Vol. 3

Liturgie

Institution

1013

London Thursday 2[4]/13 Jan 1810

Mr Singer gave his 2d Lect:
on Electro-chemical Science

Great decomposing power of a large Voltaic battery. Decomposition of the Alkalies. Exhibition of the Base of Potash, a metal which burns ~~in water~~ most brilliantly in contact with water or ice. The base of Soda, a metal possessing nearly similar properties. Decomposition of the Earths. Chemical and Physical character of these new substances. Enquiry into the general nature of Alkaline bodies. Influence of the new facts on experimental Science

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Of Mercury's attempts to decompose the Muriatic acid. and first with the failed in both - It was only the water that was decomposed. —

— Mr. Davy's first attempts and the cause of their failure. The first made use of a solution of pure pot ash, but the result was the decomposition only of the water. — At length he succeeded in decomposing the solid pure Potash — Mr. S. said that he could dissolve pot ash with one trough, containing 50 pairs of three inch plates. He tried the experiment but did not succeed. The trough was emptied and more acid added but did not succeed. A third trial was made, also without success. — much time lost. —

— He then tried the experiment with the large battery plates of 6 Inches square of 4 Inches small globules of potassium were soon produced, which exploded on water. He then Electrified a Globule of Mercury in contact with potash, making the mercury Negative and the Potash positive, when an amalgam of Potassium and Mercury was obtained — He next decomposed Soda and obtained small particles of Sodium

— Mr S. says that he has never been able to procure potassium in Naphtha, tho' many times distilled, for any length of time. It always acquires Oxygen.

Monday 25 June 1810

14 Lect: on El:o Ch:l Science

— Process for obtaining the base of Potash in large quantities. Its activity as a chemical agent. Importance of its appl:n to the purposes of chemical Analysis. Experiments on its energy in Decomposition. Enquiries into the nature of Sulphur, Carbon & Phosphorus. Composition of Ammonia. Experiments on the Muriatic acid and on Nitrogen. Advantage of the preceding facts in the explanation of Natural Phenomena. New experiments and remarks —

— Conclusion of the course —

— Recapitulation of the princi-
pal facts in Galv.^c Electricity
— Soda decomposed with a batty
of 400 —
— Ammonia amalgamated with
mercury — Mercury negative —
swells to five or six times the
size — Specific gravity 3.7
This amalgam consists of
the base of ammonia and Mercury
the former only 1/12,000 part of
the latter — Consistance of butter.
Decomposes water, but not with
an explosion like potassium
— M^r Davy thinks Sulphur
Charcoal and Phosphorus triple
compounds. Oxygen. Hydrogen and
a metallic base. The results
of these experiments are not
decisive — As the neither Sulphur
nor charcoal can be entirely freed from
water, M^r Davy's conclusions are im-
perfect and unfounded, says M^r S. —
— Fulm^d Mercury exploded by the
battery — slip of Glass silvered. —
— Iron burned in oxygen gas. lighted
from the battery.

Wednesday 7th Feb. 1811

Mr Singers 1st Lect. on Electro-Chemical Science —

— History of the rise and progress of Electricity — Amber — Gilbert's Discoveries — Glass tube, sealing wax — feather — pith balls — Otto Guenque — Globe of Sulphur — Hawkbee, Cylinder — Newton's experiment with a piece of Glass. Light Objects attracted by the one opposite to that which is rubbed — Grey's Discovery of conductors and non conductors — Positive, negative electricity. Vitreous, Resinous, improper terms.

— A variety of Experiments with a Glass tube, stick of sealing wax, pith balls and feathers, was performed to illustrate attraction and repulsion Positive and negative Elec.ty &c. —

— The following is a neat experiment. Lay a downy feather on a brass plate insulated, touch the lower side of the plate with an excited glass tube, the feather will instantly jump up and sometimes entirely off the plate — Repulsion.

Monday 11th Feb.y 1911 —
Electrical & Electro Ch. Science Lect. 2

— W. Sinyer in this lecture reciprocated the principal subjects of last lecture, and illustrated them by other experiments in a very pleasing manner

* The body rubbed to produce Electricity must be dry.

1 Exp.t. common writing paper rubbed with Elastic Gum, did not affect the pith balls but

2. When held at the fire and rubbed and then charged.

3. The paper when excited Sticks to the wall of the room

4. When laid on an insulated plate, a spark may be taken from the lower side of the plate

The last experiment is an illustration of Newton's experiment with the prism of Glass. So is the following

5 Large tumbler and pith balls
Tumbler inverted over the balls and the bottom connected with the conductor of the small machine

6 Two dissenting glasses one charged inside the other on the outside, pith balls thrown into one their being applied to each other, the balls move from one glass to the other.

7. Construction of the Electrical machine described - Names - oiled silk best - silk should be waxed to the upper edge of the rubber, upon which should project just to prevent the Amalgam from getting on the silk.

- conductor takes the whole Elect.y from off at once. —
- multiplying wheels one also that of the negative conductor will be shewn afterwards

8. ~~A~~ Feather attracted alternately by the conductor and the hand - repulsion unnecessary —

9. Pith balls as usual

10. Five balls - Dancing figures

11. Bundle of threads, connected with the Cond.r of the great machine - swell out to an oval figure - Conductor touched with Metal, Glass sealing wax &c —

12. Sparks from the large machine sent round the room several outwards, Spanish tube

then to shew the great velocity of the Electric matter.

3. The Glass support of the cond^r of the small machine Battery no sparks — dried, sparks. —

Thursday 14th Feb^y 1811. —

El^c and Electro-Ch^l: Science Lect: 3 —

— Franklins Theory of Negative and positive — one fluid —

— Rubber produces Negative Electricity —

— Attraction and repulsion

The latter term unnecessary several or any other given explained by Attraction alone

Exp^t: Head — Fly — Electric

Planetarium with Glass balls. This acted very well.

Monday 18th Feb.

Elect.y — Lecture 4th —

Positive, - negative Elec

Exp.t A wire with two pith balls placed on each conductor of Ramis machine. When excited sealing wax was applied to the balls on the negative conductor, the diverged, more the handle of the machine a very little, they diverge still more. This proves that the Elect.y of the rubber is negative. If the excited wax be applied to the balls on the positive conductor, they will also diverge, move the cylinder a little and they will converge. An excited glass tube will produce the contrary effects

— Two black ribbons laid on each other and rubbed on woollen cloth (thigh of his trousers) both electrified. When drawn from the hand they repelled each other and separated. Same Expt. with two white ribbons, and with a white and a black.

See Lyons Expt. and Obsn. on Elect.y or Adams on Elect.y 4th Edition page 186.

— Balls (the chimes or octave set) two placed near the cylinder of the giant machine, the conductor being removed, rung. The fly had four rays.

— Sparks taken various ways.

— Experiments in the dark room

— Spangled tubes of various lengths and colours - Diamond, rubies Emeralds &c.

— Common Light, Electric light —

— Vary-tong^d spiral round the outside of the a large cylindrical jar —

— Cornice for an apartment room —

Trumpet that with &c. — All these succeeded perfectly and had a fine effect.

× Exp^t on the two states of bodies electrified — The conductor of the machine was removed to the distance of a foot or more. On it was laid a piece of fur skin. This was rubbed with a large stick of sealing wax. During the friction the pith balls showed no signs of Elec^y but on removing the wax they diverged with positive Elec^y.

Thursday 21^st Feb^y 1811

Lect: 5 — El: Ch: Given —

— Recapitulation of the principal subjects of the former lectures. — Electricity produced by friction that is, by a rapid succession of contacts of two bodies of different nature. By this action one body gives out and the other receives Elect^y. — Rubber gives to the cylinder — Rubber supplied from the earth. Machine pumps up the Elect matter similar to a water pump. Elec^y would pass from the conductor to the earth but for its being supported on glass. — Conductors, imperfect conductors, non conductors. Water is an imperfect conductor. Exp^t. a small spark taken from the surface of water in

a glass bowl.
— attraction, large ball of Sola between two plates. Repulsion accompany in Electricity
— Points throw off Electricity more readily than large surfaces —
— Fly moved round both by negative and positive Elect in the same direction. The motion by the negative Elect cannot be explained on the received principle
— Mr S. Explanation. This I did not distinctly hear. —
— Sparks — a great variety from balls of various sizes down to a pointed — Nicholson's brass ball and movable pointed collector sparks of all sizes.
A point in a glass tube gave a long and loud spark.
A spark from the end of a long conductor larger than from the same quantity of matter in a shorter form.
— A point on the end of a sprung tube, large spark —
— Spark down a sprung tube on a stand 5 feet in height —
— Through 3 sprung tubes each feet in length, plate above the thorny piece
— Luminous conductor, point at one end and a ball at the other.
— Six perpendicular sprung tubes differently coloured, fly two balls one arm longer than the other. This had but an indifferent effect
— Electric light arises from the decomposition of the atmosphere
— Different colours owing to different resistances from different quantities of matter. The greater

the resistance the brighter the light and v.v. Expt. Elect.l spark taken through a piece of wood by two wires with balls on the outer ends. The wires were moveable in the wood, nearer to or farther from the surface.

Saturday 23 Feb 1811

Mr Lydiat's — 1st Lecture on the Metals and their application to arts and Manufactures —

Introduction — Many Inst.s for public Lectures — subjects in general more curious than useful — Advantages of his Lectures knowledge of the metallic arts curious — useful — prevents us from being duped &c &c —

After a neat introduction Mr L. proceeded to his subject began with Iron —

— Iron the most universal abundant, and useful of all Metals, without Iron &c &c —

— Iron found united with different bodies — with sulphur it forms Pyrites — with Carbon, carburetted iron, or Plumbago. It is united with several other metals, clays &c

— Method of preparing iron for its use — First desulphurate ore for broken into pieces of a moderate size. This mixed with lime stone & charcoal and thrown into a large furnace, some of them 20 feet deep. The charcoal absorbs the oxygen of the oxide of the iron, and flies off in the state of Carb.ic acid gas and leaves the iron in the metallic state. The lime combines with the clay, and both together run into fusion and form a kind of glass. The iron is also melted by the violence of the heat, and being heavier than the glass, falls down and is collected at the bottom of the furnace. There the contents of the furnace are separated into two portions; the glass swims at the surface and the iron rests at the bottom — Let out into moulds, when it is formed into pigs

— This cast iron is converted into malleable iron (see Cooke's process in Thomson's Chemistry Vol I Page 229) —

— Iron is rolled into bars and cut and drawn into rods by Slitt work —

— Iron is the only metal capable of being soldered — process described — In soldering the surface is in a fused state — to promote this the iron is sometimes rolled in sand.

— This property of Soldering iron of great use — Hence, palisades. Gates, Anchors &c —

— Manufacture of Anchors describe — Shank made of a great number of small bars of iron soldered together. Heated from the fire by a Crane — Hammered on a long anvil by one great number of men, Hammers of four pound Wt. with long handles to keep the men at a distance from the great heat of so great a mass of metal by this process the outside bars alone are soldered and form a kind of hoop for the inner bars which are in their natural state. By this the anchor is said to be stronger than if the all bars were soldered The arms are then soldered to the shank, and the flukes to the arms.

— Malleability — Ductility —

— Explain iron wire, which had drawn any Elasticity was hammered on a small anvil it was then very elastic; and became hot. M. L. accounted for the Elasticity again, by the cooling of its colour, the particles were brought nearer together, hence the increased elasticity. —

— Iron drawing described and shown by drawing a lead wire —

— In drawing bars of iron and other hard metals, the metal must after every hard draw, in iron, be annealed, that is

exposed to a certain degree of
heat to imbibe that caloric which
the iron had given out in drawing
the loss of which renders the iron
too hard for further drawing. —
This annealing is also necessa-
ry in drawing copper and some
other hard metals.

Monday 25th 1811

El. & Ch. seen. Sect. 6th —

— The further we advance in
the development of Electri-
cal phenomena; the science
becomes the more important.
Hitherto the subjects explained
are of little practical impor-
tance. but we are now arrived
at the most important dis-
covery in the science of Leyden
phial, History of the dis-
covery — Van Kleist — empty
phial with a wire in it &c
(see Priestley's history). —
Muschenbroek &c. Bevis, out
side coating — Watson — Franklin
Sheet lead — brass filings mi-
see — silver leaf — Tinfoil &c

Experiments — Plane plate of Glass charged — Coated plate Ditto — Jars of different sizes spontaneous discharge, terms of the Electrometer —

— Three small cups contain'g Spirit of wine were placed one at each end of the room and one over the fire place — All fired at the same instant by the discharge of a middle sized jar — The discharge of the Largest jar sent round the room by a wire with several intervals of gilt leather — repeated three times. The last did not succeed, the Gold was, by the former discharges, burnt off the Leather

Thursday 20th Feb.y
Elect.y & Gl. Ch. Lecture 1st y

This Lecture was wholly employed on the Leyden phial —

— The most interesting of Dr. Franklins Experiments were selected, to prove 1st That the Electricity in the inside is different from that of the outside — 2 — Inside positive outside Negative, — with balls — wax — Glass tubes — jars charged at both conductors different ways.

3 The charge does not reside in the coating but in the Glass it self. This was proved by (to me) a

new Experiment. A glass jar uncoated stand in the inside of a movable metalic coating which fitted it. A common Leyden jar, ~~without any outside coating~~ fitted the inside of the glass jar. Several experiments with this apparatus. — In this Latter two Leyden jars with an Electrometer on the wire of each, were much employed. —

— A large spark, and afterwards the discharge of the Leyden jar sent through a bad conductor, illuminates the conductor as in Galvanism. The conductor was gilt leather. From experiments of this kind hopes are entertained that the effects of Galvanic Electr. may be equalled by the Electric Machine —

— Charge depends on the proximity of two conducting bodies having a non conductor between them.

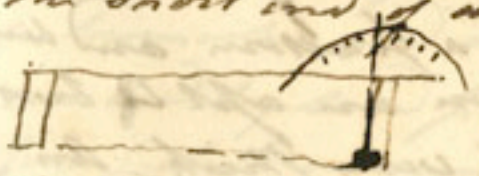
1811

Saturday 7 March

Mr. Lydiat's 2 Lectures Jan.

– Tenacity – a wire 1/10 Inch Diam. will support 500 pounds. Is the most tenacious of all metals

– Expansibility by heat shown on a wooden frame with a small wire attached to the short end of an index



Contracts in cooling.

– Inconveniences attending this property – Iron Gates will not shut in summer, and keep strong the frame in winter

— Advantages arising from the property of Iron — Wheelwright puts on his hoop tyre red hot — In cold water it is turned round like a grinding stone cools — contracts, squeezes no nails (contracts with such a force as that to bend the spokes of the strongest wheel. —

— Manufacture of Gun barrels Broad plate of iron turned round a pattern and welded. These are apt to burst unless very thick — An effectual remedy for this is the twisted barrel. This shewn by twisting a piece of lead round an iron rod — enormous contraction lead, much tighter by much stronger.

— Iron is a combustible body This was shewn at last lecture by burning small iron at the flame of a candle —

+ Also in this lecture by burning spiral wire in Ox. Gas. The Oxyd falls down and is three times heavier than the iron burnt. ——

— Brilliancy — a piece of rusty iron filed, then polished with a burnisher and oil — Polish removed by sand paper. The fine polish on iron grates is done with burnishers. The iron is soft and the burnisher so hard that a file will not touch it. — The use of the oil is to prevent small pieces of the iron being thrown off by the burnisher.

Monday 4th March 1811

W. Singers & Lect. Elect.

Leyden or Electrical Jar.

A jar when charged has just
with as much Electric from the
one side as it has received on
the other — Almost all the Expts
this Evening are intended to
illustrate this important fact

Experiments

1st An insulated Jar cannot
be charged — Jar on a glass
stand — small charge — A round
coated bottle having from the
large conductor we a very small
charge.

2. A jar charged from the outside
of another different ways.

3. Middle sized jar with an Elect.ᵉ charge at the positive conductor, then applied to the negative conductor. On turning the Machine the Elect.ᵉ ascends, the jar is exhausted. Each turning the machine, the Elect.ᵉ will rise again with negative Elect.ᵉ — If this jar with the negative charge is now applied to the positive conductor, the same Phenomena take place, but the Electricity is reversed. — Name 3rd

4 Jar charged on the outside.

5. Two jars charged by the same conductor, the one positive the other negative. Let the two jars be insulated on the same plate of metal, connect the ball of the one with the conductor of the machine, and touch the ball of the other with the hand. The first will be charged, on the inside positively, the other negatively. —

6. An concealed jar with a chain hanging from the conductor of the large Machine into the jar near its bottom, but not touching any part of the bottom. When the Machine is just in action the chain begins to move round the inside of the jar, and continues for a considerable time. When it stops, apply the discharger to discharge the jar, when the chain again to move.

7. Double jar — Outside of the upper Jar applied to the conductor — Inside of the lower to the outside of the upper — The upper jar is not charged, the under one is charged positive in the inside — Second discharger. —

8. Charg does not reside in the coating proved by Mr. Cuthbertson's jar turned way. —

9. The more the coatings are to each other, the higher the charge. — illustrated by Voltaic condenser.

10. D. Franklins experiment of a chain in a metal dish insulated, and filled with an Electrometer. — When the chain is lifted up, by a Silk thread, the Elect: falls. When the chain is let down it rises again. — Capacity of bodies for Elect!!

11. The theory of charging explained on last. two Experiments (not quite satisfactorily).

12. While a jar is charging, the Elect: tendency from the outside is positive. When the charge is completed, the outside is found to be negative. — This gave rise to the supposed opinion that a jar may be charged with negative or positive Elec on both sides at the same time.

N.B. The 10th Experiment was only described — to be exhibited next lecture —

Thursday 7th March 1811

W. Sturgeon 9th Lecture. Elect 17

— Charged Electrics —

1 Plate of air charged 2 by circular board in deaf. cover with Tinfoil. The upper one supported on a glass rod which fixed in the under board, and passing through a hole in the upper board, to which it is made fast, at any required distance by a wooden screw. The plate of air between is charged, and the strength of the charge is inversely proportional to the distance of the plates boards or coating one from each other — Leyden jar the same.

2. Electrometers - Quadrant
Lanes - Cuthbertsons -
- Line marked by a small
jar with lanes Elect. —

3. Passage of the Elect. fluid -
- from the inside of the jar
to the outside - In general from
a body electrified positively to
one electrified negatively.
- Sparks are seen to pass
from a ball on the pos. to
a ball on the negative Cond.
- small pith ball used on
taking care on the univ-
ersal discharger, and
a small shock sent through
it, compelled in to the nega-
tive side. This did not always
succeed. It was drawn towards
to the positive side

- Flame of a candle drawn to the
negative side - but what answered bette
- spirit of wine lamp supported
on the insulating pillars of Nairne
machine, two balls from the
conductor brought near the
flame it was blown strongly
towards the negative ball
which was much heated, while
the other remained cool -

4. Electrical fluid material -
- Card on the conductor at dest
one point a bow and the
other below the card. The Elect-
ric atmosphere over the card from
the positive wire, and from
below it just over the negat.
- This is also a proof of the
direction of the electric fluid

— wood split — Thick glass shat-
tered to pieces — Glass tube with
water burst — A ball of
Zinc wood drawn out of a
mortar of wood stand for pon-
derosity — A mortar charged
with spirit of wine and a heavy
ball — did not succeed — the ball
remained on the pieces

5. In discharging the large jar.
through a dollar, the dollar
stuck to the coating. Four
wires fast to the coating in
this manner — Tinfoil cap fast-
ly fixed.

Philosophy of the Mechanic arts — Lect 3. W. Lydia[illegible]
— Iron continued — Magnetism
— This subject discussed in a way not very entertaining
— Magnets, Straight and Horse-Shoe — needles, common dipping
+ A magnet having an iron ring applied to it lifts more weight than without it — This was the only new fact, to me, in the Lecture. —

Monday 11th March – Mr Singer
Electricity Lecture 10th. –

Further proofs of the corporeal nature of Electricity. Its influence on Inflam.ble bodies. Cause of those effects. Fusion of two feet of wire by a single jar. A wire melted in contact with a thread, without burning it.

1st – The Expt of the pith ball (see last Lect. art. 3) was repeated by sending the shock through the universal discharger with the balls of the discharger taken off when it succeeded perfectly. –

– He also repeated the Expt with the wooden mortar and spirit of wine, the ball was driven to the opposite end of the room

– Quire of paper – card – burr on both sides – if the card is made hot, no burr on either side

2. Effect of Elect. on inflam. substances
— Spirit of wine fired by a spark from the finger — different ways
— Cotton with powdered resin, by the discharge of a small jar —
— Slip of Gold leaf on the universal discharger — fine green flame
— Ditto between two plates of Glass
— Inflam. air pistol — loud report
— Glass ditto — very thick —
— Inflam. air from a Bladder fired by the spark different ways.

3. Cause of these effects. —
— Heat not in the Electric matter but from the body through which it passes — the air —
— Powdered resin on the outside of water fired by the discharge of the large jar — twice — wire may be ignited in water (also in vacuo)
— 2 foil of silver — thin iron ignited by the large jar. —

4. History of the various methods of increasing the power of a Jar.
— Blowing into it — In a great number of Jars or Battery this very troublesome
— Moistening the inside with water and with oil
— Putting a slip of paper round the upper edge of the inside coating this answers very well when moist but when dry it is apt to be thrown off by the explosion. — When a great Jar is wanted for a particular occasion, let the paper be pasted on immediately before the jar is wanted. —

Thursday 12th March 1811

Elect.y Lect 11 – W. Singer

– Structure and management of the Elect.c battery; its effects on Metals. Torsion and deflagration of wires ~~fusion~~. Upwards of ten feet of wire melted at one explosion. Penetrancy of these effects.

– Effect of breathing into Jar thrown – paper – oil &c

– Great denser of the report through a long conductor – Charge in this case moves with less velocity.

– Different lengths of wires melted – last about 10 feet placed on the chimney piece had a fine effect.

– Perforation of charges card –

— When great changes are wanted it is best to employ a greater power with a less intensity. By these means there is less risk of any breaking by a spontaneous discharge —

+ Cause — Heat and Light not in the electric matter itself but proceeds from the matter through which it moves, occasioned either by the Vibration of the particles of matter, which is Dr Darwin's opinion, or by disengaging the heat which is latent in the body.

Saturday 16th March 1811

Phil: of the Mech: arts Lect: 4th —

— Manufacture of Steel. Peculiarities by which it is distinguished from iron. Demonstration of the most important properties of Steel. Consideration of the cause of these properties.

M. L began with observing that the use of Steel must have been very ancient, tho' totally unknown when discovered. Architecture could not have existed without Steel. How could even the rudest huts have been constructed, without instruments to cut down trees, and in after ages to hew stone for more stately buildings — Pyramids of Egypt — Agriculture —

– Three kinds of Steel – Bar, or Blistered Steel – Shear Steel and cast or refined steel –

+ Process for manufacturing each described –

– Steel capable of uniting a temper which iron is not –

– To distinguish iron from Steel let a drop of Nitric acid fall on both. After a minute or two wash off the acid, when the spot on the Steel will be black, on the iron a light green –

– Steel differs from iron in containing Carbon. The quantity has not been ascertained –

– Cast steel is employed in razors and all the other finer cutlery. It is more dense, and consequently takes a finer edge and polish –

+ A bar of red hot Steel was plunged into a solution of soap and water without impairing the temper or hardness.

Monday 10th March 1911

Elect. Lect 12 - W. Temp

General summary of the history and practice of the science. Demonstration of its laws by the Elektrophorus. Universal existence of Elect.y and spontaneous production of Electrical effects shewn by some common experiments. Conclusion of the historical and practical part of the series -

- A short history of the principal facts in Elect.y Now explained by the Elektrophorus - An Elect.r abt 12 or 14 Inches in Diameter, furnished with two pairs of pasteboard. The resinous plate and

and loose metallic plate occasionally insulated – 1 piece of fur for a rubber – A number of Experiments, and the common explanations given. – (Not quite satisfactory)
– Notes made in the side of a small phial filled with oil –
– Small jar, burst by an attempt to charge it from the large one.
+ Several cases of different lengths burned –
– Largest just long a beautiful experiment.

Thursday 21st March 1811

Electricity – Natural agencies
Lect 1st – Mr Singer
– Cause of thunder. – Dr Franklin's Experiments. – Means of defending Buildings from the effects of Thunder Storms, exemplified by experiments and models.

– Mr Grey's and the Abbe Nollet's conjectures respecting the resemblance of Electric light to Lightning – Dr Franklin's reasoning on this subject.
– Effect of points – Explr –
– point at a greater distance than a ball from the conductor prevents the spark

— a pointed wire placed at a great distance from the conductor draws off Electricity proved by obtaining sparks from the tuft cotton on the upper part of the insulating Stand

— Feathers connected with the conductor, attracted by a Ball but repelled from a point —

— A point draws off a stream of Electricity, but flames between the finger and thumb shows sparks —

— A point on the end of the spangled tube shows spark —

— Shock of the Leyden jar taken through a point —

— Obelisk — Thunder house — Fire house — Powder magazine — Ship a large vessel of water — The obelisk drawn towards the discharging Ball by a string.

Saturday 23 March 1811

- Philosophy of the Mechanic Arts
Lect. 5 Mr. Leydecker.
- Properties of Steel. Variation of these properties by temper. Demonstration of the different temperatures for springs, and edged instruments. Indication of these difference by the prismatic colours. Consideration of the comparative superiority of Steel. —

12

Monday 25 March 1811

Natural agencies of Elect.
Lect 2 Mr. Singer
- Oxygen of Atmospheric Elect. Connection of Electrical changes with the circulation of water in the ~~air~~ atmosphere. Explanation of the nature of thunder Storms in all their variety of appt. Cause of the violence of tropical Storms Precautions for security from danger &c.

- History of the discoveries respecting the identity of Light and Electricity — Dr. Franklin French — English Philosophers Their Experiments with rods and kites — Phenomena Similar in both.

— Cause of the Elect.ⁿ of the atmosphere — Evaporation
Exp.ᵗ Water poured on red hot coals placed on a Gold Leaf Elect.ᵐ — Negative — The vapour is positive. This last shewn by receiving it in a large tin funnel insulated, and connected with the Electrometer Positive
— Zig Zags shewn but not accounted for —
— Morgan's opinion that the earth serves as a discharging rod between two clouds, and is reached with regard to Elect.ᵐ thus said by M. S — to be unfounded — Exp.ᵗ with a ball on each conductor, and one between them connected with the ground.
— Sound of lightning cannot be imitated by Electricity.
— Dalton's account of this — Different distances of the parts of the flash
— Singer adopts the old opinion reverberation — He says there is no difference in the sound of thunder at sea!! Flash crash when near an object struck — He alledges that the firing of Cannon has the like variety of the sound.
— Heat lightning — can only by reflection — Exp.ᵗ with the large circular boards, and a Leyden jar the inside coated as usual, but the outside coated

only about an inch above the bottom –

– Chimical hypotheses – Insf.ce &c.

– Experim.ts with soap bubbles blown with hydrogen gas – after this with a mixture of Hydrogen & Oxygen – They were found in the room – Could not produce single bubbles to mount in the air.

Thursday 28th March 1811

– Nat.l agencies of Elect.y Lect. 3

Luminous appearances of the Atmosphere. Origin and cause of the Northern lights, shooting stars meteors &c investigated and explained by an unusual variety number of beautiful experiments

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– Mr Singer commenced the Lecture by pointing out the best mode of securing houses "by conducting from the best metal above ground and lead beneath the surface.

– Safest and most dangerous situations during a thunder storm

– Northern lights – Mr Dalton's hypothesis. (which I will see)

— Points and balls compared by experiments —

— Electric spark sent down a recurver on the air pump; exhausted to different degrees, the light exhibits a great variety of beautiful appearances — previous to this a large Aurora; spark was shown —

— The concluding experiment was to represent a falling star — A glass tube about an inch in diameter and five feet in length, was partly exhausted of air and the charge of the large Jar sent through its whole length, it now appeared a long line of light But in 2 experiments it passed in a compleat ball, and was a good representation of a falling star —

+ Zinc being the most difficult of fusion by Elect. would be the best substance for a conductor, but that it oxydates rapidly, and is converted into a very imperfect conductor — From W. D. — Commissioners Exp. this evening, it appeared that the light is much varied both in form and colour by the degree of Exhaustion of the air —

(The phenomena of Thunder, Meteors &c are incapable on the principles of Electricity)

Saturday 30th March 1811

Phil.y of the Mech.e arts

Lect 6 Mr. Lydiatt

Nature and properties of Copper; its application to the arts. Alloys with other metals, forming bronze, brass, Bell metal &c — Consideration of the properties of brass. Conclusion of the introductory course.

Monday 1st April 1811 -

Natural agencies of Elect.

Lect. 4th — W. Sanger —

— Penetrability of Electric light.

Phenomena of Phosphorescence.

Influence of Elect.y in the production of Phosphori appearance

Brilliant luminous effects produced by Electricity. Inquiries how derived from some original experiments on this subject.

+ This lecture was dedicated entirely to the Phosphorescence of bodies or that property of bodies by which they first absorb and afterwards emit light —

+ Before Mr. S. entered on the peculiar subject of the lecture, he remarked

on D. Davy's objection to falling stars being electrical Phenomena, from the circumstance of the great difference in velocity. He M. S. alledged that if the glass in the experiment of the preceding evening had been a mile long, the ball or star, in falling, would have ~~taken~~ appeared to move much slower. (This is not satisfactory).

Experiments

— A piece of Mahogany with a groove, had two wires which slided in the groove, and could be placed at any distance required. The interval was never greater than what the charge of the large jar could pass

— various bodies were successively placed over the interval and the jar discharged in the dark. The bodies all appeared luminous, but in different degrees.—Sulphur and Carbonat of Baryta, Gunny cloth, sugar &c. The thumb bow over the interval of the wire, on the discharge became transparent

— Jars of ~~Lead~~ Water their colours illuminated in the same manner.

+ Most of these experiments were repeated by sending the shock over the surfaces of the bodies, reduced to a coarse powder and Law on the table, in a chain of an inch or two in length—

These Experiments were more luminous in this, than in the former mode.

The solids already mentioned with the bones and seminal seeds (sugar, phosphorus and) acids. Pot ash scattered about the room in luminous fragments sugar the same, the nut quite so luminous — Cantons phosphorus.

+ Phosphoric Ether poured into a basin of water, unpon luminous — Solution of phosphorus in oil of cloves — Take out the cork. Luminous &c &c —

Thursday 4th April 1811.

Natural agencies of Electricity Lect. 5th — W. Sawyer

— Relation of Elect.y to Vegetable and Animal life. Spontaneous development of Electric powers, exhibited by some singular experiments.

— Instruments by which small quantities of Electricity may be indicated — Electrometers — Gold Leaf — Volta's condenser —

Bennets, Nicholsons — Cavallos

Doubler of Elect.y

+ The condensing Gold leaf Elect.r is by far the best

— History of the effects of Elect[y]
on Vegetables — Ingenhousz —
Berthollon &c —

— On Animals — Eggs —
Torpedo Electric Eel — &c —

+ Bennets improvement of
on Lichtenburgs Experiment
in various fluids — A great
variety of Experiments shewn.

— M.S. — adopts the opinion con-
trary to Mr Davy, that bodies
are not naturally in different
states of Elect[y] — They acquire
Elect[y] by contact and subse-
quent separation —

— Harley of the effects of Elect^y
on Vegetables — Ingenhouz —
Berthelon &c —

— On Animals — Eggs —
Torpedo Electric Eel &c —

+ Bennets improvement of
on Lichtenbergs Experiment
in various States — A great
variety of Experiments shewn.

— M.S. — adopts the opinion con-
trary to M^r Davy, that bodies
are not naturally in different
States of Elect^y — They acquire
Elect^y by contact and subse-
quent separation

Monday 8th April 1811

Nat. agencies of the Lect. 6
Instrume of Elect. in the Animal Economy. Examination of the Experiments and Opinions to which the name of Galvanism is attached. Caution of Mysterious action in the Numbers of dead animals

Copper and Zinc

Exper. of the copper laid to each other and after separation to the Gold leaf Elect. current tower, the Copper was shewn to be negative, and the Zinc positive, by the apertures of the condenser, without which the G. L. Elect. was not affected — The same fact was proved by applying copper fillings through a Zinc sieve and Zinc filings through a copper sieve. In the first instance the Electricity was negative, the other positive, How the condenser was also used —

— action of iron bolts on the copper sheathing of ships — of a piece of Silver and Zinc applied to the under and upper side of the tongue &c.

— History of Galvanic discoveries

— Frog — On a plate of Zinc, Silver wire — Elect. jar discharged and immediately applied to the frog, convulsions

— Then Voltaic trough — The frog applied was instantly affected. — One trough contained 50 and each of the others 25 series of Zn Cu Exp. with the trough the frog sometimes leaped off the trough and even off the table.

— A sheep's head was then galvanized by the three hundred = 100 times — The shock was sent first through the ears, then from the Spinal marrow to the tongue and to each ear — The eye lids were twitched — The ears were, in some of the experiments moved.

Thursday 11th April 1811

Chemical agencies of Elect.y Lect.r 3d Mr Singer

Principles of Chemical Science

Powers concerned in the production of Chemical Phenomena. Circumstances which influence the action of these powers. Popular exposition of the nature of Chemical action

Mr Singer in this Lecture endeavoured to illustrate and render popular Chemical attraction or affinity — Exps. — all of them common — Muriatic, Chemical Combination — Chalk in water — Salt in water — Muriatic acid and Lime

Exp.ts

– Sulph.c acid and water – heat

– Sol.n of Muriate of Lime and alk.

li mixed form a solid. –

– Retort filled with coloured wa

and a little Ether in the top

expanded by heat – Drawn out

the water – heat of the fire. –

– Oxy. m. of Potash and Sugar

exploded by a few drops of Sul-

phuric acid – Glass tube –

– Oxy. m. of Potash and

Phosp.s (a small bit) set near the fire explode violently

\# – Nitrogen and oxygen Gases formed Nitric acid – Mr. Singer

called the apparatus for this pur-

pose a new one. –

+ Sulphur burned over water

produces an acid – test paper

– Fluidity or Solution (vapour) or Solution

Monday 15.th April 1811

Chem:l agency of Electricity

Lect 2 – Mr. Singer. –

Nature of Chemical Analysis.

Exhibition of the processes em-

ployed to ascertain the compos:n

of various bodies. Principles on

which these operations depend.

Limit of our decomposing power.

Chemical processes depending

entirely on the agency of at-

traction. –

– Decomposition and recompo-

sition of water – The first process

was only described – Oxygen &

Hydrogen burned from a bladder

with stop cock – water. –

– Decomposition of Atmospheric

air – into Oxygen and Nitrogen

Phosphorus burned in a glass

The next graduated jar in Cubic Inches
The common air in the Retort
was diminished and the water rose
The dem.r has been ascertained
by various experiments to be
21 parts in 100 of Atmospher-
ic air — The oxygen unites
with the Phosphorus and forms
phosphoric acid. The other
constituent part of the Atmo-
sphere is Nitrogene or Azote
The principal properties of
oxygen and Nitrogen gases
shewn by the usual experiments
Taper — Spirit wine &c — Three
Jars were filled, one with Oxy:
another with Nitrogen Gas, and
the third with atmospheric
air — Taper burned as usual
in the latter, was extinguished
in the Nitrogen, and lighted again
in the Oxygen Gas. (The Nitro-
gen gas was in this experiment
produced from the lungs, how
it was not known).
+ Acids and Alkalies — Now
detected — Infusion of red cabbage
was used as well as litmus
— The green does not appear to
advantage in candle light —
Test paper —
— Syrup of Violets &c — a few
experiments shewn, which succeed
very well. —
+ Two Gases
were mixed in an air jar, Mr.
D. brought the jar from on his
hand from the cistern. When
it was suspended from his hand,

by the diminution of the gas in the jar.

Thursday 18th April 1811

Chemical agencies of Elec.ty Lect 3 –

– Examination of the Phenomena of attraction as produced by various operations. Particular consideration of the powers of Elect.c action; correspondence of this with & variance with those of Chemical action &c

M. Singer's object in this lecture was to shew that Attraction alone, without the aid of repulsion, is sufficient to account for all the Elect.c Phenomena: and that Electrical and Chemical attraction differ from each other in three of the principal circumstances. 1st Elect.c attr.n acts at a considerable distance; Chemical attraction only in contact. 2d In Chemical attraction great heat is produced; in the Elect.c attraction none.

3. In chemical attraction great changes take place, the compound possess properties totally different from those of the ingredients; Electrical attraction no change takes place —

Exp. To prove repulsion unnecessary. —

1. Pith ball on the conductor attracted by the atmosphere
2. Lock of cotton attached, alternately by the hand and conductor
3. Man on stand attracted by the air —
4. Clapper of the bells attracted alternately by the centre and outward bell. —
5. The Electric fly moves round in a direction opposite to the points, because the Electricity flowing off the points Electrifies the air in their neighbourhood, consequently there is an Equilibrium on that side; the opposite side of the air will be attracted towards the air on that side which is not Elec.d the fly must therefore move round in that direction —
6. In the Electrical Thermometer the glass balls move with the brass orbits, because the neighb.g parts of the Elect.c orbit attract those parts of the glass ball near the Electrified point of contact — but supposing the same, the ball should not move at all —
7. Small conductor 2 pith balls attached to one extremity. If sealing wax be held near the opposite end the pith balls at the other end diverge with positive Electricity — The negative Elect.c draws it off the Elect.c on the

half of the conductor next to it
self which thus becomes Negative
while the other end remains
positive ——

— Several experiments of the
same nature on two and three
or small conductors or rods as
W. S. called them, with pith at
both ends, all explained by the
General Elect. Equilibrium being
disturbed by attraction. —
Induced Elect.y ridiculed by W. S.
some of Davy's Explanation
but Ind.d Elect.y objected to —

+{ In proof of Elect.l and Chem.l
attraction being different, few
Experiments were performed. In-
deed they were not necessary.)

1 — Muriatic acid gas and ammoni-
formed a solid — Sal am.c —

2. Two similar Exp.s on other gases

3. Phosphorus burned in a large
Jar of Oxygen Gas. —

Monday 22 April 1811
Chemⁱ agencies of Elect:ʸ Lect: 4ᵗʰ —
— Elect:ʸ applied to Chemical Decomposition. Researches and Exp:ˢ of Franklin, Priestley, Cavendish, Volta and others. Interesting chemical facts derived from these enquiries, illustrated by numerous Experiments

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German Philosophers first discovered that Elect:ʸ sets fire to inflam:ˡᵉ substances — Exp:ᵗ Ether in a small cup on the conductor fired by a spark from the finger.
Abbé Nollet shewed that Elect:ʸ increases the evaporation of water and circulation of fluids in small tubes. Exp:ᵗ Bucket with small tube in the bottom. —
— D. Franklin found that Elect:ʸ would not only fire inflam:ˡᵉ Sub:ˢ such as Spirit &c but that it would also turn iron wire and even reduce iron and also gold it self to an oxyd — Exp:ᵗ Iron wire with the battery, made red hot and in about a second it fell into globules — Second attempt did not succeed so well. — (When one Experiment succeeds well, another of the same kind should not be attempted again in the same lecture.)
— Gold leaf calcined and united to the surface of the Slips of Glass so intimately that no chemical agent can separate them. (S. made use of three Slips of Glass)
— Experiments of Beccaria, Priestly Cavendish and Volta on the chemical effects of Electricity on water, oils, Alcohol, Ether and other fluids, also on Gaseous Substances

The decomposition of fluids was effected in small glass tubes bent at obtuse angles, with platina wires having their points near the end at a small distance from each other. Through these wires strong sparks, and occasionally small charges were sent, when the fluid between the wires was decomposed and the gas was seen ascending to the corked end of the glass tube. Several experiments on these substances, and on the decomposition of water were shewn. Oxygen and Hydrogen gases exploded many different ways, both produced (and in many of these experiments)