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B. ...

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## Of Comets

Appears at first like a small  
star seen from a long way - but  
increases in Magnitude & beauty  
and brightens - moves towards the  
sun - tail projected in a direction  
opposite to the sun - length & breadth  
of the tail depend on the Perihelion  
When the Comet approaches the sun  
the tail seems to follow the comet  
When the Comet recedes from the sun  
the tail precedes the comet -  
Tail convex towards those parts  
to which the comet moves - Convex  
side brighter and better defined than  
the concave side - Comets move  
in all directions - in very long Ellipses

round the Sun in one year  
 - Distance regulated by the same  
 laws as those of the Planets.  
 - Comets never seen thro' all their  
 orbits only in that part nearest  
 the sun - The Ellipses whose  
 foci are at a very great distance  
 from one another differ very little  
 from a parabola - Calculations  
 of very Excentric Ellipses reduced  
 to parabolas easier - Newton's  
 problem about trajectories -  
 Aristotle thought Comets were  
 in the highest parts of our Atmosphere  
 - This very small decimal Part  
 can have considerable Annual  
 Parallax demonstrable that they

are higher than the moon and  
 in the regions of the Planets  
 - Other Comets have  
 been observed in our System  
 the period of three are known  
 1531 } The period 75 years  
 1607 } The 2<sup>d</sup> distance to the  
 1612 } least 60 to 1 - The 3<sup>d</sup>  
 1759 } light and heat to what  
 + 1535 } 3600 to 1  
 1537 } Period 9<sup>th</sup> of 100  
 1661 } 129, 100  
 + 1759 } 10,000 : 1  
 4240 } This is varied  
 531 } 576 20,000 : 1  
 1106 } 400,000,000 : 1  
 1650 }  
 + 2256 }

The Great Comet in the year 1680  
was 10. Sun from his surface  
to feet was 2000 times greater  
than our hot iron - Now this is  
found - That of Summer is 1/2  
of winter water. And from 4 times  
greater than boiling water -  
That in the inverse proportion of  
the square of the distance -

There have been 3 opinions about  
Comets - 1<sup>st</sup> That they are meteors which  
are generated and perish. - 2<sup>d</sup> That  
they come from the regions of the  
fixed stars and are sent on their  
progress thro' the planetary spheres  
but they never return - 3<sup>d</sup> That  
they are ethereal bodies revolving  
about the sun in very irregular orbits

The last is the best. -  
Comets appear successively with  
a regularity of time  
- These opinions concerning  
the nature of Comets -

I<sup>st</sup> That they were only rays  
of the sun propagated thro' the  
transparent head of the Comet  
II. That they arose from the refra-  
ction of the light in its passage  
from the head of the Comet to the  
earth -

III. Comets are the same continu-  
ally arising from the head of  
the Comet and going off in a  
direction opposite to the sun.

The two first opinions are evident  
by all former - Sir Isaac Newton  
accepts the last - It thinks the  
Amount of Comets tails is owing  
to their being rarer and lighter  
than the solar atmosphere  
which he supposes them  
surround a tail in the neigh-  
bourhood of the sun. The same  
heat expels from the comets  
through a few thin vapours more  
opposite direction to the sun, they  
become tails by reflecting the sun  
rays at their periphery amidst the  
solar atmosphere whose density he  
supposes greater than that of  
the tail, like smoke up a chimney

Dr. Newtons account of the  
tail of Comets liable to many  
and some of them, various combi-  
nations —

A body moving in a medium  
of greater density, with a very great  
velocity, will meet with a great  
resistance.

Every body which reflects must  
also reflect the rays of light.

The above Propositions applied  
to the motion of Comets —

The conclusion is, that the tails  
of Comets do not consist of aqueous  
or other vapours thrown off by the  
heat of the sun, and rising by the  
superior gravity of the surrounding

Meteor were this Meteor. The  
tail would always be left behind  
the comet, at least it would be  
longer in its approach, than in its  
recess from the Sun, this however  
is not the case — A candle moves  
through the air — flame follows it —  
— Comets tail longest a little after  
it has passed the Perihelion —

## Electrical Hypothesis

Moon  
Period. Rev<sup>n</sup> 27 7 43  
Synod. — 29.12

Orbit Elliptical — Earth  
in the focus —

Mean Dist: 240,000  
or 30 Diameters of the Earth

+ Annual motion of the  
earth the cause of the Diff.  
between the Periodic Syno-  
dical of the moon —

+ turns on her axis in  
one week — ~~Placed~~ <sup>moved</sup> ~~the~~ by  
the weight <sup>of the</sup>  
same side to the earth.

Illustrated by a candle  
— both hemispheres never  
seen to the earth —

Moon resembles the Earth

1. Globular form —  
like the Moon a flat  
surf. never visible before  
the end of her first and  
after the begin<sup>g</sup> of her  
fourth quarter — app: and  
dis: app: almost invisible  
never

2. Moon gets her light —  
— receives her light from  
the sun — otherwise she  
would appear transparent  
at all times — never so at  
full —

3. Day and night — one  
in the month

4. Irregularities of Surface  
light and shade -  
- Mountain - valleys  
best observed in the first  
and last quarters -  
- boundary not regular  
nor circular - Mountain  
now measured - 3 miles

5. Same year the same  
as that of the earth  
- Sun's apparent motion  
nearly the same  
in the earth and Moon

6. Earth a moon to the  
moon - At times larger  
motion in the same ob-  
served - Dictionary -  
- a good deal for the moon

~~The fixed stars~~

Moon differs from the  
earth

1. Little variety of seasons  
axis inclined -  $2^{\circ} 10'$   
- Torrid Zone  $4^{\circ} 20'$   
broad

2. No atmosphere heard  
by the revolution of the  
stars and her surface al-  
ways clear - No other  
moons atmosphere or  
has below or her axis  
and her surface that is  
equal -  $\frac{1}{2}$  mile - Thus  
of us are



3. No Seas - Both parts  
of water would, somehow  
reflect the sun's image  
- shadows in the dark  
parts unequal

### Consequences

1. No winds or rain
2. Inhabitable, dry
3. No fire - Electricity
4. No vegetables
5. Stars seen at midday
6. No twilight
7. No thunder lightning
8. No rain bow - Circumstances
9. Quick transition from  
darkness to light
10. Volcanic appearance

11. Size of the Moon, Jupiter  
Saturn

in Moon --  
Libration  
Nutation --

Fixed Stars --  
-- Place the same appearance  
whether seen from the sun  
or the earth -- appear at  
rest -- Proper name as some  
are said to be --  
-- Distances unknown --  
Catalogue of the Stars --  
-- Magnitudes -- 7 magnitudes  
Names -- Clusters or Constellations  
Ancients divided that part  
of the heavens into which  
they were acquainted into  
forty eight constellations  
-- twelve new constellations

These constellations received  
names from the objects they  
were famous to represent —  
— First Nelson: Chiffhounds  
— Zodiac signs now divided  
— Vespers of water — Motion  
through the set unequal —  
— Catalogues

Papparchus 150 A. C. 1022  
Ptolemy — 130 A. C. 1026  
Tycho Brahe 1600  
Keplerus 1670  
Hammela. 1690 3000

This list by far the most  
exact — 20 times the number

in Hammela observed by  
the Telescope —  
In the Sign Taurus 140  
have been observed by  
Hammela —  
Fixed Stars appear best  
through a Telescope than  
through the naked eye. —

— The luminous Bodies  
— Stars centers of systems  
— Place at unequal dist.  
from the earth.  
New Stars — cloudy —  
x Orions sword —

# Solar and Syderial Time

Sun appears to move the  
stars by almost a Degree  
every day - Hence the stars  
rise &c. near 4 minutes  
sooner every night -

$3^{\circ} 56'' =$  sun's motion in

a Day. This motion irregu-  
lar Distances from the sun.

Diurnal motion of the  
earth perfectly equal - sun  
+ con's mt. cause of diff. of day

- Motion of regular times  
clocks -

# Equation of time

2 Causes

1. Unequal Velocity of the center
  2. Obliquity of the Ecliptic
- Equated Difference  $16' 15''$

15 April 15 June

31 August 24 December

X Longitude

X Spots on the Sun

X twilight

Transit of Venus  
Earth is a point when  
seen from the sun - but  
Venus is sometimes near  
to time near the earth  
than the earth is to the sun.  
I speculate, at a distance  
will observe Venus on diff.  
parts of the Earth's Sun's  
surface at the same  
time - This difference is  
called the parallax of the Venus

Semi-Distance Determined  
by the Effect of Semi-alt.  
on the moon - Dr. Stewart  
- When the Distance of  
one planet is known, all  
the rest can be discovered  
by the universal law which  
regulate observe  $P^2 \propto D^3$   
The time of Venus's motion will  
be different by motion to the  
horizon at different hours  
of the day -

Chronology —

A Day the first Division  
of time — Month — Year  
Periods — Cycles —

Length of the Julian year  
365. 4

True year — — 365. 5. 49

Now determined —

Leap year —

— Dominical Letter —

— Shifts backwards —

$\frac{365}{7} = 52 - 1$  Day over

This shifts new years Day

forward a Day every year  
year begins and ends with  
the same day. —

— Solar Cycle 28 years —

— Lunar Cycle — Indiction

— Epact —

— Weeks derived from  
Revelation or the appearance  
of the moon. —

Julian period 7890 —

Ecliptic Cycle not exact.

Chronology —

A day the first Division  
of time — soon multiplied  
two fold — longer necessary  
— The revolution of the moon  
around earth — seven  
days — Years —  
four legible holidays  
—  
Babylonians a hundred  
years — The Jews  
in the month of  
the holiday —  
Plants growing  
down to their order  
— Sun, Venus, Mercury, the  
Moon, Jupiter, Mars —

... of Monday —

... a manifest law  
... the formation —  
... of  
... 3 days the  
... and

... the second  
of was now made to  
... the god of the world  
... — ...  
... the god of the  
... —

... —  
... the God of heaven  
... — ...  
... between  
the human and ...  
Dale —

... from the ...  
... from ...  
... ..

### Astrology

Sun - Moon, Mercury  
Mars, Venus, Jupiter  
Saturn

Solar Spots  
... from east to  
west - 12<sup>1</sup>/<sub>2</sub> days - ...  
... on his axis in  
25 days - spots adhere  
to the sun - they appear  
and disappear in equal  
spaces of time - spots  
broadest on the middle of  
the disk - hence the sun is  
... a globe - spots  
... in time a little  
curved their track is never  
straight except in two days  
to view the distant from each  
other - hence we learn that  
the sun axis is not perp.  
to the Ecliptic 5<sup>o</sup> incline



When Gall: first pointed the  
Telescope to the sun he counted  
50 spots on his surface  
From 1650 to 1670 there was  
never seen above 2 at a time  
frequently none -

The same spot will continue  
sometimes for several rev-  
olutions of the sun - at other  
times a spot will disappear  
in half the time revolution  
Quasars sometimes in  
the middle of the disk -  
Sometimes they begin their  
existence a number of  
small spots join and form  
one large <sup>spot</sup> one. At other  
times a large spot is dis-  
solved gradually by the dis-  
-

and he divided into a number  
of spots -

Spots are cavities - the black  
sides - black spot in the  
middle - Spots so large  
as to hold several each -

*Handwritten text at the top of the right page, possibly a title or header.*

- Eclipses -

Shadows - Earth - Moon

Longitudinal

Some happen

that expand all metals  
and contracts

In a warm climate the  
ball is enlarged, the pores  
and veins spring, consequently  
relaxed, the air dilated  
the result is that the  
gas flows

Difference of time given  
P. J. Long, and the Bar-

Longitude by  
the Moon

Moon moves in her  
orbit about 2' in the hour

That Gravity extends from  
every body in the system to  
the greatest distance in the  
great things on which the New  
Philosophy turns, and proved  
by the most obvious induction

But this is incompatible  
with absolute rest —

— Gravitation gone abroad in  
the universe — all the systems  
would attract and begin to  
move towards each other  
Even those bodies which are vi-  
sible in the remotest <sup>regions</sup> corners  
of space on the very verge of creation  
would leave their stations in  
absolute space and, with a  
velocity continually accelerated,  
would move on towards the  
Point of general Residency, so

But after a series of ages had  
elapsed all the liberties of nature  
all the glories of creation would  
perish in one universal ruin.  
On the tremendous sheet of so  
many opposing worlds

A supposition of a Deity  
long of the power wisdom and  
goodness of the Supreme being  
that we cannot possibly enter  
to see it

By which a hot controversy  
in nature is thus prevented

Infinite Systems -  
propagated force -

Why not suppose the  
same cause introduced into  
the universal system, why  
not suppose our Solar System

to be one grand universal  
system all moving round  
some far distant centre according  
to the laws of the Gravitation

— Grand Description of the uni-  
verse. Whole host of heav-  
ens one great sphere blaze of  
stars all in rapid motion round  
the great centre of creation

— Not from analogy alone  
— Much direct proofs

— Motions of some Stars  
— Dimensions of the centre

— Great being who commands  
into existence such a being

— But here the utmost stretch  
of human imagination falls infinitely  
short of the sublime object

— The souls labours and struggles  
with the idea but in vain

As presented with the grandeur  
of the object she sinks down  
again to this little spot of earth  
when returning into her self she  
finds there deeply impressed what  
she has only had to contemplate  
the incredible idea of infinite  
admiration.

Planets inhabited  
- Plants animals - Jovian  
- turn round their axes  
- revolve round the sun  
- moons - Mountains and  
- valleys  
- of what are light of their  
- axes inhabited  
- of what use to us the Salt  
- or even the fixed stars  
- No objections from our  
- Providence. &c.

Consider that the planets  
are all inhabited with an  
endless variety. &c.

But what is the purpose of  
their bodies, what the powers  
of their parts Do they exist  
and in what manner are  
they employed, to these questions  
we ~~do~~ must have it in  
our power to give any  
solution in this world.

Impossible to explain  
From the limited nature  
of our own powers we advance  
slowly in the acquisition <sup>of knowledge</sup> It  
is necessary that we attend  
but to few objects at once in  
order to progress in knowledge  
Had we been indulged in a cor-  
respondance with the planets

The affair of life might have  
appeared trifling, in the compass  
the duties incumbent upon us  
as members of society must  
have suffered by it.

But shall our views be for  
ever confined to this little  
Globe? Shall we never have  
a communication with the remote  
bodies in the universe?

Have we been conducted  
to this little eminence for  
no purpose, we have had a  
glimpse of those distant worlds  
and shall we never enjoy  
a nearer prospect of them?  
Shall we never have it in  
our power to converse with  
our brethren inhabiting  
the other bodies of our System?

It is not equitable to that  
goodness that shines in every  
part of creation that our curiosity  
should have been raised so  
high to be disappointed in the  
end. That we should have  
had powers and faculties  
bestowed upon us which,  
being capable of perpetual  
progress and improvement  
can never have their full  
exercise in this life.

Did our existence terminate  
in the grave, and the Spi-  
ritual part perish in the  
inexpugnable ruins of the body  
man had been created in  
vain the beautiful frame  
of nature had never been  
unfolded.

## Conclusion

The present only the instance  
of our being the Power of our  
country - that we are directed  
to a higher and a nobler  
sphere of action where our  
~~present~~ powers shall be  
greatly enlarged and our  
knowledge in proportion  
to our powers -

## Tolerance

To enlarge the mind and  
banish those prejudices which  
we have imbibed with our  
education or habituation of  
The man on whom this  
following study has its due  
influence consider himself  
as a citizen of the world,  
and looks upon every man  
of whatever country and  
whichever religion as his  
brother is it not enough  
that he wears the human  
form that he is assimilated  
with a common principle  
conscious of a common nature  
and principles of the origin  
from whom it springs -



That he is our fellow traveller  
And life, and to descend with  
us into the same humble si-  
lent habitation that we see  
her provided for all her children  
— And is it not more than  
enough — that when the  
sun shall be struck from  
the center and the mighty  
chain of attraction which  
binds the system shall  
be torn a sunder, when the  
Guardian Angel of each star  
shall drop the last tear  
over a falling world, and  
bid an eternal farewell  
to his favoured charge —  
— When a voice from the throne  
shall proclaim the final

Dissolution of the system, and  
arrange the planets in the  
mass of their original matter —  
In this awful situation it is  
surely more than enough that  
he is to stand with us the last  
chord, and be a fellow spec-  
ator of the last fringe of exist-  
ence, and for ought we  
know our inexplorable  
compass — that the various  
regions of that undivided  
universe are all his —  
A <sup>2</sup> ~~the~~ <sup>most</sup> ~~powerful~~ <sup>conspire</sup>

Books

Gregorius work 3

Martin's work 3

First Astronomy 2

Gregorius Dittus

De la quatr. Espr, Phil<sup>o</sup>

Gravesande Natural<sup>o</sup>

Halskains lectus

Principy and Frankl<sup>o</sup>

Smith and Purshy 2<sup>o</sup>

De la Lum. Nat<sup>o</sup> 4<sup>o</sup>

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Nature Displayed

Dehans work

Fontenest. Philosoph<sup>o</sup>

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Dictionary

Solar System

Periods

Mercury	—	3 Months
Venus	—	7
Earth	—	12
Mars	—	2 years
Jup	—	12
Sat	—	30
G. Sat	—	82

How know

Rotations H O H

Sun - 25 6 27 12

Mars

Venus + 23 40

Earth - 24 -

Mars - 24 40 -

Jupi: 9 56

Sat: 10 1/2

G. S.

Distances

Planet	Emp	Real	Unit
M.	4	37	millions
V.	7	69	of Eng.
E.	10	95	millions
M.	15	145	
J.	52	495	
Sat.	95	900	
G. S.	180	1800	

Cannon ball

Planet	Years
To Mercury in	2 years
Venus	16
Earth	23
Mars	34
Jupi	118
Sat	210
G. S.	400

Magnitudes

	From	1100,000
Sun	890,000	
Mercury	3,000	
Venus	9,000	
Earth	7,970	1
Mars	5,400	
Jup	94,000	1,000
Sat		
G. S.		

Suppose the Earth	1
Then the Sun	9 ft
Mercury	42 ft
Venus	
Mars	
Jup	10 ft
Sat	
G. S.	

Suppose the Diam. of the Earth 1 inch

	Then the Distance of
Mercury	387 feet
Venus	733
Earth	1000
Mars	1523
Jup	5207
Sat	9540
G. S.	10,000

From the above the circumference of the G. S. is 23 English miles

Light and heat

Mercury	7
Venus	2
Earth	1
Mars	$\frac{1}{2}$
Jup.	$\frac{1}{2}$
Sat.	20
	1
	90
	91
	360

Time in which the  
planets <sup>will</sup> fall to the sun

Mercury	15 13
Venus	39 17
Earth	64 10
Mars	121
Jup.	290
Sat.	760
J.S.	

Moon to the Earth in 4: 21

Inclinations of Orbits  
to the ecliptic

Mercury	7°
Venus	3 20
Mars	5
Jup.	1 50
Sat.	1 20
J.S.	2 20

Inclination of Axes  
to the ecliptic

Mercury	
Venus	
Earth	
Mars	
Jup.	
Sat.	
J.S.	

Proportional Gravity  
on the Surface

Satellites  
Emp. 1  
2  
3  
4

Saturn, 0  
1 - 22 - 2, 32, 2 to 77

Four of Saturn's Satellites  
4 Satellites discovered (1805)  
by D. Herschel. The  
former two are found  
to move retrograde and  
the latter two in  
orbits almost at right  
angles to the primary orbit

Brown Blacksmith

Whitcomb Street