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THE FIRST LIFE RECONSTRUCTIONS OF THE DINOSAURS *STEGOSAURUS* AND *CAMPTOSAURUS*

Las primeras reconstructiones en vida de los dinosaurios Stegosaurus y Camptosaurus

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Abstract. Because of its strange appearance, the Jurassic dinosaur *Stegosaurus* has been depicted in many life reconstructions by various palaeoartists ever since the first skeletal reconstruction was published by O.C. Marsh in 1891. However, even before that, the French illustrator Auguste Jobin produced a life reconstruction of *Stegosaurus* in a Jurassic landscape, showing it as a bipedal animal with the back and tail covered with bony spikes and plates. This reconstruction was first published in the French popular science magazine *Science et Nature* in 1884 and then republished the same year in *Scientific American*. It was then reprinted in French books in 1885 and 1886. Jobin's Jurassic landscape also included a reconstruction of *Camptosaurus* (then known as *Comptonotus*) as a bipedal, long-necked animal. Although Jobin worked under the supervision of the French dinosaur expert Henri Emile Sauvage, his reconstructions necessarily reflected the incomplete information available at the time about these dinosaurs, as well as O.C. Marsh's erroneous early interpretations of *Stegosaurus*. Even after the publication of Marsh's 1891 skeletal reconstruction of *Stegosaurus* as a quadrupedal dinosaur, an 1892 American life reconstruction of a stegosaur still showed it in a bipedal stance.

Keywords. Dinosauria, *Stegosaurus*, *Camptosaurus*, reconstruction, Marsh, Jobin, Sauvage.

Resumen. Debido a su extraña apariencia, el dinosaurio Jurásico *Stegosaurus* ha sido representado en muchas reconstrucciones en vida por varios paleoartistas desde que la primera reconstrucción esquelética que fue publicada por O. C. Marsh en 1891. Sin embargo, incluso antes de eso, el ilustrador francés Auguste Jobin produjo una reconstrucción en vida de *Stegosaurus* en un paisaje Jurásico, mostrándolo como un animal bípedo con la espalda y cola cubiertas con espinas y placas óseas. Esta reconstrucción se publicó por primera vez en la revista científica popular francesa *Science et Nature* en 1884 y luego se volvió a publicar el mismo año en *Scientific American*. Luego se reimprimió en libros franceses en 1885 y 1886. El paisaje Jurásico de Jobin también incluía una reconstrucción de *Camptosaurus* (entonces conocido como *Comptonotus*) como un animal bípedo de cuello largo. Aunque Jobin trabajó bajo la supervisión del experto en dinosaurios francés Henri Emile Sauvage, sus reconstrucciones necesariamente reflejaron la información incompleta disponible en ese momento sobre estos dinosaurios, así como también con las primeras interpretaciones erróneas de O. C. Marsh sobre *Stegosaurus*. Incluso después de la publicación de la reconstrucción esquelética de Marsh de 1891 de *Stegosaurus* como un dinosaurio cuadrúpedo, una reconstrucción de la vida norteamericana de 1892 todavía mostraba al estegosaurio en una postura bípeda.

Palabras clave. Dinosauria, *Stegosaurus*, *Camptosaurus*, reconstrucción, Marsh, Jobin, Sauvage.

INTRODUCTION

Stegosaurus is undoubtedly one of the most famous dinosaurs, largely because of the bony plates and spikes along its neck, back and tail, which gave it a weird appearance. It features in most popular books about dinosaur, and a large number of more or less convincing life reconstructions have been produced by palaeoartists since the late 19th century. Interestingly, the first such reconstruction, published in 1884 as an element of a Late Jurassic landscape and the work of the French artist Auguste Jobin, probably remains the strangest of them all – with the possible exception of Winsor McCay's gliding stegosaur of 1920 (Corbara, 2022). The same lithographic plate includes the first life reconstruction of a second Late Jurassic dinosaur, the ornithopod then known as *Comptonotus* and now called *Camptosaurus*. The present paper discusses these early reconstructions, in what context they were published, and the possible reasons for their unusual features, as well as a somewhat later, largely forgotten unusual reconstruction of *Stegosaurus* by an American artist.

O. C. Marsh and the discovery of *Stegosaurus*

The main episodes in the history of stegosaur discoveries (including that of *Stegosaurus*) were recounted by Maidment (2010). The first remains of a stegosaur, collected by A. Lakes and H.C. Beckwith from Upper Jurassic rocks in Colorado, were briefly described by Marsh (1877), who reported teeth (later shown to belong to a sauropod), vertebrae, limb bones and dermal plates. This material, which was still embedded in a very hard matrix, was not illustrated. Marsh's ideas about the systematic position of the new taxon, which he named *Stegosaurus armatus*, were somewhat unclear, since he thought that its characters pointed to ''affinities with the Dinosaurs, Plesiosaurs and more remotely with the Chelonians'' (Marsh, 1877: 512). He concluded that it belonged to a new order, the Stegosauria. That the available material was not easy to interpret is illustrated by the fact that Marsh thought that the limb bones indicated an aquatic life and that the animal moved mainly by swimming. As more material came to light and was prepared, Marsh gradually changed his mind about the characters and systematic position of *Stegosaurus*, as reflected by his various publications on the topic between 1877 and 1891. By 1879, he had concluded that *Stegosaurus* was indeed a dinosaur, but no figures had yet been published (Marsh, 1879). The first illustrations of *Stegosaurus* specimens, still including the erroneously identified sauropod teeth, were published in 1881, showing an endocranial cast, vertebrae, girdle and limb bones and bony plates (Marsh, 1881). Stegosaurs were interpreted as herbivorous, more or less aquatic in habits, but probably bipedal when on land, because of the great difference in length between the fore- and hindlimbs. In 1882, stegosaur locomotion was still interpreted as ''mainly on hind limbs'' (Marsh, 1882: 83). In 1887, Marsh was finally able to describe and illustrate the skull of *Stegosaurus* and to discuss at greater length its dermal armour (Marsh, 1887). He eventually produced a skeletal recontruction of the animal in 1891, showing *Stegosaurus* as quadrupedal, with a single row of bony plates along the neck, back and anterior portion of the tail, and two pairs of long spikes at the end of the tail (Marsh, 1891). This was to the basis for all the early life reconstructions of that dinosaur, with the exception of the first one, which was published in 1884, seven years before the first skeletal reconstruction. It is worth noting that in 1891,

Figure 1 - Portrait of Henri Emile Sauvage (1842-1917). The first life reconstruction of a stegosaur, by Auguste Jobin, was published in his 1884 paper on dinosaurs in *Science et Nature* , a French popular science magazine.

although he reconstructed *Stegosaurus* as a quadruped, Marsh still considered that the strong hindlimbs and the massive tail could enable the animal to support itself as on a tripod.

Henri Emile Sauvage, Auguste Jobin and the first life reconstruction of *Stegosaurus*

Authors dealing with the history of *Stegosaurus* life reconstructions (Gilmore, 1914; Abel, 1925) have usually assumed that the first such restoration to be published was that by the artist Joseph Smit in Hutchinson's *Extinct Monsters* (Hutchinson, 1893). This reconstruction was clearly based on Marsh's 1891 skeletal reconstruction and shows a single row of bony plates and four pairs of tail spikes; the main difference is that Smit's stegosaur is in a semi-sprawling position, with strongly bent elbows and knees, while in the skeleton figured by Marsh the limbs are in a more upright position.

Smit's reconstruction, however, is not the first reconstruction of *Stegosaurus* as it may have been in life. As early as 1884, a remarkable reconstruction of that dinosaur by the artist Auguste Jobin had been published in a semi-popular paper on dinosaurs by the French scientist Henri Emile Sauvage.

Sauvage's paper was published on 11 October, 1884, in issue n° 46 of the semi-popular science magazine *Science et Nature*, published by J. B. Baillière, a well-known publisher of medical and scientific books with offices in Paris and London. Despite its high-sounding subtitle, *Revue internationale illustrée des progrès de la science et de l'industrie* (''International illustrated magazine on the progress of science and industry''), the magazine was short-lived. The first issue was published on 1st December 1883, but *Science et Nature* ceased publication with its 105th issue of 28th November 1885. This was not unusual with popular science magazines in nineteenth-century France, when many such periodicals were launched to emulate Gaston Tissandier's highly successful *La Nature*, but few lasted for a long time, mainly because of financial problems (Raichvarg and Jacques, 1991).

Henri-Emile Sauvage (1842-1917; Figure 1) was born in Boulogne-sur-mer in northern France (Cépède, 1923; Sauvage, 1924). After medical studies, and service in the medical corps of the French army during the Franco-Prussian war of 1870-1871, he joined the National Museum of Natural History in Paris in 1874 as an assistant-naturalist, working in the department of ichthyology. He soon gained a reputation as an expert on fishes and reptiles, both extant and fossil. In 1884, he took up the po-

sition of curator of the city museums in his native town of Boulogne-sur-mer, which he held until 1916. He also founded a marine laboratory to improve the local fisheries on a scientific basis. He died in 1917. At a time when French vertebrate palaeontologists were mostly interested in fossil mammals, Sauvage worked extensively on dinosaurs, describing material from various parts of France and from Portugal (Buffetaut *et al.*, 1993). He may have been prompted to publish his 1884 semi-popular review paper on dinosaurs in *Science et Nature* by his friend the anthropologist Ernest Hamy, like him a native of Boulogne-sur-mer, who was on the editorial committee of the magazine.

Figure 2 - Reconstruction of a Jurassic landscape in North America, by Auguste Jobin. It shows the dinosaurs *Comptonotus* (misspelled as ''Compsonote'', today known as *Camptosaurus*) on the left and *Stegosaurus* on the right. Two pterodactyls fly overhead. The plants are conifers and cycads. Jobin's signature is visible at the lower left. This engraving was first published in Sauvage's paper on dinosaurs in *Science et Nature* (1884) and republished in *Scientific American* (1884), as well as in books by Sauvage (1885) and Flammarion (1886).

His paper mainly dealt with recent dinosaur discoveries from the United States and Belgium, although the names of various French (Matheron) and British (Owen, Phillips, Huxley, Seeley, Hulke) dinosaur experts were also mentioned. The Belgian finds were the Early Cretaceous *Iguanodon* skeletons from the Bernissart colliery, the discovery of which started in 1878. Sauvage discussed them at some length, quoting the work of Louis Dollo. The American finds were those made by Othniel Charles Marsh and Edward Drinker Cope in the Jurassic and Cretaceous rocks of the western United States. Although Cope's name was mentioned, Sauvage apparently based his review of recent American dinosaur finds mainly on the publications by Marsh (misspelled ''Marsch''). He discussed the dental batteries of various ornithopods, including hadrosaurs, and dealt at some length with the ''strangest beast'' found in the Rocky Mountains, viz. the brontosaur. His description of the stegosaur, with its short forelimbs and remarkable armour of bony plates and spikes, is mainly a comment on the life reconstruction in his figure 3.

The illustrations of Sauvage's paper consist of five figures. Three of them (figures 3, 4 and 5) bear the signature ''A. Jobin''; the others, showing dinosaur teeth, are unsigned. Auguste Michel Jobin was a French scientific illustrator, who produced interesting reconstructions of extinct organisms and ancient landscapes, most of which are now rather forgotten. A more comprehensive study of Jobin and his palaeoart will be published in a separate paper. He was born in Strasbourg, in Alsace (eastern France), in 1834. At an unspecified date, either before or after the annexation of Alsace by the German Empire in 1871 after the Franco-Prussian war, he settled in Paris. In 1874 he obtained a position at the library of the National Museum of Natural History, which he kept until 1900. During that time, he combined his job at the library with the production of scientific artwork. He died in 1903. Jobin's career as a scientific illustrator is not well known, but it is clear that he did not produce only palaeontological reconstructions. The reason why Jobin was chosen to illustrate Sauvage's paper may be that both worked at the National Museum of Natural History in Paris in the late 1870s and early 1880s, where they may have met. Figures 1 and 2 show teeth of *Megalosaurus* and *Iguanodon*, and whether they are Jobin's work is uncertain, since they are unsigned. Figures 4 and 5 are skeletal reconstructions, with the outline of the body added, of a brontosaur and an *Iguanodon*, respectively, and are clearly based on figures by Marsh and Dollo. Figure 3 is much more elaborate, being a reconstruction of a ''terrestrial landscape'' of the Jurassic epoch in America (Figure 2).

An analysis of the reconstruction

According to the caption, the reconstruction by Jobin of the Jurassic landscape features reptiles (stegosaur, ''compsonote'', and pterodactyls) and plants (conifers and cycads). Jobin's signature can clearly be read in the lower part of the engraving, on the left side. The name ''Vermorgken'' is visible in the lower right-hand corner and is that of the engraver who prepared the lithograph from Jobin's drawing. As usual in the latter's work, the plants are depicted in some detail. Two *Perodactylus*-like pterosaurs fly overhead.

Two dinosaurs are depicted. The one on the left, slightly in the background, is identified in the caption as ''compsonote''. This name has never been applied to a dinosaur, and it is in all likelihood a misspelling for *Comptonotus*, probably involving a confusion with *Compsognathus*, a small dinosaur from the Late Jurassic of Bavaria. The

''compsonote'' is mentioned in Sauvage's text as coming from the Upper Jurassic of the United States and as having forelimbs much less developed than its hindlimbs. The generic name *Comptonotus* was erected by Marsh in 1879 for teeth and postcranial elements from the Upper Jurassic ''*Atlantosaurus* beds''. Marsh (1885) later changed it to *Camptosaurus* because it was preoccupied by *Camptonotus* Uhler, 1864, the generic name of an extant cricket. In his 1879 paper, Marsh described and illustrated a shoulder girdle and forelimb and a pelvis and hindlimb of the new dinosaur. This material, emphasizing the size disparity between the limbs, was the only evidence on which Jobin could base his reconstruction, since the first reconstruction of the complete skeleton of *Camptosaurus* was published by Marsh only in 1894. Jobin reconstructed the ''Compsonote'' as a bipedal, slenderly built dinosaur with a very long neck and a small head, which is rather reminiscent of early twentieth century reconstructions of ''ostrich dinosaurs'' (Ornithomimosauria). The main inaccuracies, as revelead by Marsh's reconstruction (Marsh, 1894), are the excessive length of the neck and smallness of the head. More recent reconstructions of *Camptosaurus*, such as that by John C. Germann in Colbert's *Dinosaur Book* (1945), tend to show it as capable of both a quadrupedal and a bipedal stance. The very upright bipedal position of Jobin's reconstruction is unlikely. It is worth noting that, unlike *Stegosaurus*, *Camptosaurus* seems to have had little appeal for palaeoartists, since far fewer reconstructions of it have been produced.

Jobin's stegosaur is especially remarkable because it is so different from all subsequent reconstructions of that dinosaur. The animal is shown walking in a bipedal position, supported by its massive, pillar-like hindlimbs and its powerful tail, the end of which drags on the ground. The forelimbs are much smaller than the hindlimbs. The head is small and lizard-like. The neck is long (although not as long as that of the ''compsonote'') and devoid of armour. The back and tail are heavily armoured. The back bears two rows of long, pointed spikes and a third row of shorter spikes. The tail bears rows of short spikes and a row of oblong plates with a rounded distal end. This stegosaur's appearance is definitely bizarre when compared with later reconstructions, which may differ in various important details, such as the number of rows of bony plates or the number of spikes at the end of the tail, but generally depict the animal as quadrupedal, with large flattened bony plates along the neck, back and anterior part of the tail, spikes being restricted to the posterior part of the tail. The inaccuracies in Jobin's reconstruction are easily explainable when one remembers how incomplete the available anatomical information about *Stegosaurus* was in 1884. Marsh's initial papers did not include a full skeletal reconstructions, but only illustrations of a few bones and bony plates and spikes, with no clear indication of their position on the body. The skull was not described until 1887. Providing a reliable life reconstruction on such a basis was practically impossible, all the more so that in his early papers, Marsh repeatedly asserted that *Stegosaurus*, although largely aquatic, was probably bipedal when moving on land. Jobin's work can only be understood as a highly imaginative attempt at reconstructing an unusual dinosaur on the basis of very insufficient anatomical information and erroneous interpretations. As soon as Marsh (1891) was able to produce a fairly reliable skeletal reconstruction of *Stegosaurus*, Jobin's life reconstruction became obsolete. Before that happened, however, it was reproduced a few times and probably considered as relatively realistic.

Uncertainties remain about Jobin's re-

construction of this Jurassic landscape. In particular, it is difficult to determine to what extent Sauvage was involved in it. Not enough is known about Jobin to decide whether he relied heavily on the advice and information provided by scientists, or gave more or less free rein to his imagination. However, although they were interpreted in an erroneous way, the anatomical details Jobin used for his dinosaur reconstructions were drawn from Marsh's rather preliminary papers on *Stegosaurus* and *Camptonotus*, and these were probably provided by Sauvage, who was the leading French expert on dinosaurs at that time. On the other hand, the fact that Jobin worked at the library of the Paris Natural History Museum certainly gave him easy access to scientific journals, including the *American Journal of Science*, where Marsh published his above-mentioned papers on dinosaurs.

Re-publications of Jobin's reconstruction

Jobin's reconstruction of the American Jurassic landscape was republished at least thrice. The first such republication was in the well-known American science magazine *Scientific American*. Its November 29, 1884 issue contained a complete (but partly inaccurate) translation of Sauvage's paper, under the simple title ''Dinosaurs''. Although the name of the author was not mentioned, it was indicated at the end of the paper that it was from *Science et Nature*. Interestingly, in addition to the item by Sauvage, that issue of *Scientific American* contained two more papers translated from French scientific magazines, one on a steam excavator, from *Le Génie Civil*, and one on an aeroplane, from *La Nature*. None of them bore the name of its author – it seems that *Scientific American*'s editorial policy at that time was to publish mainly anonymous papers. What the copyright arrangements (if any) were between the French magazines and *Scientific American* is unknown. Jobin's illustration bore the caption ''American landscape of the Jurassic epoch with reptiles and plants of the period''. Whether Marsh knew of these reconstructions of dinosaurs he had described and named, and what he thought of them, is unknown.

A first French republication of Jobin's work was in the 1885 translation of the volume of Brehm's *Tierleben* about reptiles and amphibians. The zoologist Alfred Edmund Brehm (1829-1884) had published a highly successful multi-volume work about animal life in his native Germany, and in the 1880s the French publisher Baillière started publication of a book series which supposedly was a translation of this collection aimed at the general public. In fact, this series, under the general title *Merveilles de la Nature* (''Wonders of Nature''), was only loosely inspired by Brehm's work : the various volumes were thoroughly rewritten, with many original additions, by French authors. While most of the impressive original artwork was retained, additional illustrations by French illustrators were added. The volume about reptiles and amphibians was written by Henri Emile Sauvage (who appeared on the title page simply as ''E. Sauvage'') and the publisher's foreword made it clear that he had ''completely modified'' Brehm's work, notably by adding a long section about fossil forms that had been missing from the German version. The book contained many illustrations, some of them reproduced from the German original, others specially produced for the French version. The foreword praised ''Jobin's skillful pencil'', which had provided reconstructions of the most curious animals of the past and thus added to the value and charm of the volume. They were supposed to be ''absolutely new'', a remark possibly prompted by the fact that in many popular palaeontolo-

gy books of that period, life reconstructions of extinct animals were often copied from earlier books (especially Louis Figuier's *La Terre avant le Déluge*, first published in 1863, and its remarkable engravings by Edouard Riou ; see Rudwick, 1992) and were sometimes much outdated. Sauvage's book contained three reconstructions of ancient landscapes by Auguste Jobin, but in fact only two were really new, one showing two *Mastodonsaurus* in a Triassic landscape and one depicting ichthyosaurs, a plesiosaur and a pliosaur in a Jurassic seascape. The third reconstruction was Jobin's illustration of a Jurassic landscape in North America, first published in *Science et Nature* in 1884, showing, according to the 1885 caption, ''the dinosaurs of the Rocky Mountains in the Jurassic epoch''. Sauvage's comment on the figure was the same as in his 1884 paper, including the remarks on the ''compsonote'' and the stegosaur. In fact, his chapter on dinosaurs in the 1885 book was largely an expanded version of the *Science et Nature* paper. Jobin's skeletal reconstructions of *Brontosaurus* and *Iguanodon* were also reproduced in the book. Since Baillière was the publisher of both *Science et Nature* and Sauvage's book (which contained an advertisement for the magazine), using Jobin's illustrations for both was easy.

Jobin's illustration was reprinted again in 1886 in Camille Flammarion's book *Le monde avant la création de l'homme* (''The world before the creation of Man'') (Figure 3). This was initially supposed to be an updated edition of W.F.A. Zimmermann's book of the same title (Zimmermann, 1856), a translation of the original *Wunder der Urwelt* (''Wonders of the primitive world''), that had been quite successful and went through several German editions. Zimmermann was one of the pseudonyms of Carl Gottfried Wilhelm Vollmer (1797-1864), a polymath who wrote books about many topics, from mythology to chemistry. In fact, Flammarion's work is completely different from Zimmermann's book, except for its title. Flammarion (1842-1925) was a famous astronomer and populariser of science, who wrote a large number of books for the general public, most of them about astronomy, although he also published books about earthquakes, volcanoes and spiritualism, a topic he was especially interested in. *Le monde avant la création de l'homme* is a large, profusely illustrated volume with 412 figures and many unnumbered plates, some of them in colour. It contains a number of reconstructions of extinct animals, of very unequal scientific soundness. Some of them are outdated, having been copied from books published decades earlier. Others are rather fanciful, depicting rather monstrous-looking creatures that bear little resemblance with real fossil species. Auguste Jobin contributed several original illustrations, which on the whole are of better quality than many of the others. His fight between an *Iguanodon* and a *Megalosaurus*, produced specially for Flammarion's book, was modern for its time, showing both dinosaurs as bipeds, the *Iguanodon* bearing a thumb spike instead of a nasal horn – the influence of Dollo's work on the Bernissart *Iguanodon* specimens can clearly be felt. In addition to his drawings specially produced for the book, *Le monde avant la création de l'homme* also reproduced several of Jobin's illustrations from the 1884 paper and the 1885 book by Sauvage, including the skeletal reconstructions of *Iguanodon* and *Brontosaurus* as well as the North American Jurassic landscape featuring the ''compsonote'' and stegosaur. Jobin's pair of *Mastodonsaurus* from Sauvage's book was also republished in Flammarion's book. Flammarion drew a large part of his information about fossil reptiles from Sauvage's work, and it is not suprising that he also re-used some of Jobin's illustrations for Sauvage's papers and books.

Figure 3 - Camille Flammarion (1842-1925), a well-known astronomer and popular science writer in nineteenth-century France, in whose book *Le monde avant la création de l'homme* (1886) Jobin's reconstruction of *Stegosaurus* was reprinted.

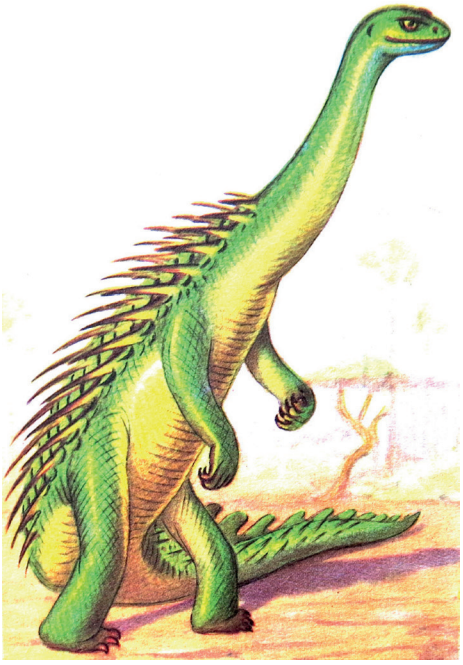

Figure 4 - Reconstruction of a stegosaur by an anonymous illustrator in a French children's book (Anonymous, 1960). It is clearly redrawn after Jobin's 1884 reconstruction.

Like other books by Flammarion, *Le monde avant la création de l'homme* seems to have been rather successful, which probably made Jobin's reconstructions familiar to the French public.

Although it was largely a work of imagination, not based on a skeletal reconstruction, but following early erroneous interpretations by Marsh, Jobin's restoration of *Stegosaurus* seems to have enjoyed some popularity in the 1880s, since it was reproduced several times – until Marsh's publication of a first reasonably reliable skeletal reconstruction in 1891 showed how thoroughly erroneous the illustration by the French artist was. A curious sequel is a colour illustration by an anonymous artist in an equally anonymous little children's book published in France in 1960, entitled *Les animaux antédiluviens* (''Antediluvian animals''). By that time, ''antédiluvien'' had long ceased to be used as a scientific term in France, and simply denoted something completely outdated, but the author of the book still used it in its old meaning of having lived in a remote period of the past (literally ''before the Flood''). The illustration shows a bipedal stegosaur obviously redrawn from Jobin's reconstruction (Figure 4) – which by that time was of course hopelessly outdated. Several other illustrations in the book are clearly redrawn from figures in Flammarion's 1886 volume, many of them by Jobin. The anonymous author clearly used outdated information from nineteenth-century books, adding erroneous information of his (or her) own, especially when he (or she) claimed that *Stegosaurus* was a ferocious carnivore!

An 1892 American life reconstruction of a bipedal stegosaur

Both Gilmore (1914) and Abel (1925) claimed that the first life reconstruction of *Stegosaurus* was Joseph Smit's illustration published in Hutchinson's *Extinct Monsters* in 1893, which was clearly based on Marsh's skeletal reconstruction of 1891, although the sprawling posture was erroneous (it was corrected in another reconstruction by Smit in Henry Knipe's *From Nebula to Man* (1905), an unusual but well illustrated history of life in verse). As shown above, Jobin's 1884 bipedal stegosaur antedated Smit's work by nine years. Moreover, Smit's drawing was not the first reconstruction of a stegosaur to be published after the publication of Marsh's skeletal reconstruction. In the April 1892 issue of *The Californian*, a magazine published in San Francisco which contained papers on miscellaneous topics, a certain James Erwin Culver published an article entitled *Some extinct giants*, illustrated with figures showing mounted skeletons and life reconstructions of extinct animals. Culver's knowledge of palaeontology seems to have been rather erratic, and his paper contains several serious mistakes, the most blatant of which probably being the figure purportedly depicting a skeleton of the ceratopsian *Agathaumas* (described by Cope in 1874, a possible synonym of *Triceratops*), which in fact shows a uintathere! For some reason, although he obviously drew a large part of his informatrion from Marsh's work, Culver seems to have preferred Cope's names for the extinct animals he discussed. The first of his figures shows an oversized version of Marsh's skeletal reconstruction of *Stegosaurus*, described in the caption as the ''skeleton of a gigantic reptile with bony frill'' and depicted as a museum exhibit being stared at by a group of visitors, but the name *Stegosaurus* is not used anywhere in the text. Instead, Culver uses *Hypsirhophus* – a genus of doubtful validity and a possible synonym of *Stegosaurus* (see Maidment, 2010, and Galton, 2010, for a discussion) erected by Cope in 1878. The reconstruction of *Hypsirhophus* is remarkable in many ways (Figure 5). In agreement with Marsh's reconstruction, the stegosaur bears a single row of bony plates along its neck, back and anterior portion of tail, followed by several pairs of spikes at the end of the tail. Its small head terminates in a somewhat pig-like snout. Its forelimbs are much shorter than its rather human-like hindlimbs and it is depicted in a bipedal stance, apparently emerging from a body of water, the shore of which is strewn with ammonites. It supports its forelimbs on a rocky cliff, on the top of which a group of tiny humans flees in terror. Long-tailed pterosaurs fly overhead and a smoking volcano is shown in the distance. In the text, Culver explains that it is not known whether man existed at this early day, since the existence of Tertiary man is ''hardly admitted''; the human silhouettes shown in the illustration (and in another one showing the sauropod *Amphicoelias*) are there mainly to give an idea of the gigantic size of the dinosaurs. The reconstructions are not signed but were apparently the work of Carl Christian Dahlgren (1841-1920), a Danish-born artist who settled in California in 1878 and for many years was the main illustrator of the *Californian* magazine (Hughes, 1986). Despite all its shortcomings, this life reconstruction of a stegosaur seems to be the first to have incorporated at least some of the anatomical characters illustrated in Marsh's 1891 skeletal reconstruction.

CONCLUSION

For various historical and scientific reasons, reconstructions of dinosaurs found

by Marsh and Cope in the western United States loom large in the history of palaeoart, and not unexpectedly American artists, especially Charles R. Knight, played a major part in this history (Lescaze, 2017). However, it turns out that some of the earliest published life reconstructions of these dinosaurs were in fact produced by European artists. In the 1880s, the much forgotten talented French scientific illustrator Auguste Jobin was among the first to attempt to depict North American dinosaurs in a Jurassic landscape. His reconstruction featuring *Stegosaurus* and *Comptonotus*, first published in 1884, must have met with some success, since it was reprinted several times, including in an American magazine. Retrospectively, its shortcomings are obvious, but it should be remembered that at the time it was produced, only incomplete remains of both dinosaurs had been described and illustrated, so that much had to be left to the imagination of the artist, all the more so that Marsh's initial interpretation of *Stegosaurus* as a both aquatic and bipedal dinosaur was, to say the least, confusing. Although few details are available, Henri Emile Sauvage, who was then the leading French expert on dinosaurs, certainly supervised Jobin's work, or at least found it scientifically acceptable enough to illustrate his own publications.

Marsh's 1891 skeletal reconstruction showed how far off the mark Jobin's life reconstruction was. Despite that, however, reconstructions published after Marsh's paper could still depict stegosaurs in an unnatural bipedal posture, as exemplified by the 1892 picture in *The Californian*, which admittedly was produced without much scientific supervision.

These early reconstructions of *Stegosaurus* illustrate the interplay between scientific descriptions and illustrations and the artistic depictions of extinct animals that were based on them. It is worth noting that

Figure 5 - Reconstruction of the stegosaur *Hypsirhophus*, probably by Carl Christian Dahlgren, in James Erwin Culver's *Some extinct giants* (1882).

Jobin (and perhaps Sauvage, too) chose to reconstruct North American dinosaurs that were still poorly known, notably *Stegosaurus*, instead of forms for which skeletal reconstructions were already available, such as sauropods (although a reconstruction of *Atlantosaurus*, unsigned but apparently by Jobin, appeared in Flammarion's 1886 book). Perhaps the bizarre bony armour of *Stegosaurus* was the reason why it was chosen, although this was a risky choice considering how little was known of its skeletal structure in the 1880s. Then as today, a large part of the attractiveness of dinosaurs lay in their unusual appearance, which was repeatedly emphasized by the authors of popular articles and books.

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