Queries

and

Hints

Vol: 3 New Series or

21st Vol

J. Dinwiddie LL.D

Calcutta

1797

Calcutta 7th Sept. 1797 —

171 — The proportion of the Troy to the Av: weight ascertained by the following persons

Mr. Boyle 10 1/20 lib Troy = 15 1/17 lib Av
Mr. Wingate 14 oz 12 dw Troy = 1 lib av
Mr. Everard 10 lib 2 oz Troy = 15 Av: —
Mr. Ward 14 oz 12 dw 15½ Troy = 1 lib avoir:
Mr. Wing ~~[illegible]~~ lib
Lib 73 Troy = 60 av.
Mr. Young oz oz
and 7 3 Troy = 80 Av.

172 c

The Solution of water in air is Dry and invisible as air itself: it is proportionate to the temperature of the Atmosphere. The Hygrometer does not indicate with precision, this water for it is not affected by a complete solution of this water in air, but more according to the quantity of water which is just going to be dissolved and still more of that which is precipitating from it ——

173

Mr Dalby thinks it probable that the Inundations are not Elliptical in low Latitudes: but that the earth as Mr Bouguer supposed is flatter in a north and south direction or has more of a globular form in those parts than an Elliptical: but nothing conclusive concerning the figure and Dimensions of the earth can be drawn from determining degrees I conclude by Time keeper as practised by Mr Rubert Barnes in India ——

174 From Mr. Burrow measurements in India, Mr. Dalby after the necessary corrections deduces the length of a degree on the meridian in Lat 23° 18' N. to be 60455 fathoms, and for a degree of longitude in 23° 18' N. 55905 — With four Rods Mr. Burrow went twelve or thirteen times backwards and forwards from Cawksatty to Dharapoorah the extremities of the East and West line. The mean result he puts down at 2' 32" for Diff Long: answering to the apparent length 212679 feet measured with the Chain —

175. In the opperation of fulling Cloth, two things chiefly are necessary, first the washing away all impurities, and secondly the thickening and conglutinating of the web by the curling or intermixture of the fibres on its surface. Any kind of Clay possessing the following properties, will answer the above mentioned purpose.

1st. Siliceous part finely divided — not hurt the fibres

2. Argillaceous proportion must not be too small, that it may dissolve readily in water, form the necessary consistence, and be easily washed away when the opperation is finished.

3. It must not be combined with any colouring matter, either bit: acid; or any other capable of affecting the dye of the Cloth

4. It should contain a small proportion of chalk

5. Nothing of the kind of Pyrites ought to be in it. It may however contain the calx of iron uncombined with any prejudicial menstrua

Clays fit for fulling

	Lond: earth		Hamps: earth
Siliceous por:	47.0	—	51.0
Aerated lime	5.4	—	3.3
Aerated Mag:	6.2	—	0.7
Argillaceous Earth	19.0	—	25.0
Calcined iron	5.4	—	3.7
Moist Vol Mat	17.	—	15.5
	100	—	100.

176. The Lemnian Earth called also Sphragis (Sphragis or Terra Lemnia, has been held in the highest estimation from the time of Homer and Hesiod. It was never used without great parade of religious ceremonies; and the Ancients assert that whether used externally or internally, it was a medicine endowed with Alexipharmic, Diaphoretic, Detersive and healing virtues

177 Soaps would be preferable to earths for the purpose of gilding, if they did not generally affect the colour of the Metal —

178 Arsenic is sometimes united with corrosive sublimate. To discover whether this has been the case, powder a little of the sub: and sprinkle it on burning coals or a hot iron — Garlic smell —

179 The mineral acid seizes upon Mercury dissolved in Nitrous acid, and if the mineral acid be oxygenated the precipitate is corrosive sublimate; but with common muriatic acid it is colomel or Mercurius dulcis — The precipitate cor: sub, is generally made in the dry way by triturating equal parts of mercury, common salt and green vit: and exposing the whole to a moderate heat, when the cor: s. sublimes in the upper part of the

180. To ascertain the temperature of deep water the Thermometer may be put into a glass vessel, the vessel filled with sand that the point of the scale is near the brim of the vessel. The vessel may then be wrapped up with flannel and a cloth and rammed in a perpendicular position into the well, should remain about half an hour. By this means the effect of the breath, atmosphere &c. is entirely removed

181 White mercurial precipitate is adulterated sometimes with white lead. To discover this add to the precipitate one fourth of any neutral salt, the whole to be exposed to the fire, if the mercury rises under the appearance of smoke, if lead be found in the crucible the fraud is beyond doubt; if not the matter remaining will be a deliquescent salt soluble in water. Should no part of the residuum admit of solution, the adulteration is made with white clay. Sometimes starch used. This is known by the levity of the residuum and the carbonaceous matter left after ignition

182 The Ancient Chemists boasted "That they
"could tame the fierce serpent and reduce the
C "Dragon to such subjection as to oblige him
"to devour his own tail" that is they could
soften and abate the acrimony of corrosive
mercury

183 When Gold has lost its ductility ~~either~~ by
C or rather when it has acquired too much
hardness and brittleness, by ~~the~~ its union
with other metals, or by the action of their
vapour, the ductility is restored by throwing
a quantity of cor: sublimate on the melted
gold; for the marine acid having a greater
affinity with most of the other metals
than with mercury or gold, leaves the mer-
cury of the cor: sub. and attracts them from
the gold— avoid the vapours
—This mode of purifying gold is preferable
to the process by ~~the~~ deflagration ~~of~~ with Nitre; for
the deflagration ~~with~~ of the nitre separates not only
the base metals, but even silver from gold
—Cor: Sub: may be employed to preserve metals
that have been fused with Zinc from too much
rigidity— For this purpose workmen in
brass throw common salt on the metal in fusion
to render it soft and more ductile—

184 Cor: Sub and white precipitate are used in
C printing cotton, to make the cloth receive
the colours, especially red, and to make them
spread equally on the ground— Cor. Sub. used
in dyeing ~~black~~ silk black— but of no use—
—and in examining mineral water, preparing
~~butter~~ butter from Antimony &c—

185. Most mineral springs owe their healing
C virtues ~~to~~ either to aerial acid or Hepatic air
Aerial acid, unless contained in a pretty
large proportion, in water, produces but little
alteration in its nature such as in the propor-
tion of eight or ten cubic inches in the pint.
Hepatic air is a much more powerful agent
than aerial acid, and is easily known by its
smell—

186. I never met with a spring water entirely free of Selenite or Acidulous Lime. — Bergman — The former and is discovered by the nitrate of Silver, the Calcareous earth by acid of Sugar — arsenic acid by tincture of turnsole — or better — by Lime water —

— Nitrate of Barytes discovers Vit: acid —

— Tincture of Galls and the Prussian alkali, the vitreous iron

187 The tincture of turnsole is of all other known tinctures the most easily acted on by acids

188 C Experiments which require much delicacy, alkali prepared from burned cream of tartar was used by Bergman —

189. The weaker any alkali is the more fixed air it requires to saturate it —

190. C fixed air it requires to saturate it —

191. Fixed air by whatever process it is procured, if properly depurated, is always the same

192. The prussic, intended alkali is best prepared from four parts of Prussian blue boiled with one part of alkali in a sufficient quantity of water. The clear liquor, saturated with an acid, must then be freed by filtration from the small portion of prussian blue which is separated. This preparation is well adapted for discovering the smallest portion of iron, which it precipitates a Prussian blue — copper of a reddish brown colour — manganese white &c —

193 C Concentrated nitrous acid deprived of its sulphur

194. C Acid of sugar is the best test for lime however mixed — White clouds and thick

195 C The oxygenated muriatic acid dissolves all the metals completely — Bergman —

196 If bread be baked with water in which beans have been boiled, it is said to be lighter and more nutritious —

197 A Longitudinal vibration in musical strings has lately been observed by a German philosopher. This does not like the transverse vib:n depend on the quantity of matter but seems more affected by the quality of the material —

198 The fifth Sat: of Saturn seems to turn round its axis in 79 days inference from change of brightness. It is ~~singu~~ remarkable that by performing its rotation in the same time as its revolution, like our moon it always turns the same side to its primary planet. —

199 The number of ships great and small that can lie afloat at low water between London bridge and Deptford at the regular mooring tiers does not exceed 800; coasters and vessels that ground not included; whereas in 1792 above 13.300 vessels arrived in the port of London — The legal quays are the same in extent now as at the fire of London in 1666, and do not exceed 1464 feet in length whilst those of Bristol are more than 4000 feet. Losses are estimated between 2 and 300,000 £ p ann— owing to this

200. The Doctrine of Solution of water in air when applied to the phenomena of rain dew &c is attended with several difficulties were this theory true, the diminution of heat must in every instance be attended with a deposition of water; and on the contrary the deposition of water should be always connected with cold. The former is in a certain degree true; but the latter scarcely observable in any instance. Indeed the opposite change is so considerable that rain must always, if this system be adopted, counteract its own course. For whilst evaporation is attended with cold, and deposition suffers the heat to escape, the temperature during rain should continually increase, so that the air must be enabled to retain an excess of humidity—

201. The mutual convertability of air and water into each other, agreeable to the new theory of Chemistry, affords a more satisfactory solution of the various phenomena of rain &c. than chemical solution — Electricity has in all probability some share in these phenomena

202. In a catch the three voices take the parts alternately, so that each sings the whole in turn; but in a Glee all begin at the same time, and sing different parts from first to last —

203 Doctor Johnson's definition of Melody by calling it Harmony of sound is wrong —

204 If a stone be thrown into a pond, and immediately after that another, then respective circles (waves) will proceed without disturbing each other — This experiment may be better performed in a large trough of quicksilver Strike with the fingers the opposite ends and the waves will pass each other without the least confusion. This is perfectly analogous to the motion of sound in waves of air —

205. Instructions for tuning a Harpsichord

Begin with C which make concert pitch by the fork. From C tune a 5th up to G rather flat; from G tune down an 8th to G, and from this last G tune upwards a 5th to D rather flat; from D a 5th upwards to A rather flat, from A down 8th from this down A a fifth upwards to E rather flat. Strike this E together with C, which is the 1st proof, and if the 3 be too sharp the fifths must be flattened a little more till the 3 be perfect. From E tune a 5th to B, and if B is a good 3 to G which is the 2d proof then this last fifth is properly tuned if not it must be altered till this third becomes good. From this B tune down an 8th and from the lower B a 5th to F sharp which must be a good 3 to D your 3 proof. From X F* tune a 5th upwards to C* which will be a natural or sharp third to A

which is the fourth proof. From C# tune down an 8th and from this lower C# tune a 5th to G# which will be a third to E the 5th proof Having thus tuned all the sharps keys, we must now tune an 8th from the first C upwards and from thence tune a fifth down to E pretty close till this F makes a good 3rd to A and from this E likewise tune down a 5th to B♭ which will be a 3rd to D. From B♭ likewise tune down a 5th to E♭ which will be a third to G. If only remains now to tune octaves, and the instrument will be as compleatly in tune as the nature of Musick and Temperament of the instrument will admit of, That is when the same string is read. In sound the sharp note below and flat above —

206. The Harp and the Organ are the richest of all musical instruments; though, as the notes of each are determined by the a fixed length of their strings, they are less perfect than those of the Violin and Violoncello &c. produced by a different position of the fingers which by their strong elastic pressure, give them a quickness and delicacy unattainable by any mere mechanical adjustments It is for this reason that the best performers seldom accord an open string of the violin which gives a disagreeable harshness even in concert. They often play the same note by shifting onto the next — Another great disadvantage which instruments stopped at the finger have over all others constructed with fixed chords for each note, that by a roll of the fingers that are called by the Italians the irritated intervals which cause a feel short of the most exact exactness, are corrected

207. M. L Cat maintains from a concert not putting out the candles in the room, that proof that atmospheric air is not the medium of musical sounds, but that some subtil fluids must exist in it, each of which is adapted to the vibrations of its particular note — To this it may be replied that the impulses of a musical chord are so extremely short, with respect to the space moved through, that they are absolutely imperceptible as well as the times of their return

Sauveur makes the gravest note = $12\frac{1}{2}$ in a second, and the most acute he can distinguish = 5100 which of course ought to be so almost infinitely minute as to bear no sensible proportion to the distance of the Atoms of the smallest Vapour —

208 Convulsant notes do not strike the ear
11 at the same instant — except unisons — all others more or less present in proportion to the frequency of concurrence —

209 The great Bell of St Marys Church at Cambridge sounds A formerly tuned flat, and was used to tune musical instruments to

210 If the finger is wiped hard on the middle of a string of the Violen, by touching either end with the bow as produces an 8th to the whole; but if lightly, we may distinctly hear the two octaves at the same time; and by rosin and rubbing off the finger, and replacing it gently on the string, the fundamental note will mix with the Bass and its two octaves. If one third of the string be stopped hard the remainder sounds a 5th, but if gently, a 12th an octave to the 5th.

211. The Harpsichord should never be played without the accompaniment of some other instrument; or as an accompaniment to the voice — tho' several eminent performers think otherwise — It produces, as a Solo instrument little effect on a general audience

212. It is probable that the process of Sublimation was known before that of distillation and that the latter was wholly unknown to the ancient Greeks and Romans — consequently ardent spirit was also unknown — Distill.n was introduced into Europe by the Moors of Spain about 1150. They had it from the African moors who learned it of the Egyptians

213 To study says the Abbé Brotier is paradise, to compose is purgatory, and to print is hell —

214. The Chancellor D'aguesseau observed of Voltaire, in his epistle to Urania "par le "tour de son esprit, cette homme perdroit "perdre un Etat."

215 To put an end to the amusement of Charades with which the Empress of Russia had been one evening at supper sadly worried she gave the following

Mon premier est un Creux
Mon second est un Creux
Mon tout ensemble est un Creux —

So the company thought and there was and end of the matter

216 Hereditary power over every thing to birth and to chance according to Tacitus how comes it to pass then says the Abbe Brotier, that mankind have been more indebted to birth than to choice for most of their great and excellent princes?

217. Wood and coal when analysed by distillation give nearly the same results. The residuum of the former is

charcoal of the latter coal —
a liquid passes over from both consisting
of a light oil on the surface, an acid
phlegm in the middle and a thick heavy
oil at bottom — Besides a considerable
quantity of inflam^le air — The phlegm
contains Vol: alkali — The fluid
which comes over is in coal generally about
$\frac{1}{8}$ part of the weight of the coal

218 The vapour which escapes from coal
C pits on fire, in Staffordshire, always
forms an Allum where it meets with
argillaceous earths. The vapour con-
tains the sulphureous acid —

219 Dr. Watson found by experiment that
hot charcoal weighed less than when
C cold, this may be accounted for two
ways either from the charcoal's having
attracted water or some other substance from
the air or from the current of air occasioned
by the heated body striking against the scale —

220. Charcoal when taken out of hot sand
C takes fire in the air — Pyrophorus —

221. The coal of gum Guaiacum taken out
C of the retort even two or three days after
the operation when exposed to the air takes
fire readily — a good Pyrophorus —
The retort must be stopped & allowed to
cool gradually

222. Onions and other bulbous roots when
C suspended in a room and sheltered from
rain and dew encrease much in bulk by
germination but decrease in weight.

223. A Dropsical patient is said by Dr. Mane
sometimes to absorb 100 lbs of water a day
from the atmosphere — a young lad at
New Market in one hour gained a w^t of
30 ounces tho' he had tasted only half a glass
of wine — 8 ounces of Salt of Tartar exposed
to the air for a few days become fluid & w^t. 20 ou

one pound of strong Vitriolic acid exposed to the air for twelve months weighed ~~ten~~ seven pounds; Toads and Frogs weigh Neither Frogs nor Toads of either drink in Jamaica and yet they are continually sweating. The air is so moist that the absorbing power of these animals imbibes a sufficiency of water. —

224. If the bulb of a Thermometer be moistened with linseed oil or other oils of a similar nature, no cold is produced because these oils are not readily evaporable —

225 Does a defect in hearing, occasioned either by age or accident, produce any alteration with respect to musical sounds?

226. The Receipt of the Queen of Hungary's water

Take aqua vita four times distilled thirty ounces, Rosemary flowers twenty ounces, all into a vessel close stopped for fifty hours, then distill in Bal: Mariæ — Dose one dram in the morning once a week in some other liquor or else with your victuals, and wash the face every morning and rub the infirm members therewith — This remedy renews the vigor causes a good spirit, cleanses the marrow, fortifies the animal spirits, renewing their operations, restores the sight and preserves it to old age, it is excellent for the stomach and breast, rubbing them therewith — may be applied cold!! —

227. The receipt in the last article was given by a Hermit to Donna Isabella Queen of Hungary as appears from her own declaration to be seen in the city of Buda —

"I Donna Isabella Queen of Hungary aged seventy
"two years, infirm in my members and gouty
"have used this present receipt, a whole year,
"which an Hermite whom I never saw before nor
"since, gave me, which had such effect upon me,
"that from that instant I was cured and recovered
"my strength, insomuch as appearing beautiful
"to every one, the King of Poland would have
"espoused me, whom I refused for the love of
"our Lord Jesus Christ, believing it was given me
"by an Angel"

228. Powdered sugar thrown into the steam will prevent the making of bubbles Lemon-
!!
229. To make flowers of any colour -
- Steep the seeds in ink for black - in vermilion for green &c !! Lemon —

230. For sweaty stinking feet —
Wash with a solution of Roch. Alum in hot water

231. Process for obtaining the Sebacic acid
M. Crafts method is to heat soap made
of animal fat and alkali with a solution
of Alum, the separates an oil, the liquor
is then evaporated, result is the sebate of
Pot ash - this decomposed with Sulphuric acid
produces Sebacic acid - To purify the Sulph:
and distill again a $\frac{1}{4}$ of Sebacic acid
remains for the purpose

232 What is the best substance for preserving
Eggs? Something which will dissolve in
boiling water, but either not at all, or with
difficulty in cold water —

234 Some serpents are capable of being tamed. These
might be rendered of more use to families than
cats, for they are great enemies to cats, mice and
all kinds of insects: besides, they are beautiful - cleanly
not so wicked as cats; they are familiar and sensible
of the attentions of man

235 Capt. Courtier says he had seen a Hindoo,
who had not taken food for some days,
refuse to eat rice because it was boiled by a
Christian: he was then offered an earthen pot
to dress some for himself, but he declared he
would rather starve than eat of any thing
which was not prepared in a Metal
Vessel !! — The Bengalee & Hindu cook all their
rice in earthen Vessels — Conjecture pots —

236 The Brahmins light their fire by
the friction of two pieces of wood, given
the kind and shape, also process of
making same —

237. How long has the flint and steel been in use in India?

238. There is no word in the Sanscrit Language for Gun powder — compositions are mentioned that go off with a great noise —

239. The acetous acid, it is said, has been
C used for etching, and it makes finer traces than the nitrous — No 13 — c

240 The Lion will not eat the flesh of a dead animal, unless much pinched by hunger —

241. The muriatic acid may be oxygenated
C by simply mixing it with manganese in a strong bottle not quite full. Air bubbles are formed on the surface of the liquor, and the empty space is filled with a greenish vapour. After some hours the acid may be still more diluted with water and made use of. It has a sour taste because not fully saturated with oxygen, but possesses all the powers of oxygenated muriatic acid —

oxy
242 The muriatic acid is not so good a test
C for Indigo, as for Cochineal. a Solution of the former never looses its colour entirely, when there is any Alkali in the liquor —

243. Stick lac is imported into England from
C this country, and (India) and afterwards almost all exported to Portugal, and Barbary and employed in staining Goat skins to produce what is called red morocco leather

244. The colours dyed by stick lac are not
C quite so lively and beautiful as Cochineal, but more durable especially on Cottons — Lac and Cochineal may be used together both require the same basis and nearly the same treatment —

245 By adding a little manganese to the
C solution of Indigo, by oil of Vit: the blue colour is destroyed as efficaciously — and in the same way as by oxygenated muri: acid

246. The Potash used even when diluted, not only destroys the blue colour of Indigo immediately, but dissipates the greatest part of its substance in the form of Vapour by a slower combustion, leaving behind a ruby iron coloured gummo-resinous Mass soluble in Alcohol and partly so in water, but of no use —

— Quere might not the dilute nitric acid be employed to determine the quantity of colouring matter in Indigo? —

247. The quantity of rain, and fertility of the Isle of France have much decreased since cutting down the woods, for hot climates should always be left at clumps of trees should always be left at certain distances over the country, to attract the clouds, and shelter vegetation from the excessive heat of the Sun —

248 The cotton which grows nearest to the Equator is generally supposed to be the best

249. It takes near twice as much Cochineal to produce a Crimson colour on Silk as on wool —

250 The Arabs — of Barbary are unacquainted with the practice of shoeing horses. As the ground is in many places remarkably stony and uneven — + Quere to what countries is the practice of shoeing horses confined? —

251. The universal hatred against Christians of all denominations, which unfortunately prevails through Arabia Syria, Egypt, Barbary and other countries, had its origin in the Crusades. The horrid cruelties committed in Syria under the cloke of religion, have justly drawn on us the just hatred of all the nation of the East which six hundred years have not done away. The modern Arabs know not why they hate us but their fathers did —

252 What a striking revolution in physic
has taken place in Arabia! In that
country once reckoned the Father of modern
physic, with whose works or even names the
inhabitants of other countries are unacquainted —
— Bleeding includes almost the whole practice of medicine
It is performed by tying a bandage round
the neck of the patient so closely that he
is almost strangled. When the veins of the forehead are
sufficiently swelled by the circulation being
checked, the operator makes four or five
incisions with a razor, and in a moment instantly,
the face of the patient is covered with blood,
the effusion of which is assisted by rolling
a cylindrical bit of wood over the incisions

The Moors inhabiting the coast of Africa are sub-
253 ject to the Venereal Disease, which they call
the disease of the Christians - They use no
remedy for it. Owing however to the purity
of the air, and simplicity of Diet, it is more
mild here than in Northern climates —

254. Indian as good a lapidary as the Chinese
adamantine spar pulverized and combined
in oil, used instead of diamond powder to cut and polish all sort of
stones,

255 Bamboo made into paper household fur-
niture, palankeens and utensils, ladders and
scaffolding for architecture, masts and yards
for shipping — Nets - pallisades — carts —
Bows — Spears — spars for water pitchers
Pipes for conveying water — measures
for both solids and fluids — Balance beam
for weighing goods — Food — Ropes for
shipping and other purposes —

256 Are animals ever attacked by the plague? Do not those that have hair ever most communicate the disease? —

257 The moors of Barbary eat with their fingers Luxury to please Beef, Mutton. Goats. fowls Couscous is flour of Wheat bruised between two portable millstones and placed in a Dish with holes in the bottom over the vessel in which the meat is boiled —

258. The Natives in India Gold and Silver This has not been done in Europe qu: No Gold and Silver must be very scarce

259. It is said that the tree producing Gum Arabic grows spontaneously in Bengal — The Caubal tree —

260. The Tenors of Reflecting telescopes which are much greater than those of Refractors are occasioned by the Springs which used to support the great mirror The small eye hole contributes a little towards Tremors

261 The Israelites &c poison their arrows with Lime juice and Arsenic this lasts but a short time, the Arrows are prepared and tried before they go to battle —
— The Israelites arrows blown thro' the spear tube are poisoned with a vegetable poison — It is prepared by the Mountaineers and is purchased by the Israelites who are ignorant of the manner of preparation in which time it is made —
It seems to be wrought up with some sort of Gum, and is said to affect only the nerves of Men, and is said to kill in a short time the largest animals Tigers Buffalos and even the Alligator and Elephant — N. S — t Auto-D-9

262 The reason why a small eye hole in a telescope causes indistinctness of Vision is the reflection of light —

263 Doctor Herschell sometimes uses a power of 6450 in his seven feet Newtonian Telescope for viewing the Spiral Stars —

264 Distilled water is unfit for drinking unless
C it is impregnated with atmospheric air—

265 The Abbé Rochon says "that one thousand
sous of them owe the daily produce of the
Albion Mills, a quantity sufficient to supply one third of the Inhabitants of London"

266 The proportional accuracy of all beams
is relative to one weight only, and diminishes
if that weight or load be altered either way.

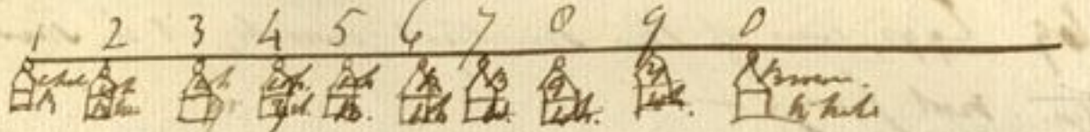
267. If Savages are as miserable as we suppose
because they despise what we so much admire; why should they resign adopting our
manners Customs religion and laws?
—Story of Vanderlet Dutch Governor of the
Cape and the young Hottentot — See the
Abbé Rochon's Voyage to Madagascar page
— 20

268 Steel produces less resistance in the air than iron — guess why? What is the
C real difference between steel and iron —
qu.

269. Eggs, even of the smallest insects, it is said do
C not freeze —
qu.

270. It is said that persons who have been
bitten by mad Dogs and who have gone
immediately after to sea, have remained
two or three years at sea without being affected;
but shortly after their coming on shore have
gone raving mad—if so guess the cause

271 There are many inconveniences attending
the present mode of Signals — Blue lights and
Rockets are of too short duration, and in a large
fleet if repeated from necessity may occasion much
confusion — Instead of which let 3 Lanterns be
used, and let them be provided with coats or Jackets
of coloured Bunting, each coat having two colours
which are best contrasted with each other, with
a black line between — 3 Lanterns will serve for
999 Signals — Ten Jackets for 100, and Quarters over
for the hundreds as follows — No substitute is necessary —



Let the Numbers as far as wanted follow the colours of their corresponding numbers above only let them be hoisted a Checkered instead of plain

Mode of making Signals similar to the Telegraph — For this only one flag quartered and three small signal pendants are requisite to indicate every the Letters in the Alphabet as in the following Table

Flag			Flags shown			With Pennants		
			No	mast	upper	Red	White	Blue
Blue			1	Red	Blue	A	I	R
			2	Red	Yellow	B	K	S
			3	White	Blue	C	L	T
Red		White	4	White	Yellow	D	M	U V
			5	Blue	Red	E	N	W
			6	Blue	White	F	O	X
			7	Yellow	Red	G	P	Y
Yellow			8	Yellow	White	H	Q	Z

N. 2 The flag should be square —
The flag itself will make eight Signals, and the 3 Pennants added, will make 24 = Letters in the Alphabet —

By the above mode a correspondence may be held with a Ship even Hull Down — Instantaneously communicated &c — Some what Resembling used in the Optical Service

The above article is the substance of a paper which I am received from Mr. Edwards Secretary of the Ship London with a request to lay it before the Naval Board —

N. B. The paper was laid before the board, who did not however think proper to encourage the plan —

272 To find the centre of Oscillation, in a vibrating body — Count the number of vibrations in a minute which call n - Then $n^2 : 60^2 :: 39.\frac{1}{8} : \frac{140850}{n^2}$

273 The month of Jan^y. 1795 was the coldest & that of Jan^y. 1796 the mildest ever recorded in England - The Thermometer in the Morn^g.

average height	23°
Afternoon Ditto	29.4

1796

Ther. Jan^y. Morn^g average h^t	43.5
Afternoon Ditto	50.1

at difference of above 20°

In Jan^y. 1795 the burials in London amounted to — 2823

In — 1796 — 1471

(Diff 1352

From which it appears, says D^r. Heberden that the common opinion respecting a cold and a warm winter is unfounded - A cold frosty winter is said to have the constitution

1795

Deaths above 60 =	717
Asthma	249
Apoplexy & Palsey	52
Fever	250
Consumption	825
Dropsy	126

1796

Deaths above 60	153
Asthma	29
Apoplexy and Palsey	31
Fever	134
Consumption	342
Dropsy	70

Every Phys^n and every Apoth^y knows that ~~the~~ his business in London increases and decreases with the Frost —

274. To know whether a piece of Soft Solder is
C Tin or lead or a compound of both —
If tin it will afford only oxyd of tin by Nitric
acid — The cold saturated solution in Mur: a
will afford Cassius precipitate on dropping into it Nitro-
muriate of Gold — will afford no acetite of
lead by digesting it in acetous acid —

275 The ancients as Pliny informs us stained
a particular kind of brass (aes coronarium)
with ox gall to make it look like gold
and that the crowns and chaplets of the public
actors were made of copper so coloured —

276. The ancients were acquainted with the tinning
C of copper vessels "Stannum illitum in aeneis vasis,
"saporem gratiorem facit et compescit aeruginis
virus — Pliny Book 34 Ch: 17

277 For examining metals —
C — 1st file and drill to ascertain the texture
and hardness — also cut thro' with a chisel
Exact: — 2d melted in ingots in the same or equal
Chrysp — moulds — broken with the blow of a hammer
to ascertain the fracture —
— 3 Specific gravity before and after melted
into ingots — for the ancient metals used
by Dr Pearson the specific Gty was always
increased by melting — Greatest after melting
= 0.800 — least before melting 7.960 —
Exp! with fire
4 They all melted at a lower tempe-
rature than that with which copper
melted, or even some kinds of brass —
— Exp! with Wedgwoods Ther. were uncertain
5 — To ascertain whether there was any
Gold or Silver cupelled with 3 times the
quantity of lead — then a second time. From

the Spear head then remained in the coppel a little Silver — This dissolved entirely in Nitric acid, therefore it contained no gold —

6 — with Nitric acid — polished and just wetted with Nitric acid — green — white and corroded like a mixture of Copper and tin

7. Experiment with the Pneumatic Chemical apparatus — quantity of nitrous gas evolved — Blue liquor — a white sediment — This liquor was afterwards evaporated and Chrystallyzed contained only Nitrate of Copper, with a very minute quantity of white sediment, for it threw down nothing but Prussiate of Copper on adding Prussiate of Soda; nor was any silver deposited on adding bright copper wire — nor was any precipitation occasioned by adding muriatic acid or muriate of Soda to the concentrated blue solution

8. The white sediment was a light impalpable fine powder — could not be melted with borax by the flame with the blow pipe but was diffused thro' that salt and rendered it opake — This sediment dissolved totally by digesting in Muriatic acid, and immediately in this menstruum when brought to boil

9. The white sediment obtained [no] at first with Nitric acid produced globules of tin with the blow pipe — Cassius precipitate by dissolving these globules in muriatic acid and adding Nitro-muriate of Gold

— Result — that all these instruments contain Copper and Tin, and no other metal — but in what proportion cannot easily be ascertained by Analysis —

10. But by Synthesis — trying different proportio[ns] and until brought to the same proportion — [illegible] result —

Copper and tin only — If Gold Sil[ver] or Platina — discovered by Coppelation —

iron by the Persiate of Soda — Zinc by the blue flame and white flowers and by the yellow colour of the fracture — Bismuth by detecting the Nitrate Solution with water — Magnesium — Manganese could have been seen on concentrated by evaporation the Nitrate Solution — Arsenic by the whiteness and brittleness of the metal and by the smell — Antimony by whiteness and brittleness of arsenic by the whole sediment with the blow pipe — Cobalt by the Persiate of Soda —

Ancient weapons &c were alloyed with tin — The Copper to the tin in various proportions 6 to 1 to 12 to 1. Celts of the hardest sort where most tin was used

Copper cannot be tempered or hardened contrary to the opinion of some Modern

Who report that the ancients had two methods of hardening copper one by cementation the other by uniting it with iron — The former has hitherto been found impossible, and with respect of the latter no iron has been ever discovered in any Ancient ~~axe~~ Copper instrument or coin — Iron united to Copper and tin could be no improvement at least for chopping instruments —

+ Gun metal consists of from 12 to 9 of Copper to 1 of Tin — Sometimes a little Zinc is

add but for what purpose, does not appear nor can the founder give any reason —

+ From 8 or 9 Copper to 1 Tin all the ancient edge tools were made before the introduction of malleable iron — viz axes, hatchets. Chizzels Spades, anvels hammers &c —

+ The art of manufacturing malleable from cast iron was not known at least was not practised extensively till within these 4 or 500 yrs

Before which period Instruments were generally made of Copper and tin as the Chalcos and best metal used for edge tools, steel excepted Bell metal — Tin varies from $\frac{1}{3}$ to $\frac{1}{5}$ of the weight of Copper according to the sound, edge and temper to be given

— The art of alloying copper with a factitious earth, which within these fifty years we have learned was ~~a factitious~~ an ore of a factitious metal (Zinck) was known to the ancients, Pliny — Orichalcum — native and artificial Orichalcum was compounded — Ancients used this principally for ornaments, on account of its resemblance to Gold — More extensively used by the moderns, cheaper than Copper and Tin — both colour more easily wrought particularly into Mathl. Instruments — does not tarnish so soon ——

— Copper may be united to Steel without the intervide of any other metal

Ten parts of Copper with one of Steel not hard — 20 Copper to 1 Tin — Find a compact malleable mass could not be made of 2 Copper to 1 Steel — hence Steel useful in the composition

— Steel Native mixed by the ancients — very difficult to unite with Copper — Tin easy — Native Steel ore which produces malleable Steel is found in many parts of the world The woods of India — in the Northern Circars — Among the Hottentots —

— The purest English tin crackles when bent or heated, but pure malacca tin has not this property

— Perhaps metals in general are rendered purer, more uniform in texture and more dense by remelting than they were immediately after coming from the ore — as in the case of Steel immediately after cementation or in the case of alloys after fusion by which the union was effected

fected. Accordingly cast iron is rendered less brittle by repeated fusion — Steel is cast simply by melting converted steel — by M. Reaumur —
— Specula metal remelted — Specific gravity seems in the same metal more than what is supposed
Of all metallic composition that of tin with copper produces perhaps the greatest increase of density — Observed by Musschenbroek — = to abt. 1/6 the bulk
Property of hardness in alloys of copper & tin is nearly in proportion to the quantity of tin in the composition —
The tin in this property seems nearly in the same proportion —
The Malleable metal among the Ancient Romans according to Pliny consisted of one part of a mixture of equal parts of lead and tin to 15 parts of copper — Lead probably to save expence
Tin was much more valuable to the Ancients than to the moderns: without the use of this metal how they could have wrought and carried on the practice of the nicest arts R

Tin was even of more importance to the ancients than steel and iron are to the moderns: because alloys of copper by tin would afford better substitutes for steel and iron than any substitutes which the ancients, in all probability could procure for alloys by copper and tin —
— In Instance of Q. Britain — being in all probability the only country which furnished the metal so necessary for civilization
M. Locke remarks on iron as the only instrument of civilization not just " If it is (I am doubt) " ful) even the use of iron lost among us, we should " in a few ages be unavoidably reduced to the " wants and ignorance of the ancient Savage Americans —— Britain known to the ancients by two names which signify the land of tin one Phenician Bretanac — the other Cassiterides — Seems upon that the ancients were unacquainted with the manufacture of iron & steel — compounded but too expensive for general use

— Iron and Steel Instruments are destroyed commonly by the oxygen of water and of Atmospheric air. The destruction of iron Instruments is prevented by whatever prevents the union of the oxygen of these Substances — Varnish preserved one of the ancient swords — Iron sword within the Copper scabbard totally destroyed; the part not in contact with the Copper preserved, shews the action of Copper and water united in destroying iron, the Copper remaining entire — This effect of Copper on the iron bolts and nails of Copper bottom ships is a loss of the greatest magnitude —

— The pommel and Guard of one of the ancient Steel swords had been tinned, part of the tin remained on one — Hence the ancients knew the mode of tinning iron

— A drop of Nitric acid on a clean part of one of the swords produced a black spot as on our Steel, and on the tinned part of the handle, a white spot —

— Philosoph: Trans: 1796 —

270. Which is the best mode of Essaying Gold to cupel and part at the same time or to perform the process separately? In the small way it is generally performed at once — Query whether it has a greater or less quantity of alloy in determining this? Would it not be better in refining on a large scale first to cupel and then part? Will not a great depth of metal prevent the absorption of the imperfect metals into by the test? —

— The instructions from the committee of the Royal Academy of France direct to ~~???~~ perform the process at once by adding both the Lead and the Silver to the Gold at first —

— What are the principal objections to employing Copper instead of Silver in the parting process? Want of sufficient purity — Tin not dissolved by Nitric acid, only corroded —

279. Copal from Mexico — Varnish Again
Copal in Linseed oil at a heat something less than boiling, Dilute the solution with oil of Turpentine — Slowly dried — applied to inside boxes, tea boards &c — Preserves and gives lustre to paintings — restores the decayed colours of old paintings, by softening up the cracks and rendering the surface capable of reflecting the light more uniformly —

280. Vinegar does not dissolve copper when boiling because the steam prevents the access of oxygen from the Atmosphere — Consequently Coal pickles and even Lemon juice or Vinegar may be kept in copper vessels without observing any bad taste or noxious consequence — Better however to reject copper vessels altogether from cooking —

281 What was the shape of the Worm of Alexander, was it a Spucking trumpet as Lambert affirms? Is a curved or circular form preferable to a Straight one in the Speaking

trumpet? as Lambert also affirms? Spurzheim — Might not the trumpet be of use in Cerebroscopy?

282. Mr. Accum found by many experiments that Red Lead or Litharge employed in glazing of potting is but little dangerous; he also tried, but without success, to substitute some other, less hurtfull material for the above purpose —

284 Directions to prepare and work the Reverberatory Refining Furnace (see ~~plates~~ drawing)

Let the furnace be built close to the stack, the cast iron rim set level, to receive the test when screwed up, and the test well dried. Fill the iron test with bone ashes made a little damp, so as they will bind. Let them be beat hard in the test rim, by a pestle with a very smooth face. Then cut it to the shape of those in the case. The test should be made at least one month before it is used, otherwise it will be liable to crack which renders it useless — Put the test thus prepared on the test bars (E. No. 3) of the furnace and screw it up into the rim, put the silver to be refined on the test, and as much of the lead as the test will hold, the whole must not rise higher than the bottom of the gutter — Light the fire with the strongest burning wood, sea coal is better, so as to make the metal and test red hot. When it has received a sufficient heat the worse metals will turn into litharge which appears on the top like a thick oily substance. If the silver should be very impure, having tin, iron or much copper, a crust will rise on the top of the metal, which must be put on one side, by an iron poker, so as to make a channel for the wind of the bellows to blow the litharge to the gutter. This must not be done till the mass is in perfect fusion, which may be known by lifting the crust up in different parts, the bellows is then to be wrought, taking care to blow just on the surface of the metal so as to drive the litharge to the gutter where it must run off. Increase the fire by degrees, keep supplying the mass with lead, at the trough (E. No. 4)

1

Loss of Silver in the test.

Silver if not more than one ounce in the lb worse than standard will require twice its weight of of clean lead, if worse it will require more, the quantity must be judged of by the appearance of the mass on the test — Silver being not more than one ounce worse and being refined by this method will be found deficient about 3 Dwt. in the pound. The average waste from 1 to 8 or 9 Oz worse is from 3 to 10 Dwt. Which in London is no loss as the greatest part is got back again from the litharge and test bottoms, which costs us about 12 or 14 Sh. per Cwt. smelting —

Gold

Gold if alloyed with lead or tin / or any
[illegible] / must be first refined on the test or
fluxed in a pot with salt petre. If refined on
the test, the same method is used as with
Silver — when the coarse metals are
separated by either process, melt it in a pot
with three times its weight of fine Silver a
Dollars / they having no alloy but fine Copper)
granulate by pouring it out of the pot into
a deep pan filled with water — It is then
put into large glasses 10 inches in Diam.r at
bottom, in shape like a common wine de-
canter — Not more than 100 oz in each glass
Pour in an equal quantity of strong aqua-
fortis and water, as will cover the metal
set the glasses on the fire on the stove with
a bed of sand interposed to keep the Glass
from breaking — Put in the stove a shovel.
Let them be a strong fire till the aqua-
fortis begins to work, then let it have a gra-
dual heat. When the aqua fortis has done
working, pour that off into jugs, and add
more till the red fumes be expired. Pour this
off and add as much of very strong aqua fortis
as will just cover the Gold. Let it remain for a short

time, then pour it off and wash the g[illegible]
out of the glass into a melting pot. Dry it
on the fire, melt it with a little salt petre
and it will be quite pure. The aqua fortis
(except the last) must be put into large
Earthen or stone jars and then twice the quantity
of soft water added. Put into a three large
plates of Copper into each vessel which will
gather the Silver, let the plates be occasionally
moved, and the Silver shaken from them until
no more Silver adheres to the copper. Take out
the plates and drain the water to settle.
When the Silver is well gathered to the bottom
pour off the water carefully and put the Silver
into an iron pan and melt what adheres to
the sides into the rest. Dry it over a slow fire,
then melt it with a little salt petre and it
will be very fine bright Silver — There is
no loss of Gold in this last process, if the aqua
fortis be poured off carefully. The loss on the
test is about 1/3 that of Silver already mentio-
ned — This last process is the best for Dollars
then being least work, and in fact probably
least expense

untill the crust on the Metal disappear
Having put enough on and the Litharge running
slow, lower the Gutter end of the test by the one screw
At last when the Litharge is nearly run off,
which is easily known by the oily matter dis-
appearing, if the heat happens not to be strong
enough to keep the Silver in fusion, the Silver
will not be quite fine, but will chill and leave
Litharge on the top of it. But if the fire is kept
up and the heat sufficient, the Litharge will run off
and leave the Silver fine. It will shoot up from
the surface in various forms, half an inch high.
this is called Springing by the workmen, a sign
of its being fine or nearly so — Lower the fire
and when the Silver chills raise it from the test
with a poker, for if left till cold it will be difficult
to separate it from the test. If it is wanted parti-
cularly fine it must be melted in a pot with
a little Saltpetre, as there is always a small
quantity of Scoria — The bellows for this furnace
should be 30 inches broad — Double — nozzle ½ inch
wrought by a common Rocker. like Smiths &c
— 1000 oz. of fine Silver may be wrought off at one on this fur-
nace — Keep the Gutter always clear ——

205. A Solution of Allum retards the putrefaction
C of Animal substances. This is an excellent
and very cheap way of preserving natural pro-
ductions which are sent as specimens from one
country into another F—y —

206. Without the help of Alum no colours
C would be permanent, or proof against water
F—y 5

207. Triturate 5¼ grains flowers of Sulphur, 3 of
C very dry powdered charcoal of willows, and 3
of common Phosphorus in an iron mortar, the
result is a good Pyrophorus. Jl. de Physique

208. A citron coloured ointment made up
C of hogs Lard and the Nitrous Solution of
Mercury is an excellent one for the itch.

209. The monsoons in the Indian Seas
almost always give way to the sea
and land breezes near the shore — A
happy circumstance to the inhabitants.

290. Krokala of Arrian now Cruttha
bay &c the first harbour in India in
which an European Navy was rode—
—Alexanders fleet com: by Nearchus—
— Situated a few miles to the W. of the
W. mouth of the Indus—

291. Several travellers have remarked that
where palm trees grow, however arid the
soil, there is always water to be found by
digging 10 or 15 feet—

292. The largest vessel in ~~the~~ Nearchus's
fleet probably did not draw more than
6 feet water —

293

294 The circumference of the Earth according
to Eratosthenes = 252.000 Stadia
— Aristotle = 400.000 Stadia
Aristotle Stadium "to that of Eratosthenes as
250: 400 That is as 5 to 8 nearly — This is
a much more exact proportion than that
of 4 to 7 which makes Erat: Stadium too
large by about $\frac{1}{9}$; whereas the 5:8
makes it too large by no more than
$\frac{1}{124}$

Roman foot to English as 97 : 100
hence Roman foot = 11.64 inches
— Passus = 5 feet = 4.10.2 English
Roman Mile (milliare) = 1000 passus = 7 furlongs
96 yards 2 feet = 4840 feet English —
call the Roman passus P.
~~the~~ Milliare M. and ~~the~~ Ol: Stadium S
Then by Polybius as quoted by Strabo
$M = 8S + \frac{1}{3}S$ — Hence $125O (= \frac{1}{8}M) =$
$= S + \frac{1}{24}S = \frac{25}{24}S$ — Hence $5O = \frac{1}{24}S$

and

Section	Ft
Ext. height	4 . . 1
Height of Grate	1 . 0
Grate to Dome	1 . 0
Masonry of Dome	0 – 9
Height of cast bars	1 , 4 1/2
Thickness of the two bars each	0 . 1 3/4
Thickness of Cast	0 – 4 1/2
Dist. from Bars of fire place to mouth of Grate	0 – 9 . 1/2
Height of mouth of Grate	0 9 –
Masonry to lower top	0 . 0
Height of first flue	1 1/2
Length of Lead through	1 . 9
Length of Chimney flue horizontal	1 . 9
Lead through square	4 1/2

The Chimney flue goes down to the bottom – cast round – The last ling is an oval having a little Gutter and hole at the smallest end – The last is supported on a plate of cast iron against which two screws push to raise it to the proper height – The screws go through the two iron bars –
The bars for the Hearthing Stone Grates are as usual pushed above –

Principal Dimensions of Furnace —

	Glass	Ft In
Ext: Length		7 - 6
— Breadth —		3 · 9
Masonry to grate — —		9
Bth: of Grate — —		1,1
Length of Do		1,9
Mas: to test —		1,2
Breadth of test —		1 9
Length of test —		2'5½
Mason: from test to Chimney flue		1-1
Breadth of Chimney flue —		9
Mason: from Chim: flue —		9
Door of fire place in front —		2·0 1·1
Bottom at grate —		5½
From Door to grate		9½

and 120 O = S —
Hence S or Olympic Stadium = 502 feet English or 194 yards
Olympic Stadium = 0.110227′27″ Miles Engt
O:S = 0.110227′27″ : 0,0600q20′45″45‴
Hence Aristotles Stadium = 0.0600q 20′45″45‴ miles London

— Greek foot was supposed to be to the Roman as 25 to 24 — It is more probable that they were the same, that the Romans adopted the Greek foot —
— If the Roman Mile was what Delyle makes it 8/9 Olymp: Stadia, the Length of the Stadium turns out exactly 120 Roman Passus & to 100 Roman feet. And since it was also 100 Greek feet the Greek and Roman foot must have been the same —

295.

Risings of the Constellations —
— Cosmical — at Sun rising
— Achronical at Suns setting
— Heliacal — both at once the Sun and Declination of the Star — Achronical the same — Heliacal also by the State of the Atmosphere and brightness of the Star —
Ex N. Let with. Star to North of the sun
The rising of the Stars rising Cosmick happens a few days sooner than that of its setting Achr:
— Stars invisible at either of the two first risings and settings —
+ Precession of the Equinoxes occasioned by the oblique action of the Sun and Moon on the equatorial parts of the earth — This increases the long of every Star 50 1/3 in the year — no change in the Lat of the Star — Change in Declination, Because the motion of the Equinoctial points is in the plane of the Ecliptic — Hence the risings &c are later now than in former ages —

In 1760 Dr Bradley determined the Longitude of Lucida Pleiadum to be ♉ 26° 30′ 34″ and Lat 4° 1′ 36″ North. Hence at this time (1760) in the Lat. of Rome the Pleiades rise cosmically on or about the 10th May, and set achronically about the 20th of the same month. And they rise achronic: about the 12, and set cosmically about the 24 Nov. The two last took place according to Columella on the 10th of October and 8th of Nov in the year of Christ 42

— Calculation —

1760 Long: n Star:	—	♉ 26° 30′ 34″
1760 42 1718 precess: for which is	—	28° 1′ 12 2/3
Long of the Star in 42 —		2 37 21 1/3
Pt of Eclip: which rose with Star was		♈ 29, 7 9
Obliquity		23 41 24
point which set as star rose	—	29 7 9

By Meyers Tab: sun in that point on the 19th of Oct. By a similar process the cos: setting was ♏ 4° 20′ = 29th of Oct —

The former of these differs nine and the latter ten days from the times assigned by Columella Cause. It is highly probable that the rising and setting mentioned by Columella where apparent, and consequently the one might be seen nine or ten days before, the other as much after the true times — This correction brings the Calcul: and Columellas time to agree —

Strabo says "Nearchus sailed from the Indies at the season when the Pleiades rise in the evening". Arrian informs us that it was on the 2 October 326 years before Christ —

From 326 before and 42 after Chr precess $= 5° 0′ 42''\frac{2}{3}$ which subtracted fro. ♉ 2° 37′ 21 1/3 the Stars Long in 42 leaves ♈ 27° 20′ 38″ 2/3 = Long in 326 A.C

Obliquity of the Ecliptic in 326 A.C = 23° 44′ 13″

Point of the Eclip ~~which~~ rose with the Star was ♈ 19° 26′ 41″

The Opposite the same in Libra = 17 Oct.

326 A.C fifteen days later than Arrians date

It is highly probable that Strabo spoke in general terms pointing out only the season of the year; and that the ~~apparent~~ rising was meant; but even in this case it must be remarked that if eight or nine days were sufficient to render the rising of the Pleiades ~~sufficient to~~ visible at Rome no more could be necessary at the mouth of the Indus — Diff: of five or six days too much — These calculat. are founded on the Julian Style which was not introduced till about 45 years before Christ. Diff: modes of computation used before that From 326 A.C. to 42 A.C. preces. was found to be $5^{\circ}0'42''\frac{2}{3}$ a space which the sun is more than five days in passing over, it may therefore be supposed that the diff. of the risings should have been made five or six days, whereas it is made little more than two, but it must be considered that near three of these days are anticipated by the excess of the Julian above the true tropical year —

— Same subject from Dr. H— 9 —

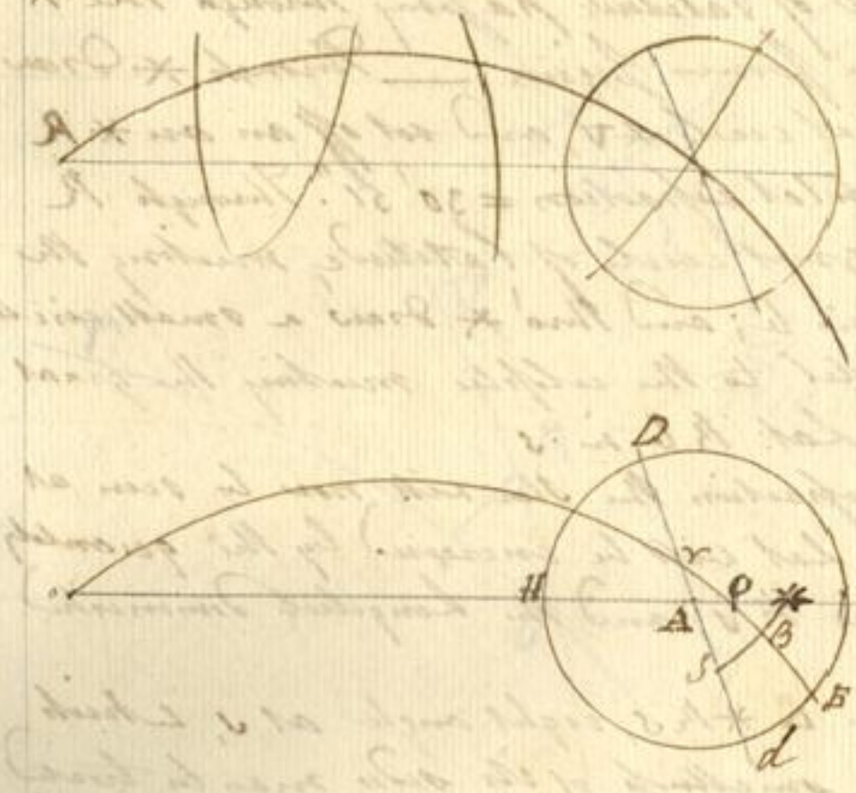
— Strabo says "the fleet sailed in Autumn "about the season of the evening rising× of "the Pleiades, before the winds were fair, the "Barbarians attacking them, and forcing them "to sea" — These are also Nearchus' own words and are such as might be supposed to be those of a Journal. A more popular writer would not like Arrian mention the particular day — They saw the Star on the East about an hour after sun set probably with that latitude, that they concluded it had arisen at sun set —

Comp:

1 Jan.y 1760 — Long: of Lucida Pl: by Bradley in ♉		26° 30' 34"
Lat		4 — 1 36 N
Lat of mouth of the Indus		24 —
Int: bn beg: of 1760 and 326 A.C.	Julian yrs	2085
Ob.ty of the ecliptic —		23 44 14
Retro.n of Eq:ox	29° 7' 35"	~~27 30 39~~
Therefore Long: Lucid: P. A.C. 326 was		27 30 39

Let HAh represent the horizon, DAd the Equinoctial and ϒOE the ecliptic all projected upon the plane of the Meridian of the moment of the Sun's at the instant when Lunda Aquarii is rising — Let the ecliptic intersect the horizon on the eastern side in O and on the western side in o Let * be Lunda Aq.ri upon the eastern horizon then O will be the point of the Ecl: that rises with the Star, and the opposite point o in the west will be the point which sets when the Star rises — Thro * draw a great circle of Lat: *BS meeting the Ecliptic in B and the Equinoctial in S — Now in the Sph: Δ *BS given L B, ∠B*S = 23° 44' 14" the side *B the Longitude of L:A.m 27° 30' 39" — by resolving the Δ, the ∠BS*P will be 69° 4' 57" and the side BS = 11° 28' 56"

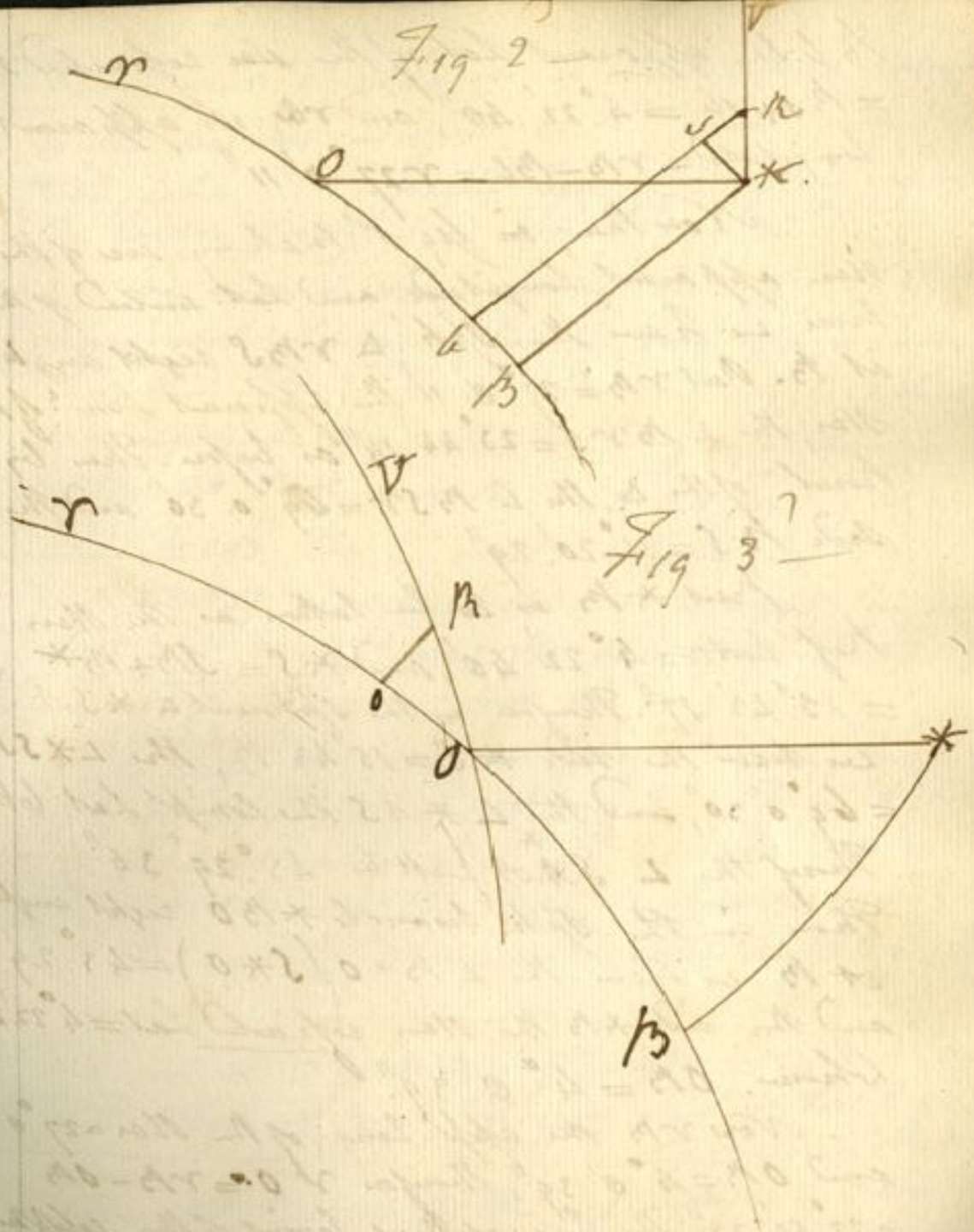
But the Arc *B is the Lat: of L:A. = 4° 36' 36", and *S = *B + BS = 15° 30' 32" Therefore in the Sph: triangle *SA we have the side *S = 15° 30' 32", the ∠ *SA or BSϒ = 69° 4' 57", and ∠ *AS the Compl: of Lat of the place = 66° — Hence by Pr: S*A = 48° 24' 29" the arc of this last ∠ to find the effect of the *'s separation — as follows



In fig: 2 Let O* OB and *B represent the same arcs of the ~~same~~ Horizon, Eclip: and circle of latitude passing through the * in the former figure — Through * Draw a vertical circle *V, and set off an arc *R = horizontal refraction = 30' 51". Through R draw a great circle of latitude meeting the ecliptic in b; and thro' * draw a small circle *s parallel to the ecliptic meeting the great circle of Lat: Rb in s

By refraction the Star will now be seen at R, its Lat will be encreased by the quantity of the arc Rs, and the Longitude diminished by Bb

In the Δ *Rs, right angled at s, which from the smallness of its sides may be treated as a rectilineal triangle, the side *R = 30' 51", ∠ R*s which with s*O makes a right angle, must be equal to O*B (A*S of Fig: 1st), which with the same s*O makes a right ∠: Therefore the ∠ R*s = 43° 24' 29" — Then by the Nature of the Δ the side Rs = 21' 12", and the side *s = 22' 24" = the length of *s in parts of a great circle — whence Bb will be found 22' 28" — Hence



γb the apparent Lat: of the star reduced Star $= \gamma s + sb = 4^\circ 22' 40''$, and $r b$ its apparent longitude $= \gamma b - \gamma b = \gamma 27^\circ 0' 11''$

Now then, in fig 1st making use of the Stars apparent longitude and Lat: instead of its true we have the Sph: $\triangle \gamma B S$ right angled at B. Viz $\gamma B = 27^\circ 0' 11''$ the apparent long: of the Star, the $\angle B \gamma S = 23^\circ 44' 14''$ as before. Then by the Resol: of the $\triangle$, the $\angle B S \gamma = 69^\circ 0' 30''$ and the side $BS = 11^\circ 20' 29''$

Next $\ast B$ is to be taken as the Stars Refl: Lat: $= 4^\circ 22' 40''$, and $\ast S = SB + B\ast$ $= 15^\circ 43' 17''$. Therefore in the Spherical $\triangle \ast S A$ we have the side $\ast S = 15^\circ 43' 17''$, the $\angle \ast S A$ $= 69^\circ 0' 30''$, and the $\angle \ast A S$ the Compl: Lat: 66° Hence the $\angle S \ast A$ will be $43^\circ 29' 34''$. Then in the Sph: triangle $\ast B O$ right angled at B, we have the $\angle B \ast O (S \ast O) = 43^\circ 29' 34$ and the side $\ast B$ the Stars reduced Lat $= 4^\circ 22' 48''$ whence $OB = 4^\circ 0' 39''$.

Now γB the apparent Long: of the Star $= 27^\circ 0' 11''$ and $OB = 4^\circ 0' 39''$, therefore $\gamma O = \gamma B - OB$ $= 22^\circ 59' 32''$ the Long: of that point of the ecliptic which comes to the Eastern horizon at the same time with the ~~Light~~ Reduced Light of the Star

The point o of the ecliptic is this which comes to the western horizon, at the same instant of time, when the reduced Light of the Star is upon the Eastern horizon is $= 22^\circ 59' 32''$

We must now estimate the effect of the horizontal refraction upon the semi apparent diameter Longitude. This depends upon the angle which the ecliptic makes with the horizon, at ocm rise or Sun Set that is on the $\angle \gamma O A$ (fig 1st) or its equal $\ast O B$. The $\angle \ast O B$ is found by Rule 2 the Sph: $\triangle \ast O B$ in which the $\angle B$ is right, the $\angle B \ast O = 43^\circ 29' 34''$ and the side $\ast B = 4^\circ 22' 48''$ Hence $\angle \ast O B$ comes out $46^\circ 39' 54''$

Now to avoid confusion Draw the Sph: $\triangle O \ast B$ by it self (fig 3) Draw O draw a Vertical Circle OV and take the arc = Hor: refraction $= 30' 51''$. Through K draw a great circle of Lat: and let it meet the visible ecliptic in the point o. Then the Sun when only on the horizon at O will by Refl: appear at K: the Star will appear at B in the great circle of Lat KO. o will be true place in the ecliptic, and the arc of the ecliptic Oo will be the Diff: between the true & apparent place or the effect of the horizontal Refl: on the apparent Longitude.

In the triangle KOo which for its smallness may be treated as a rectilineal triangle, the angle at o is a right angle, the angle KOo being the Comp.t of ✶OB is 43° 20' 3" and the side KO is 30' 51" horiz.l refr. — Then Oo comes out 22'. 26" = the effect of the horizontal refraction on the rising Sun's app.t Long.e, his true place being O in Lat 24° N., and the same will be the effect on the setting Sun in the opposite point of the ecliptic in the same Lat. — The effect on the rising is always the same on the opp.e point at Sun setting because opposite points of the ecliptic make equal angles with the horizon and on this the effect of Refr.n depends. The effect lies in opposite directions, the refr.n making the apparent longitude of the rising Sun west of his true place; and the app.t Long. of the setting sun east of his true place — Hence we must put the Sun's true place 22' 26" west of O. Therefore ♎ 22° 59' 32" — 22' 26" = 22° 37' 6" the app.t place of the Sun at the Acht. rising of Lucida Pleiad.m in 326 A.C. by Mayer's Tables = Oct.r 19d 10H 25' 9" Jul. Style mean time Mer: Greenwich. To this add Equ.n from the begin.g of the year till Oct. 19d = + 14", as

the Sun's place was deduced from the longitude of the Star. Add also 4H 36' = Diff: Merid: between G.r and the mouth of the Indus and the result is Oct/19d 15H 17' mean time by the meridian of the mouth of the Indus. —

4308 G. Jul. P. 326 A.C

\+ As the real Acht. rising cannot be observed on acc.t of the twilight, and as a Star of the 3 mag: (L.P.) requires the Sun to be 14° below the horizon that its Acht. rising may be perceived — Then the Sun's longitude when he was 14°: below the horizon will be found to be ♎ 3° 33' 56" = 30 M Sept. 12H 59' Jul. St. app.t as found, the corr.n for precess.n + 15" and 4H 34' for Diff of Merid: and these results Oct. 1. 5H 50' a.m. mean time under the merid of the mouth of the Indus — This corresponds perfectly with Arrian. — From this the apparent risings and settings must always have been meant —

The reckoning the year before Christ is seldom with precision, but in Astronomical tables for Mayer's tables the year of Christ 0 corresponds with with the year of the Julian Period 4713, but Civil Chronologers call the year 1 before Christ, at the same time they call the next succeeding year viz 4714 the 1 after Christ. By this inaccuracy they make the interval between any day in the one and the correspondg day in the other 2 years instead of one

E. Year before Christ 326 = 4388 J. P
year after Christ 1760 = 6473
2086 = 2085 Jul. year

This exemplifies thus the error — The first is by the Tables and is one year too much; the other, by the Julian is correct. —

+ This is very seldom an exact achronical rising of a Star at any Solar, because it very seldom happens that the instant of the Sun's apparent to the required point in the ecliptic, and the instant of Sun set are the same, the same with the Lunar and Tabular R.s and Settings. Take the nearest Day —

296. Remarks on Dr. Hunter's compound Screw —

Let C be the circumference of the circle described by the power P, and let the distance of the threads of the great and small screws be d and d' respectively. Then if P be applied at any given distance from the centre of the Screw AB to move it round its axis, the axis $\frac{CP}{d}$ expresses the force acting upwards at B. Now if the concave AB be a hollow tube into which FE may just freely without any being applied by a female screw, and let FE rest on an obstacle connected with the tube, which obstacle shall sustain a pressure equal to $\frac{CP}{d}$ applied at F, supposing F to meet with resistance in its motion upwards by the Cross plate Zy: this obstacle is consequently a resistance equal to the force at B, by supposing it just sufficient to oppose the pressure at F. Then for it to respect to the simple screw AB. Now if the pressure $\frac{CP}{d}$ at F be supposed constant, or which is

the same thing. Let a weight be placed at F equal to $\frac{CP}{d}$, and then the second screw applied, then in case AB could move round its axis, without having any progressive motion upwards, that is supposing the screw to terminate ~~any~~ the tube be cut on the female plate CD, and have on an axle from it while CD sustains the weight $\frac{CP}{d}$, then under these circumstances FE would be forced down by the internal screw against the obstacle in the tube with a pressure that shall be to the weight $\frac{CP}{d}$ as the circumference of the circle described by the power is to the distance between the threads of the small screw: or in other words, the pressure of the weight $\frac{CP}{d}$ will be increased to $\frac{PC^2}{dd'}$, for while AB moves round its axis, without a motion upwards, the female screw would act on the upper part of the threads of the internal screw, and consequently force it down. But while AB continues to be affected by the screw and to have a vertical motion, the weight at F is sustained by the two screws in place of the one AB, and the small screw not having any circular motion slides thro' AB, while AB slides upwards: but the force is only affected by the screw AB in passing thro' the frame CD. For these two screws are supposed to be enclosed planes, when a weight is drawn up one plane, while that plane is sliding down another like a pocket to, or meeting a great weight with it, a circumstance, exclusive of friction that never will affect either the power or weight; for it is immaterial whether a W^t be drawn up a plane at rest, or a plane be drawn under a weight at rest, so long as the power applied to sustain that weight preserves the direction in which it was at first applied. Neither will it signify, if while the sliding plane is moving down, the weight in the mean time be moved a little upwards, and so gain on its suspending height, and this reasoning will apply to the case in question, for if the threads of the small screw are at a less distance than those of the large one, the weight at F will ascend because

more perpendicular height has been gained than CD than has been lost at B in one revolution. Now if the distance of the threads to each other be the same, then F will remain at rest, and yet the pressure or weight there will be the same and it will require the same power to move AB round its axis, as if the entire screw were free to move with AB, and have the same circular as well as progressive motion. So that whether EF move down ends as fast as AB move upwards so that F may be at rest or whether F. move with the same velocity as B, it makes not as to the force at F: and like wise if EF move up, so that F may have any velocity upwards less than B, it can never affect the force at F, when friction is not taken into consideration. But friction here must be great, because there will be the same friction in CD as if it were but a simple screw, for the whole the pressure is there, and the

action of the small screw, being reduced by its opposition to that of the other the friction will transfer under the part of the whole. So that, if this reasoning be right, this compound screw cannot answer the purpose intended as to force, having in this respect no advantage over the simple screw while very great defect arising from friction will be against it—

Extracts from B. of Q. 1st account of the China Embassy —

— China proper —

Population —	333,000,000
Square Miles — — —	1 297 999
Revenues — — —	030. 719,360

Revenue rec. into the Treasury —

Cash — Taels in currency sds: 36.540,000 oz

Measures of rice and other grain — 4,245,000.

Rough calculation of the Military establishment of China —

1,000,000 Infantry at 2 Tahel (Y. Month provisions included)	Tahel 24,000,000
800,000 Cavalry at 4 Tahel (Y. M.° provisions include — —	38,400,000
All expenses yearly —	10.600,000
	73.000,000
Salaries of Military Officers	1,974,450
	74,974,450

Salaries of civil officers 2.960.000

— China trade

Exports to China for 21 years ending with 1795

In goods —	6.909.468
Bullion — —	3 676 010
	£ 10,585 478

Teas exported from China

1776	Total foreign —	lb 16.410.900
	Total english — —	13.480691
1780	Total foreign —	10.267.400
	Total english —	17,991 832
1785.	Total foreign —	5,577,200
	Total English —	23,733 810

N.B. the great increase of British exports from Canton in 1785 arose from the commutation act —

Kings Duty on tea from 1st Sept. 1784 to the 1st March 97 = £4,832,169

from 96 to 97 — £705572
—05406 292193

29th Mode of calculating a lunar obsv by Capt. N—o abriged

1. Take the diff. app: alt from Dist: and sub half the remainder from the appt. Dist. There remains a residual arc. Take the Log sines of half the Diff: and residual arc, rejecting their indices of 9, but if under nine, take their complement to 9 as the proper Index which index is always negative, and must therefore be deducted from the index of the Log. of reduction

2. With the moon's app. Altitude in degrees and minutes only, and her horizontal Par: take out the Log. of reduction of Par: and Ref. from the Lunar Tables to which add the Log Sines of half the Diff: and Residual arc, their sum is a common Log. find the corresponding Number thereto which reserve

3. Take the proportional Log: of the moon's horizontal Par^x, the Sec^t: of the moon's app^t: altitude to 4 places rejecting the index, add them together, and in the table of proportional Log^s. find the minutes and seconds, from which subtract the refraction of the moon's apparent altitude; the remainder is the correct^n of the moon's altitude. If the moon's alt: is less than that of the sun or star, this cor^n is to be subtracted from the Diff: of the app^t. altitudes and v:v: added.

The like must be observed respecting the Ref: of the sun's altitude in order to obtain the true Diff: of altitudes)

4. To the Log: found by 2 add the Nat: Versed Sine of the difference of the true altitudes, found by the last article, the sum is the Natural Versed Sine of the true Distance clear of N. of Par^x.

Example

☉'s app: Alt.	33 53 34	D's H. P.	54 36	5181
D's Do	32 0 56	Sec^t		0722
Diff	1 44 0	P. Log 4614		5903
		D's ref.	1 31	
	03 38 53		44 43	cor: D's Alt
ap: Dist:	01 54 15			
½ Diff	40 57 27	S.	0.0016524	
Resid. ure	42 41 46	S.	0.0831300	
	Log Resid.		4.297549	
081006	Com: Lo		5.945373	
		Diff: ap. Alt	1 44 38	
		cor^n D's Alt	44 43	
		☉'s Ref. alt	1 24	
000145	N. V. S. Diff T. alt		0.58 31	
081951	N. V. S. of T. Dist		03° 13' 14"	

298. It appears from a series (22) of lunar observations & taken at Greenwich Obs: in 1791, on purpose to determine to what degree of accuracy the longitude may be found by this method that the limbs observed distance of the moon and Sun or Star was less than that by the Clock and if a mean of the whole be taken it amounts to 52 Seconds = 13 minutes of Longitude that is — East and + West This error seems to arise from the D'pla being set down 30" of a degree too much to the East and in the Ephemeris

299 It has been calculated that four hours taken in the day by every individual would be sufficient to produce all the necessaries and comforts of life for the whole Society

300. The horizon is one of the most useful circles of the sphere and the only apparent circle. To this almost all the celestial phenomena are referred — Illumination of day and night — risings and settings of the heavenly bodies — altitudes &c

301 I have often remarked that a degree which had the best temper for Europe, was too soft in India — I find the same observation made on former trials by Br. A — g — A degree would the same degree of artificial heat produce the same effect in Europe? — I rather guess the reverse. —

302 What is fog? and what material does
C it contain that so much affects the eyes?
qu.
303. Have the diff. Gases different refractive
C powers, how is this to be ascertained?
qu. would not this lead to some discoveries
respecting the Atmosphere?

304. Some plants in this country will not thrive
C but by the exclusion of the air — vine for
example must be enclosed — Is not this
a proof that niter or some other de-
structive ingredient exists in the Atmosph

305 What are the best experiments to
C ascertain the existence or non existence
qu. of Nitrous gas in the Atmosphere? —

306 A mountain in Thibet is said to have
been seen at Malda = 300 Miles distance!!
this would require a height equal to about
12 miles. If the above assertion can be de-
pended on, the refraction of the Atmosphere
must occasionally be much greater than
commonly supposed — This was related
to me by Captn. Ud—n who has seen the moun-
tain from Malda — also by Mr. Carey —

307. The skimmings of Glass in fusion
C (sandiver) thrown into water produce a
violent explosion. N.B. The Alkali
used in making the glass must be from
Kelp for this experiment —

308. The pendulum rods of some regulat
are made of brass tubes. Query what
is the proportion of expansion between
a tube and a solid rod of the same length.
— The bob is also made cylindrical
— query what advantage has this over the
common form —

309 Can any instrument be constructed
on the principle of Hadley's Sextant to
give the angle on the limb equal to
that measured by the center speculum
or without the angle of the limb being
doubled? Dr. Neunber says Mr. F—s has
constructed a model of an instrument to

Spot this — I think such an eye will be superior to that in common use. — De Bonda Circular Instrument double the angle like the Sextant. It has two indexes with a nonius on each one carries the Horizon glass, and the other and the Telescope; the other index carries the centre Speculum and has no connection with the horizon Speculum

310. It seems doubtful whether the product debt, or security as it should more properly be called has increased beyond the ratio of improvement and the decrease of the value of money — It is probable that it has a less proportion to the gross revenues of the country now than at any former period —

311. A person bit by a mad dog contracts ill health generally for 20. 30. 40 days or even a much longer space of time The bite, if not prevented will in general be healed long before that time

— The Hydrophobia seems to be a symptom of Canine madness, peculiar to the species, for the mad animals which communicated the infection do not seem to have any dread of water — Cattle bit by a mad wolf dying nearly under the same symptoms as Dogs men and women. but

without exhibiting any Signs of Hydrophobia —

All other Dogs accord and run away from one that is bit — The Largest will not attack the Animal of the Latter he infected — To Discover whether a Dog Rabidly Bitten was made rub a piece of meat along the inside of his mouth & give it to another Dog, if he eats it, the Dog was not mad, if he rejects it with a kind of howling noise, it is certain the Dog has mad —

The convulsive fits of the Hydrophobia comes on every Quarter of an hour according to Doctor Wolf of Warsaw —

The Dog will in about much in time as the Disease increases —

The human patient blows the foam out of his mouth with great force and notes somewhat resembling the barking of a Dog. Those probably arise

relation
the accounts given of Patients barking like the animal after their bite them. —

A hot season and want of water are two causes supposed for canine madness. But this cannot be true, for in the island of Antigua where both prevail the Hydrophobia is said to be unknown —

312. The Church of St. Irene at Constantinople is said to have been built by Const. the G. The Turks have converted it into a great Armory — It is said to contain the Roman Military Engines used by Alexius at the siege of Nicaea in 1097. and the Armour and weapons of the Crusaders — much light may probably be thrown on Ancient War by an inspection of the Armour

313 The Greek mariners are totally ignorant of the modern Art of Navigation nor have they any acquaintance with Nautical instruments. Except certain improvements in the form of their boats, they seem to have learned nothing more from their European and Venetian Masters. It is doubtful whether they could even read the Engravings in Nautical Books

These two articles from Dalloway

314 No domestic in Constantinople performs more than one office; he serves the coffee, and that hands the napkin, but no emergency can command any other service

Dallaway.

N.B. Mr Abbott says the above is a mistake, and that the servants in Turkey turn their hand to any thing

315 The length of the pipe is in proportion to the dignity of the smoker, often twenty feet the head of pale Amber. Shank of Jasmine wood with the bark preserved, the bowl of a delicate red clay, and highly ornamented It is carried from place to place by two servants, with much ceremony, and the bowl is supported on wheels—

316 The Turks have the strongest belief in witchcraft, particularly in an evil eye—

317 Since Instrumental ~~figure~~ music was banished from the service of their Church music has much declined among the Greeks.

The lower class cannot learn a second part to any tune. This was the case with Malbrook beyond the first strain of which they could never go, tho' they had adapted to it words in their own language—

318. Dogs are said by Dallaway to be subject to the plague at Constantinople— Canine madness very rare—

319. Some years ago no Frank could walk the streets of Constantinople without being liable to insult; but since the peace with the Russians 1774 when Prince Repnin paraded the streets with 600 soldiers with drawn swords, the treatment of foreigners is much altered, their insolence much humbled—

320 Opium is made up with various other articles, composition is called Mash Allah, the works of God, in answer to Abbot "well done" or Bravo.

321 Considering the population of Constantinople, capital punishments are very rare — Generally happen among the military. There is no place of public execution, the criminal is led down the nearest street by the Executioner who is provided with a large nail and cord, which he places over the door of any shop where he is not paid for his forbearance! — ~~About 3~~ A few inches from the ground, the body must be left untouched for three days. — In instances of decapitation, the more honourable punishment, it is exposed the same number of days with the head under the arm or between the legs —

322. Elephants have been seen in the act of copulation in the   or enclosures in which they are taken wild and the female brought forth in 22 months after —

323. Cock roaches, it is said have been known to eat ~~&~~ arsenic which had been prepared for killing rats, without ~~suffering~~ experiencing any inconveniences!! —

324 When a person of Hindostan write a letter which he wishes to have forwarded by express, he encloses it in a <u>red bag</u>.

325. Mr Amiot, in the Memoirs Chinois gives a description of the manner of making the Chinese Gong — Proportions of Copper 10, Tin 3 and Bismuth 1 — mode of hammering —
C

326. Method of cleaning mercury by agitating violently in a strong phial held by both hands inverted the lower hand striking against the knee — 20 or 30 strokes. After which the
C

the clean mercury is to be let out
and the ~~bottle inverted as~~ process re-
peated till the mercury become quite pure –
The process is founded on this fact that
the metals, with which mercury is gene-
rally ~~[illegible]~~ contaminated, become con-
verted into a black powder by a partial
oxydation when agitated with respirable
~~air~~ Nicholson Journal of N. Phil.

327. The foxes of Sampson Mr. Hasselquist
says were Jackals, and ~~whether~~ where the word
occurs in Scripture, it ought to be so
translated – These animals collect in
great numbers at night in all the cities of the
East, through all Asia – "Zion is deso-
late, the Foxes walk upon it." Jerem.
– The Jackal is less than the wolf
and larger than the Fox –

328. Knives and Forks are unknown
in China, Hindostan, Turkey. Greece, and
probably to all the Eastern nations.

329. Fires happen frequently at Constantinople
when a fire has raged one hour, the Sultan
is obliged to attend in person bringing with
him mules ~~and~~ laden with presents which
he distributes with his own hand ~~[illegible]~~
among the fire men, who are very inactive
before his arrival. The women assemble in
a groupe near the Sultan, unmercifully
load him with the bitterest revilings and
charge him with the cause of their present
calamities. As this is the only privileged
time of conveying the voice of the people
to the Sultan's ears, and as women in Turkey
say any thing with impunity, it is pre-
sumed that many of the fires are not ac-
cidental.

Dalloway's Constant.

330 It is remarkable that notwithstanding the prodigious number of dogs at Constantinople, canine madness is seldom known there, tho' ~~the~~ dogs subject to the plague —

The same Author

331 If the blood, while flowing from a vein be disturbed it is turned to so fixed a black colour that exposure to oxygen will not restore the bright red — the converse is also true that if the blood which has been rendered bright red be disturbed it generally is rendered black.

Ingen.^n Author

332 Evergreens have leaves of a different texture than deciduous plants. The latter give out little or no oxygen for when the weather gets cold, whereas the ~~lat~~ former give out pure air through the whole year — the leaves of deciduous plants absorb moisture during the night this freezes in the veins of the leaf, destroys the vegetation, and the leaves consequently fall off —

333 c qu. What is the cheapest and best composition for smoking a ship in order to kill rats? —

334 On the 16 June 1794 a tremendous cloud was seen in Tuscany near Siena coming from the north about seven o' Clk in the evening — sending forth sparks like rockets — throwing out smoke like a furnace — causing violent explosions and blasts, more like those of cannon and of numerous musquets than like thunder — and casting down to the ground hot stones, whilst the lightning that issued from the cloud was remarkably red, and moved with less velocity than usual — The cloud appeared of different shapes to persons in different situations, and remained suspended a long time; but every where was seen to be burning and smoking like a furnace — Its height seemed to be much above the common region of the clouds

The evidence in proof of the fact is perfectly satisfactory — The stones were on a minute examination, found to be composed of blackish Chrystals of different kinds with metallic or pyritical spots, all united together by a kind of consolidated ashes; and on being polished, they exhibited a ground of dark ash colour interspersed with blackish cubical Chrystals and shining specks the author concludes that the stones were generated in the air by a combination of mineral substances which had risen as exhalations from the earth; but not as he seems to suppose from Vesuvius

~~The~~ The author however is of opin. that an immense cloud of ashes mixed with Pyritical dust, and with numerous particles of iron, having being projected from Vesuvius to a prodigious height, became afterwards condensed in its descent both from

both of itself as well as by means of the Electric fluid which it contained — produced many explosions — melted the pyritical and metallic and argillaceous particles of which the ashes were composed — and by this means had a sudden chrystallization and consolidation of these particles taken place, which formed the stones of various ~~sizes~~ which fell to the ground; but did not harden the Clayey ashes so rapidly as the metallic particles chrystallized, and therefore gave an opportunity for impressions to be made on the surface of some of the stones as they fell, by means of others impinging on them

King's remarks on Showers of Stones
4to 2/6 Nicol. 1796 —

335 The acting of plays either English or Latin in public Schools, seems inexpedient. It destroys that modesty, that amiable diffidence in youth, which too many other causes concur to destroy — Let not a young man be taught to overact his part or to express feelings which youth and inexperience do not possess — for thus ~~this for~~ his mode of performance will be imitation and mimicry, not such as comes from the heart

336 The noxious air in the Grotto del Cane seems to consist of Carbonic Acid, azote and perhaps some oxygen. It is warmer than the air above, Gun powder may be fired ~~in it~~, and phosphorus will burn in it.

C

Spal. Travels —

337 Mr. Dodd's estimate of the Expence of the Tunnel below the Thames from Tilbury to Gravesend

	£
To 900 yds running measure of Tunnel: including the Excavation and Walling with Key stones at 12£ p yard —	10,000
To relaying the bottom with new made ground, 900 running yds at 1£ p yard —	900
To fixing Lamps and Lamp irons through the Tunnel Toll Collectors rooms, gates &c at each end —	400
To making good entrance roads at each end of the Tunnel —	160
To a Steam Engine pipes &c, if found necessary, to draw off the drainage water	1,700
To necessary machinery during the execution	500
To 10 p Cent on the whole for Contingy	1,458
	£ 15,995

330. In the Cotton mills one person does the work of eighty in the old mode of spinning —

339. Mr. Dodd proposes to make a centre arch of London Bridge 300 feet span and 100 feet above high water mark both of iron. This would allow the largest Ships in the navy to pass into the space between London and Blackfriars bridge which when accommodated with Quays and Wharfs would contain many more Ships than the Docks proposed, and be executed in less time and at less expence. —

340. The author of "Thoughts on a new Currency" by a Banker — disapproves the idea of debasement of the coin, and thinks that any alteration in value would be attended with the most serious consequences — The regulation of the Standard in Ed: 6th might occasion an immediate and uncertain value to be affixed to all the necessaries of life —

— The quantity of Silver in circulation is calculated at about 6 millions, in Crowns, half Crowns Shillings and Sixpences worth at an average

Crowns	4, 0
Half Cr.	2 2
Shill.	0 ½
Sixpen.	2 ½

Now if the Silver coin be called in to keep up the Standard a new coinage of full value must be issued this will cost £ 25 per cent on 1½ Millions —

It would be inconvenient for Gov. to spend this sum at present (1790) and let it fall on the publick would be great injustice, uncertainty on Silver coin is mostly in the possession of the middling and lower classes.

— What is the amt. of the Gold in circulation

341. Tippoo's war Rockets consisted of an iron tube of about a foot in length and one inch in diamr. fixed to a bamboo rod of ten or twelve feet in length. It is fired from the hand, and flies to the distance of upwards of a thousand yards. Some Rockets have a Chamber and burst like a Shell; others called ground rockets have a serpentine motion, and on striking the ground rise and bound several times till the composition be spent. The Rockets make a great noise, and exceedingly annoy the native cavalry which generally move in great deep bodies; but are easily avoided & seldom take much effect among our troops —

Query what is the composition with which these rockets are charged?

342 The followers of an Indian army on a moderate estimate be reckoned at <u>four</u> times the number of fighting men —

343. Blue-lights tho' much used in sieges by the natives of India are of no use to discover the position &c. of the enemy at any considerable distance. Indeed they were of more use to the assailants than to the defendants at the siege of Seringapatam in 1792. — The Garrison could not discover our people at work within 800 yards of their walls

344 Mercury, for an artificial horizon, may be rendered clean enough, by passing it once or twice thro' a paper funnel with a small tube —

345. The following extract of a letter from the Army in Bednore dated Camp 27th Sep (1799) "we are all very much fatigued after "crossing the Tonge and Boodra rivers "an European fell in who was saved by "an Elephant sent after him for that pur-"pose. Before the creature reached him, he "went down, as we thought for the last time, "but fortunately rose again, when the Ele-"phant made a grasp at him and missed "him, the noble animal then followed him "down, and made another effort which was "successfull. The poor man was motionless "when the Elephant formed his trunk like "a crook, and raised him to his keeper. "The man perfectly recovered in a few hours

346 Scipio's tomb, which is said still to exist in the vicinity of Naples, has this inscription

"Ingrata patria! neque ossa mea habebis"

347 Several of the Bengallee numbers have a great resemblance to the European — Dow, two Teen, three, Chaur, Quatuor, four — Paunch, Penta — Saute, Septem — Aut, eight, or as the Scots pronounce it aught — Noee, Novem, Dos, Decem, Kory, 20. Hence perhaps our word Score — Ek Kory, a score

348 Words in Bengallee similar in sound to English words of a different signif. Adamee a man — Rendee a woman

349. The King and queen of Otaheite are always carried about on mens shoulders for when ever they set foot on ground the place is taboo and none but their own domestics can walk on it — If an umbrella is expanded over their heads, it becomes taboo to their own use

350 Whatever an Otaheitan asks in proportion to the utmost bounds of their expectations, to that to add more is superfluous and unnecessary

351 To offend an angry god, a human creature is often offered at Otaheite — Same in Bengal — See Asiatic researches Vol. 3th —

352. The Dignity of the Otaheitan King will not permit him to help himself at meals — after tea he requested that the saucer might be kept for his sole use, and that no woman might be permitted to touch it

353 The mode of carrying the King and Queen is with their legs hanging down before, resting on the shoulders, leaning on the heads of their carriers, and frequently amusing themselves with pinching out the worms in which they abound. It is the highest knowledge of the Queen that of all women she alone may eat them. Whilst possessing the taboo fails to make use of

354 In Otaheite poverty never makes a man contemptible; but to be effeminate and covetous is the greatest shame and reproach. — Deputies are all called by Christian —

355 Women in Otaheite have no apartment of place of worship; nor are they ever present at their solemnities; nevertheless they offer as they shall be admitted to happiness with the Eatooa as well as the men —

356. In Otaheite tattooing is universal with both sexes — Painters are employed by the time employed in travelling — Day and night as in China, are divided into 12 hours of equal parts, and the time ascertained with bells

accuracy by the Sun and Stars—
— Sit usually on the ground cross legged on a matt.— Sleep either on the same or low bedstead— Pillow a wooden stool neatly wrought out of one block—
— Excellent judges of the weather from the appearances of the Sky and weather — Have names for many of the fixed Stars and can foretell their time of rising and setting with considerable precision, And what is more singular many of their names and the account of them resemble the Grecian fable. They have their twins, or two Children, their Castor and Pollux.
— Year consists of 13 months, being lunar. They calculate by lunations, and the time when the Sun is vertical—
— Well acquainted with conversing by signs and perfect masters of the language of the eyes.
— Language smooth and soft. in some instances very expressive E.G. The pronoun we differs according to the number of persons spoken of
— Have no partitions in their houses—
— Believe in a good and Evil spirit— In a future state of happiness in gradations but not of misery— Most devout in public
— The high priest Manne Manne did not relish Capt. Wilson's discourse on the propriety of having but one wife. His five wives, however who were present said it was my Ty, my Ty very good
— Spears or Javelins from 8 to 14 feet long— poise it on the fore finger of the left hand— mark at 30 or 40 yards distance
— Bows of Bow wood, arrows of small bamboo pointed with Lao wood (very hard, clubs made of it) Bow strings of the bark of the Kraaa — Never used in war— Parties shoot against each other, greatest distance, not at a mark—

Otaheite

— Sling both for amusement and used in war — of Coir fibres — Held round the Shoulder above kept fast by the left thumb — gave a jump whirling three times round, the left hand grasping the right wrist — great force —

— N.B. It is curious that in the Roman practice the Sling was whirled three times round — Those however were esteemed the best Slingers who discharged the Stone at the first round.

357 The deep drains on each side of the street in Calcutta are a great nuisance. Instead of carrying off the water as is supposed, the water stagnates in them for a long time after the rains have ceased — Would it not be better to make the streets all convex with a very shallow Gutter on each side? —

358 There is a Portuguese Schoolmaster in the neighbourhood of Mr Uni. After Dinner that is about 4 or 5 o'clock he has also a card party in the School room while the boys are getting their Lessons!! —

359. The Continence of Scipio, in restoring the young wife to her husband, has been praised as the first trait in his Character — Is there any Officer in the British Army who would have done otherwise?
— Scipio's Character was above being heightened by an act which any man might have done —

360. The best English Alum contains Glauber's Salt and Vitriolated Tartar. This may be discovered by calcining the Alum with Charcoal powder which decomposes the alum only leaving the other two salts intermixed with the Alum earth whence they may be extracted by Water — Rep. of arts —

361 Wells cleared of noxious air by a long metal or wooden tube with a fire place of stone at top —

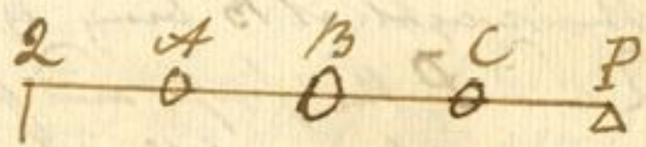
362 Archimedes's demonstration of the fundamental property of the lever, would be very satisfactory and elegant, provided the principle on which it is founded could be clearly proved, viz "that two equal powers at the extremities ~~of a lever~~ or their sum at the middle of a lever would have equal effects to move it about any point."

In a progressive motion this is sufficiently clear; but not so in a rotatory motion —

The principle may be thus proved

Let A, C be two equal bodies placed on the straight lever AP moveable about P; bisect AC in B, produce PA to Q and take BQ = BP, and suppose the end Q to be sust[ained] by a prop. Then as A and C are similarly situated in respect to each end of the lever; that is AP = CQ, and AQ = CP, the prop and fulcrum must bear equal parts of the whole weight; and therefore the prop at Q will be pressed with a weight equal to ~~B~~A. Now take away the weights A, C and put a weight equal to their sum at B; then the weight at B being equally distant from Q and P, the prop and fulcrum must sustain equal parts of the whole weight, and therefore the prop will now also sustain a weight equal to A. Hence if the prop Q be taken away the moving force to turn the lever about P in both cases, must evidently be the same; therefore the effect of A and C upon the lever, to turn it about any point,

are the same as when they are both placed in the middle point between them; and the same is manifestly true, if A and C be placed without the Spherum and Prop. If therefore AC be a cylinder of uniform density its effect to turn itself about any point will be the same as if the whole were collected in to the middle point B, which follow from what has been already proved, by conceiving the whole cylinder to be divided into an infinite Number of laminæ perpendicular to its axis, of equal thickness. —



The principle thence assumed by Archimedes is therefore established upon the most self evident principle, that is that equal bodies at equal distances must produce equal effects which is manifest from this consideration that when all the circumstances in the case are equal the effects must be equal —

— Vince

Archimedes's demonstration —

Let XY be a cylinder which rests on A — on which point it would manifestly rest. Take any point Z and bisect ZX in B, and ZY in C, then from what has been proved the effect of the two forces ZX, ZY to turn the lever about A is the same as the weight of each force was collected into B and C respectively; which weights are manifestly as ZX, ZY. and which therefore are to be placed at B & C now $AB = AX - XB = \frac{1}{2}XY - \frac{1}{2}XZ = \frac{1}{2}YZ$; and $AC = AY - YC = \frac{1}{2}XY - \frac{1}{2}ZY = \frac{1}{2}ZY$; consequently $AB : AC :: \frac{1}{2}YZ : ZZ :: YZ : XZ ::$ the weight at C : w. at B

363. There are two ~~two~~ points, one between the Earth and Moon, the other on the side of the moon opposite to the Earth, at which, the attraction of the Earth and Moon is equal.

Let the dist: of the moon from the Earth be d the quantity of matter in the Earth e in the moon m — call the dist: of the point from the center of the earth x — Its distance from the moon will be $d - x$ — But G.ⁿ is as the matter directly and square of the Dist: inversely — therefore the Earth's attraction is as $\frac{e}{x^2}$ and the moon's is as $\frac{m}{\overline{d-x}|^2}$. But these are equal to each other Therefore

$\frac{e}{x^2} = \frac{m}{\overline{d-x}|^2}$ and $\frac{\sqrt{e}}{x} = \frac{\sqrt{m}}{d-x}$ Therefore

$x = \frac{d\sqrt{e}}{\sqrt{e}+\sqrt{m}}$ or multiply both Num.^r & Den^r by $\sqrt{e}-\sqrt{m}$ $x = \frac{de - d\sqrt{em}}{e - m}$. ~~[illegible]~~ In round numbers let $d = 60$ Semi: Earth, e 40, m 1, then $x = 52$ nearly. To find the other point, put $x - d$ for the square root ~~[illegible]~~ which in this case would be a positive quantity then ~~[illegible]~~ $x =$ ~~[illegible]~~ $= \frac{de + d\sqrt{me}}{e - m} =$ 72 Sem: nearly

— If the ~~Equation~~ Quantities had been multiplied before extracting the roots the affected equations would have given the same two roots — — T—'s Algebra —

364 The best mortar for brick work in Bengal is $\frac{1}{3}$ lime $\frac{1}{3}$ sand and $\frac{1}{3}$ Sulky. Sulky is old bricks pounded — Both stone and shell lime are used, the first is by much the best.

— Saul timber is commonly used for beams and joists. It is very strong, but heavy. —

— A species of deceit among the natives here is to gather the refuse of pieces of bricks at the kilns before they are burnt, and use them as Sulky. The mortar made with this, never binds but crumbles to pieces —

— Query what reason is given for using flat roofs in India and Pitch roofs in Europe? —

365 C As Sulphate of Soda looses near half its weight by efflorescence this circumstance should be attended to in prescribing doses of this Salt — Rather more than one third less in a state of efflorescence ~~[illegible]~~ should be given than in fine transparent Crystals —

366 C — Nitrate of Soda (cubic nitre) Dissolves in two parts of cold water to 1 of the salt, and in nearly the same proportion of in boiling water

367 C — The best process for crystallizing salts which dissolve alike in hot and cold water, is to expose their solution in a dry place to the slow evaporation of the atmosphere. In this way the Crystals are larger and more perfect—

Ex: nitrate of Soda

—This salt is not found in Nature, it a product of art, and has hitherto been applied to no useful purpose—

368 A sepulchral lamp was found in the grave of a Roman in the Island of Nisida near Naples which is said to have burnt with a clear light in a Glass phial hermetically sealed; and was extinguished the moment the glass was broken!!—

369 When Augustus conceived a rather fanciful to conceive the thought of restoring the ancient fashion of the Republic, Agrippa advised him to pursue his plan; Maecenas advised the contrary. Manners were right. Political Chimeras are unmanageable: but the most dangerous of all is the project of engaging that a people deeply sunk in degeneracy, are capable of recovering the ancient grandeur of virtue who expect the bird into the air after his wings are clipped.[2] To pass from restoring it to the power of flight it will but disable it the more. ——

370. Bells are said, from the Latin name (nola) to have been invented at Nola in Italy, in the fifth Century— Bells are much older—mentioned by the Ancient Greek and Roman writers. Euripides — Aristophanes &c —

371. The boatmen in the neighbourhood of Capua by whistling collect a great number of Dolphins round the boat — to that the story of Arion has some foundation —

372. The Cork tree is the only one which lives after stripped of its bark — The bark is from 3 to 4 inches thick —

373. A state is free as Slavish according as [mostly] good laws govern or are neglected —

374 M — In Dr Beddoes report respecting the use of nitrous acid in the cure of the venereal disease, the quantity of nitric or nitrous acid was from 1 to 3 Drams in a quart of water, ~~contain~~ with the addition sometimes of water Gruel, but often with common Syrup from 6 to 8 ounces to the quart of the compound. This medicine did not last once in 3 or 4 days — The general effect was to increase perspiration raise the spirits, and suppress the constitution — To prevent the acid from acting on the Teeth it was drank through a tube. —

375. It is remarkable that the word innovation which usually requires change by the introduction of something new, should almost universally be understood in a bad sense. An innovation may only be an improvement as well as corruption — Every discovery is an innovation —

376. C — The strongest Spirit ever produced in England was reduced by Mr Lewis Dublin Hotham Specific Grav: at 55° Fahrenheit was 809½ Mr Hodges produced Spirit of 813 at the Temp: 60°. that is 810½ at 55°. — Alcohol at Apothecaries Hall is 820 at 55° ——

377. Miracles appear on that all laws both Divine and human ~~prohibit~~ forbid to violate illustrious actions &c were written in verse and probably sung by a Chorus to the sound of instruments, this Liar found the most effectual means to inspire Morality and Religion on the minds of men —

378. C — The Nitrates of Silver, Mercury and Bismuth are all equally clear — Green the best mode of distinguishing them —

379. C — Nitrous gas from iron is very variable and therefore uncertain in Eudiometrical experiments — Alkaline sulphurets are much preferable as tests for determining the purity of air —

380. C — All the oxyds of copper that are formed or dried in the air, precipitate, besides the blue, a green oxyd —

301 To analyse Gun powder —
C

Boil the Powder in distilled water on evaporating the filtered liquor, all the Nitre is obtained by Crystallization There remains on the filter the Sulphur and the Charcoal. These may be separated either by sublimating the Sulphur in close vessels, or by exposing the mixt to a degree of fire capable of burning the Sulphur without kindling the Charcoal which is easily done under a muffle —

N.B. In separating the Sulphur and Ch^l by Sub^n part of the Sulphur adheres to the Charcoal, Mr Beaumé thinks about $\frac{1}{24}$ part of the whole —

302 As the Agate and Carnelian sometimes approach near to each other in colour &c they may be easily distinguished by their fracture, that of the Agate being rough & the Carnelian smooth and shining

[illegible] — a [illegible]

303 The velocity of a body may increase to such a degree that friction will hardly be diminished — Every eminence has not time to fall into every cavity immediately before it —

304. If attrition is hurtful in many cases there are some in which it is useful — In the action of files, — compass, Screws &c — &c —

305. Friction is diminished by daubing the surfaces with some greasy matter to fill the cavities, or act as small rollers —

306 A Gun discharged on the water or from one side of ~~the~~ a river to the other is said not to carry a bullet so far as on land — the mistake arising from a wrong estimate of the Distance —

307. Dr Carter Lecture and some other Philosophers subscribe the universe a Plenum, and constituted a plenum by an elastic fluid. But Elasticity is incompatible with a plenum.

308. It is alledged by some that a lecturer on Chemistry should be a prudent man. If this be true, with the same reason he should be a Dyer, Bleacher, Brewer, Distiller, Potter, Glass maker, and fifty other arts and manufactures —

The medical virtues of certain bodies belong to the Physician not to the Chemist Every Physician should be a Chemist but a Chemist need not be a Physician — Chemistry cannot ascertain the medicinal property of a body. — Exemplified by Sugar of Lead and common Sugar — Analogical reasoning has hitherto been of little use in the medical Science —

309. Pharmacy is the art of collecting, preserving and preparing for the use of the Physician the various substances employed to act on the human body with a view to the production Health and establishment of health — Dr Black —

390. Dr Black's course of Chemistry consisted of 118 Lectures, of which only the last and part of the preceding are dedicated to Pharmacy — and this merely as an example of the application of Chemistry —

391. In forming mixtures does the composition it self ever purge? — No.

392 In Capt Kandy's patent telescope the divisions on the Micrometer scale must be doubled, because as both systems move, the scale moves thro' but half the space — When doubled, the scale gives minutes of a Degree

393 A whistling howling wind is u-
C niversally considered as a sign of rain.
1 The sign is common to all climates
and all ages — This is a sound al-
luded to most probably in sacred scrip-
ture "And Elijah said unto Ahab get
the up for there is the sound of abun-
dance of rain" 1° Kings 18 —
— Query the cause of this whistling?
Is it owing to an increased quantity of
moisture in the air? Is this moisture
is a combined or free state? —

394 The dominion of the priesthood over the
laity is in proportion to the absurdity
of the doctrines and multiplicity of the cere-
monies of any particular religion. —

395 A calf is more effectually nourished
11 by diluting its milk with an equal
quantity of water than by the milk alone
— Dr Cullen —

396. From Chemical investigation much
Knowledge with regard the nicest method
of bad air has been expected; but it is now
known that little can be obtained
— Dr Cullen —

397. The effect of warm water on the stomach
11 is a disputed problem. — Dr C —

398 A weakly child totters as it walks;
11 but by giving it a weight to carry on
by thus increasing the tension of the system
it walks more steadily — Dr C —

399. In Britain the latest part of the sea-
son is always the richest. —
— In cold climates a longer time is requi-
site to elaborate the juices, than in
warm climates — Dr C

400. It is generally supposed that the Most stylish become less as they advance in years, M. Adams always found the reverse to be true. Best despatches become necessary as the person advanced in age

401. A person who has been couched for the cataract, requires two pair of Spectacles one for distant, the other for near object

-x This proves that the power of adjusting the eye to different distances resides in the Crystalline Lens Foci from 1½ to 6

402 A Galilean telescope does not admit of a Micrometer or cross wires because the wires cannot be so situated to be seen distinctly with the object.

403 When the number of real images is even, the object appears upright, when odd, inverted —

404. Pythagoras is said by several ancient Authors to have sacrificed a hundred oxen to Apollo on discovering the Theorem which goes under his name. This seems inconsistent with the doctrine of Pythagoras, the Metempsychosis

405 Q N. in the end of a Syllable in English Sounds like n. with the preceding vowel Long, E-G. Reign, resign — Gnaw should Oppugn be pronounced in like manner Oppune? — Mr. Crawford pronounced the word so, but Miss Young sounded the G — Dare where are the Nasal sound of such Syllables? — Condign, Malign &c

406 Is not a Balance beam with 3 pans & Screws at the end the best? in the beam can be accurately adjusted immediately before the experiment?

407 The sum of the lines forming the angle of incidence and reflection is less than the sum of any other two lines drawn from the same points that is AB+BC less than AD+DC The course of the rays should be the shortest possible — Value simple &c

408. Of the five regular Solids, a congeries of Cubes only can fill a solid space — Hutton in his Phil.al Dict.y says all can. This is a mistake

409. As a white heat is required for the distillation of Phosphorus, why does not the vapour in its passage into the receiver take fire? — It has not atmospheric air —

410. If two bullets one of Cork the other of lead be discharged in vacuo the former will go farther than the latter. —

411. Last night (12 Feby 1801) Calcutta — I was much entertained and somewhat alarmed with the following phenomenon of vision. I lay awake till, I think after 12 when some luminous Sparks appeared on the bed curtain I first thought it must have been a fire fly moving about in the room, but soon found that it was in the eye itself. The following are the principal circumstances attending this luminous phenomenon — — Stars appeared towards the sides of the eye, and when the eye was moved the stars fled from the axis. — When a star approached the extremity of the eye it darted in a large flash of light, like the lambent lightening sometimes observed near the horizon. These flashes took place whenever the eye was suddenly moved. They sometimes spread and divided like branched lightening or like the strong Electric spark. Sometimes a kind of faint blue light with stars resembled the heavens. The bed appeared distinctly and when I held out my hand I could discern its white colour and distinguish each finger, tho' there was no moon and the room was shut perfectly close. I tried a new English blanket whether Electricity had any share, but found not the least appearance — The Phenomena was nearly the same whether the eye was open or shut. On looking towards a window I could not perceive a Star or any the least appearance of light. I now began to be alarmed for my

34 eye sight. occupied fully with this
C subject I fell a sleep and dreamt on the
horrid consequences attending my waking thoughts
I was happily relieved by the morning
Sun, when looking out of the window
I found my sight as usual C. —

412. Teak Casks render the country rum bitter
like Teak, if the casks be new — A few
casks of this ~~rum~~ wood rendered the rum so
much like arrack that the owner ~~of it~~
was obliged to enter it at the Custom house
in London and ~~to~~ pay the Duty for Arrack
which is much higher than for rum. —

413 The magnifying power of a Solar Mic
is as the Distance of the screen to the fo-
cus of the magnifier

414 In the compound Reflecting Microscope the high
Magnifier does not much exceed that of
lenses. For altho' the power of the
object lens is greatly encreased by two eye
glasses, yet the former must be a much
less magnifier than in a single Microscope —

415. Would it answer the purpose to extract
C the Gallic Acid from the numerous woods
of this country which contain it for Tanning? —

416. Gypsum when applied as a manure
C and sown at the rate of about Six
bushels ℔ acre, produces excellent effects —

417. Two pieces of an iron rod are to
be screwed, quere what proportion should
the interior screw have to the exterior? —

418. In a long continuance of hot weather the
C Burning Glass does not act so powerfully as
on the Suns shining immediately after a shower
quere the cause

419 Spirit of wine cannot be inflamed by the most
C powerfull burning glass — quere the cause —

420 Wednesday 6th March 1799. The French caught
two large Sharks. When got on board and
opened, Six young ones were taken out of one
two feet long, they were not only alive but ex-
hibited the greatest vivacity, and in a tub of
water swam with as much liveliness as

if they had been in the sea.

Gregory's Journal of the [illegible] Mr. Voyage

Query from what part of the Sharks were the young ones taken? —

421. C. The Kidney bean and convolvulus with some other plants follow the sun from east to west, whilst hops, honey suckles and many others move in the contrary direction

422. C. Receipt for curing butter —
Take of fine salt 2 parts, salt petre 1 and sugar 1 mix them well together by blending the whole completely. Take one ounce of this composition to a lb of butter (16 oz) work it well into the mass and close it up for use. It ought to stand three weeks or a month before it is begun to be used —

Dr. A—n [illegible]

423 M. Cure for the Dysentery by Dr. Perkins
Dissolve any quantity of the best vinegar with common or marine salt. To one large table spoonfull of this solution add four times the quant. of boiling water. Let the patient take of this preparation, as hot as it can be swallowed, one spoonfull every half minute till the whole be drank. This is for an adult. If necessary repeat the dose once in six or eight hours. Cooling simple drink, such as plantain tea sago &c may be used.

424. There is no word in the Swedish Language for Adultery!! —

425 That Gravity decreases in the inverse proportion of the squares of the distance is proved from Gravitation acting in straight lines, and from the motion of the moon — That gravity acts in straight lines is proved from the perpendicular descent of bodies to the surface the deviation arising from the spheroidal figure of the earth makes little variation for the law —

426 Professor Jacquin of Vienna has lately (1801) made some experiments on the Gases as vehicles of Sound. A small pipe about six inches in length was fixed into the neck of a receiver on the Shelf of the Pneumatic-Chemical Apparatus. A bladder full of any Air was adapted to the mouth of the pipe and the Jar or receiver was filled with the same air

— results

The intensity did not vary, but the pitch when compared with Atmospheric air was as follow

Oxygen Gas half a note lower

Azote — half a note lower

Hydrogen — Nine or eleven tones higher

Oxygen and Azote in proportion of At: air gave the same tone as A: a.

When the two Gases were not in proportion or properly mixed, the sound was very harsh

Sup: to Ency: 13c —

Dr Chladni of Wittemberg has lately

427. invented a new musical instrument composed of Glass tubes about the size of a quill and 16 inches long (42 inches) This instrument is played on by rubbing the tubes longitudinally by the wet fingers — Sup: E. Bc

428 Chimnies were unknown to the ancient Greeks and Romans — Vitruvius does not say a word on their construction. In Herculaneum tho' coals were found in some private houses, yet neither Chimney nor stove has been found —

429 To three parts of quicklime newly made, add two parts of a saturated solution of fixed alkali in water, the compound is a liquor somewhat milky, which kills earthworms caterpillars and other vermin almost the instant they touch it, without injuring in the least the most tender vegetables. Sup:

430 One ounce of Gum Arabic renders a pint of water considerably glutinous: four ounces gives it a thick syrupy consistence; but for mucilage one part Gum to two parts water is required; and for some purposes an equal proportion will be necessary.

431 Hot water is best fit for slaking lime than cold, the absorption expedited by the heat of the water added to that of the lime

432. A metal by being forged or drawn frequently through a hole in a steel plate has its cohesion greatly increased. This very difficult to be accounted for. The general density in all of the metals is increased except lead wh. is rather less by being wire-drawn; but the ×cohesion may be more than trebled by the operation. Gold silver and brass have their cohesion nearly trebled; copper and iron have it more than doubled.

× Gren says the density is increased both ways

433. A piece of iron in a solution of blue vit is almost instantly incrusted with copper. Query why does the process continue till the whole iron is sometimes wholly dissolved? Should not the first incrustation prevent the further action of the acid on the iron and consequently any further precipitation of the copper?

434 The schedule to the act of Parl past in the year 1751 or 24th of George 2d contains the Calendar of the Church of England then introduced on account of the alteration of the Style. For the table for finding Easter day = "For the next century, that is from the year 1800 till the year 1899 inclusive, add to the current year

435 To measure the diam. of wire. Coil & wrap the wire several times round a cylinder ~~to~~ measure the whole, which divide by the number of coils —

436. After pouring Sulph: acid through a glass funnel which was perfectly dry the tube of the funnel in a measure & the two became so hot that I could scarcely touch it. This is a proof of the great moisture of the atmosphere at this season (rains) 15 July 1805.

437. Water enlarges its bulk about 1/167 from 60° to 100° of Farenheit's Thermr.

438. Specific Gravity of fluids may be ascertained by weighing them in the same bottle which should contain at least a Pint, and should have a long stem, the bore of which should not exceed a quarter of an inch.

439. Olive oil has been found to be a cure for the Plague at Smyrna. It is rubbed into the body all over - About one pint each time.

440 A very limited voice can extend to 12 notes or an octave and a 5th below. The motion of the Glottis between these extreme does not amount to 1/2 of an Inch. The most Powerful is derived by the most ordinary singer into more than a thousand parts: and this must be done in an instant and repeated with rapidity, without ever mistaking one of those divisions. The mechanism for effecting this is very remarkable and seems to point that the Author of our being meant to give us this pleasure

441 The Forte Piano was invented by Mr. Wilhelm Mason an Englishman.

442 A harp string has a considerably lower tone than a steel one of the same diameter and tension - Guess how much, and the cause. - Steel lighter and more Elastic [illegible]

443. The Celestina "described by Marsennus by the name of Archimeta. A fine kind of horse hair or silk is extended below the strings and drawn smoothly along by a wheel. By a particular mechanism of the keys this hair band is made to press on one or any three conveniently as the strings of a violin are touched by a bow. —

444 There is no sensible difference between the ancient and Roman ounce and our Avoirdupois ounce — W. Cotes —

445. In 1705 the Variation of the Compass on the Plains of Abraham was 12° 35'
In 1793, 12° 5'

446. W. Canton thinks the diurnal variation of the Magnet to arise from heat: — that diminishes magnetism

447. The muriatic acid of Lemons (citric acid) is not so powerful an antiscorbutic as the juice it self. — Experiments to Chuse —

448. It is said that the best soil is that which discharges most inflammable air —

449. La Cats experiment of the fine beads being moved when held between the eye and a small hole in a black card is said to have puzzled the late M. Dufay to account for it — Why? —

450. The night tides in the Bay and Gauges are always higher than the day tides. This is known to every Bengalee — Guess the cause, and what the annual difference?

451 Dr Franklin first observed that the non-conductors of Electricity are also non conductors of Caloric and c. contra. — Examples metals, Glass. But to this rule there are many exceptions

44

The common Torricellian Vacuum affords a
ready passage to the Electric fluid. but M.
Thomson found that it was less permeable
to caloric than Atmospheric air which is a
very bad conductor of caloric. Sulphur and
oils which are non conductors of Elect.y are
represented by Rumford as the best conductors
of Caloric

452. Iron powder fuses at 600° of Fahrenheit-
C scale

453 Fourcroy is not correct in saying that caloric
C all mineral substances are dilated by heat-
The minerals which contain a large pro-
portion of Aluminous earth afford a striking
exception to the general rule — bodywards &c is
is an exception — See Phil. Trans. 1796

454 Light sustains no diminution in passing thro'
the flame of Argand candles according to
Count Rumford —

455 Whether light emitted during combustion be
C derived principally from the combustible body or
from the oxygenous gas, for it seems impropper
to derive it exclusively from either, when
there is reason to believe that it enters into
the composition of both. The present State of our
knowledge of Chemistry does not enable us to
determine. —

456 The Caloric of the French Chemists
C is synonymous with the igneous fluid
of Lavoisier, the absolute heat of Dr. Crawford
and with the matter of heat of La Place.
These terms express a particular kind of
matter or a particular quality of matter
which exists under a variety of modi-
fications that are mutually convertible
One of these modifications is pro Caloric
It is in this state that caloric affects
ourselves with the sensation of heat,
and that it expands in every direction. the
bodies

into which it ~~which it~~ enters. Free caloric was formerly called sensible heat, and is synonymous with the expressions of interposed caloric, uncombined caloric, thermometrical fire and caloric of temperature

Thompson notes a Fourcroy.—

457. To purify Tin, melt it with Sulphur or any fat substance to prevent its oxydation—

458 Corrosive Sub: is the best test for discovering whether a fluid contains Vol: alkali — a precipitate.—

459. By a late census (1801) of the united states of America it appears that their population is 6 million, their Merchant Shipping at least 10,000 the value of their yearly exports above 70 Million of Dollars, and their public revenue 15,000,000 of Dollars

Calcutta Post—

460. This day, (21st Dec. 1801) after looking at the Sun tho' a pair of Spectacles of coloured glass I wrote a few words in my Diary, the letters became gradually of a very bright red colour, the ink in the pen was extremely [illegible] On repeating the experiment, I found the result the same. The beautiful red was produced only from a black body.— query the cause?—

461 In the Danish Language öe is always sounded like oe — Röemer Muschenbroek

462. It is contrary to the Jewish religion to attempt to make Proselytes—

463. Phosphorus is not considered as a useful remedy in cases of Debility nervous fevers Palsy [?]

M Epilepsia impotentia virilis &c — in one occurred lately in which a person poisoned by aqua tofana was saved by Phosphorus. Its effects are at the same time in a considerable degree diuretic and diaphoretic — Phosphorus exhibited by mixing it with conserves with oil, both improper the last extremely disagreeable to the

taste. A solution in Ether, here its heating and irritating qualities are greatly increased and as only 8 grains of Phosphorus are soluble in one Ounce of the Ether, 120 drops must be taken to bring one grain into the body which in most cases would be too dangerous. However this Naphtha Phosphorata may be of great benefit in cases of a very high degree of nervous debility, combined with a total want of sensation —
Med: & Phys: Journ Vol 4

464. To exhibit Phosphorus. Rub 2 grains with Sweet Almonds or a sufficient quantity of Gum Ar. to make an emulsion and by an addition of Spir: vol: dul: or Liquor Anodynus, the taste and smell of the Phosphorus is rendered less disagreeable — Anodyne Liquor may 30 drops to two grains of Phosphorus — A table spoonfull every two hours. — 6 ounces of water used.

M

465. Sores of the worst kind cured by the Gastric Liquor of Bullocks Sheep and other Animals

M

M. & P. Journ Vol: 4

466 Mr. Humboldts Anthracometer for measuring the quantity of Carbonic acid in the air
See M. and P. Journ Vol 4 —

467 In Courch Bahier the following custom prevails. If a Rhyot or peasant owes a Sum of money which he is unable to pay, he is compelled to give up his wife as a pledge, and possession of her is kept until the Debt be discharged, continue for the space of two or three years. Should there be any Children during her residence with the Creditor half goes to him and the other half to her husband.
Turner Embassy

468 On one of the Bootan mountains the Natives never speak louder than a Whisper For they seriously believe that loud speaking gives such a concussion to the air that a deluge of rain is sure to be the consequence

469 In Bootan and Thibet the cups being always under the Liquor before his master pours a little into the hollow of the hand. This practice to prevent poison.

470. The Bootan bow is six feet long, straight when unstrung, made of a bamboo peculiar to the mountains of that county. Bow string a small cord of hemp — Arrows of a Dwarf bamboo, headed with barbed iron. Bow held in the right hand, bent by the thumb of the left armed with a ring or piece of leather, the fore finger on the thumb nail. —

471 The poison used for arrows is of a vegetable inspissated juice, but tho' it inflames the wound it is seldom fatal. —

472 The Bootan churn is a bucket with a hole in the lid. Thro' this passes a bamboo whirled round by two persons who take hold of each end of a string — the upper end of the staff being pointed is received into a hole in a bit of wood which is occasionally tied to a tree &c. The lower is often made four piece, which are kept asunder by a cross piece &c. —

473 In Bootan Dead bodies are exposed to in the open air like the Persees to be devoured by ravens Kites and wild Dogs. —

474. In ~~Bootan~~ Thibet raw mutton is preferred to cooked meat —

475. The Bramins can sound their Chank (Shell) for a quarter of an hour without intermission — same as the blows pipe

476 The Burmans celebrated the last day of the year by a peculiar custom, that of the men throwing water on the women and the women on the men to wash away the stains of last year.

477 Burman houses of bamboos and mats are constructed in the same manner as the Chinese — — Symes Embassy

478. Mr. Robertson has repeated Volta's Experiment for the first time at Paris — 100 pieces of silver and Zinc exhibited attraction and repulsion sparks, the divergency of the Electrometer, and electric hail — He closed the sitting by charging 100 of the Leyden bottles with the metallic pile, discharged the pistol of Volta by the sole aid of the Galvanic spark. — Madras Gazette Ext:

21 March 1802

479. Gilbert Wakefield says Pope did not understand Homer in the original. —

480. Is it possible by means of a small hole in a very large syphon to near the crown of the instrument to supply a house with water while the syphon continues to discharge the larger quantity in the usual way? — Mr. Newman finds the experiment to ~~succeed~~ when the hole is very small —

481. Green flax after the seed has been taken from it forms a good thatch for a house let it be fastened ~~together~~ with a cord well impregnated with ~~pitch~~ tar: the thatch in a wet state. In a short time it swells and throws out a glutinous matter which makes the contiguous stalks adhere together and form a solid impervious to the elements, affected by neither sun wind or rain

be thrown thwarted in this manner fifty years ago is as dry as when first put on —

482\. The following may be depended on as a fact. A man who had been condemned to be hanged and had only three or four days to live was complaining to a friend who visited him in prison, of his hard fate. His friend replied there was nothing in it at all, and asked him what he would give him to take his place. The Prisoner said he had only four rupees, I will take it said the other. He accordingly put on the dress of the other, shaved his head, got the irons changed and looked so like the prisoner, that he passed undiscovered till the moment of execution. When the felon was found concealed in another part of the prison

483\. The custom of crying at parting, between the parents and the Bride is common all over India, the same in England Scotland Ireland and probably all over Europe. —

434 The families of distinction at Jurik Cylon make a point of keeping their deceased friends as long as possible from the Pile so that the body is perfectly putrified and consequently dangerous to come near it. As the nearest relative must light the Pile he does by the following con trivance

435 The national debt of Gt Britain being 538,365000 £. If the amount were in shill and allowing 30 to be counted in a minute for ten hours in the day and six days in the week would require something more that 1917 years: weight in Gold = 5760 Tons. In Guineas it would extend in a right line 8092 miles would cover

upwards of 63 acres of ground. In Shillings it would extend in a right line 169,932 or surround the earth seven times

Cal: G: 18th Nov. 1802

436. The greatest limit of Solar eclipses is 17°. 32'
Least 15. 2

Greatest duration —— about 4 2 2/4

+ not correct — Long's Ast. vol. 2

437. Just before a north wester begins to blow hard, there is a dead calm (During this interval the wind veers from Easterly to N westerly) It is said that during this short calm stagnant water and every other object emits a stronger odour than at other times (I shall ascertain this during next n. wester season —— True —

438. Best English double aquafortis consists of 9 parts Nitrous Acid and 1 part Sulph: acid

Ch. — Single aquafortis of 20 parts Nitrous acid and 7 Sulph: acid and 30 water — by weight —

439. Roberconte's recipe for an excellent ink — 8 oz Galls and 4 oz logwood are boiled in 12 Pounds of water for an hour, or till one half the quantity be evaporated. This liquor is percolated thro' a hair sieve, and 4 oz sulphat of iron 1 oz Sulph: of Copper 3 oz Gum Arabic and 1 oz of Sugar Candy are added. Stirred and let stand for 24 hours. Liquid poured off from its thick sediment, and preserved in well stopped glass bottles. ——

440 New planet Ceres

30th April 1802 Right Ascension 176°. 29'
Declination - 17°. 17' N

29th June 1802 Right Asc: 182. 59
Decl: 8 53 N

These calculated by Dr. Gauss.

17th March was in opposition to the sun and 30° past its perihelion

— apparent Diameter about 1″½
its real Diameter about 1/7 of that of each of
1/2 that of the two

441. On the 28th March 1802 Dr. Olbers of Bremen discovered a new planet in the Northern wing of Virgo like a Star of the 7th Magnitude — The orbit is Pallas
— Mean distance a little less than that of Ceres. Excentricity greater than that of Mercury
Inclin: of orbit — 33° 37′
Periodic time 4.6 years being 2 months less than that of Ceres. — It crosses the orbit of Ceres — nearer the Sun in Perih: and farther in Aph: Note that planet Dr Herschell has made obs. on both in making the Diameter of Ceres 162 miles of Pallas 95 Ditto

Monthly Magazine, Mar and June 1802 —

442. In North America and in the northern parts of Germany, apples are preserved through the winter by putting them into a room prepared in the upper part of the house for the purpose with a home cloth spread over it. A woolen cloth it is said will not answer the same purpose! — query the cause —

443. If a rope be interwoven among the branches of a fruit tree in blossom, and one end of it brought down to water in a bucket, the tree will not be affected by a slight frost in the night. A pillar of ice will be formed on the surface of the bucket, tho' there will often be no ice in another bucket which has no rope in it.

444. In levelling if double and equidistant stations are used, there is no necessity of reducing the apparent level to the true, the visual ray on both sides being raised equally above the true level. —

445. There is a patient brought to Calcutta from the Cape, which Thinks well, tells it wants, when the first shower, it is said instantly destroys the patient—

44

Mr Carey—

Mr C— Will write on the effects of the first rains of the season in producing pains both on Natives and Europeans. He says even Water particularly that of small rivers produces the same effect — Ice bathing in the Ocean after the first rains of the season pains in the Ears, or the face and almost every part which the water has touched are the consequences — Query whether the first rains of the season quickly this the first rains of the season to produce this effect? or may it not probably be the consequence of the sick of the body after so long a Drouth and heat.

446 An Astronomical book is not peculiarly adapted to the introduction of sentiments of piety and of Arguments in favour of religion. Every thing is beautiful in its season. The 47 prop: of Euclid, however true and Elegant, could not with propriety be introduced into a charity sermon

Mr Vince on £. 4 11s

447. Sir Isaac Newton has never introduced Fluxions into his principles nor even Algebra except in Book 1 prop: 45 To find the motion of the Apsides in orbits approaching nearly to a circle. — and this only in the Examples

~~446~~ and in Prop: 10 B. 2 Given the resistance of the velocity and density of the medium conjointly, to find the density of the medium in each place that will cause the body move in any given ~~right line~~ curve line with the velocity of the body and resistance of the medium in each place

Cor: 2 Example 2

448. If a candle be placed at an angle of about 30° it will require no snuffing and will burn with an uniformly steady light.

449. Bags steeped in a solution of Nitre effectually keeps off the weavels and other destructive insects from Corn —

450. Brass of old hat immersed for a few minutes in Sulphuric acid becomes excellent polisher for the hardest metals

451 It has been lately asserted that Woulfe's apparatus was the original invention of Glauber

452. Citizen Bolet Bleacher at Dijon has discovered that ox: m: acid gas is well adapted for the recovery of the drowned. Drowned rats were recovered by this gas in his laboratory. He tried the Experiment on several other animals with success at last on himself!! —

News Paper May 1803

453 It is said that violent gales and great hurricanes happen in this country generally at the quarters and not at the full of the moon as commonly supposed in Europe

— In the year 1787. ~~Aug~~ 2 Nov. A dreadfull hurricane destroyed the crops in Bengal and a famine was the consequence — The like happened about 17 or 18 years before, in the month of May — Query what was the position of the Moon's Nodes, ~~Apo~~ Apsides &c — will the moon's orbit be in a similar situation in the year 1805? —

— To the above it may be added that there was a hurricane in 1769 and a famine in 1770, which corresponds nearly to the first mentioned interval. —

454. Is the log time of a Ship heavier by [illegible] water, as is assumed by so many learned gentlemen? If so how is the fact, if it be a fact, to be explained, that at a certain depth the [illegible] will sink no further,

— All vegetable substances when completely soaked in water are heavier than water.

— a wet sheet instantly sinks

455 A few spears and swords of different kinds just cleaned, were placed with their handles on the floor and their points rest against the wall of the room in a [illegible] sloping position about a month ago. The sides of the blades which are next the wall remain perfectly clean while the others are covered with rust As the air had equal access to both sides the cause Was the white washed lime wall any effect on the moisture of the air near it?

456. This morning I found a species of Insect lying dead on the table of my Laboratory with two small shells of Phosphorus half covered with water. The water was [illegible] oily— The Insect having remained in that position for a long time, the upper part of the Phosphorus and not whom the oily consistence of the water?

457 What drawback is there on glass imported into India from Britain? — Different duties &c — —

458. A hurricane on the East coast of America happens some at a place to the southward by about one hour for every 100 miles —

459. If a piece of charcoal be struck by a Nail or any other body it will produce a spark Shew the danger of employing charcoal in shelling in making G. Powder

~~460~~ In the experiment with the Glass tube and feather when the tube is moved round the feather the feather keeps round the tube keeping always the

460. The pigeons of this country (India) are fond of rock salt, which they are seen to eat in considerable quantities —

461. When a watch is winding up, it requires a greater force near the end than at the beginning — Quere the cause, and does she go faster immediately after being wound up? — Probably owing to the inner spirals of the main spring rubbing on each other — In adjusting the fusee to the spring, the tool allows for this.

462. The Malay Music resembles very much the Scotch — The smoking pipes used by the Malays in opium are brought from the Moluccas, mostly from Banda —

463. The short tubes of unannealed glass called by the English proofs, which crack by the smallest bit of flint dropt into them, break with much difficulty in this country (India) Quere does this arise from the tubes becoming partly annealed by the heat of the climate? All edge tools, as is well known become too soft in this country. —

464. To give Malt spirits the flavour of brandy — To one quart of Malt spirits put 3½ ounces of finely powdered charcoal and 4½ ounces of ground rice — 15 days frequently stirred or shaken after — liquor much improved —

465. Instead of the Gold leaves in ~~Cavallo's~~ Bennet's Electr.r — if very fine threads stiffened with glue be used, the instrument will be found nearly as sensible as with slips of gold leaf. —

466 In the Electrical experiment with the glass tube and feather, if the tube be moved round the feather, the latter turns round its axis keeping the same side towards the tube.—

467 The writing paper used by the Burmahs consists of the bark of a particular tree, flatted and dried. This is rubbed over with charcoal and the charcoal is rubbed in with the leaves of a particular tree, ~~or~~ containing, no doubt, a ~~ps~~ gummy or resinous substance.—

468 In the case of oblique angled plane Trigonometry, where the three sides are given to find the angles, the supposition of the [illegible] perpendicular falling without the base is of no use, because a side may be assumed in every such case ~~[illegible]~~ for the base so that the perpendicular will always fall within the triangle

469. Water may be kept in open tanks made of wood lined with sheets of tinned copper, perfectly sweet ~~for~~ during the longest voyages— For this discovery the Society of Arts &c. has given to Genl. Bentham their Gold medal

470. The Retina of a sheep's eye had been preserved for some time in water. About half the water ~~water~~ was taken out and the place filled up with spirit of wine, in three days the Retina was totally dissolved in the water—

471 A change of air or place ~~or~~ such as removing from the Country to town or going on board a ship is generally followed by a costive habit of body This has several times happened to me on moving from one house to another. On the 1st of March 1805 I moved from Lyons Range to No 5 Crooked lane in Calcutta, and had no evacuation from the 1st to the 5th but regularly afterwards— Query the cause