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Natural History
and

Natural Philosophy

Man is not more eminently distinguished from the rest of the animal creation, by the variety of his talents, or the extent of his capacity, than by the great multiplicity of his wants and the great difficulty in supplying ^{them} - Even reason and justice, which we boast as the prerogative and glory of our species are only the results of our necessities.

In all the species of animals we observe a gradation in talents corresponding to a gradation in wants, and in the difficulty of their supply - The horse, the ox, and the sheep ask of providence only grass and shelter. They may find in every field. How few are
their

their looks! how mean their
understanding! — Nothing seems
capable of causing them from their
general stupidity, but the impregnation
of present terror, or the stings of
mutual rancor. —

How much superior to them
in sagacity, in contrivance, in
variety of powers are the carnivorous
animals! To supply their returning
wants, they must get the better of
all the contrivances which nature
has provided for the security
of such animals as they single
out for their prey — But
how their art commences — The
crafty fox has no other expedient
all his wiles, and having secured
his Lamb or chicken, retreats
contentedly to his hole, gorges
himself

himself with his prey, lays himself
down to sleep, nor takes any farther
trouble, till the call of returning
hunger again sends ^{him} him abroad
in search of prey. —

But needy man has a far
different occupation. His attention
is directed to a great variety of objects
at once. — Hunger sends him abroad
in quest of food. — His delicate
body is unable to bear the violence
many of the seasons, and he
must make to himself some
shelter, for nature affords none
sufficient for his subtle constitution. — His natural weakness
his dislike for solitude drive
him into society, there he finds
others as needy and as weak as
himself. — Competitions in want
are

are inevitable and fatal.

He must arm himself against his fellow men — Not exhauſt by this variety of purſuit, man has an irreſiſtible Deſire of change unknown to other animals. The food which this week pleases his palate (conquers him the next. Nature with all her stores is not ſufficient for his love of novelty.

But her hardest task yet remains. Man is a nice creature, and there is not a gift of nature so exquisite but his ſubtilty fancy must mould it to his taste by putting it out of its original form. This is the case even in ſupplying his moſt preſſing wants, and seems neceſſary for his well being —

The delicate juice of the grape conquers with his ſtomach and must be made into wine — The warm fur of the ſheep is inconvenient it must be woven into cloth. The shade and protection of the woods must be fashioned into a hut. In short his whole employment seems to be putting things out of their natural state.

But as if all this Devourſty of attention, all this Difficultly conſequent on it did not ſufficiently employ him there is ſupplanted to his conſtitution as insatiable principle of luxury ~~of~~ and refinement — His very natural wants he refines into refinements of pleasure — Not contented with wholesome food he must have

have it reasoned — He changes
his blanket to a laced coat &
his hut to a palace — He has
flower gardens as well as win-
fields. — Not contented with
beholding beautiful objects
abroad he paints them at
home — Not being able to be
a performer or spectator of
noble actions, he lives poets
and historians to relate them.
The most pleasant sounds
are without entertainment
unless subjected to the rules
of music. — Nay the very
means of supplying his
wants he refers into sports
and hunts tho' not hungry. —

Such are so various are
the wants of men. All comes

in turning our attention without
ceasing to the objects which
surround us. There are the
instruments of all our pleasures
and all our pains — Did
these pleasures or pains come
upon us without any pos-
sibility of promoting the one
or preventing the other, there
is no doubt but they would
be the only objects of our
attention. — But from the cir-
cumstances of our condition many
effort are on our part necessary.
These efforts are directed to the
external objects — Hence directed
my attention to the bear which
stands before me — A Torrent
from the mountain threatens
to sweep me away — My calling
out will rather procure the

could not avoid the danger, I
must catch the bird, I must
quit the low grounds. — By
long practice I became a perfect
marksman and seldom fail
of hitting my object if within
a moderate distance — but in
trous of time my game becomes
more ^{scarce} or more shy. I must
fall on new contrivances in order
to get it into my power. I
invent traps and nets — It
is plain that the efficacy of these
contrivances must depend on
the habits of the animals and
on the nature of the means
employed.

But of this the savage
 seldom thinks abstractly.

He attends solely to the applica-
tion which he makes of his
acquaintance with them. ^{He} He
seldom finds himself at leisure
to sit down and consider the
nature, manner of life, food or
haunts of his prey, or the opera-
tion of his machines. Snippets
of ^{his} knowledge occur to him
from time to time, and are im-
mediately applied to practice
and the only reflection which
he makes in his own mind
is that of precept and deduction
for his successful hunting —

Our Acquaintance with
things would never proceed
much farther were it our
proprietion and Desires confined

to the class already mentioned
But ~~the~~ our great Father is
very way kind to us.

He has given us objects of
ultimate research and which
are therefore in their own
nature always grateful. The
Father in every important
case he has reconciled us to
the task of obtaining them
by rendering this very employ-
ment agreeable and desirable.
How agreeable would we
may suppose the enjoyment
of life to be all have had
experience how tedious
the task of procuring it
by the use of food ~~it~~ would
be if appetite were wanting.

How eligible would we may
suppose the knowledge of
nature to be, and however
inconvenient to our comfortable
subsistence, we have all
seen how diligent the
task of acquiring it is to
Ours and immortal minds.

But Nature is kind to
her children. As our task
of acquiring the knowledge
of natural things is so vain
and as our powers must ever
be in proportion to our know-
ledge God has not left
the employment of his
noblest work on this earth
to the cool deductions of

reason and expediency.
The truth implanted in
our minds a love of Discovery
and Disinterested curiosity -
Other Animals resemble us
in many respects - Like us
they acquire by experience
the habitual knowledge
of many relations of things
they reason and act in conse-
quence of this knowledge precisely
as we do - But of Disinterested
curiosity they exhibit no
traces. We sometimes see
them trying, with things,
but more careful observation
shows that it is always to

some immediate purpose.
An indisputable proof
of the fact is, that they ac-
cumulate no stocks of
knowledge to the species,
which exhibits the same
appearances to day, as a
thousand years ago. —

But in man Discovery
and invention are ever for
their own sake objects
of their pursuit. Curiosity
becomes a principle of action
in all men, as far as it
is necessary for the general purpose
of life. At the same time
The Author of Nature has

has render'd it in some
a principle, so as to abstract
them from every other pursuit
and to engage them in
intellectual researches by
a thirst after knowledge,
which no discovery can
quench which success in-
creases the more -

But of all the subjects
of human enquiry there
is none better calculated
to answer the two great
purposes formerly men-
tioned than the study of
the works of nature.

The infinite variety of

pleasing scenes which nature
exhibits thro' her works
is calculated to satisfy, as far
as it is possible, the most
unbounded curiosity, to
enlarge our views of ^{the} ~~the~~ ^{greater} ~~the~~ ^{per-}
~~fections of the Great Creator~~
to raise and exalt our
Ideas of the Almighty and
in short to render us both
wiser and happier -

In the pursuit of this
manly study we acquire
strength by every exertion,
the farther we advance
the more successfully we
are enabled to proceed -

But I fear - The subject
I am confident will sufficient
by recommend it self -
I shall proceed therefore
to give you a short account
of the materials and plan
of the course -

That Gravity extends from any
body into the boundless void
to the greatest distances in the
course of the Sun's Path:
and proved by the most per-
fect induction - But this is
inconsistent with absolute
rest - For the moment you
suppose gravitation spread
over the ^{universe} system, all the bodies
in the universe will begin
to attract one another towards
each other - Even those
bodies which are situated on
the very verge of creation in
the remotest regions of space
would begin to leave their
stations in absolute space
and with great velocity un-

Finally accreted would move
on towards the point of gravi-
tendency - so that after a cer-
tain series of ages had elapsed
all the beauties of nature and
the glories of creation would
perish in one universal ruin
under the tremendous shock
of so many opposing worlds -

A supporter is derogate-
ry of the power wisdom and
goodness of the supreme being
that we cannot possibly main-
tain it - By what mechanism
is nature in this prevented

In the Kepler system Pro-
jectile force - consequence "pro-
duct motion - this is abso-
lutely necessary in our solar
system - Why does not the earth

fall to the sun - the moon
the earth &c - Projectile force
which best: the power of grav.

Why not suppose the same
cause introduced into the
universal system - Why not
suppose Dan Salsar system
with an innumerable mult-
tude of others to compose
one great universal system
all moving round some far
distant centre according to
the law of gravitation -

This leads us to a very
strange conception of the universe
it represents to us the whole
host of heaven as one great
assemblage of suns all in
rapid motion round the

center of revolution —

We are not led to this system by reasoning from analogy alone — we have more direct proofs — Stars change their places — Arcturus $\frac{1}{2}^{\circ}$, Bull's eye Hyrius &c —

Their slow motion no objection

In our own system Sat: 30 years — Comet 1575 years —

Changes observed in Stars of the first magnitude —

But if the Dimensions of this mighty center were such that the whole creation moves it is impossible for the utmost stretch of human imagination to form the least conception — The soul labours and struggles with the idea but in vain It is to her insupportable — Opposed with the grandeur of the object she falls back again to the little spot, when returning into her self she finds more deeply impressed, what she has only left to contemplate, the insupportable Idea of an insupportable and unchangeable —

That the heavenly bodies
all inhabited tho' we cannot
directly prove, seems in the highest
Degree probable - Has the
thoroughly searched all his planets
all his comets, all his planets
in this system of creation, or
left the immense regions of the
planets both of our own and
all the other systems to be long
deserts. In our Solar System
the planets will come on them
and they therefore enjoy day and
night, the moon, around the
earth and consequently enjoy
years and seasons. They have
Inhabitants and worlds,
Moons - Of what use to us
are the moons of Jupiter and Saturn.

of Jupiter's moons - The former have
not been seen 'till within these
170 years, and a small moon
would you watch him all the last

We can think the easy Obj:
drawn from their being placed
at so different Distances from
the sun - The inhabitants
of Jupiter are as much surpris'd
at our being able to live in
so hot a planet as we are
at Mercury.

The world is not all the
heavenly bodies are whole
by an endless variety of
being with various situations
fitted to their respective

But what is the figure of the
bodies, what the powers of their
minds, how are they employ'd
are questions we shall never be
able to resolve in this world.

There is an impassable
gulf ~~for~~ placed between
his globe and the other
parts of the system, and it
is ~~whom~~ ^{whom} probably it is
the same with every other
globe and every other sys-
tem in the universe.

From the limited nature
of our powers we advance
slowly in the acquisition
of knowledge. It is necessary
that we should attend

but to few objects at once.
Had we been indulg'd in
a correspondence with the
planets, be the duties incumbent
upon us as members of society
must have suff'd - our
present situation is the best
fitted for our constitution.

But shall our views
be for ever confin'd to this
globe - Shall we never have
a communication with the
remote bodies seen in our
own Solar System -

Have we been conducted
to this little universe from
whence ~~we~~ we have had
a glimpse of these distant
worlds, and must we not

have a nearer prospect of the
shall in mine have it in
our power to converse with
our brethren inhabiting
the other bodies in our own
system or of the universes.

It is not suitable to the
wisdom which characterizes the
nature, that our curiosity
should be raised so high
and disappointed in the end
that we should have had
powers and faculties being
bestowed upon, which being
capable of such great progress
improvement can never
have their full exertion in
this life.

Did our various terms made
in the grave, and the spirit
that inhabitant spirits
found in the mournful ruin
of the body - man had been
created in vain, and the beautiful
scheme of nature had never
been unfolded -

conclusion - That the
present is only the infancy
of our being the dawn of
our career - that we are
ordained for a higher
and a nobler sphere of
action - when our powers
shall be greatly enlarged
and our knowledge in
proportion to our power

There are a great many others
to be considered in the
provision of the
that might be employed
which the government
requires.

Commerce

Contempt of the
employment of a
being for

Subjects as

Chairs

Other

When he finds that he can
swarm the remainder of its
power and at pleasure either
mistake or avert its useful
effects —

In Optics he has discovered
many curious properties
of light and colour, he
has invented Telescopes
and Microscopes which
enable him both to ascend
and descend in the scale of
nature far beyond the limits
of his unassisted Organ
of sight —

Astronomy teaches us
the motion, the magnitude
and distance of the Heavens
by bodies, it explains the

course of the different lengths of
day and night, the vicissitudes
of the seasons, the phases of
the moon, the nature of eclipses
which can now be calculated
to a minute for a thousand
years. Mr. represents the
earth as a point and all
the stars of heaven as one
grand assemblage of some
sort which numberless
planets all in habitable pa-
rtnally revolve. — These
Lavoisier and Laplace are
the subjects of Exp. Natu-
ral Philosophy, subjects
widely of too great im-
portance to stand in need of
a recommendation

The course and I think in
general the best method of
acquiring some knowledge
of these subjects is by a
course of Exp. —
By Experiment we first
draw out of her course
and in her struggle to restore
the lost Equilibrium she
reveals to us her secrets —
~~But~~ A proof of any fact
by experiment requires little
previous knowledge to un-
derstand it, it is an im-
mediate appeal to the senses
and therefore level to the
common understanding
of all mankind. —

Of the great advantages of
the experiment! that we see
no other proof than the high
pitch of improvement to which
Mr. Boyle's have been carried
since its introduction by
Bacon. That of Mr. Boyle's
saw and exposed the emptiness
of that Philosophy which
till his time prevailed -
The advised man had to
say so - from self will
from a noble example -
Like the great legislators
the Jews he conducted his
fellow travellers within
sight of the promised land
and encamped in Jeru

the happy fruits to port"
Newton alone was capable
of carrying the great plan
into execution - From
Capt. the most observant
- The lowering of the
will stand until a practice
shall resign to the superior
Counsel has important
charge, and day and night
no more divide the work of
God - To give some account
of the N. M. and the
Exp. by which it is esta-
blished is the intention
of the following course

The course consists of the 1st
18 - - - 22. of lectures -

As plain as the nature of
the subject and my abilities
will permit - I shall endeavor
to steer a middle course betw
abstract theory on one hand
and a confused jumble of fact
on the other. I shall exhibit
such a number of experiments
as I think sufficient to prove
the particular facts, and discuss
them with such observations
and reasoning as may be thought
necessary to establish the
principles - Only with
attention to understand &

- The operations of nature
are carried on in consequence
of certain laws originally
imposed on matter by
one Supreme intelligent
being - would we for a mo-
ment imagine the universe
to have been the effect of
chance and all this mag-
nificent creation to have
been flung into existence
from the blind hand of
fate, every attempt to dis-
cover the laws would be
in vain, it would be absurd
to investigate causes where
none are supposed to exist
on the contrary every Eff.

we make every step we
take in this interesting journey
to unveil us of this important
truth the citizens and
government of our ~~emphatic~~
being whose command ^{and} you
and the system arose and
who can strike with equal
force from citizens or indi-
vidual or an empire, an
atom or a world

Gill: composition for
tempering swords 2 N
2 Lit oil
1 Pitt Bee wax

Reduce ^{just} to a fluid state
that is dark or wine
red -

In every bar of steel there
is a grain lengthwise, Gill
beats one bar lengthwise
another side wise another
side wise and welds them
together - This makes a
better blade - It will
bear a harder temper
because the contrary
grain counteract each
other -

The bar contrary to
the grain, is folded into

into an acute angle for the
back of the sword. The bar
with the grain lengthwise
is first bent then solder
in other matter is put in
the edge to keep out the
air and the whole is brought
to a welding heat. Then
welded together - The bars
are put into spirit of salt
to clean them - In this
very course steel will an-
swer -

- Star made with a paper
dry sand ^{is} ⁱⁿ ^{the}
Dum can by water
it swells -

- Experiment of two bottles
one corked the other uncorked
both plunged into sea -

Orbit or Orbits

1 $\frac{1}{2}$ Feather beam was
in Clinic, went to Oct-
to comparison of the Pro-
dumic - in dipping a
ring -

- Copper plate will be an
early one way but
with great difficulty the
other - If two pieces are
laid on each other the
convenient way it is the
strongest possible
This captures the principle
of gilt swords -

Suppose out of O.M. extract
and then in green O.M. in the
country. Dissolve in water
and add Zink. The iron is
removed and the superabundant
part of the inflant. air -
and in great quantities -
N^o. after the iron is exhausted
is producing inflant. or
Zink added will produce
nearly as much more -

In filling Balloons
equal parts O.M. and iron
and six times the quantity
of water by ~~measure~~ weight
or about nine times by
measure -