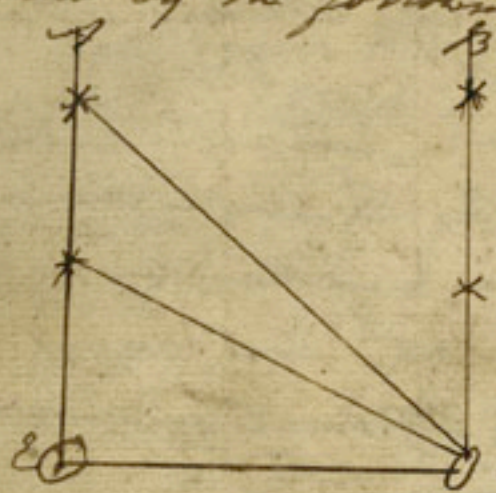


Royal Inst. 23 March Sect: 12 Astronomy

Of the Different Astronomical Systems. The Egyptian Ptolemaic, Copernican and Tycho's.

Aberration, from last lecture. Parallax, annual explained by the following figure.



The parallax leaves the object behind - A previous optical observation - The position of every object is determined by the last position of the ray of light which enters the eye.

The discovery of the aberration was the result of the search after Parallax. - Illustrated by a box thro' which a missile of lead is fired when the box is at rest - when it is in motion - Rain falling perpendicularly - The aberration shows the object more advanced.

Pythagorean system - Protagoras as persecuted - Egyptian very ancient - agrees to the general phenomenon in Ptolemaic, not supposed to be that which Ptolemy taught - Tycho's explains the general phenomena. Copernicus, the Pythagorean revised. - Objections to the Copernicity want of annual parallax, - irregular motions and different distances of the same planet from the sun - Phases of Mercury and Venus. All these objections have been removed by the discoveries of Galileo and Kepler.

11

Royal Institution 25 March 1809.

Annals of Nature Lect 2<sup>d</sup> - Mr. Este -

2<sup>d</sup> Introductory lecture - ~~facts of the present~~  
rise and progress of the science resumed. Middle  
thing to Linnaeus Buffon and Modern Naturalists

Recapitulation of the former lecture - Partory con-  
tinued - Circulation of the blood - absorbent  
system - The great discovery - Columbus - Copernicus  
- Harvey - Bot: the greatest - Cop: next - Flaming  
- Michael - The History of Animals according to  
Mr. Este. - & -  
Man - Birds - Insects - Fishes - Insects - Mammals.

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Royal Inst.<sup>n</sup> 20<sup>th</sup> March 1809.

Perspective Lect: 9<sup>th</sup> Mr. Wood.

Overview of Survey. The Anamorphosis.  
General application of perspective - Conclusion.

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Royal Inst. Saturday 1<sup>st</sup> April 1800  
 Animal Nature ~~at~~ 3 Introductory  
lecture. On the fitness of nature to sensation  
 and functions.

Mr. Erskine give the following Classification  
 which is that of Linnæus

Cl. Mamm:	a Birds	<sup>3</sup> Insep.	Fishes	Insects	Worms
Or: 7	6	2	6	7	5
9 <sup>a</sup> - 47	07	10	66	121	110
Sp: 557	2686	366	009	10,096	4036

Royal Inst. Wed<sup>d</sup> 5<sup>th</sup> April 1809-

On Ancient History and Modern  
Lecture 1<sup>st</sup> by Mr Rev<sup>d</sup> W. Crowe -

- Introduction to the subject. Use of this portion  
of History. Superior Antiquity and excellence  
of the sacred history. Origin and Progress of History  
among the Greeks. Their Historians. Subjects of their  
History. English writers of Grecian History.  
Plan of the present course of lectures.

- Use of History well known - Superiority of  
the sacred historians - Moses's relation Abraham's  
opening his son Isaac, contrasted with that of Joseph  
- Thucydides account of the retreat or  
Ambassadors, who at the account of the slain in  
a certain battle, replied with a groan and instantly  
departed -

The ancient historians may be divided into  
universal and particular historians. Of the  
former Herodotus and Diodorus Siculus are best.  
Of the latter Thucydides and Xenophon, to which  
may be added Polybius

Royal Inst. Friday 7<sup>th</sup> April 1809  
Lect 3<sup>d</sup> Musae — Musaeus Text

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Royal Inst. Saturday 8<sup>th</sup> April 1809  
Anomalous Nature, fourth introductory lecture  
— The fitness of Nature to situation and limits  
further considered.

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Royal Institution Tuesday 11<sup>th</sup> April —  
On ancient Greek History and Historians  
Lecture 2. On the Chronology and Geography  
of the Ancient Greeks.

- Various modes of reckoning time — Epochs — cycles — years — Days — subdivisions — watches — hours
- Modes made from Mr. Cavendish's paper in the Philosophical Transactions for 1792 — Olympiad
- Modern method by years <sup>after</sup> and before Christ
- Ancient Geography extremely imperfect
- Ptolemy's comparison of the ~~four~~<sup>3</sup> quarters of the Earth, Europe Asia & Africa very erroneous
- Strabo's Geography — Countries represented by figures, Sicily by a triangle, Italy by a leg, Spain by a

Royal Inst Friday 14<sup>th</sup> April 1809  
— on ancient Greek History and historians  
Lect: 3 Origin and progress of the Median  
war. — Did not attend

Royal Institution Saturday 15<sup>th</sup> April 1809  
Animal Nature Lect 5. Mr Estlin  
Lectures on Nature and the functions considered  
more particularly as preparatory to the sixth  
or concluding lecture. An account and <sup>a sketch</sup> drawing  
of the great snake stranded in the Gutneys  
in 1800, will be introduced.

Length of the snake supposed to be about 100 feet;  
part of the tail was destroyed. It had six feet.  
A fin extended along the back to the tip of the  
tail.

Royal Inst 16<sup>th</sup> April — 1809  
Ancient Greek History and Historians — Mr Crow  
Lect: 4 — Continuation of the Median war.  
— Did not attend this lecture

Royal Inst<sup>n</sup> Wednesday 19<sup>th</sup> April 1809  
Music Lect: 4<sup>th</sup> - M. Wefley

- On the force and mischief of musical prejudice

M. W. read from Locke's Essay on the conduct  
of the ~~senses~~ of the understanding, a long extract  
on prejudice. It occupied more than a quarter of  
an hour. - He then gave examples of Musical  
prejudices - Anecdotes of Handel. Some of  
them great contempt of the Solo music -  
- every person must study and understand  
music before he ~~is~~ judges any piece. The  
most solemn and highly impressive piece of Non-  
Cels at a certain concert received no approbation  
while a light insignificant piece performed  
immediately after was greatly applauded -  
- A piece of Handel's was performed in Mary  
bone Gardens by an eminent Violin player  
& friend was at the time walking with Handel  
in the garden, he said to Handel, this must be  
Mr. - the fiddler's composition, it is so bad.  
Handel replied, indeed it is very bad, but it  
is my own. - - Prejudice has even got  
into the Mathematics - One Gent<sup>l</sup> found fault  
with a translation of Euclid because it was  
called a Straight Line, instead of a right Line.  
(ridiculous)

Royal Inst. Friday 21. Mr. Crowe  
On Ancient Greek history & Herodotus  
Lecture 5 Conclusion of the Median War - Herodotus

April 22. Mr. Esli - Animal Nature  
Lect 4. Animus constantis et corporis. On  
organization in the higher Orders of Animals;  
the mind and its matter. On the dignity of  
human Nature - Conclusion. (Did not attend)

Tuesday 25 April - No Lecture Mr. Crowe Endorsed

Wed. 26<sup>th</sup> April - Mr. Dibdin - <sup>5<sup>th</sup> Lecture</sup> Lect 1  
English literature. Preliminary observations on the  
importance of preserving National literature. Publi-  
cations of the Poem, and common prayer book. The  
critical works of Ashmole and G. Wilson. Curious  
specimens of the latter's "Treatise on Rhetoric". The  
poetry of John Hall and Richard Edwards. Specimens  
The mirror of Magistrates and Paradise of Dainty  
Deviens. Specimens. Sketch of the English Drama.  
(Did not attend)



Royal Institution 29<sup>th</sup> April. 1809

Mr Davy's 1<sup>st</sup> Lecture on Electro-Chemical Science.  
Introduction. Elementary facts of Electricity. Experiments  
of Galvani. - Illustrations and Discoveries of Volta  
General views and observations concerning this branch  
of Science.

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New Discoveries treated of in last lecture appeared of  
great importance - Mr D wishes them to rest only on facts  
and experiments - He has <sup>had</sup> the honour of submitting them  
to the first judges in this Assembly, and on their o-  
pinion ~~to~~ he sets off -

In the preceding course frequent references were made  
to Electricity. In this course he would explain the principles  
of the science more particularly -

Amber rubbed - See Doctor Gilbert in 1600 published  
his work on the Magnet which also contains a number  
of Electrical experiments. This is a valuable work and  
has not been attended to so much as it deserves. Positive  
and Negative Electricity - Mr Duffay observes and shows  
two different Electricities. Dr Franklin's System  
Simple and beautiful - In the following lecture  
the terms positive and negative will be made  
use of merely as expressions of the effects, without  
enquiring whether there is one or two distinct kinds  
Construction of the Electrical Machine - Large Cylinders  
used powerfully - Experiments. Attraction and  
repulsion - Two - both gold leaf being from the  
upper ends of wires placed sometimes on one  
sometimes on both conductors - Chain connecting  
the Negative and positive conductor, no spark.

Unusual positive and negative attractions shown by two

Small conductors with several pith balls at each  
of the four ends. Leyden phial charged and discharged  
Electrometer - gold Leaf, large size - Pith balls -

Two metals brought into contact produce Elect  
Plate of Copper and Zinc with insulation, render  
the copper negative the zinc positive. -

- History of Galvani's Discoveries - Frog - muscular  
experiment. - A fluid (solution of kind of Sulphur)  
and a metal produced the same convulsions in the  
Frog. Galvani's explanation, animal Electricity

- Volta's great discovery - Pith, course de Lapes -  
Year 1798. Voltaic Battery, and Voltaic Electricity  
ought to be <sup>the</sup> terms employed. Galvani had no share  
in the discovery of the battery. - Principle  
of the Voltaic battery shown by pieces of Copper and  
Zinc placed in small tumbler of water / course  
de Lapes. -

- Concluded with a Dissertation on the  
great advantages likely to be derived from the  
new Discoveries - Necessity of public encouragement

- ~~the~~ Institutions, better has there been only one  
- Sub<sup>d</sup> to the Royal Institution not <sup>more than</sup> ~~equal to~~  
what a single Professor in Edin<sup>burgh</sup> has from  
his class &c &c. -

Monday 2<sup>nd</sup> May Royal Inst<sup>n</sup> —  
Greek History and Historians.  
Lect. 7 — Affairs of Greece from the Median,  
to the commencement of the Peloponnesian  
war.

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Wed<sup>nes</sup> 3<sup>rd</sup> May. The Rev<sup>d</sup> F. J. Dibdin  
On English Literature, Lecture 2 —  
Review of publications which treat of the  
reign of Queen Elizabeth. Character of Queen  
Elizabeth considered: first in a private and  
literary point of view; secondly with <sup>reference</sup> to  
her public situation. Influence of both upon  
the literature of the age. Anecdotes relating  
to the Queen.

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Thursday 4<sup>th</sup> May — W. Weyley  
Music-Lecture 5. On the three different  
styles appropriate to the music for the Church,  
the Chamber and the Theatre.

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Friday 5<sup>th</sup> May W. Crowe. On ancient  
Greek History and Historians Lect. 8 Conti-  
nuation of the same subject.

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Royal Institution 1805

May 4 - Mr. Davy's 2, Lecture  
on Electro-Chemical Science -

Voltaic Battery. Different Methods of construction. The new Voltaic Apparatus. Experiments on its agency.

Oil described - inconvenient, clothes very dry, plate difficult to clean. - Common Voltaic Apparatus, - requires a great space, number of glasses. - Cracks & leaks through, would soon to clean, difficult to insulate the plates, Cells often leaked - With various Improvements, troughs have glass partition plates separate, lifted out of the trough, all at once, by a wire, trouble some to put into the trough - Dr. Babington suggested making the troughs of Porcelain which is a non conductor. Mr Davy fixes his plates to a piece of baked wood. Each trough contains ten pair of plates and there were employed at the lecture 100 troughs. Effects in combustion much greater than the same number on the former construction. The plates of every trough left up <sup>when not used,</sup> and supported on the bent tops of three wires from one side of each trough rising about 10 inches above the troughs. By this contrivance the diluted acid will serve for a long time, with being changed, and the plates are more easily cleaned. Expt. Metals burnt - wires, gold leaf &c

Royal Institution

Saturday 13 May - M. Davy's

3 Lecture on Electro-Chemical Science  
Great and small surfaces compared.

Electric spark is diminished in the inverse proportion of the surface. Two insulated conductors, a spark from one is double the length of a spark from both - the same takes place in changes of different sized jars.

Great and small Galvanic plates -

A wooden Chest containing 20 plates of Copper and <sup>2 feet square</sup> zinc, let into the box like the common des tapes, compared with the same number of 6 inch plates, surface of the former 576 square inches, of the latter 162 or as 36 to 1. The shock which was scarcely perceptible was the same in both. The former <sup>burnt</sup> ~~disagrated~~ a long piece of wire the small did not produce even light. The new <sup>Wolff's</sup> ~~Galvanic~~ battery was charged and the negative and positive poles shown by the Gold leaf electrometer. This Elect: is on a much lower scale than Bennetts. A large Electrostatic Jar, and battery were charged by the Galvanic battery.

The Electric and Voltaic spark and shock  
are much weakened through bad conductors. P. 67  
Water less <sup>strong</sup> than Sulphuric acid.

Royal Institution Sat<sup>n</sup> 20<sup>th</sup> May 1809  
M. Davy's 2<sup>d</sup> Lecture on Electro-chemical  
Science

— Chemical Attractions. Experiments on its  
similarity to Electrical attraction. Decomposition  
by the Voltaic battery. Electrical relations of the  
Elementary substances. —

— Chemical attraction illustrated by a number  
of experiments on solution, precipitation &c. —  
Effects on Electrical attractions on Chemical —  
shown by decomposition of various <sup>substances</sup>, such  
as muriate of lime, sulphate of lime, &c. —  
shown on test paper —

— application to the Arts. Sheet covered by  
Gold to prevent rust. Dip it in aqua regia, it  
is covered with Gold, but part of the sheet is dissolved  
but the voltaic apparatus effects the same  
without dissolving the sheet. —

Common salts may be decomposed by the Vol-  
taic battery, and the alkalis obtained. Experi-  
ment shown in the small way. M. D. thinks  
that the process may be carried on in the great  
way with <sup>an</sup> advantage.

— Whether heat be a body or property  
Experiment & in vacuo to show that it is  
a matter sui generis. This experiment was  
not seen to half the audience. M. D. showed  
and explained it with his back to the audience

The Atmosphere is 99 times out of 100 in a  
positive state, consequently the earth is negative  
terra alkalis



Royal Inst:   
 ~~Less~~ Monday 22 May 1809 - Dr Smith  
 Botany Lect 1: - Introductory. On the Study of  
 Botany; its objects and recommendations.

Definition. The study of botany as applied to  
 Physic was the first inducement - History of the Science  
 and principal discoveries. Important discovery in  
 corals and corallines. These were thought vegetable pro-  
 ductions. Now found to be <sup>produced by</sup> Animals. Fossil specimens  
 shown. - It is frequently asked with respect to botany  
 as many other sciences, Cui bono? Some men are  
 to be found who can not be prevailed on to study  
 any science unless it be productive of riches -  
 - Other branches of Natural history, such as Zoology  
 require more exact and disgusting operations  
 and experiments; but botany is attended with the  
 highest pleasure - Anatomy of plants - Dr  
 Hope late professor of Botany at Edin. was the  
 first who gave lectures on the Physiology of plants.  
 These lectures, ~~and Physiology~~ were more admired  
 and studied abroad, than by his own students at  
 home. - It is remarkable that

Royal Inst.<sup>n</sup> 23 May - 1809. -

Botany Lect 2 - J. Smith.

General Structure, Physiology and Economy  
of Vegetables, with Incidental remarks.

(see Smith's Introduction Chapters 3, 4, 5  
6<sup>th</sup> and 7<sup>th</sup> - ~~remarks~~)

Anatomy of plants - Cuticle, cellular membrane,  
bark - wood - pith - Specimens shown round.

- Incidental remarks -

Cuticle advants of the passage of fluids from  
without and from within - former more than  
the latter, particularly in hot climates - etc.

In the bark the chief and peculiar virtues  
of plants reside, particularly in the layer next  
the wood - E.g. much Bark - astringent principle  
of the oak and willow - resin of the fir and Juniper,  
and the aromatic oil of the cinnamon.

These substances also pervade the wood and  
other parts of these plants but usually in a less  
concentrated state - Camphor is found entirely  
in the wood. A fine specimen shown in which  
a large quantity of Camphor occupied the  
middle of a piece of wood 6 or 7 inches in dia -  
The Camphor tree has never been classed unknown  
Chinese pench an the Sumatra Camphor at a  
higher price than the Camphor from China is  
sold in London - now an substance unknown here

Remarks

The underside of some plants in hot climates has  
the side next the ground covered with a kind  
of fur while the upper part of the leaf is quite  
smooth. Use of this fur unknown to D. S.

14

Royal Institution Saturday 27 May 1809  
Lect 5 - By Mr. Davy - Electricity & Decomposition of acids and Alkalies by Electricity. Energies and properties of the new substances obtained. General Laws of Electrical decomposition -

- Short history of the principal Discoveries in Galvanism - Nicholson and Carlisle first observed the Decomposition of water, in 1781. an experiment was pursued by its small - Positive and negative poles - Cruikshank observed that the positive pole produces acids <sup>he thought the water</sup> the negative alkalis, ammonia, Muriatic acid and Soda were said to be produced from water by Spallanzani, Oct. 1784. (N.B. Oct was a fictitious name, and his paper ~~was~~ contained conjectures, not real experiments). Mr. Davy in his Bakerian Lecture 1807 proved that when the experiment was properly conducted neither acid nor alkali was produced in water by the Voltaic machine. Their sources, in former experiments, were pointed out by Mr. Davy. - In prosecuting these experiments Mr. Davy made the important discovery that Alkaline matter ran to it self round the negative pole, and acids round the positive pole. This led him to the decomposition of the Alkalies and Alkaline earths. Now he shewed the decomposition of Pot ash by the Voltaic Battery. It was performed in a very short time, a minute or two - Potassium - properties specifically captured in water or on ice - Decomposes carbonic acid gas. - &c. &c. see the Bakerian Lecture

Platina crucibilia corroded by <sup>Potash</sup> Alkali, the  
Potash is decomposed, and the potassium acts on  
the Platina — Pyrophorus of Sturton and Char-  
cot. The Musc contains pot. ash, which is de-  
composed and potassium formed, which takes  
fire in the atmosphere — Amalgam - Barylum  
mode — Simple method of producing Potassium  
by iron, process described — It was shown in the  
former course. Silica composed of oxygen and metal  
— Armonia contains a metal, this must either arise  
from the hydrogen or Nitrogen, most probably from  
the last. The Experiments of Cavendish and Mas-  
selyne, <sup>show that</sup> the mean density of the earth is to that  
of water as 9 to 2, and to that of Common Stone  
as 9 to 5. Hence it is inferred that there must be  
great quantities of metal in the interior parts of the  
earth. — Hence Earthquakes, Volcanos &c —

x x To this it may be objected that as the masses  
of Pot ash and Soda are both lighter than water,  
The ~~mean~~ mean density of the earth should  
if they abound, <sup>be</sup> less than it is found to be —

Royal Institution Monday 29<sup>th</sup> May 1809

Botany Lect: 3 - Doctor Smith

- On the Vascular System of plants, their fluids and excretions. Physiology of flowers and plants  
fruits.

- See Introduction to Botany by D. Smith

Tuesday 30<sup>th</sup> May 1809 D. Smith

Botany Lect: 4<sup>th</sup> - Same Subject continued  
Especially concerning Stamens and Pistils

- See Introduction -

Before the commencement of the lecture I gave D. Smith a plant containing four rows of Serris, with a single one for the Experiment, which he showed, and which pleased the audience very much - A continental botanist who had never seen the plant that I described it in its open state. - He did not know that it shut, and opened.

- In this lecture the different systems, with objections brought against the Linnæan Syst-

Royal Institution Saturday 3 June 1809

Electro chemical science - Lecture 6 - Mr. Davy  
Decomposition of the fluoric, ~~acid~~ Boracic and  
Muriatic acids. Decomposition of Nitrogen,  
Phosphorus and Sulphur. New arrangements  
arising from the new facts. Probable future ad-  
vancement of Electro Chemical science. Conclusions  
of the Course - See Mr. D's paper in the Phil.  
Transactions which will soon be published

5<sup>th</sup> June 1809

W. Singer's lecture of Galvanism

State of discovery in Electricity before Galvan  
- Binetti's Volta's and Experiments - Metallic taste  
of the zinc - History of Galvanism's discovery - Frog  
several experiments with it - Feet joined and the  
armed spine placed on them, when brought into  
the circle of three troughs (120 grain) spring three  
or four inches high, sometimes thrown to a distance  
of the bubble. Frog galvanised by three persons  
taking hands. Great advantage of troughs over  
piles - Discoveries by Carlyle and Nicholson. -  
By Cruikshank and others. Decomposition of  
Water several different ways. M.S. object to  
Cruikshank's system, says it must be broken to get  
out two gases!! - One mode by making two  
holes in the sides of a drinking glass - wires through  
them with two tubes for receiving the gases - M.S.  
method is with two small tubes in a wine glass  
filled with water - Experiments <sup>on</sup> Condensed fluids  
in single tubes placed <sup>horizontally</sup> on the bottom of an Ale  
glass inserted on the middle trough - Arbores  
Vicence and Salerni performed in the same man-  
ner - They would have appeared more beautiful  
if the tubes had been placed in a perpendicular si-  
tuation - Experiments with the condenser - An  
insulated plate of copper and <sup>another</sup> of zinc applied  
several times to each other and the condenser, shew  
that the zinc is positive and the copper negative  
same experiment with the Voltaic apparatus.



Royal Institution Mon Tuesday 6<sup>th</sup> June 1809

Botany Lect: 5 H. Smith

Principles of Botanical arrangement, with  
illustrations.

see Introduction

— Principally on Genera, or Families

— June 7<sup>th</sup> —

Lect 6 — Same Subject continued.

Examples of Linnean classes and Orders.

— See Introduction

— Principally on Classes and Orders.

- Scientific Institution - Mr. Singer's 2 Lectures -
- Structure of the Voltaic Apparatus. - Common de  
Tape - took up too much room. - Oil's troublesome in  
cleaning. - Leitch's trough - Withinson's improve-  
ment. Davy's porcelain troughs suggested by D. Babing<sup>ton</sup>
  - Singer's mode of supporting the plates when the brass  
is not wanted, by flat pieces of wood of the depth of the  
plates. This is a simple and easy mode, much pre-  
ferable to Davy's. - Great and small plates  
compared - Same charge spread over a large surface  
is less intense than over a small surface. This the  
same in Common Electricity, proved by charging on  
great and small Sars with the same number of turns  
of the cylinder - This applies to great and small  
plates in the Voltaic Apparatus. - Advantage  
of great plates in respects only the dissipation of  
Metals. - The same in Withinson's trough where  
both sides of the plates are acted on by the acid  
mixture. - What is the use of the acid? It is said  
to be owing to its being a better conductor, but  
metals are better conductors. - It would be a great  
advantage if water would answer the purpose.
  - Water is a bad conductor of Electricity (see Mr. Gualt  
experiments in the Phil. Transactions) - For Experi-  
ments on good conductors large plates should be used  
in the Voltaic Apparatus, when <sup>in perfect</sup> the conductors are  
used, smaller plates and a greater number, are  
preferable. For general use plates of four inches  
square are perhaps the best. - Various metals  
were burnt both in foil and wire, Gold, Silver, Copper,  
Iron, Lead &c in leaves. A brass ball three to four inches

in Diameter placed on a stand. The foil laid  
on the bulb and a metal point, and sometimes  
another foil of a different metal used to complete  
the circle, beautiful colours - Silver a fine green.  
+ Mr. Davy produced a white flame from Silver, which  
he said was owing to its great purity; but Mr. Senguer  
found that it was owing to his having made use  
of Charcoal on the point of the closing wire. Charcoal  
always produces a white flame. The common  
method of explaining the action of the Voltaic  
battery by induction - given in the Arithmetical  
proportion of the series - This Mr. S. thinks unsat-  
isfactory, and will, at a future Lecture propose  
a theory of his own. Mr. Davy at the establish-  
ment of 20 plates of 2 feet square, said that  
a piece of wire might be kept red hot for 24 hours.  
This Mr. S. says cannot be done, for the battery which  
is most powerful at first gradually diminishes  
in power.

Royal Inst<sup>n</sup>. Monday 12 June W. Smith  
Lect: 7<sup>th</sup> Prot. - Explanation of Voltaic Plates  
and Batteries, with occasional illustrations and remarks

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Scientific Institution - W. Singer Section 3 Electro-  
chemical Science. -

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- recapitulation of the chief objects of last lecture. -  
- Voltaic apparatus - Nitric acid acts more power-  
fully, but its action is sooner over - Sulphuric acid  
decomposes the plate too rapidly and produces a great  
quantity of inflamm<sup>le</sup> air - Nitromuriatic acid  
acts very powerfully <sup>but</sup> the action soon ceases -  
In the whole muriatic acid showed the best. It  
acts more uniformly and much longer than any  
of the others. For common purposes an ounce ~~of~~  
~~of~~ acid to a pint of water may be used. -  
This acid dissolves the oxide of zinc and conse-  
quently the plates need little cleaning. The action  
of every trough decreases from the moment of  
its commencement. Its power ~~is~~ may in some  
cases be totally destroyed, but will ~~soon~~ recov-  
er in a short time. Great and small plates  
then comparative strength. <sup>Large</sup> Great plates should  
be used for experiments on  $\Delta$  conducting substances.  
- Whence the heat and light? - Not in Electricity -  
not from the Atmosphere, for  $\Delta$  inflames char-  
coal in vacuo, also in water. But it may be  
said that it is produced from the oxygen in the  
water. But it <sup>is</sup> also produced in oils (Turpentine) which

have no seizure. — M. S. — account of the heat  
— All bodies contain a certain proportion of Caloric  
and Electricity — Equilibrium. — When a larger portion  
of Elect<sup>n</sup> is added, if the wire be thick it passes  
without producing any sensible effect. But when  
the wire is very small the additional Elect<sup>n</sup> cannot  
pass with<sup>out</sup> disturbing the equilibrium and causing  
the Caloric escape — Cruikshank's explanation  
of the Oxygen and Hydrogen produced from wires of  
two or three inches <sup>in length</sup> from each other, unsatisfactory,  
a better solution will be found than this —  
— The latter part of the Lecture was employed on  
the history of the opinions and experiments respecting  
the production of the an Alkali and acid in water  
from the water. Expt. of Washburn. Pict. — Litwiler,  
and Davy. The latter proved that neither acid  
nor Alkali is produced from <sup>pure</sup> Water. — The soda  
is from the glass vessel, and the acid

Royal Inst. Tuesday 13<sup>th</sup> June 1859

Botany Lect: 3<sup>rd</sup> - Continuation of the Linnæan class  
and birds - (I did not attend)

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Scientific Institution Thursday 15<sup>th</sup> June

W. Singer's 2<sup>nd</sup> Lecture - Electroch. Science  
(11<sup>th</sup> of the long course - see Syllabus) - Decomposit.  
of saline substances - Sulphat of soda in one half  
glass and water in another, the former connected with  
the positive, the latter with the negative, acid in the  
first and Alkali in the last - Three glasses, water  
in one, Sulphuric Acid in the middle and Sulphat  
of soda in other side. This with the positive, and the  
water with the negative, the Alkali was found in the  
water - glasses joined by cotton threads -

- Geological phenomena - A stratum of clay found  
over basalt - Basalt may be decomposed by Bot.  
Elect. and this clay is a component part -

- Light produced in water - bit of turpentine, which  
contains no oxygen -

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Royal Inst. 19 June Monday 1<sup>st</sup>

Prof. Smith's 9<sup>th</sup> Lecture. Illustration of the Linnæan  
Classes from Senguer's

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Scientific Institutions 19<sup>th</sup> June 1809.  
Lect 5<sup>th</sup> or 12<sup>th</sup> of the full course / see Syllabus

- Chemical Analysis greatly extended by the voltaic apparatus - Light and heat are supposed to proceed from the attraction and union of the opposite Electric energies - But now this the case the production should be instantaneous. Something more is still wanting, and the theory of combination is not complete. Electricity is the cause of Chemical Attraction. Acids are <sup>61</sup> ~~inferred~~ <sup>positive</sup> substances are negative alkalies and Metals are positive. Theory of the Decomposition of a compound Salt by the Voltaic Battery. - Decomposition of the Sulphuric Acid by the Voltaic Battery. Water in a wine glass, two platinum wires, one connected with the positive side gives out oxygen gas. The other at first produces Hydrogen gas from the water which the <sup>acid</sup> water contains, but afterwards a white powder is precipitated which is found to be Sulphur. Sulphur takes up  $\frac{1}{2}$  of its weight of Oxygen, Phosphorus  $\frac{1}{2}$ . Both these substances were burnt in oxygen gas, in two air pump receivers, that with the phosphorus broke.

Iron in a solution of Copper, covered over with copper, <sup>Silver</sup> not affected, but if iron and silver touching each other are immersed into a solution of Copper they will both be covered with copper.

Royal Institution Tuesday 20<sup>th</sup> June 1809  
G. Smith's 10<sup>th</sup> Lecture - Botany -  
- Same subject continued. Miscellaneous  
remarks on examining plants, preserving  
specimens &c - Conclusion of the course.

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Scientific Institution Thursday 22 June  
W. Singer's 4<sup>th</sup> Lecture, was principally employed  
on the decomposition of Potash - He tried the Ex-  
periment with one troy of 50 series, but did  
not succeed. He then employed 260, with which  
he produced small globules of Potassium. They  
exploded on water - An amalgam of Mercury &  
potassium formed by the Voltaic battery, a Globule  
of mercury and a little pure potash in contact  
with each other, the mercury connected with the  
end and the alkali with the end of the  
Battery, a silver support for better than a platinum  
one for the materials. Potassium corrodes platinum.  
- W. S. thinks that the smallest plates will de-  
compose as well as the largest, and intends to con-  
struct a battery with plates of one inch square.



Scientific Institution Thursday 29<sup>th</sup> Jan  
Mr. Smyer 7<sup>th</sup> and last lecture —

The object of this meeting was to have shown  
the decomposition of Pot ash by the French  
mode — Mr. S. had not been successful in effecting  
this, and therefore contented himself with describing  
the process — Performed several experiments with  
his whole battery consisting of six troughs 4  
of 50 series each, 6 inches square, and two of 32 series  
each of 6 inches square — 264 in all. — Charcoal  
burned with great brilliancy, but a very small  
length of wire only could be burnt. — The charge was  
too weak for this purpose. Phosphorus was burnt in  
a small glass tube bent at nearly right angles  
with a platinum wire thru' the top. This was used in  
in question in a summer, the Phosphorus was  
pushed on at the lower end of the tube to the bend.  
In completing the circuit the phosphorus immediately  
took fire, and a considerable quantity of Hydrogen  
gas ascended to the upper part of the tube. In  
the same manner sulphur, carbon may be tried  
Mr. S. that the Hydrogen Gas here proceeds from  
the water which these bodies contain, and is not  
a constituent part of these bodies. Mr. S. concluded  
the lecture with cautioning us against too hastily  
forming a theory (Diamond artificial) — Motion  
Stones — Soil can be altered formed by Electricity.

London 3 Nov. 1809

Attended Mr. Bywater's<sup>2</sup> Lecture on Electricity

Different modes of producing Elect. Friction, Amber, Sealing wax, Glass &c - Evaporation. Exp. small cup of Water on Bennet's Electrometer, a piece of red hot coal dropped into it, the gold leaves instantly separate. Description of the Electrical machine - Rubber produces Electricity as well as the conductor. New Experiments with small pith balls hung from the conductor, showing the two kinds of Electricity, by Wax and Glass. Two pith balls also hung on a brass rod projecting from the rubber.

The following ~~new and~~ beautiful experiments were performed - A mixture of about equal parts of powdered Sulphur and minium ~~was mixed together~~ on a paper <sup>was</sup> put into two Dishes, powder puff. An Elec jar was then charged at the Conductor of the Machine ~~of the Machine~~. The charged jar was then placed at a distance from the Machine, and the minium powder thrown on it, the ball of the jar became covered with the white, without a particle of the red powder. Another jar was charged at the rubber, and the same powder thrown on it ~~powder~~ covered the Ball with red.

Both jars were then used, one charged at the conductor, the other at the rubber, the jars were then placed together and the powder puffed on them, when the former was covered with white and the other with red. - The Leyden phial was then described - An plane, and a coated plate were used. Several <sup>discharges</sup> from the plane plate, - only one from the coated plate, and from any point of it - Battery of wine jars - Charge sent through several folds of paper - through 3 eggs on a neat perpendicular stand - Last Experiment, Discharge of the Battery through a Chain on the wall three times.

Mr. B. promises a new theory of Electricity.

A Plate of air charged - Apparatus - Two wooden circular boards 18 Inches in diam., covered with tinfoil

The lower supported on a glass, the upper board  
being to a cross piece of wood through which it passes  
and is fixed by a screw at any distance from the  
lower board. This cross piece is supported on two glass  
pillars which rise from the bottoms on the outside of  
the circular boards. Upper board connected with the  
conductor and the finger applied to the lower, the plate  
of air below becomes charged, and gives a small shock.  
This ~~an~~ apparatus is an improvement on the common  
construction, in which the upper plate is hung from the  
ceiling of the room.

Tuesday 7<sup>th</sup> Nov. 1829 - W. B. Watson 3 Lecture Elect.

Franklin's system from Gregory's Economy of Nature.  
Objections - Leyden phial may be charged positive on  
both sides - A stream of Electric matter from the rubber  
as well as the conductor, shown by two wires projecting  
one from the rubber, the other from the conductor of a small  
machine, two paper vanes or wheels hung from magnetic  
bars obliquely near the points turned round both in the  
same direction - Double barrel disproves the Franklinian  
system - Upper bottle shown to be charged positively on  
both sides. This was endeavoured to be shown by pith  
balls. - The Hypothesis of two Electricities (Eles) considered  
and objected to, as worse than Franklin's - W. B. then  
proposed his new system - There are two Electricities  
composed of Caloric and Oxygen, the one, and Caloric and  
Nitrogen, the other - The Electric matter proceeds from the  
decomposition of Atmospheric air - It passes through Electric  
but not through conductors. - It is agreeable to this system  
that the positive Electricity should produce acidity, and the  
negative Electricity of the rubber, alkali; which is said to  
be the case. - The Earth is not the grand source  
of Elect, but the Atmosphere is. - This part of W.  
B.'s system is, in my opinion, contradicted by Experiments

(Insulate the rubber and nothing or no Electricity is produced.)

- M. B. - concluded the lecture with a few miscellaneous Experiments - read in DuRoi as usual -

Dancing Balls in a glass vessel open at both ends. To the upper end a brass plate and ball to receive the Electricity. This exp. did not succeed well - Dancing soon - mounted balls, common construction - placed on the end of the conductor - Sprunged tubes, a hemispherical piece of glass, with a brass ball in the center, connect the four tubes together by zig zag pieces of tin foil extending from the ball down to the upper ends of the spriged tubes - This is in my opinion, inferior in effect, to the construction with the fly - The luminous word Electricity on a plate without a frame, supported on an insulating stand, has a good effect. The letters had in their broadest parts four cents in breadth.

+ The Electrical machine will not produce but in 2 runs. This was made use of as an argument in favour

of M. B.'s system that Electricity is derived solely from the atmosphere.

+ Some lecture on Thursday the 20<sup>th</sup> Dec. 1809. - In the miscellaneous Exp. an orange, onion, apple were illuminated by sending a shock from the galv. battery through them - Finger beautifully red - Four Jar of coloured water did not succeed - Spirit tubes, now mounted with a fly, much improved. Wax on fire blown both from the positive and negative conductors - Charged Jar insulated, inside touched, little Elec. escapes, this the whole inside charge!! The Jar afterwards discharged in the usual way. In the Experiment with the Double bottle, the <sup>out</sup> coating of the lower jar was connected with the copper part of the outside coating of the upper jar, on discharge, the outside and inside of the upper jar give a second discharge - this agreeable to Franklin's system.

Friday 10<sup>th</sup> Nov, 1809.

M. Bywater's fourth and last lecture on Electricity.  
— He began by saying down his system which he handed  
at last lecture — But as M. B. means to publish  
his system in a few weeks I shall not notice it at  
present. — The Experiments brought to support it, were  
some of them, at least, in favour of Franklin's  
System — An insulated charged jar had its ball touched  
and none any electricity escaped. Hence it was in-  
ferred that a charged jar contains little Electricity  
in the inside!! — A jar having two gilded balls  
connected with the inside, and two with the outside coating  
was charged and insulated. When the ball commu-  
nicating with the inside is touched with a conducting  
Substance the <sup>inner</sup> gilded balls <sup>converge</sup>, and the outside balls  
diverge: when the out side is touched, its balls converge  
and those connected with the inside diverge. And thus  
after a great number of Alternate applications, the  
jar will be discharged. May be explained, I think on  
Franklin's Hypothesis. — Two experiments with the  
Double Leyden Jar.

Monday 27<sup>th</sup> Nov. 1809.

M. Tatum's lecture - Oxygen, Nitrogen and Hydrog. Gas

He began by exhibiting an Apparatus for decomposing water - It consisted of a Gun barrel, the lower end filled with iron turnings, placed perpendicularly thro' a portable furnace. To the lower end, which just passed through the bottom of the furnace, was fixed a Copper or Tin vessel which held about a quart or half a pint of water. Under this was placed a lamp to heat the water. The <sup>Hydrogen</sup> gas, as it issued from the upper end of the barrel, which was connected to a small tube for the purpose. A tube was inserted into the <sup>gun</sup> barrel - The Gas burned at the top. This is preferable to the common apparatus. It is also much cheaper.

- Oxygen Gas prepared by iron powder Manganese and sulphuric acid over an Argand's lamp -

- Oxygen about one fourth part of Atmospheric air, supports animal life and flame combustion. -

Breathing - Model and Drawing of the Heart. -

Exp: Chip in Oxygen Gas. - Charcoal, very brilliant - Large Eudiometer tube. a bit of Phosphorus floats on the surface of the water with which it was half filled, water rose in the tube - Same with Nitrogen gas Eudiometer. -

- Nitrogen Gas made with Chere and Nitrous acid and Hydrogen gas from Zinc with Sulphuric acid The former is best done with a water bath. -

- Phosphorus burned in Oxygen gas - former after some time under the water in the plate acid - The phosphorus acid - Sulphur a fine gas evolved. - The Sulphurous acid. - These effects shown by test papers.

- Oxygen thickens Soda - boiled oils -  
 - Inflamed air from a bladder and stopcock. —  
 - Soap bubbles with a mixture of Oxygen and Hydrogen  
 gases - loud report in the air - Several bubbles formed  
 on the surface and fired in <sup>the</sup> baron, a very sharp report,  
 affected the ears very much.
- + The gases were all made in small long necked re-  
 torts, supported on rings - Lamps applied to the pro-  
 duction of Oxygen and Nitrogen gases. The gases were  
 all made in air pumps receivers, open at top,  
 ground and covered with mirror glasses —
- Mr. Tatum breathed <sup>both</sup> Strasburgh and Inflamed  
 air from the tops of these jars. — The Hydrogen  
 Gas was blown through a common Blow pipe —  
 great caution ~~was~~ in this Experiment, the  
 lungs must be emptied as much as possible,  
 of common air. —

Mr. Tatum's Lecture Pneumatic Chemistry 11 Dec  
 Carbonic acid - Carbonic acid from iron and  
 chalk. - Nitrous acid - Nitrous acid. Phosphor  
 and hydrogen gas - Sulphureted hydrogen gas  
 - Carbonic acid from Marble, water, in pint, mix the  
 water and Chalk well before <sup>adding</sup> putting in the acid  
 acid of Carbon from clean iron filings mixed with  
 Chalk. - Nitrous acid gas from copper filings  
 with Nitrous acid - Nitrous acid from Nitrate  
 of ammonia in a retort with a patent lamp  
 a long <sup>time</sup> in preparing - Phosphoreted Hydrogen  
 gas from Phosphorus and Caustic Alkali in a  
 small retort, little heat, a lamp. - Sulphureted  
 Hydrogen gas from Sulphur, iron filings and Mu-  
 riatic acid, in a tubulated retort - See Thomson's  
 Chem. Vol 1 -

- Sulphureted Hydrogen gas burns with a  
 bluish <sup>and flame</sup> gas ~~color~~ - Carbonic acid with a fine  
 blue ~~color~~ flame issuing from the retort in the  
 portable furnace & brought on the table. Experiments  
 from a small piece of ~~red~~ Phosphorus H<sub>2</sub> gas,  
 stop and open alternately by the finger, coronal  
 ring of smock. - A sheet of paper on the bottom  
 of a jar extinguished by pouring carbonic acid  
 on it. Several Gent: breathed Nitrous acid  
 violent effects on two, little on Tatum himself



14 Dec. 1809.

M. By water's Course of Lect. 1<sup>st</sup> Lecture -

History of Electricity - Amber jet Green  
Stones - 1600 - Glass - Rubbe - Glass - conduct  
a Gun Barrel - Leyden Vial - its history - an experiment  
- showed the Exp. a small sheet with a wire through  
through the cork - gun shaker with this to some of  
the company - Gray's Experiments on by which he  
discovered the existence of Condensation and non Con-  
ductors. - Experiments on the Electric light. -

Zig Zags on a long slip of Glass - Board -  
Iron Chain in Zig Zags on the same from that Gray  
Experiments when shown in Franklin's Note  
a piece of wood about three feet long, on one  
end a rod of Glass two feet long with a Rile on  
its top, the said end of the Rile undermost, a small  
pointed wire on the upper end. A string from  
the Rile to the other end of the lower board. That part  
of the string which connected it with the glass was  
like Franklin's with a key hung to the lower end  
of the conducting string. This instrument was placed  
several feet from the machines, the fresh Cells, and  
were affected, and even a charge was obtained -  
The best experiment was the Electrical Orrey - sup-  
ported on a point within the sun. -

21<sup>st</sup> Dec 1809

Mr. Py. Water 2 Lectures of the 3<sup>rd</sup> Course

- see notes on the same lecture of last course

- Alterations and some additions -

Dancing balls in this lecture did not act well, as in last - Head in despair shown in this. - Newton's Experiment of rubbing a plate of glass, small bits of paper below attracted -

Instead of the three eggs the shock of the battery sent through an orange, fine red. - After the Experiment of throwing the red and white powder on the jars, the following pretty Experiment was shown. - A pair of glass was laid flat on the table two jars were charged, one pos: the other neg. The bell of one was paper round the frame over the edge, with the bell of the other a cross was formed thro' the center. The mixed powder was then puffed on the plate, when the circumference was white and the cross red. - In this lecture the white powder was resin, in the former, Sulphur. The red in both cases was the same, red lead + This is Benardi's Experiment. -

