



*S. P. Woodward*

## I.

## A MEMOIR OF

DR. S. P. WOODWARD, A.L.S., F.G.S., &amp;c.

WITH A LIST OF HIS PUBLISHED PAPERS.

BY HORACE B. WOODWARD, F.G.S.

*Read 26th April, 1881.*

The roll of Norfolk Naturalists would be incomplete without the name of S. P. Woodward. Although his contributions to the Natural History of his native county are small, yet in wider fields his published works have occupied an influential position; and his 'Manual of the Mollusca' alone sufficiently proclaims the author to be one of the scientific men of mark of whom Norfolk may justly be proud.\*

To the class of Naturalists of whom Edward Forbes was pre-eminently the leader, belonged the subject of this memoir. In boyhood a student of insects, he became later on an ardent collector of plants, and an excellent botanist; geology next took up most of his attention; and, finally, he devoted himself to the particular study of the Mollusca, with a perseverance that led him to be recognized as the highest living authority on recent and fossil shells.

As a Natural History Reviewer his "Literary Remains," published in the 'Critic' and other periodicals, have commended themselves to all who have read them, by their pleasant style, their valuable criticism, and the many original remarks with which they are interspersed.

Such a bald statement, even if accompanied by a list and analysis of his chief scientific works, would give but little idea of the man, of his passionate love of Nature, and his earnestness in striving to do thoroughly whatever he undertook. The story of his life may present few incidents of particular interest to Naturalists, and I shall attempt no more than an outline of its leading features; but the position he had gained for himself, and the esteem in

\* A short memoir of S. P. Woodward was given in 'Men of the Time,' by E. Walford (1862).

which he was held by men like Sedgwick, Darwin, Lyell, and Owen, not to mention other distinguished men of science, leave me no room to doubt that I do right in offering this tribute in memory of him to the 'Transactions of the Norfolk and Norwich Naturalists' Society.'

His scientific works are so well known to all who would be interested in them, that the list appended to this memoir will in most cases sufficiently indicate his labours. My object will be to sketch some of the surroundings and circumstances of his life, that served to prompt his undertakings.

Samuel Pickworth Woodward was the second son of Samuel Woodward of Norwich, and was born in Briggs Lane, in that city, on the 17th of September, 1821. His father, at that date (and until his death in 1838) a clerk in Gurneys' Bank, was well known as an enthusiastic Naturalist, and especially for his researches into the Antiquities and Geology of Norfolk.\*

In 1828, when seven years of age, S. P. Woodward was placed at the Priory school, at Grayfriars (situated near the top of what is now the Prince of Wales' Road, in Norwich), conducted by Mr. William Brooke, where he received a sound knowledge of Latin and Greek, besides the ordinary English subjects. In 1831 his father removed to Grove Cottage, Lakenham, where the remaining years of his childhood were spent. As a boy he often accompanied his father, his elder brother B. B. Woodward, and their school-fellow T. G. Bayfield, on country walks; sometimes to the crag-pits at Bramerton, Postwick, and Thorpe, at other times in search of plants on Mousehold, and on the heaths and marshes of St. Faith's, Horsham; and no doubt these excursions kindled the love of Natural History which influenced his after-life.

As before mentioned, entomology was his earliest recreative science, and on one occasion he brought home some specimens of the Hymenopterous insect *Trichiosoma lucorum*, a notice of which his father contributed to the 'Magazine of Natural History' on the 16th May, 1831, accompanied by a drawing (which was engraved) made by his little son, then nine and a half years of age, and entirely self-taught.†

\* A memoir of Samuel Woodward was published in the Trans. Norfolk and Norwich Nat. Soc. vol. ii. p. 563.

† See Mag. Nat. Hist. vol. v. (1832) p. 86.

His half-holidays were mostly spent in rambles with his brother Bernard, and in learning the names of the birds, and butterflies, and flowers they noticed in their walks. Nor did they neglect the "slugs and snails," for they searched the country round, and collected in hedge and marsh nearly a hundred species. Many years later he spoke of the hours thus spent as among the pleasantest recollections of his school-boy days.

In June, 1835, S. P. Woodward, then not quite fourteen years of age, stayed a short time at Yarmouth, with Mr. Dawson Turner, F.R.S., having been asked to collect plants for him. Early in the following year (1836) his school-days had terminated, and he was engaged by Mr. Turner to work at his extensive collection of dried plants. Accordingly he left Norwich in February by the river-steamer, and found the passage over Breydon very pleasant. Writing home, he observes that

"Hundreds of little snow-white Gulls and Terns were running about the sands, the Herons were wading breast deep in the shallow water, every post had its long-necked Cormorant, and large flocks of Royston Crows\* were picking shells out of the mud banks, which being covered with grass wrack looked more like a common intersected by ditches than a quicksand which would at most bear a duck or a gull."

He found plenty to do when he arrived at his destination, and in writing to his mother he says: --

"My work this morning [Feb. 16th, 1836] consisted in carrying the plants from the Ante-library to the Attic, up two long flights of stairs, more than twenty times, with as many as I could possibly carry, Mr. T. laughing all the time in a manner peculiar to himself."

"Mr. T.'s collection consists of almost all the British flowering plants, a vast number of foreign plants, mosses, fungi, &c., &c., named and arranged according to the old system. These I shall have to clean, re-name and arrange according to the present systems. Besides these, Mr. T. has a great quantity of unarranged plants (many hundreds) which I shall have also to clean, name, fasten on paper and arrange; they are mostly in parcels just as they were sent from all the great botanists who lived twenty or thirty years ago, some of the plants have been in the papers they are now in more than forty years, and the worms have eaten them through and through, but they are very valuable nevertheless!"

In this employment he made great progress with his botanical knowledge, and for some years afterwards the study of plants

\* Hooded or Norway Crow.



became the pastime of his leisure hours. In the course of time he formed a large and valuable herbarium himself, chiefly made between the years 1835—50, and which was ultimately purchased for the Royal Agricultural College at Cirencester.

Many years later, in reviewing the 'Foot-notes from the Page of Nature' (by the Rev. Hugh Maemillan, 1861), he observed, the author's "genial enthusiasm brings back to us recollections of our own beginnings in botany; the pleasure of gathering a plant at the place where some master of the science had found it many many years before, and the disappointment experienced when we failed—as in the case of the *Buxbaumia* (*B. aphylla*), that queer little moss named after a queer old German, which Sir W. Hooker first discovered in England at a spot where we have spent many a holiday." This was in a fir plantation at Sprowston, near Norwich. His herbal was indeed a source of great delight: to him "there was a tale on every page—the flowers were the book of his remembrance;" and yet a companion once likened it "to so much donkey's feed"!

In 1837 he went to Fakenham, as usher in Mr. Carr's school, but was unable to settle there, and left after three months. During his stay he made the acquaintance of Mr. Legge (the independent minister); and of Mr. J. Gage Pigg,\* a student then reading for college, the friendly intercourse with whom exercised considerable influence upon his religious sentiments.

After leaving Fakenham he was employed for a time in the office of Mr. Brightwell, a lawyer in Norwich; but early in the following year (1838) his father died, and thenceforth he was thrown entirely upon his own resources.

Shortly afterwards he went to London, at the request of Mr. Hudson Gurney, to arrange and catalogue the library at his town residence in St. James' Square; and through Mr. Gurney's influence he obtained, in May, an appointment in the library of the British Museum. This office he filled little more than twelve months, being elected next year (1839), chiefly on the recommendation of Professor Sedgwick, to be Sub-ordinator to the Geological Society of London, an office then vacant through the resignation of Mr. Searles V. Wood.

\* Afterwards minister of Marlborough Chapel, Old Kent Road, London. He died in 1861.

Mr. William Lonsdale, of whom my father speaks as "his friend and master" \* was then the curator. S. P. Woodward entered upon his duties at Somerset House † on June 1st, 1839, and was employed in arranging, labeling, and cataloguing specimens, in drawing illustrations for the evening-meetings, and in attending the students and visitors who then, much more often than now, consulted the Society's Museum. His occupations were congenial, and he set to work "with zeal and assiduity." Fortunate indeed was he, while in the service of this Society, in working under the immediate direction of such a man as Lonsdale, who, besides his extensive and accurate knowledge of paleontology, had been educated to the profession of a soldier, and, to quote the words of Dr. Fitton, brought into the service of the Society "some of the best qualities of the military character,—singleness of purpose, the strongest sense of duty and subordination, with such devoted energy in the performance of whatever he undertook, as too often led him to exertions beyond his strength."

Partly, no doubt, to Mr. Lonsdale's example he acquired those habits of scrupulous neatness in his arrangements of books, specimens, and papers, and in writing on tablets, &c., which formed a remarkable trait in his character. Unfortunately it may be said of him as of Lonsdale, that his spirit "no labours could have tried," but the "frame of adamant" was wanting. ‡

While his attention was confined to geological subjects during the day, he gave up much of his spare time to botany. In 1839, he was elected a member of the Botanical Society of London, which had been instituted November 29th, 1836, mainly with the object of promoting the exchange and distribution of plants. Of this Society in 1843, Mr. J. W. Ewing of Norwich, the Rev. George Munford of East Winch, and Daniel Stock of Bungay, were local secretaries. He also belonged to a Botanical Club, of which Adam White, Edward Doubleday, G. E. Dennes, Arthur Henfrey, and others, were members. It is also noteworthy, as a matter of local interest, that a Botanical Society was in 1841 (September 6th) established at Holt, of which Mr. J. W. Bloy was the secretary.

\* Preface to the 'Manual of the Mollusca.'

† The Society now has rooms at Burlington House.

‡ Remarks at Anniversary Meeting of Geological Society, 1846.

In 1840 my father spent a short holiday with Mr. Dawson Turner at Yarmouth, and made many botanical excursions, some in company with the Rev. John Gunn. He says, in a letter to a friend, on Tuesday, July 23rd, "we went to Upton Broad, St. Bennet's Abbey, and Mr. Gunn's house at Smallborough, where we slept—this was my hardest day's work, there I gathered my rarest plant, it cost me a jump into the water, and a dozen miles walking afterwards." And he "was covered to the waist with mud."

He also collected nineteen species of 'Crag-shells' from the "washed beds" at Scratby, Caister, and Gorleston, including an entire specimen of *Voluta Lamberti*, which he obtained in company with Mr. Gunn at Scratby. These beds have since been carefully examined by Messrs. Wood and Harmer, and grouped by them as "Middle Glacial."

His assistance was acknowledged by Edward Newman, in his 'History of British Ferns,' published in 1840; and in the following year, when but twenty years of age, he communicated his first scientific paper to the 'Annals and Magazine of Natural History.' It was entitled the "Flora of Central Norfolk," being "Addenda to Mr. Mann's List of Norwich Plants," published in a previous number of the magazine.

In the same year (1841) he was chosen as an Associate of the Linnean Society, a purely honorary election, as but a limited number of associates are made.

Among the prominent members of the Geological Society at this time were Fitton, Sedgwick, Buckland, Lyell, Murchison, Henslow, Whewell, and De la Beche; while among younger members of the council were Darwin, Owen, and Sir Philip Egerton.

There was a vigour and freshness about the science of Geology which gave rise to papers of general interest, and led to interesting and warm discussions at the Society's rooms.\* Thus, in June, 1840, Agassiz for the first time pointed out the evidence of the former existence of glaciers in the British Islands, and in November of the same year, the subject was taken up by Buckland. Some notes of the discussion which followed the reading of their papers before the Geological Society, were made at the time by my father.

\* See 'Life of Sir Roderick I. Murchison,' by Archibald Geikie, vol. i. p. 195.

Buckland pointed to the evidence furnished by groovings on the rock-surfaces, and to the scratches on the boulders; but he met with much opposition from Murchison, Whewell, and Greenough. After an animated debate, Buckland rose to reply, expounding at some length the doctrines of the new theory; and in concluding, with a look and tone of triumph, he pronounced upon his opponents who dared to question the orthodoxy of the glacial scratches, when they should come to perdition, the pains of eternal itch, without the privilege of scratching!!'

My father was a great lover of poetry, many of his earlier letters are full of it; while, among prosaic works, he speaks with enthusiasm (when twenty-two years of age) of Herschell's 'Astronomy,' Sedgwick's 'Discourse on the Studies of the University,' and Whewell's 'Bridgewater Treatise' on Astronomy and General Physics. Carlyle has said that "a man's religion is the chief fact with regard to him;" and as in this age of freethought, science is too often regarded as the enemy of religion, I should not omit to mention that my father was ever animated by a deep appreciation of those doctrines of Christian teaching, which in their highest human development rise above all fixed creeds and formularies. His religious views, as before mentioned, had taken their inspiration at the fount of the Congregational Independents, and for a time he taught in the Abney Chapel Sunday School in London; while his sentiments were further strengthened by intercourse with his brother Bernard, who had entered the Highbury Theological College, and afterwards accepted charge of a congregation at Harleston. Although in after years his views broadened, and his ideas of the Sabbath enabled him to enjoy a country ramble, or a few hours' gardening, he never hesitated to make a determined stand against the materialistic teachings that have been deemed, though far from rightly, as the logical outcome of scientific culture.

From the year 1841 to 1856 (excepting only 1852) he attended every meeting of the British Association, acting as reporter of the Geological Section for the 'Athenæum.' His accounts, which contained full notes of the discussions, are elaborate and interesting. The journeys he thus made, which always included a walking tour, afforded him many opportunities of adding to his herbarium, and making observations on various geological subjects. His note-



books are filled with miscellaneous memoranda and drawings. Here, lists of plants; there, a sketch of some village church; memoranda on fossils, descriptions of scenery, and not a few extracts of poetry. On November 17th, 1843, he read before the Botanical Society of London some "Notes of a Botanical Excursion in Warwickshire, Worcestershire, Wales and Ireland." This was a rambling account principally of the ferns and flowers he met with, accompanied by references to the geological features.

21 Under the direction of Mr. (afterwards Sir Roderick) Murchison, he prepared in 1843 the Geological Map of England and Wales, published by the Society for the Diffusion of Useful Knowledge; and another edition published *in relieve* by Messrs. Dobbs & Co.

While fortunate in working under Lonsdale, equally so was he when, in 1842, the Curator resigned his position at the Geological Society, and Edward Forbes was appointed in his stead, as Curator and Librarian. The friendship then formed was enduring, and through Forbes' researches on the Mollusca my father's particular attention was no doubt concentrated later on upon this subject. With such an enthusiastic and gifted colleague, the museum work must have been carried on with great delight, and as Forbes became professor of Botany, in King's College, there were many bonds of sympathy between them. Forbes resigned his office in 1844, on being appointed Palaeontologist to the Geological Survey; and Mr. D. T. Ansted succeeded him under the title of Vice-Secretary of the Society. The same year my father assisted Lyell in comparing and naming a large collection of fossil plants from the Coal-measures of North America; and in 1845, he applied for, and obtained (in August), the appointment of Professor of Geology and Natural History in the Royal Agricultural College just established at Cirencester. This at once gave him a recognized position, and employment that was congenial in all respects.

On leaving the Geological Society, the Council recorded their sense of the great value of the services he had rendered; and it was also resolved unanimously (September 7th, 1845), that the thanks of the Botanical Society of London be presented to him for the great services he had rendered the Society during the whole time he had been a member. On the 29th November of the same year, the Council of this Society appointed him Local Secretary for the county of Gloucester.

This year was marked also by his marriage with Elizabeth, eldest daughter of John Tenlon, the descendant of a Huguenot family of Nismes.\* And it may be mentioned that during the course of the next fifteen years he became possessed of eight "hostages to fortune," two of whom, however, did not survive a very tender age.

The Royal Agricultural College, which obtained its charter on the 27th March, 1845, was intended to teach agriculture, the various sciences connected with it, and their practical application in the cultivation of the soil, and the management of stock.

The Professor of Geology and Natural History was to teach the rudiments of those sciences, and to draw attention to the various "insects, animals, plants, or minerals, with which the farmer in this country is most concerned." He had, in course of time, to give, to the senior department, three lectures a week on Natural History, and two lectures a week on Geology, with occasional examinations. To the junior department, one Botanical, and one Geological lecture or examination were to be given each day. Portions of the above course of instruction were given in the field.

Hence the duties of the Professor gave him constant occupation. The lectures covered a wide range of knowledge, including the structure and physiology of both plants and animals. Whilst at Cirencester (my father writes) "for nearly 400 days of that time I made it a rule to get a *diagram* done daily, in addition to the collections I made to illustrate my lectures." And these diagrams were done so elaborately that each one was a work of art.

The other Professors at this time were Mr. Thomas Arkell (Agriculture), Mr. J. T. Way (Chemistry), the Rev. G. C. Hodgkinson, Principal of the College (Mathematics and Natural Philosophy), Mr. John Bravender (Surveying and Practical Engineering), and Mr. Robinson (Veterinary Surgery).

During his residence there he took a prominent part in the foundation of the Cotteswold Naturalists' Club, a brief account of which it may be interesting to give.

\* Smiles mentions that the Tenlon family fled from France and settled in this country about the time of the Revocation of the Edict of Nantes (October, 1685). 'The Huguenots' (1867), p. 520.

In June, 1843, Sir Thomas Tancred sent out a circular containing a proposal for the formation of a club similar to the Berwickshire Naturalists' Club, the earliest club of the kind established in this country ; and in the course of his remarks he says :

“ Thus it will be seen that the Club is a peripatetic body, the *rendez-vous* being appointed at some village or country town, where a substantial breakfast is ready, at about eight o'clock. At this any members within reach and so disposed assemble, accompanied occasionally by friends, and after breakfast proceed in one or more bodies, as may best suit the objects of each, to explore the neighbourhood, some attending to the geology, others to the botany, entomology, and other branches of the Natural History of the district traversed by them, visiting on the way any fine park, curious manufactory, remains of antiquity, or whatever other object of interest the walk may produce. Some may be armed with fishing tackle or a gun, or the cool stream may invite to a bath. From their several rambles the different parties return by a stated hour to a plain dinner, at which it is a rule to avoid expense, so that, for instance, the native beverage of the north, whisky, is substituted for wine, after dinner. This repast being ended, and a few customary toasts drunk, the President calls upon any members who may be prepared to read communications, which are discussed, and if of sufficient interest are printed in the transactions.”

On the 7th July of the same year a few Naturalists met at the “Black Horse” on Birdlip Hill, and in the course of a walk through Witeombe Woods, to the Roman Villa, and Cooper's Hill, Sir Thomas Tancred “showed how much enjoyment and instruction might be gained by a simple ramble through beautiful scenery, in company with several men who are all more or less skilled ; but at least, all interested in that glorious study of nature.” \* There were present at this first meeting (besides Sir T. Tancred) Mr. Prideaux J. Selby, of Twizell House, Northumberland, who came to assist at the inauguration of the new Society ; Mr. T. Barwick Lloyd Baker, of Hardwieke Court ; Mr. J. T. Way and Mr. S. P. Woodward, Professors at the Royal Agricultural College ; and the Rev. J. M. Prower, Vicar of Purton. Dr. Daubeny of Oxford, and Mr. H. E. Strickland were enrolled as members at this first meeting. Thus was established the Cotteswold Naturalists' Field Club, which has continued to do good work ever since.

At its first meeting my father gave an account of the geology of the district to be explored by the Club.

\* See address to Cotteswold Nat. Field Club, by Mr. Baker, Feb. 16th, 1859.



His youngest brother Henry \* joined his classes and those of the other Professors at Cirencester, and laid the foundations of that natural history knowledge which has since gained for him the high position he now occupies.

A little over two happy years passed at Cirencester, for although he had to labour hard, his work brought him into frequent contact with Nature, and later on (1863) he wrote: "Our first term at Cirencester was passed in a new world to us, and such a world! I would go back to it now if I could." This delightful time, however, was not of long duration. Owing to pecuniary difficulties, the result of mismanagement, the Council of the Agricultural College were reluctantly obliged to diminish the number of their staff and remodel the professorships; and on the 24th July, 1847, my father was informed that his tenure of office must terminate at Christmas. This decision of the Council, which they expressed with regret, came quite unexpectedly, and was most disappointing after the labour he had bestowed upon his lectures. At the close of the year he left Cirencester, and at the age of 26, without any fixed occupation or income, settled in London. The Council of the Botanical Society temporarily engaged his services, as did also Professor Tennant, whose large collection of fossils (to quote Mr. Tennant's words) he assisted in naming and arranging "with his usual accuracy and neatness," and whose catalogue (published in 1858) he subsequently prepared.

During his residence at Cirencester he was subject to occasional attacks of asthma, which, though at first slight, gradually became more frequent after he had settled in London, and until the end of his days he suffered more or less acutely.

On the 1st July, 1848, Mr. Hudson Gurney having heard, through Sir Henry Ellis, then Principal Librarian of the British Museum, of a vacancy in the Natural History Department of that institution, wrote to my father, telling him he thought he might probably obtain it. An application was accordingly sent in a fortnight afterwards, accompanied by testimonials from Mr. Gurney, the Dean of Westminster (Dr. Buckland), Professor Sedgwick, G. B. Greenough, Dr. Mantell, Murchison, Lyell, Darwin, H. E. Strickland, J. S. Bowerbank, T. Sopwith, Owen, Lonsdale,

\* Henry Woodward, LL.D., F.R.S., is now Keeper of the Geological Department in the British Museum (Natural History), South Kensington.



E. Forbes, D. T. Ansted, Thomas Bell, James Paget, R. E. Grant, W. B. Carpenter, De la Beche, John Phillips, A. C. Ramsay, Dr. Daubeny, John Edward Gray, and others.

It is not to be wondered at, with such support, that (on the 28th September following) he received notice of his appointment as First-class Assistant in the Department of Geology and Mineralogy in the British Museum. At this time Mr. Charles König,\* who was Keeper of the Department, reserved to himself exclusively the Minerals and Fossil Fishes; Mr. G. R. Waterhouse (who entered the Museum in 1843) was working at the Fossil Osteological collection; and my father obtained leave to work at the Invertebrata, commencing on those of the Oolites. Thenceforth nearly all the specimens belonging to this division that were purchased were previously examined by him and recommended to the Trustees. After the death of Mr. König in 1851, Mr. G. R. Waterhouse was appointed Keeper of the Department; and in 1857 he requested the Trustees to divide it into two. Mr. Waterhouse was then appointed Keeper of the Geological Department, and Professor N. Story Maskelyne of the Mineralogical Department.†

Mr. Henry Woodward, who joined the Geological Department in 1858, had previously assisted in compiling the materials for the catalogue of Brachiopoda in the collection of the Museum, which was edited by my father. From this time the two brothers worked together; Mr. Henry Woodward, as is well known, devoting his particular attention to the elucidation of the fossil Crustacea.

During the seventeen years he held office at the British Museum, besides the naming and arranging of various invertebrate fossils, a great deal of my father's time was taken up in displaying and expounding the treasures to the numerous visitors, British and Foreign, who came for the purposes of inquiry and study. Many a youthful student, moreover, owed much to his kindly help and encouragement; amongst whom may be mentioned Mr. Harry Seeley‡ (now Professor of Geography in King's College, London), Mr. George Sharman (now Palæontologist to the Geological Survey of England),

\* Mr. König in his youth was Librarian to Sir Joseph Banks.

† Professor Owen was appointed Superintendent of the Natural History Department in 1855.

‡ See Ann. and Mag. Nat. Hist., Sept. 1865.

and Lucas Barrett (late Director of the Geological Survey of the West Indies). And my father speaks (in one of his letters) of the great (and gratuitous) assistance he had received "almost continuously" from Mr. Sharman and Mr. Barrett. The sad death of Mr. Barrett affected him very much; and in the 'Critic' of February 1st, 1863, he writes: "Since the death of Edward Forbes, no British naturalist had won such golden opinions, or raised such hopes of a brilliant future as the young and ardent spirit who thus met with a sudden and untimely end." Mr. Barrett was drowned off Jamaica, while dressed in a diving-suit, when only 25 years of age.

Soon after he entered the British Museum my father's thoughts began to be taken up with his 'Manual of the Mollusca,' and it occupied the "unceasing attention" of his leisure hours for six years. The first part was published in 1851, the second in 1854, and the third in 1856. They were accompanied by twenty-four plates, engraved by Mr. J. W. Lowry; and six hundred and three species were figured, all of which were previously drawn by the author. The general appearance of the work and of the plates was, however, unfortunately much injured by the necessity of their being cut down to the size of the volumes in Weale's Series.

It was a work at once well received and adopted by all the leading Naturalists at home, and by many abroad. In his presidential address to the Linnean Society (1866) Mr. Busk makes the following remarks in reference to it:—

"This work speedily took the very first rank among text-books on the subject—and deservedly so, both by the lucidity of its arrangement, the amazing amount of correct information compressed into a small space, and the great amount of original matter contained in it. The Supplement, more especially, containing a detailed account of the geographical distribution of living Mollusca and of the distribution in time of the fossil forms, is particularly deserving of notice as a monument of the full and accurate information possessed by the author, and as one of the most useful compendiums of what is known on those subjects ever given to the world."

I might add the testimonies of many distinguished men, of Lyell, Mantell, and others; but two will suffice.

Darwin writing on June 3rd, 1856, says: "I have just finished studying, with all the attention of which I am capable, your book. And I, for one, am deeply indebted to you for its publication, as I have not derived for years so much solid instruction and interest from any other book."

In the Annual Report of the Regents of the Smithsonian Institution for 1860, Dr. P. P. Carpenter, a well-known conchologist, remarks in reference to the 'Manual of the Mollusca,' "a comparison of all ordinary books with which, only amazes us more and more at the vast amount of patient investigation, of accumulated facts, and of philosophic judgment, which its author has condensed into a small and cheap volume."

In an article which my father published in 'Recreative Science' for February, 1861, he enumerates several works which would be serviceable to "the shell-collector in London," and observes:

"Our own' manual, we must refer to (as people speak of children who have cost them pain and trouble) with mingled satisfaction and regret. More than seven thousand copies of it have been circulated, and it is now both out of print and out of date, for in the last ten years an amount of conchological work has been done, which was altogether unprecedented; so many new shells have been described and new genera proposed; so many of the old names have been changed for better or worse; new facts of structure and history made out and recorded, that the last published manual already requires revision in every page."

"We write in sand, our *science* grows,  
"And, like the tide, our work o'erflows."

Eventually over eleven thousand copies were sold, by which the publishers must have realized at least £1000: my father never received more than £75. For a short time before his death he had been occupied in preparing a new edition of this work from the elaborate notes he had ready, mostly in his own interleaved copy. Unfortunately but little progress was made, and no portion of his own work appears in the later editions, brought out by the publishers under an editor who, I believe, laid no claim to any special knowledge of the Mollusca. The work indeed passed from the hands of Weale to the firm of Virtue & Co., and has since passed through the hands of Messrs. Strahan & Co. to those of Messrs. Lockwood & Co.

A valuable addition to the original work was the Appendix by Mr. Ralph Tate (now Professor of Natural Science in the University of Adelaide), published by Virtue & Co. in 1868.

It will always be a matter of regret that, owing to the short-sightedness and parsimony of the publishers, the new edition was not placed in the hands of my uncle, Mr. Henry Woodward. This is not, perhaps, surprising when I learn from a communication made to my father, that Virtue, the publisher, had "offered £40 for



a *real new edition*, and £20 for an ordinary revision." A French translation, by M. Humbert, was printed in 1870.

By the publication of his 'Manual,' my father became a recognized authority in all matters relating to the Mollusca, or to the science of Malacology. Conchology he treated as "a craft rather than a science," calling it "the art of collecting, naming, and arranging shells;" and "a capital amusement for young people, and ladies, and for gentlemen who have some leisure and spare means, and whose tastes are not sanguinary." It is true that collections of shells, selected as types of beauty of colour and form, are not undeserving of commendation, for in most respects they may be quite as instructive as a series of less-favoured specimens; but those whose ambition it is to make advances in the knowledge of the Mollusca, cannot be content with the outward form, and "treat the shell-fish themselves as mere abominations, unfit for the contemplation of those who daintily arrange their 'cones' and 'cowries' in drawers of rosewood and cedar." \*

To the study of the Mollusca my father brought a knowledge, not only of the fossil as well as recent forms, but he was intimately acquainted with their anatomical details and microscopic structure. The dredge and the hammer, the aquarium and the microscope, all lent their aid to his researches. His summer holidays, in 1853, were spent in sea-side studies of the Mollusca at Folkestone (the results of several dissections were published in the 'Annals and Magazine of Natural History'), while his familiarity with the Invertebrata generally, enabled him the better to elucidate several obscure forms which had puzzled those Naturalists who had previously attempted to interpret them.

Perhaps his most important special contribution to science was his paper on the structure and affinities of the Hippuritidæ, read before the Geological Society of London in 1854. These remarkable fossils, ranged under the order Rudistes by Lamarek, had been variously grouped as Cephalopods, Corals, Annelides, Balani, Brachiopods, and Lamellibranchs. To the last-named division they indeed belong; but those who had so regarded them had not agreed as to their family-relationship. Their position between the *Chamaecæ* and *Cardiadae*, where they were placed by Quenstedt,

\* His own collection of the genera of Mollusca was, after his death, purchased for the Anatomical Museum in the University of Cambridge.



was now proved to be the true one; they were further shown to constitute a distinct family—the Hippuritidæ, and to furnish the only instance of a whole family of bivalve shells which has become extinct.

He subsequently described a new and remarkable genus of Hippurites from Jamaica, which he named *Barrettia*, in honour of the late Lucas Barrett.

Another obscure form which he investigated, was a new and anomalous Echinoderm from the Chalk of Kent, and he named it *Echinothuria floris*, after the discoverer, Mr. J. Wickham Flower. Its particular rank and affinities were not apparent; but in describing it the author said, “the publication of it should be acceptable to those who base their hopes on the ‘imperfection of the geological record,’ as it seems to indicate the former existence of a family or tribe of creatures whose full history must ever remain unknown.”

It is most interesting to find that these anticipations have been strangely set at naught, for Sir C. Wyville Thomson, in his ‘Depths of the Sea,’ has actually founded the family of *Echinothuridæ*, to contain, besides the original fossil named by my father, two recent genera, *Calveria* and *Phormosoma*, which have been brought to light by the recent deep-sea dredgings. And he remarks that Woodward “describes the Chalk species *E. floris*, almost as fully and accurately as we could describe it now with a full knowledge of its relations.”\*

In 1856 he identified a number of land and freshwater shells from Kashmir and Tibet, and observed it was “somewhat surprising to find, that of 22 sorts collected by Dr. Thomson, one half were British species, and the rest of the commonest and most widely diffused Indian forms.” He also described four new species of freshwater shells from Lake Tanganyika in Central Africa, collected by Captain Speke.

The genus *Synapta*—a marine animal allied to the Sea-cucumbers—formed the subject of a paper by Lucas Barrett and himself. The species (of which one new one was described) are familiar to all workers at the microscope, comprising spicules which present the appearance of miniature anchors.

\* See ‘Depths of the Sea’ (1873), pp. 163, 164; also paper by R. Etheridge, Jun., Quart. Journ. Geol. Soc. vol. xxx. p. 307.

In 1854 he was elected a Fellow of the Geological Society of London. His certificate was signed, among others, by Sedgwick and Murchison. The latter, in expressing his great pleasure in signing the paper, added: "I need not say how gratified I am to find my name once more associated with that of my eminent friend the Woodwardian Professor, whose steps I willingly follow, except when they invade and carry into captivity all my lower Silurian subjects."

He was twice (1854 and 1857) presented with the balance of the proceeds of the Wollaston Donation Fund by the Council of the Society in recognition of his paleontological labours, to the merits of which Professor Edward Forbes and Colonel Portlock, the respective Presidents on these occasions, bore testimony. In 1859 he was chosen a Member of the Council, and continued to serve on it for the rest of his life.

We may pass briefly over the incidents connected with his later years. He was constantly occupied at the British Museum in the daytime, while he devoted his winter evenings to literary work, and most of the summer ones to his garden, where he took delight in cultivating the so-called "old English flowers," and displayed much skill in constructing summer-houses out of materials that appeared anything but promising.

Up to the year 1860 he was a frequent attendant at the weekly receptions held by Dr. Bowerbank at his house in Highbury Grove. There were gathered together, not only men eminent in various departments of science, but youthful students, who found in their distinguished host "a willing instructor and a sincere and kind friend. The treasures of his museum, the use of his microscopes, and his personal assistance were at the disposal of every one."\* Truly, science owes much to these social-scientific gatherings.

A life without especial incident is one that happily belongs to most of us; though not exempt from those cares and worries to which all are more or less subject. It is "uneventful" because free from the more remarkable and unexpected occurrences, when great obstacles are surmounted, great sacrifices made, or when the incidents have some connection with public events. Such a life may, however, teach its lessons of patience under suffering, of

\* Geol. Mag., decade 2, vol. iv. p. 192.

industry and prudence, and of earnest effort in the pursuit of truth. The severe asthmatic attacks from which my father suffered in later years were "so distressing as to awaken the sympathies of all, and caused many to marvel at his wonderful flow of genial and animated discourse during times of release from pain."\*

In one of his essays in the 'Critic' (Review of Life of William Scoresby, 1861) he remarks :

"It is pleasant to review the life of a good man—one who has achieved distinction, yet 'kept the whiteness of his soul.' We feel a personal interest in his strivings, and claim to participate in his success. Thank Heaven, there are many such in every profession, and in the midst of the heroes of Arctic discovery, yet distinct from the rest—like the pole star among the constellations of the North—is the figure of William Scoresby. We rise from the perusal of his 'Life' with a better opinion of human nature, for we have here the example of a man tried more than most of us have been, and coming out of the furnace unharmed, purified, victorious. It has been too much the tendency of the age to attribute right-doing and ill-doing to 'organization ;' but, practically, we all know what it is to look back upon opportunities wasted, and struggles which need not have ended in failure. We remember being struck with the sound practical sense of Jane Eyre's advice to Mr. Rochester, 'to begin at once so to think and act that in a few years he would have laid up a new and stainless store of recollections, to which he might revert with pleasure.' And they who read this Life of Scoresby will find the precept illustrated, with the addition of other and more exalted motives."

Family ties prevented my father from taking many extended holiday excursions during the later years of his life. But one of the most interesting trips he ever took was in 1857, when he was invited by Mr. Robert McAndrew to join him in a dredging expedition to Vigo Bay, an opening on the Spanish coast. Mr. Lucas Barrett, then 19 years of age, accompanied them. On the 20th of May they started from Gosport in Mr. McAndrew's yacht "Naiad," full of spirits and eager expectation to haul up "the treasures of the deep." Their outward voyage was a tantalizing one, for before they sighted Spanish land they experienced a very heavy gale, the wind was dead against them, and at one time they could do nothing but "lay to" and hope it would moderate before they drifted all the way back again. They were forced to keep under cover, watching the petrels, when each

\* Obituary notice in the 'Reader,' July 22nd, 1865.



heave of the sea revealed a watery bank with "Mother Cary's chickens" playing on it. This bird he observed was very much like the Marten on the wing: "it never swims, and goodness only knows where (or whether) it rests day or night." On the 28th May they were sixty miles nearer home than on the 24th: having drifted for three days in spite of jib and try-sail; and then, when the storm did abate, for some time they had all sail set and no wind, with nothing to do but to catch crabs. At length the wind freshened; on June 1st they sighted the Spanish coast, and on the following day they cast anchor in Vigo Bay.

To his own astonishment, no less than his friends', he never felt "at sea" once; and Mr. McAndrew observed, that after a week's cruise he already looked five years younger. A sea-voyage invariably gave him relief from his asthmatic troubles.

It would, perhaps, be tedious to describe the dredging operations, but I may note a few Natural History observations he made inland.

In writing home he said: "Every bank is a flower garden. Many of our old favourites are here, and many new to me. Beds of golden-flowered Chrysanthemum and beds of blue Bugloss, three kinds of Cistus (Roekeist) white, yellow like ours, and yellow with a black eye. A yellow Oxalis grows on the walls, with Cotyledon and Pellitory—white and yellow Stone-crop, and abundance of the annual Fern (Gymnogramma) of Guernsey. Many of our commonest flowers, like the narrow-leaved Vetch, appear to flower twice as large and abundantly as with us. On the sunny banks we saw the golden green (Guernsey) Lizard, as well as our nimble Lizard, and the whole air was vocal with grasshoppers. At first I thought it was an hundred larks singing all at once. But there are song birds too—Blakeap and Chaffinch, and Robin at least. The Swift and Swallow are here too. . . . In the deep rocky lanes which lead from the high ground east of the town to the beach, we found a great many ferns, *Osmunda regalis*, *Scolopendrium*, Lady fern, (*Asplenium*) *Adiantum-nigrum* and *Trichomanes*, Brake, Broad fern, and *Blechnum*—but not our common *Aspidium* (*Lastrea*) *felixmas*. In the afternoon we walked along the beach westward, and picked up shells and starfishes mostly familiar English sorts, scallops and cockles, (*Aporrhais*) *pes-pellicani*, and the Chinaman's hat (*Calyptrea*."



In another note he says: "When we go to the Pier we are saluted by a mob of boys and beggars, with demands for copper-money and shouts of 'I say'—the universal nick-name for Britishers. I made a vow never to use the phrase or countenance it—but one day a fisherman very evilly overhauled for me a whole boat-load of euttle-fishes (Oetopods), and in my delight I shouted 'I say! I say!' at the top of my voice, without having anything further to say."

Before leaving to return home, they determined to ascend the highest hill within sight. After proceeding some distance his breath failed him, and his companions pushed on while he strolled leisurely, until forgetting his heavy breath, and seeing a tempting lane he determined to make the ascent by himself. "The lane soon became a footpath beside a watercourse bordered with ferns and flowers. I soon found the *Cystopteris montana* and two Heaths new to me. There were plenty of large dragon-flies and those with purple-clouded wings, and more butterflies than I had seen this year. The 'clouded yellow,' 'the gate-keeper,' 'small copper,' and in the yellow flowers were green or bronzed beetles. Besides the grasshoppers there really were hundreds of larks singing. I was quite glad to be alone, for MeAndrew always wants to be 'getting on' just as one finds a rare plant!" On the summit he found no mountain plants "but only foxgloves and eistus sheltering beneath the huge grey masses of mica-slate, and clustering white stone-crop, and a dwarf Star of Bethlehem."

In August, 1859, he paid a visit, in company with Mr. Etheridge, to Mr. Heaven, at Heraelea, Lundy Island. He observes that the granite of the island is so regularly *bedded*, that you might think the great piles of "cheeses" were no different from masses of limestone. "At the N. extremity there were some flocks of gulls and gannets clamouring loudly as they wheeled past, or fishing in the deep sea below. The season for birds is over now. A month ago there were thousands here, whitening all the rocks. The puffins breed in the rabbit-burrows, whilst the gull and guillemot lay their eggs on the rock. The black eormorants fish up branches of eoral (*Gorgonia verrucosa*) with their sharp bills and make a sort of nest."

During the course of his life my father furnished much assistance to the authors of the Monographs of the Palaeontographical Society, acknowledged by Darwin, Davidson, Wright, and others;

and in conjunction with the Rev. Thomas Wiltshire, the energetic secretary, he was to take part in a monograph on the Cretaceous Mollusca (exclusive of the Brachiopoda, which Mr. Davidson had described). This joint work was proposed by Mr. Wiltshire in 1863, but my father did not live to fulfil his portion of the undertaking. At one time he contemplated the publication of a manual of the Radiata, as a companion-work to his book on the Mollusca: this likewise was not carried out, and his large collection of Echinodermata was afterwards purchased for the Edinburgh Museum. Another work on 'British Fossil Shells' was also at one time advertised by Lovell Reeve to be prepared by him.

In 1861, however, he assisted Professor Owen in his work on Palaeontology, first published in the 'Encyclopædia Britannica,' who acknowledges (p. 114) that "for the drawings and most of the facts or their verification, relating to invertebrate fossils, the writer is indebted to his experienced colleague in charge of that department of the British Museum, Mr. S. P. Woodward, F.G.S."

Professor Morris, too, records his assistance in his 'Catalogue of British Fossils,' and Lyell took frequent occasion to consult him on palaeontological matters in the preparation of his celebrated works.

Numerous species, both recent and fossil, have been named in honour of him, chiefly Mollusca, Echinodermata, and plants.

In 1848 he discovered at Stratton St. Margaret's, near Swindon, some "puzzling specimens" of a Thistle, which were described and temporarily distinguished as *Carduus Woodwardii*.\* And in 1866 a new mineral, a hydrous sulphate of aluminium and copper, occurring usually in blue rippled incrustations, discovered by Mr. Richard Talling in Cornwall, was analyzed by Professor A. H. Church, and named in his memory Woodwardite.†

Nor were his merits unacknowledged in other ways. In 1860 he was elected an honorary member of the Yorkshire Philosophical Society, and in 1862 a foreign associate of the Zoologico-Botanical Society of Vienna. On October 9th, 1864, Dr. Wilhelm Keferstein (Professor of Zoology and Director of the Zoological Museum at Göttingen) wrote to inform him that the Philosophical Faculty of

\* 'Cybele Britannica,' by H. C. Watson, vol. ii. (1849) p. 83.

† Journ. Chem. Soc. vol. iv. p. 130; Geol. Mag. vol. iii. p. 190.

the University of Göttingen had conferred on him, with great pleasure, the honorary degree of Doctor of Philosophy. He added: "I have so often the opportunity to consult your excellent Manual by which you have become a very popular *autor* in Germany, that I expect with great enjoyment the new edition, which I hear you are preparing at present!" The diploma was sent on October 15th, by Wilhelm Weber (Dean, and Professor of Physics), with his hearty congratulations.

In May, 1865, he was elected an honorary member of the Norwich Geological Society, then lately formed under the presidency of the Rev. John Gunn, with Mr. J. E. Taylor as honorary secretary.

He was for several years (in conjunction with Mr. Warrington W. Smyth) an Examiner in Natural Sciences to the Council of Military Education at Sandhurst; and he examined the cadets at Woolwich, Chelsea, and Portsmouth. Still more recently he was elected as one of the Examiners in Geology and Palæontology to the University of London.

In the later years of his life he spent his holidays in the Crag district of Suffolk, staying twice at Aldborough and once at Orford. Here extensive collections of fossils were made, with the help of his children, especially from the pits of Coralline Crag at Broom Common, Gedgrave, and Gomer; and from the Red Crag at Butley.\*

In 1864 he contributed the list of Mollusca from the Norwich Crag, which was published in Mr. Gunn's sketch of the Geology of Norfolk.

In the early part of 1865 his asthmatic attacks had become much more troublesome and frequent, and his strength thereby was greatly reduced. In the spring-time he kept at home on sick-leave, and Professor Owen wrote to him (May 25th) strongly recommending him to put all thoughts aside of returning to work at the British Museum, until he had completely recovered his bronchial troubles: adding, "you are too precious to us to be risking anything by prematurely returning to this atmosphere." Later on he went to Herne Bay in the hopes of recruiting his health and strength. But, as on many a previous occasion, his zeal and interest led him to undertake expeditions to which his physical strength was unequal,

\* Professor Prestwich has published lists of the species then collected from Broom Hill and Gomer. Quart. Journ. Geol. Soc. vol. xxvii. pp. 123, 124.



and the rupture of an artery in the lungs, occasioned by over-exertion at this Kentish watering-place, was the immediate cause of his passing away on the 11th July, when he was not quite forty-four years of age.

There is no need to recount the many expressions of regret which were made, and felt, by a large circle of scientific friends, several of whom paid a last tribute of respect at the funeral at Highgate Cemetery.

The President of the Geological Society (Mr. W. J. Hamilton, F.R.S.) observed in his address (1866), that "by his death the Society has experienced a very serious loss. His sound knowledge and assistance, both as a naturalist and a paleontologist, were always at the service of the Society or of its Fellows."

The President of the Linnæan Society (Professor Busk, F.R.S.), while deploring his early death, spoke of his "amiable and modest demeanour, and the readiness with which he was at all times willing to aid those who might seek his assistance," adding that he displayed "in all he wrote the utmost acuteness of observation, combined with the most minute attention to accuracy and truth."

In this attempt to sketch the principal circumstances of the life of S. P. Woodward, and the chief scientific labours which have tended to make his name known to students of Natural History, I have, however, but barely alluded to those other literary works which he left behind him, the now lost-sight-of essays and reviews which were printed in the 'Critic' and some other periodicals.\*

To use his own words "the best memorial of a literary man is a selection from the articles he may have contributed to periodical literature. Such fugitive pieces are usually more spontaneous, and exhibit the writer's feelings and sentiments more truly than works of deliberate character and higher pretensions." †

His own reviews truly give an insight to his sentiments which the purely scientific papers could not yield. In the latter we have

\* Most of the reviews of scientific books in the 'Critic,' between March 17th, 1860, and August 1st, 1863, were by S. P. Woodward; other reviews appeared in the *Ann. and Mag. Nat. Hist.* [2] vol. xix. (1857) p. 74, and in the *Geological Magazine*, vols. i. and ii.

† Review of Sir Henry Holland's 'Essays on Scientific and other Subjects' (1862).



literally the "dry bones" of science—the descriptions of new or little-known species of animals, which only a few who have devoted themselves particularly to the subject would care to read or could appreciate: we have for the most part hard facts which seem to have little, if any, direct application to the welfare of the human race. Nevertheless, however minutely we seek to trace out the works of Nature, there is always good to be gained, and lessons to be learned, that may in one way or another serve to increase the happiness, and contribute to the well-being of mankind. And enthusiasm need never flag when we remember, that in the details we investigate we are ever seeking out the laws of Nature, tracing out, however obscurely, a Divine plan. No wonder that the highest teachings of science become interblended with religious emotion!

In these "Literary Remains" of my father may be discerned a deeper purpose than the mere description of a new or obscure fossil,—a protest against the materialistic tendencies of the age; and the desire to uphold "The Power, Wisdom, and Goodness of God, as manifested in the Creation." Such indeed was the guiding idea in the celebrated treatises prepared under the will of the Earl of Bridgewater (1829). In the present age such works are sometimes looked upon as out of date, if not unscientific: a notion no doubt originating in the fact, that theological dogma has too often retarded the progress of science. Experience also teaches us that the elementary teaching of science and theology should be kept quite distinct—though the philosophy of both becomes merged.\*

\*[P.S.—That the "Argument from Design" has failed in many special instances or examples, through the teachings of Darwin, may be admitted; but this does not in any way affect the general argument, as recently maintained (in 'Nature,' Oct. 20th, and Nov. 3rd, 1881) by the Duke of Argyll. He observes that there are many minds "who not only fail to see any contradiction between evolution and design, but who hold that the doctrine of evolution and the facts on which it is founded have supplied richer illustrations than were ever before accessible of the operations of design in nature." And, he adds, "no possible amount of discovery concerning the physical causes of natural phenomena can affect the argument that the combination and co-ordination of these causes which produce the 'apparent' effects of purpose are really and truly what they seem to be—the work of Mind and Will." (See also remarks by Dr. G. J. Romanes, 'Nature,' Oct. 27th, 1881.)]

It is then that the man of science, as much as the theologian, has to face many perplexing questions. My father has remarked, (in some MS. notes for a lecture), that—

“Evidence of Divine Wisdom may be seen in each individual, and the relations of the whole. Beauty is everywhere apparent, not only in form and colour, but in that higher excellence, fitness, or adaptation to purpose. The question arises, What evidence is there of Goodness? One half the living world preys on the other half, and thus to morbid sentiment it appears a vast charnel house in which deeds of violence extinguish all gentler feeling. If not checked in numbers the bivalves (*e.g.*) exhaust the ground, and die out. It is an essential part of the Economy of Nature that the young, feeble, and aged should fall a prey to the strong. No wild animal dies of Old Age. The Moral World stands in contrast to, not in harmony with, the Physical world. It is only in Human Society, and in proportion as we retain the tradition of a better life, that the natural affections are extended from family to all mankind, that hospitals are established, the weak protected, the sick tended, the old revered, and a kindly spirit cultivated.”

To some of the conclusions in the ‘Origin of Species,’ as taught by Darwin, he made grave objections. In many of his reviews he had occasion to touch upon the subject, and, inasmuch as he supported his objections by an appeal to the species of Mollusca, it will not perhaps be thought inadvisable that I should briefly indicate the position he took. The subject was one that he had well considered. As early as 1856 (July 18th) Mr. Darwin wrote: “I am growing as bad as the worst about species, and hardly have a vestige of belief in the permanence of species left in me, and the confession will make you think very lightly of me; but I cannot help it,—such has become my honest conviction, though the difficulties and arguments against such heresy are certainly most weighty.”

In a review of Phillips’ ‘Life on the Earth’ (1860) my father spoke of the transmutation theory as “useful in tracing out the system of nature; but it is no more the system of nature itself, than the scaffolding is identical with the temple it is used to raise.”

He coincided with those who maintain “that the array of facts which has been relied on for proving that the world was abandoned to itself from the beginning, are in reality so many ‘evidences of the manner in which the Divine author has been pleased to work;’ and that ‘natural selection’ has operated as a provision for maintaining—not for destroying—the stability of species.”

Remarking upon the number of recent species of Mollusca, he observed, "that we have a catalogue of sixteen thousand shells which wants revision from beginning to end; and among the benefits likely to arise from the revision, not the least will be the reduction of perhaps one-fourth of these reputed species to the rank of mere varieties." "To this pervading fault may be attributed a good deal of the scepticism respecting the 'reality of species,' of which we have lately heard so much." It may be interesting to quote what he says on this subject.

"Linnaeus, with his usual felicity of expression, has given us his opinion respecting genera and species :

"Classis et ordo est sapientiae, species naturæ opus,"

which may be freely translated, 'Species are real; genera, ideal.' The marshalling of species in classes and orders is matter of discretion; but species themselves are the work of God. It is an axiom in natural history, as in philosophy, that *like produces like*; and, as this is the result of all human experience, we have come to regard *relationship by descent* as the essential quality constituting identity of species. Absolute agreement in size and appearance is not expected, since we must all have observed how greatly the individuals of one brood may differ; but it is only by long and frequent observation that we can tell in what respect and to what extent these variations may occur. Dredge up a thousand shells of *Astarte compressa* in Berwick Bay, and you may select from among them half-a-dozen more deeply furrowed than the rest, many which are less distinctly marked than the average, and a few quite smooth and polished.

"The town naturalist to whom you show the selected series might reasonably conclude that there were at least three species, unless he had previously seen instances of the kind. Gregarious shells, like the common whelk and periwinkle, which occur in very great abundance, are more prone to vary than others; but these variations occurring at the same place are individual, and not hereditary; whereas variations peculiar to different localities occur amongst all widely-distributed species, and constitute permanent varieties or *races*. Hence the idea of a 'species' is not so simple or readily expressed as at first might appear. It generally includes—as in the case of our own species—many permanent races (each composed of individuals differing more or less from one another), distributed over a definite geographical space, and related—more or less remotely—by descent.

"A genus in like manner, is a group of *species*, related to each other *topographically*, just as races are related to species. Upon this point the best naturalists are agreed. But the same inference with respect to *relationship by descent* does not necessarily follow, and is rendered at least improbable by the evidence of fixity of species which palæontology affords.



Mr. Wollaston—a most accurate observer—speaking of the land shells of Madeira, says that nearly all the species (upwards of one hundred) are found in a fossil state, and they have not altered, apparently, *so much as a puncture or a granule* during the enormous period which has elapsed—a period in which there is every reason to believe that the various physical conditions of the whole region have most materially changed. Similar observations have been made in England. The shells of *Helix hortensis* and *nemoralis* (by some regarded only as ‘races’), and the shells of the little *Helix costata* and *H. pulchella*, found in the newer Pleiocene [now called Pleistocene] deposits, are just as distinct as those now living in the country. Another minute land-snail—*Helix labyrinthica*—now living in the United States, is undistinguishable from fossil specimens found in the London clay at Hordle! ”\*

In a review of Lyell’s ‘Antiquity of Man’ (1863), he observes, in reference to the subject treated by the “Historian of Geology:”

“Upon any hypothesis it is tolerably certain that the ‘cradle of our race’ was in the warmer region of the old world. Kashmir, with its occasional snow-falls, is not a perfect paradise. But on the tropical sea-coast man still finds all the necessaries of life without labour, and still exists in a condition which, if it is not that of ‘nature,’ approaches as nearly as possible to the state of the brute creation.”

“Our first parents need not have been savages, although unacquainted with modern arts; for steam-engines and philosophical instruments are the produce of a complex civilisation and artificial wants in the world’s old age—things not needed in the prime. They mark a particular phase in the development of the human faculties, rather than an *advance* on all that was achieved before. If the last century has witnessed great improvements in medicine and surgery, and mechanical inventions—almost always made empirically—we must not forget that we owe to former times our best models in sculpture and poetry, our highest style of architecture, systems of logic and metaphysics, algebra, geometry, and the elements of our boasted jurisprudence. Will anyone dare to say that if the spirit of Pericles had survived in Athens until now—if the Moors still flourished in Spain, or the Augustan age had never known decline at Rome—that those people would ever have devoted their intellect to physical science, or that we should have obtained through them chronometers or microscopes, theodolites or rifled guns? Our forefathers could be polite, refined, religious, or whatever best becomes humanity, without these things.”

Speaking further on the subject of man’s origin, in criticizing Huxley’s ‘Evidence as to Man’s Place in Nature,’ he points out

\* Review of Reeve’s ‘Elements of Conchology’ (1860).

how religious aspirations and the development of intellect serve to distinguish man from other members of the animal creation.

The real question involved in the "Darwinian Heresy" is (he says), "whether the world is governed entirely by natural laws; or, whether these 'natural laws' are subject to the constant management and control of a superintending Providence." He admits "the possibility of such interference without any apparent violation of the ordinary course of affairs," for "we must be dull indeed if we advance far in life yet fail to perceive the existence of this influence; both dull and soulless if we refuse to recognise it even within the limits of our own experience."

From these and other passages it will appear plain that, to my father, the doctrine of the "Origin of Species" as taught by Darwin, was, taken by itself, not satisfactory; and it also appears that he was greatly influenced by a feeling that its acceptance identified man too closely with the animal creation, that the line of separation became indistinct if not inseparable, and consequently Materialism usurped the place of all religious aspiration. Since his views were thus advocated great progress has been made in illustrating and substantiating the doctrine of Evolution, and there are few Naturalists who do not accept it in some degree. Embryology in one direction, and Palæontology in another, have continued to supply evidence in its favour; so that the opponents have found themselves standing on more and more uncertain ground, and their faith has in many instances been shaken. Indeed, had my father been living now, I am disposed to think that he would no longer have been regarded by Darwin as a "good man" whom he would "very much like to *stagger*," and "to *pervert*," for he might have modified his views on the origin of species without relinquishing his cherished faith in religion.

Even in accepting all that is taught by Darwin, and others, on the structural development of the various complex forms of life, it is not necessary that we should yield up any faith in Divine Providence; it is not necessary that the holding of such views should lead to Materialism. No greater mistake could be made.

The concluding passage in 'The Origin of Species' (6th edit. 1878) is as follows: "There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that, whilst this planet has gone

cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved." If in tracing out the plan of the Creation it is ultimately demonstrated that all forms of life have sprung from one original speck of life, surely our notions of its grandeur cannot be less than if we picture many distinct acts of creation at many different periods; the series of developments that has resulted is scarcely more wonderful than that which every day arises from the earliest stages of each form of plant or animal around us. The germ of animal life may have been imparted in the beginning, and carried on consecutively even to man; and while he possesses in varying degrees, according to the individual sources of inheritance and association, much that pertains to the purely animal creation, the germ of intellectual life—of intellectual enjoyment, and I may add of religious emotion,—that distinctly marks him off from the rest of the animal creation, may, and so far as our sources of information go, must have been directly imparted to him, when his structural and perishable organization had (it may be inferred) been sufficiently developed from the lower types of animal life.\*

And I may close these remarks by observing, that whatsoever may happen in the provinces of anatomy and physiology, as they affect our structural organization, intellectually and spiritually the history of mankind, as exemplified in this memoir, is a continual protest against the doctrine of the "survival of the fittest."

\* It may be mentioned that as yet "there is a complete absence of any fossil type of a lower stage in the development of man" (Virchow). See also Dawkins' 'Early Man in Britain.'

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NOTE.—*The accompanying Portrait of Dr. S. P. Woodward is an autotype by Messrs. Sawyer & Bird, enlarged from a photograph taken in 1856 (æt. 35).*



*List of Books, Papers, &c., by S. P. Woodward.*

1841.

1. Flora of Central Norfolk. Addenda to Mr. Mann's List of Norwich Plants. *Ann. and Mag. Nat. Hist.* vol. vii. pp. 201—206.

1844.

2. Notes of a Botanical Excursion in Warwickshire, Worcestershire, Wales, and Ireland. Botanical Society, London. *Phytologist*, No. 33, pp. 875—879.

1846.

3. On 'Honey-Dew' (signed 'Ruricola'). *Wilts and Gloucestershire Standard*, May.
4. Weeds and Insects. *Ibid.* May.

1847.

5. On the Geology of the district explored by the Cotteswold Club, and more particularly the clay subsoil (Bradford Clay) of the (Royal Agricultural) College Farm. *Proc. Cotteswold Nat. Club*, vol. i. pp. 1—8; *Wilts and Gloucestershire Standard*, April.

1848.

6. Fossils from Lower & Upper Greensand (named for J. Manwaring Paine). *Gardener's Chronicle*, p. 123.
7. Note on the Geology of Suffolk in paper "On the Farming of Suffolk," by Hugh Raynbind. *Journ. Roy. Agric. Soc.* vol. viii. pp. 262, 263.

1849.

8. Skeleton Leaves. *Gardener's Chronicle*, p. 86.
9. On *Carduus* (*Woodwardi*). *Ibid.*
10. Origin of Fossil Phosphates. *Ibid.*

1850.

11. Geology, Agricultural Botany, and Entomology of Gloucestershire, in "Farming of Gloucestershire," by John Bravender. *Journ. Roy. Agric. Soc.* vol. xi. pp. 6—15.
12. On the tenacity of life in Snails. *Ann. and Mag. Nat. Hist.* [2] vol. vi. pp. 489, 490.
13. Drawing of the animal of *Nautilus pompilius* (Pearly Nautilus) to illustrate paper by J. E. Gray. *Ibid.* p. 269.

1851—56.

14. A Manual of the Mollusca; or, Rudimentary Treatise of Recent and Fossil Shells. In three parts, 1851, 1853, 1856, pp. 486; map and 24 plates. 12mo. *London.*

1853.

15. Notes on the habits of bivalve Shell-fish. *Ann. and Mag. Nat. Hist.* [2] vol. xii. pp. 415—417.

16. Catalogue of Brachiopoda in the collection of the British Museum. 12mo. *London.*

1855.

17. Descriptions of the animals of certain genera of Bivalve Shells. *Ann. and Mag. Nat. Hist.* [2] vol. xv. pp. 99—101.

18. Descriptions of the animals of certain genera of Conchifera. *Ann. and Mag. Nat. Hist.* [2] vol. xvi. pp. 22—27.

19. Note on a new locality for *Clausilia Rolphii*. *Ibid.* p. 298.

20. On *Helix aspersa*. *Ibid.* p. 298.

21. Note on "List of Species of Mollusca obtained by Professor Goodsir from Spitzbergen. By R. McAndrew." *Ann. and Mag. Nat. Hist.* [2] vol. xvi. p. 466.

22. Description of a new species of recent Rhynchonella (*R. Grapti*, Woodw.). *Ann. and Mag. Nat. Hist.* [2] vol. xvi. p. 444. Plate x. fig. 16.

23. On the structure and affinities of the Hippuritidae. *Quart. Journ. Geol. Soc.* vol. xi. pp. 40—61. Plates iii.—v.

24. On *Panopæa Aldrovandi*, Lam. *Proc. Zool. Soc.* vol. xxiii. pp. 218—221.

1856.

25. Another note on *Sissurella*. *Ann. and Mag. Nat. Hist.* [2] vol. xvii. pp. 401—402.

26. On the occurrence of the fossil genus *Conoteuthis*, D'Orb., in England. *Ann. and Mag. Nat. Hist.* [2] vol. xvii. pp. 402—403.

27. On the evils of increasing Synonyms. *Ann. and Mag. Nat. Hist.* [2] vol. xviii. pp. 36, 37.

28. On typical series of objects in Natural History, adapted to local Museums. By the Rev. Prof. J. S. Henslow. Mollusca. Cephalopoda to Tunicata, by S. P. Woodward. *Rep. Brit. Assoc.* for 1855. pp. 114—117.

1856.

29. On the land and freshwater shells of Kashmir and Tibet, collected by Dr. T. Thompson. *Proc. Zool. Soc.* vol. xxiv. pp. 185—187; *Ann. and Mag. Nat. Hist.* [2] vol. xix. (1857) pp. 408—410.
30. Exhibition of preparations of the Mantle and Oral Apparatus of the recent British Terebratula (*T. caput-serpentis*). *Proc. Zool. Soc.* vol. xxiv. p. 368.
31. On an *Orthoceras* from China. *Quart. Journ. Geol. Soc.* vol. xii. pp. 378—381. Plate vi.
32. Notes on British Fossil Diademas; notes on *Echinopsis*; description of *Cidaris Carteri*, and note on some other species of *Cidaris* found in British strata; description of *Pyrina Desmoulinii*, var. *Prattii*; description of *Hemiaster Murchisonie*, and note on other British species of *Hemiaster*; notes on species of *Cyphosoma*, *Salenia*, *Cardiaster*, *Epiaster*, and *Micraster*. Figures and descriptions illustrative of British Organic Remains. Decade v. *Memoirs of the Geological Survey of the United Kingdom.* 4to. London.

1857.

33. List of genera of Fossil Mollusca in the St. Cassian and Hallstatt Beds. *Supplement to Lyell's Manual.* 2nd edition.
34. General view of the Bradford Clay Fossils of Cirencester. *Quart. Journ. Geol. Soc.* vol. xiv. pp. 117, 118.

1858.

35. On some Pleistocene Shells from Aberdeenshire. *Quart. Journ. Geol. Soc.* vol. xiv. p. 532.
36. On the genus *Synapta*. By S. P. Woodward and Lucas Barrett. *Proc. Zool. Soc.* vol. xxvi. pp. 360—367, plate xiv.; *Ann. and Mag. Nat. Hist.* [3] vol. iii. (1859) pp. 214—221.

1859.

37. The article "Conchology" in Bohn's 'Young Lady's Book.' Svo. London.
38. Another note on the tenacity of life in Snails. *Ann. and Mag. Nat. Hist.* [3] vol. iii. p. 448.
39. On a new species of mollusk of the genus *Scissurella*, D'Orb. *Proc. Zool. Soc.* vol. xxvii. pp. 202—204. Plate xlvii.
40. Note on *Cyclostoma articulatum*. *Ann. and Mag. Nat. Hist.* [3] vol. iv. p. 320; *Proc. Zool. Soc.* vol. xxvii. p. 204, plate xlvii.



1859.

41. On some new freshwater shells from Central Africa. *Proc. Zool. Soc.* vol. xxvii. pp. 348—350, plate xlvii; *Ann. and Mag. Nat. Hist.* [3] vol. v. (1860) pp. 337, 338.

1860.

42. List of the fossil shells from the lower freshwater deposits of Bessarabia. *Quart. Journ. Geol. Soc.* vol. xvi. p. 286.
43. List of fossil shells from under Babel and Bardur, Lake Yalpuik. *Ibid.* p. 288.
44. List of the recent shells from the freshwater lake of the Steppe adjacent to the Danube. *Ibid.* p. 290.
45. List of recent shells collected about Spitzbergen in 1859 by J. Lamont; named by S. P. Woodward. *Quart. Journ. Geol. Soc.* vol. xvi. p. 437.
46. How we began Shell-collecting. *Recreative Science*, July, pp. 35—40.
47. Collecting Sea Shells. *Ibid.* September, pp. 103—114.
48. The article 'Volcanoes' in *Encyclopædia Britannica*, pp. 603—607.
49. On an Ammonite with its operculum *in situ*. *Geologist*, p. 328.

1861.

50. The Shell-Collector in London. *Recreative Science*, February, pp. 297—305.
51. Notes on, and drawings of, the Invertebrata in Owen's 'Palæontology' (*Encyclopædia Britannica*). Svo. *Edinburgh.*

1862.

52. Note on König's Sea-urchin (*Cyphosoma Königi*, Mantell). *Geologist*, vol. v. pp. 41, 42. Plate iii.
53. Some account of *Barrettia*, a new and remarkable fossil shell from the hippurite limestone of Jamaica. *Geologist*, vol. v. pp. 372—377. Plates xx. and xxi.
54. On the Fossil Human Skeletons from Guadaloupe. Letter of Admiral Sir Alexander Cochrane respecting the Fossil Human Skeleton from Guadaloupe, now in the British Museum. *Intellectual Observer*, vol. ii. pp. 280—284.

1863.

55. On *Echinothuria floris*, a new and anomalous Echinoderm from the Chalk of Kent. *Geologist*, vol. vi. pp. 327—330.
56. Obituary notice of Lucas Barrett, F.G.S. *Ibid.* pp. 60—63; and *Critic*, February, 1863.

1864.

57. Shells of the Newer Pliocene or Norwich Crag (including Bulchamp and Chillesford, in Suffolk, and Bridlington, Yorkshire). Reprinted from the Rev. J. Gunn's article on "the Geology of Norfolk," in White's History and Directory of the County. Svo. *Sheffield*.
58. Note on the Freshwater Shells collected in Nubia by Dr. Leith Adams. *Quart. Journ. Geol. Soc.* vol. xx. p. 19.
59. Note on the Land and Freshwater Shells (from the fluvio-lacustrine beds of the North-western Himalayas) collected by Captain Godwin-Austen. *Quart. Journ. Geol. Soc.* vol. xx. p. 388.
60. Remarks on the Bridlington Crag, with a list of its Fossil Shells. *Geol. Mag.* vol. i. pp. 49—55, 142.
61. Note on *Plicatula sigillina*, an undescribed fossil of the Upper Chalk and Cambridge Phosphate-bed. *Ibid.* vol. i. pp. 112—114. Plates v. figs. 1—6.
62. Note on *Montacuta bidentata*. *Ibid.* p. 142.
63. On the nature and origin of Banded Flints. *Ibid.* pp. 145—149. Plates vii. and viii.

1865.

64. List of Mollusca from the Post-tertiary deposits of the Valley of the Nar. *Geol. Mag.* vol. ii. pp. 11, 12.
65. Cliona, recent and fossil [brief note]. *Ibid.* p. 576.
66. List of Shells, &c., from the Hunde Islands, Davis Straits, dredged by Dr. Sutherland, October, 1862; named by Dr. S. P. Woodward. *Phil. Trans.* vol. clv. p. 328.

1866.

67. On the form, growth, and construction of Shells. Edited by Henry Woodward. *Intellectual Observer*, vol. x. pp. 241—253.

1867.

68. On the form, growth, and construction of Shells. Edited by Henry Woodward. *Intellectual Observer*, vol. xi. pp. 18—30.
69. Economic uses of Shells, and their Inhabitants. By Henry Woodward. From the notes of the late Dr. S. P. Woodward, F.G.S., etc., and other sources. *Ibid.* vol. xi. pp. 161—172.

1880.

70. [Post-Pliocene] Mollusca from Clacton & Copford, in W. H. Dalton's Geology of Colchester (Mem. Geol. Surv.). pp. 20—22.