@article{Carrillo2023a,
   abstract = {The La Venta deposits (Colombia) record one of the most fossil-rich regions in tropical South America and offers an exceptional opportunity to study the effect of the Miocene climatic changes and the evolution of extinct and extant clades in a low-latitude ecosystem. Land and freshwater vertebrates, and less commonly plants and invertebrates, constitute most of the La Venta fossils. The mammal record has been used to define the Laventan Age/Stage c. 13.5-11.8 million years old. La Venta has been studied for nearly a century, but the last major collecting efforts were done several decades ago. Recently, Colombian and international researchers have begun studies at La Venta, with the valuable participation of the local community. The joint efforts resulted in the establishment of a new La Venta natural history museum (Museo de Historia Natural La Tatacoa). This new wave of paleontological and geological studies has resulted in an improved stratigraphy of La Venta and new paleobiological and evolutionary hypotheses of several vertebrate groups, and in the museum's educational and outreach activities. Here, we review the current geological and paleontological knowledge of La Venta, identify knowledge gaps, and discuss future research directions. A century after the first paleontological expedition, La Venta's fossil record continues to illuminate the evolution of the South American tropical biodiversity during the Miocene.},
   author = {Juan D Carrillo and Carlos Jaramillo and Fernando Abadía and Orangel Aguilera and Andrés Alfonso-Rojas and Guillaume Billet and Aldo Benites-Palomino and Edwin Cadena and Andrés Cárdenas and Alfredo Carlini and Jorge Domingo Carrillo Briceño and Mónica Carvalho and Dirley Cortés and Jaime Escobar and Fabiany Herrera and Andrés Link and Javier Luque and Camila Martinez and Diana Karen Lara and Sebastian Zapata Henao},
   doi = {10.5252/geodiversitas2023v45a26},
   journal = {GEODIVERSITAS},
   keywords = {LaVenta,Miocene,SouthAmerica,geology,paleobiology,tropics},
   month = {12},
   pages = {739-767},
   title = {The Miocene La Venta Biome (Colombia): A century of research and future perspectives},
   volume = {45},
   year = {2023},
}
@article{Palma-Castro2023,
   abstract = {Correctly identifying fossil specimens from parautochtonous deposits where marine and terrestrial organisms co-occur can be challenging due to the abundance of rare and obscure specimens with unclear morphologies. In this study, we reviewed fossils from the Lower Cretaceous La Paja Formation (Ricaurte Alto, Villa de Leyva, Colombia) that were originally described as the plant "Sphenophyllum colombianum" based on an apparent resemblance to the upper Paleozoic genus. We determined that the type specimen corresponds to the carapace of a hatchling turtle. In addition, a second specimen of "S. colombianum" although less well-preserved, also exhibits similar features of a hatchling turtle. The two fossil specimens are significant as they represent the first report of hatchling marine turtles from the Aptian of northwestern South America and provide evidence of the exceptional preservation of the Marine Reptile Lagerstätte of Ricaurte Alto.},

   author = {Héctor D. Palma-Castro and Diego A. Cómbita-Romero and Edwin-Alberto Cadena and Mónica R. Carvalho and Fabiany Herrera},
   issue = {3: a50},
   journal = {Palaeontologia Electronica},
   keywords = {Aptian,Colombia,Pan-Chelonioidea,SouthAmerica,Testudines},
   pages = {1-10},
   title = {An Early Cretaceous Sphenophyllum or a hatchling turtle?},
   volume = {26},
   year = {2023},
}
@article{Benavides2023,
   abstract = {The Villa de Leiva – Sáchica - Sutamarchán region is the most prolific locality for Early Cretaceous marine vertebrates in Colombia and one of the richest in these vertebrates in the world. All of these vertebrates come from beds of the Barremian-Aptian Arcillolitas abigarradas Member of the Paja Formation. Although many of the specimens have already been taxonomically studied, no publications have discussed their stratigraphic position and distribution within the Barremian-Aptian interval. Herein, we provide, for the first time, detailed stratigraphic information for the majority of the Barremian-Aptian marine vertebrates of the Villa de Leiva – Sáchica - Sutamarchán region reported so far. Based on 10 stratigraphic sections described in the several specimens finding sites, together with biostratigraphic information associated with specimens of imprecise geographical origin, we determined the stratigraphic provenance of 26 marine vertebrate specimens. We also refined the stratigraphic provenance of some specimens including the holotypes of Muiscasaurus catheti, “Kyhytysuka” sachicarum, and Protolamna ricaurtei whose stratigraphic origin was not previously specified beyond the Arcillolitas abigarradas Member. The data obtained allowed us to identify four vertebrate assemblages representing coeval faunas within the Barremian-Aptian interval, two from the Barremian and two from the upper Aptian.},
   author = {Cristian Benavides and María Páramo and Héctor Palma-Castro and José Narváez},
   doi = {10.15446/esrj.v27n2.108292},
   journal = {Earth Sciences Research Journal},
   keywords = {Barremian-Aptian,LowerCretaceous,MarineVertebrates,PajaFormation,StratigraphicDistribution},
   month = {11},
   pages = {211-226},
   title = {Stratigraphic distribution of marine vertebrates from the Arcillolitas abigarradas Member (Paja Formation) of the Villa de Leiva - Sáchica - Sutamarchán region, Boyacá, Colombia},
   volume = {27},
   year = {2023},
}
@article{Paramo2023,
   abstract = {A recently prepared fragment of the anterior end of a snout comprising occluded upper and lower jaws of a juvenile individual of Stenorhynchosaurus munozi Páramo-Fonseca et al., 2016 (Plesiosauria, Pliosauridae) is described herein. The specimen was found in the 1990s at Sutamarchán (Boyacá, Colombia), in Barremian beds of the Arcillolitas abigarradas Member of the Paja Formation. Its description provides

hitherto unknown valuable morphological information on the species: dorsal anterior extension of the vomer, five premaxillary teeth (not four as was previously suggested), and anteriorly directed orientation of the first premaxillary alveolus (procumbent). New observations made on previously studied material corroborated the existence of procumbent anterior premaxillary teeth in the species. The presence of this trait highlights the close relationship of S. munozi with other early-diverging brachauchenines from the Lower Cretaceous of Russia.},
   author = {María Eurídice Páramo and Cristian David Benavides-Cabra and Héctor Daniel Palma-Castro and Antonio José Castañeda-Gómez},
   doi = {10.15446/esrj.v27n1.105689},
   issue = {1 SE -},
   journal = {Earth Sciences Research Journal},
   keywords = {Barremian,Brachaucheninae,Colombia,Pliosauridae,ProcumbentTeethProcumbentTeeth,Stenorhynchosaurus},
   month = {5},
   pages = {1-9},
   title = {Procumbent anterior premaxillary teeth in Stenorhynchosaurus munozi (Plesiosauria, Pliosauridae), evidence from new material},
   volume = {27},
   url = {https://revistas.unal.edu.co/index.php/esrj/article/view/105689},
   year = {2023},
}
@book{Jaramillo2023a,
   author = {Carlos Jaramillo and Marcelo Sánchez-Villagra and Felipe Lamus Ochoa and Henry Arenas-Castro and Mailyn Adriana González Herrera and Juan Pablo Narváez-Gómez and Andrés L. Cárdenas-Rozo and Camilo Montes and Germán Bayona and Natalia Hoyos and Juan Camilo Restrepo and Mauricio Ibáñez-Mejía and Javier Luque and Camila Martínez and Fabiany Herrera and Catalina Suárez and Jorge W. Moreno-Bernal and Kevin Jiménez-Lara and Juan D. Carrillo and Federico Moreno and Jaime Escobar and Catalina Pimiento and Edwin Cadena and Ingrid Romero and Aldo F. Rincón and Mónica R. Carvalho and Carla Baquero Castro and Juan Guillermo Martín},
   city = {Bogotá, Colombia},
   edition = {2ª},
   editor = {Carlos Jaramillo and Luz Helena Oviedo},
   isbn = {978-958-5183-82-7},
   pages = {144},
   publisher = {Instituto Alexander von Humboldt e Instituto Smithsonian de Investigaciones Tropicales},
   title = {Hace tiempo. Un viaje paleontológico ilustrado por Colombia},
   year = {2023},
}
@article{Cortes2023,
   abstract = {This study presents the first dinosaur tracksite from the Paja Formation of Villa de Leyva (Boyacá, Colombia). A trackway on a single level was identified within an upper Hauterivian unit of the formation and includes nine well-preserved tridactyl footprints with theropod morphology. The estimated relative speed of the theropod trackmaker is associated with slow running to walking behavior. Variations in speed and track morphology were associated to some extent

with variations in step depths in wet mud. The new record provides useful data to the terrestrial ichnofossils of Boyacá and adds a new record of dinosaur tracks from South America. The tracks were produced in a nearshore, water-saturated, muddy substrate, that is consistent with the interpretation of the Lutitas Negras Inferiores member's depositional environment as intertidal muds. This study compiles a detailed methodology that can serve as a guide for future dinosaur tracksite discoveries in Colombia and other regions.},
   author = {Dirley Cortés and Mary Luz Parra-Ruge and Juan De Dios Parra-Ruge and Alexandre Demers-Potvin and Anthony J. Smith and Hoai-Nam Bui and Hans C.E. Larsson},
   journal = {Revista FACIES},
   keywords = {Colombia,DinosaurTracks,EarlyCretaceous,LateHauterivian,PajaFormation,TheropodDinosaur,VilladeLeyva},
   pages = {1-17},
   title = {Dinosaur Footprints From The Early Cretaceous Of Colombia: Walking Dynamics And Paleoenviromental Implications},
   volume = {9},
   year = {2023},
}
@article{Cortes2023a,
   abstract = {The Mesozoic Marine Revolution restructured the world's ocean biodiversity into the complex marine ecosystems of today. This revolution began during the Triassic but the origin of this complexity is poorly understood due to a lack of detailed ecosystem reconstructions throughout time. We present the first site-specific ecological network for a marine Mesozoic fauna based on the Early Cretaceous Paja Formation biota of Colombia that preserves numerous, large-bodied, predatory marine reptiles. The trophic food-web was quantitatively reconstructed based on inferred trophic interactions of marine producers, consumers, and large apex predators. Compared to well-studied Caribbean reef ecosystem networks, the Paja biota network is missing a great proportion of benthic invertebrates and fishes, despite its rich higher trophic levels. We hypothesize that the ammonites from the Paja biota either mirrored the diversity represented by some fishes today or established a novel trophic unit with no living analogue. Recalibrating the Paja biota network to trophic analogues in the Caribbean, such as sea turtles, estimates that the largest Paja marine reptile hyper-apex predators occupied trophic levels a full tier higher than any extant marine apex predator. The Paja biota network is a starting point to tracing the evolution of marine ecosystems across the Mesozoic Marine Revolution.},
   author = {Dirley Cortés and Hans C E Larsson},
   doi = {10.1093/zoolinnean/zlad092},
   issn = {0024-4082},
   journal = {Zoological Journal of the Linnean Society},
   month = {9},
   pages = {1-19},
   title = {Top of the food chains: an ecological network of the marine Paja Formation biota from the Early Cretaceous of Colombia reveals the highest trophic levels ever estimated},
   volume = {XX},
   url = {https://doi.org/10.1093/zoolinnean/zlad092},
   year = {2023},

}
@article{Carrillo2023,
   abstract = {Litopterna is one the most diverse and long-lived clades of South American native ungulates. Megadolodus and Neodolodus are bunodont litoptern genera recorded in the middle Miocene tropical faunistic assemblage of La Venta (Colombia). Both taxa were initially identified as didolodontid 'condylarths', but later reclassified into Proterotheriidae, within Litopterna. Previous studies proposed their inclusion within Proterotheriidae, but possible affinities with early litopterns and didolodontids have not been properly tested in phylogenetic analyses. We report new material of Megadolodus and Neodolodus from La Venta, which document new aspects of their upper and lower dentition, and we reassess their phylogenetic relationships with Litopterna and Didolodontidae. Using pre-existing matrices, we tested two alternative approaches of character construction for serial characters on the dentition in our phylogenetic analyses. Based on previously known and new fossil material, our analyses with both coding approaches support a close relationship between Megadolodus and Neodolodus, within Litopterna, and do not support a close relationship with Didolodontidae. At a less inclusive level, the relationships of Megadolodinae within Litopterna vary depending on the coding approach used. However, all of our analyses unambiguously support the monophyly of Megadolodinae as a clade of Neotropical bunodont litopterns. While the discovery of these new remains enlightens part of the litoptern phylogeny, the sensitivity of our analyses to coding approaches further highlights the importance of critical evaluation of character construction in morphological phylogenetics.},
   author = {Juan David Carrillo and Catalina Suarez-Gomez and Aldo Benites-Palomino and Andres Vanegas and Andres Link and Aldo F Rincón and Javier Luque and Siobhán B Cooke and Melissa Tallman and Guillaume Billet},
   issue = {15},
   journal = {Geodiversitas},
   keywords = {LaVenta,Litopterna,Miocene,SouthAmerica},
   pages = {409-447},
   title = {New remains of Neotropical bunodont litopterns and the systematics of Megadolodinae (Mammalia: Litopterna)},
   volume = {45},
   year = {2023},
}
@article{Florez2018a,
   abstract = {We document for the first time Miocene corals from the Siamaná and Jimol formations of the Cocinetas Basin in La Guajira Peninsula, northern Colombia. This is the first of two contributions dedicated to the description and detailed illustration of morphospecies collected during two scientific expeditions (2011, 2014) to the remote region. Here we report coral morphospecies attributed to the families Acroporidae, Agathiphylliidae, Astrocoeniidae, Caryophylliidae, Diploastraeidae, Merulinidae, and Montastraeidae. Eighteen species belonging to these seven families, included in nine genera, are described. Fifteen species are assigned to established taxa, while three remain in open nomenclature. Of the species identified, only Montastraea cavernosa (Linnaeus, 1767) exists today. The coral taxa described are typical of the Oligocene–Miocene transition and were important components

of shallow-water reefs in the Caribbean and Gulf of Mexico region during this period. The occurrence of Agathiphyllia spp., Antiguastrea, and Diploastrea spp. confirms the presence of these genera in the Miocene of the Southern Caribbean. Coral assemblages suggest that the La Guajira coral community thrived in calm and shallow waters.},
   author = {Paola Florez and Paula Zapata-Ramírez and James S Klaus},
   issn = {0022-3360},
   journal = {Journal of Paleontology},
   pages = {1-24},
   title = {Early Miocene shallow-water corals from La Guajira, Colombia: part I, Acroporidae–Montastraeidae},
   volume = {93},
   year = {2018},
}
@article{Florez2018a,
   abstract = {We document for the first time Miocene corals from the Siamaná and Jimol formations of the Cocinetas Basin in La Guajira Peninsula, northern Colombia. This is the first of two contributions dedicated to the description and detailed illustration of morphospecies collected during two scientific expeditions (2011, 2014) to the remote region. Here we report coral morphospecies attributed to the families Acroporidae, Agathiphylliidae, Astrocoeniidae, Caryophylliidae, Diploastraeidae, Merulinidae, and Montastraeidae. Eighteen species belonging to these seven families, included in nine genera, are described. Fifteen species are assigned to established taxa, while three remain in open nomenclature. Of the species identified, only Montastraea cavernosa (Linnaeus, 1767) exists today. The coral taxa described are typical of the Oligocene–Miocene transition and were important components of shallow-water reefs in the Caribbean and Gulf of Mexico region during this period. The occurrence of Agathiphyllia spp., Antiguastrea, and Diploastrea spp. confirms the presence of these genera in the Miocene of the Southern Caribbean. Coral assemblages suggest that the La Guajira coral community thrived in calm and shallow waters.},
   author = {Paola Florez and Paula Zapata-Ramírez and James S Klaus},
   issn = {0022-3360},
   journal = {Journal of Paleontology},
   keywords = {xxx},
   pages = {1-21},
   title = {Early Miocene shallow-water corals from La Guajira, Colombia: Part II, Mussidae–Siderastreidae and Milleporidae},
   volume = {93},
   year = {2018},
}
@article{Oviedo2023,
   abstract = {El museo como refugio: el caso de un proyecto comunitario en el desierto de La Tatacoa en Colombia. El desierto de la Tatacoa en el centro de Colombia ha sido explorado por científicos durante aproximadamente un siglo, sin embargo el papel de sus habitantes ha sido limitado. Esto es problemático porque impide que los habitantes locales se beneficien de los posibles resultados asociados al proceso de hacer ciencia. El desarrollo de la exposición Territorio Fósil, Historias Vivas representa un caso de estudio ideal para entender los factores que aumentan la posibilidad de éxito en iniciativas a largo plazo en contextos rurales y con acceso limitado a servicios básicos y oferta

educativa y cultural. Un proceso liderado por la comunidad local de La Victoria, un pequeño pueblo en la región de la Tatacoa, reunió a investigadores y profesionales de museos para desarrollar colaborativamente una exhibición museográfica que incrementa el bienestar social y fortalece la relación de los habitantes con su territorio.},
   author = {Luz Helena Oviedo and Alejandra Estrada and Juliana Restrepo and Patricia Fernández},
   doi = {10.5252/geodiversitas2023v45a12},
   issue = {12},
   journal = {Geodiversitas},
   keywords = {CommunityMuseums,SocialAppropriation,TatacoaDesert,museumExhibition},
   month = {7},
   pages = {367-376},
   title = {Museum as a Refuge: the case of a Community Project in La Tatacoa desert in Colombia},
   volume = {45},
   url = {https://doi.org/10.5252/geodiversitas2023v45a12},
   year = {2023},
}
@article{Mora2023,
   abstract = {The middle Miocene Konzentrat-Lagerstätte of the La Venta site recorded in the Honda Group contains invaluable information on the biotic response to the climatic changes of the Miocene Climatic Transition. Its fossil record has been studied for almost a century and offers one of the best windows to the Neotropics terrestrial ecosystems during the Neogene. We have compiled all published studies and, using graphic correlation and a recently published geological map for the region, placed them into a composite standard section. Furthermore, we improved its chronostratigraphic control by analyzing new geochronological data (U-Pb in zircons) and developing a probabilistic age model using a Bayesian framework. The results suggest that most of the fossil assemblage of the Honda Group accumulated in a meandriform fluvial system (upper part of La Victoria Formation – lower part of Villavieja Formation) that later shifted to an anastomosed system (upper part of Villavieja Formation). The c. 552-m-thick La Victoria Formation is younger than 16 Ma and older than 12.58 Ma, whereas the c. 569-m-thick Villavieja Formation is younger than 12.58 Ma and older than 10.52 Ma. The La Venta site is crucial for understanding Miocene paleoecological dynamics in northern South America, but despite decades of studies, it is still in the early phase of exploration.},
   author = {Laura Mora and Andrés Cárdenas and Carlos Jaramillo and Daniele Silvestro and Germán Bayona and Sebastian Zapata Henao and Juan Jaramillo-Ríos},
   doi = {10.5252/geodiversitas2023v45a6},
   journal = {GEODIVERSITAS},
   keywords = {DepositionalSystems,Geochronology,HondaGroup,ProbabilisticAgeModel,SedimentationRates},
   month = {4},
   title = {Stratigraphy of a middle Miocene neotropical Lagerstätte (La Venta Site, Colombia)},
   volume = {45},
   year = {2023},

}
@article{Zorro-Lujan2022,
   abstract = {Six vertebrae (one cervical, three articulated thoracic, and two lumbar) and an incomplete thoracic neural spine from a new late Pleistocene site at Anolaima, Cundinamarca, Colombia, are attributed to the extinct gomphothere (Elephantoidea, Proboscidea) Notiomastodon platensis. The preserved bones exhibit a range of alterations, including porosities, piercings, hollows, and deep bone lesions on the spinous process and the neural arch; asymmetrical zygapophyseal articulations; and osteoarthritic lesions. Diet, behaviour, ecological aspects, selective pressures, and disease have the potential to affect the bones, so the study of individual variations and palaeopathology provides important information for understanding aspects of the life of extinct organisms. Osteological anomalies in the Anolaima gomphothere are interpreted as the result of nutritional deficiencies in essential minerals caused by environmental stresses, possibly related to the palaeoenvironmental instability that characterized the late Pleistocene and that coincides with the age of the fossils. Excessive biomechanical loading on already weakened bones from locomotion through the uneven, upland terrain of the Anolaima region may have contributed to the pathologies. This palaeopathological analysis is the first for Colombian megafauna, and thereby broadens our knowledge of the health conditions of South American gomphotheres.},
   author = {Catalina María Zorro-Luján and Leslie F Noè and Marcela Gómez-Pérez and Sandrine Grouard and Andrés Chaparro and Saúl Torres},
   doi = {DOI: 10.1017/qua.2022.49},
   edition = {2022/10/25},
   issn = {0033-5894},
   journal = {Quaternary Research},
   keywords = {Colombia,Extinction,Gomphothere,Megafauna,Notiomastodonplatensis,Palaeopathology,Pleistocene,Proboscidea,SouthAmerica,Vertebrae},
   pages = {1-15},
   publisher = {Cambridge University Press},
   title = {Vertebral lesions in Notiomastodon platensis, Gomphotheriidae, from Anolaima, Colombia},
   url = {https://www.cambridge.org/core/article/vertebral-lesions-in-notiomastodon-platensis-gomphotheriidae-from-anolaima-colombia/5C2F4FA8438CE4102878DD50D54E8BBC},
   year = {2022},
}
@article{Giraldo2022,
   abstract = {Modern Neotropical rainforests are characterized by the high intensity and host specificity with which insects feed on plants. Previous studies have shown that, during the middle–late Paleocene, the leaves of the early evolving Neotropical rainforests of tropical South America were heavily herbivorized by insects. Yet, less attention has been given to insect damage found on fossil fruits and seeds, despite the host specialization of many disseminule predators in modern forests. Here, we present and describe borings found on a fruit compression fossil of cf. Cocos (coconut) from the middle–late Paleocene Cerrejón Formation (58–60 Ma) of Colombia. We interpret the borings as constructed by palm seed beetles (Chrysomelidae: Bruchinae: Pachymerina) based on size, number, position, plant reaction tissue, and plant host selection. This

occurrence provides the earliest record of an ecological interaction between seed beetles and palms, suggesting that this host-specific interaction has been consistently maintained for several tens of millions of years.},
   author = {L Alejandro Giraldo and Mónica R Carvalho and Fabiany Herrera and Conrad C Labandeira},
   doi = {https://doi.org/10.1016/j.revpalbo.2022.104630},
   issn = {0034-6667},
   journal = {Review of Palaeobotany and Palynology},
   keywords = {FossilFruits,Host-SpecializedInteractions,Paleobotany,Paleoecology,SeedPredation},
   pages = {104630},
   title = {Ancient trouble in paradise: Seed beetle predation on coconuts from middle–late Paleocene rainforests of Colombia},
   volume = {300},
   url = {https://www.sciencedirect.com/science/article/pii/S0034666722000288},
   year = {2022},
}
@book{GomezPerez2022,
   abstract = {Colombia no solo es un país rico en ecosistemas naturales, fauna y flora, sino que somos también un país geodiverso y fascinante. Las múltiples configuraciones que han tomado nuestros suelos y subsuelos determinan la manera en que transcurre nuestra vida aquí, en la superficie, sobre montañas, volcanes, llanuras, sabanas y desiertos: todas estas variadas formas de nuestros paisajes son comprendidas gracias a la geología.La Tierra, como nosotros, tiene un pasado, la diferencia es que ella ha escrito la historia de su vida en las rocas. ¿Cómo ha sido el transcurrir del planeta y de nuestro territorio en sus 4600 millones de años? ¿Por qué cambia? ¿Cuáles son sus dinámicas? ¿Qué animales han vivido aquí? ¿Cómo fueron sus ecosistemas? ¿Por qué en muchos casos se extinguieron? Estas son algunas de las preguntas que han sido respondidas gracias a la geología.En Colombia, la producción de conocimiento sobre los diversos ámbitos de nuestra geología es parte de la misión del Servicio Geológico Colombiano, una institución con más de cien años de existencia que, en esta oportunidad, tiene el placer de compartir con ustedes algunas de las más fascinantes historias de nuestro pasado, a través de las Rutas geológicas. La primera entrega de esta colección está dedicada a un momento remoto de la Tierra del que en Colombia tenemos vestigios magníficamente preservados en un punto singular de la región Andina, que ha sido además escenario de hechos históricos como la batalla de independencia de Colombia: Boyacá. En un pequeño cuadrante dentro de este territorio está la región conocida como Ricaurte alto, del que hacen parte los municipios de Villa de Leyva, Sáchica y Sutamarchán. Allí aflora uno de los escasos registros más completos de rocas sedimentarias del periodo Cretácico a nivel mundial. Estas rocas, junto con los fósiles que ahí quedaron enterrados, son los testigos de la existencia de un antiguo mar que inundó nuestro territorio hace 120 millones de años.Los fósiles —improbables vestigios de la vida transformados en roca— que están en este punto de Boyacá nos llevan en un viaje hacia el Cretácico para descubrir que el territorio semidesértico que hoy visitamos con amigos y familia fue hogar de grandes reptiles

marinos, almejas, erizos de mar, algunos crustáceos y, sobre todo, amonitas.A través de esta ruta, el Servicio Geológico Colombiano invita a recorrer los municipios de Villa de Leyva, Sáchica y Sutamarchán desde una perspectiva patrimonial y paleontológica, que nos acercará al pasado milenario de nuestro territorio para conocerlo y, sobre todo, para protegerlo. Los fósiles, aunque hermosos, no son figuras decorativas; son un particular y escaso “boleto” que nos permite tener acceso a nuestra historia geológica, pero solo si los protegemos para su estudio científico.Los invitamos cordialmente a usar esta guía para que en su paso por Boyacá, sea pasajero o permanente, se sumerjan imaginariamente en este antiguo mar para conocer mejor y proteger el patrimonio paleontológico de Colombia.},
   author = {Marcela Gomez-Perez and Paula Andrea Grisales Naranjo and Leslie F Noè},
   city = {Bogotá, Colombia},
   edition = {1},
   editor = {Marcela Gómez Pérez and Paula Andrea Grisales Naranjo and Leslie F Noè},
   isbn = {978-958-53993-2-7},
   keywords = {Alto Ricaurte,Boyacá,Mar paja,amonitas,historia de la geología colombiana,paleontología,patrimonio geológico},
   publisher = {Libros del Servicio Geológico Colombiano},
   title = {Ruta geológica: Las amonitas del sur del Ricaurte alto, ícono del patrimonio paleontológico},
   url = {https://libros.sgc.gov.co/index.php/editorial/catalog/book/84},
   year = {2022},
}
@article{Noe2021,
   abstract = {Kronosaurus boyacensis is the most famous and most important Lower Cretaceous marine reptile fossil recovered from the Villa de Leyva region of Boyacá, Colombia, northern South America. To the local population it has become iconic as The Fossil (‘El Fósil’) of Colombia. Here we provide a detailed re-description of the holotype of the pliosaurid sauropterygian Kronosaurus boyacensis, and designate it a new genus, Monquirasaurus. Redescription of Monquirasaurus boyacensis required detailed consideration of the genus Kronosaurus, the Albian holotype of which is non-diagnostic at the taxonomic level of genus and species so the name Kronosaurus queenslandicus is thereby restricted to the holotype only. Aptian specimens currently assigned to Kronosaurus queenslandicus, and housed in the University Museum in Harvard, USA, are designated as the holotype and referred specimen of the new genus and species Eiectus longmani, which also provisionally includes all Albian material formerly referred to the genus Kronosaurus. The two pliosaurid marine reptiles from the Cretaceous of Colombia and Australia do not fit well into the current phylogenetic framework proposed for these gigantic marine reptiles, highlighting the importance of both northern and southern peri-Gondwanan specimens for the study of Lower Cretaceous Gap pliosaurids.},
   author = {Leslie F. Noe and Marcela Gomez-Perez},
   doi = {https://doi.org/10.1016/j.cretres.2021.105122},
   issue = {0195-6671},
   journal = {Cretaceous Research},

keywords = {LowerCretaceousGap,PajaFormation,Peri-GondwananSeas,Plesiosauria,Pliosaurid},
title = {Giant pliosaurids (Sauropterygia; Plesiosauria) from the Lower Cretaceous peri-Gondwanan seas of Colombia and Australia},
year = {2021},
}
@article{Florez2021a,
abstract = {Bryozoans are common and diverse in fossil and modern coral reefs. However, studies of bryozoans in ancient reefs are generally limited, and even less is known about fossil bryozoan faunas associated with coral reefs in the Caribbean region. This is the second contribution describing the bryozoan assemblage from the early Miocene (Aquitanian) reefs of the Siamaná Formation in the La Guajira Peninsula, southern Caribbean. Here, we describe and illustrate 17 species of ascophoran-grade cheilostomes, including one new genus and three new species, Ditaxiporina colombiana n. sp., Poricella paulae n. sp., and Cycloavicularia parva n. gen. n. sp. Of the remaining fourteen taxa left in open nomenclature, one is considered confer and three affinis to species previously described, one is identified at family level, and nine at genus level. The Siamaná bryozoan fauna differs in species and colony-form composition from those associated with other paleoenvironments from Oligocene and Miocene localities of North America, the Caribbean, and Brazil. UUID:},
author = {Paola Florez and Emanuela Di Martino and Laís V Ramalho},
doi = {DOI: 10.1017/jpa.2021.94},
edition = {2021/10/29},
issn = {0022-3360},
journal = {Journal of Paleontology},
keywords = {xxx},
pages = {1-30},
publisher = {Cambridge University Press},
title = {Early Miocene coral reef-associated bryozoans from Colombia. Part II: “Ascophora” Cheilostomatida},
year = {2021},
}
@article{Cortes2021,
abstract = {Early Cretaceous ichthyosaur diversity has markedly increased in recent years with the discovery of new taxa in the field and in museum collections. This has led to new characters, and a better understanding of taxonomically informative anatomy. Here, we re-describe the holotype of the ophthalmosaurid Platypterygius sachicarum from the Barremian–Aptian of Colombia and place these data in a phylogenetic context. The validity of the species is supported by several new characters of the narial region, mandible and dentition. The dentition is unique among ichthyosaurs in that it presents several discrete tooth morphologies that range from piercing to cutting to crushing. In combination, these cranial specializations imply a large vertebrate diet and make this taxon the first Cretaceous hypercarnivorous ichthyosaur. Differences from the type species of Platypterygius, P. platydactylus, include a suite of characters associated with differing feeding ecologies and the complex external nares. The large number of character differences and revised phylogenetic relationships are used to remove the Colombian taxon from Platypterygius and recognize it as a new genus, Kyhytysuka sachicarum comb. nov. A revised set of taxonomic definitions are proposed

for Ophthalmosauria to maintain stability at this important node. Kyhytysuka sachicarum opens new questions regarding the diversity and paleobiogeography of Early Cretaceous ichthyosaurs from northern Gondwana and highlights the importance of individually assessing each ‘Platypterygius’ species and, potentially, specimen to better understand the diversity of this broadly distributed taxon.},
   author = {Dirley Cortes and Erin E Maxwell and Hans C E Larsson},
   doi = {10.1080/14772019.2021.1989507},
   issn = {1477-2019},
   journal = {Journal of Systematic Palaeontology},
   keywords = {Colombia,EarlyCretaceous,Ophthalmosauridae,PajaFormation,Platypterygius sachicarum,SouthAmerica},
   month = {11},
   note = {doi: 10.1080/14772019.2021.1989507},
   pages = {1-34},
   publisher = {Taylor & Francis},
   title = {Re-appearance of hypercarnivore ichthyosaurs in the Cretaceous with differentiated dentition: revision of ‘Platypterygius’ sachicarum (Reptilia: Ichthyosauria, Ophthalmosauridae) from Colombia},
   url = {https://doi.org/10.1080/14772019.2021.1989507},
   year = {2021},
}
@article{Martinez2021,
   abstract = {Movement toward our current climate state began in the middle Eocene to early Oligocene interval when the global temperature cooled and the first Antarctic ice sheet appeared. This dramatic climate change caused a significant global turnover in both marine and terrestrial biotas. The biotic response to this event at low latitudes remains mostly unexplored. Here, we studied a recently discovered Eocene fossil macro- and palynoflora from Esmeraldas Formation (Colombia). The Esmeraldas Flora consists of more than seven hundred macrofossil specimens found in two localities, including 45 morphotypes of leaves, seeds, cuticles, fruits, and flowers and > 5000 palynomorphs, that include 210 morphospecies. The Esmeraldas Formation is dominated by meandering river floodplain deposition, and was dated, using palynology and isotopic stratigraphy, as middle to late Eocene (~47.3 to ~33.9 Ma). Quantitative paleoclimatic calculations based on leaf physiognomy and coexistence analyses indicate a warm temperature and a seasonal precipitation within the range of modern tropical dry forests. Furthermore, the floristic composition that includes the presence of macrofossils of the Pterocarpus clade (Fabaceae), and pollen records of the subfamily Bombacoideae (Malvaceae), and Euphorbiaceae, could be indicative of a tropical dry forest. The overall paleobotanical record suggests that the Esmeraldas flora represents one of the earliest records of a tropical dry forest from low latitudes.},
   author = {Camila Martinez and Carlos Jaramillo and Jhonatan Martínez-Murcia and William Crepet and Andrés Cárdenas and Jaime Escobar and Federico Moreno and Andrés Pardo-Trujillo and Dayenari Caballero-Rodríguez},
   doi = {https://doi.org/10.1016/j.gloplacha.2021.103617},
   issn = {0921-8181},
   journal = {Global and Planetary Change},

   keywords =
{Colombia,EsmeraldasFormation,Neotropics,Paleobotany,Palynology,Precipita
tion},
   pages = {103617},
   title = {Paleoclimatic and paleoecological reconstruction of a middle
to late Eocene South American tropical dry forest},
   volume = {205},
   url =
{https://www.sciencedirect.com/science/article/pii/S0921818121002022},
   year = {2021},
}
@article{Velez2021,
   abstract = {How Indigenous peoples and European settlers transformed
terrestrial ecosystems in the Americas is well evidenced in the
literature, but far less is known about how aquatic ecosystems changed.
This study examined diatom records from sediment cores from paleoclimate
studies in mountain lakes of Guatemala, Panama, and Colombia, in order to
clarify the long-term human influences on the ecology of these lakes. We
focused on two aspects of beta diversity in identified diatom zones:
species turnover and variation in relative abundances of species. All
records displayed a single diatom zone or cluster of zones with
assemblages that had no close analogues in the past. The ages of these
distinctive assemblages varied from post-European to 5000 cal yr BP. Most
novel assemblages comprised moderately motile, non-planktonic, single-
celled diatoms, associated with disturbed, productive environments.
Archaeological data and pollen records pointed to the onset of
intensification of human activities as the main driver behind the changes
in diatoms. Maximum depth exerted control on how diatom communities
responded to anthropogenic stressors. In shallower lakes, diatom
assemblages transitioned gradually over time into their current novel
composition. In deeper lakes, assemblages displayed slight fluctuations
before shifting to their current condition. Differences between the two
lake groups likely resulted from a more complete water-column mixing and
higher rates of nutrient cycling in the shallow lakes, which led to a
more rapid response of the diatoms to environmental changes. The shift to
novel recent diatom assemblages suggests that these lakes now display
ecosystem characteristics with no past analogues, and that they have lost
their capacity to resist change or recover from stressors, jeopardizing
the future of mountain water resources.},
   author = {Maria I Velez and Jorge Salgado and Mark Brenner and Henry
Hooghiemstra and Jaime Escobar and Arnoud Boom and Broxton Bird and Jason
H Curtis and Yunuen Temoltzin-Loranca and Luisa Fernanda Patiño and
Catalina Gonzalez-Arango and Sarah E Metcalfe and Gavin L Simpson and
Cesar Velasquez},
   doi = {https://doi.org/10.1016/j.ancene.2021.100294},
   issn = {2213-3054},
   journal = {Anthropocene},
   keywords =
{Anthropocene,EuropeanColonization,Holocene,LakeDepth,Neotropics,NovelDia
tomAssemblages},
   pages = {100294},
   title = {Novel responses of diatoms in neotropical mountain lakes to
indigenous and post-European occupation},
   volume = {34},

   url =
{https://www.sciencedirect.com/science/article/pii/S2213305421000175},
   year = {2021},
}
@article{Carvalho2021a,
   abstract = {Premise of research.?Melastomataceae are a diverse and
primarily tropical family with a particularly sparse fossil record.
Various biogeographic interpretations based on phylogenies, extant
distribution, and a limited fossil record have placed the origin of the
family in either Laurasia or Gondwana (eastern or
western).Methodology.?We describe Xystonia simonae M. Carvalho gen. et
sp. nov. on the basis of fossil leaves from middle?late Paleocene
deposits of the Bogotá Formation in central Colombia. These leaves have a
characteristic acrodromous venation pattern common among subfamily
Melastomatoideae. The leaves are compared with various acrodromously
veined fossils and living angiosperms to assess their natural
affinities.Pivotal results.?The fossil leaves described predate the
earliest known occurrence of Melastomatoideae by 5?7 Myr and conflict
with previous interpretations that considered Melastomatoideae as
Laurasian in origin. In revising the fossil record of Melastomataceae, we
reevaluated the age of Melastomaephyllum danielis Huert. to be Miocene
(previously Eocene/Oligocene) using pollen obtained from the rock that
contained the type specimen.Conclusions.?Our findings contribute to the
scant early records of Melastomataceae and show that Melastomatoideae was
part of a tropical rain forest assemblage by the middle?late Paleocene.
Leaf galls and other leaf damage on X. simonae evidence intense and
specialized biotic interactions in the early evolution of this lineage.},
   author = {Mónica R Carvalho and Fabiany Herrera and Sebastián Gómez
and Camila Martínez and Carlos Jaramillo},
   doi = {10.1086/714053},
   issn = {1058-5893},
   journal = {International Journal of Plant Sciences},
   keywords =
{BogotáFormation,Leaves,Melastomaceophyllum,Paleobotany,Xystonia},
   month = {2},
   note = {doi: 10.1086/714053},
   pages = {0},
   publisher = {The University of Chicago Press},
   title = {Early Records of Melastomataceae from the Middle–Late
Paleocene Rain Forests of South America Conflict with Laurasian Origins},
   url = {https://doi.org/10.1086/714053},
   year = {2021},
}
@article{Lopez-Otalvaro2019,
   abstract = {The Floresta Massif, located in the Eastern Cordillera of
Colombia, has a diverse and precious natural heritage. It is one of the
areas that contains an exceptional palaeontological heritage of the
Middle Devonian not only of Colombia, but also of South America. This
heritage is represented by fossil specimens of marine fauna and
terrestrial flora (correlated with North America and Europe) of the
Floresta and Cuche Formations. Since 2004, actions made by several
academic and research institutions, community and local government have
introduced schoolchildren, teenagers and university students to art and
science, and have promoted the conservation of palaeontological heritage

as an essential, vibrant and relevant discipline. The high diversity of invertebrates, fi shes and terrestrial plant fossils unearthed has promoted teaching and outreach projects, the creation of a small Museum of Palaeontology in the Floresta municipality, and the aim of developing a geotouristic ring road in the Floresta municipality and towns surrounding the Floresta massif. These initiatives are a lively example of conservation and good use of the palaeontological heritage of Floresta.},
   author = {Gatsby-Emperatriz Lopez-Otalvaro},
   issue = {1},
   journal = {Spanish Journal of Palaeontology},
   keywords = {Artworks,Boyacá,Colombia,Education,Floresta,Fossils,MiddleDevonian,PalaeontologicalHeritage.},
   pages = {153-162},
   title = {Working to the conservation and good use of the Devonian palaeontological heritage in Floresta, Boyacá (Colombia): a review of teaching case studies to engage students and the community},
   volume = {34},
   year = {2019},
}
@article{Carvalho2021,
   abstract = {The end-Cretaceous event was catastrophic for terrestrial communities worldwide, yet its long-lasting effect on tropical forests remains largely unknown. We quantified plant extinction and ecological change in tropical forests resulting from the end-Cretaceous event using fossil pollen (>50,000 occurrences) and leaves (>6000 specimens) from localities in Colombia. Late Cretaceous (Maastrichtian) rainforests were characterized by an open canopy and diverse plant–insect interactions. Plant diversity declined by 45% at the Cretaceous–Paleogene boundary and did not recover for ~6 million years. Paleocene forests resembled modern Neotropical rainforests, with a closed canopy and multistratal structure dominated by angiosperms. The end-Cretaceous event triggered a long interval of low plant diversity in the Neotropics and the evolutionary assembly of today’s most diverse terrestrial ecosystem.},
   author = {Mónica R Carvalho and Carlos Jaramillo and Felipe de la Parra and Dayenari Caballero-Rodríguez and Fabiany Herrera and Scott Wing and Benjamin L Turner and Carlos D’Apolito and Millerlandy Romero-Báez and Paula Narváez},
   issue = {6537},
   journal = {Science},
   keywords = {xxx},
   pages = {63-68},
   title = {Extinction at the end-Cretaceous and the origin of modern Neotropical rainforests},
   volume = {372},
   year = {2021},
}
@article{Suarez2021,
   abstract = {Potamosiren magdalenensis Reinhart, is an extinct species of manatee (Sirenia, Trichechidae, Trichechinae), which has only been recorded for the middle Miocene Honda Group, in the La Venta area (Huila Department, Colombia). A new specimen referable to Potamosiren cf. P. magdalenensis is reported herein, collected from the early Miocene

Barzalosa Formation. This unit crops out in the Pubenza locality, at the Tocaima municipality of the Cundinamarca Department, Colombia. The material described here represents the first evidence of a mammal from the Barzalosa Formation, the earliest record of Potamosiren so far reported and one of the only two trichechid records for the early Miocene of South America. The new specimen adds to a small but growing record of extinct trichechids, increasing the fossil record of this group in South America and allowing us to further explore their evolutionary history. The early Miocene appearance of trichechines coincides geographically and temporally with the onset of the Pebas Mega-Wetland System, which likely provided favourable conditions for the invasion of freshwater ecosystems of this group of fully aquatic mammals. Finally, the depositional environments represented by the Barzalosa Fm and a review of the fossil record of trichechines further support the notion that manatees have had a close association with freshwater systems since early in their evolutionary history, and that reinvasion of marine ecosystems did not occur until much later.},
   author = {Catalina Suarez-Gomez and Javier N Gelfo and Jorge W Moreno-Bernal and Jorge Velez-Juarbe},
   doi = {https://doi.org/10.1016/j.jsames.2021.103277},
   issn = {0895-9811},
   journal = {Journal of South American Earth Sciences},
   keywords = {BarzalosaFormation,Colombia,Sirenia,SouthAmerica,Trichechidae},
   pages = {103277},
   title = {An early Miocene manatee from Colombia and the initial Sirenian invasion of freshwater ecosystems},
   volume = {109},
   url = {https://www.sciencedirect.com/science/article/pii/S0895981121001231},
   year = {2021},
}
@article{Florez2021,
   abstract = {This is the first of two comprehensive taxonomic works on the early Miocene (ca. 23–20 Ma) bryozoan fauna associated with coral reefs from the Siamaná Formation, in the remote region of Cocinetas Basin in the La Guajira Peninsula, northern Colombia, southern Caribbean. Fifteen bryozoan species in 11 families are described, comprising two cyclostomes and 13 cheilostomes. Two cheilostome genera and seven species are new: Antropora guajirensis n. sp., Calpensia caribensis n. sp., Atoichos magnus n. gen. n. sp., Gymnophorella hadra n. gen. n. sp., Cribrilaria multicostata n. sp., Cribrilaria nixor n. sp., and Figularia bragai n. sp. Eight species are identified only at genus level and remain in open nomenclature. Of the species found, 27% have erect colonies and 73% encrusting colonies. Both types contributed to the reef framework and produced sediment. The observed bryozoan diversity was higher in the barrier reefs than in the lagoonal patch reefs.},
   author = {Paola Florez and Emanuela Di Martino and Laís Ramalho},
   doi = {10.1017/jpa.2021.5},
   journal = {Journal of Paleontology},
   keywords = {xxx},
   month = {3},
   title = {Early Miocene coral reef-associated bryozoans from Colombia. Part I: Cyclostomata, "Anasca" and Cribrilinoidea Cheilostomata},

   year = {2021},
}
@inbook{NOE2020,
   abstract = {Dinosaur remains from northwestern South America are rare, with only extremely scarce fossil evidence recovered from Colombia. Here we report six dinosaur footprints preserved on a sub-vertical bedding plane of the upper Valanginian – lower Hauterivian Batá Formation, Santa María, Boyacá Department, Colombia. The Batá Formation consists of a thick succession of conglomerates and sandstones with shale intercalations interpreted as deposited along the palaeoshoreline of an epicontinental seaway. Four of the footprints form a trackway made by a single dinosaur, which is interpreted as a sub-adult ornithopod, estimated at 8 m in length, weighing around 2.5 metric tons, and travelling at an average walking speed of almost 5 km/h. The footprints are assigned to the ichnogenus Iguanodontipus, and were probably produced by an iguanodontian dinosaur. Prior to this work, Iguanodontipus was considered an exclusively European taxon, making this a unique record of the ichnogenus in Gondwana. The presence of Iguanodontipus in northern South America suggests an Early Cretaceous sweepstake, with dinosaurs crossing Tethys Ocean into modern-day northern Africa, and migrating along the northern shores of Gondwana into modern-day South America. Range extension of iguanodontian ornithopods southwards into Gondwana during the Early Cretaceous was apparently prevented by the Central Gondwana Desert Belt, possibly as a result of the palaeoecology of these dinosaurs, which seem to have had an affinity for environments rich in water and lush vegetation. A migration route across Tethys and the Central Gondwana Desert Belt helps explain similarities between northern Gondwanan and southern Laurasian dinosaurs, and the differences between northern and southern Gondwanan faunas, during the Early Cretaceous.},
   author = {Leslie F. Noe and Marcela Gomez-Perez and José Vicente Rodriguez and Alejandro Corrales-Garcia and William G. Caranton-Mateus},
   journal = {The Geology of Colombia},
   keywords = {Dinosaur,Gondwana,Laurasia,LowerCretaceous,faunalinterchange.,ichnofossils},
   pages = {375-401},
   title = {Dinosaur Footprints from the Lower Cretaceous, Batá Formation, Colombia (South America), and the Possible Interchange of Large Ornithopods between Southern Laurasia and Northern Gondwana},
   year = {2020},
}
@article{Jaramillo2020,
   abstract = {Abstract Dry biomes occupy ~35% of the landscape in the Neotropics, but these are heavily human-disturbed. In spite of their importance, we still do not fully understand their origins and how they are sustained. The Guajira Peninsula in northern Colombia is dominated by dry biomes and has a rich Neogene fossil record. Here, we have analyzed its changes in vegetation and precipitation during the Neogene using a fossil pollen and spore dataset of 20 samples taken from a well and we also dated the stratigraphic sequence using microfossils. In addition, we analyzed the pollen and spore contents of 10 Holocene samples to establish a modern baseline for comparison with the Neogene as well as a study of the modern vegetation to assess both its spatial distribution and anthropic disturbances during the initial stages of European

colonization. The section was dated to span from the latest Oligocene to the early Miocene (~24.2 to 17.3 Ma), with the Oligocene/Miocene boundary being in the lower Uitpa Formation. The early Miocene vegetation is dominated by a rainforest biome with a mean annual precipitation of ~2,000 mm/yr, which strongly contrasts with Guajira's modern xerophytic vegetation and a precipitation of ~300 mm/yr. The shift to the dry modern vegetation probably occurred over the past three millions years, but the mechanism that led to this change is still uncertain. Global circulation models that include the vegetation could explain the ancient climate of Guajira, but further work is required to assess the feedbacks of vegetation, precipitation, and CO2.},
   author = {Carlos Jaramillo-Muñoz and Pierre Sepulchre and Damian Cardenas and Alexander Correa-Metrio and J Enrique Moreno and Raul Trejos and Diego Vallejos and Natalia Hoyos and Camila Martínez and Daniella Carvalho and Jaime Escobar and Francisca Oboh-Ikuenobe and Mercedes B Prámparo and Diego Pinzón},
   doi = {10.1029/2020PA003933},
   issue = {11},
   journal = {Paleoceanography and Paleoclimatology},
   keywords = {Biome,DryForest,Miocene,Neotropics,Palynology,Rainforest},
   pages = {e2020PA003933},
   title = {Drastic Vegetation Change in the Guajira Peninsula (Colombia) During the Neogene},
   volume = {35},
   url = {https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2020PA003933},
   year = {2020},
}
@article{Paramo-Fonseca2020,
   abstract = {A new specimen of Muiscasaurus catheti Maxwell et al., 2016 from upper Aptian of the Paja Formation found in Villa de Leiva (Boyacá, Colombia) is described herein. It consists of a well preserved skull and a nearly complete axial skeleton of a sub-adult individual and provides valuable new morphological information on the species, including two autapomorphies: the presence of a quadratojugal with extremely reduced external exposure, and basioccipital floor of the foramen magnum with a medially furrowed anterior ridge. A detailed comparison between the new specimen (FCG-CBP-16) and the holotype (CIP-FCG-CBP-74) allows us to identify misinterpretations in the original description of M. catheti that were probably due to the highly deformed and partially unprepared state of the holotype. Consequently, we propose the new specimen (FCG-CBP-16) to be a benchmark specimen for the species. Morphological comparisons with other Ophthalmosauridae highlight the affinities between M. catheti and the species of the Upper Jurassic genus Ophthalmosaurus. A phylogenetic analysis recovers M. catheti in a ‘basal’ position within Ophthalmosaurinae, supporting its proximity to Ophthalmosaurus and contrasting with previous topologies where M. catheti was recovered as a basal Platypterygiinae. This implies a temporal extension of the Ophthalmosaurinae up to the Aptian in South America.},
   author = {Maria Paramo-Fonseca and Javier García Guerrero and Cristian David Benavides-Cabra and Santiago Padilla Bernal and Antonio José Castañeda-Gómez},
   doi = {https://doi.org/10.1016/j.cretres.2020.104685},
   issn = {0195-6671},

   journal = {Cretaceous Research},
   keywords = {Colombia,EarlyCretaceous,Ichthyosauria,Ophthalmosauridae},
   pages = {104685},
   title = {A Benchmark Specimen Of Muiscasaurus Catheti From The Upper Aptian Of Villa De Leiva, Colombia: New Anatomical Features And Phylogenetic Implications},
   url = {http://www.sciencedirect.com/science/article/pii/S0195667120303724},
   year = {2020},
}
@article{Luque2020,
   abstract = {The BarremianeAptian Paja Formation, as exposed in Villa de Leyva and nearby areas (Boyaca, Colombia), is one of the most fossiliferous Cretaceous units in northern South America, yet no fossil crabs had ever been recorded from this formation in the region. Here we report the first occurrence of crabs from the upper Aptian “Arcillolitas con nodulos huecos” Member of the Paja Formation in Boyaca, belonging to two species of orithopsid crabs: Bellcarcinus aptiensis Luque, 2014 and Planocarcinus olssoni (Rathbun, 1937). The newly collected material d represented by dozens of samples in small nodules d includes individuals preserving key rostral, orbital and pereonal traits previously unknown from the type material. Furthermore, a few specimens of B. aptiensis have swellings in their branchial regions, consistent with the deformation produced by parasitic isopods infesting the crab's gill chambers. To our knowledge, this is the first record of parasitic isopod traces in the family Orithopsidae, and the oldest evidence of isopod parasitism in raninoidan crabs. The new material here reported increases the number or marine arthropods known from the fossiliferous Paja Formation in Boyaca and provides valuable information for further palaeoecological reconstructions of these shallow-marine settings in northern South America during the Early Cretaceous.},
   author = {Javier Luque and Dirley Cortés and Alejandra Rodriguez-Abaunza and Diana Cárdenas and Juan de Dios Parra},
   journal = {Cretaceous Research},
   keywords = {Brachyura,Decapoda,Marine,Mesozoic,Neotropics,Parasitism},
   pages = {1-9},
   title = {Orithopsid crabs from the Lower Cretaceous Paja Formation in Boyacá (Colombia), and the earliest record of parasitic isopod traces in Raninoida},
   year = {2020},
}
@book{Gomez2017,
   abstract = {El Servicio Geológico Colombiano (SGC) ha diseñado la presente guía con el objeti vo de facilitar la identi fi cación de elementos muebles consti tuyentes del Patrimonio Geológico y Paleontológico Colombiano, como rocas, fósiles y minerales, por parte del público no especializado. La divulgación debe entenderse como una necesidad para asegurar la conservación, pues no es posible gesti onar de manera sostenible algo que no se conoce. Esperamos que esta herramienta de divulgación facilite la cooperación por parte de funcionarios de enti dades estatales, como la Aeronáuti ca Civil, la Dirección de Impuestos y Aduanas Nacionales (DIAN), la Policía Nacional, las alcaldías, así como aeropuertos, puertos, museos e insti tuciones educati vas, para evitar el saqueo, destrucción, hurto, tráfi co, distribución y comercialización en

el territorio nacional y extranjero del Patrimonio Geológico y Paleontológico de los colombianos.},
   author = {Marcela Gomez-Perez and E Salgado},
   city = {Bogotá, Colombia},
   editor = {Servicio Geológico Colombiano},
   keywords = {xxx},
   pages = {44},
   title = {Guía para reconocer objetos del patrimonio geológico y paleontológico},
   year = {2017},
}
@article{Scholz2020,
   abstract = {During the Mid-Miocene Climatic Optimum (MMCO, 14.7–17.3 Ma), global temperatures were warmer than present, and similar to predicted temperatures for the coming century. Limited paleoclimate data exist from the tropics during this period, despite its potential as an analog for future climate conditions. This study presents new subannual stable isotope data (δ18O and δ13C) from a large population of Miocene Turritella gastropods from the Jimol and Castilletes Formations of the Guajira Peninsula, Colombia. Turritellids are aragonitic marine mollusks that live in shallow coastal waters, and their rapid growth rates allow for high-resolution subannual records. We compare these fossils to modern Turritella gastropods from multiple tropical localities to reconstruct subannual climate conditions. The seasonal range in δ18O in the modern shells correlates with the seasonal variance of local precipitation, once temperature seasonality is accounted for. The Miocene fossils show larger (in some cases >2‰) seasonal variation in δ18O than modern Turritella from the same location, suggesting increased seasonality of precipitation in Miocene northern Colombia relative to today. We propose that this increased seasonality of precipitation was due to a more northerly position of the Intertropical Convergence Zone during the mid-Miocene. The resulting wet Miocene paleoenvironment is in stark contrast to semiarid conditions on the Guajira Peninsula today, indicating that this area of tropical South America has undergone a drastic environmental change since the Miocene.},
   author = {Serena R Scholz and Sierra V Petersen and Jaime Escobar and Carlos Jaramillo and Austin Hendy and Warren D Allmon and Jason H Curtis and Brendan M Anderson and Natalia Hoyos and Juan C Restrepo},
   journal = {Geology},
   keywords = {xxx},
   title = {Isotope sclerochronology indicates enhanced seasonal precipitation in northern South America (Colombia) during the Mid-Miocene Climatic Optimum},
   volume = {48},
   year = {2020},
}
@article{Jaramillo2017b,
   abstract = {There is a considerable controversy about whether western Amazonia was ever covered by marine waters during the Miocene [23 to 5 Ma (million years ago)]. We investigated the possible occurrence of Miocene marine incursions in the Llanos and Amazonas/Solimões basins, using sedimentological and palynological data fromtwo sediment cores taken in eastern Colombia and northwestern Brazil together with seismic information.We observed two distinctmarine intervals in the Llanos Basin,

an early Miocene that lasted ~0.9My (million years) (18.1 to 17.2 Ma) and amiddleMiocene that lasted ~3.7 My (16.1 to 12.4Ma). These twomarine intervals are also seen in Amazonas/Solimões Basin (northwestern Amazonia) but were much shorter in duration, ~0.2 My (18.0 to 17.8 Ma) and ~0.4 My (14.1 to 13.7 Ma), respectively. Our results indicate that shallow marine waters covered the region at least twice during the Miocene, but the events were shortlived, rather than a continuous full-marine occupancy of Amazonian landscape over millions of years.},
   author = {Carlos Jaramillo-Muñoz and Ingrid Romero and Carlos D'Apolito and Germán Bayona and Edward Duarte and Stephen Louwye and Jaime Escobar and Javier Luque and Jorge D Carrillo-Briceño and Vladimir Zapata and Alejandro Mora and Stefan Schouten and Michael Zavada and Guy J Harrington and John Ortiz and Frank P. Wesselingh},
   issue = {5},
   journal = {Science Advances},
   keywords = {xxx},
   title = {Miocene flooding events of western Amazonia},
   volume = {3},
   year = {2017},
}
@inbook{LeslieF.NOE2020,
   abstract = {The Cretaceous Paja Formation of the alto Ricaurte of the Eastern Cordillera of central Colombia was laid down under an epicontinental sea during Hauterivian – Aptian times. The Paja Formation epicontinental sea was home to a diverse, and now well-preserved, pelagic marine fauna that includes members of Plesiosauria, other marine reptiles, fish, and ammonites. However, the benthic fauna is depauperate, preserving just a few thin-shelled bivalves and evidence of microbial mats. This suggests dysoxic–anoxic bottom waters, separated from oxic surface waters by a chemocline- pycnocline. The exceptional preservation of the Paja Formation fauna makes the alto Ricaurte a unique Lower Cretaceous marine vertebrae Lagerstätte. Previous palaeoenvironmental interpretations of the Paja Formation, based on observations of the gypsiferous, dark mudrock sequence, suggested an intertidal evaporitic (sabkha) environment. However, integration of sedimentological, palaeobiological, taphonomic, and diagenetic data provides evidence for deeper water conditions. The exquisite preservation and articulation of the skeletons of large marine reptiles, three-dimensionally preserved fish, beautifully ornamented ammonites, and delicate plants, do not accord with a sabkha environment. Sabkha is typical of mid-latitude, dryer climates under the descended limb of the Hadley atmospheric cell, rather than a wet tropical equatorial location of the Paja Formation. Mineralogical arguments used to infer the presence of sabkha are not primary depositional features, but due to secondary migration of mineral-rich fluids. These fluids probably had their source in the earliest Cretaceous topographic high now beneath the Sabana de Bogotá, and were driven by hydraulic pressure generated by volumetric changes due to hydration of anhydrite into gypsum due to the post-Cretaceous rise of the northern Andes mountain chain. The separation of primary and secondary diagenetic features is thereby critical for understanding the evolution of the Paja Formation sedimentary basin in the alto Ricaurte.},
   author = {Leslie Noe and Marcela Gomez-Perez},
   city = {Bogotá, Colombia},
   editor = {A.O Gómez, J. & Pinilla-Pachon},

   journal = {The Geology of Colombia},
   keywords =
{Lagerstätte,LowerCretaceous,PajaFormation,Plesiosauria,palaeoenvironment
s},
   pages = {1-43},
   publisher = {Servicio Geológico Colombiano, Publicaciones Geológicas
Especiales},
   title = {Plesiosaurs, palaeoenvironments, and the Paja Formation
Lagerstätte of central Colombia: An overview},
   url =
{https://www2.sgc.gov.co/LibroGeologiaColombia/Paginas/v2ch13.aspx},
   year = {2020},
}
@book{Jaramillo2017a,
   author = {Carlos Jaramillo-Muñoz and Marcelo R Sánchez-Villagra and
Felipe Lamus Ochoa and Henry Arenas-Castro and Juan Pablo Narváez-Gómez
and Mailyn A González and Andrés L Cárdenas-Rozo and Camilo Montes and
Germán Bayona and Natalia Hoyos and Mónica R Carvalho and Camila Martínez
and Federico Moreno and Catalina Suárez-Gómez},
   city = {Bogotá, D.C., Colombia},
   editor = {Instituto Alexander von Humboldt e Instituto Smithsonian de
Investigaciones Tropicales},
   isbn = {978-958-5418-20-2},
   keywords = {xxx},
   pages = {124},
   title = {Hace tiempo. Un viaje paleontológico ilustrado por Colombia},
   year = {2017},
}
@article{Paramo-Fonseca2019a,
   abstract = {A new specimen of Stenorhynchosaurus munozi Páramo-Fonseca
et al., 2016 (Plesiosauria, Pliosauridae), found at Sáchica (Boyacá,
Colombia) in upper Barremian beds of the Arcillolitas Abigarradas Member
of the Paja Formation, is described herein. It consists of a complete
skull and 10 cervical vertebrae of an adult individual and provides
valuable new morphological information on the species: the presence of
nasals covering a subsurface circular cavity where salt glands were
probably lodged (new autapomorphy), the presence of a high sagittal crest
on the parietal, a very elongated pineal foramen enclosed entirely within
the parietals, and unfused neural arches in the cervical vertebrae. A
phylogenetic analysis supports the inclusion of Stenorhynchosaurus munozi
within the pliosaurid clade Brachaucheninae. A morphological comparison
between the juvenile and adult stages of S. munozi shows that in the
adult stage, the margins of the internal nares and the anterior part of
the anterior interpterygoid vacuity are well ossified, the medial joints
of the pterygoids and the mandibular symphysis are closed, and the atlas
and the axis are fused, but the cervical neural arches remain unfused to
the centra. The growth pattern of the skull dorsal bones differs from
that of the palatal elements, but the relative distance between the
external and internal nares remains the same. A greater longitudinal
growth in the skull and a negative allometric orbital growth pattern
results in a proportionally longer skull and relatively smaller orbits in
the adult.},
   author = {Maria Paramo-Fonseca and Cristian David Benavides-Cabra and
Ingry E Gutiérrez},

journal = {Journal of Vertebrate Paleontology},
keywords = {xxx},
title = {A new specimen of Stenorhynchosaurus munozi Páramo-Fonseca et al., 2016 (Plesiosauria, Pliosauridae), from the Barremian of Colombia: new morphological features and ontogenetic implications},
year = {2019},
}
@article{Cortes2019,
abstract = {Teleosauroid extinction at the J/K boundary has been hypothesized to be an artifact of sampling only temperate paleolatitudes. Here, we describe the definitive youngest record of Teleosauroidea, from the upper Barremian of the paleotropics. The preserved material consists of dorsal vertebrae, dorsal ribs, dorsal and ventral osteoderms and epipodial remains. We refer the specimen to Teleosauroidea based on the large hourglass-shaped amphiplatyan morphology of the dorsal centra and rectangular dorsal osteoderms, which are much wider than long and have a straight anterior edge. The South American specimen is one of the largest known teleosauroids, with an estimated body length of 9.6 m. This is the first evidence of a marine crocodylomorph recorded from the Paja Formation of Colombia. The survival of Teleosauroidea in the paleotropics of northern Gondwana following the group's extinction in Europe supports the hypothesis that water temperature played a role in controlling the diversity and distribution of these large marine predators.},
author = {Dirley Cortes and Hans C.E. Larsson and Erin E Maxwell and Mary Luz Parra-Ruge and Pedro Patarroyo and Jeffrey A. Wilson},
journal = {Ameghiniana},
keywords = {Colombia,EarlyCretaceous,LateBarremian,PajaFormation,SouthAmerica,Teleosauroidea,Thalattosuchia,VilladeLeyva},
title = {An early Cretaceous Teleosauroid (Crocodylomorpha: Thalattosuchia) from Colombia},
year = {2019},
}
@article{Herrera2019,
abstract = {Leguminosae are one of the most diverse flowering-plant groups today, but the evolutionary history of the family remains obscure because of the scarce early fossil record, particularly from lowland tropics. Here, we report ~500 compression or impression specimens with distinctive legume features collected from the Cerrejón and Bogotá Formations, Middle to Late Paleocene of Colombia. The specimens were segregated into eight fruit and six leaf morphotypes. Two bipinnate leaf morphotypes are confidently placed in the Caesalpinioideae and are the earliest record of this subfamily. Two of the fruit morphotypes are placed in the Detarioideae and Dialioideae. All other fruit and leaf morphotypes show similarities with more than one subfamily or their affinities remain uncertain. The abundant fossil fruits and leaves described here show that Leguminosae was the most important component of the earliest rainforests in northern South America c. 60-58 million years ago.},
author = {Fabiany Herrera and Mónica R Carvalho and Scott L Wing and Carlos Jaramillo and Patrick S. Herendeen},
doi = {10.1071/SB19001},
issn = {10301887},
issue = {6},

   journal = {Australian Systematic Botany},
   keywords =
{Diversity,Fabaceae,FossilPlants,Neotropics,SouthAmerica,legumes},
   pages = {385-408},
   title = {Middle to Late Paleocene Leguminosae fruits and leaves from
Colombia},
   volume = {32},
   year = {2019},
}
@article{Martinez2015,
   abstract = {PREMISE OF THE STUDY: Documented fossil floras in the
neotropics are sparse, yet their records provide evidence on the spatial
and temporal occurrence of taxa, allowing for testing of biogeographical
and diversification scenarios on individual lineages. A new fossil Piper
from the Late Cretaceous of Colombia is described here, and its
importance for assessing diversification patterns in the genus is
addressed. METHODS: Leaf architecture of 32 fossil leaf compressions from
the Guaduas Formation was compared with that of 294 extant angiosperm
species. The phylogenetic position of the fossil named Piper margaritae
sp. nov. was established based on leaf traits and a molecular scaffold of
Piper. The age of the fossil was independently used as a calibration
point for divergence time estimations. KEY RESULTS: Natural affinities of
P. margaritae to the Schilleria clade of Piper indicate that the genus
occurred in tropical America by the Late Cretaceous. Estimates of age
divergence and lineage accumulation reveal that most of the extant
diversity of the genus accrued during the last ~30 Myr. CONCLUSIONS: The
recent radiation of Piper is coeval with both the Andean uplift and the
emergence of Central America, which have been proposed as important
drivers of diversity. This pattern could exemplify a recurrent theme
among many neotropical plant lineages.},
   author = {Camila Martinez and Carlos Alberto Jaramillo Muñoz and
Santiago Madriñán},
   doi = {DOI: 10.3732/ajb.1400427},
   journal = {American Journal of Botany},
   keywords = {Colombia,GuaduasFormation,LateCretaceous,Pipe},
   pages = {273-289},
   title = {A Late Cretaceous Piper (Piperaceae) from Colombia and
diversification patterns for the genus},
   year = {2015},
}
@article{Doria2008,
   author = {Gabriela Doria and Carlos Jaramillo and Fabiany Herrera},
   issn = {0002-9122},
   journal = {American Journal of Botany},
   keywords =
{Colombia,LeafMorphology,LowerEudicots,Menispermaceae,Paleobotany,Ranuncu
lales.},
   pages = {954-973},
   title = {Menispermaceae from the Cerrejón Formation, middle to late
Paleocene, Colombia},
   volume = {95},
   year = {2008},
}
@article{Paramo-Fonseca2019,

abstract = {A new genus and species of elasmosaurid, Leivanectes bernardoi gen. et sp. nov., from the upper Aptian levels of the Paja Formation of Villa de Leiva (Boyaca, Colombia) is described. The new elasmosaurid is characterized by a short mandibular symphysis, bears only three alveoli (there are five in Callawayasaurus colombiensis), has an enlarged premaxillary alveoli, and has a mandible that includes only seven alveoli in each ramus anterior to the orbit (there are 11 in Callawayasaurus colombiensis). This new elasmosaurid taxon has fewer and larger alveoli than any other presently described elasmosaurid taxon. The observed differences indicate that the new species consumed larger-bodied prey than did other elasmosaurids. The new taxon suggests that the elasmosaurids were diverse in the Colombian late Aptian sea.},
author = {Maria Paramo-Fonseca and José Patricio O'Gorman and Zulma Brandoni de Gasparini and Santiago Padilla and Mary Luz Parra-Ruge},
issn = {0195-6671},
journal = {Cretaceous Research},
keywords = {Aptian,Colombia,Elasmosauridae,LowerCretaceous,Plesiosauria,VilladeLeiva},
pages = {30-40},
title = {A new late Aptian elasmosaurid from the Paja Formation, Villa de Leiva, Colombia},
volume = {99},
year = {2019},
}
@article{Herrera2014,
abstract = {Los bosques tropicales de Centroamérica y Suramérica tienen una alta diversidad de frutos y semillas alados (dispersados por el viento). Sin embargo, se desconoce cuándo la gran diversidad de frutos alados evolucionó en esta región. En este artículo se describen seis nuevas especies fósiles de frutos y semillas aladas del Paleoceno de Colombia, de ~60 millones de años de antigüedad. Uno de ellos se relaciona a la familia del cacao (Malvaceae) y otro a la familia del olmo (Ulmaceae).},
author = {Fabiany Herrera and Steven R Manchester and Mónica R Carvalho and Carlos Alberto Jaramillo Muñoz and Scott L Wing},
journal = {Acta Palaeobotanica},
keywords = {Fossils,Malvaceae,Neotropics,Paleocene,Ulmaceae,WindDispersalSyndromes},
pages = {197-229},
title = {Paleocene wind dispersed fruits and seeds from Colombia and their implications for early Neotropical rainforests},
volume = {54},
year = {2014},
}
@article{Suarez-Gomez2016,
abstract = {A new species of Sparassodonta (Mammalia, Metatheria), Lycopsis padillai, sp. nov., is described on the basis of a partial left maxilla with M1–M4 and fragments of lacrimal and jugal. The material comes from the early to early middle Miocene Castilletes Formation, La Guajira Peninsula, Colombia. This specimen represents the northernmost record of a fossil metatherian in South America and integrates a highly diverse vertebrate association, recently discovered in the north of Colombia. The La Guajira specimen is referred to the genus Lycopsis, as

supported by the results of our phylogenetic analysis. This analysis also demonstrates that species of Lycopsis (L. torresi, L. longirostrus, L. viverensis, and L. padillai) constitute a monophyletic group and are placed as the basal taxon of Borhyaenoidea. Lycopsis padillai is a large-sized sparassodont with a body mass of about 22 kg. The presence of Lycopsis from La Guajira extends the geographical distribution of the genus to the entire South America, representing the sparassodont with the widest latitudinal distribution.},
   author = {Catalina Suarez-Gomez and Analía M Forasiepi and Francisco J Goin and Carlos Alberto Jaramillo Muñoz},
   issn = {0272-4634},
   journal = {Journal of Vertebrate Paleontology},
   keywords = {xxx},
   pages = {e1029581},
   title = {Insights into the Neotropics prior to the Great American Biotic Interchange: new evidence of mammalian predators from the Miocene of Northern Colombia},
   volume = {36},
   url = {https://www.tandfonline.com/doi/abs/10.1080/02724634.2015.1029581},
   year = {2016},
}
@article{Gracia2004,
   abstract = {Thatcherina diazi n. sp., especie actual del género fósil pliocénico Thatcherina VERA-PELÁEZ, 1998 del Plioceno inferior de Estepona (Málaga, España), se describe a partir del material colectado frente a las costas septentrionales del Caribe colombiano. Esta especie se suma a otros taxones relictos del Plioceno caribeño que forman parte de la malacofauna reciente del extremo norte de Sudamérica. Se ha realizado un estudio comparativo a nivel específico y genérico con especies afines vivientes del mundo y del Neógeno europeo y americano. Es la primera cita de la subfamilia Thatcherinae y del género Thatcherina en el continente americano en la actualidad, si bien, el género Thatcheria ANGAS, 1866 está citado en el Neógeno americano.},
   author = {Adriana Gracia},
   journal = {Pliocenica},
   keywords = {MarCaribeColombiano.,NuevaEspecie,Plioceno,TaludContinental,Thatcherinadiazi,Turridae},
   pages = {1-10},
   title = {Thatcherina diazi, nueva especie actual del género fósil del Plioceno ThatcherinaVera-Peláez, 1998 (Gastropoda, Turridae) del Caribe colombiano: consideraciones estratigráficas, biogeografías y filogenéticas},
   volume = {4},
   url = {https://www.researchgate.net/profile/Jose_Luis_Vera_Pelaez/publication/312578758_Thatcherina_diazi_nueva_especie_actual_del_genero_fosil_del_Plioceno_Thatcherina_Vera-Pelaez_1998_Gastropoda_Turridae_del_Caribe_Colombiano_consideraciones_estratigraficas_bi},
   year = {2004},
}
@article{Padilla2010,

```
   abstract = {Acid preparation of large vertebrate fossils poses special
problems for the preparator. The Fundación Colombiana de Geobiología has
prepared a number of large vertebrates (marine reptiles from the
Cretaceous of Colombia, South America) using acid to remove calcareous
matrix. A combination of factors, including: specimen size: choice of
acid; number and length of acid baths; ventilation needs; area of matrix
and fossil exposed; matrix homogeneity; number of acid resistant
protective coats applied; management of voids; and acid consumption are
shown to be important. By varying these parameters, exceptional
preparation of specimens ready for detailed research and study can
result.},
   author = {Carlos B Padilla and María Eurídice Páramo-Fonseca and
Leslie F Noè and Marcela Gómez-Pérez and Mary Luz Parra-Ruge},
   journal = {The Geological Curator},
   keywords = {xxx},
   pages = {213-220},
   title = {Acid preparation of large vertebrate specimens},
   volume = {9},
   year = {2010},
}
@article{Paramo-Fonseca2018,
   abstract = {Se describe un nuevo espécimen de pliosaurido, encontrado
en capas del Barremiano de Sáchica, municipio vecino a Villa de Leiva, el
cual representa el esqueleto más completo descubierto en la región. El
estudio detallado de sus características morfológicas evidencia que el
nuevo espécimen representa un nuevo género y especie de pliosáurido
brachauchenino de la región central de Colombia, al que hemos denominado
Sachicasaurus vitae gen. et sp. nov. Sachicasaurus es un brachauchenino
de gran tamaño (alrededor de 10 m de longitud) caracterizado por dos
caracteres autopomórficos: sínfisis mandibular muy corta, terminando en
la mitad del cuarto alvéolo mandibular y número reducido de dientes
mandibulares (17-18). También se caracteriza por la siguiente combinación
de caracteres: cráneo con longitud mayor a dos metros; constricción
transversal en el rostro; dientes caniniformes presentes; secuencia
dental con dos dientes de mayor tamaño no contiguos (D4, Mx1), foramen
pineal ubicado en una posición avanzada; vómer bifurcado posteriormente,
palatinos separados en la línea media por los pterigoideos; hioides
esbeltos; 12 vértebras cervicales; centros cervicales sin forámenes
dorsales pero con forámenes ventrales; una sola faceta articular para las
costillas en todos los centros cervicales; como mínimo 37 vertebras pre-
sacras; e ilion con una proyección posterior larga. La comparación
morfológica y los análisis cladísticos muestran al nuevo espécimen como
un brachauchenino derivado con una evidente proximidad filogenética con
la especie colombiana “Kronosaurus” boyacensis del Aptiano superior,
sugiriendo que los dos podrían pertenecer al mismo género},
   author = {Maria Paramo-Fonseca and Cristian David Benavides-Cabra and
Ingry Esmirna Gutierrez},
   issn = {1794-6190},
   journal = {Earth Sciences Research Journal},
   keywords =
{Barremian,Brachaucheninae,Colombia.,LowerCretaceous,Pliosauridae,Sachica
},
   pages = {223-238},
```

   title = {A new large Pliosaurid from the Barremian (Lower Cretaceous) of Sáchica, Boyacá, Colombia},
   volume = {22},
   year = {2018},
}
@article{Carballido2015,
   abstract = {Brachiosaurid sauropods achieved a broad distribution during the Late Jurassic, which has been considered to provide evidence of their origins during the Middle Jurassic, prior to the breakup of Pangea. In contrast to their broad geographic distribution during the Late Jurassic, formally named brachiosaurid species from the Cretaceous have so far been restricted to the Aptian–Albian of North America, which has been interpreted as a signal of differential extinction and/or a bias in the Early Cretaceous fossil record. Here we describe a new brachiosaurid titanosauriform taxon from the Early Cretaceous of Colombia, which is represented by axial elements. The material was recovered from marine sediments of the Paja Formation (Barremian), close to the locality of Villa de Leiva. The weakly laterally expanded and divided transverse processes of the anterior-most caudal vertebrae allows the recognition of a new sauropod taxon, Padillasaurus leivaensis, gen. et sp. nov. In order to test the phylogenetic relationships of the new taxon, we performed a cladistic analysis that recovered Padillasaurus as a brachiosaurid titanosauriform. This position is supported by a combination of characters, including the presence of blind fossae in anterior caudal vertebrae. Among titanosauriforms, the presence of blind fossae in anterior caudal vertebrae is an apomorphic character that is exclusive to Giraffatitan, Venenosaurus, Cedarosaurus, and Abydosaurus. Although more complete remains are needed to test more thoroughly the affinities of the new taxon, the available evidence indicates that brachiosaurids survived at lower latitudes in Gondwana until at least the Early Cretaceous.},
   author = {José L Carballido and Diego Pol and Mary Luz Parra Ruge and Santiago Padilla Bernal and María Euridice Paramo Fonseca and Fernando Etayo Serna},
   issn = {0272-4634},
   journal = {Journal of Vertebrate Paleontology},
   keywords = {xxx},
   pages = {e980505},
   title = {A new Early Cretaceous brachiosaurid (Dinosauria, Neosauropoda) from northwestern Gondwana (Villa de Leiva, Colombia)},
   volume = {35},
   url = {https://www.tandfonline.com/doi/abs/10.1080/02724634.2015.980505},
   year = {2015},
}
@article{Gomez2007,
   abstract = {Holocene environments in the intra-Andean basin of Duitama (Eastern Cordillera of Colombia, 2510 m altitude) are presented based on the 620 cm long Vargas pollen and sediment record. Seven AMS radiocarbon dates show these lake and swamp sediments represent the period from 8800 to 2610 14C yr BP. We identified seven distinct periods of environmental conditions in the basin. From ca. 8800 to 7700 14C yr BP (9450–8300 cal yr BP) Alnus and Myrica swamp forest grew on wet soils. On the surrounding slopes Andean forest was present with Hedyosmum,

Melastomataceae and Quercus. Between 7700 and 6090 14C yr BP (8300–6750 cal yr BP) open water with aquatics alternated with peat-forming Plantago meadows reflecting repeated lake levels changes. From 6090 to 5220 14C yr BP (6750–5680 cal yr BP) open water and grassy vegetation around the lake was replaced by Alnus-dominated swamp forest, suggesting lower lake levels and drier climatic conditions. Between 5220 and 4500 14C yr BP (5680–4810 cal yr BP) an alternation between Alnus-dominated swamp forest and open grassy vegetation continued, reflecting fluctuating water levels. At that time Hedyosmum, Miconia, Quercus, Solanaceae, Relbunium and Rubiaceae were common elements in the Andean forest. From about 4500 to 3680 14C yr BP (4810–3800 cal yr BP) Alnus-dominated swamp forest alternated with Myrica shrub and much organic material accumulated in the basin. Evidence of deforestation (reduction of Quercus in particular), lowering of water tables and increasing disturbance, probably by erosion (presence of Amaranthaceae/Chenopodiaceae, Borreria and Dodonaea) point to the settlement of pre-Hispanic populations. Between 3680 and 2610 14C yr BP (3800–2470 cal yr BP) there is clear evidence of crop cultivation (presence of Zea mays) and frequent fires (high amounts of charcoal in the sediments). Erosion all over the basin led to significant sediment supply and the lake gradually changed into a swamp. By this time pre-Hispanic populations had used nearly all alder wood in the catchment area. The uppermost sediments are oxidised and the last 2610 radiocarbon years of the Holocene are not represented, possibly due to agricultural activities.},
   author = {Andrea Gomez and Juan Carlos Berrío and Henry Hooghiemstra and Miguel Becerra and Rob Marchant},
   issn = {0034-6667},
   journal = {Review of Palaeobotany and Palynology},
   keywords = {Colombia,EnvironmentalChange,PantanodeVargas,PollenAnalysis,PreHispanicPopulation},
   pages = {143-157},
   title = {A Holocene pollen record of vegetation change and human impact from Pantano de Vargas, an intra-Andean basin of Duitama, Colombia},
   volume = {145},
   year = {2007},
}
@article{Carvalho2018,
   abstract = {A large and almost complete dorsal exoskeleton of a homalonotid trilobite from the Middle Devonian of Colombia (Floresta Formation) is described and referred to Dipleura dekayi Green, 1832, confirming prior suggestions of biogeographical affinity between Colombia and the North Eastern Americas Realm during Devonian times.},
   author = {Maria da Gloria Pires de Carvalho},
   issn = {0003-0082},
   journal = {American Museum Novitates},
   keywords = {Colombia,Devonian,Trilobita (Homalonotidae)},
   pages = {1-9},
   title = {Occurrence of Dipleura dekayi Green, 1832 (Trilobita; Homalonotidae) in the Devonian of Colombia},
   volume = {2018},

   url =
{http://digitallibrary.amnh.org/bitstream/handle/2246/6899/N3902.pdf?sequence=1&isAllowed=y},
   year = {2018},
}
@article{Noe2006,
   abstract = {As a result of a collaborative research effort between the Universidad Nacional de Colombia and the Sedgwick Museum (UK) the acid prepared skull and rock encased postcranial skeleton of a new Cretaceous marine reptile (a pliosaur) has been transported from Bogotá to the University of Cambridge. This contribution details the procedure from agreeing the loan, planning the transport, obtaining the funds, through the challenge of paperwork, innovative packing and labelling, to planning and managing the media, and the successful arrival of the specimen.},
   author = {Leslie F. Noe and Rigoberto Gomez-Cruz and Marcela Gomez-Perez and Pedro Patarroyo},
   issn = {0144-5294},
   journal = {Geological curator},
   keywords = {xxx},
   pages = {271-280},
   title = {A pliosaur travels: the packaging of a unique Cretaceous marine reptile, and its transport from Colombia to the United Kingdom},
   volume = {8},
   year = {2006},
}
@article{Carvalho2011,
   author = {Mónica R Carvalho and Fabiany Herrera and Carlos Jaramillo and Scott L Wing and Ricardo Callejas},
   issn = {0002-9122},
   journal = {American Journal of Botany},
   keywords =
{Colombia,Eumalvoideae,FossilLeaves,LeafArchitecture,Malvaceae,Neotropics,Paleobiogeography,Pollen},
   pages = {1337-1355},
   title = {Paleocene Malvaceae from northern South America and their biogeographical implications},
   volume = {98},
   year = {2011},
}
@article{Maxwell2019,
   abstract = {Platypterygius sachicarum is one of the few Lower Cretaceous ichthyosaurian species described from the Hauterivian–Aptian-aged Paja Formation, the most complete Lower Cretaceous sedimentary sequence in northern South America. To date, P. sachicarum has been described only from a single skull, limiting morphological, stratigraphic, and phylogenetic comparisons. Here, we describe a new skull and associated postcranium of upper Barremian age from Villa de Leyva, Colombia, which represent the first documented postcranial remains of this species and enable detailed comparison with other Early Cretaceous ophthalmosaurid ichthyosaurs. Platypterygius sachicarum shares many morphological similarities with contemporaneous taxa from Europe but differs in both skull and tooth morphology from coeval South American species from northern South America and from the eastern Pacific. The additional data provide new diagnostic characters for this species and

resolve the position of P. sachicarum as part of a polytomy of other species historically referred to Platypterygius. However, as with previous analyses, all recovered clades are poorly supported. The rich vertebrate fossil record of the Paja Formation provides an unparalleled opportunity to explore paleobiogeographic and paleoecological questions pertaining to Cretaceous marine reptiles; however, in most cases, a robust stratigraphic and phylogenetic framework remains elusive.},
   author = {Erin E Maxwell and Dirley Cortés and Pedro Patarroyo and Mary Luz Parra Ruge},
   issn = {0272-4634},
   journal = {Journal of Vertebrate Paleontology},
   keywords = {xxx},
   pages = {e1577875},
   title = {A new specimen of Platypterygius sachicarum (Reptilia, Ichthyosauria) from the Early Cretaceous of Colombia and its phylogenetic implications},
   year = {2019},
}
@article{PerezConsuegra2014,
   abstract = {Recientes investigaciones en localidades fosilíferas de la alta Guajira colombiana sugieren que hasta hace por lo menos tres millones de años, lo que hoy es un desierto (figura 1) fue un lugar boscoso con ríos caudalosos y sinuosos, con una gran variedad de reptiles, peces, invertebrados y mamíferos [1]. Entre estos últimos se han encontrado abundantes restos de unos organismos de caparazón gigante: los gliptodontes. Estas localidades nos abren una ventana única para comprender la vida y los ambientes en el pasado. Además, nos revelan información sobre la existencia de una fauna prehistórica hasta ahora desconocida para el mundo.},
   author = {Nicolas Perez-Consuegra and Federico Moreno and María Camila Vallejo Pareja},
   journal = {Hipótesis, Apuntes científicos uniandinos},
   keywords = {Colombia,Gliptodontes},
   title = {Gliptodontes: mamíferos gigantes en el pasado},
   url = {http://hipotesis.uniandes.edu.co/hipotesis/images/stories/ed17pdf/Gliptodontes-17.pdf},
   year = {2014},
}
@article{ParamoFonseca2010,
   abstract = {Se describe un fragmento de rama mandibular derecha de mastodonte que conserva un molar M3 incompleto. El espécimen fue encontrado en cercanías de la ciudad de Cartagena y su procedencia estratigráfica, aunque desconocida,puede relacionarse con la Formación Gravas de Rotinet de edad Pleistoceno. Este estudio constituye nueva información sobre la presencia de mastodontes en la región Caribe de Colombia. Con base en la morfología molar, el espécimen se determinó como un miembro de la familia Gomphotheriidae conferido al género Haplomastodon. El material estudiado pone en evidencia una vez más la riqueza del registro fósil de mastodontes en Colombia.},
   author = {Maria Paramo-Fonseca and Ingrid Carolina Escobar-Quemba},
   issn = {2357-3767},
   journal = {Geología Colombiana},
   keywords = {Colombia,Gomphotheriidae,Haplomastodon,Mastodon},

   pages = {50-57},
   title = {Restos mandibulares de mastodonte encontrados en cercanías de Cartagena, Colombia},
   volume = {35},
   url = {https://revistas.unal.edu.co/index.php/geocol/article/view/21722},
   year = {2010},
}
@article{Gomez-Perez2017,
   abstract = {Following the marine extinctions at the end of the Jurassic, only three clades of Plesiosauria passed into the Lower Cretaceous: Brachaucheninae (thalassophonean pliosaurids), Cryptoclididae, and Xenopsaria. However, these plesiosaur clades, and the Brachaucheninae in particular, are represented by a limited number of genera. The Berriasian to Albian thereby represents a considerable period of time (~45 Ma) lacking a plesiosaur-rich strata or Lagerstätte: a time period we here designate as the “Lower Cretaceous Gap” or LCG. One critical region for understanding LCG plesiosaurs is modern northern South America, which, during Early Cretaceous times acted as a crossover between the northern and southern hemispheres, and between the Pacific and proto-Atlantic oceans, as Gondwana gradually divided. Colombia preserves one of the most complete Lower Cretaceous sedimentary successions in the world. These strata, deposited in an epicontinental sea on the margin of Gondwana, are well-exposed close to Villa de Leyva, central Colombia. From the lower Barremian Arcillolitas Abigarradas Member of the Paja Formation, we describe a new genus and species of pliosaurid, Acostasaurus pavachoquensis. Acid preparation has exposed an exceptionally well-preserved three-dimensional pliosaurid skull with superb anatomical detail, allowing thorough description of previously poorly known areas of the plesiosaur skull such as the olfactory wings, otic capsules, sclerotic plates, basicranium and mandibular symphysis. Acostasaurus displays a unique suite of characters: short preorbital rostrum, stepped maxilla contacting the nasal and parietal posteriorly, large nasal in contact with the parietal, frontal with small exposure dorsally, deep notch in the dorsal surface of orbital margin, sagittal crest formed from the parietal and squamosal, dentition markedly heterodont, four pairs of premaxillary teeth, and a mandibular symphysial region containing five-and-a-half tooth pairs, which together differentiate Acostasaurus from all the other Cretaceous pliosaurid genera. Based on analysis of morphological characters used in recent phylogenetic studies, Acostasaurus nests firmly within the increasingly inclusive Pliosauroidea and Pliosauridae, almost certainly within Thalassophonea, and with much less certainty within Brachaucheninae, assuming Acostasaurus does not represent part of a new clade passing into the Early Cretaceous. As a brevirostrine taxon, Acostasaurus is distinctly different from the generally longer-snouted Brachauchenine genera Brachauchenius, Kronosaurus, Megacephalosaurus, Makhaira and Stenorhynchosaurus. The presence of Acostasaurus, together with other as yet undescribed plesiosaurs in central Colombia, firmly establishes northern South America as a key region for understanding of the taxonomy and phylogeny of Lower Cretaceous Gap pliosaurids},
   author = {Marcela Gomez Perez and Leslie F Noè},
   journal = {Palaeontographica Abteilung A},

keywords =
{Barremian,LowerCretaceousGap,PajaFormation,Plesiosauria,Sauropterygia},
pages = {5-42},
title = {Cranial anatomy of a new pliosaurid Acostasaurus
pavachoquensis from the Lower Cretaceous of Colombia, South America},
year = {2017},
}
@article{CadenaRueda2007,
abstract = {The first fossil record of Kinosternon turtles in South
America, from the late Pleistocene (16500 years before present) at the
Pubenza locality, Department of Cundinamarca, in the Bogotá River basin
of Colombia is described. The fossil material is composed of an
epiplastron, a hypoplastron, a peripheral, two costals, and a neural
bone, which suggest an affinity to the Kinosterninae subfamily based upon
the absence of an entoplastron and an abdominal scale. The presence of a
hinge in the anterior and posterior plastral lobe and a large epiplastron
longer than wide indicate an affinity to the genus Kinosternon. The
presence of a marked scar for the insertion of the cervico-plastral
ligament on the visceral surface of the epiplastron indicates a close
relationship to Kinosternon leucostomum and Kinosternon scorpioides. More
shell and cranial material must be found in order to define precisely if
the Kinosternon of Pubenza corresponds to some extant species, or if it
is a new extinct species.},
author = {Edwin Alberto Cadena Rueda and Carlos Alberto Jaramillo
Muñoz and María Euridice Paramo Fonseca},
issn = {1808-9798},
journal = {South American Journal of Herpetology},
keywords = {Colombia,Kinosternidae,Kinosternon,LatePleistocene},
pages = {201-206},
title = {The first Late Pleistocene record of Kinosternon (Cryptodira:
Kinosternidae) turtles for Northern South America, Pubenza Locality,
Colombia},
volume = {2},
url = {https://bioone.org/journals/South-American-Journal-of-
Herpetology/volume-2/issue-3/1808-9798(2007)2[201:TFLPRO]2.0.CO
http://0.0.0.2/The-First-Late-Pleistocene-Record-Of-span-classgenus-
speciesKinosternon-span/10.2994/1808-9798(2007)2[201:TFLPRO]2.0.CO ht},
year = {2007},
}
@article{GomezNavarro2009,
abstract = {Palms are a monophyletic group with a dominantly tropical
distribution; however, their fossil record in low latitudes is strikingly
scarce. In this paper, we describe fossil leaves, infl orescences, and
fruits of palms from the middle to late Paleocene Cerrej ó n Formation,
outcropping in the Rancher í a River Valley, northern Colombia. The
fossils demonstrate the presence of at least fi ve palm morphospecies in
the basin ca. 60 Ma. We compare the morphology of the fossils with extant
palms and conclude that they belong to at least three palm lineages: the
pantropical Cocoseae of the subfamily Arecoideae, the monotypic genus
Nypa , and either Calamoideae or Coryphoideae. The fossil fruits and infl
orescences are among the oldest megafossil records of these groups and
demonstrate that the divergence of the Cocoseae was more than 60 Ma,
earlier than has previously been thought. These fossils are useful in
tracing the range expansion or contraction of historical or current

neotropical elements and also have profound implications for the understanding of the evolution of neotropical rainforests.},
   author = {Carolina Gomez Navarro and Carlos Alberto Jaramillo Muñoz and Fabiany Herrera and Scott L Wing and Ricardo Callejas},
   journal = {American Journal of Botany},
   keywords = {Arecaceae,Arecoideae,Attaleinae,Cerrejon,Cocos,Colombia,Neotropics,Nypa, Paleocene},
   pages = {96},
   title = {Palms (Arecaceae) from a Paleocene rainforest of northern Colombia},
   year = {2009},
}
@article{ParamoFonseca2016,
   abstract = {From one of the most complete Lower Cretaceous rock sequences in the world (in Villa de Leiva region, central Colombia), we describe a new genus and species of pliosaurid plesiosaur Stenorhynchosaurus munozi. Stenorhynchosaurus displays a series of features which differentiate it from all the other Cretaceous pliosaurid genera: the anterior of the vomer, in ventral view, posterior of the palatal premaxilla-maxilla suture, contacting the posterior palatal process of the premaxilla level with the third maxillary alveolus; rostrum narrow and elongated with straight sides in dorsal view; lacrimal forming the anterior border and greater part of the ventral border of the orbit and broadly borders the maxilla anteriorly; anterior interpterygoid vacuity present; internal nares located between vomer and maxilla at the level of 13th-15th maxillary alveoli; anterior of rostrum and mandible without lateral expansion or marked increase in size of the functional alveoli; penultimate premaxillary alveolus slightly larger than adjacent premaxillary alveoli; homodont maxillary functional alveoli, with fourth tooth positions very slightly enlarged with respect to the neighboring alveoli; homodont dentary dentition; and epipodials extremely short. Based on morphological analysis of phylogenetic characters, Stenorhynchosaurus most likely nests within the increasingly inclusive Pliosauridae and Pliosauroidea, however, as currently defined, firm inference for referral of Stenorhynchosaurus to Thalassophonea is much more problematic, but ultimately seems likely based on characters shared with Pliosaurus and Brachaucheninae. However, this uncertainty indicates Thalassophonea requires rigorous redefinition. As to whether Stenorhynchosaurus is a member of the currently exclusively Jurassic genus Pliosaurus, or the Cretaceous sub-family Brachaucheninae, remains equivocal.},
   author = {Maria Paramo-Fonseca and Marcela Gómez-Pérez and Leslie F Noè and Fernando Etayo Serna},
   issn = {0370-3908},
   journal = {Revista de la Academia Colombiana de Ciencias Exactas, Fisicas y Naturales},
   keywords = {Barremian,Colombia,LowerCretaceous,Pliosauridae},
   pages = {84-103},
   title = {Stenorhynchosaurus munozi, gen. et sp. nov. a new pliosaurid from the Upper Barremian (Lower Cretaceous) of Villa de Leiva, Colombia, South America},
   volume = {40},
   url = {http://www.scielo.org.co/pdf/racefn/v40n154/v40n154a10.pdf},

   year = {2016},
}
@article{PerezConsuegra2017,
   abstract = {Salvinia is a pantropical aquatic fern that has the highest species diversity in tropical America. Its evolutionary history and biogeography is still poorly understood. Contrasting its almost modern pantropical distribution, fossils of Salvinia have been found worldwide, including North America, Europe and Asia. Here, we describe fossils of Salvinia from four Paleogene localities of Colombia. Based on comparative morphological analyses of sterile organs, we describe two new species: Salviniamagdalenensis sp. nov. and Salviniabogotensis sp. nov and assign the fossils from the other two localities to Salvinia sp. Available fossil data, together with these new records indicate that Salvinia was distributed in tropical latitudes as well as in temperate latitudes of the Northern Hemisphere throughout most of the Cenozoic. Its modern pantropical distribution could be the result of Pleistocene extinction of Salvinia in temperate regions due to global cooling climate trend.},
   author = {Nicolas Perez-Consuegra and Aura Cuervo Gómez and Camila Martínez and Camilo Montes and Fabiany Herrera and Santiago Madriñán and Carlos Alberto Jaramillo Muñoz},
   issn = {0034-6667},
   journal = {Review of Palaeobotany and Palynology},
   keywords = {Biogeography,Eocene,HeterosporousAquaticFerns,Neotropics,Paleocene,Salvinia},
   pages = {85-108},
   title = {Paleogene Salvinia (Salviniaceae) from Colombia and their paleobiogeographic implications},
   volume = {246},
   url = {https://www.sciencedirect.com/science/article/pii/S0034666716302007},
   year = {2017},
}
@article{Vernygora2018,
   abstract = {The extinct neoteleost family Dercetidae includes elongate, long-jawed marine fishes that are known from the Late Cretaceous to Paleocene in deposits from the Levant, Europe, North Africa, England, Mexico and Brazil. The fossil record of the family in South America is very sparse and previously was restricted to outcrops in Brazil. Herein we describe a new dercetid fish from the Turonian of Colombia, dagger Candelarhynchus padillai gen. et sp. nov. A single articulated specimen is preserved in part and counterpart; the posterior part of the fish is missing. The specimen differs from other dercetid species by the following unique combination of morphological features: lack of scutes on the flanks of the body, presence of a single pair of transverse processes associated with the abdominal vertebrae, roofed posttemporal fossa, single row of small conical teeth on the dentary and maxilla, toothless premaxilla ornamented with pronounced longitudinal striations and protruding forward far beyond the anterior end of the dentary, and relatively large pectoral fins positioned high on the body. When included in a phylogenetic analysis of dagger Enchodontoidei, dagger C. padillai gen. et sp. nov. falls within a monophyletic family Dercetidae and is placed as sister taxon to the Late Cretaceous dercetid

dagger Hastichthys from Israel, indicating faunal connections between the Eastern and Western Tethys. The new taxon provides novel insights into the distribution of dercetid fishes in the Western Tethys region during the early Late Cretaceous.http://zoobank.org/urn:lsid:zoobank.org:pub:29F97139-98BD-48E5-AAC0-091980F866E2},
   author = {Oksana Vernygora and A M Murray and Javier Luque and Mary Luz Parra Ruge and María Euridice Paramo Fonseca},
   city = {[Vernygora, Oksana; Murray, Alison M.; Luque, Javier] Univ Alberta, Dept Biol Sci, Edmonton, AB T6G 2E9, Canada. [Luque, Javier] Smithsonian Trop Res Inst, Balboa Ancon 0843-03092, Panama City, Panama. [Parra Ruge, Mary Luz] Ctr Invest Palaeontol, Villa D},
   doi = {10.1080/14772019.2017.1391884},
   issn = {1477-2019},
   journal = {Journal of Systematic Palaeontology},
   keywords = {Dercetidae,Enchodontoidei,SanRafaelFormation,Teleostei},
   note = {ISI Document Delivery No.: GJ9EI
Times Cited: 0
Cited Reference Count: 65
Vernygora, Oksana Murray, Alison M. Luque, Javier Parra Ruge, Mary Luz Paramo Fonseca, Maria Euridice
Murray, Alison/0000-0001-9648-2902; Luque, Javier/0000-0002-4391-5951
Natural Science and Engineering Research Council of Canada (NSERC) [327448]; Izaak Walton Killam Memorial Scholarship (Canada)
This research was supported by the Natural Science and Engineering Research Council of Canada (NSERC) Discovery Grant 327448 to AMM, and an Izaak Walton Killam Memorial Scholarship (Canada) to JL. Special thanks go to Juan Parra and Freddy Parra (Centro de Investigaciones Palaeontologicas, Villa de Leyva, Colombia), who assisted with the examination of the specimen, provided access to the field sites, and overall provided an excellent research experience. Thanks also go to Dirley Cortes and Alejandra Rodriguez (Smithsonian Tropical Research Institute, Panama) for field assistance, and to Joshua S. Slattery (University of South Florida, USA) for providing reference items. We thank Rio Santiago Dolmetsch who discovered the fossil and brought our attention to it, and the administration and residents of the Monasterio de La Candelaria in Raquira, Boyaca for their generosity in facilitating the fossil material for study. We are grateful to Dr Santiago Padilla for his support and contribution to the palaeontology in the region that made this study possible. Our thanks also go to Louis Taverne, two anonymous reviewers and the editor, who provided valuable comments to improve the manuscript.
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Abingdon
1478-0941},
   pages = {1057-1071},
   title = {A new Cretaceous dercetid fish (Neoteleostei: Aulopiformes) from the Turonian of Colombia},
   volume = {16},
   year = {2018},
}
@article{Valencia-Giraldo2016,
   abstract = {Aunque solamente el 11.5% del área de Antioquia tiene afloramientos de rocas sedimentarias, la revisión bibliográfica y elaboración de un mapa digital de las localidades fosilíferas (27), permite concluir que esta región tiene un gran potencial paleontológico. Los datos muestran que las ocurrencias fósiles antioqueñas datan desde el período Ordovícico (~ 485.4 a ~443.8 Ma) hasta el Cuaternario (~ 2.6 Ma

al Presente). Además, se encuentran macro-fósiles pertenecientes a diferentes phyla (i.e. Arthropoda, Chordata, Hemichordata, Echinodermata, Mollusca y Trachaeophyta). La paleofauna más antigua está conformada por graptolites y trilobites en metasedimentos del Paleozoico, mientras que moluscos marinos y equinodermos conforman las principales localidades fosilíferas del período Cretácico. La paleoflora (i.e. hojas fósiles y xilópalos) de la zona está asociada a la Formación Amagá (Oligoceno - Mioceno). Finalmente, fósiles de vertebrados terrestres (i.e. mastodontes y equinos) se encuentran en depósitos Cuaternarios.},
   author = {Yenny Paola Valencia-Giraldo and Luis Carlos Escobar-Arenas and Juliana Mendoza-Ramírez and Daniel Delgado-Sierra and Andrés L Cárdenas-Rozo},
   issn = {0120-3630},
   journal = {Boletín de Ciencias de la Tierra},
   keywords = {MacroFossils,Paleontology,Phanerozoic},
   pages = {46-54},
   title = {Revisión de las localidades fosilíferas del departamento de Antioquia, Colombia},
   url = {http://www.scielo.org.co/pdf/bcdt/n40/n40a06.pdf},
   year = {2016},
}
@article{Martinez2017,
   abstract = {The plant fossil record for the neotropics is still sparse and temporally discontinuous. The location and description of new fossil material are fundamental for understanding evolutionary and biogeographic patterns of lineages. A new fossil record of Passifl oraceae from the late Eocene of Colombia is described in this study.},
   author = {Camila Martinez},
   issn = {0002-9122},
   journal = {American journal of botany},
   keywords = {EsmeraldasFormation,FossilSeeds,Macrofossils,MiddleMagdalenaValleyBasin,MinimumAge,Neotropics,Paleobotany,Passifloroideae,RuminateEndosperm,SeedCoat},
   pages = {1857-1866},
   title = {Passifloraceae seeds from the late Eocene of Colombia},
   volume = {104},
   year = {2017},
}
@article{CruzGuevara2011,
   abstract = {El género Orthokarstenia se considera un microfósil guía para las edades del periodo Cretácico. La especie característica de la Formación Los Pinos correspondiente al Periodo Cretácico y la edad Maastrichtiana se ajusta a la descripción morfológica de Orthokarstenia ewaldi. De la matriz silícea se extrajeron varios especímenes y se maceraron para realizar pruebas de Espectroscopía de Infrarrojos por la transformada de Fourier (FTIR) utilizando como base KBr. Se colectaron especímenes de tres niveles de una roca. Se tomaron imágenes tridimensionales con un video-microscopio para detallar la forma y organización de los minerales.Un fragmento de la roca se utilizó para llevar a cabo pruebas con Espectroscopia de plasma inducida por laser(LIBS) y determinar la presencia de los elementos Ca, Fe y Mg. También se elaboraron y describieron secciones delgadas. Los espectros de FTIR de los foraminíferos fueron similares en los tres niveles donde se

tomaron las muestras aunque presentaron diferencias con el espectro de la matriz de sílice. Los análisis de LIBS confirmaron la presencia de Ca y de Fe en las muestras. En las secciones delgadas se pudo determinar que el relleno de las conchas, está constituido por sílice amorfo apreciándose además una débil traza de la concha original como un sedimento fino. Las trazas de Ca encontradas confirman el reemplazo de aragonito a calcita magnesiana y finalmente a sílice. Utilizando el método de la relación entre la varianza y la media en tres tamaños de cuadrantes se determinó la dispersión de los especímenes. Los valores obtenidos indicaron una distribución de tipo agrupado. Este tipo de distribución es un indicativo de las condiciones de recursos en el hábitat, del modo de reproducción y dispersión. Se puede inferir que el sistema reproductivo dominante de O. ewaldi fue el asexual predominando las formas megalosféricas.},
   author = {Luis Enrique Cruz Guevara and Javier Hernando Jerez Jaimes and Humberto L Amaya and Jorge E Rueda Fonseca and Juan David Badillo Requena and Jaiber L Villamizar Cáceres},
   journal = {Boletin de Geologia},
   keywords = {Benthic,FTIR,Foraminifera,LIBS,UpperCretaceous.},
   pages = {95-105},
   title = {Caracterización físico química, tafonomía y ecología de Orthokarstenia ewaldi (foraminiferida: siphogenerinoididae) de la Formación Los Pinos (Cretácico: Maastrichtiano) de Samacá (Boyacá, Colombia)},
   volume = {33},
   url = {http://revistahumanidades.uis.edu.co/index.php/revistaboletindegeologia/article/view/2547},
   year = {2011},
}
@article{Paramo-Fonseca2015,
   abstract = {En este artículo se pretende mostrar el estado actual del conocimiento de los reptiles marinos cretácicos de Colombia. Se ofrece una breve síntesis histórica de los estudios realizados, se brinda un panorama de los taxones presentes y se discuten algunos aspectos de su distribución geográfica y estratigráfica. La revisión realizada revela que en los sedimentos marinos cretácicos de Colombia los restos de reptiles marinos son abundantes e incluyen fósiles de tortugas, plesiosaurios, ictiosaurios y mosasaurios. Aunque las publicaciones sobre este material son aún escasas, el incremento de la participación de investigadores nacionales en el estudio de los restos de reptiles marinos ofrece un panorama alentador para el desarrollo de esta rama de la paleontología en Colombia. Los estudios y descripciones realizados ofrecen las primeras bases para sugerir que hubo cambios en la distribución, asociación y abundancia de los distintos grupos que habitaron el mar colombiano a lo largo del Cretácico. Las tortugas, los ictiosaurios y los pliosauroideos tienen una distribución limitada geográficamente y temporalmente a los inicios de la ingresión marina (Cretácico Temprano), mientras los plesiosauroideos amplían su distribución hasta el tiempo de la mayor inundación (Turoniano). Los mosasaurios aparecen con la mayor inundación y permanecen en el mar colombiano durante todo el Cretácico Tardío.},
   author = {Maria Paramo-Fonseca},
   issn = {2469-0228},

   journal = {Publicación Electrónica de la Asociación Paleontológica Argentina},
   keywords = {Colombia,Cretacico,ReptilesMarinos},
   title = {Estado actual del conocimiento de los reptiles marinos cretácicos de Colombia},
   volume = {15},
   url = {http://www.peapaleontologica.org.ar/index.php/peapa/article/view/98},
   year = {2015},
}
@article{Paramo1994,
   author = {Maria Paramo-Fonseca},
   journal = {Revista de la Academia Colombiana de Ciencias exactas, fisicas y naturales},
   keywords = {xxx},
   pages = {63-80},
   title = {Posición sistemática de un reptil marino con base en los restos fósiles encontrados en capas del Cretácico superior en Yaguará (Huila)},
   volume = {19},
   year = {1994},
}
@article{Vallejo-Pareja2015,
   author = {M C Vallejo-Pareja and Juan D Carrillo and Jorge W Moreno-Bernal and M Pardo-Jaramillo and D F Rodriguez-Gonzalez and J Muñoz-Duran},
   journal = {Journal of Vertebrate Paleontology},
   keywords = {xxx},
   pages = {e903960},
   title = {Hilarcotherium castanedaii, gen. et sp. nov., a new Miocene astrapothere (Mammalia, Astrapotheriidae) from the Upper Magdalena Valley, Colombia},
   volume = {35},
   year = {2015},
}
@book{Alvarez-Leon2013,
   author = {Ricardo Álvarez-León and R Orozco-Rey and María Eurídice Páramo-Fonseca and D Restrepo-Santamaría},
   city = {Bogotá, Colombia},
   isbn = {978-958-46-3657-7},
   keywords = {Colombia,List of species,common names,current fish species,distribution,fossil fish species,habitat,watersheds},
   pages = {347},
   publisher = {Eco Prints, Diseño gráfico y audiovisual Ltda},
   title = {Lista de los peces fósiles y actuales de Colombia: Nombres científicos válidos, distribución geográfica, diagnosis de referencia y nombres comunes e indígenas.},
   year = {2013},
}
@article{Martinez2018,
   author = {Camila Martinez},
   issn = {1058-5893},
   journal = {International Journal of Plant Sciences},
   keywords = {Colombia,Dalbergieae,Fabaceae,LateEocene,Samara,fossil},

   pages = {541-553},
   title = {Dalbergieae (Fabaceae) Samara Fruits from the Late Eocene of Colombia},
   volume = {179},
   year = {2018},
}
@article{Perez2017,
   abstract = {One of the most striking components of the modern assemblage of South American mammals is the semiaquatic capybara (Caviidae, Hydrochoerinae), the biggest rodent in the world. The large hydrochoerines are recorded from the middle Miocene to the present, mainly in high latitudes of South America. Although less known, they are also recorded in low latitudes of South America, and in Central and North America. We report the first record of capybaras from the late Pliocene of Colombia, found in deposits of the Ware Formation, Guajira Peninsula in northeastern Colombia. We analyze the phylogenetic position within Caviidae, the possible environmental changes in the Guajira Peninsula, and the implications of this finding for the understanding of the Great American Biotic Interchange. The morphological and phylogenetic analyses indicate that the hydrochoerine of the Guajira Peninsula is a new species, ?Hydrochoeropsis wayuu, and this genus is most closely related to Phugatherium. According to the latest phylogenetic results, this clade is the sister group of the lineage of the recent capybaras (Neochoerus and Hydrochoerus). ?Hydrochoeropsis wayuu is the northernmost South American Pliocene hydrochoerine record and the nearest to the Panamanian bridge. The presence of this hydrochoerine, together with the fluvio-deltaic environment of the Ware Formation, suggests that during the late Pliocene, the environment that dominated the Guajira Peninsula was more humid and with permanent water bodies, in contrast with its modern desert habitats.},
   author = {MaríiaE Perez and María Camila Vallejo Pareja and Jorge D Carrillo-Briceño and Carlos Alberto Jaramillo Muñoz},
   issn = {1064-7554},
   journal = {Journal of Mammalian Evolution},
   keywords = {Caviomorphs,GABI,Hydrochoerinae,Neogene,Neotropics,Phylogeny},
   pages = {111-125},
   title = {A new Pliocene capybara (rodentia, caviidae) from northern South America (Guajira, Colombia), and its implications for the great american biotic interchange},
   volume = {24},
   url = {https://link.springer.com/article/10.1007/s10914-016-9356-7},
   year = {2017},
}
@article{ParamoFonseca2012,
   abstract = {An overview of the main traits of the mosasauroid remains found in Colombia is presented. Three stratigraphic levels have been identified as mosasauroid-bearing beds. In adition to the already known Turonian material, new fossils found in Coniacian and Campanian rocks are preliminary described. The taphonomic and geological features of the findings, as well as the differences in age and anatomical morphology of the new Colombian mosasauroid remains open new perspectives for the analysis of processes of adaptation to marine life that occurred in mosasaurs during the Cretaceous.},

author = {Maria Paramo-Fonseca},
issn = {1777-5817},
journal = {Bulletin de la Société géologique de France},
keywords = {Colombia,Mosasauroidea,SouthAmerica,UpperCretaceous},
pages = {103-109},
title = {Mosasauroids from Colombia},
volume = {183},
url =
{https://www.researchgate.net/publication/235470270_Mosasauroids_from_Colombia},
year = {2012},
}
@article{Cortes2018,
abstract = {Se describen por primera vez restos apendiculares de ictiosaurio oftalmosáurido procedentes de la Formación Paja de Villa de Leiva, Colombia, cuya edad se establece como Barremiano inferior. Las características morfológicas del espécimen son consistentes con el género Platypterygius. Las aletas presentan un conjunto de caracteres autopomórficos del zeugopodio no presentes en las especies del género de las que se conocen restos apendiculares: (1) faceta para elemento extrazeugodial anterior en el húmero fuertemente cóncava, dirigida anteriormente y con reborde pronunciado; (2) cúbito con hendiduras pronunciadas en sus superficies anterior y posterior; (3) elemento extrazeugopodial anterior en forma de silla de montar con cuatro facetas articulares; (4) pisiforme masivo y en forma distintivamente subtriangular. A pesar de que la procedencia geográfica y estratigráfica del espécimen estudiado es aproximadamente equivalente a la de P. sachicarum, la ausencia de material comparable impide incluir el espécimen en esta especie. Este estudio constituye el primer reporte de restos apendiculares de Platypterygius para el extremo norte de Sudamérica},
author = {Dirley Cortes and María Euridice Paramo Fonseca},
issn = {2145-8553},
journal = {Boletin de Geologia},
keywords =
{Colombia,Forefins,Ichthyosauria,LowerCretaceous,Ophthalmosauridae,Platypterygius},
pages = {15-30},
title = {Restos apendiculares de un ictiosaurio oftalmosáurido del Barremiano inferior de Villa de Leiva, Colombia},
volume = {40},
url = {http://www.scielo.org.co/pdf/boge/v40n1/0120-0283-boge-40-01-00015.pdf},
year = {2018},
}
@article{Paramo-Fonseca1997,
author = {Maria Paramo-Fonseca},
journal = {Comptes Rendus de l'Academie des Sciences Series IIA Earth and Planetary Science},
keywords = {Colombia,Newtaxon,Tselfatioidei,Turonian},
pages = {147-150},
title = {Bachea huilensis nov. gen. nov. sp. the first Tselfatioidei (Teleostei) from Colombia},
volume = {325},

   year = {1997},
}
@article{Paramo1997,
   author = {Maria Paramo-Fonseca},
   journal = {Revista Ingeominas},
   keywords = {xxx},
   pages = {1-12},
   title = {Platypterygius sachicarum (Reptilia, Ichthyosauria) nueva especie del Cretácico de Colombia},
   volume = {6},
   year = {1997},
}
@article{Paramo-Fonseca2001,
   abstract = {Se estudian cinco especímenes de peces de la familia Pachyrhizodontidae, provenientes de capas del Turoniano del Valle Superior del Magdalena, Colombia. Cuatro de estos especímenes son asignados a una nueva especie del género Goulmimichthys: G. gasparinii y el quinto es referido a una nueva especie del género Pachyrhizodus: P. etayoi. Las dos nuevas especies muestran algunas características que difieren de la diagnosis establecida por Forey (1977) para el suborden Pachyrhizodontoidei: en las dos especies colombianas los cinco infraorbitales están libres; en la especie G. gasparinii se observa una osificación entre el dermoetmoides y el premaxilar; en P. etayoi el único centro vertebral visible no lleva orificio notocordal. El estudio del nuevo material colombiano amplía la distribución paleogeográfica de la familia Pachyrhizodontidae en el Turoniano, la cual estaba limitada a la región de Europa y Norte de Africa. Además, confirma la presencia de esta familia en capas del Cretácico Superior en Suramérica},
   author = {Maria Paramo-Fonseca},
   journal = {Boletín de Geología},
   keywords = {xxx},
   pages = {47-83},
   title = {Los peces de la familia Pachyrhizodontidae (Teleostei) del Turoniano del valle superior del Magdalena, Colombia, dos nuevas especies},
   volume = {39},
   year = {2001},
}
@article{Paramo-Fonseca2013,
   abstract = {En este artículo se da a conocer un nuevo mosasaurio hallado en Colombia. El fósil fue extraído de capas del Campaniano, al norte de la población de Coello, departamento del Tolima. Se trata de un esqueleto casi completo y articulado, en cuyas cavidades se preservaron restos de tejidos blandos. Se ha determinado como una nueva especie del género Eonatator, E. coellensis, con base en la sistemática propuesta en 2005 por Bardet y otros. La anatomía de la parte anterior del cráneo, así como la morfología y las inter-relaciones de los huesos de la cintura pélvica y de los miembros, constituyen un nuevo aporte a la definición del género. El espécimen colombiano representa el mosasaurio halisaurino más completo conocido hasta ahora en el mundo y ofrece posibles evidencias de gestación interna en los mosasaurios.},
   author = {Maria Paramo-Fonseca},
   issn = {0370-3908},

   journal = {Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales},
   keywords = {Campanian,Colombia,Eonatator,Mosasauridae},
   pages = {499-518},
   title = {Eonatator coellensis nov. sp.(Squamata: Mosasauridae), a new species from the Upper Cretaceous of Colombia},
   volume = {37},
   year = {2013},
}
@article{Paramo-Fonseca2000,
   abstract = {New remains of Yaguarasaurus columbianus found in the Turonian beds of the upper valley of the Magdalena River, in Colombia, are described. Three aspects of the cranial morphology of Y. columbianus are of particular interest. First, its morphology is one of the most primitive among mosasaurs; second, it exhibits most similarities to the cranial morphology of the aigialosaurs; and finally, it exhibits some traits that are unknown in other mosasaurs, including certain cranial features that resemble those of the terrestrial varanoids.},
   author = {Maria Paramo-Fonseca},
   issn = {0891-2963},
   journal = {Historical Biology},
   keywords = {Colombia,Cretaceous,Mosasauridae,Turonian,Yaguarasaurus},
   pages = {121-131},
   title = {Yaguarasaurus columbianus (Reptilia, Mosasauridae), a primitive mosasaur from the Turonian (Upper Cretaceous) of Colombia},
   volume = {14},
   url = {https://www.tandfonline.com/doi/abs/10.1080/10292380009380560},
   year = {2000},
}
@article{GonzalezMichaels2002,
   abstract = {El análisis palinológico de los 6 m superiores de un perfil turboso de la sección V del Valle de Tenjo, permitió evidenciar periodos fríos dominados por vegetación de páramo (pajonales y matorrales) con especies de Poaceae, Asteraceae, Ericaceae e Hypericum, y periodos cálidos dominados por bosques de la región andina y de la franja altoandina con especies de Weinmannia y Melastomataceae que fueron sustituidos durante algunos periodos por bosques con especies de Myrica. En la base de las laderas se establecieron bosques con especies de Podocarpus que paulatinamente fueron sustituidos por bosques dominados por especies de Ilex, Panopsis, Miconia y Xylosma. En las partes planas se encontraban los bosques de Alnus acuminata (vegetación local), que en algunos periodos climáticos muy húmedos disminuyeron su área de distribución con lo cual se favoreció el avance de otros elementos de la vegetación de pantano. En la sección analizada están representados los eventos acaecidos entre 40.000 y 21.000 años A.P., correspondientes a la parte media y superior del Pleniglacial, con los estadiales de Faca (36.000 - 33.500 años A.P.) y Güicán (28.000 - 24.000 años A.P.) y los interestadiales de Tenjo (39.000 - 36.000 años A.P.), Santuario (33.500 - 28.000 años A.P.) y Saravita (24.000 - 21.000 años A.P.).},
   author = {Natalia Gonzalez Michaels and Luz Angela Forero Trujillo and J Orlando Rangel-Ch.},
   journal = {Caldasia},

   keywords =
{ClimateandVegetationChange,MiddleandUpperPleniglacial,Palaeoecology,Vall
edeTenjo.},
   pages = {15-32},
   title = {Cambios en la vegetación y el clima durante el pleniglacial
medio y superior en el valle de Tenjo (Cundinamarca, Colombia)},
   volume = {24},
   year = {2002},
}
@article{MonjeDussan2016,
   abstract = {En este trabajo se describen nuevos registros de la
macroflora del Cretácico Inferior (Aptiano-Albiano) de Colombia. El
material estudiado fue colectado en la Cuenca del Valle Superior del
Magdalena en tres localidades del departamento del Tolima, en las
formaciones Yaví y Caballos. Los restos fósiles comprenden especímenes de
filicopsidas y coníferas. Entre los helechos se encuentra la familia
Marsileaceae, un grupo importante identificado en la flora fósil ya que
se propone como el primer registro de un helecho acuático para el
Cretácico Inferior en Colombia. Adicionalmente, abundantes restos de
frondes estériles al menos bipinnadas con pínulas lanceoladas y venación
pecopteridea son asignadas al morfogénero Cladophlebis sp. Las coníferas
por su parte, presentan estructuras vegetativas asociadas a estructuras
reproductivas. Los ejes con hojas más frecuentes fueron asignados al
morfogénero Brachyphyllum sp. mientras que las escamas ovulíferas
aisladas poseen características morfológicas de tipo Araucarites sp.
(Araucariaceae). En conjunto, estos hallazgos constituyen un punto clave
para entender la biogeografía y evolución de estos grupos y así mismo
contribuyen a ampliar el conocimiento de la flora del Cretácico en
Colombia.},
   author = {Camila Monje Dussán and Camila Martínez and Ignacio Escapa
and Santiago Madriñán},
   issn = {0120-0283},
   journal = {Boletin de Geologia},
   keywords =
{Colombia,Cretaceous,Gymnospermophyta,Pteridophytes,UpperMagdalenaValley}
,
   pages = {29-42},
   title = {Nuevos registros de helechos y coníferas del Cretácico
Inferior en la cuenca del Valle Superior del Magdalena, Colombia},
   volume = {38},
   url =
{http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0120-
02832016000400002&lng=en&nrm=iso&tlng=es},
   year = {2016},
}