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**BEST-PRESERVED LARGE DINOSAUR SKELETON FROM JAPAN IDENTIFIED  
AS NEW HADROSAURID GENUS AND SPECIES**

***Remarkable for the near completeness of the skeleton, *Kamuysaurus japonicus* reinforces the idea of a land bridge connection between Asia and North America during the day of the dinosaur***

**HOKKAIDO, JAPAN (Sept. 5, 2019)** – What is considered the best preserved and most complete large dinosaur skeleton from Japan has been identified as a new genus and species named *Kamuysaurus japonicus*. Found near Hokkaido, Japan, the discovery reinforces the idea of a land bridge connection between Asia and North America during the day of the dinosaur.

The scientific paper describing the find – titled “A new hadrosaurid dinosaur from Japan: *Kamuysaurus japonicus* and implication for origin of Hadrosauridae” – has been published in *Scientific Reports*, an online open access scientific mega journal published by the Nature Publishing Group, covering all areas of the natural sciences. The author of the report is Yoshitsugu Kobayashi, Ph.D. of the Hokkaido University Museum who led an international team of co-authors, including Anthony Fiorillo, Ph.D., Perot Museum of Nature and Science.

To read the entire manuscript and view renderings, go to [nature.com/articles/s41598-019-48607-1](https://www.nature.com/articles/s41598-019-48607-1).

“It’s rare and pretty astonishing to find an almost complete skeleton, and there is no doubt that this is the best preserved large dinosaur skeleton from Japan,” said Kobayashi.

Anatomical comparisons and phylogenetic analysis revealed that *Kamuysaurus japonicus* is a hadrosaurid dinosaur. The genus name “Kamuy” refers to a mythological deity of the Ainu, an indigenous people of Hokkaido Island of Japan. The phylogenetic analysis reveals that *Kamuysaurus* belonged to the tribe Edmontosaurini of the subfamily Hadrosaurinae of the family Hadrosauridae and that it is closely related to *Kerberosaurus* from Russia and *Laiyangosaurus* from China.

Histological study demonstrates *Kamuysaurus* to be at least 9 years old at the time of death with a body length of approximately 8 meters and body mass of 4-5.3 tons. One of the cranial bones of *Kamuysaurus* – the frontal – bears a large contact surface with the nasal, suggesting the possible presence of a bony cranial crest. The crest, if present, is likely to be thin and flat like the one in juvenile *Brachylophosaurus* known from North America.

The scientists’ analysis also demonstrates that the common ancestors of Edmontosaurini, including *Kamuysaurus*, are found widely in both Asia and North America through modern Alaska, and the group of *Kamuysaurus*, vicariated in the Far East during the Campanian and evolved independently from North America. The discovery of *Kamuysaurus* from marine deposit and the ancestral state reconstruction analyses indicate that inhabitation in coastal environments had an important role in the early evolutionary history of hadrosaurids.

“This discovery is not only significant for the people of Hokkaido and all of Japan, but it has global significance because this dinosaur shows us how the world has been connected through the history of the Earth,” said Dr. Anthony Fiorillo, chief curator and vice president of research and collections for the Perot Museum of Nature and Science in Dallas, Texas. “*Kamuysaurus* is closely related to the animal we study from Alaska, *Edmontosaurus*, a duck-billed dinosaur that is also found throughout much of western North America. Because these dinosaurs are so closely related, they provide further evidence that long ago, Asia and North America were connected.”

The initial discovery of the fossils came in April 2003 when a local resident unearthed them in the Upper Cretaceous Hakobuchi Formation near Hokkaido, Japan. The vertebrae were initially considered to belong to a marine reptile plesiosaur, but were later identified as a dinosaur by Dr. Tamaki Sato (Tokyo Gakugei

University) in 2011 and brought to Dr. Kobayashi. The original discovery contained 13 articulated caudal vertebrae.

Joint expeditions held in the summers of 2013 and 2014 were launched to find the remaining parts of the dinosaur. In 2013, while exploring the same hill where the original fossils were found, the paleontologists found multiple skeletal elements including isolated teeth. During the excavation in 2014, a part of cranial element, maxilla, was discovered; thus, the dinosaur was considered to be a nearly complete skeleton.

Preparation of the dinosaur took nearly 10 years with the help of a large number of volunteers. Although multiple miscellaneous bones remain to be identified, the prepared fossils clearly demonstrate that this is a nearly complete skeleton including multiple cranial elements, nearly complete series of vertebrae, and nearly complete fore- and hind-limbs.

In order to infer the relationship between *Kamuysaurus* and other dinosaurs, phylogenetic analysis was conducted through comparing 350 morphological characters with 70 other hadrosauroids. The analysis demonstrated that *Kamuysaurus* belongs to Edmontosaurini, a sub-group of Hadrosauridae.

In determining the phylogenetic position, it was found that *Kamuysaurus* possesses three diagnostic characters that are absent in any other hadrosaurid dinosaurs, as well as a unique combination of 13 morphological characters, therefore identified as a new genus and species. The three diagnostic characters are: (1) quadratojugal notch of the jugal positioned significantly lower than in other hadrosaurids, (2) short ascending process of the surangular, and (3) anteriorly inclined neural spines of the 6<sup>th</sup> to 13<sup>th</sup> dorsal vertebrae.

Regarding the paleobiogeographical significance, Dispersal Extinction Cladogenesis analysis provides information on origins and migratory pass of hadrosaurines. The group Hadrosaurinae and the subgroup Saurolophini have their origins in North America, the subgroup Kritosaurini originated either in North America or both North and South America, and Brachylophosaurini originated either in North America or both Asia and North America. The most recent common ancestor of Edmontosaurini, the group including *Kamuysaurus*, is inferred to have inhabited throughout both Asia and North America through today's Alaska. By the early Campanian, vicariance of Edmontosaurini occurred and *Kamuysaurus*, *Laiyangosaurus*, and *Kerberosaurus* evolved in the Far East, independently from North America.

Hadrosaurines are known to be discovered from marine deposits more frequently than lambeosaurines, another subgroup of Hadrosauridae. Among the taxa analyzed in the present phylogenetic analysis, three taxa are discovered from marine sediments (*Kamuysaurus*, *Hadrosaurus*, and *Lophorothon*). Ancestral State Reconstruction analysis of habitat environment suggest that the most recent common ancestors of Hadrosauridae, and successive clades preferred living in a marginal environment close to the ocean. The result might indicate that adaptations to marginal environments have important influences on the early evolution of Hadrosauridae.

***About the Perot Museum of Nature and Science.*** *The top cultural attraction in Dallas/Fort Worth and a Michelin Green Guide three-star destination, the Perot Museum of Nature and Science is a nonprofit educational organization located in the heart of Dallas, Texas. With a mission to inspire minds through nature and science, the Perot Museum delivers exciting, engaging and innovative visitor and outreach experiences through its education, exhibition, and research and collections programming for children, students, teachers, families and life-long learners. The 180,000-square-foot facility in Victory Park opened in December 2012 and is now recognized as the symbolic gateway to the Dallas Arts District. Future scientists, mathematicians and engineers will find inspiration and enlightenment through 11 permanent exhibit halls on five floors of public space; a children's museum; a state-of-the art traveling exhibition hall; and The Hoglund Foundation Theater. Designed by 2005 Pritzker Architecture Prize Laureate Thom Mayne and his firm Morphosis Architects, the museum has been lauded for its artistry and sustainability. To learn more, please visit [perotmuseum.org](http://perotmuseum.org).*

***About Hokkaido University.*** *Hokkaido University is home to some 4 million specimens and documents that have been gathered, preserved and studied since the Sapporo Agricultural College began more than 130 years ago. Amongst these are more than 10,000 precious "type specimens" that form the basis for the discovery and certification of new species. Opened in the spring of 1999, the Hokkaido University Museum conveys the diverse range of research carried out at Hokkaido University while also using various original materials and visual media to introduce the university's cutting-edge research.*