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Discovery and study of dinosaurs from Spain: The contribution of Albert F. de Lapparent

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ABSTRACT

Albert F. de Lapparent (1905–1975), the scion of a family of famous French geologists, was a dinosaur palaeontologist. He explored many territories in Europe, Saharan Africa and Asia in search of fossils. The studies he undertook in Spain, which resulted in a dozen publications between 1955 and 1969, are an important part of his research on dinosaurs. Lapparent et al. discovered about thirty dinosaur localities, mostly of Cretaceous age, in several Spanish provinces, including Albacete, Castellón, Cuenca, Soria, Teruel and Valencia in the Iberian Range, and Lleida (or Lérida) in the Pyrenean region. In 1958, Lapparent published the discovery of dinosaur eggs in the Tremp Basin (Lleida), the first ones found in the Iberian Peninsula. His 1960 work on the dinosaurs of Galve (Teruel) was the first monograph on the subject published in Spain. In 1965, Lapparent was also the first to publish the discovery of dinosaur footprints in Spain, more specifically in the province of Valencia.

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R É S U M É

L'Abbé Albert F. de Lapparent (1905–1975), membre d'une célèbre famille de géologues français, fut un paléontologue spécialiste de dinosaures. Homme de terrain avant tout, il explora de nombreux territoires en Europe, en Afrique saharienne et en Asie, à la recherche de restes fossiles. Les études menées en Espagne, qui ont donné lieu à une douzaine de publications entre 1955 et 1969, constituent un volet important de sa recherche sur les dinosaures. Lapparent et al. ont découvert une trentaine de gisements, pour la plupart d'âge Crétacé, dans plusieurs provinces espagnoles, dont celles d'Albacete, Castellón, Cuenca, Soria, Teruel et Valencia dans la Cordillère Ibérique, et de Lleida (ou Lérida) dans la région pyrénéenne. Lapparent publia, en 1958, la découverte d'œufs de dinosaures dans

Abbreviations: IGAL, Institut Géologique Albert de Lapparent (now part of the Institut polytechnique LaSalle-Beauvais, Beauvais, France); MCNV, Museo de Ciencias Naturales de Valencia, Spain; MNCN, Museo Nacional de Ciencias Naturales, Madrid, Spain; MNHN, Muséum National d'Histoire Naturelle, Paris, France; MPT, Museo Provincial de Teruel, Spain.

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le Bassin de Tremp (Lleida), les premiers trouvés dans la Péninsule ibérique. Son travail de 1960 sur les dinosaures de Galve (Teruel) fut la première monographie sur le sujet publiée en Espagne. Enfin, Lapparent fut également le premier à publier, en 1965, la découverte d'empreintes de pas de dinosaures en Espagne, dans la province de Valencia.

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1. Introduction

Albert Félix de Lapparent (1905–1975) is one of the leading personalities of French vertebrate palaeontology in the 20th century (Fig. 1). He was the scion of a family of famous French geologists (Montenat, 2008). His grandfather, Albert-Auguste de Lapparent (1839–1908), was a renowned geologist and a prolific author who popularized geology in France with the publication of a number of original textbooks, such as his *Traité de Géologie*. His uncle, Jacques de Lapparent (1883–1948), was a well-known professor of mineralogy and petrology in Strasbourg and Paris.

Albert F. de Lapparent was born in 1905 in Le Mont-Dieu (Ardennes) and spent his childhood in the Ardennes and in Provence. His father, Pierre C. de Lapparent, was an agriculturist. Albert was the eldest of nine brothers and sisters. In 1923, he entered the Seminary of St. Sulpice near Paris and was ordained as a priest in 1929. He studied geology at the Sorbonne in Paris. From 1932, Lapparent taught geology at the *Institut Catholique* of Paris (as had his grandfather, Jean Boussac and Pierre Teilhard de Chardin previously; Montenat, 2008). Lapparent produced a doctoral thesis on the sedimentary geology of Provence, under the supervision of Charles Jacob, which he defended in 1938. This work (Lapparent, 1938) was awarded the Cuvier Prize of the *Académie des sciences*.



Fig. 1. Portrait of Albert-Félix de Lapparent (1905–1975). Institut Géologique Albert de Lapparent (IGAL) archives, Institut polytechnique LaSalle-Beauvais.

Fig. 1. Portrait d'Albert-Félix de Lapparent (1905–1975). Archives Institut Géologique Albert de Lapparent (IGAL), Institut polytechnique LaSalle-Beauvais.

Lapparent was mostly a field man. He soon became familiar with the geology of the sedimentary basins of France and participated in the preparation and revision of a number of geological maps at a scale of 1/80,000 (Bordet, 1977). From 1946 to 1975, he explored large regions of northern and central Africa, Afghanistan, Iran and Oman, mapping the field, studying the stratigraphy and collecting vertebrate fossils (Bordet, 1977; Montenat, 2008).

From 1944, A.F. de Lapparent was a researcher at the *Centre National de la Recherche Scientifique* (CNRS). In 1959, he was appointed director of the IGAL, an institution founded in tribute to his grandfather. He served as president of the *Société Géologique de France* in 1960, and became corresponding member of the *Académie des sciences* in 1970. In 1974, Lapparent was made director of the French scientific mission in Afghanistan. He died in Paris in 1975 at the age of 69.

Lapparent published 277 notes and articles on geology and palaeontology (see Bordet, 1977 for a complete list). About one fifth of these publications dealt with dinosaurs. The importance of this research has been evoked in biographical works (Bordet, 1977; Montenat, 2008), but the contribution of Lapparent as a dinosaur palaeontologist has never been treated in detail. The present work focuses on the role played by A.F. de Lapparent in the discovery and study of dinosaurs in Spain.

2. The dinosaur research of Lapparent

Albert F. de Lapparent became interested in dinosaurs when he found fragmentary remains during the course of his doctoral thesis in Provence. Jean Piveteau, Professor of Palaeontology at the Sorbonne, encouraged him to become a dinosaur specialist, one of the few at the time in France who worked on this topic. From 1938 to 1975, Lapparent published about 55 articles on dinosaurs (see bibliography in Bordet, 1977).

One of the most important contributions made by Lapparent was the discovery of dinosaur remains in the field. He found new dinosaur sites in several countries, in Europe (France, Germany, Portugal, Spain and Svalbard in Norway) and in Asia (Iran), and more especially in Africa. In the beginning of the 1940s Lapparent made two expeditions to Morocco, where dinosaur remains were found in Jurassic rocks (Taquet, 2010). Lapparent was the pioneer of dinosaur research in the Sahara (Taquet, 2007). From 1946 to 1959, he led nine expeditions to collect Cretaceous vertebrate fossils in what are now Algeria, Tunisia, Libya, Mali, Niger and Chad. He discovered some 35 localities with reptilian remains, including bones and footprints of dinosaurs. His memoir on the dinosaurs of the “Continental Intercalaire” of the central Sahara (Lapparent, 1960a) was the starting point for studies of the terrestrial vertebrate faunas

of the Mesozoic of the Sahara (Taquet, 2007). In 1966 and 1970, Lapparent also participated in two missions to Niger and Algeria, which were led by Philippe Taquet (Taquet, 2007, 2010).

The dinosaur research of Lapparent was mainly focused on bones, but he also studied footprints and eggshells, as well as the geology and stratigraphy of fossiliferous sites. He contributed to the renaissance in studies on dinosaur ichnology and participated in the renewal of interest in dinosaur eggs during the “quiet times” of the period from 1930 to 1970 (Buffetaut, 1997). Among the main publications of Lapparent, mention should be made of his monograph on the Late Cretaceous dinosaurs of southern France (Lapparent, 1947), which was a standard work on the subject for forty years, and the memoir written with Georges Zbyszewski on the dinosaurs of Portugal (Lapparent and Zbyszewski, 1957). Moreover, the chapter on dinosaurs that Lapparent published in Volume 5 of the *Traité de Paléontologie* by Jean Piveteau (Lapparent and Lavocat, 1955) was the reference work of dinosaur palaeontology in the French language for several decades.

With regard to the dinosaur specimens studied by Lapparent, there are two papers that are worthy of attention: that of Lapparent (1943) includes the description of the Late Jurassic sauropod material from the Damparis quarry of the Jura region of eastern France, one of the most complete sauropod skeletons ever found in Europe, then referred to *Bothriospondylus madagascariensis* (and currently regarded as an indeterminate brachiosaurid; Mannion, 2010); the second paper of Lapparent concerns the study of “*Cetiosaurus*” *mogrebiensis* on the basis of three cotype partial skeletons from different localities of the Middle Jurassic of El Mers in Morocco (Lapparent, 1955). These remains are probably not diagnostic and therefore “*C.*” *mogrebiensis* has been regarded as an indeterminate sauropod (Upchurch et al., 2004). This taxon may represent a chimera (Läng and Mahammed, 2010).

Lapparent was one of the few palaeontologists from the 1940s to study dinosaur tracks and became a renowned specialist for over 20 years (Montenat, 2008). One of his most significant finds was the discovery in 1960 of dinosaur footprints in Spitsbergen (Svalbard) during a field trip of the 21st International Geological Congress held in Copenhagen. Lapparent (1962) described the tracks as those of a giant bipedal dinosaur and referred them to the ornithopod *Iguanodon*, but a theropod affinity cannot be discarded (Lockley and Meyer, 2000). This was the first record of the presence of dinosaurs at high latitudes. Another outstanding contribution was his memoir on the Le Veillon tracks (Vendée) on the Atlantic coast of France (Lapparent and Montenat, 1967), which represents the first study of Early Jurassic footprints in Europe (Lockley and Meyer, 2000). Lapparent also participated in the discovery of dinosaur footprints from the Early Jurassic of Iran and Afghanistan (see Taquet, 1977 and references therein). Finally, Lapparent became interested in the study of dinosaur eggs as a result of the finds made in the Late Cretaceous of Provence, Languedoc and Catalonia (Lapparent, 1947, 1958).

Lapparent erected a number of dinosaur taxa on the basis of material found in Algeria, Libya, Morocco, Niger and Portugal. Most of these taxa are currently regarded as

nomina dubia or synonymized (Weishampel et al., 2004). At least two sauropod species are considered valid: *Lourinhsaurus alenquerensis* (Lapparent and Zbyszewski, 1957), originally identified as a new species of *Apatosaurus*, and *Lusotitan atalaiensis* (Lapparent and Zbyszewski, 1957), originally referred to *Brachiosaurus*, both from the Late Jurassic of Portugal (Antunes and Mateus, 2003; Upchurch et al., 2004). “*Brachiosaurus*” *nougaredi* Lapparent, 1960a from the mid-Cretaceous of Algeria could be a valid brachiosaurid species, but the material is probably not referable to *Brachiosaurus* (Upchurch et al., 2004). On the other hand, the sauropod genus *Lapparentosaurus* Bonaparte, 1986 from the Middle Jurassic of Madagascar and the theropod species *Cristatusaurus lapparenti* Taquet and Russell, 1998 from the Early Cretaceous of Niger were named in recognition of Lapparent. Recently, the new ornithopod genus *Delapparentia* Ruiz-Omeñaca, 2011 from the Early Cretaceous of Spain has been described in honour of A. F. de Lapparent (see below).

3. The role of Lapparent in the discovery and study of dinosaurs from Spain

Lapparent’s activities in Spain represent an important part of his research on dinosaurs. Besides the work done by José Royo Gómez prior to the Spanish Civil War (e.g., Royo Gómez, 1926, 1927, 1928; see more references in Pereda Suberbiola and Ruiz-Omeñaca, 2005; Pérez-García et al., 2009), Lapparent was a pioneer in making his dinosaur research in Spain part of a geological long-term project. During the 1950s and 1960s, Lapparent et al. undertook active fieldwork in several regions of Spain. Lapparent directed the fieldwork of a number of geology students in several areas of the Iberian Range and in the Pyrenean region (Lapparent, 1966). Even if this project was basically of geological nature and only a few palaeontological excavations were made, about thirty new dinosaur localities were found in the Jurassic-Cretaceous transition deposits of Valencia, the Early Cretaceous (“Wealden facies”) of Albacete, Castellón, Cuenca, Teruel and Valencia, and the Late Cretaceous (“Garumnian”) of Lleida and Soria (Fig. 2; Table 1). Between 1955 and 1969, Lapparent published a dozen papers on dinosaurs from Spain; three of them are translations into Spanish of the original French texts (Lapparent, 1958, 1959, 1960b, 1966; Lapparent and Aguirre, 1956a, 1956b, 1957; Lapparent et al., 1957a, 1957b, 1957c, 1965, 1969).

In the Tremp Basin of Lleida, Lapparent and Aguirre (1956a, 1956b, 1957) noted the discovery of dinosaur remains that included titanosaurian sauropods (referred to *Hypsosaurus* nov. sp. and *Titanosaurus* cf. *indicus*; this material is now regarded as Titanosauria indet. by Royo-Torres, 2009) and ornithopods (*Rhabdodon priscus*; this identification is doubtful, but *Rhabdodon* sp. has subsequently been identified in Lleida on the basis of a dentary tooth, see Ruiz-Omeñaca, 2001). They mentioned about twelve localities situated in the vicinity of the towns of Talarn, Suterranya, Orcau, Conques and Isona (maps in Lapparent, 1966; Lapparent and Aguirre, 1956b). A few of these sites were found by Walter Kühne and Emiliano Aguirre during field prospections made in 1954–55.

Table 1

Dinosaur localities discovered by Lapparent et al. in Spain. B, bones and/or teeth (skeletal remains); E: eggs and eggshells; F: footprints. Modified from Ruiz-Omeñaca (2000, 2006).

Tableau 1

Gisements à dinosaures, découverts par Lapparent et al. en Espagne. B, os et/ou dents (restes squelettiques); E: œufs et coquilles d'œuf; F: empreintes. Modifié d'après Ruiz-Omeñaca (2000, 2006).

Province	Age	Locality	Number in Fig. 2	Discoverer (year)	Dinosaur remains	Repository	References	
Albacete	Lower Cretaceous	Almansa	1	P. Petit (1964)	B	Unknown	Lapparent (1966)	
Castellón	Lower Cretaceous	Morella, two localities	2	J. Marie (1964)	B	MNCN	Lapparent (1966)	
Cuenca	Lower Cretaceous	Vadillos (Cañizares)	3	R. Curnelle (1966)	B	MNHN	Lapparent et al. (1969)	
Lleida	Upper Cretaceous	Basturs (Isona i Conca Dellà)	4	A. F. de Lapparent, C. Bézier and N. Glanchat (1958)	E	IGAL	Lapparent (1958, 1959, 1966)	
		Coll de Nargó	5	A. F. Baudrimont (1961)	E	IGAL	Lapparent (1966)	
		Conques (Isona i Conca Dellà)	6	A. Clotet	B	MNCN	Lapparent and Aguirre (1956a, 1956b, 1957)	
		Isona (Isona i Conca Dellà)	7	W. Kühne and E. Aguirre (1956)	B	MNCN	Lapparent and Aguirre (1956b)	
		Talarn, two localities	8	W. Kühne, E. Aguirre, J. Rosell (1956)	B	MNCN	Lapparent and Aguirre (1956a, 1956b, 1957)	
		Orcau (Isona i Conca Dellà), four localities	9	W. Kühne (1954)	B	MNCN	Lapparent and Aguirre (1956a, 1956b, 1957)	
				W. Kühne, E. Aguirre and J. Rosell (1956)				
		Suterranya (Trempe), two localities	10	W. Kühne and D. Nadal (1954)	B	Unknown	Lapparent and Aguirre (1956a, 1956b, 1957)	
				J. Muntaner (1955)				
		Between Suterranya and Orcau	11	W. Kühne and E. Aguirre (1956)	B	Unknown	Lapparent and Aguirre (1956b)	
		Soria	Upper Cretaceous	Cubilla	12	A. F. de Lapparent, I. Quintero and E. Trigueros (1956)	B	MNHN
Teruel	Lower Cretaceous	Cantavieja	13	J. C. Fabre (1963)	B	Unknown	Lapparent (1966)	
		Castellote NE (Castellote)	14	A. de Miroschedji (1968)	B	MNHN	Lapparent et al. (1969)	
		Castellote SW (Castellote)	15	B. Pallard (1968)	B	Unknown	Lapparent et al. (1969)	
		Ejulve	16	B. Defaut (1967)	B	Unknown	Lapparent et al. (1969)	
		Galve, three localities	17	J. M. Herrero (1958)	B	MPT	Lapparent (1960b)	
		Mora de Rubielos, two localities	18	A. F. de Lapparent (1954)	B	Unknown	Lapparent (1960b)	
				F. Gautier		B		Lapparent (1966)
		Rubielos de Mora, two localities	19	F. Gautier	B	Unknown	Lapparent (1966)	
Valencia	Upper Jurassic	Arroyo Cerezo (Castielfabib)	20	P. Gillain (1964)	F	MCNV	Lapparent et al. (1965), Lapparent (1966)	
		Benagéber	21	A. F. de Lapparent	B	Unknown	Lapparent et al. (1957a, 1957c), Lapparent (1966)	
	Lower Cretaceous	Alpuente	22	B. Rothé (1959)	B	MNHN	Lapparent (1966)	
		Arroyo Cerezo (Castielfabib)	23	P. Gillain (1965)	B	Unknown	Lapparent (1966)	
		Titaguas	24	B. Rothé (1959)	B	MNHN	Lapparent (1966)	

MNCN: Museo Nacional de Ciencias Naturales; MPT: Museo Provincial de Teruel; MCNV: Museo de Ciencias Naturales de Valencia; IGAL: Institut Géologique Albert de Lapparent.

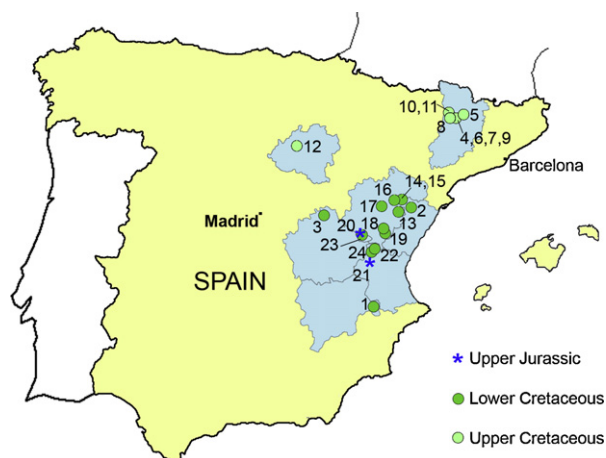


Fig. 2. Map of dinosaur localities described by Lapparent et al. in Spain. See Table 1 for more details. Albacete province: **1**: Almansa; Castellón province: **2**: Morella; Cuenca province: **3**: Vadillos (Cañizares); Lleida province: **4**: Basturs (Isona i Conca Dellà), **5**: Coll de Nargó, **6**: Conques (Isona i Conca Dellà), **7**: Isona (Isona i Conca Dellà), **8**: Talarn, **9**: Orcau (Isona i Conca Dellà), **10**: Suterranya (Tremp), **11**: between Suterranya and Orcau; Soria province: **12**: Cubilla; Teruel province: **13**: Cantavieja, **14**: Castellote NE (Castellote), **15**: Castellote SW (Castellote), **16**: Ejulve, **17**: Galve, **18**: Mora de Rubielos, **19**: Rubielos de Mora; Valencia province: **20**: Arroyo Cerezo (Castielfabib), **21**: Benagéber, **22**: Alpuente, **23**: Arroyo Cerezo (Castielfabib), **24**: Titaguas. Modified from Lapparent and Aguirre (1956b) and Lapparent (1966).

Fig. 2. Carte des gisements à dinosaures décrits par Lapparent et al. en Espagne. Voir le Tableau 1 pour plus de détails. Province d'Albacete : **1** : Almansa; province de Castellón : **2** : Morella; province de Cuenca : **3** : Vadillos (Cañizares); province de Lleida : **4** : Basturs (Isona i Conca Dellà), **5** : Coll de Nargó, **6** : Conques (Isona i Conca Dellà), **7** : Isona (Isona i Conca Dellà), **8** : Talarn, **9** : Orcau (Isona i Conca Dellà), **10** : Suterranya (Tremp), **11** : entre Suterranya et Orcau; province de Soria : **12** : Cubilla; province de Teruel : **13** : Cantavieja, **14** : Castellote NE (Castellote), **15** : Castellote SW (Castellote), **16** : Ejulve, **17** : Galve, **18** : Mora de Rubielos, **19** : Rubielos de Mora; province de Valencia : **20** : Arroyo Cerezo (Castielfabib), **21** : Benagéber, **22** : Alpuente, **23** : Arroyo Cerezo (Castielfabib), **24** : Titaguas. Modifié d'après Lapparent et Aguirre (1956b) et Lapparent (1966).

Some of the fossils are housed in Madrid (MNCN 32656, 59295–59327, 59539); other fragmentary remains were deposited at an institution in Barcelona (Lapparent and Aguirre, 1956b; E. Aguirre, pers. comm.), but the current whereabouts of this material is unknown. The MNCN material is still unpublished and has never been illustrated; only a supposed titanosaurian vertebra (*sensu* Lapparent and Aguirre, 1956b) from the locality of Norets de Tremp in Talarn (MNCN 59326) has been identified as a posterior caudal vertebra belonging to Hadrosauridae indet. (Pereda-Suberbiola et al., 2003: 381, table 1). The MNCN collection includes as well titanosaurian sauropod and ornithomimid remains, but the specimens offer little information about the precise affinities of the taxa.

Lapparent (1958, 1959) published the discovery of dinosaur eggs and eggshells from the Maastrichtian of the Tremp Basin, more precisely in Basturs (or Bastús, Lleida). These were the first dinosaur eggs described in the Iberian Peninsula (a supposed egg was found associated with the skeletal remains of the stegosaur *Dacentrurus* from the Late Jurassic of Portugal and described by Lapparent and Zbyszewski, 1957; however, it is probably a nodule; see Galton and Upchurch, 2004). At that time, only a few sites

with dinosaur eggs were known, and Basturs was one of the most relevant (Lapparent, 1958, 1959). Recent studies have confirmed the richness and importance of this site (Sanz et al., 1995; see also Díaz-Molina et al., 2007, Sander et al., 1998). Lapparent (1966) mentioned a second egg locality in Coll de Nargó (Lleida). The Coll de Nargó area has recently yielded complete dinosaur eggs and nests (Vila et al., 2010 and references). A few eggshell remains from Basturs and Coll de Nargó are still housed in the Institut Polytechnique LaSalle Beauvais near Paris (C. Montenat, pers. comm.), which currently includes the IGAL and its collections.

One of the most outstanding systematic contributions made by Lapparent is his paper on the dinosaurs of Galve (Teruel). Lapparent (1960b) described the remains found in 1958 at two localities in Galve by the local amateur palaeontologist J.M. Herrero (see Fernández-Galiano, 1960; Alcalá, 2005, 2006 for more details). He recognized two taxa: the ornithomimid *Iguanodon bernissartensis* from La Maca (renamed as La Maca-3 in Ruiz-Omeñaca et al., 2004), and what he considered was a new genus of sauropod, for which no name was suggested, from Las Zabacheras (Fig. 3C–D). This work by Lapparent (1960b) is considered to be the first monograph on dinosaurs published in Spain. The sauropod bones studied by Lapparent and new material found in Las Zabacheras during the 1980s became the type material of *Aragosaurus ischiaticus* Sanz et al., 1987, the first dinosaur taxon described in Spain. With regards to the ornithomimid remains, these have recently been referred to the new basal iguanodontoid *Delapparentia turolensis* by Ruiz-Omeñaca (2011). The material is housed in Teruel (Fig. 3A–B; MPT collections, some fossils are on display at the Galve centre of the Dinópolis palaeontological park “Legendark”).

Other finds were made by Lapparent and his geology students in several areas of the Iberian Range, including the first discoveries of dinosaur bones in the provinces of Albacete, Cuenca and Soria, and new skeletal remains from the provinces of Castellón, Teruel and Valencia (Lapparent, 1966; Lapparent et al., 1969; see Fig. 3E–F, Table 1). All these provinces have provided more and more dinosaur localities since Lapparent's day but, surprisingly, no new dinosaur discoveries have been made in Albacete. Most of the material collected by Lapparent was presumably housed in the *Institut Catholique* of Paris, and then in the collections of the IGAL. In 1971, a vertebrate collection with fossils from Spain, which includes dinosaur remains from Cuenca, Soria, Teruel and Valencia, was donated to the Museum of Paris (MNHN 1972/3).

The dinosaur remains from the Early Cretaceous of the Castellote NE site (Teruel) were referred by Lapparent et al. (1969) to a large sauropod, a large *Iguanodon* and a small *Iguanodon*, though they were not figured. A recent revision of the material suggests the presence of indeterminate titanosauriforms and basal iguanodontoids, and tentatively of stegosaurs (Ruiz-Omeñaca, 2000: pls. 1–8, 2006).

On the basis of the remains found in the Early Cretaceous of Vadillos (Cuenca), Lapparent et al. (1969) identified sauropod and theropod vertebrae (Fig. 3F) and limb bones, as well as vertebrae and ribs from *Iguanodon* sp. Only part of this material is now housed in the MNHN of Paris, and has never been figured except for a sauropod vertebra

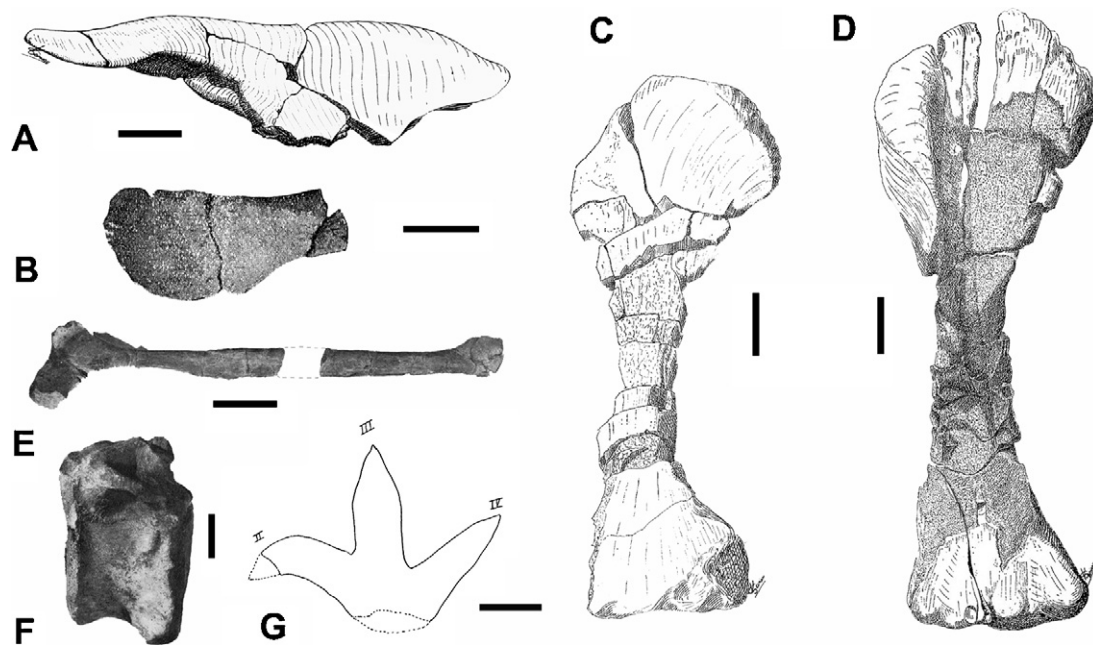


Fig. 3. Dinosaur remains from Spain figured by Lapparent. A: left ilium and B: left prepubis of *Delapparentia turolensis* from Galve (Teruel), both in lateral view (as *Iguanodon bernissartensis* in Lapparent, 1960b: fig. 5, pl. 1, fig. 11), housed in Museo Provincial de Teruel (MPT); C: right pubis and D: right humerus of *Aragosaurus ischiaticus* from Galve (Teruel), in medial and anterior views, respectively (as left pubis and left femur of “Saurópodo de Las Zabacheras” in Lapparent, 1960: figs. 10–11), housed in MPT; E: left ischium assigned to *Iguanodon* sp. from Ejulve (Teruel), in medial view (Lapparent et al., 1969: fig. 3), unknown repository; F: dorsal vertebra of Theropoda indet. from Vadillos (Cuenca), in left lateral view (Lapparent et al., 1969: fig. 2), unknown repository; G: natural cast of a left theropod footprint from Arroyo Cerezo (Valencia), drawing (Lapparent et al., 1965: fig. 3), housed in the Museo de Ciencias Naturales de Valencia (MCNV). Scale bars = 10 cm (A–E) and 2 cm (F–G).

Fig. 3. Restes de dinosaures trouvés en Espagne, figurés par Lapparent. A : ilium gauche et B : prépubis gauche de *Delapparentia turolensis* de Galve (Teruel), tous deux en vue latérale (décrits comme *Iguanodon bernissartensis* par Lapparent, 1960b : fig. 5, pl. 1, fig. 11), conservés au Museo Provincial de Teruel (MPT) ; C : pubis droit et D : humérus droit d'*Aragosaurus ischiaticus* de Galve (Teruel), en vues médiale et antérieure, respectivement (pubis et fémur gauches du « Saurópodo de Las Zabacheras » d'après Lapparent, 1960b : figs. 10–11), conservés au MPT ; E : ischium gauche attribué à *Iguanodon* sp. d'Ejulve (Teruel), en vue médiale (Lapparent et al., 1969 : fig. 3), lieu de conservation inconnu ; F : vertèbre dorsale de Theropoda indet. de Vadillos (Cuenca), en vue latérale gauche (Lapparent et al., 1969 : fig. 2), lieu de conservation inconnu ; G : moulage naturel d'une empreinte gauche de théropode d'Arroyo Cerezo (Valencia), dessin (d'après Lapparent et al., 1965 : fig. 3), conservé au Museo de Ciencias Naturales de Valencia (MCNV). Barres d'échelle : 10 cm (A–E) et 2 cm (F–G).

(MNHN 1972/3-Vad6) that was identified as Titanosauriformes indet. by Ruiz-Omeñaca and Canudo (2003: fig. 1A).

The remains from the localities of Alpuente and Titaguas (Valencia) consist of fragmentary sauropod and theropod bones (Lapparent, 1966). The age of these localities is uncertain: Lapparent (1966) considered them to be Early Cretaceous (“Wealden” facies), but it is possible that the remains come from Jurassic–Cretaceous transition beds, as do several dinosaur localities recently discovered in the Alpuente/Titaguas area (see Company et al., 2010 and references).

Lapparent (1966) noted the discovery of several dinosaur bones, including teeth from *Iguanodon*, from the Wealden beds near Morella (Castellón). A prepubis of a basal iguanodontian ornithopod from the Aptian of El Beltrán in Morella is now in Madrid (MNCN 59706; see Pérez-García et al., 2011: fig. 9D). Two other dinosaur bones from the same locality are also housed in Madrid. The whereabouts of the remainder of the material is unknown.

Lapparent et al. (1957b) described a vertebra from the sauropod “*Hypselosaurus*” and three bones from the ornithopod *Rhabdodon priscus* from the Late Cretaceous of Cubilla (Soria). Only an isolated caudal vertebra, which has

been referred to Titanosauria indet., is now preserved in the collections of the MNHN (Pereda Suberbiola and Ruiz-Omeñaca, 2001: fig. 1). The three bones supposedly from *Rhabdodon* (fragmentary femur, tibia and dorsal centrum; Lapparent et al., 1957b: figs. 1–3) are too incomplete for an accurate assignment to be provided (Ruiz-Omeñaca, 2001). A picture of the dinosaur locality of Cubilla (labelled as “north of Cubillos”) was published by Ríos García et al. (1956).

Finally, Lapparent was the first to publish the discovery of dinosaur footprints in Spain (Lapparent et al., 1965). The material consists of a small tridactyl footprint found in the Late Jurassic of Arroyo Cerezo (Valencia), which is currently housed in the MCNV (Fig. 3G) (donated by the discoverer P. Gillain; see Gillain and Belinchón, 2010). This footprint is currently under study.

4. Conclusions

The Abbé Albert-Félix de Lapparent was an active French dinosaur palaeontologist who made excavations in several European countries and led explorations in large regions of Africa and Asia in search of fossils. Though his research

was mainly focused on the study of skeletal remains, Lapparent contributed to the renaissance in studies on dinosaur ichnology and participated in the renewal of interest in dinosaur eggs. In Spain, Lapparent was a pioneer in devoting his research on dinosaurs to part of a long-term project. Together with French and Spanish collaborators, he undertook active fieldwork in several areas of the Iberian Range and the Pyrenees during the 1950s and 1960s, and discovered a significant number of new dinosaur localities, mostly of Cretaceous age (Lapparent, 1966). Moreover, Lapparent was the first author to publish a systematic study of dinosaurs based on material found in Spain (Lapparent, 1960b). His works on dinosaur footprints and eggs (Lapparent, 1958; Lapparent et al., 1965) were the first to be published in the Spanish literature, and therefore Lapparent is considered to be the precursor in the development of these disciplines in Spain.

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