



# MEETING PROGRAM AND ABSTRACTS



August 23 - 26, 2017  
Calgary TELUS Convention Centre  
Calgary, Canada

All Paleozoic and Mesozoic fossil tetrapods from Greenland have been found in outcrops on the East Coast, which is snow free during the summer months and available for expeditions. The two most fossiliferous periods are the Late Devonian and the Late Triassic, both in terms of richness and diversity of the tetrapod fauna. During these two epochs, East Greenland was characterized by extensional crustal movements, followed by rapid synrift sedimentary fillings of the deposition of terrestrial deposits at low paleolatitudes: the Middle to Late Devonian Caledonian crustal welt and the Triassic phases of rifting due to the initial breakup of the Pangaea.

Grant Information:

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Technical Session X (Friday, August 25, 2017, 11:30 AM)

#### THE OLDEST CROCODYLIA? A NEW EUSUCHIAN FROM THE LATE CRETACEOUS (CENOMANIAN) OF PORTUGAL

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Eusuchia is well-known since the Early Cretaceous (Barremian), being *Hylaeochampsia* from England the oldest representative of this clade. Nevertheless, the eusuchian record from the Barremian to the Santonian is very scarce and fragmentary worldwide. The diversity of Eusuchia increases notably during the Campanian - Maastrichtian with the radiation of Hylaeochampsidae and the first appearance of Allodaposuchidae and Gavialoidea in Europe, or the oldest record of Crocodylia with representatives of Alligatoroidea, Crocodyloidea, Borealosuchidae and Gavialoidea in North America.

Here we described a new eusuchian crocodylomorph based in a partial skull and jaw (ML1818) from the early upper Cenomanian of Baixo Mondego, west central Portugal (Tentúgal Fm.). The specimen presents a series of exclusive characters not seen in other taxa. The most important characters are the presence of a small-sized external mandibular fenestra between the dentary-angular suture, without surangular participation; massive postorbital bar with a very marked mediolateral compression being twice as wide anteroposteriorly as mediolaterally; and dorsal margin of the infratemporal fenestra very elongated with trapezoidal contour rather than triangular.

The resulting cladistic analysis place this specimen nested at the base of Crocodylia in a more derived position than Gavialoidea and as the sister taxon of the rest of Crocodylia. Another change in the Eusuchia phylogeny after the incorporation of this new taxon is the position of Allodaposuchidae within Crocodylia, a clade generally considered as basal eusuchians.

Therefore, this Portuguese specimen would represents the only well documented and valid eusuchian species in the Cenomanian of Europe and probably the oldest representative of Crocodylia worldwide, helping to fill a gap of Eusuchia and Crocodylia record from the Barremian to the Campanian. In addition, the discovery of this new taxon would shed light on the radiation of Eusuchia and the origin of Crocodylia, which probably would have taken place in Europe. Nevertheless, due to the fragmentary nature of these remains, although the position within Eusuchia is undoubtedly (choanae clearly enclosed by the pterygoids), the phylogenetic position of this specimen within Crocodylia is not very well supported. Hence, the recovery of new remains would help to confirm or discard this hypothesis.

Romer Prize Session (Thursday, August 24, 2017, 10:30 AM)

#### QUANTITATIVE ANALYSIS OF AQUATIC ADAPTATION IN DESMOSTYLIA (MAMMALIA: ?AFROTHERIA) BASED ON CRANIAL CHARACTERISTICS

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Desmostylia is a clade of extinct aquatic mammals with no close living relative. Numerous desmostylian fossils are known from the uppermost Eocene to Miocene marine strata in the North Pacific Rim. However, their paleoecology is still debated, mainly due to unique, highly-specialized postcranial skeletal morphology. In particular, inferences on the habitat and aquatic adaptation of desmostylians greatly vary, depicting them as mostly terrestrial forms, semiaquatic animals restricted to shallow water, or even active swimmers invading the pelagic area, dependent on sources of data (e.g., postcranial osteology or bone histology).

One key for clarifying aquatic adaptation of desmostylians is the cranial and brain morphology, especially characters related to the olfaction and vision, because these characters have been considered as modified in aquatic mammals. However, there have been few studies that analyzed the correlations between such characters and the degrees of aquatic adaptation quantitatively in extant mammals, a prerequisite for inferring aquatic adaptation in fossil taxa.

To rectify the problem, I analyzed cranial and brain endocast characters quantitatively in 97 species of extant mammals covering all major clades based on digital 3D reconstructions using CT scan data, with a particular focus on the sizes of the olfactory bulb, orbit and optic canal, all of which past qualitative observations indicated as having been modified through aquatic adaptation. The result showed that the sizes of the olfactory bulb and optic canal are significantly different among animals of different degrees of aquatic adaptation and become smaller in more extensively aquatic taxa, thus establishing these characters as quantitative indices for making an inference on paleoecology of fossil taxa. The orbital size, however, did not show a clear difference corresponding to different degrees of aquatic adaptation.

Based on the above analysis, an inference was made on the paleoecology of *Paleoparadoxia* using a CT data set of the skull. The relative size of the olfactory bulb of *Paleoparadoxia* was intermediate between the median values of extant aquatic and semiaquatic mammals whereas its optic canal size was close to the median of aquatic and full-aquatic species. These data suggest that *Paleoparadoxia* was likely a semiaquatic species, with its habitat limited to shallow marine realms. Such a habitat preference may explain extinction of Desmostylia at around 10 Ma when the sea-level dropped rapidly, leading to great reduction in the shallow marine area.

Grant Information:

JSPS 16J00546

Poster Session III (Friday, August 25, 2017, 4:15 – 6:15 PM)

#### A NEW PARAPITHECINE (PRIMATES: ANTHROPOIDEA) FROM THE EARLY OLIGOCENE OF CENTRAL LIBYA

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Parapithecines are an extinct subfamily of stem anthropoid primates known only from the Jebel Qatrani Formation in Egypt. Currently, parapithecines are represented by two monotypic genera: *Parapithecus fraasi* and *Simonsius grangeri*. The generic distinction between these taxa has been questioned in the past, but recent analyses have maintained the validity of both genera on the basis of differences in their lower dental formula and cheek tooth morphology. Here, we report the discovery of a new, relatively small-bodied parapithecine taxon from Zallah Oasis in the Sirt Basin of central Libya. This new taxon documents the first occurrence of parapithecines outside of Egypt. It is currently represented by a right M<sub>3</sub> and a left P<sub>4</sub>, both of which show affinities with *Simonsius* and *Parapithecus*. P<sub>4</sub> in the new taxon possesses a buccally and mesially inflated trigonid that is much larger than the reduced talonid, which bears no distinct cusps. This is in contrast to *Parapithecus*, which retains inflated, cuspidate hypoconids on P<sub>3-4</sub> and shows less buccolingual inflation of the lower premolar trigonids. In these respects, the morphology of P<sub>4</sub> in the new Libyan parapithecine more closely resembles that of *Simonsius*, although P<sub>4</sub> of *Simonsius* bears an extremely reduced talonid. Relative size comparisons between P<sub>4</sub> and M<sub>3</sub> show that the new Libyan parapithecine resembles *Parapithecus* in having P<sub>4</sub> much smaller than M<sub>3</sub>. In contrast, the distal premolars of *Simonsius* are hypertrophied so that P<sub>4</sub> is roughly equivalent in size to M<sub>3</sub>. M<sub>3</sub> in the new Libyan parapithecine is low-crowned and bunodont, to the extent that the metaconid is the only obviously discernible cusp. As in all parapithecines, the paraconid is completely absent. The overall shape of M<sub>3</sub> seems to ally the new Libyan parapithecine with *Simonsius*, because both taxa possess buccolingually broad trigonids and narrow talonids that taper evenly into the hypoconulid lobe. A phylogenetic analysis based on dental characters reconstructs the new Libyan parapithecine as the sister group of *Simonsius*, with *Parapithecus* as sister to this clade. The new Libyan parapithecine augments previously reported evidence supporting a modest degree of faunal provincialism across northern Africa during the early Oligocene. The relatively small body size of the new Libyan parapithecine likewise supports the convergent acquisition of body mass larger than ~700 g among multiple clades of early Oligocene African anthropoids.

Grant Information:

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Technical Session II (Wednesday, August 23, 2017, 10:15 AM)

#### RE-EVALUATION OF THE ONTOGENY AND REPRODUCTIVE BIOLOGY OF SAURICHTHYS (ACTINOPTERYGII)

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Viviparity has evolved independently at least 12 times in ray-finned fishes. However, it has been reported only in two non-teleost actinopterygians, *Saurichthys curionii* and *S. macrocephalus*, both from the Middle Triassic Meride Limestone (Monte San Giorgio, Switzerland). Recent work on gastrointestinal anatomy has raised the possibility that these reported 'embryos' are predated juveniles. We apply a combination of criteria to distinguish between embryos and gastric contents to draw new conclusions regarding life history and ontogeny in these fishes.

Our criteria are both preservational and positional. Small individuals preserved in the abdominal cavity of males (as indicated by the presence of an ossified gonopodium), incorporated into the gastric mass, positioned in the pharyngeal region, or chaotically oriented in the abdominal cavity were considered to be predated juveniles. Embryos show unusual preservation, never observed in unambiguous gastric contents, in that the notochord is preserved in three dimensions and phosphatized. This was used as one of the primary criteria in separating embryos from cannibalized juveniles in our study. As a rule, embryos were positioned with the skulls usually directed anteriorly, dorsal to the gastrointestinal tract, parallel to the axial skeleton and to each other, in the posterior 2/3 of the abdominal region.

After applying these criteria, of 6/18 adults with small individuals preserved in the abdominal region are unambiguously gravid. A minimum of 16 embryos are preserved in the most fecund females, and based on the largest preserved embryos and smallest preserved neonates, birth must have occurred at 7-12% of maternal fork length. Embryonic crania and teeth are relatively well-ossified. In the postcranium, the median scale rows and lepidotrichia are ossified, but not the lateral scale rows. Ossified squamation suggests that neonates of *S. curionii* did not undergo metamorphosis, and were relatively precocial.

Viviparity is associated with exploitation of pelagic habitats in fishes, and often with higher rates of speciation. A better understanding of early ontogeny in the oldest documented case of actinopterygian viviparity provides additional data to help in uncovering the underlying selective pressures driving the repeated evolution of this life-history strategy. Detailed information on embryonic size, position, and morphology will be of use in identifying fossilized embryos in other non-teleostean actinopterygians.

Technical Session XVII (Saturday, August 26, 2017, 9:15 AM)

#### HISPANIOLA-LA! UNDEREXPLORED INTRASPECIFIC VARIATION AND TAXONOMIC IMPLICATIONS FOR ISLAND SLOTHS (MAMMALIA: PILOSA: MEGALONYCHIDAE)

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