

Notes on New York
No 1st Lecture —

Introduction — Curiosity —
cannot be more rationally
employed than about Mr. Galvani
and his works —

Electrostatics — Love of science
extends to our views — exalts
over ideas of Pantheistic prejudice
&c —

Properties of matter —

Calcium — Oxidizibility — mineral
acids — Nitric — copper in a gas
state — an iron wire — dip into it
immediately encased with copper

Gold wire — leaf — Cod fish animals
& imperviously hard — original
particles the same in all bodies —
unchangeable — water in the

Plummet strikes like metal
Air rushing into the vacuum of
an Air Pump — Galvani Expt

Electric shock - found -
 on all these a proof of the base
 nity of the particles by water
 + Water attracts and is attracted
 Cork balls in water sink to-
 gether with an auxiliary mo-
 tion - one of them will follow
 the finger - Swan follows the
 finger - water rises above
 its level on the sides of the bowl
 in capillary tubes - red wine
 made use of in this Expt
 Two glass plates about 3 to 4
 inches long and about 3 broad
 closed at one end and separated
 at the other by a Gumm or
 Myrica - capillary attraction
 Lead bullets whose head plan
 whose with a few which sup-
 ported one hundred wt. altho'
 the planes in some places might
 be seen thro' - Two bars of
 lead may be made perfectly
 one so that nothing but
 fire will separate them

Portion of Gold and a feather
 of the same weight - Gumm or
 feather Expt.

Electric attraction
 of this kind is Magnesium
 natural magnet attracts and
 repels the ends of a needle -
 artificial magnets least
 made - A circulator of the



spectrum one pole gives the
 other receives - illustrated by
 presenting the end of a needle
 to a needle - join them to
 without separating the poles
 This compound magnet does
 not attract - the reason - change
 the poles and it will instantly
 - The reason

Magnetic curves - Dip
them by a small needle with
an axis on a little brass plate
in a magnetic bar from end
to end - Each pole of a mag-
net supports three balls but mi-
nor of them a fourth - Place a
fourth between and the ring
like a string of beads -
Magnetic plates of three bars
placed end-wise and destroyed
at one stroke - Magnetic
tops - History of the variation
- A small globe with the line
of the variation marked on it
- Paper moved vertically
along side a ^{small} compass turns
round the needle - Some show
magnet rolled in iron filings
with little bit or small weight
Two semicircular magnets
in iron filings, like poles repel
the flat end, unlike attract -

Fire cause of fluidity in all
bodies - apparatus - ring and
ball - Pyrometer - fact was
the fire - Thermometer how
filled - how the freezing and
boiling points are marked
use of the thermometer -
little spiral therm? with water
thin of air - the ball about 1/2
inch with sp: v. -
Newman heat the same all over
the globe - In a New Britain
to boiling water the heat of
the blood was not increased -
This is occasioned by wapo-
ration - perspiration -
Providence saw that the hu-
man race must be cast on dif-
ferent climates &c -
- Thermometer in Ether moved
Now the Air -

Different conductors of heat - metals
good conductors - hence the feet ~~to~~ ^{of} culprits
to the hand -

Thermom^r in a mixture of Snow &
salt descends rapidly - Lady laid
a wager that she would keep skin
with her finger this mixture for 5
minutes she won the wager but lost
her finger - finger cut off by the
middle joint - Cloth frozen to the
plate below -

Water Frozen seems to be an
exception to the general property
of heat expanding all bodies but
it is not - A bomb shell last
year in Canada - exposed partly
water to a severe frost stopped
at first drove out - in the second
experiment the shell was burst.
A piece of ice has many cavities
I suppose it of them by pounding
to powder and it will sink
in water - No wonder that
frost should break bottles lead
pipes, it was Spiller rocks burst

X Capillary attraction applies
to the circulation of the saps in
vegetables and Respiration in the
Animals - Every vegetable pruned
in its roots incessantly mouths
or openings to the earth to draw
in the saps - but how can capit-
lary attraction raise the saps
so high as the top of a tree?
organization - sphygmeter &c -
In animals the Stomach is the
root - part of the food is turned
into milk and drawn off by
the Lymphatic Vessels - Capill-
lary tubes open at the surface hence
the effect of rubbing any medicine
on the skin it is absorbed -
- Handkerchief - sugar - sponge
X That vaporation carries off heat
proved by the boiler - Vibrating
Boiler, a prismatic iron box
with a heater in each end op-
posite to the bulb of the boiler
- Colpils - Sp. V. Shown of fire, look

Throwing to a suppository attraction
that the sailor that almost
exposed with their dip & cloth
into the naked sea and wraps
it round his naked body - In
like manner the soldier lies down
on the ground -

2. Lecture - Mechanics -
Mechanics the most useful
branch of Science, whether we
consider our selves as a common
man or as it contributes to
our pleasures -

- Preliminary Articles -
- Gravitation - Poet's idea
a beautiful figure but more
poetical than just - The attraction
of the earth does not exist in
one point, but diffused over
the whole - Maskelyne's Exp
on Schi hallion - weight let
down 200 yards found lighter
- one same denser air - another
the attraction of the upper parts
of the earth -

- Expⁿ from that bodies de-
scend in the first second of
time 16.1 - in the squares of the
time - space in the numbers
1. 3. 5 &c

Illustrated by a triangle
swept and coloured
and proved by a wheel and
axle on friction wheels a wt
coiled round the axle Descend
slowly thro' the spaces 1. 3. 5 &c
during ^{on many} one vibration of a pendu-
lum being behind - The divisions
are marked on a slip of paper
+ Composition of forces illustrat-
ed by a figure, parallelogram
coloured - Demonstrated by
Engis's Machine -
Projectile force - cannon -
Ball strikes the ground at
when thrown horizontally
at the same instant with
another despt suspended from
the same height - proved by
a machine similar to Coups
gen's - ~~That~~ Experiment of the
- curve for the descent of bodies
- movable pulley -
- pendulums - :: vib? -

Stone dropped from the topmast
of a ship describes the same
curve -
x Centre of Gravity -
- piece of mahogany with a
small hole in the center of
G. twisted about - cannot
Pisa - scaffolding or any other
weight raised on it would thro
it down - a plummet being
to its center of gravity -
Ballon on a needle - Double
cone - Cylinder rolls upward
line of direction - bodies oblige
more or less firmly &c -
- kind of perpetual motion
by the double cone -
- Animals subject to the
laws of the center of G. -
- sometimes which we see in
a particular. Detach a
forget to Paris coffee house we
Stagger -

Momentum - effect of quantity
of matter and velocity -
Exemplified in a battering
ram - and Cannon ball
Momentum of the same body
descending from different heights
is as the square roots of the
hts. Expt. a ball from the ht.
of 4 fathoms raises a given wt.
at the opp. end of a beam -
from 4 times the height of 16
raises twice as much &c. &c. -

Mechanic powers -
Lever - exemplified by a com-
mon beam - Debit and Credit
- Bot. false to such would produce
a very considerable sum in
a Grocers Shop in the year -
- Superior of Levers of this kind
- 2 kind - Two points carrying
a weight - Expt. the former
ball with a Stand and pulley
- Load waggon with 4 wheels
weight between them more
easily overcome an altitude
than when placed on either
of the wheels - calling this
&c. -
- Third sort - never use it but
from necessity - Annet's Lemma
all Levers of this kind - insert
of the muscles of the arm about
 $\frac{1}{4}$ from the center of motion
fulcrum - contract - (Sledge
how does the mind act!!!)

The heart is too important
to be left to my will, it acts
independent, but my limbs
which have to overcome gra-
vitation &c - are properly
subjected to my will - The
metaphysicians have thrown
no light on the subject -

A compound lever like the
steam engine beams -

Compound Engine great weight
raised with the wind of the masts.

Wheel and axle illustrated with
one axle and two levers ^{one} on each
side of the dist. of the wheel and
axle -

× Pulley single upper - Double
triple &c They Count - Smecton's

Pulleys - running Pulley
explained - Two ropes, one for
the wedge Ferguson's nothing new -

Ferguson's plane - elevated by
rope by a rack, pulley elevated
and supported by a joint in the

stand -

+ Friction of two kinds Rubbing
friction and friction by contact
Lashed wheel - compound wheel
In the friction wheels the friction
is reduced to the second and much
advantage gained. Eff. machine
used for descending Rads -
drivels by means of a leather
spring joint in pivot holes 2,
on Friction Wheels -

Compound Engine

Pile Drivers - Crane -

Coal mill - Wind Mill -

Great stone at Edinburgh

36 feet long 25 Deep 21 Broad

Iron Groover balls, road as

well as stone carried forward

new fresh when they come to

soft ground piled it. In one place

it sunk fifteen feet - carried on

a raft across the Gulf of Fin-

land -

Wheeled carriages - advantage
of great wheels not so great
as is commonly imagined
mud is soft but a horse should
pull oblique from the angle of
his shoulder - when the line of
draught is oblique the force which
more easily overcome an obstacle
Eff. A horse placed with
his hind feet on the upper
extremity of the plane pulls
at different Elevations much
more at a small than a great
- The slope form of the Expositor
can be a waggon - invariate friction
by a dragging motion Eff. A
friction of a cone will not move
straight - The waggons are now
made with a top curve but w.
the same exterior slope, hence they
run on the inner edge only - cut the
road - great w. & w. soon destroy the
but roads - Single cars preferable
In waggons horses seldom carry more
than 10 wt. each - in Sing. C. 15 or 20
Best lot of the waggons