



Yorkshire Philosophical Society.

ANNUAL REPORT

FOR

MDCCCLXXVII.



A N N U A L R E P O R T

OF THE COUNCIL

OF THE

Y O R K S H I R E

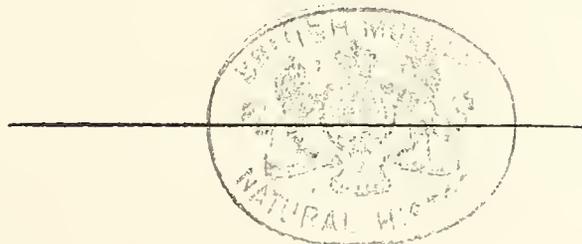
PHILOSOPHICAL SOCIETY

FOR

M D C C C L X X V I I .

PRESENTED TO THE ANNUAL MEETING,

FEBRUARY 5TH, 1878.



Y O R K :

J. SOTHERAN, BOOKSELLER, CONEY STREET.

—
1878.

PATRONESSES

OF THE

Yorkshire Philosophical Society.

HER MAJESTY THE QUEEN.

H. R. H. THE PRINCESS OF WALES.

PATRONS.

H. R. H. THE PRINCE OF WALES.

H. R. H. THE DUKE OF CONNAUGHT.

THE ARCHBISHOP OF YORK.

OFFICERS OF THE SOCIETY, 1878.

PRESIDENT:

HIS GRACE THE ARCHBISHOP OF YORK, F. R. S.

VICE-PRESIDENTS:

THE RIGHT HON. LORD LONDESBOROUGH.

THE HON. AND VERY REV. THE DEAN OF YORK, D. D.

WILLIAM HENRY RUDSTON READ, M. A., F. L. S.

EGERTON VERNON HARCOURT, M. A., F. G. S.

THE VEN. ARCHDEACON HEY, M. A.

THE REV. CANON RAINE, M. A.

WILLIAM REED, F. G. S.

JOHN FRANCIS WALKER, M. A., F. L. S., F. G. S., F. C. S.,

MEMBER OF THE COMMITTEE OF THE BRITISH ASSOCIATION, &c.

WILLIAM WALKER, F. G. S.

J. H. GIBSON, M. D.

TREASURER:

WILLIAM GRAY, F. R. A. S., F. G. S.

COUNCIL:

Elected 1876. . WILLIAM MATTERSON, M. D.

THE REV. GEORGE ROWE, M. A.

TEMPEST ANDERSON. M. D., B. SC.,

FELLOW OF UNIVERSITY COLLEGE, LONDON.

JOSEPH WILKINSON, F. R. G. S.

Elected 1877. . JOHN P. WOOD.

RICHARD PEARSON.

EDWARD W. SMITHSON.

Elected 1878. . JAMES MELROSE.

THE REV. ROBERT DANIEL.

ALFRED HENRY SPENCE.

WILLIAM LEWIN NEWMAN.

WILLIAM BARNBY (for 2 years.)

HON. SECRETARY:

T. S. NOBLE, F. R. A. S., F. G. S.

CURATORS :

GEOLOGY	W. REED, F. G. S.
MINERALOGY	W. H. HUDLESTON, M. A., F. G. S.
COMPARATIVE ANATOMY . . .	T. ANDERSON, M. D.
BRITISH ORNITHOLOGY . . .	W. H. RUDSTON READ, M. A. F. L. S.
INSECTS AND CRUSTACEA . . .	VEN. ARCHDEACON HEY, M. A.
ETHNOGRAPHICAL COLLECTION	J. H. GIBSON, M. D.
ANTIQUARIAN DEPARTMENT . .	{ REV. W. GREENWELL, M. A. REV. J. RAINE, M. A.
LIBRARY	REV. G. ROWE, M. A.
BOTANY	WILLIAM MATTERSON, M. D.
CONCHOLOGY	S. W. NORTH, F. G. S.
OBSERVATORY & METEOROLOGY	{ W. GRAY, F. R. A. S., F. G. S.
<i>under the care of a Committee</i>	{ VEN. ARCHDEACON HEY, M. A.
<i>consisting of</i>	{ T. S. NOBLE, F. R. A. S., F. G. S.

REPORT OF THE COUNCIL
OF THE
YORKSHIRE PHILOSOPHICAL SOCIETY,

FEBRUARY 5TH, 1878.

The gross income of the Society for the year 1877 has been £1388 16s. 10d., whilst the total expenditure has amounted to £1587 7s. 5d., leaving a balance due to the Treasurer on the year's account of £198 10s. 7d.

Although the income of the Society is apparently below an average, yet this is not so in fact. The possession of the land, part of the Manor Shore Estate, late the leasehold property of the Society, and from which about £100 a year was received in rents, has been surrendered to the Fine Art Committee, and, consequently, there is a loss of income to that extent which is more than counterbalanced by the Crown rent of £120 formerly paid for the same land, and which has now ceased to be paid.

The Council, however, consider it to be a matter for congratulation when the extra-ordinary outgoings for the year, on works absolutely required to maintain the fabric of the Museum, are taken into account, that the balance due to the Treasurer is so small in amount.

The damp and unsatisfactory state of the upper rooms in the Museum, in which the Ethnological collection was exhibited, had for some time previous to the past year received the consideration of the Council, and various attempts to remove the cause of damage had been made, but without success. The injury to the walls and ceiling at length became so serious, that the Council resolved to take the opinion of their Architect, Mr. Atkinson, on the matter. Mr. Atkinson reported

that the interior rafters and stone-work of the roof were in so damaged a condition as to require immediate repair. He advised that a new roof be built, and at a higher pitch, and that the two rooms containing the Ethnological collection be made continuous, whereby considerable space would be gained. The Council adopted the report, and the required work has been done, at a cost of £335 14s. 8d., a sum which includes not only the cost of the repairs, but all expenses incident to the repair and enlargement of the cases of the Ethnological collection, and in fitting them to the walls. By this alteration the Society have gained to their Museum a room 62 feet by 18½ feet wide, in which the collection can now be exhibited to the utmost advantage, without any break in its continuity, a point of great importance in a collection intended to trace the works of man from the Palæolithic age to a time comparatively recent.

The Council now propose to add to the general account the Lodge account, hitherto kept separate. The balance which still exists on this account amounts to £650 2s. 3d., but as the last year's account disclosed a balance in hand of £430 2s. 4d., the actual debt on the present year's account as shewn in the Treasurer's balance sheet, after deducting the deficit of £198 10s. 7d. on the present year's account, will be £418 10s. 6d. When the Members are reminded that this debt is the result of the alterations referred to, and of the extra-ordinary outlay which the Society incurred a few years ago in providing the present Lodge, which is so great an ornament to our grounds and to the quarter of the City in which it stands, they will concur with the Council, whilst regretting the existence of any debt on the annual balance sheet, that such debt was unavoidable under the circumstances.

There are also other items of expenditure which will be more particularly stated in the Treasurer's Account to be annexed to the Report. A sum of upwards of £30 has been expended in a new boiler to the Greenhouse, and £54 11s. 6d., and £15 6s. 0d., have been respectively paid for objects of antiquity, and for asphaltting the Walks of the Museum. The Marygate Tower has also been repaired at a cost of £39 2s. 4d.

The Antiquarian Department has received some important additions during the past year, the chief of which is the very interesting tomb of Julia Fortunata, wife of (M) Verecundius Diogenes, which was discovered by the excavators of the new Railway buildings in the month of March. It is a remarkable circumstance that the monument of her husband was found at the same place exactly three centuries ago. M. Verecundius Diogenes prepared his own tomb, and it may perhaps be inferred from the absence of any age upon the coffin of the lady, and from the peculiar wording of the inscription, that he made ready the memorial of his wife during her lifetime. The epitaph discloses the fact that she was a native of Sardinia, and the bones in the tomb, which were in a good state of preservation, proved her to have been a tall and masculine person.

The formation of a new road across Scarcroft yielded in the month of May several curiosities, and a fragment of a votive inscription. Other excavations in the same neighbourhood have revealed the interesting fact that the Roman road to Tadcaster did not run through Micklegate Bar, as has been stated by various antiquaries, but a little to the north of it; indeed it seems evident that it did not strike the modern high-road at all on this side of the Village of Dringhouses. It is the intention of the Curator to prepare a map in which the recent discoveries on the Micklegate side of the Ouse will be carefully laid down.

The excavations at the new Railway Station have yielded to the Museum an impression of the body of a female, in gypsum, which is remarkably perfect, and a very fine stone coffin, the largest that the Society possesses, eight feet in length, and proportionately thick. This has been placed in the row of Roman tombs in the Hospitium, and in it has been carefully laid the gypsum in which the body was enveloped.

In the new Ethnological room the large collection of flint and stone implements which the Society possesses has been arranged, and Dr. Gibson has very kindly fastened the specimens to the boards on which they are exhibited.

Considerable progress has also been made in bringing

together a collection of Pottery of a comparatively recent date, the work of the Northern manufacturers.

The Coin cabinet has received a somewhat important addition through the kind bequest, by Miss Widdowson, of the collection of her late uncle, Mr. James Cook. It contains a large number of Roman and English coins, some of which supply deficiencies in our cabinet. During the year the modern English tokens and the foreign coins have been classified and catalogued by Mr. Norcliffe, who has kindly added to them a number of his own.

In the course of the past year the Society has had an opportunity of acquiring, by purchase, two small collections of antiquities which had been found in York, chiefly derived from the recent excavations at the Railway. It is much to be desired that other collectors would grant to the Society the same privilege. Apart from the city in which they are found, such objects possess a very trifling interest, their chief value is in combination and comparison with others, and this can only be tested in a large public collection such as that in our Museum. It is only a few years since the position of Eburacum as the chief city in Britain was questioned on account of the paucity of memorials of the Romans in our Museum, which were all the while in existence in private collections. This needless slur has been, to a great extent, taken away, but it would disappear entirely if amateurs would permit us to acquire from their museums objects found at York of which we have at present no types, and they would shew the Society equal consideration if they refrained from standing in its way by purchasing objects which ought to be secured for our collection as soon as they are discovered.

The Honorary Curator of Geology reports that the re-arrangement of the Yorkshire Geological room is nearly completed; the Lias is being arranged in the following zones:—*Ammonites Jurensis*, *A. Communis*, *A. Serpentinus*, *A. Annulatus*, *A. Spinatus*, *A. Margaritatus*, *A. Capricornus*, *A. Jamesoni*, *A. Oxynotus*, *A. Bucklandi*, *A. Angulatus*, *A. Planorbis*, so as to correspond with the tables in Tate and

Blake's Yorkshire Lias; next follow the Rhætic, Triassic, Permian, Coal measures, Millstone Grit series and Carboniferous Limestone. The collection is very deficient in good specimens from the last named formation.

The Yorkshire collection has been enriched by the donations of our Honorary Member, W. H. Hudleston, Esq., of a fine specimen of *Ammonites Berryeri* from the Upper Calcareous Grit of Kirkdale, and of *Araucaria Hudlestoni* from the Coralline Oolite of Malton. He has also given a very fine slab of *Trigonia clavellata* from the Coralline Oolite of Weymouth, which is useful for comparison with the slabs of *Trigonia perlata* in our Yorkshire collection.

The general collection has been increased by the presentation of a series of Fossils from the Sponge Gravel Beds near Farringdon, belonging to the Lower Green Sand, by Mr. Whitwell, of Holgate, and a series of Photographs of sponges from E. Davey, Esq., Wantage, Berks. Miss H. M. Crompton has given a fine Fish from the Eocene Beds of Monte Bolca; J. F. Walker, Esq., a large specimen of *Ammonites spinatus* from South Petherton; and the Honorary Curator a Cast of a molar tooth of *Mastodon Borsoni* from the Red Crag, Suffolk.

The Curator of Ornithology reports the addition of the White Spoonbill (*Platalia leucorodia*), to the Rudston collection, which he purchased, having been taken by Anthony Savage in the decoy at Hornby Castle, 1865. He has also to report the capture of two specimens of the large Bittern (*Ardea stellaris*), one killed by Col. Napier at Buttercrambe Moor, on Jan. 10, 1877, which proved to be a female, and another shot at Moss, below Askern, Jan. 9, 1877, by Mr. Hindle, Surgeon, of the latter place, and now in the possession of Mr. Yarborough, Camps Mount. It is remarkable that they were killed on two consecutive days, 20 miles apart. Also a specimen of Honey Buzzard, killed at Kilburn, and a Sea Eagle, on Thornton Moor, Northumberland. A Woodcock's nest was found on Wass Banks, April 20, 1877, on bare ground, composed of a few straws and dried leaves. The Curator has also to record an

interesting race between a Continental express train and a carrier pigeon from Dover to London. The bird was tossed from a carriage window as the train left the Admiralty Pier. The train got up speed of 60 miles an hour and proceeded to Cannon Street without stopping. The pigeon was "housed" in a building in Cannon Street. It took the direct route probably, saving about half-a-mile in the whole distance of $76\frac{1}{2}$ miles, and beat the train by 20 minutes or time allowance of 18 miles.

Two specimens of the Hoopoe (*Upupa epops*), one at Summer Lodge, Richmond, and the other at Tockwith, have been killed during the year; and a white Starling at Holtby.

The Curator of Comparative Anatomy reports that though a large amount of valuable material which had not previously been shewn to the public has been placed in the cases for exhibition, much still remains to be dealt with.

The skeleton of the Irish Elk, one of the most valuable specimens in the collection, the mounting of which was cumbersome and unsatisfactory, is now nearly completely remounted in a most satisfactory manner. It will be placed in the centre of the new Ethnological gallery in close proximity to the Flint implements and other remains of pre-historic man with which it was contemporary. The rest of the collection is now in process of re-arrangement, with a view to the incorporation of the still available material and the more effective display of the whole.

Mr. Wakefield reports:—The past year will be remembered as being remarkable for barometric disturbances, great winds, and an excessive rainfall, although the results are almost the exact means of the observations of half a century, in regard to atmospheric pressure and temperature.

On January 1st a severe storm swept over the country, striking the southern coasts first and seriously damaging the Admiralty Pier at Dover, and the Promenade Piers at Brighton and Eastbourne, but doing little damage in the northern counties. Two others had been recorded, one, which might be

termed the great storm of the year, on account of its duration, occurred on October 14th, the other on November 22nd, equally severe, and probably extending over a larger area.

The mean height of the mercurial column for the year corrected to 32° F. and mean sea level was 29·8403 inches, being ·0853 inch below a mean, and having a range of 2·022 inches from a minimum of 28·686 inches on November 29th, to a maximum of 30·708 inches on October 6th. The barometer fell, however, to 28·600 inches at 6 p. m. on November 11th, with the wind in the south and a velocity of 40 to 48 miles per hour. The barometer had been twice below 29 inches in January, once in March, and five times in November.

METEOROLOGICAL REGISTER, YORK, 1877.

BAROMETER.				RAIN.		THERMOMETER.				
Month.	Highest.	Lowest.	Mean.	Inches.	Days.	Average Maximum.	Average Minimum.	Mean Temp.	Highest.	Lowest.
Jan.	30·558	28·760	29·7303	3·27	24	46·45	35·13	40·79	57	30
Feb.	30·157	29·218	29·8038	2·22	22	48·46	35·93	42·19	55	22
Mar.	30·360	28·994	29·7169	2·85	22	46·39	32·35	39·37	54	21
April	30·246	29·111	29·8065	3·37	17	50·13	37·46	43·80	58	30
May	30·378	29·034	29·8845	2·04	15	54·32	40·06	47·19	64	27
June	30·266	29·319	29·9803	1·43	13	67·63	49·13	58·38	78	41
July	30·201	29·022	29·8354	3·13	15	66·55	51·00	58·77	73	42
Aug.	30·111	29·334	29·8163	4·43	21	66·48	51·35	58·91	75	42
Sept.	30·391	29·637	30·0615	3·33	16	60·13	43·97	52·05	67	35
Oct.	30·708	29·246	29·9379	2·92	19	56·00	40·35	48·17	65	27
Nov.	30·366	28·686	29·5673	2·10	17	50·70	37·53	44·12	59	30
Dec.	30·700	29·150	29·9426	2·18	21	44·58	33·71	39·14	52	26
	30·708	28·686	29·8403	33·27	222	54·82	40·67	47·74	78	21

The temperature for the year was 47°·74, or ·13 above a mean, the highest point being 78° on June 19th, and the lowest 21° on March 1st. On 51 nights it fell to or stood at 32°. The following table exhibits the months of excess and defect respectively.

Excess.		Defect.	
January	4.49	March . . . . .	.93
February	4.39	April	1.90
June . . . . .	.28	May	5.01
July . . . . .	.17	August . . . . .	.39
October . . . . .	.07	September	2.55
November	2.52		<hr/>
December . . . . .	.44		10.78
	<hr/>		
	12.36		
	10.78		
	<hr/>		
	12)1.58		
	<hr/>		
Excess for the whole year	.13		

In London the first week in May showed a deficiency in the temperature of 8°·8 below the mean of 100 years.

The quantity of rain, snow and hail that had fallen amounted to 33·27 inches, being 1·75 inch above the rainfall of 1876, and 9·28 inches above the mean of 50 years. Every month had

RAIN FALL, 1877.

Month.	Total Depth.		Greatest Fall in 24 Hours.		Days on which .01 or more fell.	Langton.	
	Inches.	Depth.	Date.			Inches.	Inches.
Jan.	3.27	.84	3	24	3.63	3.575	
Feb.	2.22	.34	25	22	1.95	2.785	
Mar.	2.85	.91	30	22	2.85	2.775	
April	3.37	.70	22	17	3.33	3.635	
May	2.04	.62	17	15	1.79	1.905	
June	1.43	.38	12	13	1.62	1.715	
July	3.13	.70	14	15	3.36	3.410	
Aug.	4.43	.81	25	21	4.10	3.590	
Sept.	3.33	1.11	15	16	3.10	3.190	
Oct.	2.92	.62	23	19	2.44	3.030	
Nov.	2.10	.53	21	17	2.31	2.370	
Dec.	2.18	.96	30	21	2.08	2.490	
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	
	33.27	1.11		222	32.56	34.470	

been much above a mean, with the exception of June, which showed a deficiency of .91 inch [see the following table], and

as a consequence the rivers had been much above the summer level nearly the whole year. The mean rainfall for York is 23·99 inches, having a range of 21·96 inches from a minimum of 17·89 inches in 1850 to a maximum in 1872 of 39·85 inches.

Excess.		Defect.	
January	1·57	June	·91
February	·75		
March	1·26		
April	1·87		
May	·35		
July	·70		
August	1·72		
September	1·12		
October	·50		
November	·03		
December	·34		
	<hr/>		
	10·21		
	93		
	<hr/>		
Excess for the whole year	9·28		

Mean rainfall for 20 years, ending 31st Dec., 1877	25·458 inches.
„ 10 „ „	27·569 „
„ 5 „ „	26·006 „
	<hr/>
Mean of the three terms . .	26·344 inches.

showing an excess of 2·35 inches above the mean for fifty years; during that period the following years have had a rainfall above 30 inches.

	Inches.	Days of rainfall.	Mean daily rainfall.
1860 ..	30·37	190 ..	·1598 inch.
1876 ..	31·70	194 ..	·1634 „
1877 ..	33·27	222 ..	·1498 „
1848 ..	36·02	192 ..	·1876 „
1872 ..	39·85	216 ..	·1844 „

COMPARATIVE PREVALENCE OF WINDS.

N.	N.N.E.	N.E.	E.N.E.	E.	E.S.E.	S.E.	S.S.E.
32	6	18	8	24	5	10	8
S.	S.S.W.	S.W.	W.S.W.	W.	W.N.W.	N.W.	N.N.W.
74	23	36	19	41	17	24	20

The following observations made at Langton, Malton, have been kindly supplied by the Rev. A. Shadwell, M. A.

Rain fall 7·33 inch over average. Rivers above summer level the whole year. Flood in Derwent January 4th, 11 ft. 2 in. ; April 20th, 8 ft. 2 in. ; September 16th, 8 ft.

Mean height of Barometer, 29·997 corrected for level and temperature.

WINDS.

S. to W.	W. to N.	N. to E.	E. to S.	Calm.
152	93	58	51	11

Thirty-three new Members, six Ladies, and four Associates have been elected during the past year, whilst twelve Members, eight Lady Subscribers, and two Associates have been lost to the Society either by death or resignation during the year. Amongst those whose names will no longer appear on the Society's roll is that of our late honoured Vice-President, the Rev. John Kenrick.

The Rev. John Kenrick joined the Society on its foundation in the year 1823, as his name appears in the first list of its Members published in the year 1824. Over a period of upwards of fifty years he continued to aid, by his labours and his experience, the Society of which he had been one of the first promoters, and so long as the Society lasts, the numerous papers published in its Transactions, of which he was the author, on almost every branch of antiquities and antiquarian literature will remain an enduring evidence of his profound learning. Mr. Kenrick not only added renown to the Society by these labours, but from an early period he took an active part in the administration of its affairs. In 1824 his name first appears on the list of the Council, and from that date it has remained

on our list as one of its principal executive officers. On the death of his father-in-law, the late Rev. C. Wellbeloved, he succeeded to the Curatorship of the Antiquities in this Museum, with which department his labours were more intimately associated during the last sixteen years of his life. Apart from this Society the name of Mr. Kenrick was well-known, and took high rank in the world of literature. In 1850 he published in 2 vols., "The History of Antient Egypt under the Pharaohs;" and in 1855 a History of "Antient Phœnicia." During his long residence in York, Mr. Kenrick was an active promoter of those Societies founded in our city which have for their object to promote learning or to alleviate suffering; and his loss is deeply mourned. He died at York on May 7th last in the 90th year of his age. In his will Mr. Kenrick remembered the Society with which his name had been so intimately associated, and a bequest contained in it has been the means of adding to the Society's Library a valuable series of books, a list of which will be published in this Report.

Mr. Thomas Gott, of Knaresbro', one of the Honorary Members of the Society, has also died during the past year. Mr. Gott will be remembered as a gentleman who took much interest in our Museum, and, on more than one occasion, presented to the Antiquarian department several very valuable objects of Roman Antiquity.

The following Lectures have been delivered in the Theatre of the Museum during the past year.

SUBJECT.	NAME OF LECTURER.
The History of the Potter's Art in Britain	} F. W. RUDLER, Esq., F.G.S.
The Giant Planets .....		R. A. PROCTOR, Esq., B.A., F.R.A.S.
Wind and Weather	REV. ARTHUR SHADWELL, M.A.
Second Lecture on do.	Do.
Spenser's Faerie Queen.....	REV. GEORGE ROWE, M.A.
New Zealand	T. B. WHYTEHEAD, Esq.
Public Health and Sanitary Laws	S. W. NORTH, Esq., F.G.S.
The History of the Alphabet ..	REV. ISAAC TAYLOR, M.A.

SUBJECT.	NAME OF LECTURER.
Recent Geological Speculations	PROF. DUNCAN, F.R.S.
The Galvanic Battery	R. ROUTLEDGE, Esq., B.Sc., F.C.S.
Second Lecture on do.	Do.
Jerusalem as it is	REV. F. LAWRENCE, B.A.
Modern Greece	J. W. BARRY, Esq., B.A.

During the past year the Council have allowed the use of the Theatre of the Museum for a series of Lectures given under the auspices of the Cambridge University Extension Society. It is gratifying to the Council to learn that these lectures, chiefly on scientific subjects, yet embracing others not within the scope of the Society, have been a great success, and must be the means of affording to many the opportunity of acquiring a knowledge of science.

The Council propose for election the following gentlemen, well known in the scientific world, as Honorary Members of the Society: William Carruthers, F.R.S., F.L.S., F.G.S., British Museum; Henry Woodward, F.R.S., F.G.S.; Henry Clifton Sorby, F.R.S., F.G.S.; W. S. Dallas, F.L.S., Secretary of the Geological Society; Robert H. Scott, M.A., F.R.S., F.G.S., Director of the Meteorological Office; L. C. Miall, F.G.S., Professor of Biology in the Yorkshire College of Science, Leeds; Robert McLachlan, F.R.S., F.L.S., &c.; Rev. T. G. Bonney, M.A., F.S.A., F.C.S., F.G.S., Professor of Geology, University College, London; Dr. Augustus Voelcker, F.R.S., F.C.S., Professor of Chemistry to the Royal Agricultural Society; H. T. Stainton, F.R.S., F.L.S.; Sir Wyville Thompson, F.R.S.

The following Members of Council retire according to the rules of the Society, and are not eligible for re-election at the present: Joshua Oldfield, Esq., Mr. Ald. March, Edward Allen, Esq., and Frederick L. Mawdesley, Esq.

The Council propose the following Members of the Society as new Members of Council: Mr. Ald. Melrose, Rev. Robert Daniel, A. H. Spence, Esq., W. L. Newman, Esq., and Mr. Barnby in the room of Dr. Gibson, elected a Vice-President.

THE TREASURER IN ACCOUNT WITH
THE YORKSHIRE PHILOSOPHICAL SOCIETY
FOR THE YEAR 1877.

Dr.	INCOME.					
1877.	£.	s.	d.	£.	s.	d.
<i>Annual Subscriptions, &c.:</i>						
Members	690	0	0			
Lady Subscribers	70	1	0			
Associates	18	0	0			
Arrears	6	0	0			
				784	1	0
<i>Admission Fees of New Members:</i>						
Paid in Full	15	0	0			
Paid by Instalments	59	0	0			
				74	0	0
Keys of the Gates		48	15	0		
Temporary Subscribers		3	0	0		
<i>Rents:</i>						
New Manor Shore Property	14	16	3			
St. Mary's Lodge	54	6	3			
Cottages in Marygate ..	13	15	4			
Boat Yard	5	0	0			
Water Works Co. (9 years) ..	0	9	0			
				88	6	10
Gate Money	295	11	3			
Swimming Bath	40	0	0			
Sale of Guide to Antiquities, &c.	16	11	0			
Use of Tent	10	5	0			
Sale of Duplicate Antiquarian Specimens	6	0	0			
Donation from W. Atkinson, Esq. ..	5	0	0			
Widdowson, Miss, Executors of the late	15	7	0			
Proceeds at Whitsuntide	1	19	9			
				1388	16	10
Excess of Expenditure, 31st Dec., 1877	198	10	7			
				£1587	7	5
<i>Permanent Debt:</i>						
Yorkshire Insurance Company	1900	0	0			
Due to Two Members, £50 each	100	0	0			
				2000	0	0
Balance in Treasurer's hands, 31st Dec., 1876 ..	430	2	4			
Less Excess of Expenditure, 31st Dec., 1877 ..	198	10	7			
				231	11	9
Balance due to the Treasurer, 31st Dec., 1877	418	10	6			
				£2650	2	3

		EXPENDITURE.		Cr.		
1877.	£.	s.	d.	£.	s.	d.
Crown Rent	1	0	0			
Corporation do.	19	15	0			
Water do.	8	9	6			
Rates and Taxes	15	16	1			
Insurance	5	13	0			
Fine Arts Committee (proportion of Rent)	21	7	3			
				72	0	10
<i>Salaries and Wages:</i>						
C. Wakefield	140	0	0			
H. Baines (Pension)....	100	0	0			
J. Davison (Do.)	26	0	0			
J. Fielden	70	4	0			
Lodge Keeper	46	16	0			
Attendant, Museum	46	16	0			
Do., Hospitium ..	16	18	0			
Gardeners	126	0	0			
				572	14	0
Interest to Insurance Company		75	1	0		
Interest and Commission to Bankers		10	16	4		
<i>General Expenses and Repairs:</i>						
Museum	67	13	11			
Estate	30	5	1			
St. Mary's Lodge	13	7	0			
Marygate Tower	39	2	4			
New Roof and Cases for Ethnological Room ..	335	14	8			
				486	3	0
<i>Gardens, Greenhouses, &c.:</i>						
General Expenses and Repairs	29	16	0			
Seeds, &c.	4	8	6			
Coals and Coke	11	14	1			
Asphalting Walks	15	6	0			
New Boiler in Greenhouse (2nd Account) ..	30	3	11			
				91	8	6
Purchase & Preparation of Specimens		7	17	2		
<i>Library: Books and Binding</i>		26	17	11		
Swimming Bath		8	17	1		
<i>Miscellaneous Expenses:</i>						
Printing of Report, Communications, and List of Members	34	4	6			
Printing, Stationery, &c.	9	15	7			
Coals and Gas	41	7	2			
Expenses of Lectures ..	64	17	5			
Do. Bands	10	5	1			
Do. Hospitium ..	19	14	8			
Do. Roman Antiquities	54	11	6			
Postages and Bridge ..	0	15	8			
				235	11	7
				£1587	7	5
<i>Permanent Debt:</i>						
Yorkshire Insurance Company	1900	0	0			
Due to Two Members, £50 each	100	0	0			
				2000	0	0
Deficiency on the Entrance Lodge Improvement Account, now closed	650	2	3			
				£2650	2	3

LIST OF SUBSCRIBERS

TO THE

ENTRANCE LODGE IMPROVEMENT FUND.

	£.	s.	d.
His Grace the Archbishop of York, President of the Society	25	0	0
Aldam, W., Frickley Hall	5	0	0
Anonymous	5	0	0
Barber, J. S., Osbaldwick Cottage	2	0	0
Bell, W. H.	5	0	0
Bleasdale, G.	5	0	0
Cattley, T., Brandsby	3	0	0
Colburn, J., the late	5	5	0
Cowling, H.	10	10	0
Cussons, G.	2	0	0
Davies, R., the late	10	10	0
Duncombe, the Hon. and Very Rev. Dr.	10	0	0
Ellis, T.	105	0	0
Ford, J., the late	10	10	0
Gowland, W. T.	2	2	0
Gray, Wm.	25	0	0
Harcourt, E. V., Whitwell Hall	25	0	0
Hey, the Ven. Archdeacon	5	0	0
Hoggard, J., the late	2	2	0
Johnson, R.	5	0	0
Jones, G. F.	10	0	0
Kenrick, Rev. J., the late	5	0	0
Leeman, G., M. P.	25	0	0
Lloyd, Miss Ann, Stockton Hall	5	0	0
Lowther, J., M. P., Swillington	25	0	0
March, J.	5	0	0
Matthews, P.	5	0	0
Mills, J. R.	10	0	0
Millward, C. A.	2	2	0
Munby, J., the late	10	10	0
Noble, T. S.	10	10	0
Norcliffe, Mrs.	10	0	0
Oldfield, G., Dringthorpe	20	0	0
Oldfield, J.	25	0	0
Padel, C. G.	1	1	0
Peckitt, H., Carlton Husthwaite	5	0	0
Pearson, R.	5	0	0

Carried forward .. £447 2 0

							£.	s.	d.
					Brought forward	..	..	447	2 0
Prescott, R.	..	..	..	..	..	..	..	5	0 0
Procter, W., M. D.	..	..	..	..	..	..	..	5	0 0
Read, W. H. Rudston			..	..	..	..	..	10	10 0
Reed, W.	..	..	..	..	..	..	..	10	10 0
Richardson, H.	..	..	..	..	..	..	..	10	0 0
Richardson, W. B.	..	..	..	..	..	..	..	10	10 0
Robinson, Rev. J.	..	..	..	..	..	..	..	5	0 0
Roper, J., the late	..	..	..	..	..	..	..	25	0 0
Smithson, E. W.	..	..	..	..	..	..	..	20	0 0
Sotheran, H.	..	..	..	..	..	..	..	5	0 0
Sotheran, W.	..	..	..	..	..	..	..	10	10 0
Spence, A. H.	..	..	..	..	..	..	..	5	5 0
Steward, H., the late, Bishopthorpe				..	..	..	..	5	5 0
Smith, Rev. G. Vance		..	..	..	..	..	..	2	2 0
Swann, Clough, and Co.		..	..	..	..	..	..	21	0 0
Terry, J. ..	..	..	..	..	..	..	..	10	10 0
Thomas, W., the late	..	..	..	..	..	..	..	1	1 0
Walker, J. F.	..	..	..	..	..	..	..	10	10 0
Walker, W.	..	..	..	..	..	..	..	25	0 0
Weatherley, Ralph	..	..	..	..	..	..	..	5	0 0
Whitehead, G.	..	..	..	..	..	..	..	10	0 0
Whytehead, W.	..	..	..	..	..	..	..	10	10 0
Wilkinson, J.	..	..	..	..	..	..	..	10	10 0
Wolstenholme, G.	..	..	..	..	..	..	..	2	2 0
Varvill, R.	..	..	..	..	..	..	..	1	0 0
Woodd, B. T., M. P., Conyngham Hall				..	..	..	..	5	0 0

Total £688 17 0

STATEMENT OF EXPENDITURE

ON ACCOUNT OF THE

ENTRANCE LODGE IMPROVEMENT FUND,

31st DECEMBER, 1877.

	£.	s.	d.
Preliminary Expenses	11	4	6
Cost of Temporary Lodge	62	17	6
Cost of Building New Lodge	916	6	6
Cost of Gates, Palisades and Lamps	188	16	11
Cost of Laying out the Approaches	63	8	10
Cost of Concreting the Walk	36	19	0
Architect's Charges	74	6	0
	<hr/>		
	1353	19	3
Total Amount of Subscriptions to the Improvement Fund (see page 21)	688	17	0
Sale of Temporary Lodge	15	0	0
	<hr/>		
	703	17	0
	<hr/>		
	650	2	3
Balance in Treasurer's Hands, 31st Dec., 1877	231	11	9
	<hr/>		
Total Liabilities of the Society, 31st Dec., 1877 (independent of the Permanent Debt)	£418	10	6
	<hr/> <hr/>		

W. GRAY,
Treasurer.

Audited and found correct
2nd March, 1878,
F. L. MAWDESLEY.

MEMBERS ELECTED IN 1877.

- Atkinson, Albany, 22, *Bootham Terrace*.
 Barry, John Warren, *Heworth Hall*.
 Bass, Joseph, 34, *Parliament Street*.
 Bollans, Robert Henry, 14, *High Petergate*.
 Brown, Eleanor, 49, *Monkgate*.
 Champernowne, Capt., R. E., *Lord Mayor's Walk*.
 Coke, Capt., *Militia Depôt*.
 Croft, Michael, *Lendal*.
 Fletcher, Allen, 6, *Lord Mayor's Walk*.
 Goadby, Edwin, 16, *Bootham*.
 Gray, Alan, *Minster Yard*.
 Grayston, Elton, *Coney Street*.
 Grimwood, Charles, 20, *Coney Street*.
 Hodgson, Mrs., *Stonegate*.
 Hood, William, *Castlegate*.
 Houlden, William, *Union Terrace*.
 Jubb, William, 9, *Micklegate*.
 Lewis, William, *Stonegate*.
 Marchant, Robert, *Petergate*.
 Mawson, Miss, 3, *St. Mary's*.
 North, Arthur William, *Union Bank*.
 Peart, Joseph, 41, *The Mount*.
 Proctor, John William, 23, *St. Paul's Square*.
 Prudames, Samuel, *Low Ousegate*.
 Richardson, Mrs., *Bootham*.
 Russell, William James, *Heworth*.
 Smith, Charles, *High Ousegate*.
 Stamp, Thomas, *Marygate*.
 Taylor, John, *Coney Street*.
 Wade, Mrs., 31, *Bootham*.
 Walker, Charles, *Marygate*.
 Wilberforce, Rev. W. F., *St. Oswald's Terrace*.
 Wilkinson, Edward Towler, *Micklegate*.

LADY SUBSCRIBERS ADMITTED IN 1877.

Child, Miss, *Trinity Lane*.
 Edward, Mrs., 9, *Markham Street*.
 Fowle, Mrs., *Clifton*.
 Haynes, Mrs., 37, *St. Mary's*.
 Rougier, Miss, 1, *South Parade*.
 Walker, Miss, 20, *St. Mary's*.

 ASSOCIATES.

Denison, George, *St. Leonard's Place*.
 Leeds, Charles Edward, 24, *Portland Street*.
 Hutchinson, William Hilton, *Bootham*.
 Raven, Vincent, *East Mount Road*.

 RESOLUTIONS

PASSED AT THE ANNUAL MEETING, FEBRUARY 5TH, 1878.

—o—

1. That the Report of the Council now read be adopted and printed for circulation amongst the Members, Lady Subscribers, and Associates of the Society.
2. That the thanks of the Society be given to the Members of Council retiring from office, also to the Treasurer, Secretary, and Curators for their valuable services; and that authority be given to the Council to give admission to the Public to the Museum on Whit-Monday and Tuesday, under the same regulations as last year.
3. That the thanks of the Meeting be given to the Chairman.

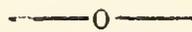
DONATIONS TO THE MUSEUM.

GEOLOGY AND MINERALOGY.

Crompton, Miss Henrietta M.	} Specimens of Fossils and Minerals.
Clayton, Capt.	Fossils from the Gault, East Wear Bay, Folkestone.
Edson, Mr. G.	Six Fossils from Brandsby and North Grimston.
Gibson, Dr.	Bones of the Moas, from New Zealand.
Hudleston, Mr. W. H., London	} <i>Araucarites Hudlestoni</i> , from the Coral-line Oolite, Malton. <i>Ammonites Berryeri</i> , from the Upper Calcareous Grit, Kirkdale Cutting. Slab of <i>Trigonia clavellata</i> , from the Trigonia beds of the Corallian Series, Weymouth.
Lawrence, Rev. F.	Fragment of Stalagmite, from Ephesus.
Percival, Mr. S. G.	Polished Section of <i>Cyathophyllum regium</i> , from the Yorkshire Coast.
Raine, Rev. Canon	Specimens from the Coal Measures of Durham. Coral, from Nunnington.
Reed, Mr. W.	Cast of Molar of Trilophodont Mastodon (<i>Mastodon Borsoni</i>).
Walker, Mr. J. F.	<i>Ammonites spinatus</i> , from the Middle Lias, South Petherton.
Whitwell, Mr. W.	Specimens of Sponges, from Faringdon.
Widdowson, Miss, The Executors of the late ..	} A Collection of Precious Stones, and Polished Stones from the Yorkshire Coast.

ZOOLOGY.

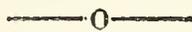
Crompton, Miss Henrietta M.	} Specimens of Shells.
Raine, Rev. Canon	
Read, Mr. W. H. Rudston	A Longicorn Beetle (<i>Monochammus dentator</i>).
Walker, Mr. J. F.	Two Colorado Beetles.
Walker, Mr. T.	Albino specimen of the Rook.
	Do. Blackbird.



ANTIQUITIES.

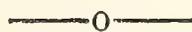
Acton, Mr. G.	Pieces of Stained Glass, with some recipes for making it, by Peckitt, the York Glass Stainer.
Dixon, Mr. W.	A Sword, temp. Geo. III.
Eccles, Mr.	A Glass Bottle, 18th sæc.
Edson, Mr. Geo.	Part of a Roman Urn, from Malton.
Gibson, Dr.	Two Armorial Seals, 18th sæc.
Healy, Rev. E., <i>Copman-</i> <i>thorpe</i>	} A series of Casts from the Poniatowski Gems.
Jones, Mr.	
Morrell, Mr. W. W.	Piece of Carved Oak Screen-work, from Old Belfrey Church.
Nelson, Mr. F.	Eight Silver Coins of Elizabeth, James I., and Charles I.
N. E. Railway, Directors of	Part of a large Jet Hair-pin.
	Inscribed Coffin of Julia Fortunata.
	Stone Coffin, with Cast of Body.
	Perfect Cast of Woman, from a coffin.
	Two Jet Pins.
	Cinerary Urn, Glass Vessel, and Cup inscribed DAMI.
Newton, Robinson, and Brown, Messrs.	} Three broken Mediæval Vessels. Two fragments of Saxon Combs. A Spindle-whorl of bone.

- Norcliffe, Rev. C. B. Many foreign Coins, in Silver and Copper.
Impression of Great Seals of Charles II., George III., and William IV.
- Reed, Mr. W. Stone Axe, from Mornington, New Zealand.
- Seller, Mr. G. Old Key, found in Fossgate.
- Smith, Mr. W. Lower Maxillary of Human Skull.
- The Dean and Chapter of } Several Carved Stones of Norman
York) work, taken out of the Old Library of York Minster.
An early English Capital from the South Transept.
- Walker, Mr. J. F. Knife Handle of wood, from Cambridge.
- Widdowson, Miss, The } A collection of Coins made by the
Executors of the late ..) late Mr. Jas. Cook.
A Roman Gold Ring.
- Wilson, Mr. D. Skull of *Bos longifrons*, found in King's Square.
- Wolstenholme, Mr. C. D. Mediaeval Tyg, from Plymouth.



MISCELLANEOUS.

- Wood, Mr. W. Specimen of Cloth from the bark of the Paper Mulberry.
Plait and Shaving from the bark of the Cocoa Nut.



LIBRARY.

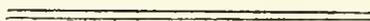
- Anne, Mr. Geo., Burgh- } The Astronomical M.S.S. of the late
wallis Hall) Edward Pigott.
- Association, British, for the } Report for 1876.
Advancement of Science)
- Association, Geologists' .. Proceedings, vol. v., Nos. 1 and 2.

- Author, The On the Artesian Well at St. Clement's,
Oxford, by J. Prestwich, M. A.,
F. R. S.
- Author, The Das Innere der Vancouver—Insel, von
Robert Brown.
- Authors, The On the Corrallian Rocks of England,
by Rev. J. F. Blake, M. A., F. G. S.,
and W. H. Hudleston, Esq., M. A.,
F. G. S.
- Club, Tyneside Naturalists' } Natural History Transactions of
Field } Northumberland and Durham, vol.
v., pt. 3.
- Club, Warwickshire Field Proceedings for 1876.
- Davey, Mr. Photographs of Sponges from Faring-
don.
- India, Geological Survey of Palæontologia Indica, series x., pt. 2,
and series xi., pts. 1, 2.
Memoirs of do., vol. xii., pts. 1, 2, and
vol. xiii., pts. 1, 2.
Records of do., vol. ix., pts. 2—4, and
vol. x., pts. 1, 2.
- Institution, Royal, of Great } Proceedings, Nos. 64, 65.
Britain }
- Institution, Smithsonian.. Report for 1875.
Geological Survey of the Territories,
vol. 2. (E. D. Cope's Cretaceous
Vertebrata).
- Kenrick, Mrs. Thesaurus numismatum Imperatorum
Morellianus, 5 vols., fol.
Imperium Orientale Banduri, 2 vols.,
fol.
Glossarium ad Scriptores mediæ et
infimæ Latinitatis, Du Cange,
6 vols., fol.
Glossarium novum ad Scriptores medii
ævi, Carpentier, 4 vols., fol.
Orellii Inscriptiones, 3 vols., 8vo.
Inscriptiones antiquæ totius orbis
Romani Gruteri, 4 vols., fol.
Recueil de Medailles de Rois, 9 vols.,
4to.

- Kenrick, Mrs. Recueil de Monumens Antiques, par
Grivaud de la Vincelle, 4to.
Recueil d'Antiquités Egyptiennes,
Etrusques, Grecques et Romainés,
7 vols., 4to.
The Coinage of England, by T.
Snelling, 4to.
Aquæ Solis, or Notices of Roman
Bath, by Rev. H. M. Scarth, 4to.
The Yorkshire Library, by W. Boyne,
4to.
- Publishers, The Nature (Journal) for 1877.
- Read, Mr. W. H. Rudston Journal of the Linnean Society:
Zoology, Nos. 66—73.
Botany, Nos. 87—92.
- Society, Chemical Journal for 1877.
- Society, Geological Journal, Nos. 129—131.
- Society, Hull Literary and }
Philosophical } Report for 1876—77.
- Society, Leeds Literary and }
Philosophical } Report for 1876—77.
- Society, Leicester Literary }
and Philosophical } Report for 1876.
- Society, Meteorological .. Meteorological Data for the nine 10°
Squares, Lat. 20° N. to 10° S. Long,
10° to 40° W.
Quarterly Weather Report, pts. 3, 4,
1874.
Report of the Permanent Committee
of the First International Congress
at Vienna, Meeting at London,
1876.
Report of Meteorological Committee
of the Royal Society.
- Society, Royal, of Edin- }
burgh } Transactions, vol. xxvii., pt. 4.
Proceedings, Session 1875—76.
- Society, Warwickshire }
Natural History and } Report, 1876.
Archæological }
- Society, Zoological Transactions, vol. ix., pts. 10, 11, and
vol. x., pts. 1, 2.

SERIAL WORKS SUBSCRIBED FOR.

- Corpus Inscriptionum Latinarum (4 vols. with Atlas of Plates and Supplement published).
- Birds of Asia, by John Gould, F. R. S.
- Natural History of the Tineina, by H. T. Stainton, F. R. S.
(13 vols. published).
- Nautical Almanack.
- Proceedings of the Zoological Society, with Illustrations.
- Publications of the Palæontographical Society (30 vols. published).
- Publications of the Ray Society.
- Sowerby's Thesaurus Conchyliorum, col. plates (32 parts published).
- London, Edinburgh, and Dublin Philosophical Magazine.
- Annals and Magazine of Natural History.
- Geological Magazine.
- Journal of the British Archæological Association.
- Numismatic Chronicle.
- Memoires de la Société Paléontologique Suisse.
- D'Orbigny's Paléontologie Française.



COMMUNICATIONS
TO THE
MONTHLY MEETINGS
OF THE
YORKSHIRE PHILOSOPHICAL SOCIETY,
1877.

APRIL 3RD.—DR. PROCTER read the following paper on the Composition of some of the Colours used by the Romans:—Almost all the knowledge which the Romans had of colours for decoration is to be derived from Pliny's Natural History, which is in truth a vast encyclopædia of ancient knowledge and belief upon every known scientific subject, with quotations from between four and five hundred authors.

In the portion of that work devoted to mineralogy, including mineral colours, Pliny cites thirty-six authors. Of these, I believe, only the writings of Vitruvius, and the meagre treatise of Theophrastus, written 300 B.C. are now extant.

It is, therefore, a matter of interest to translate the substances which he describes into their modern names, or, in other words, to identify them. But the manner in which he has collected, and especially grouped together the mass of matter, has caused it to lose a great portion of its value from the mixture of fable and truth he has written, as well as from the difficulty, in some cases impossibility, of discovering exactly the special object of which he is speaking. This arises mainly from the absence of the relation of essential characters or a mention of them in detail. The description of natural objects is most scanty and imperfect, although it is true that if he had given minutely the characters of every object, he would have swelled his book to a most enormous size; nevertheless a deficiency of this kind increases the difficulty of recognising

some substances, regarding which he sets down only the most apparent, and often unimportant characters, as colour, weight, locality, &c.

For the origin of the pigments employed by the Romans in decoration, we must, in a great measure, look to the Greeks. The pictures of the great Greek Masters are entirely lost. They disappeared during the wars waged by the Romans with the successors of Alexander, and the later Greek republics. The subjects of many of these pictures are described by Pliny and other classical authors, and some idea of the manner and style of the Greek artists may, I presume, be gained from the designs of the so-called Etruscan vases which were executed by the artists of Magna Grecia, and some of which are probably copies of celebrated works or portions of them; whilst some faint notion of their execution and colouring may be gained from the paintings in fresco found at Herculaneum and Pompeii. It may truly be said that these paintings are not of Greek execution, yet we are certain at the period when Rome was the metropolis of the world, that the fine arts were cultivated in that city almost entirely by Greek artists, or at least by artists of the Greek school. Pliny is diffuse on this subject in book xxxv., and by comparing his descriptions with those of Vitruvius and Theophrastus, it will be found that the same materials for colouring were used at Rome and Athens. Pliny mentions thirty great painters, whose works were known to the Romans, of these only two are expressly mentioned as being born in Italy, and the remainder were Greeks.

Whatever may be their origin we do know that the colours used by the Romans were brilliant, and the contrasts of the frescoes strong, and those competent to form an opinion consider them to be of much excellence, and in fact the minor ornaments have led to the foundation of the Arabesque style, largely used for decoration in modern times. But there is another point of view besides that of art proper, from which they may be viewed by affording information with respect to the nature and chemical composition of the colours used by these ancient artists, and it is that which I propose to consider.

I had lately given to me small portions of several colours on walls from Pompeii. These with some similar portions obtained from a Roman Villa, at Collingham, excavated some years ago, have been made the subject of experiment.

The colours were—yellows, greens, reds, and a rose colour.

The yellows were three in number, and I found No. 1 to be a yellow ferruginous earth with clay. No. 2 was Limonite, mixed with gypsum. No. 3 was a yellow mixed with chalk.

It is in the first place proper to mention that the word Ochre is applied in mineralogy to any product of decomposed ores, as Cobalt ore, &c., but in ordinary and popular language, and without definite accuracy, it is applied to any combination or mixture of the earths with iron which can be used for pigments and the like. Hence, as the colour is light or dark, we have yellow, red, and brown ochres. They are produced by the disintegration of iron ores, and notably of the Hematite forming the red, and of Limonite, or the hydrated oxide of iron, giving rise to the formation of the lighter ochres, the tint being moreover varied by admixture in different quantities with light coloured earths. The admixture of them, I found, with clay, chalk or gypsum, admits of a probable explanation, by reference to Pliny who tells us that certain colours were mixed with other substances to render them lighter, and thus obtain various tints, whilst other colours required an under coating, or some preparation of the surface for their reception. This latter statement may account for the presence of gypsum in No. 2, assuming that it did not happen to be an ingredient of that particular ore from whence the colour was obtained.

Pliny describes numerous colours under different names, all of which appear to be those which we should now call ochres. “Sinopis, the author writes, was discovered in Pontus, and hence its name from the city of Sinope. It is produced also in Egypt, and the Balearic isles, but the best is found in Lemnos and Cappadocia, being extracted from quarries there. In the native mass it has its own proper colour within, but is spotted on the exterior, the ancients made use of it for tone.” Pliny here uses in the original the word “splendor” supposed by Wornum to be the equivalent of our word tone, which

comprehends both the tone and harmony of the Greeks. Our author then continues,—“ There are three kinds of Sinopis, the pale, the red, and the intermediate. It is used both with the brush and for colouring wood. That which is of the deepest red is used for colouring partitions. The Sinopis known as the dull (*pressior*) is tawny, and is used principally for the lowest partitions.”

Then he speaks of Rubrica, which is either red ochre or oxide of iron, as a better kind of Sinopis, highly esteemed, and only sold in sealed vessels, hence called Sphragis, and as being used to adulterate or give an under coating to minium, which is probably a vermillion, and that it is found in Egypt and Arabia in iron mines. Another variety he describes thus—“ It is from Rubrica that ochrea is prepared. The Rubrica being burnt in new earthen pots, well luted with clay, and is very useful for plasters by reason of its desiccative properties.”

Other varieties he describes under the term sil, which were in all probability ochres.

Thus then there can be no doubt that these various forms of ochre were used by the Romans as yellow, brown, or red pigments variously modified in their tints or shades by admixture with neutral substances, as we employ those minerals in the present day.

The green colours which I examined were two in number.

No. 1 was composed of the protoxide and a little peroxide of iron, silica, lime, alumina, and carbonic acid.

This appears to be an exception to the usual ancient green pigments, which generally contain copper, whilst in this substance none is present. It is a carbonate of protoxide of iron or ferrous carbonate, with chalk, alumina, silica and a little ferric oxide. The only substance that I can find given by Pliny, agreeing with it occurs in this passage. “ There are also two colours of very inferior quality which have been recently discovered. One of these is known as Appianum, a fair imitation of Chrysocolla. This colour is prepared from a green chalk.” This passage is readily understood as we are acquainted with several minerals of a green colour which owe that colour to ferrous compounds.

The green colour, No. 2, is a much altered substance containing copper, and is probably the Chrysocolla of Theophrastus, Vitruvius, and Pliny. The mineral which we now term Chrysocolla, is a hydrated silicate of copper, whilst that of the ancients there is every reason to believe was the carbonate (Malachite). This will be seen from Pliny's description, bearing in mind that copper is often found mineralised with gold, silver, and lead. "Chrysocolla is a liquid which is formed in the shafts flowing through veins of gold, a kind of slime which becomes indurated by the cold of winter until it has attained the hardness even of pumice. The most esteemed kind is found in copper mines. He then describes how an artificial Chrysocolla may be manufactured by allowing water to percolate through a vein of the metal, and allowing the former to evaporate."

Of the two reds which were examined, one was a dull red ochre, its colour being derived from ferric oxide. Several red earths used in painting are described by Theophrastus and Pliny as the Sinnian earth, the Armenian earth (Bole) and African ochre which had its red colour produced by calcination.

The other red was a compound of lead and probably minium. The red lead oxide was known to the Greeks under the name "sandarake."

In parts of Pliny's descriptions there is some confusion between minium and cinnabar. He says that sandarach was a product of an island in the Red Sea, then he tells us "that there is a spurious kind prepared by calcining cerusse in the furnace," and that this was discovered accidentally by means of a fire at the Pirceus at Athens. Some cerusse *i.e.* white lead which had been exposed to the fire was found converted into minium, and afterwards the process was imitated artificially. He likewise describes another colour Sandyx, and which Beckman, from a passage in Virgil, considers it to be our madder, Pliny also remarks that Virgil has taken Sandyx to be a plant. But the naturalist's description shows that this could not be true, for according to him it is prepared by calcining equal proportions of rubrica and sandarach, and the only effect of this operation would be to alter the tint of the pigment, and to give it a more crimson hue.

From Sandyx and Sinopis, another colour, Syricum, is prepared, which Pliny says is used to adulterate first-class minium, and he continues “one motive for giving an undercoat of Syricum is the evident saving of expense, which results therefrom.” He has previously, in another passage, told us that the more expensive colours were furnished to the painters by the employers, and says—“Minium in another way affords a very convenient opportunity to painters for pilfering by washing their brushes filled with colouring matter, every now and then. The minium of course falls to the bottom, and is thus so much gained to the thief.”

In the description of these substances there is evidently some confusion between these several modifications of minium and cinnabar or vermillion, which was both known and used by the Romans.

The remaining pigment which I examined was of a rose colour. I have had with this specimen great trouble to determine its composition, and I am not as yet thoroughly satisfied regarding its exact nature. The outer portion exposed to the air is of a cream colour, but the interior has a rose tint. It consists of a fine white clay with chalk and some colouring matter. Having satisfied myself that this colouring matter was not mineral but of organic origin, I endeavoured to ascertain with what colours derived from this source, and known to the Romans, the pigment in question corresponded.

The Porfura of the Greeks, and the Purpurissimum^{*} of Pliny was a colouring matter derived from species of shell fish belonging to the genera Murex and Purpura. Vitruvius says that the fish from the northern countries afforded a more violet, and those from the southern coasts a redder colour, and Pliny says, that for the use of painters, “argentine creta” was dyed with it.

It is necessary here to remark that the antients do not appear to have been acquainted with the difference between calcareous and aluminous earths, and that “creta” was a term applied by them to every fine white earthy powder. Both Vitruvius and Pliny say that in reference to this particular instance, it was adulterated or imitations made of it by

tinging creta with madder and hysginum, a dye derived from a plant unrecognised, although called by Pliny the hyacinth.

The finest purpurissimum had a tint like that of a deep coloured rose, and was laid on a picture to give the last lustre to sandyx (red ochre) and to produce the brilliant colour of vermilion, but if it was desired to produce a purple, then a coat of ceruleum (probably copper ochre) was laid beneath, and one of purpurissimum with egg, upon it.

The second colour which the pigment in question might be is madder, called by Dioscorides "eruthodanus" or "ereathodanus," of the identity of this substance with our madder there can be but little doubt. Under the kermes berry our cochineal is described—"the holm oak with its scarlet berry. It is produced in Galatia, Africa, Piscidia, and Cilicia; the most inferior kind is that of Sardinia."

This mistake of the Roman author in describing an insect as a berry, is an excusable one, as it was a long time before the nature of the Coccus was understood. The Coccus Ilicis is here alluded to, and is found on the Ilex or Quercus Coccifera.

My colour so far agrees with either of the two preceding, insomuch that it forms a lake with alumina, and it is the abundance of the latter to which its permanency may be due. Whilst agreeing in this matter, in other respects they present marked differences. The ancient colour is more permanent than a true vegetable lake would be, and they do not agree in some chemical reactions, especially in the action of chlorine upon them. Under the influence of this agent the ancient colour becomes more purple, and is remarkably stable when compared with a true madder or cochineal lake. So that I am inclined to think that if this pigment is not a lake derived from purpurissimum, that into the composition of this colour it at least enters combined probably with kermes and madder.

Pliny says that the celebrated Greek painters only employed four colours—(1) White Melian earth, or more rarely cerussa; (2) Rubrica; (3) Yellows; and (4) Blacks; but he gives a list of 17 besides several combinations used in his time. This statement arose probably from an imperfect recollection of a passage of Cicero. His statement may be true when applied

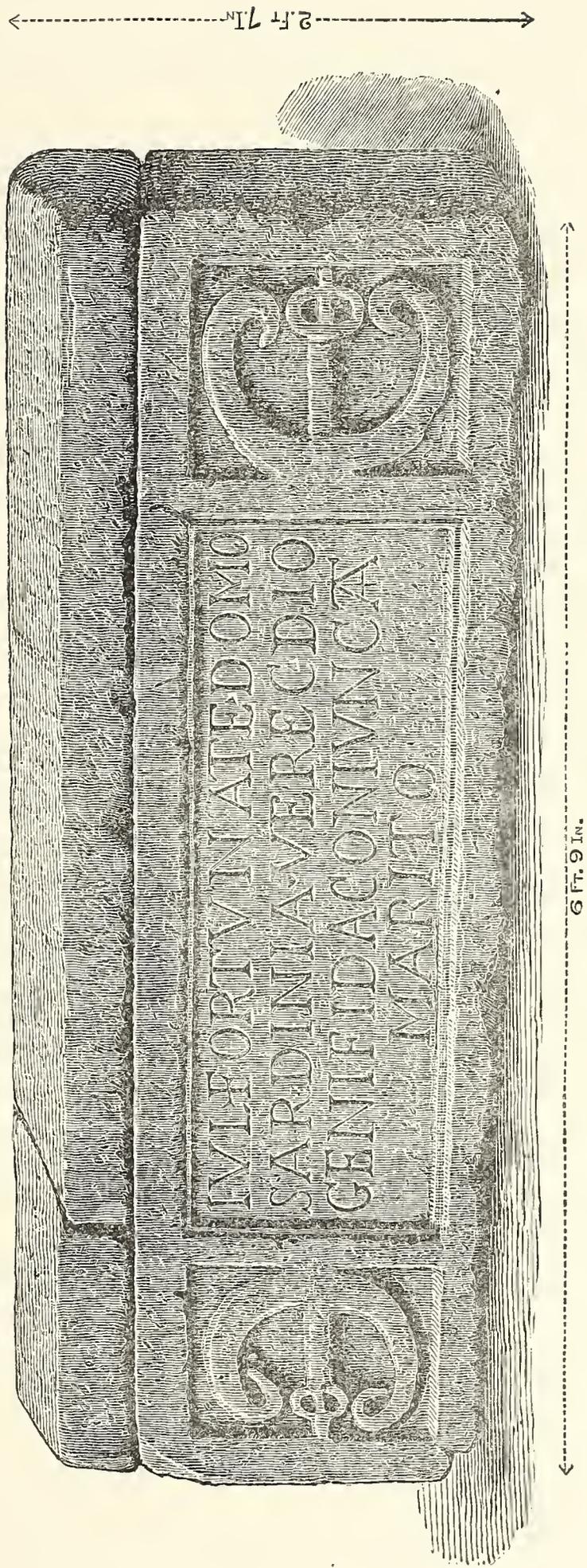
to the earliest Greek painters, to the time of Apelles. But those of the later school all evidence serves to show were perfect masters in all the resources of colouring both in variety of tints as well as means of producing effect and harmony.

This examination, limited as it is, seems to show that mineral colours were most extensively employed by the Romans as pigmentary substances, arising in all probability from a knowledge that they possessed greater permanency than those obtained from the organic kingdom, and likewise that pure native minerals, without artificial preparation, were adopted and this serves to account for the numerous small quantities of foreign matters found in their pigments. The presence of alumina in large quantities with colours of animal or vegetable origin, would also seem to demonstrate, that they were acquainted with the method of preparing those compounds which we now call lakes, which are simply vegetable colours precipitated in combination by that earth, giving them greater brilliancy, and in the generality of cases, more permanence than the colour alone would possess. It would be somewhat interesting to learn whether they were acquainted with the property which tin possesses, as well as alumina in this respect.

OCT. 2ND.—The REV. CANON RAINE read a paper on some Roman curiosities recently discovered in York. He stated that in the summer of 1874 a remarkable sculptured stone was discovered by the workmen who were making an entrance to the new railway station through the mediæval wall of the city. It represents a rude headless figure of a deity with wings, leaning against what seems to be a seat. The right hand, most of which is lost, seems to have held a staff, the left has a bunch of keys. Around the middle of the figure is a girdle or apron, curiously fringed with something running or coiling round it. Under the feet is a plinth or label containing a fragmentary inscription, the D being on the outside. It may be read as follows :—

VOL· IRE
D ARIMANIV

The figure was probably placed in a niche in some building,



MONUMENT OF JULIA FORTUNATA, WIFE OF M. VERECUNDIUS DIOGENES, SEVIR OF THE COLONY OF EBURACUM.
FOUND IN YORK, 1877.

and still retains traces of the white paint with which it seems to have been covered. It is possible also that on certain special occasions it was carried about in procession, shoulder high, as may be seen in some of the sculptures from Nineveh. It has been designedly injured; the head is gone, and the inscription is mutilated. This is probably another example of early Christian intolerance. The reading of the inscription has taxed the ingenuity of many.

I shall now give you, with some remarks of my own, a short abstract of a learned paper on the subject by Professor Hübner, of Berlin, which he has published in the Transactions of the Archæologists of Bonn. Dr. Hübner, before explaining his own views, takes the Aristotelian method of shewing how each of the previous interpretations is inaccurate. The letter D, as he observes, in the left corner, might pre-suppose the existence of M on the opposite side, which is now broken away. If the M was intended for *Manibus*, we have a funereal inscription; but, independently of anything else, the winged figure of the deity forbids such a supposition.

Another suggested reading has been *Deo Magno Volusius Irencus Arimanio posuit*. Now Arimanius was an Eastern deity, representing the minister of evil, in opposition to Mithras. This reading, however, cannot be assented to, as the last letter in the word Arimanius upon the stone is not O, but a portion of U or V.

Then, again, it has been conjectured that on the right hand corner there might have been the letter M as an abridgment for *Mithræ*, the Sun-god, the beneficent source of life and heat. This is possible, but at present there is no recorded instance of M by itself, standing for Mithras. He is generally addressed as *Deo Soli invicto*; or *D S I M*, that is, *Deo Soli invicto Mithræ*, or *Mithræ C(auto) P(ati)*, and it would not be easy for the sculptor to find room for all these letters in the right-hand corner; nor does the figure in any way resemble the representations of Mithras. Another reading is *Deo Magno Volcano Irencus et Arimanius posuerunt*. Against this there is the fact that Vulcan never appears under the form of *Vol*. Besides, he is never represented with wings, and the hammer and tongs are more congenial to him than the staff and keys.

We now come to Professor Hübner's own suggestion. Leaving for a moment the name of the deity, he reads the words within the label or inclosed space, as follows:—VOLVSI IRENÆVS ET ARIMANIVS POSVERVNT, that is, he makes the dedicators two brothers, called respectively *Volusius Irenæus* and *Volusius Arimanius*. The name Arimanius is peculiar; it is possible that the *Volusii* were of Persian descent, and familiar therefore with the Eastern deity Arimahn.

We now turn to the headless mysterious divinity. Dr. Hübner considers that we have in it a representation of Time—Æon or Ævum—and he compares it with a number of similar figures, discovered abroad, which are thought to set forth the same deity. The characteristics of these figures are a naked form with a lion's head, and a serpent coiling round the body. Sometimes it has two wings on the shoulders, sometimes two more on the legs. It holds a staff in one hand, often resembling a measuring rod; in the other hand there is a bunch of keys. All these points are symbolical of Eastern worship, and some of them have been introduced into Christianity. The snake represents the mingling ages or eternity; the rod, the power to take the measure of time; the keys, the opening and closing of all things, particularly of the year; the lion's head signifies the strength and the devouring power of time.

To turn to the sculpture itself, which is standing beside you, Dr. Hübner considers that it had a lion's head, and that the belt around the waist is an unsuccessful effort of a provincial sculptor to represent a serpent. In the right hand, or near it, is a portion of the measuring rod, in the left are the keys. The figure has two wings, and Dr. Hübner supposes that in the right hand corner, at the end of the label, was the word *Ævo* or something like it. At the head of his paper, by the side of our figure from York, he gives a lithograph of a stone in the museum at Bonn, which does little more than express the very part which the York sculpture wants, I mean the lion's head. A more hideous looking creature it is difficult to imagine.

In the course of the present summer a fragment of a tablet of limestone was discovered on the Mount, but most

unfortunately, only six letters of the inscription have been preserved. They constitute the ends of the two last lines

C V R
O. S. P.

Of course any reading of this fragment can only be of the most conjectural character. The last two letters probably stand for *sua pecunia*. It is much to be hoped that some farther portions of this inscription may be discovered.

There have been recently placed in the Museum two silver rings, each of which bears an inscription. The first was found some two years ago upon Barker Hill, and when it was cleaned with acid the two words DEO SUCELO disclosed themselves. The god Sucelus is entirely unknown. Probably he was some local divinity. There was a place of a similar name in Spain, and it is easy of course to form a theory that some soldier of the 9th, or the Spanish legion, brought this ring with him to York.

The other ring bears the letters TOT, which are still more difficult to explain. It was found on the new railway works. Dr. Hübner suggests the possibility of Mars *Toutates* having been intended. But this is entirely conjectural, and so also is the idea that TOT represents *totus*, to be rendered perhaps *wholly thine*, so that we may regard the ring as a lover's gift.

We have a discovery of a very different character in a stone coffin which was found in the new Railway Station in the month of June. It bears no inscription, but it is the longest and the heaviest that we possess, being eight feet in length and proportionately thick. The coffin contained the bones of a woman laid in gypsum, in close adherence to which were portions of the dress in which she had been interred. The best of these fragments have been carefully preserved (they were shown upon the table), and the coffin is now placed in the row of Roman tombs in the Hospitium, the bones and the gypsum having been carefully replaced in their original positions. The top of the coffin is secured by a glass frame. And now let me mention a curious circumstance. The holes in the stone by which the frame is fastened to the coffin, were drilled by a left-handed man, and he remarked that the tool marks

on the outside of the coffin showed that the Roman mason who made them with his chisel had been left-handed like himself. The stone is so fine, and the chisel marks upon it are so fresh, that the coffin might have left the mason's yard last week, instead of sixteen hundred years ago.

Presented
13 MAR 1886

