A Systematic Review of the Generic Separation of *Giraffatitan brancai* from *Brachiosaurus altithorax*: History, Anatomy, and Taxonomy

1. Introduction

The taxonomic history of the Sauropoda—the clade of long-necked, distinctively gigantic herbivorous dinosaurs—is replete with revisions, synonymies, and re-evaluations. However, few cases illustrate the evolution of paleontological methodology as clearly as the divergence of the genus *Giraffatitan* from *Brachiosaurus*. For nearly a century, the colossal sauropod fossils excavated from the Tendaguru Formation in Tanzania were universally recognized as *Brachiosaurus brancai*, an African species of the genus originally described from the Morrison Formation of North America. This classification, established by Werner Janensch in 1914, created a trans-continental generic identity that influenced decades of biogeographical and anatomical theory.

The dissolution of this taxonomic union was not a singular event but a protracted process spanning three distinct phases of scientific inquiry: the initial morphological skepticism of the "Dinosaur Renaissance" in the late 1980s, the nomenclatural formalism of the early 1990s, and the rigorous cladistic verification of the 21st century. The specific query—"Who reassigned the species *Brachiosaurus brancai* to its own genus, and when?"—requires a tripartite answer involving **Gregory S. Paul (1988)**, who first identified the subgeneric distinction; **George Olshevsky (1991)**, who formalized the generic elevation; and **Michael P. Taylor (2009)**, whose comprehensive osteological analysis cemented the separation in the scientific consensus.

This report provides an exhaustive analysis of this taxonomic transition. It examines the historical context of the original discoveries, the specific anatomical characters that drove the separation, the resistance the proposal faced from prominent researchers, and the broader implications of recognizing *Giraffatitan* as a distinct biological entity. By synthesizing data from historical monographs, obscure taxonomic checklists, and modern phylogenetic studies, we elucidate how *Giraffatitan brancai* emerged from the shadow of *Brachiosaurus* to reclaim its identity as the "titanic giraffe" of the Late Jurassic.

2. The Foundation: *Brachiosaurus altithorax* (1903)

To understand the separation, one must first understand the anchor point: the genus *Brachiosaurus*. In 1900, Elmer S. Riggs of the Field Columbian Museum (now the Field Museum of Natural History) led an expedition to the Grand River Valley of western Colorado. There, in the rocks of the Morrison Formation, his team uncovered the partial skeleton of a sauropod that defied the then-prevailing norms of dinosaur anatomy.

Unlike the familiar *Apatosaurus* (then *Brontosaurus*) or *Diplodocus*, which possessed relatively short forelimbs and low-slung shoulders, Riggs' specimen displayed an immense humerus and a dorsal column that sloped upward from the hips to the neck. Recognizing this unique

architecture, Riggs formally described the specimen in 1903 as *Brachiosaurus altithorax*—the "arm lizard with the deep chest".
However, the holotype material for *B. altithorax* was, and remains, relatively fragmentary. It consists of the last seven dorsal vertebrae, the sacrum, the first two caudal vertebrae, a coracoid, the humerus, the ilium, and the femur. Crucially, it lacked a skull and the cervical series (neck vertebrae). This fragmentary nature created a "morphological vacuum." When fuller material was later discovered in Africa, it was easy to graft the African data onto the American name, assuming that the missing parts of *B. altithorax* would resemble the new finds. This assumption would hold for eighty years, obscuring significant anatomical divergences.

3. The African Giant: Discovery and Initial Classification (1909–1914)

3.1. The Tendaguru Expeditions

Between 1909 and 1913, the Museum für Naturkunde in Berlin launched one of the most ambitious paleontological enterprises in history: the German Tendaguru Expeditions. Located in what was then German East Africa (modern-day Tanzania), the Tendaguru Formation yielded a quantity of dinosaur biomass that dwarfed the American Morrison finds.
Among the tons of excavated material were the remains of a brachiosaurid far more complete than Riggs' Colorado specimen. The material included multiple partial skeletons, limb bones, and, critically, cranial material. The task of describing this abundance fell to Werner Janensch, a meticulous comparative anatomist.

3.2. Janensch's Classification (1914)

In 1914, Janensch published his description of the primary sauropod taxon from the site. He noted striking similarities with Riggs' *Brachiosaurus altithorax*: the elongation of the humerus, the high dorsal neural spines, and the general gigantism. Based on these shared derived characters (synapomorphies), Janensch confidently assigned the African material to the genus *Brachiosaurus*, creating the new species *Brachiosaurus brancai* (honoring Wilhelm von Branca, the director of the Berlin museum).
Janensch was not blind to differences. He noted variation in the proportions of the vertebrae and ribs. However, the taxonomic philosophy of the early 20th century was largely phenetic—grouping animals by overall similarity—and the geographic distance between Colorado and Tanzania was not seen as a barrier to generic unity. The concept of plate tectonics and the separation of Laurasia and Gondwana was decades away from acceptance; thus, the presence of the same genus on two continents was viewed as a curiosity rather than a biogeographical impossibility.
For the remainder of the 20th century, *Brachiosaurus brancai* effectively *became Brachiosaurus* in the scientific and popular consciousness. The famous composite skeleton mounted in Berlin—composed primarily of "Skeleton S" and "Skeleton S II"—was the world's reference point for the genus. When researchers discussed *Brachiosaurus* biology, physiology, or feeding mechanics, they were almost invariably analyzing data derived from the African *B. brancai*, assuming it applied equally to the American *B. altithorax*.

4. The Instigator of Divergence: Gregory S. Paul (1988)

The first significant fracture in this taxonomic monolith occurred during the "Dinosaur Renaissance" of the 1970s and 1980s. This period was characterized by a shift from viewing dinosaurs as sluggish, swamp-dwelling reptiles to active, dynamic endotherms. This shift necessitated a rigorous re-examination of functional morphology, led by researchers like Robert Bakker and the freelance researcher and paleo-artist Gregory S. Paul.

4.1. The *Hunteria* Analysis

In 1988, Paul published a monograph in the journal *Hunteria* titled "The Brachiosaur Giants of the Morrison and Tendaguru with a Description of a New Subgenus, Giraffatitan". Paul's work was unique in its heavy reliance on skeletal restorations—precise, multi-view drawings of the skeletal elements corrected for distortion. This artistic-anatomical approach allowed Paul to visualize differences in proportion that were obscured in tables of raw measurements.
In his comparison of *B. altithorax* and *B. brancai*, Paul identified a suite of differences that he argued exceeded the variation expected within a single genus. He noted that the African form was distinctly more gracile—"giraffe-like"—compared to the robust, heavy-chested American form. Specifically, he highlighted:

- **Vertebral Proportions:** The trunk vertebrae of the African species were relatively uniform in length, whereas the American species showed extreme variation in centrum length along the dorsal column.
- **Torso Shape:** The ribs of *B. altithorax* were longer relative to the limb bones, indicating a deeper, wider torso. *B. brancai*, by contrast, had a shallower, more compressed torso.
- **Mass Distribution:** Paul's volumetric estimates suggested that despite being similar in height, *B. altithorax* was significantly heavier. He estimated the Berlin specimen (*B. brancai*) at roughly 31.5 metric tonnes, revising earlier estimates that placed it over 50 tonnes.

4.2. The Proposal of a Subgenus

Despite these divergences, Paul did not immediately sever the link. Adhering to a philosophy that emphasized the close evolutionary relationship between the two taxa, he proposed retaining them within the genus *Brachiosaurus* but separating them at the subgeneric level.

- The American form became *Brachiosaurus (Brachiosaurus) altithorax*.
- The African form became *Brachiosaurus (Giraffatitan) brancai*.

The etymology of *Giraffatitan*—"Titanic Giraffe"—was Paul's invention, intended to capture the gracile, high-browsing nature of the African species. While this established the name and the morphological argument, the taxonomic rank remained subordinate. In the strict codes of zoological nomenclature, *Giraffatitan* was available but was not yet functioning as a distinct genus in the literature.

5. The Taxonomic Act: George Olshevsky (1991)

The elevation of *Giraffatitan* to full generic status—the answer to the "Who" of the user's query—occurred three years later in a publication that sat outside the mainstream academic

journal system.

5.1. *Mesozoic Meanderings #2*

George Olshevsky, a mathematician and independent researcher based in San Diego, was a prolific cataloger of dinosaur nomenclature. In 1991, he self-published a massive revision of archosaur taxonomy titled "A Revision of the Parainfraclass Archosauria Cope, 1869, Excluding the Advanced Crocodylia," released as issue #2 of his series *Mesozoic Meanderings*. Olshevsky's work was essentially a checklist and reclassification of every known archosaur. In this volume, he reviewed Paul's 1988 arguments and concluded that the morphological distance described was sufficient for full generic separation. Olshevsky formally treated *Giraffatitan* as a genus, creating the new combination ***Giraffatitan brancai***.

5.2. The "Grey Literature" Problem

Because *Mesozoic Meanderings* was self-published and not widely distributed to university libraries, Olshevsky's revision did not immediately trigger a shift in consensus. While the name *Giraffatitan* entered the technical databases (such as the Paleobiology Database), the wider paleontological community continued to use *Brachiosaurus brancai* throughout the 1990s and 2000s. This period is characterized as a "soft synonymy," where the name existed but was largely ignored or treated as a junior synonym of *Brachiosaurus* by major workers in the field. It is crucial to credit Olshevsky with the specific *act* of generic reassignment, but it is equally important to recognize that without subsequent validation, this act might have remained a nomenclatural footnote.

6. The Scientific Validation: Michael P. Taylor (2009)

The definitive turning point—the moment when *Giraffatitan* transitioned from a controversial proposal to an accepted scientific reality—occurred in 2009. Michael P. Taylor, a researcher at the University of Portsmouth, published a landmark paper in the *Journal of Vertebrate Paleontology* titled **"A Re-evaluation of *Brachiosaurus altithorax* Riggs 1903 (Dinosauria, Sauropoda) and Its Generic Separation from *Giraffatitan brancai* (Janensch 1914)"**.

6.1. Methodology: The Bone-by-Bone Review

Taylor's study was the first comprehensive, peer-reviewed osteological comparison of the two taxa since Janensch's work in 1914. Taylor visited the Field Museum to examine the holotype of *B. altithorax* and the Museum für Naturkunde to examine the *B. brancai* material. He identified 26 distinct osteological characters (autapomorphies and differential diagnoses) that separated the two.

6.2. Key Osteological Divergences

The report detailed significant anatomical differences that could not be attributed to individual variation or sexual dimorphism:

6.2.1. The Dorsal Column

The most compelling evidence lay in the dorsal vertebrae. Taylor confirmed Paul's earlier observation:

- In *B. altithorax*, the dorsal centra are elongated, resulting in a longer trunk. The ratio of the centrum length to height varied significantly along the column.
- In *G. brancai*, the dorsal centra are shorter and relatively uniform in length. Furthermore, the neural spines of *G. brancai* are inclined posteriorly (swept back) at a distinct angle, whereas those of *B. altithorax* are nearly vertical. This has significant implications for the attachment of the epaxial muscles and the mechanics of the back.

6.2.2. The Caudal Series (Tail)

Taylor's analysis of the tail vertebrae revealed a major structural difference. The anterior caudal vertebrae of *G. brancai* are highly pneumatic (filled with air sacs) and possessed broad lateral fossae. In contrast, the caudals of *B. altithorax* lack this degree of pneumaticity and are proportioned differently. Taylor concluded that *Brachiosaurus* likely had a shorter, taller tail compared to the longer, more tapered tail of *Giraffatitan*.

6.2.3. Limb Proportions

While both animals were long-armed, the proportions differed. The humerus of *B. altithorax* is more robust (wider relative to its length) than the gracile humerus of *G. brancai*. Additionally, the femur of *B. altithorax* is slightly flattened anteroposteriorly, whereas *G. brancai* has a more elliptical femoral cross-section.

6.3. Cladistic Analysis and Monophyly

Taylor performed a phylogenetic analysis treating *B. altithorax* and *G. brancai* as separate Operational Taxonomic Units (OTUs). The analysis recovered them as sister taxa—meaning they are each other's closest relatives. However, Taylor argued that "sister taxa" does not necessitate "same genus." He pointed out that *Deinonychus* and *Velociraptor* are often sister taxa but are universally recognized as distinct genera due to their morphological differences. To lump *Giraffatitan* back into *Brachiosaurus* would require a definition of *Brachiosaurus* so broad that it might overlap with other distinct brachiosaurids like *Sauroposeidon*. Therefore, to maintain a precise and useful taxonomy, the separation was necessary.
Taylor explicitly stated: "The genus name *Giraffatitan* Paul 1988 must be used for 'Brachiosaurus' brancai". This statement served as the formal academic endorsement of Olshevsky's 1991 proposal.

7. The Resistance: Daniel Chure and *Abydosaurus* (2010)

Scientific consensus is rarely instantaneous. The re-establishment of *Giraffatitan* faced immediate pushback from prominent sauropod researchers. In 2010, **Daniel Chure**, alongside Brooks Britt, John Whitlock, and Jeffrey Wilson, published the description of a new

brachiosaurid from Utah named *Abydosaurus mcintoshi*.

7.1. The Argument Against "Taxonomic Inflation"

In the discussion section of the *Abydosaurus* paper, Chure et al. addressed Taylor's 2009 reclassification. They acknowledged the differences Taylor had highlighted but argued that they were insufficient to justify a generic split. Their primary concern was **taxonomic inflation**—the tendency to erect new names for every minor variation, which can obscure true evolutionary relationships. They argued that the differences between the American and African forms could be interpreted as species-level variation within a single, widespread genus, similar to how the modern genus *Panthera* includes lions, tigers, and leopards.
Chure noted that while the humerus was different, the femur proportions were statistically similar. He also pointed out that the *Brachiosaurus* holotype might be an immature individual (indicated by unfused coracoids), suggesting that some of the differences could be ontogenetic (growth-related) rather than taxonomic.

7.2. The "Lumper" Philosophy

This resistance stemmed from a "lumping" philosophy that prioritizes the stability of names. Since *Brachiosaurus brancai* had been used for nearly a century, Chure et al. felt that the burden of proof for changing it should be exceedingly high. They formally rejected the name *Giraffatitan* in their 2010 publication, continuing to refer to the Tendaguru material as *Brachiosaurus brancai*.

8. Phylogenetic Consensus: D'Emic and the Titanosauriformes (2012–Present)

The conflict between Taylor's "splitter" view and Chure's "lumper" view required resolution through broader phylogenetic studies. This resolution arrived with the comprehensive work of **Michael D'Emic** in 2012.

8.1. The D'Emic Topology (2012)

In his monograph "The Early Evolution of Titanosauriform Sauropod Dinosaurs," D'Emic conducted a massive cladistic analysis of the entire Titanosauriform clade. Crucially, his analysis included not just *Brachiosaurus* and *Giraffatitan*, but also newly described taxa like *Abydosaurus*, *Cedarosaurus*, *Venenosaurus*, and *Lusotitan*.
The results were decisive. D'Emic's cladograms consistently recovered a topology where *Giraffatitan* was indeed distinct from *Brachiosaurus*. More importantly, the analysis showed that *Brachiosaurus altithorax* was likely part of a North American lineage that included *Abydosaurus* and *Cedarosaurus*, while *Giraffatitan* represented a distinct African lineage. If *Brachiosaurus* and *Giraffatitan* were kept in the same genus, the genus would become **paraphyletic** unless it also included *Abydosaurus* and *Cedarosaurus*—a move that would require renaming those distinct animals as species of *Brachiosaurus*.

8.2. Mannion et al. (2013)

Subsequent analyses by Philip Mannion and colleagues focused on the Titanosaurs of Tendaguru provided further support. They found that the osteological features of *Giraffatitan* (such as the pneumaticity of the ribs and the structure of the hyposphene-hypantrum complex) were distinct enough to warrant generic separation. From 2012 onward, the majority of sauropod researchers adopted *Giraffatitan*, and it is now the standard nomenclature in academic literature.

9. Comprehensive Comparative Osteology

The following table synthesizes the specific anatomical characters that distinguish *Brachiosaurus altithorax* from *Giraffatitan brancai*, drawing from the work of Taylor (2009) and D'Emic (2012).

Anatomical Feature	*Brachiosaurus altithorax* (USA)	*Giraffatitan brancai* (Tanzania)	Functional/Taxonomic Implication
Dorsal Vertebrae Length	Elongate centra; ratio of length to height is high.	Short, compact centra; ratio of length to height is low.	*B. altithorax* had a longer, more flexible back.
Dorsal Variation	Length varies significantly along the column.	Length is relatively uniform along the column.	Suggests different developmental patterns.
Neural Spines	Oriented vertically; rod-like.	Inclined posteriorly (swept back); triangular articular surfaces.	*Giraffatitan* had different neck-supporting musculature.
Anterior Caudal Vertebrae	Solid internal structure (lack pneumaticity).	Highly pneumatic (filled with air sacs).	*Giraffatitan* had a lighter tail structure.
Tail Proportions	Shorter, taller tail; approximately 20-25% shorter than *G. brancai*.	Long, tapering tail.	*Giraffatitan* had a more "diplodocid-like" balance.
Dorsal Ribs	Longer relative to humerus length.	Shorter relative to humerus length.	*B. altithorax* had a deeper, barrel-shaped chest.
Humerus	Robust; broad proximal and distal ends.	Gracile; slender shaft.	Indicates different weight-bearing capacities.
Ilium (Hip)	Pubic peduncle is massive and broad.	Pubic peduncle is more slender.	Differences in the pelvic girdle structure.
Cranial Crest	(Skull unknown; inferred from relatives).	High, arched nasal crest above the eyes.	The "classic" Brachiosaur look belongs to *Giraffatitan*.

9.1. The Skull of "Brachiosaurus"

One of the most persistent confusions involves the skull. The iconic high-crested skull associated with *Brachiosaurus* in textbooks and movies is, in fact, the skull of *Giraffatitan*. No complete skull of *Brachiosaurus altithorax* has ever been found. Reconstructions of *B. altithorax* often rely on the *Giraffatitan* skull, but recent discoveries of *Abydosaurus* (a close relative of *Brachiosaurus*) suggest that the American forms might have had slightly less exaggerated

crests and longer muzzles. This means that for 80 years, the public perception of *Brachiosaurus* was based on the head of a different genus.

10. Biogeographical and Evolutionary Implications

The reassignment of *B. brancai* to *Giraffatitan* has profound second-order implications for our understanding of the Jurassic world.

10.1. The Breakup of Gondwana and Laurasia

The presence of a single genus (*Brachiosaurus*) in both North America and Africa was often used as evidence for a persistent land connection between Laurasia (the northern supercontinent) and Gondwana (the southern supercontinent) well into the Late Jurassic. However, the separation of the genera suggests that while the two landmasses were connected in the past (allowing the common ancestor to spread), they had been isolated long enough for significant divergence to occur. The "Brachiosaurid" populations in America and Africa were evolving independently, adapting to local flora and climates.

10.2. Niche Partitioning and Ecology

The morphological differences—specifically the robust, deep-chested build of *Brachiosaurus* versus the gracile, high-browsing build of *Giraffatitan*—suggest distinct ecological niches.

- **Giraffatitan:** With its gracile limbs and potentially higher vertical reach, it was likely a specialized high-browser, feeding on the canopy of conifers and araucaria trees in the semi-arid Tendaguru environment.
- **Brachiosaurus:** With a longer torso and heavier build, it may have been a "generalist" browser, capable of processing larger volumes of coarser vegetation in the seasonal Morrison floodplains.

11. Conclusion

The answer to the query "Who reassigned the species *Brachiosaurus brancai* to its own genus, and when?" is a narrative of scientific progression.

1. **Gregory S. Paul (1988)** provided the **concept** and the **name**, proposing *Giraffatitan* as a subgenus based on volumetric and proportional differences.
2. **George Olshevsky (1991)** performed the **taxonomic act**, elevating *Giraffatitan* to full generic rank in his *Mesozoic Meanderings* revision.
3. **Michael P. Taylor (2009)** provided the **scientific validation**, publishing the peer-reviewed osteological evidence that convinced the academic community to accept the split.

The reassignment was not merely a bureaucratic change of labels. It was a recognition that the "African Brachiosaurus" was a distinct evolutionary masterpiece—a gracile, pneumatic, sky-reaching giant that roamed the coast of ancient Tanzania, separate in time, space, and form from its heavy-set American cousin. Today, when one looks at the mounting in the Berlin Museum, one is not seeing a "Brachiosaurus," but the type specimen of *Giraffatitan brancai*, a name that finally reflects its titanic, giraffe-like majesty.

Source References (Integrated)

- **** Wikipedia: Brachiosaurus (General history and Taylor reference).
- **** Wikipedia: Giraffatitan (Janensch 1914 description).
- Taylor, M.P. (2009): *A Re-Evaluation of Brachiosaurus altithorax...*
- Simple Wikipedia: Giraffatitan (Name meaning). * Plazi.org: *Brachiosaurus altithorax* Riggs 1903.
- **** SciSpace/Wikipedia: Comparative vertebral osteology.
- **** Paul, G.S. (1988): *Hunteria* paper details.
- Olshevsky (1991): *Mesozoic Meanderings* citation.
- **** Taylor (2009): Abstract and specific conclusions.
- Wikipedia: Acceptance history and D'Emic (2012) phylogeny.
- Chure (2010): Rejection arguments and humerus/femur comparison.
- **** D'Emic (2012): Titanosauriform evolution and cladograms.
- Olshevsky (1991): Full bibliographic details.
- **** Janensch history and skeleton composition.
- Chure et al. (2010): *Abydosaurus* paper.

Works cited

1. Brachiosaurus - Wikipedia, https://en.wikipedia.org/wiki/Brachiosaurus
2. Giraffatitan - Wikipedia, https://en.wikipedia.org/wiki/Giraffatitan
3. Late Jurassic North American Brachiosaurids - Gregory S. Paul, http://www.gspauldino.com/CommentBrachio88.pdf
4. Giraffatitan - Simple English Wikipedia, the free encyclopedia, https://simple.wikipedia.org/wiki/Giraffatitan
5. ARTICLE A RE-EVALUATION OF BRACHIOSAURUS ... - Mike Taylor, https://www.miketaylor.org.uk/dino/pubs/taylor2009/Taylor2009-brachiosaurus-and-giraffatitan.pdf
6. Giraffatitan Facts for Kids, https://kids.kiddle.co/Giraffatitan
7. Untitled Document - Paleofile.com, http://www.paleofile.com/Dinosaurs/Sauropoda/Giraffatitan.asp
8. Giraffatitan brancai (Janensch, 1914) - Plazi TreatmentBank, https://tb.plazi.org/GgServer/html/039EB144C619FFCDBE14F8FFFD88950B
9. A ReEvaluation of Brachiosaurus altithorax Riggs 1903 (Dinosauria ..., https://www.researchgate.net/publication/242264129_A_ReEvaluation_of_Brachiosaurus_altithorax_Riggs_1903_Dinosauria_Sauropoda_and_Its_Generic_Separation_from_Giraffatitan_brancai_Janensch_1914
10. Your Brachiosaurus Is Not a Brachiosaurus, https://dinomuseum.ca/2019/05/your-brachiosaurus-is-not-a-brachiosaurus
11. Giraffatitan | Natural History Museum, https://www.nhm.ac.uk/discover/dino-directory/giraffatitan.html
12. Giraffatitan - Prehistoric Wildlife, https://www.prehistoric-wildlife.com/species/giraffatitan/
13. Giraffatitan - Prehistorica Wiki - Fandom, https://prehistorica.fandom.com/wiki/Giraffatitan
14. HUNTERIA - Gregory S. Paul, http://gspauldino.com/HunteriaBrachio.pdf
15. A re-evaluation of Brachiosaurus altithorax Riggs 1903 ... - SciSpace, https://scispace.com/pdf/a-re-evaluation-of-brachiosaurus-altithorax-riggs-1903-50u6udxhvg.pdf

16. A Revision of the Parainfraclass Archosauria Cope, 1869, Excluding ...,
https://www.miketaylor.org.uk/tmp/Olshevsky_1991_A_revision_of_the_parainfraclass_Archosauria_Cope_1869_excluding_the_advanced_Crocodylia.pdf
17. Celebrating dinosaurs: their behaviour, evolution, growth, and ...,
https://cdnsciencepub.com/doi/10.1139/cjes-2022-0131
18. "Brachiosaurus" brancai is not <i ... - Rogue Scholar,
https://rogue-scholar.org/records/5cy23-6j852
19. Mike Taylor : "Just a quick check on how Chat…" - Sauropods.win,
https://sauropods.win/@mike/111935967471427403
20. Brachiosaurus - Scientific Library,
https://www.scientificlib.com/en/Biology/Dinosaur/Brachiosaurus.html
21. Dinosaur - Wikipedia, https://en.wikipedia.org/wiki/Dinosaur
22. Brachiosaurus | Dinosaurpedia Wiki - Fandom,
https://dinosaurpedia.fandom.com/wiki/Brachiosaurus
23. A re-evaluation of Brachiosaurus altithorax Riggs, 1903 (Dinosauria ...,
https://www.researchgate.net/publication/287557112_Erratum_A_re-evaluation_of_Brachiosaurus_altithorax_Riggs_1903_Dinosauria_Sauropoda_and_its_generic_separation_from_Giraffatitan_brancai_Journal_of_Vertebrate_Paleontology_1914
24. A re-evaluation of Brachiosaurus altithorax Riggs 1903 ... - Mike Taylor,
https://www.miketaylor.org.uk/dino/pubs/taylor2009/
25. First complete sauropod dinosaur skull from the Cretaceous of the ...,
https://npshistory.com/publications/dino/n-2010.pdf
26. New dinosaur discovered head first, for a change - ScienceDaily,
https://www.sciencedaily.com/releases/2010/02/100223161829.htm
27. (PDF) First complete sauropod dinosaur skull from the Cretaceous of ...,
https://www.researchgate.net/publication/41548947_First_complete_sauropod_dinosaur_skull_from_the_Cretaceous_of_the_Americas_and_the_evolution_of_sauropod_dentition
28. [PDF] The early evolution of titanosauriform sauropod dinosaurs,
https://www.semanticscholar.org/paper/The-early-evolution-of-titanosauriform-sauropod-D%E2%80%99Emic/9b5104c1feab0e8be7e3b533081e91118739c738
29. Giraffatitan - Jurassic Park Institute Wiki - Fandom,
https://jurassic-park-institute.fandom.com/wiki/Giraffatitan
30. Taxonomic affinities of the putative titanosaurs from the Late ...,
https://discovery.ucl.ac.uk/10068573/1/Mannion_Tendaguru%20titanosaurs%20MS.pdf
31. Brachiosaurus - Prehistoric Wildlife,
https://www.prehistoric-wildlife.com/species/brachiosaurus/