

FERDINAND PANESCORSO AND HIS CLASSIFICATION OF COPROLITES

JEANLE LOEUFF

Musée des Dinosaures, 11260 Espéraza, France; email: jeanleloeuff@yahoo.fr

Abstract—In the midst of the “coprolite mining rush” of the early part of the second half of the nineteenth century, the amateur geologist Ferdinand Panescorso prospected for phosphatic nodules in his native region of the Var in Provence (southeastern France). He published in 1872 a catalogue of his finds, that he interpreted as coprolites, coining 70 morphotypes distributed among 19 groups. It is shown that most if not all of his “coprolites” are nodules of sedimentary origin.

INTRODUCTION

Ferdinand Panescorso (1808-1888) was “agent-voyer du département du Var” in Draguignan, or in other words an officer in charge of the regional road network. He was also an enthusiastic naturalist, especially interested by the then modern science of geology, and was among the pioneers of geology in his homeland, the department of the Var in Provence (Segond, 1888; Tessier, 1890). Panescorso was a founder of the local scientific society in Draguignan (Société d'études scientifiques et archéologiques de la ville de Draguignan, founded in 1855). His name is still remembered by a few students of Late Cretaceous dinosaurs in France as that of the discoverer of the locality of Fox-Amphoux, which was originally mentioned by his friend Jean Dominique Doublier (1786-1874) in a short note read at the Société géologique de France in 1842. A century later, in 1939, Albert-Félix de Lapparent excavated this rich fossil site, describing many dinosaur bones in 1947. Ferdinand Panescorso was a local correspondent of several geologists of his time such as the palaeobotanist Gaston de Saporta. Panescorso himself was the author or co-author of a few geological publications such as the *Prodrome d'histoire naturelle du département du Var*, published in Draguignan in 1853 (Doublier et al., 1853). This work is merely a list of minerals, fossils, birds, plants of the Var with no scientific analysis and Panescorso wrote the sections on fossils and recent mollusks. His son Henry Panescorso died in 1890, two years after Ferdinand passed away and he bequeathed the paternal house to the Société d'études scientifiques et archéologiques de la ville de Draguignan, which still resides at Panescorso's house in 2011.

FERDINAND PANESCORSO AND THE PHOSPHATE RUSH

In 1872 Ferdinand Panescorso published a curious memoir called *Etude sur les phosphates de chaux et les coprolithes fossiles du Var* (Study of the phosphates of lime and of the fossil coprolites from the Var) in the *Bulletin de la Société d'agriculture de commerce et d'industrie du Var*. Panescorso's attempt has to be replaced in the historical and economic context of the 1860s when a rush on phosphates began everywhere in Europe, starting in England around 1848 where the Cambridge Greensand was extensively dug for its nodules. Phosphate was used as a fertilizer in agriculture and this rush has sometimes been compared to the gold rush (Grove, 1974; 1976). As stated by Ford and O'Connor (2009) “coprolite digging was a labour-intensive industry with thousands being employed and barracks to house workers were sometimes erected ». In France similar lower Cretaceous greensands from the eastern part of the country were exploited since the 1850s for their phosphatic nodules (De Molon & Thurneisen, 1856), called “coquins”, “crottes du Diable” or “Brin du Diable” (devil's dung) by locals (cf. Feneulle, 1857). The exploitation of the rich lower Tertiary phosphorites in the Quercy began in the late 1860s (Buffetaut, 2006). In both cases a frenetic economic development occurred. The research for new sources of phosphatic nodules was during these years a major occupation for geologists (see de Beaumont, 1857) and many studies were devoted to the chemistry of “coprolites” (cf. Bobierre, 1861; Chateau, 1875).

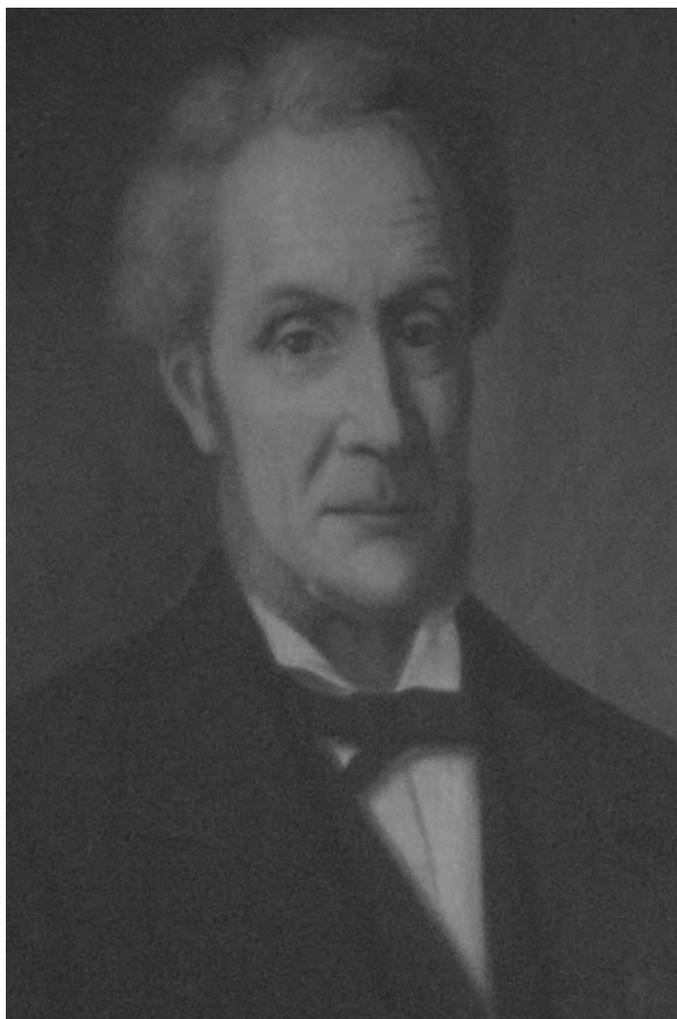


FIGURE 1. Portrait of Ferdinand Panescorso (unknown provenance).

Panescorso remarks in his paper that the extraction of phosphatic nodules in eastern France amounted to 23.400 tons a year in the late 1860s. He was eager to provide his homeland with such an economic treasure, hence his prospections. Unfortunately he was also aware that the richness in phosphates of the nodules he analyzed was too low for an industrial development. Panescorso decided however to describe his discoveries despite their lack of economic value. Everywhere in France in this period the local scientific societies published papers linked to the discovery of phosphates or coprolites as both terms soon had become synonyms outside paleontological circles. Coprolites even reached a literary status when Gustave Flaubert had them mentioned by his characters Bouvard and Pécuchet (a novel published posthumously in 1881).

Panescorse considered all his nodules as coprolites. As Ford & O'Connor (2009) remark "some nodules are just irregular lumps of phosphatic material. Purists might wish to use terms such as pseudo-coprolites or false coprolites for any nodules which cannot be shown to be excretions, but the term coprolite has long been used commercially to embrace any phosphatic nodules, whether excreta or not. Scientifically it is probably best if they are all referred to as phosphatic nodules, though coprolite is normally taken as a colloquial or commercial equivalent term." Coprolite was indeed a commercial term in the 1850s: a dictionary of custom duties published in 1867 lists "coprolithes" as a synonym of "chaux phosphatée minérale" (phosphate of lime: see Kessler & Champy, 1867). Thus Panescorse had some reasons to call his nodules coprolites, although Buckland himself in his founding 1829 paper had remarked that many concretions were not coprolites, calling some of them pseudo-coprolites. Geologists like Coquand (1840) had suggested that calcareous nodules were probably formed inside the sediment. Coquand was largely followed by many geologists who considered that only a small part of the phosphatic nodules were real coprolites (Elie de Beaumont, 1857). Coquand's hypothesis was rejected by Panescorse without any positive argument: "This explanation is not satisfactory today as we are allowed to believe that they are indeed animals' productions petrified in the bowels of the earth following a long lapse of time."

Most of Panescorse's "coprolites" come from Permian red beds,

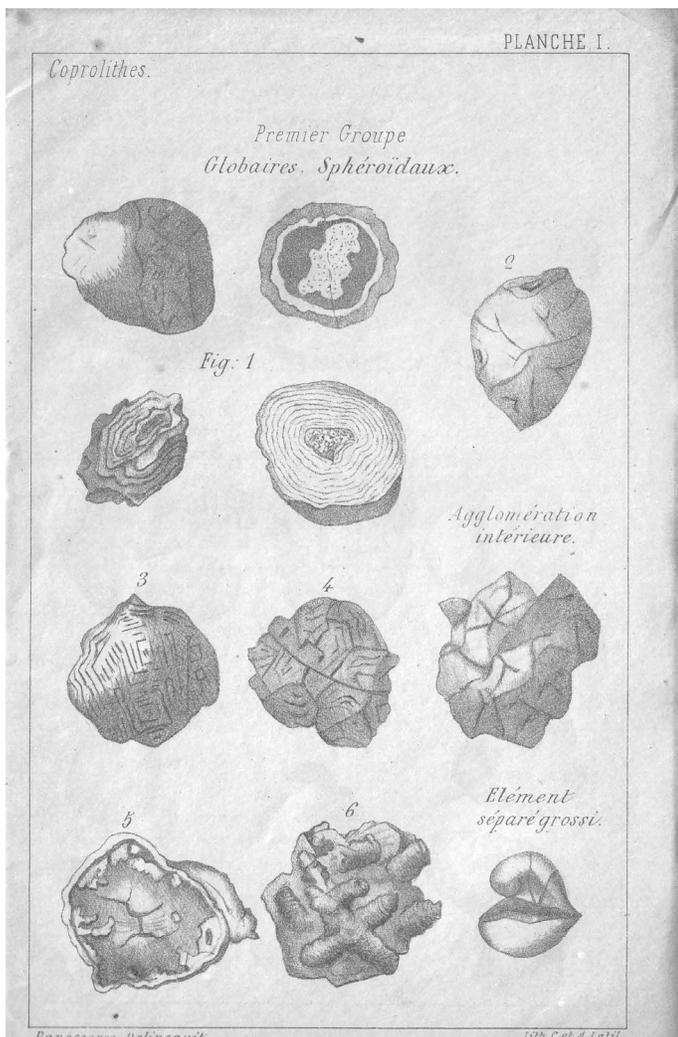


FIGURE 2. Panescorse's plate 1; Premier groupe - Globaires, Sphéroïdaux: 1, *Coprolithes globatus*; 2, *C. galloe-formis*; 3, *C. tuber plicatilis*; 4, *C. tuber mandroe formis*; 5, *C. geodes*; 6, *C. cristatus*.

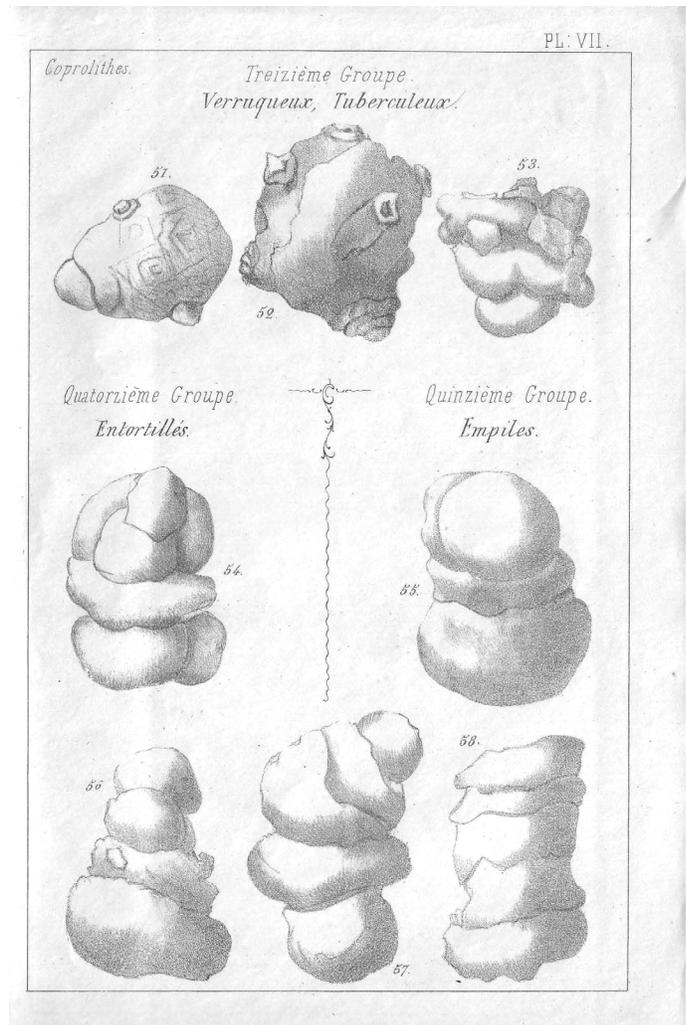


FIGURE 3. Panescorse's plate 7; Treizième groupe - Verruqueux, Tuberculeux: 51, *C. globus verrucosus*; 52, *C. cucurbita tuberculata*; 53, *C. diadema*. Quatorzième groupe - Entortillés: 54, *C. serpentinus*. Quinzième groupe - Empilés: 55, *C. triplex*; 56, *C. quadruplex*; 57, *C. quintuplex*; 58, *C. quinqueplanus*.

especially from the Muy Formation, the Mitau Formation and the Pradineaux Formation. These upper Permian units have also yielded rich palichnological assemblages (see Demathieu et al., 1992) and Panescorse mentions "des empreintes de pattes de batraciens" (batrachian footprints) found near Saint-Raphaël and sent by M. Francis Scribe to the Muséum d'histoire naturelle in Paris. Unfortunately he did not find such specimens himself, although they are quite frequent around Fréjus, and consequently he did not decide to describe them, rather focusing on his supposed coprolites. The Pradineaux Formation is also known for its numerous calcareous nodules interpreted as of palustrine origin (Toutin-Morin, 1985) and it is unfortunately clear that Panescorse's coprolites fall in this category. Ferdinand Panescorse, more than one century before, held another opinion on these nodules, as for him all of them were clearly coprolites.

"LES COPROLITHES FOSSILES DU VAR"

Panescorse's paper was published in 1872, with a reprint published the same year with no mention of the original publication in the Bulletin (Panescorse 1872b). Panescorse had announced his discoveries and their potential interest for agriculture some years before in a meeting of the "comices agricoles" in Aix-en-Provence (the comices were agricultural shows with meeting): "The Comices discussed the coprolithes [sic]

localities mentioned by M. Panescorse. Coprolites are petrified faeces and excellent fertilizers for agriculture. Their extraction may be a source of fertility for the department of the Var” (Anonymous, 1868).

In this 44-pages long paper, Ferdinand Panescorse described and illustrated himself (plate 1 mentions in Latin: Panescorse delineavit: see Fig. 2) many nodules found by him in the Var region, and considered by him as coprolites. Panescorse’s paper is rather disorganized and hard to follow, mixing sections on the geology of the Triassic near Draguignan, the phosphate industry from Russia to eastern France, or the description of a huge kidney stone of a horse. He mentioned coprolite localities from the Silurian to the Cenozoic but almost all the specimens he figured were found by himself at a few Permian localities near Fréjus. He discussed briefly the origin of his coprolites (p. 24), admitting that some of his “cow dungs” 35 cm in diameter looked like those of large mammals which did not exist in the Late Palaeozoic. He thus suggested that all his “coprolites”, including the largest, were produced by various kinds of fish.

He then embarked on a fascinating work classifying his specimens into 19 groups and 70 “species” according to their morphology, carefully drawing each morphotype (Figs. 2-4). Categories included “pyramidal” (group 11), “triangular” (group 10), “elongated” (group 5), “verrucous” (group 13), etc. It is interesting that his classification imitates a binominal classification, all specimens belonging to an “ichnogenus” Coprolithes (note that coprolite spells “coprolithe” in French) and various

“ichnospecies” the Latin name of which describes their morphology: Coprolithes pyramidalis (shape of a pyramid), Coprolithes cucurbita tuberculata (shape of a verrucous gourd), etc.

It may be that a few of the 70 “species” are real coprolites, such as some of those illustrated in figure 2, however most of them and more likely all of them are not: their irregular shape does not conform to what is known of coprolites, and none of them contain either bone fragments or scales, rather suggesting that they are nodules of sedimentary origin which are excessively abundant in the upper Permian formations near Fréjus. We have not found the specimens illustrated by Panescorse but some of the nodules (from the same localities) he generously offered to various museums were found by Eric Turini in the collections of the Muséum d’Histoire naturelle in Aix-en-Provence (Fig. 5) in December 2011. Interestingly they are not labelled as “coprolites” but as “phos-

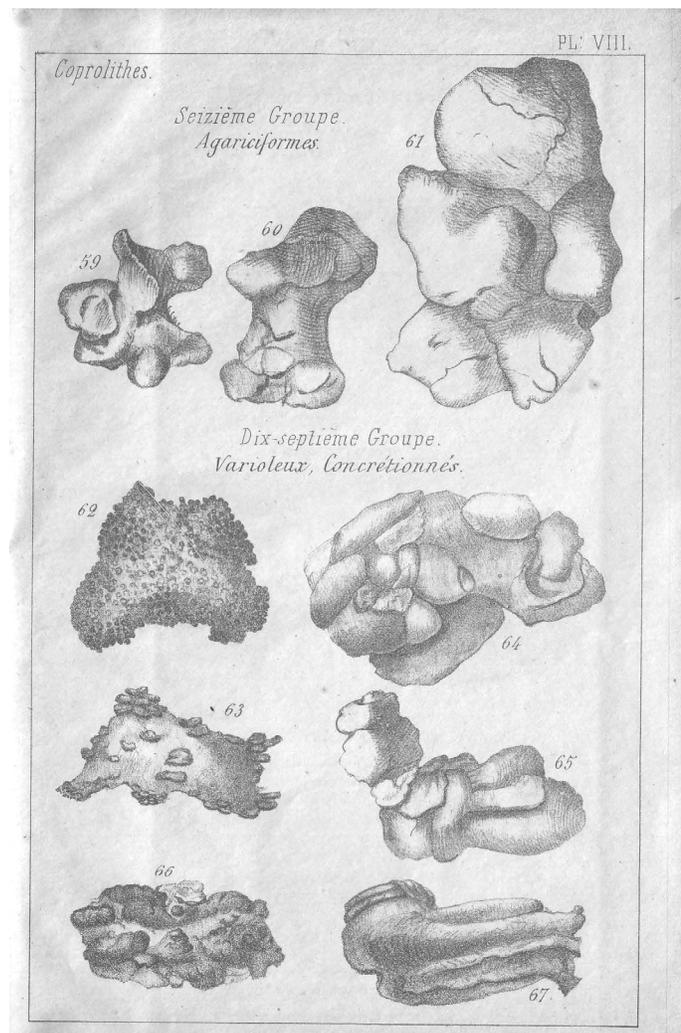


FIGURE 4. Panescorse’s plate 8; Seizième groupe – Agariciformes: 59, *C. agaricus*; 60, *C. nodus*; 61, *C. corolarius*. Dix-septième groupe – Varioleux et Concrétionnés: 62, *C. variolithes*; 63, *C. stalactites*; 64, *C. conglomeratus*; 65, *C. spirirorbis*; 66, *C. mammosus*; 67, *C. tofus*.



FIGURE 5. Two “coprolites” presented by Ferdinand Panescorse to the Muséum d’histoire naturelle in Aix-en-Provence in 1882 (courtesy Eric Turini). Grid = 1 cm.

phatic nodules”, thus attesting to the scepticism of Panescorse’s contemporaries. Their shape again strongly suggests that all the coprolites found by Panescorse are nodules of sedimentary origin.

Panescorse’s work has been largely ignored since its publication; among the few citations are two papers by H. Segond, another amateur geologist from Provence, about similar nodules found near Draguignan in Triassic levels (Segond, 1878, 1879) and a few notes by Panescorse himself about field trips around Fréjus (Panescorse, 1877a,b). Segond accepted their coprolitic nature, whilst noting the absence of bone fragments or fish scales inside them. We have not found scientific papers discussing Panescorse’s memoir, which apparently was quickly forgotten, not well disseminated and not really taken into consideration. Among the rare citations some are rather ironical such as one by Vallier (1882) who, after evoking the great living geologists of Provence Gaston de Saporta and Philippe Matheron, mentioned “M. Panescorse who collected and published a marvelous collection of specimens that science denoted of a technical name inspired from that of the Byzantine emperor Constantine Copronymus: I speak here of coprolites, these remnants of antediluvian fauna still looking forward to their Cuvier”.

CONCLUSIONS

Panescorse’s memoir on coprolites has been very rarely cited, except in some historical contributions (see Le Loeuff, 1992, 1998; Buffetaut et al., 1993). However it reveals a mind fond of all kinds of classifications, as well as an early interest for these strange objects whose real nature was still under discussion. Ferdinand Panescorse might have been an enthusiastic amateur naturalist but clearly he did not have a scientific mind. It is ironical that Panescorse was on the verge of much more interesting paleontological discoveries around Fréjus where many vertebrate footprints occur in the same strata as his “coprolites”. Panescorse never became the “Cuvier of dung”, as his “dung” was not what he thought it was which may confirm that the best described facts are not necessarily true to life.

ACKNOWLEDGMENTS

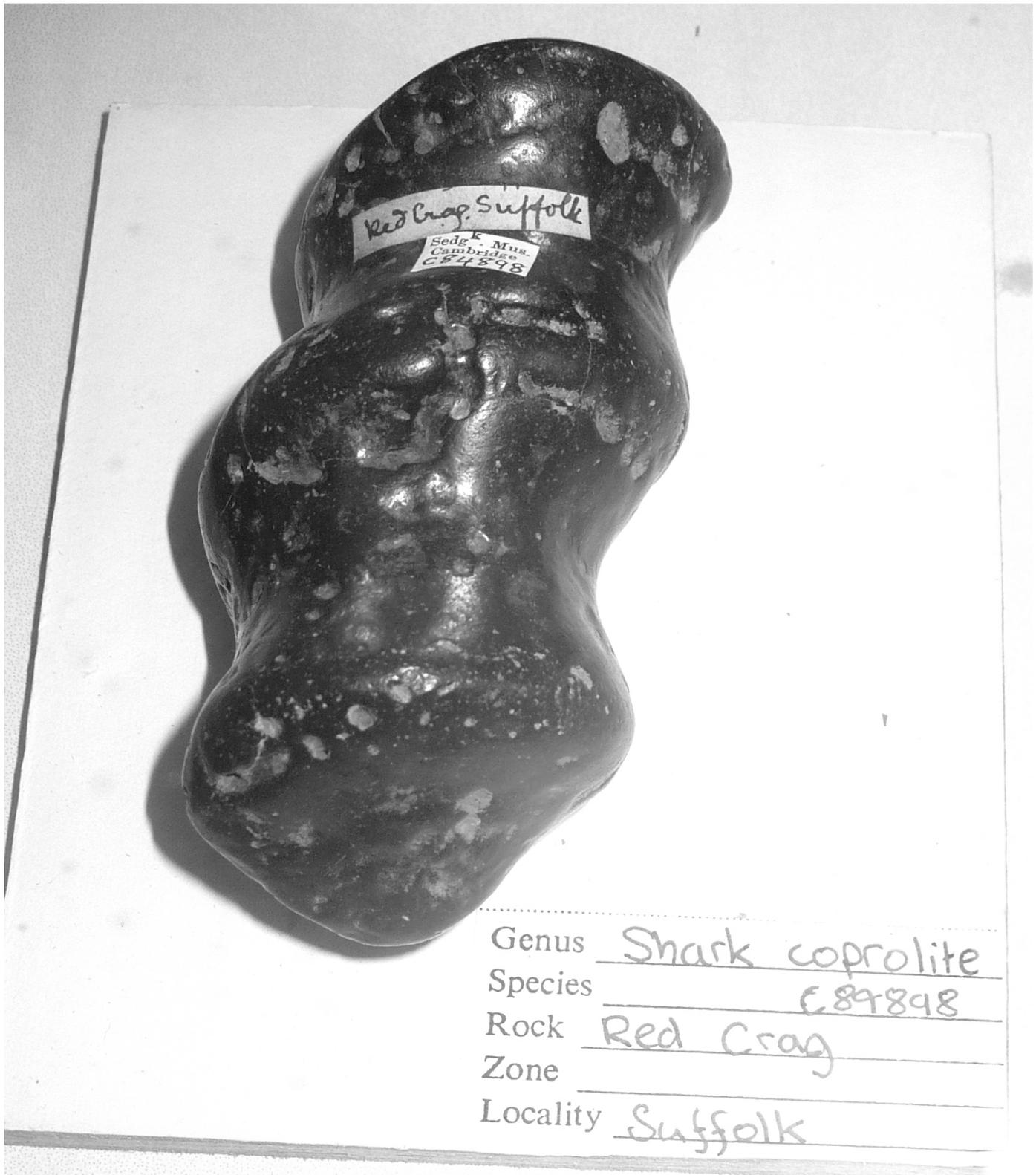
I thank Eric Turini (Muséum d’Histoire naturelle d’Aix-en-Provence), for providing useful documents and finding some of Panescorse’s “coprolites” in the Aix-en-Provence Museum’s collections. Thanks also to Patrick Méchin who provided the original citation of Ferdinand Panescorse’s work and to Jill Crome who improved the English of this paper. The comments of the reviewers Eric Buffetaut and Jesper Milan are greatly appreciated.

REFERENCES

- Anonymous, 1868, Une réunion du Comice agricole d’Aix: Le Mémorial d’Aix, Journal politique, littéraire, administratif, commercial, agricole et feuille officielle d’annonces légales, 32e année, n° 19, p. 2.
- Bobierre, A., 1861, Etudes chimiques sur le phosphate de chaux et son emploi en agriculture comprenant l’examen des coprolithes et nodules pseudo-coprolithiques, des phosphorites d’Espagne, des guanos terreux, etc.: Librairie agricole, Paris, p. 1–186.
- Buckland, W., 1829, On the Discovery of Coprolites, or Fossil Faeces, in the Lias at Lyme Regis, and in other Formations: Journal of the Geological Society, London, v. 3, p. 223–236.
- Buffetaut, E., 2006, La « ruée vers les phosphates » du dix-neuvième siècle : une aubaine pour la paléontologie des vertébrés: *Strata*, v. 13, p. 11–23.
- Buffetaut, E., Cuny, G. and Le Loeuff, J., 1993, The discovery of French dinosaurs: *Modern Geology*, v. 18, p. 161–182.
- Chateau, T., 1875, Etude pratique sur la fabrication du phosphate de chaux précipité extrait des coprolithes et autres phosphates minéraux: *Annales de la Société d’agriculture, sciences, arts et belles-lettres di département d’Indre-et-Loire*, v. 44, p. 272–290.
- Coquand, H., 1840, Cours de géologie professé au musée d’histoire naturelle d’Aix: Imprimerie Martin, Aix-en-Provence, p. 1–224.
- Demathieu, G., Gand, G. and Toutin-Morin, N., 1992, La palichnofaune des bassins permien provençaux: *Geobios*, v. 25, p. 19–54.
- Doublier, J.D., 1842, Ossements de saurien sur le terrain tertiaire du Var: *Bulletin de la Société Géologique de France*, v. 13, p. 449.
- Doublier, J.D., Panescorse, F., Hanry, H., Jaubert, J.B., Segond, A. and Maurin, F., 1853, Prodrome d’histoire naturelle du département du Var: P. Garcin, Draguignan, p. 1–490.
- Elie de Beaumont L., 1857, Etude sur l’utilité agricole et sur les gisements géologiques du phosphore. Imprimerie et librairie d’agriculture et d’horticulture: Bouchard-Huzard, Paris, p. 1–128.
- Feneulle, H., 1857, Analyse du coprolithe des Ardennes: *Mémoire de la Société d’émulation de Cambrai*, v. 25, p. 176–180.
- Flaubert, G., 2005 [1881], Bouvard and Pécuchet: Dalkey Archive Press, p. 1–328.
- Ford, T.D. and O’Connor, B., 2009, A Vanished Industry: Coprolite Mining: *Mercian Geologist*, v. 17, p. 93–100.
- Grove, R., 1974, The Cambridge Coprolite Mining Rush: Oleander Press: Cambridge, p. 1–51.
- Grove, R., 1974, Coprolite mining in Cambridgeshire: *Agricultural History Review*, v. 24, p. 36–43.
- Kessler, A. and Champy, E., 1867, Dictionnaire douanier ou nomenclature explicative officielle de tous les produits et marchandises figurant dans le tarif général de l’union des douanes allemandes: Dupont, Paris, p. 1–527.
- Lapparent, A.F. de, 1947, Les Dinosauriens du Crétacé supérieur du midi de la France: *Mémoires de la Société Géologique de France*, v. 56, p. 1–54.
- Le Loeuff, J., 1992, Les vertébrés continentaux du Crétacé supérieur d’Europe: *Paléoécologie, Biostratigraphie et Paléobiogéographie: Mémoires des Sciences de la Terre de l’Université Pierre et Marie Curie*, v. 92-3, p. 1–273.
- Le Loeuff, J., 1998, Les dinosaures du Crétacé supérieur de l’île ibéro-armoricaine: Abstracts of the 1st International Meeting on Dinosaurian Palaeobiology, Lisboa, p. 49–64.
- Molon, C. de and Thurneysen, 1856, Mémoire sur la découverte en France de gisements de phosphate de chaux fossile: *Comptes-rendus de l’Académie des Sciences de Paris*, v. 43, p. 1178–1182.
- Panescorse, F., 1872a, Etude sur les phosphates de chaux et les coprolithes fossiles du Var: *Bulletin de la Société d’agriculture, de commerce et d’industrie du département du Var*, 7è série, tome 1er, p. 113–144.
- Panescorse, F., 1872b, Etude sur les phosphates de chaux et les coprolithes fossiles du Var: C. & A. Latil, Draguignan, p. 1–44.
- Panescorse, F., 1877a, Excursion géologique et minéralogique dans l’Estérel (Var): *La Feuille des jeunes naturalistes*, v. 81, p. 115–117.
- Panescorse, F., 1877b, Seconde excursion géologique & minéralogique dans l’Estérel (Var): *La Feuille des jeunes naturalistes*, v. 84, p. 154–156.
- Segond, H., 1878, Etudes sur le Trias. Les concrétions (coprolithes) du Muschelkalk de Draguignan (Var): *La Feuille des jeunes naturalistes*, v. 98, p. 20–23.
- Segond, H., 1879, Etudes sur le Trias. Les concrétions (coprolithes) du Muschelkalk de Draguignan (Var) – deuxième partie: *La Feuille des jeunes naturalistes*, v. 99, p. 32–35.
- Segond, H., 1888, Nécrologie de M. Ferdinand Panescorse: *Bulletin de la Société d’études scientifiques et archéologiques de la ville de Draguignan*, v. 17, p. xxvii–xxviii.
- Teissier, O., 1890, Henry Panescorse: *Bulletin de la Société d’études scientifiques et archéologiques de la ville de Draguignan*, v. 18, p. v–xii.

Toutin-Morin, N., 1985, Les dépôts carbonatés lacustres et palustres du Permien provençal : différences et significations: Comptes-rendus de l'Académie des Sciences de Paris, v. 203, p. 1423–1428.

Vallier, G., 1882, Iconographie numismatique du Roi René et de sa famille: Mémoires de l'Académie des Sciences, Agriculture, Arts et Belles-Lettres d'Aix, t. XII, 26–101.



Typical spiral morphology from Red Crag, UK. Collected due to coprolite mining