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### Monographs of the Palaeontographical Society

The Palaeontographical Society was established in 1847, and is the oldest Society devoted to study of palaeontology worldwide. Its primary role is to promote the description and illustration of the British fossil flora and fauna, via publication of an authoritative monograph series. These monographs cover a wide range of taxonomic groups, from microfossils, trilobites and ammonites through to Coal Measure plants, mammals and reptiles, and from all ages from Cambrian to Pleistocene. They form a benchmark for understanding the past life of the British Isles and many include the original descriptions of numerous key species. The first monograph (on the Crag Mollusca) was published in March 1848 and the Society still continues this work today. Notable authors in the series include Charles Darwin (fossil barnacles) and Richard Owen (dinosaurs and other extinct reptiles). Beginning in 2014, the Cambridge Library Collection and the Society are collaborating to reissue the earlier publications, focusing on monographs completed between 1848 and 1918.

### A Monograph on the British Fossil Echinodermata of the Oolitic Formations

Urged by his colleague Edward Forbes, Thomas Wright (1809–84) devoted himself to completing this monograph of the echinoderms ('spiny-skinned animals') of Britain's Oolitic Formations. These would be referred to as Middle Jurassic by the modern geologist. This is a notable contribution, describing as it does the echinoderms following a major stratigraphic gap. In the British Isles, apart from some minor occurrences in the Permian and Lower Jurassic, echinoderms are almost entirely absent from the Lower Carboniferous (Mississippian), a span we now know to represent 150 million years. Although common and diverse elsewhere during this interval, the British Oolitic echinoderms show many changes from those of the Mississippian. Wright's two-volume monograph includes thorough descriptions and locality details, all supported by beautiful plates. Volume 1, originally published in four parts between 1857 and 1861, considers the many and varied echinoids (sea urchins) of the Middle Jurassic.

# A Monograph on the British Fossil Echinodermata of the Oolitic Formations

VOLUME 1

THOMAS WRIGHT

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# A MONOGRAPH

ON THE

# BRITISH FOSSIL

# ECHINODERMATA

OF

## THE OOLITIC FORMATIONS.

BY

THOMAS WRIGHT, M.D., F.R.S.E.

PART FIRST,

CONTAINING

THE CIDARIDÆ, HEMICIDARIDÆ, AND DIADEMADÆ.

LONDON:
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1855.

J. E. ADLARD, PRINTER, BARTHOLOMEW CLOSE.

# PREFACE.

In presenting the First Part of my Monograph on 'British Fossil Echinodermata' to the members of the Palæontographical Society, I deem it necessary to make a few remarks in order to explain—1st, how I came to occupy the position of an author in the magnificent volumes published by your Society; and 2dly, to state the manner in which I have endeavoured to discharge the duties of the task I have undertaken.

After the publication of my 'Memoirs on the Echinodermata of the Oolites,'* in the 'Annals of Natural History,' my much lamented friend, the late Professor Edward Forbes, as a member of your Council, asked me to contribute a Monograph on the same subject to the Palæontographical Society. Knowing that he had in preparation a supplementary chapter on the Echinoderms of the Great Oolite, for Messrs. Morris and Lycett's Monograph on the Mollusca of that Formation, I thanked him for the good opinion he had formed of my ability for such a work, but declined, lest, by complying with his request, I might possibly have interfered with any intentions of his own on the subject, knowing how ardently he loved all that related to this class of the Animal Kingdom. As Professor Forbes, however, on another occasion, renewed, in the most pressing manner, his solicitation, I then proposed to join him in a Monograph on the British Fossil Echinodermata of the Secondary Formations, which he at once agreed to, and the proposal for this joint work was submitted to the approval of your Council, and received its sanction.

The numerous and constantly increasing duties of my esteemed colleague at the School of Mines prevented him from taking any share in the collection of materials for the preparation of the Monograph on the Oolitic Echinodermata, and, with his usual candour, he told me that, as he was unable, from want of time, to contribute to this division of our proposed joint work, his name must be withdrawn from its title page; and, if agreeable to me, that I should undertake the Monograph on the Oolitic species, whilst he would devote himself to the description of the Cretaceous forms. After this arrangement, I directed my attention with redoubled energy to the subject of my special studies.

On his appointment to the chair of Natural History in the University of Edinburgh, Professor Forbes took with him the materials for the first part of his promised Monograph

* 'Annals and Magazine of Natural History,' new series, vol. viii, 1851.

on the Cretaceous Echinoderms; but, alas! his untimely and much-lamented death prevented him from even commencing that work upon which his mind had been so long and busily engaged, and which was looked forward to with so much interest by all who knew the high qualifications of my friend for his selected task. But the mysterious decrees of Providence disappointed our expectations, and at the same time deprived Natural Science, in this country, of one of its brightest ornaments and warmest advocates. It would be doing violence to my own feelings if I did not, on this occasion, record the high estimation in which I held the opinions of my distinguished colleague on all points relating to the work we had undertaken together, and the uniform deference I paid to his suggestions, as to the best mode of executing the same, which were always dictated by that kindness, frankness, and wisdom so characteristic of the man.

Having been thus thrown entirely on my own resources, before the real difficulties of the work began, I have experienced more than ever the deep responsibility of the task I have undertaken. I trust the circumstances I have narrated will entitle me to the consideration and indulgence of all who know the nature and amount of the difficulties to be grappled with in a work like that in which I am engaged, and the time and labour necessary to overcome them. I can only add, that I have spared neither time, labour, nor research, in order to make this Monograph worthy of the confidence originally reposed in me; but how far I may have succeeded in my efforts, it remains for others to decide.

At the suggestion of my excellent friend, Thomas Davidson, Esq., author of the magnificent Monograph on the Brachiopoda, and several other kind friends interested in the success of this work, it was thought advisable that, at the conclusion of my Monograph on the Oolitic species, I should proceed with the description of the Cretaceous forms, in order that a greater unity in the arrangement and management of the subject might be observed in the two Monographs on the Echinodermata of the Secondary rocks; and a proposal to this effect has been submitted to your Council, and received its sanction.

I have ventured to propose some important alterations in the classification of the Echinoidea, and have grouped the genera into thirteen natural families, many of which are entirely new. My object has been to attain a more natural method, and thereby facilitate the study of the different groups. I have given an analysis of these families at the commencement of the work, and enumerated the most common types of each.

In the description of the species, I have taken them in their stratigraphical order, always commencing with the species found in the oldest rock in which the genus is discovered, thus — *a*, Lias, Lower, Middle, and Upper; *b*, Inferior Oolite; *c*, Great Oolite, including Fullers-earth, Stonesfield Slate, Great Oolite, Bradford Clay, Forest Marble, and Cornbrash; *d*, Oxford Clay; *e*, Coralline Oolite, including Calcareous Grit, and Coral Rag; *f*, Kimmeridge Clay; *g*, Portland Oolite; *h*, Purbeck Beds;—so that my work has the double advantage of being stratigraphical and palæontological at the same time, a mode of treating the subject which I hope will prove useful and convenient to geologists.

Many of the readers of this Monograph will probably be surprised to find some old generic names reproduced, which have long been superseded by those of modern writers; but a sense of justice to such authors as Van Phelsum, Breynius, Klein, and Leske, has led me to consult their original works, and restore the genera first described and figured by them, but omitted from the treatises of later authors on the same subject. In the nomenclature of the Echinodermata, had I merely gone back to the time of Linnæus, as suggested by the committee of the British Association in their report made in 1842, I must necessarily have excluded the important work by Breynius,* in which, for the first time, were proposed seven well-described and accurately figured genera of Echinoidea, which, by some strange oversight, were not adopted by his contemporaries, although they have reappeared under new names in the works of later authors. On the principle of priority, therefore, I have restored the original genera so clearly defined by Breynius, even although it may occasion a temporary inconvenience in the names of some well-known forms of urchins.

In every case, where practicable, the name of the author who either first recorded, described, or figured the species, follows the specific name of the object, without the addition of "Sp." adopted by some authors. By this mode justice is done to the original author, and confusion avoided. The modern practice of inventing and changing generic names, and appending to the old specific name that of the individual who has merely changed a name, but discovered nothing, cannot be sufficiently discountenanced, as it greatly increases the confusion arising from an already overloaded synonymy, and thereby retards the real progress of the natural history sciences.

The accurate determination of species, and their distribution in time and space, form problems of the highest importance to the palæontologist, as their true solution are the only certain guides of the geologist in his investigations in the field, and his generalizations in the study: for the classification of strata, the subdivision of rock groups, and the boundary lines between different formations, are all points which are more or less affected by the soundness of his conclusions.

In determining the species of Echinodermata, therefore, the most careful comparison has been made with the true type forms to which they are referred, and the extent of the section in the description of the species, on the affinities and differences exhibited by each with other Foreign and British congeneric forms, will show how much care has been taken to arrive at a correct determination.

The range and stratigraphical position of the species described in this work has occupied much time and attention, as many errors found in previous lists of Oolitic Echinodermata required considerable research to correct; for experience has taught me that, unless the palæontologist can verify for himself the statements of his collectors, he will frequently be led into similar errors. In every instance, with the exception of the Northamptonshire beds, which have been carefully noted by my friend the

* De Echinis et Echinitis, sive Methodica Echinorum distributione, Schediasma. Gedani, 1732.

Rev. A. W. Griesbach, I have visited the different localities given in this work, and with my own hammer ascertained the presence of the species in the rock whence they are stated to be obtained; the most perfect confidence may therefore be placed in the notes on the stratigraphical distribution of the species, as the greatest care has been taken in order to arrive at the truth.

As the Oolitic rocks of Europe were deposited in basins of greater or less extent, it follows that many contemporary species which lived on different shores of these ancient seas will, from time to time, be discovered; and Foreign species, hitherto found only in the Oolitic rocks of the Continent, will doubtless be discovered in strata of the same age in England, and *vice versâ*. I have, therefore, at the end of the description of the species of each genus, for the purpose of easy reference in the event of new species being found, appended original notes on Foreign Oolitic species of that genus most nearly allied to our own forms, but which have not as yet been found in the English Oolites. The Foreign species are printed in a different type, and the notes are placed at the end of the section to which they belong. The short diagnosis I have given of each species is drawn from authentic specimens kindly contributed by several distinguished foreign friends, whose names are mentioned in connection with their specimens. A reference is made to the best figures of each species extant; and for the localities in which they are found, and the collections in which the types are contained, I have consulted with much advantage M. Desor's excellent 'Synopsis des Échinides Fossiles,' now in course of publication.

It is now my pleasing duty to return my most sincere thanks, either for the loan of specimens, or permission to inspect their collections in quest of new forms, to Mr. Pickering and Mr. King, Malton; Mr. Charlesworth, York; Mr. Waite and Mr. Duck, Calne; Mr. William Buy, Sutton; Mr. Bean, Scarborough; the Hon. Mr. Marcham; Mr. H. C. Sorby; Mr. W. Cunnington, Devizes; Mr. Walton and Mr. Bush, Bath; Mr. Mackneil, Wotton-under-Edge; the Rev. P. B. Brodie, Rowington Vicarage, near Warwick; Mr. John Lycett, Minchinhampton; Mr. John Jones, Gloucester; Professor Buckman and Mr. Bravender, Cirencester; Professor Morris, Professor Tennant, and Mr. J. S. Bowerbank, London; Mr. W. M. Tartt, Mr. Charles Pierson, Mr. Thomas Bodley, and Mr. Edward Hull, F.G.S., Geological Survey, Cheltenham.

I beg to tender my especial thanks to the Rev. A. W. Griesbach, of Wollaston, for several valuable contributions, consisting of many fine series of different species of Echinoderms from the Great Oolite, Forest Marble, and Cornbrash of Northamptonshire, likewise for the labour he has bestowed in finding some rare species, and ascertaining many valuable facts relative to the distribution of the species found in his county; to Mr. J. Graham Lowe, Kensington Park, for the gift of *Pygaster umbrella*, Lamk., from the Coral Rag; and to Mrs. Lowe for the gift of the rare *Asterostoma excentricum*, Agass.; to Dr. Symes, Bridport, for a fine *Clypeus Agassizii*, from the Inferior Oolite of Chideock; to Mr. Charles Moore, Bath, for the gift of some rare specimens from the

Upper Lias of Ilminster; to Mr. Etheridge, Bristol, for several rare urchins; to Mr. G. E. Gavey, C.E., for the donation of several fine CRINOIDEA and ASTEROIDEA, from the Middle Lias of Chipping-Campden, and for the loan of his finest specimens for figuring in this work; to the Earl of Ducie, for the loan of his unique *Solaster Moretonis*, Forbes, and several fine Cretaceous Cidaris and Star Fishes; to Mr. John Leckenby, Scarborough, for much useful information relative to the distribution of the Yorkshire Oolitic Echinodermata, and for the gift of several specimens; to Dr. Murray, Scarborough, for the donation of several rare Coralline Oolite *Pygasters* and *Pyguri*, collected by him at Ayton; to Mr. Reed, York, for much valuable information regarding the Whitwell beds of Inferior Oolite, and for the gift of type specimens of *Pygaster semisulcatus*, Phil., and *Echinus germinans*, Phil.; to Mr. Wood, Richmond, Yorkshire, for the gift of fine specimens of *Echinobrissus orbicularis*, Phil., *Echinobrissus dimidiatus*, Phil., and *Woodocrinus macrodactylus*, de Koninck, and for kindly placing his beautiful collection of CRINOIDEA at my disposal; to Mr. Charles Fowler, Cheltenham, for the gift of *Cidaris Fowleri;* to Mr. Davidson, of Brighton, for the uniform interest he has taken in the success of this work, for the specimens he has contributed, the manuscript plates he has lent, and the introductions he has given me to several distinguished Continental naturalists, who have kindly supplied much useful information.

I desire to make my warmest acknowledgments to M. Michelin, of Paris, who possesses the finest collection extant of living and fossil Echinodermata, for the magnificent series of type specimens he most generously contributed to my cabinet for comparison with English forms; to M. Bouchard-Chantereaux, of Boulogne, for a series of Echinoderms from the Oolitic rocks of the Boulonnais; to M. Cotteau, of Coulommiers, for the types of the species described by him in his 'Études sur les Échinides Fossiles du département de l'Yonne;' to M. Triger, of le Mans, for a suite of specimens collected by him from the Oolites in the departement de la Sarthe; to Professor Deslongchamps, of Caen, for the specimens collected by him from the Oolites of Calvados, and determined by M. Agassiz; to M. de Lorière, of Paris, for many rare urchins from the département de la Sarthe; to Professor Roemer, for the types of several of his brother's species from the Oolites of Hanover; to Dr. Fraas, of Stuttgart, for the types of many of Count Münster and Professor Goldfuss's species from the Royal Museum of Württemberg; to Professor de Koninck, of Liège, Dr. Oppel, of Stuttgart, and M. Sæmann, of Paris, for good types of many Foreign species.

My warmest thanks are likewise due to my friend Mr. S. P. Woodward, of the British Museum, for kindly acting as my referee in the prosecution of this work, and for the many valuable suggestions he has made during its preparation and progress, as well as for the assistance he has given me in comparing my specimens with Foreign types in the British Museum, and aiding in the determination of dubious forms.

The late Sir Henry de la Beche, Director-General of the Geological Survey of Great Britain, most liberally gave me free access to all the specimens contained in the Geological

Museum in Jermyn Street; and the same privilege has been most kindly renewed by his distinguished successor, Sir Roderick I. Murchison, to whom I beg to tender my warmest acknowledgments. I am under many obligations to my friend Mr. Waterhouse, of the British Museum, for his kindness in allowing me to examine all the Echinoderms in the National Collection, and his permission to figure those I have selected for this purpose. Professor Sedgwick, of Cambridge University, at my request, most liberally communicated the types of Professor M'Coy's new species of urchins, described in the 'Annals of Natural History.' Mr. Rupert Jones has at all times given me free admission to examine the rich cabinets of the Geological Society of London. Professor Phillips, of Oxford, has afforded me much useful information relative to the species of Echinoderms first figured in his valuable work on the 'Geology of Yorkshire.' To each of these kind friends I beg to tender my most grateful acknowledgments.

My best thanks are likewise especially due to Messrs. Bone and Baily, for the great care they have bestowed on the beautiful plates that enrich my Monograph, which, for scientific accuracy in details, and artistic effect in execution, are second to no lithographs of similar objects extant.

THOMAS WRIGHT.

EXETER PLACE, CHELTENHAM;
*August*, 1856.