico, he often worked with David S. Berman and Stuart S. Sumida. He also explored classic Permian localities in European Russia in collaboration with colleagues from the Paleontological Institute of the Russian Academy of Sciences and from the Kotelnich Museum (1995–2001). In 2004, he collected hadrosaurs in Dinosaur Provincial Park (Alberta, Canada) with David Evans. Robert also undertook paleontological reconnaissance in the Karoo Basin of South Africa in collaboration with colleagues from the Bernard Price Institute for Palaeontological Research (University of the Witwatersrand) in Johannesburg (2003–2010). Most recently, he has embarked on fieldwork in an Early Jurassic dinosaurian bonebed in the Lufeng Basin of Yunnan, China (since 2009). In addition, Robert has been a frequent visitor to many paleontological collections, such as those in London, Paris, New York, Chicago, Norman (Oklahoma), Washington, DC, Moscow, Johannesburg, Cape Town, Berlin, and Beijing, to gain first-hand data for his research. He has an uncanny ability to recognize the scientific potential of material that others have considered unpromising and has found many an important fossil in existing collections (Fig. 3).

Given all these accomplishments, it is no surprise that Robert has received many honors and awards. In recognition of his scientific achievements he was elected Fellow of the Royal Society of Canada (2009) and Fellow of the American Association for the Advancement of Science (2007) and was made an Honorary Member of the Society of Vertebrate Paleontology (2011). He has received a Bass Fellowship from the Field Museum (1998–2000), a Visiting Wilson Fellowship from King's College (University of London), and, most recently, the Humboldt Award for Excellence in Research and Teaching. Robert is a Research Associate at the Royal Ontario Museum, Toronto (since 1975), the Carnegie Museum of Natural History, Pittsburgh (since 1980), the Field Museum, Chicago (since 1998), and the Oklahoma Museum of Natural History (since 2005), and was appointed Honourary Research Fellow at the Bernard Price Institute for Palaeontological Research (since 2009). He was Senior Visiting Scientist at the Paleontological Institute of the Russian Academy of Science, Moscow (1989–2003) and Invited Professor at the Muséum National d'Histoire Naturelle, Paris (2000–2003). He is also a Fellow of the Linnean Society of London and the Royal Canadian Institute. Last but not least, Robert has served with distinction as Senior Editor of the Journal of Vertebrate Paleontology (2006–2010) and as editor for vertebrate paleontology for the leading German scientific monthly Naturwissenschaften (since 2008).

6. Conclusion

Robert is truly a "Renaissance paleontologist", having made fundamental contributions to many areas of vertebrate paleontology, both through his scientific publications and by training students, postdoctoral fellows and preparators. His energy and enthusiasm remain undiminished, and we may look forward to many additional achievements on both fronts. Robert's outstanding legacy is certainly worthy of his distinguished academic genealogy, which can be traced back to Edward Drinker Cope and (in chronological order) includes Henry Fairfield Osborn, William King Gregory, Alfred Sherwood Romer, and Robert L. Carroll.

Acknowledgements

We thank Diane Scott for sending us the pictures that are reproduced here with her permission as Figs. 1 and 3 and Nadia Fröbisch for providing the photograph reproduced here as Fig. 2. David Dilkes and especially Sean Modesto provided careful reviews of a draft of the manuscript.

Appendix A.

Scientific Publications by Robert R. Reisz.

Reisz, R.R., 1972. Pelycosaurian reptiles from the Middle Pennsylvanian of North America. Bull. Mus. Comp. Zool. Harv. Univ. 144, 27–62.

Reisz, R.R., 1975. Pennsylvanian pelycosaurs from Linton, Ohio and Nyrany, Czechoslovakia. J. Paleont. 49, 522–527.

Reisz, R.R., 1977. *Petrolacosaurus*, the oldest known diapsid reptile. Science 196, 1091–1093.

Berman, D.S, **Reisz, R.R.,** 1980. A new species of *Trimerorhachis* (Amphibia, Temnospondyli) from the Lower Permian Abo Formation of New Mexico, with discussion of Permian faunal distributions in that state. Ann. Carnegie Mus. 49, 455–485.

Heaton, M.J., **Reisz, R.R.,** 1980. A skeletal reconstruction of the Early Permian captorhinid reptile *Eocaptorhinus laticeps* (Williston). J. Paleont. 54, 136–143.

Reisz, R.R., 1980a. The Pelycosauria: a review of phylogenetic relationships. In: Panchen, A.L. (Ed.), The Terrestrial Environment and the Origin of Land Vertebrates. Academic Press, London, pp. 553–592.

Reisz, R.R., 1980b. A protorothyridid captorhinomorph reptile from the Lower Permian of Oklahoma. R. Ont. Mus. Life Sci. Contrib. 121, 1–16.

Reisz, R.R., Heaton, M.J., 1980. Origin of mammal-like reptiles. Nature 288, 193.

Berman, D.S, **Reisz, R.R.,** Fracasso, M.A., 1981. Skull of the Lower Permian dissorophid amphibian *Platyhystrix rugosus*. Ann. Carnegie Mus. 50, 391–416.

Langston, W., Jr., **Reisz, R.R.,** 1981. *Aerosaurus wellesi*, new species, a varanopseid mammal-like reptile (Synapsida: Pelycosauria) from the Lower Permian of New Mexico. J. Vertebr. Paleontol. 1, 73–96.

Reisz, R.R., 1981. A diapsid reptile from the Pennsylvanian of Kansas. Univ. Kans. Publs. Mus. Nat. Hist. 7, 1–74.

Berman, D.S, **Reisz, R.R.,** 1982. Restudy of *Mycterosaurus longiceps* (Reptilia, Pelycosauria) from the Lower Permian of Texas. Ann. Carnegie Mus. 51, 423–453.

Reisz, R.R., Heaton, M.J., 1982. *Bayloria morei* Olson 1941 identified as an immature specimen of the Permian reptile *Captorhinus aguti* (Cope, 1882). Can. J. Earth Sci. 19, 1232–1234.

Reisz, R.R., Heaton, M.J., Pynn, B.R., 1982. Vertebrate fauna of Late Pennsylvanian Rock Lake Shale near Garnett, Kansas: Pelycosauria. J. Paleont. 56, 741–750.

Reisz, R.R., 1983. [Review of] Mammal-like Reptiles and the Origin of Mammals by T.S. Kemp. J. Vertebr. Paleontol. 2, 483–485.

Reisz, R.R., Baird, D., 1983. Captorhinomorph "stem" reptiles from the Pennsylvanian coal-swamp deposit of Linton, Ohio. Ann. Carnegie Mus. 52, 393–411.

Reisz, R.R., Berman, D.S, Scott, D., 1984. The anatomy and relationships of the Lower Permian reptile *Araeoscelis*. J. Vertebr. Paleontol. 4, 57–67.

Berman, D.S, **Reisz, R.R.,** Eberth, D.A., 1985. *Ecolsonia cutlerensis*, an Early Permian dissorophid amphibian from the Cutler Formation of North-Central New Mexico. Circ. New Mex. Bur. Mines Miner. Resour. Bull. 191, 1–31.

Reisz, R.R., Berman, D.S, 1985. *Scoliomus puercensis* Williston and Case, 1913, identified as a junior synonym of *Sphenacodon ferox* Marsh (Reptilia, Pelycosauria). Can. J. Earth Sci. 22, 1236–1239.

Berman, D.S, **Reisz, R.R.,** 1986. Captorhinid reptiles from the Early Permian of New Mexico, with description of a new genus and species. Ann. Carnegie Mus. 55, 1–28.

Dilkes, D.W., **Reisz, R.R.,** 1986. The axial skeleton of the Early Permian reptile *Eocaptorhinus laticeps* (Williston). Can. J. Earth Sci. 23, 1288–1296.

Heaton, M.J., **Reisz, R.R.,** 1986. Phylogenetic relationships of captorhinomorph reptiles. Can. J. Earth Sci. 23, 402–418.

Reisz, R.R., 1986, Pelycosauria. In: Wellnhofer, P. (Ed.), Handbuch der Paläoherpetologie, Volume 17A. Gustav Fischer, Stuttgart, 102 p.

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