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NEW LOCALITIES OF MESOZOIC REPTILES IN SPAIN*

SUMMARY

Enumeration of 24 localities of fossil reptiles, recently discovered in Spain, that are distributed thus:

In the Triassic: *Cheirotherium* and *Placodus*; in the Jurassic: marine crocodylian and dinosaurs; in the Lower Cretaceous: *Megalosaurus*, sauropod, *Iguanodon*; in the Upper Cretaceous: sauropod and ornithopod bones, dinosaur eggs.

At the occasion of the XIVth International Geology Congress, Madrid, 1926, J. Royo y Gómez published a report on the reptile localities known at that date in the Mesozoic terrains of Spain. Wishing in our turn to extend the research of fossil vertebrates in the Spanish continental series, in 1954 we made a reconnaissance trip with Bernard Guérangé to Morella, Benageber, and Utrillas. These localities, noted previously, did not give us any new good things. But we then formed the project to entrust to young geologists working under our effective direction the detailed study of various regions in the provinces east of the Meseta. Thus it was from 1954 to 1964 that discoveries were accumulated. The friendship of Mr. José María Ríos having always supported us in our works in Spain during these ten years, we are happy to dedicate to him today a report on the Mesozoic reptiles of Spain.

The localities are arranged in the three great periods: Triassic, Jurassic, Cretaceous. The map in fig. 1 situates them geographically. The final bibliographic list includes little-known works of detail, the reference of which will be useful to have.

It is known that fossil reptiles are usually manifested to the geologist by teeth or skeletal bones, more rarely by eggshells or footprints. Such are, in effect, the paleontological objects that we now know in the Mesozoic terrains of Spain.

TRIASSIC

A counter-print of the foot of *Cheirotherium*, very well preserved, was discovered in 1964 at Boniches [16] (1) in the red sandstones that without doubt must be referred

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(1) The figures between brackets correspond to the localities shown on the map.

here to the lower part of the Middle Triassic (Mathieu 1965). It is thought that the traces of this sort must be attributed to pseudosuchian reptiles. A similar imprint was found formerly in the Triassic of Molin of Aragón (Calderón 1897).

Placodonts are highly specialized marine reptiles of the Triassic Period. However remains of these interesting animals were discovered in several places in the Muschelkalk:

—a tooth, recovered by us in the vermiculated limestones north of Torrijas [18];
—another tooth was found at Boniches in the dolomitic limestones [17] (Mathieu 1965);

—a tooth and a vertebra, with several bones, came from Cañete [15] (Le Joncour 1965);

—Ph. Petit (1964) recovered some vertebrae, ribs, limb bones, and a series of bony plates in the varicolored marls of the railroad trench west of Alpera [22]. The form of the teeth and the presence of a dermal cuirass indicates the family Cyamodontidae. The stratigraphic level was specified: the middle Muschelkalk.

JURASSIC

Callovian.—Some vertebrae and limb bones of a marine crocodylian were found in the marls limestones near Valgañón [4] by some students in the course of a camping trip that we directed in 1960 in the Escaray region (cf. M. Colchen).

Purbeckian.—Royo y Gómez thought with reason that the Benageber locality was situated in the Purbeckian and not in the Lower Cretaceous. The village of Benageber is now drowned. But the locality [21] is visible at low water, on the border of Lake Pantano del Generalissimo. We still recovered there some bone fragments of a large indeterminate dinosaur.

East of Arroyo Cerezo [14], a footprint of a small dinosaur was found in the end-Jurassic limestones (Gillain 1965).

CRETACEOUS

Wealden (Neocomian and Barremian).—The localities that have revealed at least fragments of reptiles are numerous here.

The best discovery is that of two dinosaurs from Galve [9] (Fernandez-Galiano 1958, Derréal 1959, Lapparent 1960), whose remains are conserved in the Museo Provincial de Teruel: *Iguanodon bernissartensis* and a new species of sauropod:

Moreover, we note:

—a vertebra of *Iguanodon*, with ossified tendons, rib fragments, and two phalanges from Cantavieja [7] (Fabre 1963);

a dinosaur pelvis from Arroyo Cerezo [13] (Gillain 1965);

some sauropod, theropods, and crocodile bones from Alpuente [19] (Rothé 1959);

a rib and bone fragments of a sauropod from west of Titaguas [20] (Rothé 1959);

—a bone in an oyster bed, from south of Aliaga [8] (Lapparent, unpublished);

—a tooth of *Megalosaurus* (cf. Lapparent 1960, p. 17) and portions of ribs of *Iguanodon* (F. Gautier) from south of Mora de Rubielos [11];

—three vertebrae and several bony fragments attributable to a marine crocodylian from an oyster bed near Alcala de la Selva [24] (F. Gautier);

—a vertebra of a sauropod on one hand, some limb bone fragments (femur, tibia, fibula) of a large sauropod on the other hand, in two distinct levels, from Rubielos de Mora [12] (F. Gautier);

—a Wealden facies corresponding to the upper Barremian (Marie 1964) has furnished vertebrate remains from southwest of Morella [6], either in the red manufacturing clays, or in the gravel of the Cintorres road crossing: bone fragments and three teeth of *Iguanodon*, sauropod bones, crocodile teeth, turtle shell, without mentioning numerous fish teeth;

—a deltaic facies situated below the Aptian with Orbitolinas containing some dinosaur bone fragments near Almansa [23] (Petit 1964).

Albian.—The lignites exploited at Utrillas [10] and Aliaga are a continental facies from the Albian stage. In spite of the favorable aspect of the terrain, recent researches have not recovered vertebrate remains there; however, some dinosaur bones had been found in the past at Utrillas (Royo y Gómez 1927).

Maastrichtian-Danian.—The highest Cretaceous has furnished important dinosaur remains in the north of Spain.

—In the Tremp basin, reptile bones were known (Bataller). They were exploited by W. Kühne and E. Aguirre in 1954-55. The localities, twelve in number, distributed in the communities of Talarn, Suterranya, Orcau, Isona, and Conquès, were carefully re-examined in 1956 (Lapparent and Aguirre 1956). Some important pieces were stored in the Museo de Ciencias Naturales de Madrid, where they wait to be studied.

—We have discovered a good locality with dinosaur eggs at Orcau [2] (Lapparent 1958).

—Some eggshell fragments of the same type were also located west of Coll de Nargo [3] (Baudrimont 1961).

—Further west, at Cubilla [5], several bones were able to be attributed to *Hypselosaurus* and *Rhabdodon priscum* (Lapparent, Quintero and Triguero 1957).

CONCLUSION

Thus, from the Triassic up to the highest Cretaceous, we know that terrestrial reptiles populated the Iberian regions. At the same time, we foresee the existence of marine reptiles swimming in the oceans: placodonts in the Muschelkalk sea, crocodylians in the Callovian and at the beginning of the Cretaceous.

These still-fragmentary discoveries are distributed in 24 localities. The paleontological pieces already recovered must be considered as promising remains, which increasingly detailed researches will increase in the future.

BIBLIOGRAPHY

[Not listed.]

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FIGURE CAPTION

LIST OF LOCALITIES SHOWN ON THE MAP

1. Tremp basin (Lérida). Maastrichtian-Danian.
2. Orcau (Lérida). Danian.
3. Coll de Nargo ((Lérida). Maastrichtian.
4. Valgañón (Logroño). Callovian.
5. Cubilla (Soria). Danian.
6. Morella (Castellón). Wealden.
7. Cantavieja (Teruel). Wealden.
8. Aliaga (Teruel). Wealden.
9. Galve (Teruel). Wealden.
10. Utrillas (Teruel). Wealden.
11. Mora de Rubielos (Teruel). Wealden.
12. Rubielos de Mora (Teruel). Wealden.
13. Arroyo Cerezo (Valencia). Wealden.
14. Arroyo Cerezo (Valencia). Kimmeridgian.
15. Cañete (Cuenca). Triassic.
16. Boniches (Cuenca). Triassic.
17. Boniches (Cuenca). Triassic.
18. Torrijas (Teruel). Triassic.
19. Alpuente (Valencia). Wealden.
20. Titaguas (Valencia). Wealden.
21. Pantano del Generalissimo, Benageber (Valencia). Purbeckian.
22. Alpera (Albacete). Triassic.
23. Almansa (Albacete). Wealden.
24. Alcala de la Selva. Wealden.