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Wm. Le. Nesbitt
Albany

GALE'S
CABINET OF KNOWLEDGE;
OR,
MISCELLANEOUS RECREATIONS:

CONTAINING

MORAL AND PHILOSOPHICAL ESSAYS, PROPOSITIONS,
NATURAL AND METAPHYSICAL MAXIMS,

AND

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TO WHICH ARE ADDED,

A GREAT NUMBER OF ORIGINALS.

LIKEWISE

AN APPENDIX;

containing various Propositions tending to prove

LIGHT AND HEAT TWO DISTINCT BEINGS;

WITH

SOME CURIOUS DEFINITIONS IN OPTICS.



THE FOURTH EDITION,

WITH MANY VALUABLE ADDITIONS.

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THE PREFACE.



THE Title-page setting forth so fully the substance of this book, it is presumed that little need be said in respect to its contents ; yet, as a preface is usually expected, I cannot well avoid saying something relative to its utility.

The following sheets will be found to contain such a collection of choice,

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useful, and entertaining matter as never before appeared in print ; and such as must prove a spring of invention to the ingenious reader ; furnishing him with such hints, contrivances, and discoveries, as are serviceable to the necessity, convenience, and pleasure of human life. Of all the methods capable of being practiced with success for cultivating the understanding, there are none that procure more sure and lasting effects than curiosity.

The desire of wisdom and knowledge to us is as natural as reason, it exerts itself with force and vivacity through every stage of life ; but never with more efficacy than in youth,—when the mind being unfurnished with knowledge, seizes with a peculiar eagerness on every object

that is presented to it ; resigns itself to the charms of novelty, and easily contracts the habit of reflection and attentiveness.

We might receive all the benefit this happy disposition is able to produce, did we employ our time upon subjects equally fit to engage the mind by pleasure, and fill it with clear and instructive ideas.

It is by this book that I propose to lay open to every eye such entertaining extracts as must tend to make young persons sensible of what treasures they possess unenjoyed ; and to present to their observation those things which inattention, want of time and opportunity might have concealed from them.

But as it is not sufficient to give the mind a propensity to be curious, by entertaining it with agreeable subjects, unless we likewise teach it to be moderate and cautious in its curiosity, my intention has been not so much to collect all the deep learning that may be advanced under each particular, but to offer that which seems, in my judgement, most easily to present itself to the first efforts of reason; and to be most adapted to the taste and occasions of those readers whom I had principally in view.

As to the mode of the work, I have endeavoured to exclude from it whatever might seem disagreeable; and instead of a methodical discourse, or chain of dissertations, that frequently satiate and

disgust, I have chosen the stile most natural and proper to engage all sorts of readers.

The works to which I have had recourse for my own information, and to justify my remarks, are such, I have no doubt, as will meet the good opinion and approbation of my readers; suffice it to say, that they are scarce, and not to be found in every library.

The alterations I have made to the matter extracted are of two kinds, some only relate to a few expressions that seemed too negligently touched, while others regard the substance of things, which in some places it was necessary to illustrate, and in others to entirely reform; and

upon the whole no pains have been spared to render this work valuable, and worthy of attention.

J. GALE.



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The following is an improved Answer to a Query inserted in
Page 255 of this Work.

Query.

Great Britain was discovered to be an Island in the Year
70—Who was the Discoverer ?

Answer.

Julius Agricola, who governed Britain in the reigns of
Vespasian, Titus, and Domitian, who also was the person
that finally subdued the Britons, and traversing the whole
Island, introduced the Roman laws and civility, and incor-
porated them into the empire of their conquerors.

GALE'S

CABINET OF KNOWLEDGE;

OR.

Miscellaneous Recreations.

PART I.

TRUTH'S MORAL EUCLID.

TRUTH in general is, *what is*; and what is, *is* but in respect of being *consciously* perceived by *some* Being; for if there was *no* Being to perceive what *is*, nothing could exist, since absolute *imperception* implies absolute *Non-existence*. Hence all *truth* is relative, or refers to other *truth*, *ad infinitum*, till we stop at some original; which proves the necessary and absolute existence of a *God*; an adorable *Great Being*; to which all other things, or Beings necessarily refer; whose own absolute *perfections* refer to his own absolute immensity, in which all things are relatively subsisting and have their being. But how, or in what manner this infinite and astonishing *Chain* of existence depends, our capacities are ignorant, except in some very few particulars, consistent with the nature of our present Being. And though the *Ways* of this *Great Being* are unsearchable, and his *wonders* will be ever past finding out, all intelligent Beings can discern so much of his perfections, by referring to their own conscious perception (the next truth lying open) as at once

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command their profound adoration! and men, and all beings, may be justly looked upon as a part connected with the great whole, which though inconsiderable in respect of that immensity, yet for wise causes cannot be destroyed; whatever *changes* all beings (animate or inanimate) are appointed to undergo. And as the *Law of God* is written in every man's heart, or *consciousness* (which he cannot recede from, or find *plea* to evade), he is relatively accountable for what he does in respect of his great original, and the *beings* with which he is immediately connected; and therefore this *standard of consciousness* in man, beyond dispute, is the *truth*, to which all his actions must refer; and even his *volition*, or will, according as he is *conscious* of his *intention* of *good* or *evil*, and no farther. And for any man to assert that he is not *free*, (notwithstanding his connection with other parts of the universe by which he may be relatively influenced) is the same in truth, as if he were to assert that he did not exist, when his *consciousness* is a proof of it to himself, and his very *denial* of his existence, a proof of it to the *consciousness* of others. So likewise he that denies the existence of a God, denies his own *existence*. If truth could be set aside or baffled, as easy as it is denied by *sceptics* (who sometimes disallow the Freedom of Human Actions), Human Laws would be in vain! and the judge who should at last ask the Prisoner, *guilty* or not *guilty*, in order to prove the truth, would himself be found guilty of a *false maxim*! When men deny the conscience and sense of things, all argument drops, and there is an end to enquiry after truth, by relation or connection of propositions.

Having cleared the way to truth (which variously refers) we would establish some general maxims (referring to the standard of conscientious right and wrong) as rules for Happiness in the conduct of Human Life. And herein we are obliged to the learned, *wise* and just *maxims* of the ancients.

True Moral Maxims.

1. The end of man's existence is proposed for happiness.
2. General happiness should be proposed in the private, and in respect of Society.
3. Men should not do unto others what they would not be done unto, in respect of conscientious right and wrong.
4. Virtues and vices in men's power, make rewards and punishments necessary, in respect of society.

5. In some cases, mercy is better than justice, in respect of society.
6. God is seen in all his works.
7. God is adorable for his perfections, &c.

PROPOSITIONS.

1. Virtue promotes happiness, private and public.
2. Vice is destructive of happiness, private and public.
3. Honour is the reward of virtue.
4. Fawn not on a *prince*, nor trample a *beggar* under foot, &c. by which it will be seen how far *morality* is capable of demonstration, according to the opinion of Mr. *Lock*, in his *Essay on Human Understanding*, that is; by an induction of moral propositions or precepts in the solution of any moral difficulty, or problem.

PROPOSITION I.

Virtue promotes happiness, private and public.

DEFINITION and DEMONSTRATION.

As in our *introduction* concerning truth, we have proved, that every *thing* known by the human mind, is but by its *reference* to, or *comparison* with other things, according to *conscious perception*; and that nothing is absolute but God; so virtue refers to human *action*, or disposition of mind, and the *comparison* of each with one another.

VIRTUE is the *name* of such *moral* actions, and *disposition* of mind, wherein the *benefit* of human society, in general, is *consciously* intended. If the *benefit* is restrained to *particular* persons, at the expencè of *injury* to others, it is not *moral* public good; which likewise regards the end of society linked in government. What promotes *moral* public good among the *whole*, and in each *particular*, promotes happiness, private and public; which is *virtue*. Q. E. D.

Corollary.

HENCE, to act according to *virtue* is to act consistently with the *harmony* and benefit of the *whole*, and of each *particular* member of society; which is the same as to act according to reason, judgment, and morality.

PROPOSITION II.

Vice is destructive of happiness, private and public.

DEFINITION and DEMONSTRATION.

VICE being the *contrast*, or *opposite* to virtue, refers likewise to action, and disposition of mind, wherein *selfish* gratification and *private* ends are considered, or *consciously* intended to the hurt of particular persons, against the *benefit* of society. If the ends intended by action, and disposition of mind, were for *moral* public good, they would not come under the denomination of vice; but those ends are sometimes perverted, and intended for public *mischief*, in the gratification of private ambition, spleen, or resentment, which is *vice* of the deepest dye: *As witness rebellions in Heaven and on earth.* Yet they always tend to destroy the peace and welfare of *particulars*, and therein are destructive of that *harmony*, which should subsist in the *whole*; consequently are destructive of happiness, private and public.

Q. E. D.

Corollary.

HENCE, to act according to *vice*, is to act inconsistently with the harmony of the *whole*, and of each particular *member* of society; which is to act according to *madness, folly* and *immorality*.

Scholium.

THE degrees of *virtue and vice* are according to the degrees of the good and ill intention with which they are practised.

ILL consequences may ensue from *good* design, and *good* effects from *ill* purposes, as matters of *slight* or little consequence may proceed from either; which alter not the *merit* or *demerit* of the motive they proceed from. So likewise *consciousness* of right and wrong, each person's director, is the measure of *innocence*, where neither *good* nor *ill* is intended; as it is the measure of every *duty* and *omission* in human life.

As men are linked in society, under the particular forms of government, and each member's time part of the public treasure, they are bound by their obligations to God for their Being, and the *whole community* for protection, to *bear and forbear* with one another as much as possible, consistent with their respective happiness, and the public emolument; according to

the maxim of *Epictetus*. But discovering men of *treacherous* dispositions, we may safely be allowed to break off farther society with them; as with the fewest acquaintance there is the least hazard of disagreement. And men of the aforesaid dispositions may be looked upon as pernicious members of society, by whatsoever *veil* they appear with *fair* characters. As it is incumbent on every *member* of society, by nature and reason, to promote his neighbour's welfare and happiness, so far as it is consistent with his *own*, and the happiness of the *whole*; so is it against nature and reason for the *whole*, or any particular *number* of *members* thereof, more or less, to diminish the welfare or happiness of any *particular*, or *particulars*, belonging to that society; the *obligations* betwixt *each* and the *whole* being mutual and reciprocal. Yet, where men *wilfully* counterplot each other's happiness, for private *lucre*, and ambitious views to themselves, the *satirist* is at liberty, with a *moral* view, to use methods for reclaiming them, and for restoring the benevolence of society. There are many other *unworthy* members of society, whose *vices* are all proper objects of the *satirist's* ridicule.

The preceding *propositions* proved true, being the two *principal* ones in the doctrine of *morality*, serving like 47 E. 1, and 4 E. 6. in *geometry*, the demonstration of many other *propositions* may be deduced therefrom, and the axioms of the *conscientious* right and wrong, and of doing as we would be done by; which axioms are often forgot, or neglected.

PROPOSITION III.

Honour is the reward of virtue.

THE DEMONSTRATION

Is very plain from the foregoing *inductions*; for virtue being *benevolent* to *all*, must needs be applauded and rewarded by *many*; bringing reputation and honor. Q. E. D.

PROPOSITION IV.

Fawn not on a prince, nor trample a beggar under foot.

DEMONSTRATION.

To *fawn*, is to suffer one's self to be *trod under foot*, by courting the *insolence* of mankind; by which servility many

have paved their way with difficulties who might have gone *smooth* and easy; which was therefore acting *not right*. And to treat a beggar as we would not be treated ourselves, by treading him under foot, is acting against conscience, and therefore wrong.

Q. E. D.

We now proceed to lay down such *moral propositions* and *rules* of happiness in the conduct of human life, as occur to our present perception; leaving the *demonstration* thereof to be examined hereafter, as we shall find occasion, in solving *moral problems* relating to right and wrong *practices* of mankind; wherein we propose to make discoveries in the crooked and by-ways of human action, shewing, by investigation, how to *square* and rectify the same.

MORAL PROPOSITIONS, RULES, &c.

1. To avoid *ill* thoughts, is to be habituated and employed in *good* ones.
2. Conversation with *wise* men delights and inspires us with *noble* sentiments.
3. *Evil* communication corrupts good *manners*; or, ill or foolish company communicate their contagion.
4. ALEXANDER the Great learned his *drunkenness* by associating with *Leonides*; and NERO his *cruelty* of his barber.
5. *Idle* jests, in conversation, are the *squibs* of wit; and vain compliments, verbal *idolatry*.
6. Make no *figure* among *cyphers*.
7. In the reputation of being *witty*, is commonly lost the reputation of being *wise*.
8. To study *nature*, is to read the volumes of the *universe*, lying open to *all*, but regarded by *few*.
9. Chuse your *books* as you do your *friends*.
10. *Antisthenes* used to say, that *learning* was good *company*.
11. Shun *ill* manners, wherever you *meet* them.
12. By *much* familiarity *esteem* is lost.
13. If any *slanders* you, observe to him, that he knows not your other *faults*, because if he had, he would have mentioned them.
14. Always *reprove* the *vice*, but not *reproach* the *person*.
15. Virtue procures and secures friends.
16. Be thou *bonorum maximus* & *magnorum optimus*.
17. *As all men desire happiness*, each member of society should promote the happiness of his fellow *being*, but

always consistently with *justice* to himself, and the public community, *i. e.* for all men to do as they would be done by.

18. *Self-love*, which is implanted in us to serve ourselves, should teach us, by our own wants, to serve others.

19. *Benefits* received lay us under proportionable obligations to our *benefactors*.

20. *Injuries* done to private persons sometimes are better resented with *forgiveness* than justice, in respect of the forgiver's happiness consequent thereto.

21. To forgive private injuries and affronts, or to return them with kindness and civilities, *shames* the offender, and may work better effect than exacting justice.

22. *General* satire and moderate justice restore the benevolence of society, while *personal* reflection and *persecution* stir up endless hatred and malice.

23. If man is not a free agent, as some *sceptics* assert, he has no cause to complain of injuries received, or of what others can bring upon him.

24. If man is a free agent, as his consciousness suggests to him, he is worthy of rewards or punishments, or of the favour or disesteem of others, according as he promotes or destroys the happiness of his *fellow beings*, with whom he is linked a member of society, by the nature of government.

25. The only proof of the *freedom* and *power* of the human WILL is man's consciousness of them.

26. The greatest *virtue* that can be acquired is the *habit* of doing good.

27. The greatest *vice* that can be attained is the *habit* of doing evil.

28. Neglecting to do good, when we have it in our power, without doing injury to ourselves, or others, is a prostitution of our abilities.

29. To destroy public happiness is the *grand* quality of the *Devil*.

30. To promote public happiness is a *kingly* virtue.

31. The *passions*, which are the principal motives of action, serve to exercise our *reason*, which, by comparing consequences, regulates our conduct.

32. The *passions* and *reason* are rightly proportioned; though the former become predominant by habit.

33. Religious faith agreeing with *morality*, refines the affections, and fills the mind with serenity and composure.

34. *Hope*, by religious faith, if grounded on morality, exalts the mind to greater happiness than acts of virtue can do without faith: because men may be strictly *moral*, but wanting religion, can build no hopes on the reward of their virtue from the SUPREME BEING.

35. The *rational* customs of religious worship, void of superstition, exalt our thoughts to magnanimity and virtue.

36. Religion, morality, and happiness, consequent thereto, are promoted by frequent attention to those two subjects.

37. Irreligion, immorality, and misery, are increased by a familiarity with the monstrous productions of hell in human shape.

38. Offences and injuries received should be treated with *charity*, or *justice*; but not with malice or revenge.

39. He that is guilty of *lying* or *deceit*, is incapable of friendship with all *honest* men; because he cannot be depended upon.

40. He that advances a wilful falsehood of another in public, by making a false quotation, or translation (as *Lauder* did of *Milton*), is as great a *criminal* as a false evidence at the bar of a court of justice, where matter of property is concerned; because he is equally audacious, and guilty of ill design.

41. Criticism is no crime, except attended with *evil* intention, and *wilful* misrepresentation.

42. He that accuses another of evil, and evil designs, and cannot prove his assertions, deserves the punishment due to that evil he would make another guilty of.

43. Avarice of *fame* is attended with numerous evils.

44. The surest way to *fame* of any kind is by indifference about it, while the *pursuit* is some public good.

Vice is a monster of so frightful mien,
As to be hated, needs but to be seen;
But seen too oft, familiar with her face,
We first endure, then pity, then embrace.

POPE'S *Ethics*.

Corollary.

Hence religion (*not founded on superstition*) and morality, are found mutual friends to each other. Religion cannot subsist without morality; and morality without religion is like a traveller passing by himself over a desert country, and losing his way.

From *prop.* 33, 34, 35, 36 (all proved true by a short induction), appears the *great use* of setting one day apart in seven for divine contemplation and worship, according to the custom of all wise nations, adoring their *creator* on the *sabbath*. By which religious application, Mr. *Pope's* master-passion, and train of lesser *serpents*, lamented in *Ethic Epist.* II. V. 101. to V. 150, can be only subdued.

Scholium.

To those who may ask, what is the importance of the many *trifling actions* of mankind to an INFINITE BEING, during their continuance upon this earthly spot, Mr *Addison* observes, that the happiness of a future life is the natural result of good habits acquired in this, and not of any merit in us for such a state, except by those habits. Man first lost his happiness by an *act of disobedience* to his maker, if original tradition may be credited; and if he continues to follow the corruptions of his nature from his evil choice, *mercy*, though infinite, is supposed to avail him nothing. Though *man* is so limited in his bodily capacity, as to appear of little more consideration than a *mite* in the *universal eye*, surveying all nature, yet by his intellectual consciousness, foresight, and boundless contemplation, partaking of the divine nature, his emulation for the highest achievements, and his desire of immortality, he seems to be designed by his maker for no less honour than an *Abidel*, *Raphael*, or *Michael*, described by *Milton* in his *Paradise Lost*.

MORAL OBSERVATIONS.

1. "Men who will not take warning will not take advice."
2. *Spleen*, *impudence*, and *ill-manners*, are immorally used, and too often mistaken for *wit*.
3. If you seek *peace*, avoid the immoral and vain.
4. "Ill company is like a *dog*, who fouls those most whom he loves best."
5. Trust not treachery a second time.
6. "A nice man is a man of nasty ideas."
7. *Formality* is no token of friendship.
8. Many people take more care to hide their wisdom than their *folly*.

9. Affectation is the *ape* of sense and polite breeding; *i. e.* the ape of dignity.
10. The *inquisitive* man is a dangerous acquaintance.
11. Popular pageantry is the *fop's* happiness.
12. Health, peace, and sufficiency, constitute the happiness of a *wise man*.
13. *Marriages* will be more happy, when the *married* are more discreet.
14. *Drunkenness, gaming, riot, and excess,* are the fashionable arts of this age.
15. *Science* and *literary* improvements are as much neglected, as they were in the declining state of the *Roman* empire.
16. With all our religion, we fall greatly short of the *Roman* virtues.
17. If religion is *hypocrisy*, *virtue* is turned out of doors.
18. Oh! the vast fountains of happiness that are shut up and restrained.
19. If each qualified person endeavoured to promote the happiness and welfare of individuals (like the late Duke of Richmond, of glorious memory) what blessings would soon flow over this land.
20. Shall any neighbouring nation pretend to rival *Britain* in *wisdom, prowess, virtue, learning, and beneficence*?
21. If some had the power to promote *public good*, as they wish it, how happy would this nation be!
22. *Exemplary practices* among the *great* have the most influencing effect upon the human mind, whether good or bad. If good, the scheme proposed by the late celebrated *Dean Swift*, for the advancement of religion and virtue, is certainly the best that can be thought of.
23. How would it redound to the glory of this nation, and the good of posterity, to see it recorded in history, that in such a *century*, by the united force of men in power, vice, and immorality in *England* received a deadly blow, and the *British diadem* a jewel of inestimable value!
24. All controversial argument convinces so much the more, the more it is moral, and free from ill manners.
25. *Abuse* in argument to prove *truth*, is just like *swearing* in conversation to prove *courage*.
26. Moral *ridicule* or *railery*, in public argument, serves to rouse the attention of the *respondent* and *hearers*, also to lash *public infamy*, with the satirical justice due to it; but in per-

sonal disputes about knowledge, and the fame of it, ridicule and raillery, confined to decency, serve to assert understanding, and silence and abash the obstinate in error.

27. The *passions* (*more strong in some than others*) are apt to be inflamed on any real or fancied injury received, and the force of reason can hardly restrain them; yet the *will*, as president, and the *rational powers* being summoned to council, the *passions* thereon become obedient, and submit to order.

28. While there is *evil* in the world, men will still be infringing upon each other; the *evil* first brought in, and still subsisting among mankind, being the *cause* of all the misfortune and misery attending their being.

29. *Evil* is so habitually planted in some natures, it is not in the power of friends to promote some men's happiness, while (*like common prostitutes*) they are still seeking misfortune, and bringing it down upon their own heads!

30. Abandoned *hackney writers* complain of their cruel treatment from booksellers, to whom their ill morals have justly rendered them a prey: like *prostitutes* for pay, that will oblige and *p—x* their benefactors at the same time.

31. "The serpent loseth not his sting, though benumbed
"with the frost: the tooth of the viper is not broken, though
"the cold closeth his mouth; take pity on his state, and he
"will shew thee his spirit; warm him in thy bosom, and he will
"requite thee with death."

32. *Genius* may be admired in any, but ill morals must be hated in all.

33. It is no charity to assist a *prostitute* lost to all shame, and abandoned to misery of his or *her* own seeking.

34. He that chooseth a *beast* able to bear his burthen shall find rest; but he that carries a *Vulture* upon his shoulders shall be pulled to pieces, and die, as he lives, miserable.

35. Dirt thrown at a clear character will not stick.

36. The heart of the hypocrite is hidden in his bosom, and his business is to deceive.

37. He works in the dark like a mole, and fancies himself safe; but blunders into day-light, and is betrayed and exposed, with his dirt in his hand.

38. His days are a perpetual constraint upon him, and his tongue and his heart are for ever at variance.

OF TIME.

TIME, by it's nature, proceeds with a constant and equable flux, and therein differs from duration, which is permanent and stable. The measure of Time must therefore be referred to motion of some kind or other: that of the heavenly bodies has, by the universal consent of all ages, been made choice of for this purpose; especially the sun and moon, which seem to have been attended, besides their other uses, for perpetual chronometers by the divine architect himself; namely, to distinguish, and mark out, seasons, days, and years.

Relative rest we observe daily in the masses of lifeless matter about us; but absolute rest in any thing in infinite space, is as hard to be assigned, as the place of an absolute *vacuum*, or space void of all substance whatsoever.

Though the earth's motion from west to east, contrary to the sun's apparent one from E. to W. is doubtless the truth; yet some have questioned, whether the sun has only a diurnal rotary motion in the same space, or may be relatively moving contrary to the earth, and other planets, at the same time, by which the direct, retrograde, and stationary appearances of the neighbouring globes, may without the usual principles be accounted for (to the greater wisdom and glory of the divine architect) with all the shining host of innumerable worlds attending; not supposing the sun to move at so vast a distance, as we now suppose, in completing the annual period.

Astronomers observe that days, hours, and minutes are respectively unequal, occasioned by the earth slackening her pace, and sometimes quickening it again, in her orbit. This they infer from the sun's different apparent motion. Therefore to measure time, or refer it to a standard of uniform motion, they have fixed the length of the tropical or solar year (or that time wherein the sun and earth finish all their positions in respect of each other) to the exact period of 365d 5^h 48^m 67^s 39th &c. which however, is no more certain, than the mean length of a day; since, in this computation, they divide the distance of time betwixt any two distant Æquinoxes observed, by the number of revolutions happening between, for the length of this supposed permanent solar-period. And I have observed, that Sir Isaac Newton went no farther back than 20 years betwixt the two observations, which could not bring the measure of

the year to so great an exactness, as if he had gone as far back as the farthest true observation that has been made of the sun's arrival at any point of the ecliptic, and so dividing the whole time elapsed by the remotest observation, whether of Ptolemy, or before. The mean tropical year this way determined would have rendered it near the truth, if there had been an error of an hour or more in the first observation; because the error would have been divided into so many parts by the number of revolutions as to become of insignificant value in one single revolution, or year.

Hence $365^d\ 24^h\ 33^m\ 40^s\ 27^{dec}$: 365^d : 12^s : 11^s . 99203814 , &c. $\equiv 11^s\ 29^o\ 45^m\ 40^s\ 7^{th}$, &c. the mean distance moved over by the sun in a common year: according to which the mean diurnal motion in the ecliptic $\equiv 59^m\ 8^s$, &c. whereas the apparent or real motion amounts to 61^m sometimes, but at other times scarce to 57^s . And the mean and true times are ever proportional to the mean and true motions.

But considering the annual motion of the equinoctial points in *antecedentia*, reckoned at the mean rate of 50^s by some (but differently by others) the variation of the ecliptic's obliquity, the different distances of observed Equinoxes, for determining the length of the solar-period, an uncertain length of the year must thence arise; whence it follows, that all astronomical tables, built on this or that particular length of years, must vary more or less from truth in computing by them, according as the precession admitted, length of the year, eccentricity of the earth's orbit, ecliptic's obliquity, and the mean and true motion therefrom, variously measured. Computations by each of these tables will agree with observations nearest the time when the tables were made, except when errors of one kind compensate for those of another. Mr. Street's *Astronomia Carolina* Tables, once in great repute for their exact use in computing the places of the celestials, are since exceeded by Mr. Flamsteed's solar numbers, as Mr. Flamsteed's will very likely be exceeded by Dr. Halley's, and as Dr. Halley's tables will, very likely, be exceeded by others of a still newer improvement. Astronomical instruments, exacter than those used by Mr. Flamsteed in Sir Isaac Newton's time, or Dr. Halley's since, are now most commended, and there is no fault now in the eye of an observer. And the set of motions which have been deduced from a set of observations (foreign and domestic) must yield to the next more fashionable. Sir Isaac Newton's theory of the moon, at first so much applauded,

has since, by infallible observation, been discovered to be imperfect;—which is also evinced by the reformers of gravity among the Celestial bodies, like the Corpuscularians in the practice of physick.

Another gentleman (more indefatigable than any of his predecessors) has discovered the aberration of the fixed stars from the motion of light and of the earth in its orbit; and has made a curious and unexpected discovery (in a letter to the Right Honourable the Earl of Macclesfield) of a new motion among the fixed stars. And worlds, or distant systems, may probably have a relative motion among one another, at the same time that they are relatively moving on in the infinite space. The notion of a plurality of worlds has prevailed ever since the time of the Pythagoreans, who maintained, as we now do, the probability of the planets being inhabited, and kept in their orbits by natural gravity; each moving like a stone whirled round in a sling, by centripetal and centrifugal forces. Lucretius, taught by Epicurus and Democritus, supposed worlds without number possessing infinite space, and counterpoising each other by some general law of gravitation; and that if bodies were bounded, those within the limit would, by the attraction of one another, in time unite in the middle space. And herein it is observable, that limits of space appear as impossible to conception as limits of time, or of existence; since there is no thought can imagine when time and existence were not; nor can imagination represent a possibility when time and existence shall be no more; therefore an eternal existence is necessary and absolute. But the infinite succession of time, and those points of it from whence all new existence of substantial forms, or a change of things existing immediately spring, and receive their astonishing modes of alteration, who but an infinitely great, omnipotent, and omnipresent, Being can comprehend?

I can't tell how or why I came to be,
 Why not before, what mortal yet could see;
 I know I am, and that's enough for me.
 Existing nature too I can discern,
 And wisdom infinite from thence I learn;
 Effects and causes mutually depending,
 From infinite to infinite extending.
 Sceptics and critics, by your learned leave,
 Conscious perception can't the sense deceive.

Pythagoras observing the different sound of hammers upon a smith's anvil, discovered the harmony of music by weights suspended at the ends of musical chords equally thick, generating tones; which weights he found were to one another in a reciprocal proportion of the squares of the length of the chords of equal tension, and producing the same sound respectively: he thence applied this harmony between weights and their distances of suspension to the celestial bodies moving, at certain distances about their centres of motion, called the harmony of the spheres, proportioning the gravity, weight, or tension of each planet, towards the sun reciprocally, as the squares of their respective distances, which astronomers have not gone beyond to this day.

The ancient astronomers first imagined, that the celestial bodies had a circular and equal motion round the body which they supposed at rest; but not finding this circular hypothesis to agree with their observation (the sun spending near eight days more in the northern than in the southern semi-circle of ecliptic), to reconcile appearance better to supposition, fixed the earth (or sun) at rest. 3450 such parts from the centre of the supposed circular orbit, as the radius of it is 100,000, which distance from the centre is called eccentricity, whence they readily calculate the sun's place at any time. Though this theory answered pretty well for the place of the sun, the motion of other planets could not be accounted for by it; therefore it was changed by Kepler, for the elliptical theory: which supposes the sun in the lower focus common to the elliptical orbits of all the planets, with a rotary motion only about his own axis, they circulating round him, and describing constantly equal areas in equal times (or areas proportional to the times) by rays drawn from the sun to each respective planet. By the same hypothesis are represented the motions of all the secondary planets round their primary ones, placed in the focus of each secondary's orbit; and this hypothesis answers to the appearances in the heavens beyond all others hitherto invented; though Kepler himself at first doubted whether some orbits vary from true ellipses; thinking it not improbable, that some might have a form like the section of an egg, by the force of gravity dilating one part of the orbit more than another. But this theory is not to be considered as truth, but a method of adapting rules to appearances: it is but following the track of the first circular theory, which supposed the earth (or sun) at rest in the centre of the planetary orbits, and planets moving circularly round them, which must then describe

equal areas in equal times, as is now supposed in the elliptical theory.

The sun's least apparent diameter in apoge has been accurately observed $31^m 29^s$, and his greatest in perige $32^m 33^s$, by which it should result, that the sun's greatest and least distances are as 1953 to 1889, as 101,661 to 98,339 (vid. Keil's Astron. p. 276), and the eccentricity only 1661 of such parts as the radius of the circular orbit, sem. trans. (or mean dist.) of the elliptical one is 100,000; but the ancient eccentricity 3450 is above double 1661, from whence the circular theory is concluded to be false. For admitting but 1725 one half of the ancient eccentricity, it would better agree with the sun's apparent diameters observed; but then would not, so well as the whole, account for the appearances of the sun's unequal motion round the year. And making, as the ancients did, the centre of the circular orbit, the centre of equal motion, 1725 eccentricity, will not account for the annual inequalities; for the prostaphæreses, or differences between the sun's mean and true places, are thus twice as much as they will amount to with this half of ancient eccentricity. This defect of ancient eccentricity of the circular orbit was afterwards remedied, by placing half of it each way from the orbit's centre, and making the centre of equal motion at the contrary extreme to that where the earth or sun is placed, which in the elliptical orbit is supposed, by Ward and Bullialdus, similar to the centre of equal motion in the circular theory. Mr. Street's eccentricity to the present theory of the earth's motion is 1732, and Mr. Flamsteed's 1692, which make a difference in finding the sun's true place from his mean; nor is this difference likely to be adjusted, while so many observators of the celestials are, like so many surveyors of a gentleman's estate, differing in their quantities from one to another.

It has been observed by Kepler, that the squares of the periodical times of revolving bodies, are as the cubes of the distances from the centres of the orbits, about which they are supposed to perform their equal motions; i. e. as the cubes of their mean distances from the body about which they revolve. And this universal theory of motion, examined and confirmed by Sir Isaac Newton, is said to be only contradicted by supposing the sun in motion, and the earth at rest.

The Theory of Motion of the Celestial Bodies in our System.

MERCURY, Venus, the Earth, Mars, Jupiter, and Saturn, in ascending order from the Sun, revolve round him, in the lower focus of the several elliptical orbits, as has been described; which, with the moon's motion round the earth, four moons, or satellites, moving round Jupiter, and five round Saturn, at the same time, constitute six primary, and ten secondary planets in our system; besides comets unnumbered, revolving in variously inclined, and very eccentric and remote orbits, crossing the planetary orbs; all paying their respective devoirs to their great Lord, who commands their constant attendance, while they mutually gravitate, in their amours, acting on each other. The motion of each body, and particularly that of our earth round the Sun, the immensely greater body, is thus proved by philosophical principles. The common centre of gravity between the sun and earth, or of any other distant body, being situate in the sun, the lesser body is compelled thereby to revolve round him.

By the earth's uninterrupted rotary and progressive motion, like the motion of a rolling stone over a hill, carrying its poles nearly parallel, in an obliquity of $66\frac{1}{2}^{\circ}$ with the plane of its orbit, the appearances of day and night are naturally accounted for; as likewise those of the seasons. And the poles of the earth being again supposed to move backward, in a small circle, about a degree in 72 years, will account for the precision of the equinoxes, or of the fixed stars departing forward of their longitudes, according to what we experience.

The quantity of motion of the planetary bodies in their several orbits, are set down farther on according to the observations of Dr. Haller; to which tables, are made farther additions and improvements from those published of that celebrated author's.

As to the fixed stars appearing so glorious in a sparkling canopy round us, preserving very nearly the same positions with one another, though at such immense distances, they are probably suns to different systems, or globes of matter, revolving respectively round them, but imperceptible to us at such distances: and these worlds, in the universal space, or inane, we may, with reason, suppose to be of infinite number, moving toge-

ther round some central world, while each world has its respective motions; being most agreeable to the notion we have of the divine being, filling immensity, and supporting immense and eternal existence.

And as it would be absurd to suppose the great being unattended with numberless beings and worlds, till the time of a creation, mentioned by Moses in the scriptures, within so short a duration as about six thousand years since; so the late creation there mentioned can only be the new modelling of this earth from a chaos with some few other globes, put into new form and motion, reinstating and reinhabiting them from the ruins of an old world.

Of apparent, real, and absolute motion.

A person carried in a ship under sail in a river will perceive the motion of outward objects, while he perceives not his own motion; and a ball being dropt from the mast-head at such time will fall in the same place on deck as if the ship had no motion, though under the swiftest way; and that by reason of the ship's motion under way, though ever so swift, being communicated to the ball when it was dropt by the hand; by which they, and all bodies moving together, remain in the same relative situation in motion as at rest. The earth, moving at the rate of 15 miles per minute, and all bodies upon or near its surface moving together, preserve the same relative situation with one another; birds, insects, fish, &c. moving together with the atmosphere and the water: as flies and insects, shut up in a ship's cabin, preserve the same situation, whether the ship is at anchor, or under sail; the air in the cabin being carried with the ship. And a person can leap no farther on a ship's deck under way towards the stern, than with the way she is going; because, being carried with her in the same motion communicated, he remains in the same relative situation as if the ship had been at rest; except that he exerts more motion than the ship's in jumping over-board: this exertion of motion would be the same as flying in the air, swimming in the water, or jumping upon deck, still relative or comparative with the ship's motion and with that exerted by the earth's absolute motion, or rest, being as hard to determine as identity of space; for admitting a motion exerted by the earth, one exerted by the ship, and another by the man jumping on the deck; yet it is not improbable, that our whole solar system may exert another motion

independent of all the rest, &c. whereby worlds may move together, or move one another.

To outward spectators at rest, a person jumping on a ship's deck, under way, towards the stern, would appear not to move, if he exerted as much motion as the ship had way; but, jumping towards the head, would appear to have more motion than the ship. And the retrograde and stationary appearances of the planetary bodies, while their motions really continue forward, are accounted for by the motion of the observer with those bodies, which is another argument for the earth's motion. The motion of the celestial bodies, seen from different surfaces, will appear very various; though at the same time they are in reality the same.



Of the Cause and Manner of Eclipses.

EACH primary and secondary body in our system being globular, will always be enlightened on the side next the Sun, while the back part of it remains opaque, casting out a conical shadow, terminating where the sun's rays, as tangents to the extreme outer parts of the body's surface next him, intersect each other;—all bodies that fall in the way of this shadow are eclipsed by it more or less; and the different phases of the Moon, and the other bodies, appearing horned, gibbous, dischotomized, and full, by having so much of their enlightened parts turned towards the spectator, are thence accounted for.

And hence an Eclipse of the Sun, or rather of our Earth, is caused by the interposing dark body of the Moon betwixt that luminary and the spectator's sight, so as to intercept his view of the Sun's light, either in part, or the whole; which can never happen but at new Moon, when the Sun, Moon, and Earth are so near being in a right line, that the conical shadow cast by the Moon towards the Earth, falls more or less upon it.

An Eclipse of the Moon is occasioned by the Earth coming betwixt her and the Sun's body, and thereby depriving her of his light; which can never happen but at full Moon, when the Sun, Earth, and Moon, are so near being in a right line, that the conical shadow cast by the Earth towards the Moon, falls more or less upon her.

In an Eclipse of the Sun, or rather of our Earth, the Moon's shadow travels at a determinate rate over the eclipsed parts of the

Earth's surface; and the Moon moving faster through her orbit than the Earth through her's, she likewise passes through the Earth's shadow at a determinate rate in an Eclipse of the Moon; the dimensions of which shadows, and their motions, with other requisites concerning eclipses, we shall now explain.

*Dimensions of the Earth and Moon's Conical Shadows
in Eclipses.*

The inverted luminous cone, terminating the penumbral frustum next the Sun, being equal and similar to the umbral cone, terminating on the opposite side of the interposing body on this side in, or beyond the remote body from the Sun, and the semi-angle at the vertex of either cone being equal to the Sun's apparent diameter, the altitude of the Earth's shadow, and consequently of the Moon's, will be thus determined by trigonometry.

Say, as the sine of the Sun's apparent sem. diam. at a mean distance from the earth, (viz. S. 16.) is to the sem. diam. of the earth, so is the radius of the earth to 214,8 semi-diameters of the Earth; the height of the Earth's shadow; but as the Sun's apparent diameter is 15m 50s at his greatest distance from the Earth, the height of the Earth's shadow at that time will come out 217 of the Earth's semi diameters; being above three times as great as the mean distance of the Moon, but falls short of the orbit of Mars, and therefore can involve none of the heavenly bodies but the Moon.

Now the diameter of the Earth to the diameter of the Moon being as 25 to 7, so is 214,8 to 60,144 semi diameters of the Earth the height of the Moon's shadow; the conical shadows of the Earth and Moon being both similar, because the angle of the Moon's shadow (and all spheres whose semi-diameters bear no sensible proportion to their distance from the Sun) is the same with that of the Earth.

Hence if the Moon's distance from the Earth be greater than her mean distance, or 60 semi-diameters of the Earth, the Moon's shadow cannot reach the Earth; at which time there may be a central eclipse of the Sun, but cannot be a total one, for then a bright luminous ring will appear to embrace the Moon's body, then intercepting the Sun's light every where, except about the circumference of his disk.

Nature of Eclipses.

If the Moon's anomaly be less than three signs, or greater than nine, an eclipse can no where be seen total; the distance of the Moon from the Earth in both which cases being greater than her mean distance.

The breadth of the Moon's shadow upon the Earth, at her least distance from it, is likewise easily computed to be about 200 English miles when it is circular, the Sun being in apogee at the same time; but when the Sun, Moon, and Earth, are not in a direct line, and the conical shadow of the Moon is obliquely divided at the Earth's surface, the ecliptical diameters of its section are determined by the Moon's distance from the Sun, as if seen from the Earth's centre. The quantity of the Earth's surface also involved in the penumbra (being in perihelion, the Moon in apogee, and the Sun's apparent diameter $16^m 23^s$) will be about 4900 miles over the circular convexity; as in other positions of those three bodies, the transverse and conjugate axis of the Moon's shadow on the Earth's surface may be determined. So likewise the breadth of the Earth's shadow at the distance of the Moon is determined to be about three times the Moon's diameter. From hence it is observable, that if the Earth's body was equal to, or bigger than the Sun's, that a shadow would run out behind it into infinite space, and involve the bodies of Mars, Jupiter, and Saturn, coming in opposition to the Sun, which is never observed to happen; and therefore the Sun must be greater than the Earth (as it is known vastly to exceed it) to terminate the Earth's shadow at a nearer distance than those orbits. And for the same reason, as the diameter of the Earth's shadow, involving the Moon, is less than the Earth's diameter, the Moon is therefore less than the Earth.

It is evident, that if the Moon's latitude from the ecliptic be greater than the sum of the diameters of the Moon and Earth's shadow, the Moon cannot enter it; and if the Moon's latitude be equal to those two semi-diameters, the limb of the Moon will touch the Earth's shadow, but not enter it. If the Moon's latitude be less than their sum, but greater than the difference, a partial eclipse of the Moon will happen; but her latitude being less than the said difference, an eclipse will be total. Hence the ecliptic limits, or Sun's distance from the Moon's nodes at the time of eclipses are determined, viz. eclipses of the Sun at new Moon always happen when the Sun is less than $16\frac{1}{2}^o$ from the

Moon's node ; and eclipses of the Moon at full Moon when the Sun's distance from her node is less than 120° .

The limits of the eclipse of the Sun are hitherto considered without allowance for the Moon's parallax, which is about one degree (and sometimes more) near the horizon, called the horizontal parallax ; and diminishes, in all degrees of the Moon's altitude, from the horizon to the zenith, where it vanishes. This parallax being the angle between the true place of the body, as if seen from the Earth's centre, and the apparent place of it, actually seen from the Earth's surface, or the angle, the semi-diameter of the Earth would be seen under from that body, depresses the true place of it to the apparent, in all altitudes from the zenith to the horizon, by that parallax ; so that the Moon having north latitude with us, it is thereby diminished ; or south latitude with us, it is thereby increased ; as the apparent longitude of the Moon thereby also differs from the true ; by which the limits of solar eclipses are variable by a small matter, according to each degree of latitude of the places where those eclipses are seen.

The Sun being at such an immense distance from the Earth, the angle which the semi-diameter of our Earth would be there seen under, amounts to no more than 10° s, and therefore in computing the appearances of eclipses, the Sun may be reckoned without parallax that would affect the computation ; though the same semi-diameter seen from the Moon is considerable, and about a degree when the Moon is at the point of our sensible horizon.

The angle under which the semi-diameter of the Moon's dark shade appears at the Earth, when seen from the Moon, is equal to the difference of the apparent semi-diameters of the Sun and Moon, seen from the Earth ; and the apparent semi-diameter of the Moon's penumbra, seen from the Moon, is equal to the sum of the apparent semi-diameters of both Sun and Moon, seen from the Earth ; as the Earth's apparent semi-diameter, or that of the Earth's disk, being equal to the Moon's horizontal parallax, which a little consideration will prove ; the apparent semi-diameters of the Sun and Moon, and also the horizontal parallax, being calculated in astronomical tables to the several distances of the Sun and Moon from the Earth, with the least, mean, and greatest eccentricities of the lunar orbit.

THE DOCTRINE AND APPLICATION OF MORALITY.

Of true happiness; and how to obtain it.

WORLDLY happiness, or what is otherwise called contentment, might easily be attained, if we could bridle and restrain our sensual appetites: the things necessary to procure this great blessing are few in number, lie in little compass, and are all comprehended in that short petition of Agar—Give me neither poverty nor riches, feed me with food convenient for me.—Prov. xxx. 8.—But, alas! such is the depravity of human nature, that there are few, very few, in whom some predominant passion does not interpose her ability to delude, and gratify her tyranny over the noblest part of man, his reason and liberty of reflection; seducing the powers of his soul to an implicit reverence of her magisterial persuasion: besides the plausible pretensions, and engaging address of this seducer to obtain our favor and esteem, she has the ascendancy over our very nature to conquer our affections.

Nor is the bait contemptible: many people of parts and prudence, age, and religion, have been staggered, and their virtue put to proof by her allurements: the ruling passion attending us in this life, throwing us daily into some confusion and disorder; so that the epidemical disease of avarice, the immoderate love of pleasure, and insatiable thirst of ambition or power, bring us into continual slavery, and plunge us into the gulph of misery; where all our thoughts and affections are swallowed up. Did happiness consist in the abundance of wealth, something might be urged in favour of the miser; but it is evident to common sense, that betwixt the hopes of getting, and the fears of losing, his mind is kept in a state of continual anxiety.

There is no passion so mean or sordid as avarice; and it does not appear how it is possible that those who idolize riches can be infected with that distemper without being liable to all the symptoms with which it is attended; such as pride, insolence, and oppression, unruliness and luxury, and all the other inexorable tyrants of the soul! as soon therefore as any one gives himself over to such insatiable desires, he gives over all thoughts of virtue, and looks upon that only to be just and honest which is most useful and advantageous to himself. When men's minds and manners are thus corrupted, making it their business to

defraud this man of his inheritance, to lay snares for another, to wheedle a third to make him his heir, to force unreasonable gain out of every thing, and to expose even themselves to sale, they entirely discard that innate pleasure that waits upon innocence, in exchange for those bosom quarrels and anxieties that reverberate and sting them to the heart.

Neither must we look for happiness in courts and palaces. We are much mistaken in the value of a crown; we admire its brightness, but forget its brittleness, and gaze upon its glory, and consider not its frailty.—But if all the gay things were our own which we fondly imagine are really to be met with in greatness, yet we should find on reflection, that they are always purchased too dear; for it is a standing maxim in policy, that those who covet dominion over others first become slaves to the lust of power. Ambition knows no bounds; there is nothing so sacred which it will not violate; it claims kindred with every vice, and stoops to take up every sin that lies in its way; as it is such a complicated mischief we should avoid it ourselves, and not be dazzled by it in others.

Nor is the sensual person happier than the great in his search of variety, and the disappointments he meets with; for to obtain this inestimable jewel of happiness in the first place it will be necessary for us to have a thorough knowledge of ourselves, and to observe what passions are most predominant in our nature: then we must take counsel of our reason, and follow her dictates with steadiness and resolution, to avoid the dangers into which we are most liable to be precipitated. Nothing is more dishonourable and shameful than to suffer our reason to be dethroned by every casual temptation, whereby that divine principle which inspects over, and governs universal nature, is brought under in man, and made subject to the yoke; but though reason should ever sit at the helm, and govern our passions, yet it should not attempt to destroy them, while its proper business is to regulate and controul them; not to govern them as subjects, but slaves.

A rational conduct does not therefore consist in the fruitless austerities and rigorous practices of religion; but in the charitable exercise of conscience and reason, religion and morality, and in acting in conformity to their just dictates, if we expect to be happy; which is the true interest of the whole intelligent creation; and herein consists that glorious resemblance to the supreme and perfectly happy Being, dignifying men and angels,

which if duly pursued and imitated, will promote our happiness throughout all ages.



On the Vicissitudes of States and Kingdoms.

IT is observable, that a state subsists and flourishes no longer than whilst it cultivates and improves the means to which it owed its rise and progress. The first Romans were plain, hearty, and sincere; they went to the wars with honour, and returned with success; and their very enemies reaped the benefit of their victories as well as themselves; for their virtues always protected those whom their valour had subdued; they fought for dominion, but not for tyranny, and chose rather to be loved than feared. This made the provinces cheerful in their submission, hearty in their contributions, and unwavering in their obedience. It is not so much to be admired, that from so small a beginning they should rise to such a stupendous height of greatness, as that so many qualities, productive of a real greatness, should be found united in one people, diffusing themselves with so exact a tenor throughout every part as to make up the very life and being of the whole.

How much the Romans who lived in the age we are now writing of, were fallen off from that original perfection, I leave the reader to imagine. They were grown effeminate, factious, proud, and inconsiderate. The court was become debauched, the camp licentious, and the commonality obstinate and mutinous. They were so far from pushing on to new conquests, that they were not able to maintain their hereditary acquisitions, &c.

Having lately received a Packet from Dagal Hal Lagal, Emperor of the Moon, with dispatches of the highest importance, relating to the government, laws, and customs of the inhabitants of Jupiter, we here communicate the contents for the service of the public.

He first informs us, that this planet was always governed by Empresses; that the secretaries of state, the priesthood, magistracy, and all their courts of law, consist of females, who manage the helm of government, deal out divine oracles, dispense justice, and plead causes between contending parties, as serjeants and

counsellors do with us ; but without a fee. The women also were chosen governors of all their charitable institutions.

The men are engaged in employments suitable to their abilities. Their original form of government was much of the same nature with ours ; but they soon found it necessary for the happiness of the nation, by and with the advice and consent of the whole community, to turn their courtiers into merchants and tradesmen, their superior and inferior clergy into regiments of soldiers, to strengthen their armies, fight battles, and garrison frontier towns.

Their lawyers were changed into pioneers to level mountains, drain marshes, dig canals, make and mend roads, and do all other laborious works for the good of the public ; so that fraud, oppression, collusion, and corruption, which before reigned among them, by the aforesaid inversion were entirely rooted out.

Their address to the present Empress runs thus in the highest style. To the most potent, august, pious, prudent, just, merciful, resplendent, and magnanimous, Adastrea, Roraura, Braru, Lieza, Heightonba, Zabachthe Matrix, Empress of the solar system ; whose first favourite at this time, Cinkluda Eshul, is styled Charandra. To their metropolitan. To the most reverend mother in God, Shebal Drumbauda, high priestess of Bonavital, capital of Jupiter. To their judges. To the Lady Chif-dismtrestralia, and Madam Justristral, &c. To the inferior clergy. Veravendral. Their common Lawyers are called Amicitaaz, &c.

Two thirds of the late income of the priesthood are now applied towards the support of the army, consisting of parsons and lawyers ; and the females who perform the offices of religion, live upon the other third, are contented with their stations, and very exemplary in their morals ; no pluralities being here allowed.

The ladies of the law, or amicitaaz, are maintained by a tax laid upon folly in general, and all public diversions, such as plays, assemblies, operas, balls, pleasure-gardens, masquerades, bagnios, &c.

A great trade is carried on betwixt the adjacent satellites and this orb by vast fleets of habbernabs, which continually pass and repass through the intervening atmosphere : the courtiers by these means are now an useful body to the community, and acquire prodigious fortunes, enriching the empire in general, and her Imperial Majesty in particular, by this and other

foreign intercourse; so that here are no beggars, but all the poor are provided for by trade or manufacture.

Criminals here are not put to death, except for murder, but are transported to the Moon, where they are kept in a state of confinement to hard labour for life, or till their thorough reformation, and till compensation is made for their lives.

It is one part of the religion of this orb for the women not to have commerce with the men after their conception, till they are delivered: and if any man is found in bed with his wife during the time of her pregnancy, he is brought to trial before Madam Justistrail, and being convicted of having carnal knowledge of her, he is transported to the lunar regions for life, like other notorious offenders; the Empress having first approved and signed the sentence, which is only reversible by the favour and interest of Charmandra.

The young women here, cautious of losing their virginity, are not suffered to enter upon marriage till twenty, before the consummation of which they are strictly examined by two experienced midwives, called Bambooz, who report their chastity to the priestess of the parish, which report she enters in a public register, when, and not before, the bride is delivered to her husband's embraces; but if it appears upon examination that she has lost her maidenhead, the marriage becomes instantly void, and the bride is banished to the planet Venus for a common prostitute; as are likewise the married women here, found guilty of adultery, who are restrained from that vice by taking a solemn oath before the altar, twelve times in a year, of their fidelity to their husbands.

The physicians here are in high esteem for their usefulness, and are called the Grando Foquax, being all females; they are obliged to pass a public and strict examination before they are allowed to practice, before the president Madam Kilpatrac, the members of clappux, and a numerous assembly of learned auditors, met in the Regal Kipotal, or next royal amphitheatre.

They take no fees, but are paid for preserving the health of the community by salaries allowed them out of the public revenue, and often relieve the patient who stands in need of their charity. The current money of this orb is pieces of crystal, of different colours and sizes, stamped with the Empress's mark, to signify the value of each. Gold and silver are here of no worth. The ladies of the faculty keep no coaches, but visit their near patients on foot, and are carried on slamduks, creatures

like English asses, to those at a distance: they speak but little, and in familiar language, and discover the nature of diseases without any ceremony: their medicines consist chiefly of vegetables, with a few animal and mineral productions, and they chalk down their prescriptions, with few marks, on a piece of board, which is sent to the hangslab, the nearest public repository, where the medicines are delivered by the slabber.

Old men are nurses to the women, and old women nurses to the men, so accustomed for the natural tenderness betwixt the sexes.

Each lady-physician is obliged to deliver to madam Kilpatrac, and the clappux-members, a journal of her practice and proceedings upon each respective patient, to be publicly read and examined in the next Regal Kipotat; and if any lives appear to be lost through mal-practice, or neglect, she is utterly disqualified to practice for the future; but if her extraordinary services appear in the preservation of subjects' lives, she is then registered upon the list of merit, to be chosen one of her Imperial Majesty's physicians in ordinary.

The most flagrant vices reign in the army, called blu blustrax, and in the navy, or vanal habbernabs, whose people are irreclaimable, notwithstanding the influencing example of the swagdaghaggigs, their principal commanders.

Backbiters, detractors, tale-bearers, scolds, pernicious liars, profane swearers, and stirrers up of strife, have their tongues cut out for mutes, to serve the government as in Turkey.

Sodomites are employed as kennel-rakers, chintney-sweepers, and night men, in the capitol, and are distinguished by badges from the rest of the subjects.

Gamesters, if noblemen, are instantly degraded; and if commoners, are punished by casting a die, whether they shall, or shall not, be deprived of their fortunes; which fortunes, so forfeited, are applied to the use of the public, and the offenders employed as common labourers in the state for a maintenance. They have no bridewells, nor prisons, but for holding offenders till trial. Debtors, sottish drunkards, petty criminals, and thieves, if men, are punished by being sent to work-houses, where they have no support but from what they earn, for a certain time; and for every such repeated offence, are obliged to suffer a double period of confinement.

The Notions of Spinoza and Atheism Confuted.

BENEDICT Spinoza, or Espinoza, was born a Jew, at Amsterdam, in Holland, but made no profession of any religion, either jewish or christian: he wrote several books in Latin, the most celebrated whereof is his *Tractatus Theologico-Politicus*, wherein he endeavours to overturn the foundation of all religion; the book therefore was accordingly condemned by a public decree of the states; though since it has been publicly sold, and even reprinted both in Latin and French in that country, and also in English at London.

Spinoza here insinuates that all religions are only political engines, calculated for public good, to render the people obedient to magistrates, and to make them practise virtue and morality.

He does not lay down his notions of the Deity openly; but only suggests his opinion. In his *Ethics*, published among his posthumous works, he is more open and express; maintaining that God is not, as we imagine him, an infinite, intelligent, happy, and perfect being; but only that natural virtue and faculty which is diffused throughout all creatures.

And the great principle of this doctrine of Spinozism is, that there is nothing properly and absolutely existing but matter, and its modifications; among which are even comprehended thoughts abstract and general ideas, comparisons, relations, combinations of relations, &c.

Spinozism is a species of naturalism, pantheism, or hylotheism, as it is sometimes called, i. e. of the dogma which allows of no God but nature, or the universe; and therefore makes it and matter to be God; notions, long before Spinoza, held by many different sects of philosophers among the Chaldeans and Greeks; very much like the opinion of the Stoics and those who held the notion of an *Anima Mundi*.

Strato, and some of the Peripateticks, were of opinion something like it. And though no ancient sect seems farther removed from Spinozism than the Platonic, they attributing the greatest freedom to God, and carefully distinguishing him from matter, yet Gundlingius proves at large, that Plato gives matter much the same origin with Spinoza; but the sect that approached nearest to Spinozism was that which taught that all things were

one, as Xenophanes the Colophonian, Parmenides Mellissus, and especially Zeno Eleates; whence it obtained the name of the Eleatic system of Atheism;—to which the opinion of those may be reduced who held the first matter for God, as Almaricus and David of Dinantum. Also the sect of Foe in China and Japan, the Seusi in Persia, and Zindikites in Turkey, philosophize much after the manner of Spinoza.

1. That there is but one substance in nature. 2. That this only substance is endowed with an infinite number of attributes, among which are extension and cogitation. 3. That all the bodies in the universe are modifications of this substance considered as it is extended; and that all the souls of men are modifications of the same substance considered as cogitative. 4. That God is a necessary and infinitely perfect Being, and is the cause of all things that exist; but is not a Being different from them. 5. That there is but one Being and one nature, and thus this nature produces within itself, by an immanent act, all those which we call creatures. 6. And that this BEING is at the same time both agent and patient, efficient cause and subject; but that he produces nothing but modifications of himself.

Thus the DEITY is made sole agent, as well as patient in all evil, both physical and moral, that called *malum pœnæ* as well as *malum culpæ*; a doctrine, fraught with more impieties than all the heathen poets have published concerning their Jupiter, Venus, Bacchus, &c. What seems to have led Spinoza to frame this system was the difficulty of conceiving either that matter is eternal, and different from God, or that it could be produced from nothing, or that an infinite and free Being could have made a world such as this is.

A matter that exists necessarily, and which is nevertheless void of activity, and subject to the power of another principle, is an object that startles our understanding, as there seems no agreement between the three conditions.

A matter created out of nothing is no less inconceivable, whatever efforts we make to form an idea of an act of the will that can change what before was nothing into real substance; contrary to the known maxim of philosophers, *ex nihilo nihil fit*. In short, that an infinite, good, holy, free Being, who could have made his creatures good and happy, should rather choose to have them wicked, and eternally miserable, is no less incomprehensible; and amazingly so, as it is so difficult to reconcile the freedom of man with the equality of a Being made out of nothing.

These appear to be the difficulties which led Spinoza to search for a new system, wherein God should not be distinct from matter, and wherein he should act necessarily, and to the extent of all his power, not out of himself (*ad extra*) but within himself; but if this new system rescues us from some difficulties, it involves us in others infinitely greater. Spinoza is very full on the subject of the authors of the scriptures, and endeavours to shew, that the Pentateuch is not the work of Moses; contrary to the common opinion both of the Jews and Christians; and has also his particular sentiments as to the authors of the other books; which part of the work has been answered by M. Huet, in his *Demonstratio Evangelica*; and M. Simon in his *Hist. Crit. du Vieux Test*.

Numbers have undertaken to refute Spinoza's doctrine; but all very weakly, except what we have in Dr. Clark's sermons at Boyle's lectures.

To which we shall add the opinion of some modern sceptics, who acknowledge God in their actions, yet urge that *all is God*, and that all causes and all effects ever existed in one power, as we see exerted in nature; that unless a cause could be found to God as creator, the wisdom and power of God cannot be otherwise understood than the wisdom and power of one nature, self-existing and self-created; and demand, by what necessary, immanent, and wise causes did one God exist prior to one universal nature, to be the cause of it, and that very nature the effect of his creating power? And likewise how one necessary, original, self-existing, and creating wisdom and power is better understood than one necessary, original, self-existing and wise nature? alledging, that if all nature is not by necessity, or chance, that the cause of it, God, must come by necessity, or chance; diabolically making the Creator to be his creation, i. e. all nature, and all causes and effects therein produced.

ANSWER.

The fools have said in their hearts, there is no God.

But if self-existing nature is as incomprehensible as God (as all sceptics allow), and we find wisdom and power dispensed through the world; it is more rational to give praise and adoration to one incomprehensible, wise, and glorious creator, as

the cause of created nature, than to bestow it where it is lost (on nature itself), and what cannot reward us for our duty and gratitude.

Consciousness is the infallible principle of all we know, and by which we come to know any thing. Various are the effects we consciously perceive are produced in nature by various efficient causes; and every particular effect we consciously perceive is adequate to its efficient cause, from whence every effect is singly and immediately produced; whence it will follow, that the immense, infinite, and wise existence of things that we see produced and operating in nature, together, or in succession, must proceed by an infinite series of causes and effects, from a necessary, original, all-wise, all-powerful, universal, and infinite cause, continually supporting and acting upon nature, prior to all natural causes, which is God from all eternity, and for evermore.

As we are conscious of what is doing well or ill, and of praise or blame due to ourselves or others, which consciousness proves the diversity of our being and existence, and that all is not one nature, it is amazing that men are so wilfully obstinate and blinded in their understandings, as to acknowledge beings of superior power and wisdom on earth whom they adore, and yet refuse to acknowledge and adore a being superior to all; the cause of all!

I never heard that the most obstinate sceptics who refuse to own the free being of a God, ever disputed the free being of their prince, whose laws they willingly submit to, and are bound to obey, or not have the privilege of his protection: they talk of every thing happening of necessity, and yet ask favours, which shew their doctrine and their consciousness of things to be direct contradiction: they talk of crimes committed by necessity, deserving punishment by necessity; and yet exclaim bitterly against the offenders; and I have heard them praise what they approve, though happening by necessity: some I have known in great fear of punishment for an offence given, ask pardon to prevent it; which proves they are not conscious of its necessity; but will deny God and his glory for obstinacy, till they come to fear him.

And there can be nothing more absurd, besides impiously dangerous and diabolical, than to dispute the free being and existence of him that made the universe, and all things therein, by ranking himself with his work, or making him inseparable

from it ; for this necessity of a pre-existing agent, or Creator, is infinitely more probable than a necessary nature uncreated : the voice of all nations, and all nature, consent to adore him as Creator and supporter of all his glorious works ; and shall the opinions and tenets of a few paltry sceptics weigh against the general sense and belief of all mankind ?

Rewards and punishments here are sufficient grounds to expect them in a state hereafter : we live now but in the dawn of existence ; where the greatest proof of immortality is our continual new desires, and our hopes and expectations of it, which could not be implanted in us for nothing. The heathens, improved in their reason, doubted and discovered immortality ; and Mr. Addison, in his 210th Spectator, shews the meanness and absurdity of expecting annihilation. The same gentleman also, in Spectator 185, shews, that Atheists are great zealots and bigots, and their opinions downright nonsense ; that the creed of this generation of wranglers requires an infinitely greater measure of faith than any set of religious articles for the good of mankind, which they so violently oppose.

The Origin of Popes and Popery.

THE author of the Devil's History, speaking of the Devil being out of play for restoring idolatry, and finding himself at a loss how to proceed with mankind, in the time of Jovian, the Emperor of Rome, who was a good christian, he threw a bone of contention among the clergy for primacy, which fully answered his purpose ; and declaring for the Roman pontif, in the following reign of the Emperor Mauritius, Boniface, who had long contended for the title of Supreme, fell into a treaty with Phocas, captain of the Emperor's guards, that he should murder his master the Emperor, and his sons ; when Boniface, countenancing the treason, should declare him Emperor, as Phocas, in return for the kindness done him, should acknowledge the primacy of the church of Rome, by declaring Boniface universal Bishop.

By this notable devilish policy, Satan then got at the head of affairs in the christian world, as well spiritual as temporal, ecclesiastical as civil ; who never gained a more important point (says the author) since his conquest over Eve in Paradise, 'till that time.

The Devil, indeed, is allowed to have prospered tolerably well in his affairs for some time before this matter was accomplished, as his interests among the clergy gained ground for some ages; but it was all a secret management, carried on with difficulty; such as sowing discord and faction among the people, perplexing the councils of their princes, and wheedling privately in with the dignified clergy.

He had raised abundance of little church rebellions, by setting up heretics of several kinds, and raising them favourers among the clergy, such as Ebion, Cerinthias, Pelagius, and others.

He had drawn in the bishops of Rome to set up the pageantry of the Key; and while he, the Devil, set open the gates of Hell to them all, set them upon locking up the gates of Heaven, and giving the Bishop of Rome the Key; it was so gilded over with delusion, and so blindly the age received it, that like Gideon's Ephod, all the catholic world went a whoring after the Idol.

The story of this Key being given to the Bishop of Rome by St. Peter (who by the way never had it himself), and of its being lost by somebody or other (but the Devil never told who) is this:—it being found again by a Lombard soldier in the army of King Antharis, who attempting to cut it with his knife, was miraculously forced to direct the knife to cut his own throat; which King Antharis and his nobles seeing, were thereby converted to christianity. And that the King sent this Key, with another made like it, to Pelagus, then Bishop of Rome, who thereupon assumed the power of opening and shutting heaven's gates; as he afterwards set a price or toll upon the entrance thereof, as we do for passing a turppike in England.

These fine things were successfully managed for some years before the compact with Boniface and Phocas had taken effect, and the Devil gained a deal of ground; but when he had made an universal Bishop, or Pope, he triumphed openly by setting up a Murderer upon the temporal throne, and a church Emperor upon the ecclesiastical throne, of his own choosing; and so begun his restoration.

The Devil's affairs went on swimmingly, and the clergy brought so many gewgaws into their worship, and such devilish principles were mixed with that which we called the christian faith, that from this time the Bishop of Rome (now distinguished by the name of Pope) commences whore of Babylon.

Tyranny of the worst sort crept into the pontificate, errors of all sorts into the profession, and they proceeded from one

thing to another, until the very Popes (for so the Bishops of Rome were now called) professed openly to confederate with the Devil, and to carry on a personal correspondence with him, at the same time they took upon them the title of Christ's Vicar, and the infallible Guide of the consciences of christians.

This we have sundry instances of in some merry Popes, who (if fame lies not) were sorcerers, magicians, had familiar spirits, and immediate conversation with the Devil, visibly and invisibly; by which means they became what we call Devils incarnate.

The hellish imposture and wickedness transacted in church-government by the Romish clergy to this day, in those countries where the popish authority prevails, are dismal instances of the corruptions of original christiauity; as they are shocking to all true protestants of the reformed religion, who see, by the infinite massacres of all heretics to popery, with what a vengeance the Romish clergy shew their authority, whenever they get the upper-hand: so far from their following the mild and pure doctrines of Christ and his apostles, in bearing and forbearance, there is nothing so wicked or inhuman but they will put in practice to establish their church-tyranny over all men, even princes themselves who presume to dispute, or doubt its infallibility. This consideration should make us charitable to those dissenters, professing christianity among us, who differ from us; as by that reformation which brought liberty and happiness to Great Britain, and for which so many suffered flames and martyrdom in effecting it, came the several dissensions among us; wherein it is to be feared, that interest or party is more the prevailing principle than a zeal for Christ's doctrines; even from the smugglers of the reformed christian religion down to the hawkers and pedlars of salvation, who would be better restrained by mild authority than by persecution.

In the times of fanatical usurpation, they had but little tenderness for a true church-man, and to this day the itinerant teachers make a market of the people's ignorance, and reproach our lawful clergy, as if guilty of crimes, whereof themselves are chargeable.

The Scripture is allowed to be the standing rule of faith (not fathers, creeds, catechisms, &c.) as the departure therefrom is the infallible falling into antichristian apostacy; but men being allowed to preach the scripture doctrines, and explain them publicly, without being duly qualified, and legally authorized, excite a frenzy among the people, misleading them into gross

errors and superstitions for private lucre; for the texts of the same scripture, we find, are explained into as many different meanings as suit with the interest of the explainers. And who but the ignorant, superstitious, weak, or mad, would run and pay for such enthusiastic absurdity, or religious jargon, as are licentiously preached up and down the countries, at home and abroad, by fanatic disturbers of the people? If no rule be established for the preaching and practice of religion, there must in time be as many religions and religious teachers as there are people of different interest or party. And if the clergy of England, by law established, are insufficient for teaching the true religion throughout his Majesty's dominions, those mercenary straggling teachers who pretend to correct the church of England's errors, will be found far less qualified, and guilty of far greater errors, as well as of contempt of their sovereign, who sits at the head of the true church as guardian.

Reformation on reformation, and dissention on dissention, will be constant events where nonconformity is propagated, so long as a mercenary nonconformist finds it his interest to stir up and delude the people.

Read a book by Benjamin Bennett, intitled, a Memorial of the Reformation; for a farther account of the rise and progress of popery, and of the infernal power of the church of Rome, also read the Devil's History.



Of the Jewish Year—Beginning of the Jewish Day, and the Motive of the Legislature for fixing the Vernal Equinox on the 21st of March, instead of the 20th, as it now happens.

THE Jews, whose year consisted of lunar months, begun their month at the Moon's first appearance, and when it should appear, if not clouded (and not at the Moon's true change), of which proclamation was made in all public places, until their nation had lost its authority; when they had recourse to Cycles for determining the day of apparent change, and the 14th day after, which they counted the day of the full Moon; though it really happened the 15th day from the true change: and hence the 15th day of the Moon came to be called the 14th, which was the apparent and real day of full

Moon; though some are apt to think it really happens the 14th after the true change.

The Jews always begin their day at Sun setting, about three-fourths of a day before our astronomical day begins; the Arabians, Athenians, and in general all these Eastern nations who regulated their months and years by the course of the Moon, followed their example: and this custom of beginning the day prevailed among the ancient Gauls and Germans, and still continues in Bohemia and Poland, where the clock strikes twenty-four at Sun-set, and the new day begins. Regard being had to this custom seems to be the reason why the church of England now orders the collect for any festival to be read in the evening preceding that festival: and the celebration of our Easter depending on the time of the Jewish passover, and that on the vernal equinox, if regard is not had to the commencement of the Jewish day, we shall sometimes fall into the mistake the Nicene council were solicitous to avoid, by keeping our paschal feast day of Christ's resurrection at the same time with the Jewish passover.

Our present political day begins at midnight, yet some compute the vernal equinox from the astronomical day, beginning 12 hours later, neither of which commencements are so much to be regarded in this affair as the commencement of the Jewish day at Sun-set, preceding both these times, for avoiding our keeping Easter with their passover; for if the vernal equinox falls on the 20th of March (reckoning the beginning from midnight) some time after sun-set of that day, and the full Moon falls later on the same day after sun-set, but before midnight, which may happen to be on a Saturday, then Easter, according to the rule for observing it, being on the Sunday after the full Moon which happens next after the vernal equinox, should be kept the next day, being Sunday, or the day after the Jewish sabbath, ending at sun-set; but the Jews then begin the 14th day of their ecclesiastical month *nisan*, on the 21st of their March, or 20th of ours, at sun-set, who on that 21st day following are by the law of Moses to celebrate their passover; and therefore our Easter being made to fall with our 21st of March, that coincidence with our commemoration of Christ's resurrection is avoided by a Moon.

It was ordained at the Nicene council, anno 325, and since by the British Parliament, that the vernal equinox should be considered as happening on the 21st (a day forward of the true) instead of the 20th of March (as it then really happened) for

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avoiding a coincidence of Easter with the Jewish passover, which yet is not prevented, if the Jewish method of computing the time of the vernal equinox, and full Moon next happening, is fallacious; whereby the Jews retarding a day may yet coincide with us, as in the preceding case of the vernal equinox happening on the 20th: this is a nicety in distinction cannot always be made with certainty, on account of their carrying the vernal equinox before the end of our day into the beginning of their next; and therefore the vernal equinox might as well have been fixed on the 20th of March, as it really happens; for, while we make the vernal equinox on the 21st, and the Jewish, or true vernal equinox to fall on the 20th of March, Easter is postponed a whole Moon, besides the days to Sunday following; whereas it ought to have been kept the Sunday next after the Jewish passover, as it should be kept when the full Moon of the Jews happens the day next after the vernal equinox; provided they keep their passover on that day; which yet is best determined by astronomical tables of the Moon's mean motion from the Sun. If the exact true time of the full Moon happening on, or next after, the vernal equinox of Jew and Christian, were duly fixed for determining Easter, difference will yet necessarily arise from the time of that true and the mean full Moon, often happening on different days in the same months of March or April; or from either happening so near the end of one day and the beginning of the next, that the true day of happening may not be easy to assign.

Yet if the legislature had ordained an exception to the present rule for finding Easter, and made it postpone a week only, instead of a Moon and to Sunday (from its original institution) in cases where the Jewish passover and that rule should happen to coincide, when the full Moon falls on the 20th of March (which is the true time of the vernal equinox) though we had differed from the church of Rome herein, it had certainly been for our honor; the coincidence happening so seldom, would have required little trouble to correct; at the same time, we had shewn our strict adherence to a matter which the Papists themselves acknowledged to be right.

The form of the Jewish year was *lunæ solar*, or a solar year, composed of 12 lunar months, besides the intercalary, or embolimean month, *veadar*: the lunar months were called *pleni* and *cavi*, consisting of 30 and 29 days by turns; and this artificial lunar month seems to be regarded in our old calendar, making

the Moon to have 30 days when the month has 31, and only 29 when it contains 30; the golden numbers pointing out the ecclesiastical Moon (as it is called) are there fixed according to this supposition. The embolimean, consisting of 30 days, were added, when necessary, to keep the lunar year receding from the equinoxes, that the passover might be kept at the time appointed, making the equinoxial Moon the first month.

They used a decemnoval cycle of the years like our own, of which 12 were common, and 7 embolimean: in their civil year they sometimes added, and sometimes omitted a day, to make it correspond with the year astronomical; which, when common, contained 354 days, 8 hours, and 793 helakim of 18 minutes each; and the embolimean 382 days, 21 hours, and 589 helakim.

They strictly regarded their tekuphæ, or cardinal points, corresponding to the equinoxes and solstices, as their year by this means was constantly regulated, so as never to require any such reformation as the Julian form, after a long period; for such corrections were continually made and required by the constitution and form of their year as was every way adapted to their fasts and festivals enjoined by the law.

Bishop Beveridge distinguishes their civil year into deficient, abundant, and ordinary: in the first, a day, he says, is taken from their astronomical year, whether common or embolimean; in the second, a day is added; and in the third, the astronomical computation is unalterably observed. This author also takes notice, that they had likewise a solar year of the like extent with the Julian. See Beveridge's *Institutiones Chronologicæ*.

In the preface to Dean Prideaux's *Connection*, there is another good account of this Jewish year.

The Reasons for the Commencement of the Date of the Year in January, and Correction of the British Calendar.

THE Right Hon. the Earl of Macclesfield, in an excellent speech made to the House of Peers, on Monday the 18th day of March, 1750, julian style, explained to their Lordships the reasonableness of having established in Great Britain one uniform method of reckoning or computing time, and of fixing the dates of all matters which may be transacted by the inhabitants of much the greatest part of Europe. His Lordship then

shewed the absurdity of the legal commencement of the year in one part of our kingdom, differing by the space of near three months from the legal commencement of the year in another part of the same kingdom, and also from the general usage throughout the whole; in consequence of which, it was established by the legislature, that the date of the year throughout Great Britain should commence the year following from January, 1752.

His Lordship then made appear the necessary correction our calendar stood in need of, with regard to the civil year, to make the times of our fixed festivals, and dates of transactions thereon depending, as also the time of Easter, and moveable feasts depending on Easter, accord with the practice of the greatest part of Europe, for the right understanding and dispatch of business, as well as the benefit of commerce in general;—in consequence of which, it was established by the legislature, 1751, that the third of September, 1752, according to the Julian style, be reckoned the 14th day, new style, and so on; and that Easter-limit should fall, and Easter be determined as formerly, from the 11 days so added; whereby our day of the month and festivals now correspond in all those countries who keep their account according to Pope Gregory's correction of the calendar in 1582; preventing the seasons running back, as in the Julian account. See the speech, containing many things instructive and curious. See also remarks upon the solar and lunar years, the cycle of 19 years, commonly called the golden number, the epact, and a method of finding the time of Easter, as it is now observed in most parts of Europe; being part of a letter from the Right Hon. George Earl of Macclesfield to Martin Folks, Esq. President of the Royal Society, communicated May 10th, 1750.

The Chronology of Christ's Crucifixion.

OUR Saviour was kept up all Thursday night before the Friday, or next day, on which he was crucified, in the High Priest's house, and led away in the morning to Pontius Pilate (See Matth. xxvii. 1: compared with other Evangelists) who was then Governor of Palestine, under Tiberius, the Emperor of Rome. Pontius Pilate first sent Christ to Herod (Luke xxiii.), who sent him again to Pilate, who took some time in examining him in the Pretorium, and in going out to confer with the

people standing without doors, lest they should be defiled by entering into a hall where a heathen acted as judge. See St. John's Gospel compared with the rest.

It was just before the second cock-crowing that Peter denied him, before he was sent to Pilate; and it was about the third Jewish hour (or our 9 o'clock) according to St. Mark, when his Crucifixion was ordered or resolved on; for by St. Luke's Gospel, he was hung on the cross about the sixth hour, (or 12 o'clock as we reckon) as he, as well as St. Matthew and St. Mark, mentions a darkness from the sixth to the ninth hour; and St. Mark tells us, it was about the ninth hour (which we reckon three o'clock past noon) when he expired.

From whence it is plain, he was condemned about the third Jewish hour (or nine o'clock as we reckon); arrived at Golgatha, or Calvary, at or little before the sixth hour (or 12 at noon as we reckon), when the darkness begun, and expired at three in the afternoon, when the darkness ceased.

He did not live long on the cross, as appears from Pilate's wondering at his being dead so soon; and that his death was towards Friday evening (April 3rd, Anno 33) is plain, from the care the Jews took to kill the thieves executed at the same time, by breaking their legs, (who had broke our Saviour's, if he had not already been dead) lest the bodies should remain on the cross upon their sabbath day; sabbath then happening at the time of the Jewish passover, or in their passover-week, which was a festival of seven days; though the passover was eaten on the first according to St. John's Gospel.

It was also the law of Moses, that all who were hanged should not remain after sun-set; and accordingly we find by St. Matthew, that St. Joseph, of Arimathea, buried our Saviour that Friday Evening, soon after his execution. The Jews always began their day at sun-setting (before we begin ours at midnight), from whence to sun-rise they reckon 12 equal hours, which was the former part of their day (as we reckon 12 equal hours from midnight to noon following): the latter part of their day was from sun-rise to sun-setting, in which time they reckoned 12 equal hours more; and their first hour of sun-rise was about the same as our six o'clock; their sixth hour, like our twelve o'clock at noon; and their twelfth hour, at sun-setting, about the same as our six-o'clock in the evening; these twelve hours were called planetary hours; and those of the night, though equal among themselves, were unequal to the planetary.

or Jewish hours by day; which were also equal among themselves (being each the twelfth part of time from sun-rising to setting, and at the time of the equinoxes, when the day and night is of equal length; the Jewish hours by day and night are therefore equal.

The Evangelists have plainly pointed out the exact time of our Saviour's Crucifixion, as well by the previous as such sequent circumstances relating thereto; so that no person can be mistaken in determining or fixing the day and hour of Christ's suffering, when they mention a darkness spread from noon to three o'clock, according to our reckoning.

This darkness, by astronomical tables, is found to be no natural eclipse of the Sun, as St. Augustin, Origen, Erasmus, and others supposed; there being no solar eclipse at that time: the darkness was not seen at Athens, or in other remote places; but extended itself only in the neighbourhood of Jerusalem. The impossibility of the Sun's being totally dark in a solar eclipse, for three hours, evinces the darkness to be miraculous. The Jewish passover being at the time when our Saviour suffered, at the first full Moon after the vernal equinox, which then was on Friday, April 3rd, in the year of Christ 33 (by astronomical tables), there could happen only an eclipse of the Moon to the remote parts of the earth, preceding by about three hours the time of his Crucifixion: the Moon could not at Jerusalem hide the Sun's light at Christ's suffering by day, when she was below the horizon, the whole heaven's opposite; so that the darkness spoken of by the Evangelist must therefore be miraculous, and no natural eclipse of the Sun.

Dionysius, the Areopagite, then a young man in Egypt, of about 25 (well versed in astronomy for those times), on occasion of this unnatural darkness, when he saw the Sun hid, and no Moon present to hide it, cried out to his friend Apollophanes, *Aut Deus patitur, aut vicem patientis deflet*; either God suffers, or is much concerned for him that suffers; and many have thought the remembrance of this incident was a great step in his conversion to christianity, as appears by the preaching of St. Paul (See the Acts of the Apostles); and also the dialogue between Dionysius and Appollophanes (quoted by Straucius and others), as recited by Suidas in his Lexicon upon the word Dionysius. Phlegon, the Trallian, an heathen writer, speaks of this miraculous darkness as of an eclipse in these words:

“ In the fourth year of the 202d Olympiad, there happened “ the greatest eclipse that ever was known;” for he took this miraculous darkness for an eclipse; as in those times the true causes of eclipses were but imperfectly understood. The epocha of the Olympiad begun in the 3938th year of the julian period at the calends of July; therefore the fourth year of the 202d Olympiad must be completed in the 4746th year of the julian period, in the summer; and this was the year on which our Saviour suffered has been plainly proved by Scaliger, Strauchius, and others; being in the year of our Lord 33 (according to Dionysius, the author of that Æra, and on Friday the 3d of April, by the julian account; which was the 14th day of the Jewish month Nisan; for which we have also the concurring testimony of Philo the Jew. Tacitus, in the 15th book of his annals, says, “ The first founder of the Christian name was one “ Christ, who was put to death under the reign of Tiberius by Pontius Pilate, then governor of Palestine.”

And Josephus (a well known Jewish historian of great authority), in the 5th chapter of the 18th book of his Antiquities, tells us, that Vitellius having advanced his friend Marcellus to the government of Judea, ordered Pilate to return to Rome, to answer to the Emperor Tiberius such matters as the Jews had objected against him; and Pilate having governed the province ten whole years, being obliged to submit to Vitellius's orders, set out for Rome; but before he could reach that city, Tiberius died, so that Pilate's government and Tiberius's life terminated in the same year; and that Tiberius's happened in or about the 4750th year of the julian period, or according to Dionysius the year of our Lord 37—so that Christ suffered between the years 27 and 37 is plain;—which event must therefore happen in that year betwixt the two, when the paschal full moon happened on a Friday, which is according to the authority of the Evangelists, who tell us that the Crucifixion was on a Friday, as before observed. We are also told, that the day of our Saviour's resurrection was on a Sunday, the third day inclusive from the day of his suffering, which was immediately made the Christian Sabbath, as from the beginning, in the room of the Jewish Sabbath, before and since kept on a Saturday.

Now there was no year between the 27th and 37th year of Christ inclusive but the 33d year on which the paschal full moon could happen upon the 3d day of April; this fell out about noon at London, and consequently corresponded to about

half an hour after nine o'clock, as we reckon, at Jerusalem, or about the 16th hour from the beginning of their fifth Feria, or week day (beginning, according to the Jewish reckoning, on the Thursday after sun-set), which astronomically set down is April 2d, 21 hours and half, anno 33, or the 4th hour on April 3d, by the Jewish reckoning.

Other chronological events might be produced for ascertaining the time of our Saviour's passion; as Caiapha's high priesthood, St. Luke's account of the time of our Saviour's baptism, if the testimonies hitherto advanced to corroborate Phlegon's account of the time of the miraculous darkness happening at that time (of our Saviour's suffering) were not sufficient, and the true time of the passion not indisputably proved.

The Controversy of Phlegon's Eclipse at Christ's suffering decided.

A controversy about Phlegon's Eclipse was begun by Dr. Sykes, who endeavoured to shew, that Phlegon meant a common eclipse of the Sun; and because no such eclipse happened the 4th year of the 202d olympiad, he would have it, that it was the first year of that olympiad, and that the numeral Δ , by which the Greeks signified 4, was made a δ by the carelessness of transcribers, and was at first probably an Λ to denote the first year; and of this supposed change of the α into δ , he found his conjecture, or what he calls his proof; but not to mention Whiston's answer (who mixes so much chaff with his wheat), alledging the Apochryphal authority superior to that of the best historians, and equal to that of the sacred writ itself, as to be not worth regarding, Mr. Chapman, of Cambridge, M.A. took up the cudgels against Mr. Sykes (who had before writ a reply to Whiston), and makes a nice and critical enquiry into Phlegon's account of this eclipse, and the ancient authors who have mentioned it, distinguishing those who had it at first hand from Phlegon from those who barely transcribed from them; and in short does a great deal to corroborate Phlegon's testimony. Dr. Sykes replies to this, and Chapman's rejoinder puts an end to the controversy.

They all agree that the year of Christ's passion was the 4th of the 202d olympiad (which has been already proved), and look

upon it as past all dispute ; but they differ in respect to the eclipse, and also an earthquake, mentioned by Phlegon, which Sykes would have to be in another year of the Olympiad, and consequently not that which happened at our Saviour's passion : Chapman has fully proved it to be the same, and that the passage in Phlegon which relates to it is genuine.

“ And in the IVth year of the CCIInd olympiad, there was
 “ an eclipse of the Sun, the greatest that had been known, or ob-
 “ served before ; it was night at the sixth hour of the day, in-
 “ somuch that the stars appeared in the heavens ; and there
 “ was also a great earthquake in Bythynia which overthrew a
 “ great part of the city of Nice.”

To confirm the truth of this passage, Mr. Chapman observes, that there are no less than seven ancient writers, three Greek, viz. Eusebius, the author of the *Cronicon Paschale*, alias *Chronicon Alexandrinum*, who quotes this passage of Phlegon twice ; and Joannes Philoponus ; and four Latin, viz. St. Jerom, Anas-tatius, the author of the *Historia Miscella*, and Freculpius Lexoviensis, who all lived while the works of Phlegon were yet in being ; the latest of the Greek writers being about the year 600, and the latest of the Latins about 814), all quoting or translating this passage from Phlegon, and all concurring in one uniform representation thereof, and in one reading of a controverted numeral : a number of writers very extraordinary, and of great weight ; there is not, I believe (adds the learned author) any ancient chronological fragment in a hundred (of those which are now extant) so well attested and supported as those of Phlegon.

Those who have a mind to examine the controversy relating to this affair may consult these pamphlets, containing arguments on both sides.

“ Dissertation of the Eclipse mentioned by Phlegon, or an Enquiry whether that Eclipse had any Relation to the Darkness which happened at our Saviour's Passion. By Arthur Ashley Sykes, D.D. Printed at London, 1732.”

“ The Testimony of Phlegon vindicated ; or an Account of the great Darkness and Earthquake at our Saviour's Passion, described by Phlegon, including all the Testimonies, both Hea-then and Christian, in the very words of the original Authors, during the first six centuries of Christianity, with proper observations on those testimonies. By William Whiston, M. A. London, 1732.”

“ Phlegon examined critically and impartially, in Answer to the late Dissertation and Defence of Dr. Sykes. To which is added, a Postscript, explaining a Passage in Tertullian.—By John Chapman, M. A. Fellow of King's College, in Cambridge. London, 1734.

“ A second Defence of the Dissertation upon the Eclipse mentioned by Phlegon; wherein Mr. Chapman's Objections, and those of the A. of a letter to Dr. Sykes, are particularly considered. By A. A. Sykes, D. D. London, 1734.”

“ Phlegon re-examined—in Answer to Dr. Sykes's second Defence of his Dissertation concerning Phlegon. To which is added, a Postscript concerning the Chronicon Paschale. By John Chapman, Fellow of King's College, Cambridge. London, 1735.” Ending the controversy.

The six Dissertations published by William Whiston, in 1734, need not be regarded, one of which is a reply to Dr. Sykes's Defence of his Dissertation: he falls short of Chapman, and has nothing valuable but extracts from some original authors (in which he is scarcely to be trusted), and the calculations of some eclipses, which help to set matters right in the said controversy. Chapman entirely disregards him, opposing no one but Dr. Sykes, calls in no assistance, nor refers to Whiston, or any other.

Phlegon was an heathen, born at Tralles, a city of Lydia, and when he grew up, became a Libertus or Freedman, of the Emperor Adrian, and was much esteemed for his learning, and the works he published: among other pieces, of which a catalogue is still in being, he wrote one of more note and eminence than the rest, entitled, A Chronological Account of the Victors of the Olympic Games, beginning with the first Olympiad, and continued down to the 299th, in sixteen books. Of this, some fragments now remain, of which the passage in dispute is one, but the whole work was extant in Photius's time, who lived in the ninth century; for he tells us he had it in his hands, and made considerable extracts from it: one may judge it must have been a very long and valuable work, and of great service towards settling many points in ancient chronology: we also find that the whole work was extant in Suidas's time, who lived about 200 years after Photius; but when it was lost is uncertain. What we would chiefly observe from this is, that Phlegon did not live at the time of the eclipse he mentions (as some have supposed and argued on that supposition), but

transcribed his account of it from the annals of those times, which might give a much more particular account of the eclipse and earthquake that accompanied it than Phlegon has done, or than perhaps suited his purpose to transcribe; and what pity that ancient writings are not more preserved, that we might take our prospects from the shoulders of giants.

The evidence wanted by some of the generality or universality of the earthquake and eclipse, might possibly or not possibly be there found; and thus endeth the story of an eclipse and earthquake; being a miraculous darkness, and miraculous eruption, observed only in that part of the earth when and where Christ suffered; and for which he came to suffer as God and Man, for the general redemption and salvation of mankind; notwithstanding which necessary event, those who were accessory to his suffering, or of putting the king of heaven and earth to so great pain and indignity, are doomed to eternal misery; like Henry the VIIIth and his abettors, who were the providential instruments of bringing about a reformation of Religion; but intended only the accomplishment of their own wicked and villainous designs.

Of Primitive and Reformed Christianity.

The corruptions of Popery and the Pope's authority are sometimes confounded with the wholesome doctrines of the council of Nice, every way different from each other: the present reformed church of England owes its authority to that council, not to the Popish Church of England before the reformation.

Our church receives and acknowledges the authority of the council of Nice, held anno 325, and of the three subsequent councils: she rejected the errors and corruptions of popery since crept into the church doctrines, but embraces the decrees and determinations of the Nicene councils, which were all of them held before popery had good footing, and before the Popes usurped their pretended supreme authority over all ecclesiastical and temporal affairs, and also over all Christian princes.

The council of Nice met only to determine the Arian Controversy, and to regulate the festival of Easter; for we every Sunday and holy-day repeat that very Creed which was then

first drawn up, together with the additions made thereto by the following councils; and now keep Easter according to the decrees of that council, and therein differ from the custom of the ancient Britons.

Henry the VIIIth's reformation of the Church of England shook off the Pope's authority to give a sanction to his adultery, and more freely to exercise his tyranny and oppression: he dissolved the monasteries for the sake of their wealth, though religion and reformation were his pretended views: it is certain, if he had any religion (which is much to be questioned), that he lived and died a Papist in all points, except the Pope's supremacy, which he rejected, and persecuted all that owned it; except those who were as much Papists as himself.

He burnt Papists and Protestants in the same fire; the former for not acknowledging him to be Pope, and the latter for rejecting those six articles which contained the very marrow of popery.

It is true, the steps taken towards a reformation in his reign facilitated it in the next; but no thanks to him, who intended no such thing, and was only accidentally an instrument thereof, as his wicked actions happened providentially to be productive of future good; or rather he was the wicked tool by which Providence wrought good out of evil; so that the reformation ought no more to be ascribed to him than the salvation of mankind to Judas the traitor, who was an instrument of bringing it about, though he meant no more, as before observed, than the accomplishment of his own villainous designs.

The Temple of Folly;

A VISION.

The following Visionary Scenes, if rightly considered, convey very instructive morals: there you have a real picture of mankind surrounded with all their foibles, vanities, and imperfections;—a thought of this kind, so capable of affording useful hints, and inoffensive admonitions, may not be unentertaining to the reader, as it is pointed at no particular person, but levelled at the general depravity of the whole nation.

Falling into a Dream, after some late fatigues, I imagined myself walking by the side of a pleasant grove, meditating upon my own inadvertencies, and contemplating the frailties of human nature. Methought, at some distance, I

observed a person making hastily towards me; by the richness of his dress, I took him for a young heir just entered upon possession of his estate; having set up a splendid equipage to squander what his frugal father with so much care and pains had got together: curiosity prompted me to give him the meeting, and to salute him in a manner suitable to his appearance; not doubting but from a compleater view I should find greater scope for speculation, which fell out just as I expected.

Drawing near, I beheld the hat of this wonderful personage very large, bound with a broad gold lace; his wig was of the bag-kind; his waistcoat of various colours, intermixed with flowers of gold and silver; his coat was covered with sundry kinds of hieroglyphics, and above the middle, on his back, was affixed a large oval plate of gold, from which a silken line hung down, with a bearded fish-hook, and about it on the plate was engraven in capitals: *non capio, nisi capior*: he had wings on his shoulders, like a cherub; in his right hand he held an enchanted rod, with which he could render himself and others invisible; in his left hand he held a toy or rattle, resembling that with which nurses please children.

Coming up, he addressed me with so becoming an air of complacency, and so easy and graceful a negligence, as shewed him to be educated in one of the politest courts of Europe:—we immediately entered into conversation, and he soon made me sensible, that I had met with a person well worthy of my acquaintance; a person who, notwithstanding the oddity of his apparel, was possessed of all the most amiable qualifications both of body and mind.

Having entertained me for a while with elegant discourses on different subjects, the distinguishing characteristic of good breeding, he thus proceeded:—"I perceive, Sir, you are in a serious mood: I have for some time, from a principle of good manners, co-operated with you in imagination; now do you accompany me for a few hours, and I will place before your eyes, the real thing which you now fancy represents the imaginary scene. I am high priest of the Goddess Folly, and will conduct you to her Temple, give you a full view of that stupendous edifice, and read you a lecture upon every class of her numerous votaries." I readily accepted the offered favour; when, waving his magic wand over my head, we were both, as I thought, instantly raised from the earth, passed swiftly through the air, and came to a delightful plain, or garden, em-

bellished with statues, cascades, fountains, grottos, groves, vistas, walks, parterres, and every other ornament of ancient and modern invention. In the centre of this beautiful spot stood the Temple of Folly, a very magnificent and amazing structure! built with Egyptian marble, curiously wrought, into which my guide now conducted me by an easy ascent. He first led me up to the temple to his own apartment, situated at the right hand of the grand altar, over which the Goddess herself presided: passing along, I observed on each side numberless little chapels, dedicated to different idols, and furnished with every article that nature and art could produce in order to captivate the senses. When I entered the place of his residence, he seated me in an easy chair, covered with crimson velvet, laced with gold. Having refreshed ourselves, he opened the door, walked backwards and forwards, before the grand altar, and shook his rattle for the space of a minute, which made a very shrill, though no inharmonious echo; thus declaring himself:—"The dress I now appear in, which I imagine, Sir, has caused your surprise, is the regular habit appropriated to my high office. This rattle you saw me shake, is the summons to several votaries to attend their respective altars, and perform the rites thereto belonging. The deities to whom they are raised receive delegated power from the Sovereign Goddess; and this vast congregation consists of such attendants only as are inflamed by the objects of sense, who give a loose to their inordinate desires, and obey their irregular passions, instead of the dictates of reason. Those who can judge rightly of the causes of action, and distinguish what ought to be desired from what ought to be avoided, and put their judgements in practice, have no business here. The Sovereign Goddess presses no man into her service; for her attendants are all voluntary, pursuant to the meaning of her motto I bear, *Non capio, nisi capior*.—But the temple now fills.—Take this wand, go where you will, none can see you; when this ceremony is over, return to me."

I staid some time at the altar, where my friend officiated, and took a full view of the Sovereign Goddess, who was seated in a yellow velvet chair of state, under a satin canopy of the same colour; her complexion was fair, and her features agreeable, but much prejudiced by her ridiculous gestures, and continual laughter: on her head was a crown of gold, hung round with little bells, like those on a child's coral, which made a continual though no inharmonious jingling; her hoop extended five yards

on each side ; before her stood a table covered with toys of all sorts, the offerings of her devotees, with which she played, and seemed delighted : her votaries were all disguised, looking like a mixed multitude, composed of all nations upon earth ; and were divided into small parties, whispering and squeezing in a confused hum.

Tired of this station, I took a turn round the Temple, and having observed the different idols in each compartment, I went to the theatre, thence to the opera-house, and last of all to the great room, where some were dancing, some gaming, some cavilling, some wheedling, and flattering for interest, and some betraying their friends.

Having rambled about for a considerable time without seeing one object that could afford me true pleasure, I observed the Goddess of Folly to withdraw, and her congregation disappeared.

I hastened to my friend's apartment, who observing me more inclined to melancholy than mirth, was pleased to entertain me with the following discourse on the strange sights that so lately had appeared before me.

“ Though you have had a cursory view, Sir, of all the follies
 “ incident to mankind, perhaps you may be at a loss to guess
 “ how such a multitude of fools could possibly be assembled ;
 “ permit me therefore to inform you in what manner I gain
 “ so many proselites to, and adorers of, the Goddess whom
 “ I serve ; and for what reason we indulge their several ruling
 “ passions. I travel through all Europe, and when I find a
 “ party addicted to what is called pleasure, but in fact curiosity
 “ and wanton sensuality, I shake my rattle, and instantly I am
 “ encircled round ; I, without much conjuration, can readily
 “ discern how many of these fools are fit for my purpose ; I in-
 “ vite them to my levee, and having allurements suited to every
 “ inclination, I make them such offers of my favour and friend-
 “ ship, that, greedily swallowing the bait, or taking my hook,
 “ they enlist with great joy under the banner of my patroness.
 “ The inhabitants of your island, male and female, have many
 “ humours among them, to whom I annually pay a visit, and
 “ seldom fail of gaining my mistress many proselites ; for the
 “ weakness and depravity of mankind cannot be more conspicu-
 “ ous than in employing their time and acquisitions there to
 “ ignoble purposes : hence you beheld at the grand altar so
 “ many devotees of distinction, all masqueraders ! persons in

“ high life, who, according to the proverb, keep holiday all the
 “ year: these over-act the vices of the vulgar, both in public
 “ and private conduct, and are justly distinguished by their
 “ want of discretion. Thus again, if a man finds himself ad-
 “ dicted to anger, and suffers not his intellectual faculties to
 “ perform their functions, I create in him by my allurements
 “ an insatiable thirst for revenge, that opportunity permitting
 “ him to gratify, dire reflection may succeed; while he sur-
 “ renders himself into my custody, and plays the fool by sur-
 “ rendering his own quiet and happiness at the same time:

“ If any be troubled with pride, the attendant of self-con-
 “ ceit, and ambition gains the ascendant over them; I allure
 “ them to adhere to those views which entail their destruction.

“ If they delight in pleasing the palate, or to stupify their
 “ senses with drinking; I allure them to excess and drunken-
 “ ness, that they may play the fool with their constitutions,
 “ their health, and their peace of mind.

“ If to please the eye, or the ear, be their favourite inclina-
 “ tion, I allure them to follow obscenity, plays, oratorios, music
 “ meetings, balls, operas, assemblies, gardens, routs, drums,
 “ drum-majors, riots, and hurricanes, that they may hear and
 “ see objects for enhancing their vain ideas; and inflammatory
 “ lust taking possession of them, or a desire of being distin-
 “ guished for trifles, I cause them to squander their substance
 “ idly, and to feel want for their not applying it to charitable
 “ or useful purposes; who are so great fools as to think of no-
 “ thing but actual enjoyment with all the fine faces they meet
 “ among the brilliant fair.

“ You might observe the idol fashion, peculiarly adored by
 “ the fair sex, to which they have so many different ways of
 “ worshipping and sacrificing; some you might behold pay
 “ their devotion in the habits they wear; others, by the sacri-
 “ fices they make: some think the idol is a great lover of
 “ whalebone, or cane, and therefore I allure them to be so silly
 “ as to wear several yards of both sorts about their legs, and to
 “ case their bodies with coats of mail made of the former; so
 “ that their shapes may be reduced to the form of a taper to-
 “ bacco-stopper: others, who are inclined to think that the
 “ idol will esteem them for wearing frizzled sheep's heads, or
 “ têtes de mouton, I allure to become ridiculously expensive, by
 “ purchasing sham locks, while nature has furnished them with
 “ better locks of her own: thousands of the country folks I al-

“ lure with great zeal to sacrifice to this idol fashion, their time, their money, their quiet, and too often their reputation.

“ I shall not pretend to enumerate all the various instances of lewdness, intemperance, and vanities, that have appeared to you at this cursory view in the Temple of Folly; but in general, I, like Circe in the fable, omit no arts to allure persons of all degrees and denominations, and especially strangers.”

Here my friend paused a while, and thus proceeded: “ There are several other meannesses to which I allure mankind; such as to behold the prosperity of others with a grudging eye; to look upon the afflicted without a sympathizing concern; to hug resentment, when by properly showing it a good understanding might ensue; to be pleased with the imperfections of others; to procure self-applause; to be silent when the cause of another should be maintained; and to be guilty of other disingenuities of the like kind, bordering on pride and envy, are all objects of my bait. Folly and inadvertency are very near relations, and my business is to gain them proselytes by my various snares and allurements, and my endeavours seldom fail of success.

“ Our indulging mankind in their favourite passions is by way of chastisement. You must be sensible, Sir, that the too frequent repetition of pleasure of any kind, makes it nauseous, and palls the appetite; it is for this reason, all that offer sacrifices to the respective idols in the Temple of Folly are obliged to submit to corporal punishment as often as the Goddess shall think fit; hence the devotees grow weary of their duty, and there are few but would gladly return to good habits, which we seldom allow.

“ But it gives me great pleasure to find there is one Ulysses who can withstand all the charms and allurements he has had recourse to.” The Goddess now returning to the temple before a multitude of adorers, and the temple bell sounding to worship, my friend too beginning to shake his rattle, I started upon my seat, which awaked me.

The Philosophy of Manners, with the Doctrine and Application thereof to Human Conduct.

THE mischiefs daily arising from the common neglect of decency and good manners are a proof of the importance of

such necessary conduct in our behaviour as may prevent those evils.

A statesman, lawyer, divine, orator, or disputant, of the greatest talents, requires a degree of demeanour and address to engage the attention and bias the inclination of his hearers before he can persuade them to a right opinion; and therefore too much care cannot be taken to acquire that quality which must set off all the rest; and which serves to correct those solecisms in behaviour which men, either through giddiness, or a wrong turn of thought, are most likely to commit to their own disadvantage.

Politeness is not less an ornamental accomplishment than a thing necessary to procure happiness, connected as closely with small things as with great; which may be observed from the cross accidents to be met with relating to trifles; for disquiet is found a very great evil, let it arise from what cause it will.

In the concerns of common life, as well as among persons of rank and fortune, it may be observed, that numbers are brought into bad circumstances from small neglects more than from great errors in material affairs; for shillings and pence, so lightly thought of by many people, go to the making up of large sums.

Our duty to our neighbour is not sufficient when we pay our debts, and do him no injury; we owe him farther obligations of civilities, complacencies, and endeavours to give him pleasure, in order to preserve the true relish of life in reciprocal enjoyments; as also in his affection and esteem, procured by means of politeness done him.

Honorius is a person equally distinguished for his birth and fortune; his natural good sense has been improved by his education; his wit is lively, and his morals unspotted, yet he has contracted a notion, that it is beneath the man of true honour to fall below the height of truth in any degree upon any occasion whatsoever: from this principle, and the habits he has fallen into, he speaks abruptly whatever he thinks, without any regard to the company or place where he is: he reads a lecture on female hypocrisy before a married couple, where the lady was violently suspected of it: soon after he fell into a warm declamation on simony and priestcraft before two dignitaries of the church; he is therefore more dreaded than esteemed by his acquaintance.

Prudentius, on the contrary, came into the world under great disadvantages of birth and fortune; yet by his behaviour he has acquired a handsome estate in the country, on which he lives with greater reputation than most of his neighbours.

His readiness to do obliging offices gained him the love and esteem of his inferiors; his deference to those in high station procured him their good will; and the complacency he expressed towards his equals, and those immediately above him, made them espouse his interest with almost the same warmth as their own; by which means he rose to preferment, and affluence has made no alteration in his manners.

The same easiness of disposition still attends him in that fortune to which it has raised him, who is at this day the delight of all who know him; from an art he has of persuading them that their pleasures and their interests are equally dear to him as his own.

Who then, if it were in his power, would refuse what Honorius possesses? But who would not wish that possession accompanied with Prudentia's talents and sweet disposition?

The practice of politeness does not require that a man should fall into a carelessness, or contempt of science; since a necessary stock of knowledge will distinguish every one from the pedant, and adorn his other qualities: perspicuity should run through all his easy discourse; and candour and sincerity appear in all his thoughts and actions.

Religion, which is become the jest of fools, should be always treated with the utmost respect; for what can be a greater offence, or more shocking to good sense and manners, than to speak ludicrously, or with contempt of "that worship which men, from a sense of duty, pay to that being unto whom they owe their existence, with all those blessings and benefits attending it?"

All party disputes and politics must be set aside, and reflections on men's professions; and all expressions or behaviour whatsoever that are any ways liable to give pain, should, with the utmost caution, be avoided.

Invective, ridicule, and raillery, are very offensive weapons, and dangerous to be dealt with; the playing with which for diversion, being similar to jesting with the point of a naked sword, insulting or wounding the person it is turned against: a false ambition, envy, and ill-nature, often prompt the posses-

son to employ these weapons by making continual war against the more worthy.

A sudden vehemence in discourse is not a little shocking to others, at the same time it exhausts not a little the person who puts it in practice; contrary to the rules of good breeding: this defect arises from impatience at the difference of opinion, while we are equally guilty in cherishing the same tenacity in ourselves.

If submission to others be a thing disagreeable, why should we expect it ourselves? Truth can only justify tenacity of opinion; and if we calmly lay down what is reasonable, it will hardly fail of convincing those to whom we speak: heat produces heat, and the clashing of opinions seldom fails to strike out the fire of dissention: passion excites opposition, and that very opposition, to a man of tolerable sense, should be the strongest reproof for his inadvertency.

As this foible is more especially incident to the fair sex, it may not be amiss to remind them likewise, that passion is as great an enemy to beauty as it is to truth; it discomposes the sweetest features, discolours the finest complexion, and gives the air of a fury to the face of an angel; whereas, to effect what they wish, what can be denied to beauty speaking with an air of satisfaction? Complaisance does all that vehemence would extort; as it is anger alone can abate the influence of their charms. Redundancy in conversation is a fault rather from carelessness than design; and is the more dangerous the less it is considered.

A person of a loquacious disposition may escape open censure from the respect due to his quality, or from an apprehension in those with whom he converses, that a check would but increase the evil, and like curbing a hard-mouthed horse, tend only to make him run a head the faster: from whence the person in fault becomes often rivetted to his error, by mistaking a silent contempt for a profound attention.

Conversation should be looked upon as a sort of bank, in which all who compose it should have their respective and proper shares: the man who attempts to engross it, trespasses upon the rights of his companions in partnership, and whether they think fit to tell him so or not, he will not of consequence be regarded as a fair dealer.

Conversation differs from other co-partnerships in one very material point, which is this, that it is worse taken if a man

pays in more than his proportion than if he had not contributed his full quota ; provided he be not too far deficient.

Some of the fair sex, when past the noon of life, or in the wane of their beauty, are apt to disoblige their hearers with topics of detraction ; by which they reduce the light of those stars to gild the hemisphere only where they once shone with sparkling and resplendent lustre.

Some men are guilty of egotism, or self-panegyric, to the great lessening of themselves and disturbance of others ; and this is a weakness, the bare mention of which shews it to be an improper topic to entertain company ; yet there are men perpetually introducing and recommending themselves who appear amazed at the coolness of their auditors, by forgetting that there is scarce a person in the room who has not as good an opinion of himself at least as of any body else.

Disquisitions of this kind into human nature properly belong to sages in polite philosophy ; the first principle of which is not to offend against such dispositions of mind as are almost inseparable from our species ; to find out and methodize which require no small pains and application : reflections on these sort of subjects will open a sense of novelty, which is attended with a most powerful recommendation.

The character of a Marplot, in an assembly of impertinents, should be carefully avoided.

Instances might be produced of Major Ramble engrossing a tedious conversation on his travels for an hour, in company with gentlemen who he knew had seen all and more than he described ; wherein a desire of displaying his own parts buried every other circumstance in oblivion. When Dr. Hectic started a subject on medicinal bath waters, and tried the company's patience for a considerable time, without staying for their approbation, Mr. Mathematics sat silent ; but the most unaccountable of all, Mr. Papillo, after all these impertinencies, read the company a lecture upon a Medallion, to make them amends for the late queer conversation he had observed ; when every one losing all patience, took up his hat, and went away without saying a word,

Thus far the rocks are described on which is split the bark of good manners, and all those passengers of life set adrift who would arrive at the character of being agreeable.

Having conducted you to the door of the world's great school, you must enter and practice the precepts here laid down,

avoiding all positiveness and affectation; and make what further observations your experience can discover. Your best way to improve will be from conversation with the fair sex; who, in general, possess all the accomplishments of politeness in an eminent degree, and are qualified to teach the *utile* and *dulce*; by whose means alone you may arrive at the summit of Mount Pleasant.



Of the Supreme Being and Creator of the Universe; and his Influence and Dominion over all his wonderful Works.

AS we cannot but conceive the universe as depending on the first cause and chief mover, whom it would be absurd, not to say impious, to exclude from acting in it; so we have some hints of the manner in which he operates in nature from the laws which we find established in it: though he is the source of all efficacy, yet we find that place is left for second causes to act in subordination to him; and mechanism has its share in carrying on the great scheme of nature: the establishing the equality of action and re-action, even in those powers which seem to surpass mechanism, and to be more immediately derived from them, seems to be an indication, that those powers, while they derive their efficacy from him, are however, in a certain degree, circumscribed and regulated in their operations by mechanical principles; and that they are not to be considered as mere immediate volitions of his (as they are often represented), but rather as instruments made by him to perform the purposes for which he intended them.

For example; if the most noble phenomena in nature be produced by a rare elastic ethereal medium, as Sir Isaac Newton conjectured, the whole efficacy of this medium must be resolved into his power and will who is the supreme cause: this however does not hinder but that the same medium may be subject to the like laws as other elastic fluids, in its actions and vibrations; and that if its nature were better known to us, we might make curious and useful discoveries concerning its effect from those laws. It is easy to see that this conjecture no way derogates from the government and influences of the deity, while it leaves us at liberty to pursue our enquiries concerning the na-

ture and operations of such a medium; whereas, they who hastily resolve those powers into immediate volitions of the supreme cause, without admitting any intermediate instruments, put an end to our enquiries at once, and deprive us of what is probably the most sublime part of philosophy, by representing it as imaginary and fictitious; by which means they hurt those interests which they appear so sanguine to promote; for the higher we rise in the scale of nature towards the supreme cause, the views we have from philosophy appear more beautiful and extensive. Nor is there any thing extraordinary in what is here represented, concerning the manner in which the supreme cause acts in the universe, by employing subordinate instruments and agents, which are allowed to have their proper force and efficacy; for this we know is the case in the common course of nature; where we find gravity, attraction, repulsion, &c. constantly combined and compounded with the principles of mechanism; and we see no reason why it should not likewise take place in the more subtle and abstruse phenomena and motions of the system. It has been demonstrated by ingenious men, that great revolutions have happened in former times on the surface of the earth; particularly from the phenomena of the strata, which sometimes are found to be in a very regular manner, and sometimes to be broken and separated from each other to very considerable distances, where they are found again in the same order; from the impressions of plants left upon the hardest bodies, dug deep out of the earth, and in places where such plants are not now found to grow; and from bones of animals, both of land and sea, discovered some hundreds of yards beneath the surface of the earth, and at very great distances from the sea.

Some philosophers explain these changes by the revolutions of comets, or other natural means; but as the deity has formed the universe dependent upon himself, so as to require to be altered by him, though at very distant periods of time, it does not appear to be a very important question to enquire, whether these changes are produced by the intervention of instruments, or by the same immediate influence which first gave things their form.

We cannot but take notice of one thing, that appears to have been designed by the author of nature: he has made it impossible for us to have any communication from this earth with the other great bodies of the universe, in our present state; and it is highly probable, that he has likewise cut off all com-

munication betwixt the other planets and betwixt the different systems. We are able by telescopes to discover very plainly mountains, precipices, and cavities, in the Moon; but who tread those precipices, or what purpose those great cavities, many of which have a little elevation in the middle, serve, we know not; and are at a loss to conceive, how this planet, without any atmosphere, vapours, or seas, as it is now the common opinion of astronomers, can serve for like purposes as our earth.

We observe sudden and surprising revolutions on the surface of the great planet Jupiter, which would be fatal to the inhabitants of the earth. We observe in them all enough to raise our curiosity, but not to satisfy it.

From hence, as well as from the state of the moral world, and many other considerations, we are induced to believe, that our present state would be imperfect without a subsequent one; wherein our views of nature, and of its great author, may be more clear and satisfactory. It does not appear to be suitable to the wisdom that shines throughout all nature, to suppose that we should see so far, and have our curiosity so much raised, concerning the works of God, only to be disappointed at the end.

As man is undoubtedly the chief being upon this globe, and this globe may be no less considerable in the most valuable respects than any other in the solar system; and this system, for ought we know, not inferior to any in the universal system; so, if we should suppose man to perish, without ever arriving at a more complete knowledge of nature than the very imperfect one he attains in his present state, by analogy, or parity of reason, we might conclude, that the like desires would be frustrated in the inhabitants of all other planets or systems; and that the beautiful scheme of nature would never be unfolded, but in an exceedingly imperfect manner, to any of them: this therefore naturally leads us to consider our present state of preparation or probation for farther advancement, which appears to have been the opinion of the most judicious philosophers of old. And whoever attentively considers the constitution of human nature, particularly the desires and passions of men, which appear greatly superior to their present objects, will easily be persuaded, that man was designed for higher views than this life: these the author of nature may have in reserve, to be opened to us, at proper periods of time, and after due preparation: surely it is in his power to grant us a far greater improvement

of the faculties we already possess ; or even to endow us with new faculties. " For we know things in our present, or any state, but according to our ways of perception ; and our knowledge and faculties in a new state may be different, and the present be of no use : we may perceive every thing intuitively, in vast plans of ideas, or without external ideas, by the constitutions of things ; with a power of not forgetting, and to assume faculties or ways of knowledge, as suits our purpose or design ; and of making extensive comparisons and conclusions ; and may exist in a form requiring no nourishment or supply of substance, from motion, as in our present mortal state of being," Pal. Author. Of which, at this time, we have no idea for penetrating farther into the scheme of nature, and approaching nearer to himself, the first supreme cause. We know not how far it was proper, or necessary, that we should not be let into knowledge at once ; but should advance gradually, that, by comparing new objects, or new discoveries, with what was known to us before, our improvements might be more complete and regular ; or how far it may be necessary, or advantageous, that intelligent beings should pass through a kind of infancy in knowledge ; for new knowledge does not consist so much in our having access to a new object, as in comparing it with others already known ; observing its relations to them, or discerning what it has in common with them, and wherein their disparity consists.

Thus our knowledge is vastly greater than the sum of what all its objects separately could afford ; and when a new object comes within our reach, the addition to our knowledge is the greater the more we already know ; so that it increases not as the new objects increase, but in a much higher proportion.

Effects of Bad Company.

1. BAD company is ruinous to fame and reputation.
2. Judging men look on others from the company they frequent ; according to the old proverb, shew me your company, and I'll tell you the man.
3. Ill company often gives an incurable wound to reputation.
4. Revelling with prostitutes, and parading with gamblers, wert thou a king, thy reputation could not be safe.
5. Ill company, like objects besmeared with filthiness, besmear all those who come near or touch them.
6. Ill company is the ruin of youth, and the reproach of age.

7. Ill company is the grand engine with which the devil effects most of his purposes on mankind.

8. Ill company is to be shunned as deadly poison, or as a snare laid for your safety and welfare.

9. Unavoidable and innumerable mischiefs and misfortunes attend the keeping bad company.

10. Many men have been good till they were ill associated.

11. Pure water changes its quality and virtue by passing through pernicious minerals.

12. When vice runs in a single stream or rivulet, it is shallow and fordable; but when many of these vicious streams fall and unite into one large and deep channel, the unwary are drowned therein.

13. Good and wise associates are like princes in offensive and defensive leagues against the common enemy; one is a bulwark for the mutual safety and protection of the other.

14. Bad companions and associates, like a jack o'lantern, or misguiding light, lead the unwary insensibly into ambuscades.

15. Evil companions, like the sirens, allure men into dangerous follies and destructive vices.

16. He who frequents evil company requires stronger antidotes carried about him than are carried by a physician visiting his infected patients.

17. It is better to have no companion or associate than to have an ill one.

18. Acquaintance is similar to commerce, or dealing of one tradesman with another; begun by accident, continued by custom or inclination, and revocable, on either side, at pleasure.

19. When a commerce of acquaintance happens between two persons, and is carried on in mutual confidence; and if through inadvertency either find himself deceived in his choice by discovering the other to be evil minded; he, by prudent and safe measures, should shake him off, as St. Paul did the viper.

20. When esteem is forfeited, acquaintance, or even friendship, is broken.

21. When a wife forfeits her honour, she forfeits her husband's esteem; her dependence is on the law, and her happiness to be sought.

22. A worthy and honest companion of either sex is like a guardian angel.

Miscellaneous and Moral Observations.

1. THE tyger kills to satisfy his hunger; but wicked and more cruel man has often betrayed to misery his protector, preserver, and deliverer, for gain.

2. Of so little moment is difference of country for defining a person's true character, that the honest, tender, and generous sentiments of a wild Indian have been found to surpass those of one of a politer nation.

3. How weak the charms, how short-lived the triumph of beauty, attended with pride and insolence! and how powerful and lasting the attraction of a well cultivated mind, with a condescending, cheerful, and obliging behaviour!

4. Were men to pay a more general regard to real worth in their choice of a partner for life, the fair sex would doubtless be more careful to adorn their minds, instead of trusting so much to dress, and the fading charms of their persons.

5. The force of true wisdom is seen, in the practices of life, to restrain or change the worst dispositions, though ever so strongly seated in the constitution.

6. The generous mind will never value itself upon what can make no part of its worth, but as it is worthily employed.

7. How requisite is a liberal education, regular conduct, and a just sense of things, to adorn a great estate!—Were this rule more generally observed, we should not so often see mean spirits, and rude and ridiculous behaviour, in men of fortune: whose wealth only serves the more strongly to expose them to contempt and ridicule.

8. It is impossible for a mind untainted with mean, interested views, not to feel a variety of emotions from seeing the worthy and amiable in deep distress.

9. How cruel does that tyrant appear who arrogates to himself a power over the children to whom he is guardian; and sacrifices to his own grovelling passion and lucrative views their real happiness! to promote which happiness was the real design and limits of his authority; yet we find, there are frequent instances of such men having existed.

10. How hard it is for a bad man to divest himself of his fond conceit of his own abilities when employed in a bad cause! A moderate opinion of ourselves is perhaps, one of the last virtues we shall attain.

11. Of how little value and dependance are the strongest professions of love and friendship in a heart abandoned to the wild starts of passion, flying from one extreme to another!

12. It is prudent sometimes to smother resentment, and even to repay great offences with great benefits; by these means we may gain over a powerful and dangerous enemy to become a faithful and sure friend, as well as to enjoy the godlike pleasure of returning good for evil.

13. The basest returns for the greatest obligations raise a horror in the honest mind, shocking to human nature; yet we may learn, from the exemplary danger of listening to temptation, how soon it may seduce us to listen to what we most detested; for he who can be false to his God, and can make his religion subservient to his interest, is not likely to prove true to his friend.

14. This world, or state of being, may be likened to an inn, where one generation is continually passing off, and another succeeding.

15. Let none, however insignificant he may think himself, imagine that he is neglected by his creator; for every station, as far as it is providential, is appointed by the most consummate wisdom——

Who sees with equal eye, as God of all,
A hero perish, or a sparrow fall.

POPE.

16. There is scarcely a passion that gives a warmer glow to the heart than gratitude: it is the foundation of every duty to God and man; but cannot dwell in contracted souls.

17. Kind and generous actions often meet with return when long forgotten by the doer.

18. The ill tendency of severity to youth for little faults, striking with terror their tender minds, is very obvious; as it puts them upon all kinds of shifts, or arts of evasion, to prevent punishment; thereby corrupting their native honesty and simplicity, which ought, as a first principle, to be carefully cultivated and succoured.

19. Prudence and patience are remedies for the deepest afflictions and distress.

20. As we treat others, we may one time or other expect to be treated.

21. The folly of the hermetic art, and of stretching life beyond its usual date, is ridiculous, and contrary to good sense.

22. What folly and impiety appear in some, who find fault with the appointments of infinite wisdom, and would reform the original constitution of things!

23. Mutual dependance of station is necessary to preserve the beauty, order, and well being of society.

24. A compassionate action carries its own reward.

25. In the course of providence, occurrences, seemingly disadvantageous to us, prove greatly beneficial in the event.

26. As we know not how we should behave in a different station, it teaches us to be satisfied with the station allotted us.

27. Those reproofs do the most good, given in the least offensive manner; when, by some distant hint, you make the offender his own accuser.

28. As we cannot limit the divine omnipotence, so it is fruitless to busy ourselves in speculations we can never clear.

29. All that is necessary for us to know of truth and duty lies plain before us; and we can have no certain knowledge beyond our real ideas.

30. Mr. Addison observes in his Spectator (a library of useful knowledge for both sexes), that we are not, at present, in a situation to judge of the counsels by which providence acts, since but little arrives at our knowledge, and even that little we discern but imperfectly; and those events, the permission of which seems now to accuse the divine goodness, may, in the consummation of all things, both magnify his goodness and exalt his wisdom.

31. Moral good and evil are seen to be productive of all the happiness or misery in the world.

32. So erroneous is human judgement, that granting our wishes would, sometimes, be the greatest cruelty done to us.

33. We behold different nations equally ardent in praying to heaven for each other's defeat or destruction; instead of resigning the merit of their separate causes into God's hands.

34. A reliance on divine providence, and ascribing our successes to God's power, is the only sure way to engage his protection; and to gain that firmness of mind which nothing else can afford; for he who holds the universe in dependance and existence can easily avert the most hidden mischief, and by unforeseen causes turn it upon the head of the contriver.

35. To him who formed us all of one clay, it is seen, in many instances, that the life of the meanest slave has the same protection as that of the greatest hero, and is as providentially guarded.

36. The wise author of nature has so ordered the constitution of the human mind, for the mutual happiness and preservation of the human species, that the pure joys of natural affection for our children give us a delight hardly to be equalled. How greatly therefore are those their own enemies who suffer their vicious passions to interrupt, or totally destroy, these solid enjoyments, and those of friendship!

37. One crime committed with impunity leads to the commission of a greater, till the hopes of concealment terminate in remorse and punishment.

38. An overbearing and insolent disposition always deserves, and often meets, with humbling circumstances.

39. Happy is that disposition which is brought to a just sense of its own demerits.

40. We learn from visible instances how great an injury those parents do to their children who bring them up in a way they are not likely to support.

41. As we know not how soon a reverse of fortune may set our inferiors above us, we should learn from thence never to behave disdainfully to any.

42. A fixed or well-grounded esteem often rises superior to ill-usage, and rejoices at an opportunity of shewing itself, when the conduct of an ingrate is altered.

43. An infinite disproportion or difference is seen between a tyrant governed by his cruel jealousies and raging passions, and a mind tempered with wisdom and benevolence: the horrors of the one illustrate, by contrast, the beauty and amiableness of the other.

44. The haughty oppressor is often dealt with deceitfully; his cruelty furnishes his best friends with arts to evade his power.

45. Among well instructed minds, we see grandeur makes no part of real happiness.

46. How dreadful a temptation is extreme poverty! but when innocently borne with resolution and patience, it is a happy state, compared to any relief purchased by guilt, and the reproach of a bad conscience.

47. What a commanding awe is virtue seen to have over the vicious heart, when it checks the flushed libertine, in the height of his promised pleasure, from destroying virgin innocence!

48. He becomes a victim to repentance, and a guardian and rewarder of virtue, when he preserves those charms he was about to destroy!

49. From the immorality of servants, derived from example and negligence of masters of families, flows that irresistible torrent of misfortunes which spreads through all ranks of life.

50. Old age, by means of ill example and immorality, is oppressed with beggary; youth are drawn into the commitment of murders and robberies from the same evil cause.

51. If we consider the happiness which results from a fatherly conduct of masters towards servants under their inspection and notice, it would encourage every moral man to use his influence towards their well doing, instead of exercising a libertine behaviour, so pernicious and frightful in its consequences.



Of the Advantages to be gained from any Company.

1. AS the bee sucks honey from every flower, whether growing in the field or in the garden, from which the spider also extracts his poison; so a provident man, let his company be what it will, may gain advantage from it, while the indiscreet and improvident man is worsted by most conversation.

2. Wise men improve themselves from contrary qualities; for when vice beats up for recruits, as soon as her ugly form is discovered, instead of enlisting, she frightens her attendants, who fly to virtue's standard for refuge, and immediately take on in her corps.

3. Every man learns to correct his own faults by seeing how ugly those deformities appear in others.

4. A drunken fellow, wallowing in a kennel, would make us believe, at first sight, that Circe has transformed him into a swine; as the soldiers of Ulysses, in Homer's fables, were transformed on a like occasion; being a lesson of instruction in Homer against such bestiality.

5. Choler, passion, and insolent pride, by being seen, correct those deformities in others.

6. Some have imagined, that cruel commanders will be transmigrated into cart horses, and whipped by carmen to their duty.

7. Some others have imagined that the rich popish clergy, who fleece the poor and distressed, as well as the rich and opulent (preaching up charity, and doing none), will be transmigrated into beggars, to stroll the country for a livelihood.

8. Others have imagined, that the great whore of Babylon, dressed in scarlet, will be transmigrated into a poor street-walker, and prostitute herself to every mean fellow for a livelihood.

9. Others again have imagined, that the part of mankind who prostitute honest principles for gain to themselves, and to the disadvantage of others, will be transmigrated into robbers of different degrees and denominations.

10. That lawyers will be transmigrated into false witnesses ; and that every one who has dishonoured his profession will be transmigrated into a being of a class the most worthy of his demerits.

11. Reasonable men mend by looking at vice ; but profligates grow the worse for the sight.

12. As neither example nor precept, except in matters of religion, can be an absolute guide for any man's conduct, it must be an experienced and practical judgement in the knowledge of men and things, that must direct him in the doublings and turnings of the world,

13. Since in the state of man's life events are casual for the future, it is impossible that any man can leave to his successors infallible rules to direct them, because he knows not how times and things may altar.

14. In some things men will fall short of those who went before them ; in others they will go beyond them : such imperfect beings are men.

15. As the industrious bee gathers honey from different flowers, so (like men gathering fruit from all kinds of company) she completes the composition by blending together the honey gathered from several.

16. It requires care in conversation, and choice of acquaintance, to distinguish the real and useful from the counterfeit and worthless sort : this is done by observing every good and bad talent without dislike or prejudice to any man.

17. As men cannot pass through the world without meeting vice in their passage ; so when they meet it, they should make the best use of it, that they may avoid being intimate with, or infected by it.

18. The example of good society may be improved to the doing some future good.

19. When we fall into bad company, we may from thence learn where the rocks lie that we are to shun.

20. As the mariner makes every wind serve him for sailing towards his intended port, even amidst dangers, difficulties, and currents, when he has sea room ; so a prudent man will navigate himself into the harbour of safety and happiness in any company.

21. As ambassadors from foreign states avail themselves of all advantages they are sent to take ; so mankind, sent hither to avail themselves of the happiness of a future state, should gain as much empire on that dominion as they can ; who, like the physicians, by correcting poison should make it medicable for the mind's health,—which, of its own nature, and without such necessary correction, is destructive to the human being.

22. The imperfections and depravities of the present human state, with all the different modes of pleasure and pain considered, are such, that the best and wisest human being may, with reason, wish for a translation from this to some other orb, or situation of being, among the innumerable worlds, revolving in infinite space, either visible or remote from sight ; in hopes that there is some state amongst them to be found of more substantial and permanent happiness than what, from experience, can be enjoyed upon this our contracted spot of earth.

23. If the multiplication of our faculties of perception, and the enlargement of our understanding, connected with a substance fitted for such a change (not affected by hunger, thirst, heat, cold, pain, &c.) could once become our privilege, without a possibility of a future death, or a falling from that state, but still advancing towards perfection, to what a pitch of happiness (O infinite and sacred Creator) shall we then attain.

CHANGE OF ACQUAINTANCE.

BY OBSERVATOR.

1. ACQUAINTANCE, or friendship, is dissolved, like a broken league, or a cloud by the winds, when the conditions are forfeited.

2. Acquaintance, founded on self-interest and selfish views, changes with advantage and new prospects.

3. The aggressor, in acquaintance or friendship, first breaks the ties.

4. There is no right of future acquaintance founded in the custom of present intimacy.

5. Choice, or liberty, will warrant an alteration in friendship, or acquaintance, on a sufficient cause assigned.
6. Esteem is forfeited in friendship as well as in love.
7. Gratitude, entailed by a generous benefactor, should be acknowledged as a debt due, though never discharged, for the weighty obligations received.
8. To forbid gratitude is to forbid humanity and duty.
9. Praise for a small accomplishment is often founded on fear, is a tribute of flattery, and at best to be suspected of sincerity, when actions do not concur to prove the heart.

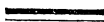


Rules found in the Study of a Periodical Author.

1. **SELECT** the best things, and improve what is useful.
2. Reject immoral and indecent subjects.
3. Promote truth, and suppress error.
4. Determine place of connection.
5. Extract truth from the dross of words, scattered in a multitude of books; as gold is selected and refined from its ore, scattered abroad in the mines.
6. Truth is smothered by many, but made conspicuous by few and expressive words.
7. Eloquence (by metaphor, similitude, and allusion) strikes like a likeness in a glass.
8. False metaphor and allusion are similar to painting in disproportion, or to giving a wrong likeness.
9. The ornaments of language should be striking, while they convey a strong likeness of the thing, or things, represented.
10. Never sacrifice truth to prejudice.
11. Do no injustice.
12. Treat an open enemy with generosity; but a treacherous and concealed one as he deserves.
13. Moral rules and maxims, drawn from experience, will direct men to the port of happiness, as ships are guided through a tempestuous ocean to a safe harbour by the plain and sure rules of navigation.

Address to British Youth at School.

PALLAS and Prudence all your steps should guide,
 And still from meanness ever turn aside.
 Though understanding marks the youth and man,
 If you're not as you would, be what you can.
 Good habits are by custom soon acquir'd ;
 The bad are hated, and the good admir'd.

*The Duty of Man inferred from the Works of Creation ; or
 Natural Religion Delineated.*

CONTEMPLATING the infinite variety and grandeur of the works of creation, especially those works which come most under our observation, that concern the sciences to know, will the most exalt our ideas of the Creator's greatness and goodness ; and the most excite our gratitude and homage to the author of all things, for the powers, faculties, and benefits we enjoy ; to understand which is the proper subject of moral philosophy, and of human happiness : in the dependance, connection, scheme, union, harmony, and preservation, of the works of creation is manifested the duty of man in respect to the Creator of all things, and the individuals of society.

Men, like the plants, first received their being upon this spot of earth, whence they first knew sensation, perception, memory, reflection, reason, and judgement, and all that their faculties comprehend. Who were here first conscious of their exalted stations above all other created animals, were likewise made conscious of their power to do good or evil, in respect to each other's pleasure or pain ;—whence it is inferred, that men were created as instruments, or agents, of the divine providence, to obey his will, and execute the purposes of creation, according to the laws of civil government (dictated and inspired by God), under which they are placed by that divine providence evidently presiding and ruling over kings and kingdoms.

Men, it appears, were created in high and low subordination, under the divine power and influence, and the direction of one another, to act in mutual concert for each other's dependance

and happiness; in which a deviation from the laws of nature, and the general good of creation, can never be supposed, to the disorder, confusion, or destruction of any part thereof, which would be to subvert and destroy the peace, order and harmony of the whole. That since the beauty, order, and good of the whole creation is evidently supported and preserved by the infinite wisdom and power of an almighty Creator, he must be virtually present every where, by his essence, to direct and influence the whole; or by his delegated powers and commands to his ministers and agents, in their several appointed stations and subordinations, amidst innumerable revolving worlds, in the infinite space, who are directed to regulate and govern under them.

In which several appointed stations and gradations of power and influence, every intelligent being created should co-operate to the great end or design of the world; from which the inanimate and sensitive parts of creation, with the whole species of animals, governed by the laws of nature and instinct, never deviate. And man, and other intelligences, by their freedom only can fail of their duty; like the lesser wheels and movements of a grand machine, always going true to answer one main end, except disturbed and made to go wrong by falling into the hands of evil guides.

Hence it also appears, that the first cause of infinite nature, and of nature's whole scheme, could have no beginning; therefore the cause must be infinite in power and wisdom, which must be God; who therefore must exist necessarily (independent of creation, or of any power or being), and therefore can never cease to exist, from eternity to eternity; without a possibility of ever changing his existence to non-entity; who, being able to do all things possible and consistent with his own attributes, glory, and perfections to do, yet cannot destroy himself.

Who is the fountain of all life, wisdom, power, glory, perfection, and happiness, as well as the cause and support of all created beings, of all material forms, and of every other substance whatsoever, that can be seen or comprehended; in and by whom all things perpetually subsist; whose attributes and perfections are infinite and incomprehensible.

Hence it is inferred, that all those intelligent beings, holding their existence and degrees of excellence under him, who are conscious of their freedom to act or forbear to act, and of being

subject to his laws and protection, are by that consciousness bound to obey and perform the duty required of them, in each particular superior or inferior station of life, in the scale of subordinate intelligent beings. And thence it is farther inferred, that those intelligent beings who depend on his power and goodness in every state should not only in duty submit to and obey his laws, but are bound in gratitude to be thankful for his benefits received with humble prostrations, worship, and adoration; who, if they expect to be made farther happy, or continued in the happiness they at present enjoy, through his boundless favour and bounty, should solicit the continuance of his favour, influence, and support, here and hereafter.

Hence it will follow, that men's religious duty is founded in the practice of morality, depending on a rational and natural religion, and not on an enthusiastic superstition, improved by true faith and revelation, in praying, homage, worship, adoration, thanksgiving, and soliciting favour of the giver of all benefits, and supreme of all beings.

This natural and moral religion, improved by true faith, chiefly consists in the love of God and man; and doing to others as we would be done unto; being, as we are told by the great example and Saviour of mankind, the sum and substance of the gospel.

For he who does good or evil to others sets a forcible example for others to do the like good or evil to himself;—whence, on the one hand, proceed friendship, friendly alliances, kindnesses, and the several benefits from doing good to others that happen to men linked in society; as, on the other hand, proceed quarrels, hatred, malice, effusion of blood, and all the mischiefs and evils consequent from injuring others that befall mankind; of which the divine Socrates (who was an example and sufferer before Christ for shewing men their errors of action) gave us a clear demonstration, as to the effects of moral or immoral conduct.

Against mankind's reason, and sober approbations, the several implanted rebellious and unruly passions and affections are observed to be continually making war, and causing their unhappiness and misery: to oppose and conquer which passions and affections is the work of a philosopher and a Christian, and of parents by an early education to perform.

From nature's chain, whatever link you strike,
Tenth or ten thousandth break the chain alike.
Aspiring to be Gods, if angels fell,
Aspiring to be angels, men rebel ;
And who but wishes to invert the laws
Of order, sins against th' eternal cause.

POPE'S ETHICS.

END OF THE FIRST PART.

CURIOUS RECREATIONS.

PART II.

Previous to these Recreations with the Cards, it will be necessary to explain the Method of making the Pass: that is, bringing a certain number of Cards from the bottom of the Pack to the top; as many of these Recreations depend on that Manœuvre.

HOLD the pack of cards in your right hand, so that the palm of your hand may be under the cards; place the thumb of that hand on one side of the pack, the first, second, and third fingers on the other side, and your little finger between those cards that are to be brought to the top, and the rest of the pack; then place your left hand over the cards, in such manner, that the thumb may be at C. (Pl. I. Fig. 1 and 2.) the fore finger at A. and the other fingers at B.

The hands and the two parts of the cards being thus disposed, you draw off the lower cards confined by the little finger and the other parts of the right hand, and place them, with an imperceptible motion, on the top of the pack.

It is quite necessary, before you attempt any of the recreations that depend on making the pass, that you can perform

it so dexterously that the eye cannot distinguish the motion of your hand; otherwise, instead of deceiving others, you will expose yourself. It is also proper that the cards make no noise, as that will occasion suspicion. This dexterity is not to be attained without some practice.

It will be necessary, in several of the following recreations, to have a pack of cards, including one or more that are a small matter longer or wider than the rest; a proper method of preparing which will be given in the course of these recreations.

The Card of Divination.

Have a pack in which there is a long card; open the pack at that part where the long card is, and present the pack to a person in such manner that he will naturally draw that card. He is then to put it into any part of the pack, and shuffle the cards: you take the pack, and offer the same card in like manner to a second or third person; observing, however, that they do not stand near enough to see the card each other draws: you then draw several cards yourself, among which is the long card, and ask each of the parties, if his card be among those cards, and he will naturally say yes, as they have all drawn the same card: you then shuffle all the cards together, and cutting them at the long card, you hold it before the first person, so that the others may not see it, and tell him that it is his card: you then put it again in the pack, and shuffling them a second time, you cut again at the same card, and hold it in like manner to the second person, and so of the rest.

If the first person should not draw the long card, each of the parties must draw different cards; when cutting the pack at the long card, you put those they have drawn over it, and seeming to shuffle the cards indiscriminately, you cut them again at the long card, and shew one of them his card: you then shuffle and cut in the same manner, and shew another person his card, and so on; remembering that the card drawn off by the last person is the first next the long card; and so of the rest.

This recreation may be performed without the long card in the following manner. Let a person draw any card whatever, and replace it in the pack; you then make the pass, and bring that card to the top of the pack, and shuffle them without losing sight of that card. You then offer that card to a

second person, that he may draw it, and put it in the middle of the pack. You make the pass, and shuffle the cards a second time in the same manner, and offer the card to a third person, and so again to a fourth or fifth, as is more fully explained further on.

There is frequently exhibited another experiment, similar to this, which is by making a person draw the long card; then giving him the pack, you tell him to place his card where he pleases, and shuffle them, and you will then name his card, or cut the pack where it is: you may also tell him to put the pack in his pocket, and you will draw the card, which you may easily do by the touch.

The four Confederate Cards.

Let a person draw any four cards from the pack, and tell him to think on one of them: when he returns you the four cards, you dexterously place two of them under the pack, and two on the top: under those at the bottom, you place four cards of any sort; and then taking eight or ten from the bottom cards, you spread them on the table, and ask the person if the card he fixed on be among them: if he say no, you are sure it is one of the two cards on the top: you then pass those two cards to the bottom, and drawing off the lowest of them, you ask if that is not his card; if he again say no, you take that card up, and bid him draw his card from the bottom of the pack.

If the person says his card is among those you first drew from the bottom, you must dexterously take the four cards that you put under them, and placing them on the top, let the other two be the bottom cards of the pack, which you are to draw in the manner before described.

The Numerical Card.

Let the long card be the sixteenth in a pack of piquet cards. Take ten or twelve cards from the top of the pack, and spreading them on the table, desire a person to think of any one of them, and to observe the number it is from the first card. Make the pass at the long card, which will then be at the bottom; then ask the party the number of his card, and count to yourself from that number to 16, turning the cards up one by one from the bottom: then stop at the seventeenth card, and ask the person if he has seen his card, when

he will say no; you then ask how many more cards you shall draw before his card appears; and when he has named the number, you draw the card aside with your finger, and turn up the number of cards he proposed, and then throw down the card he fixed on.

Divination by the Sword.

After a card has been drawn, you place it under the long card, and by shuffling them dexterously you bring it to the top of the pack; then lay or throw the pack on the ground, observing where the top card lays: a handkerchief is then bound over your eyes, in such manner however that you can see the ground, which may be easily done: a sword is then put into your hand, with which you touch several of the cards, seemingly in great doubt, but never losing sight of the top card, in which at last you fix the point of the sword, and present it to him who drew it. Two or three cards may be discovered in the same manner, that is, by placing them under the long card, and then bringing them to the top of the pack.

The Card thought on per force.

You part a pack of cards before a person, in such manner that one of the pictured cards only is completely visible; you then tell him to think on one of those cards, observing attentively if he fixes his eye on the pictured card: when he says he has determined, you shuffle the cards, and turning them up, one by one, you tell him, that is his card.

If he does not appear to fix his eye on the pictured card, or if he spread the cards in order to fix upon another, you tell him to draw the card he chooses, and then by placing it under the long card, you perform some other recreation. It is easy to conceive, that this recreation may fail, and that it should not be attempted with those who are conversant with deceptions of this sort.

The transmutable Cards.

You must have in the pack two cards of the same sort, suppose the king of spades: one of these is to be placed next the bottom card, which may be the seven of hearts, or any other card; the other is to be placed at top: you then shuffle the cards, without displacing those three cards, and shew a person that the bottom card is the seven of hearts; they

drawing that card privately aside with your finger, which you have wetted for that purpose, you take the king of spades from the bottom, which the person supposes to be the seven of hearts, and lay it on the table, telling him to cover it with his hand;—you then shuffle the cards again, without displacing the first and last card, and passing the other king of spades at the top to the bottom, you shew it to another person:—you then draw that privately away, and taking the bottom card, which will then be the seven of hearts, you lay that on the table, and tell the second person, who believes it to be the king of spades, to cover it with his hand.

You then command the seven of hearts, which is supposed to be under the hand of the first person, to change into the king of spades; and the king of spades, which is supposed to be under the hand of the second person, to change into the seven of hearts; and when the two parties take their hands off, and turn up the cards, they will see, to their no small astonishment, after having so carefully observed the bottom card, that your commands are punctually obeyed.

The Three Magical Parties.

You are to offer the long card to any one, that he may draw it, and place it again in any part of the pack he thinks proper;—you then make the pass, and bring that card to the top of the pack;—you next divide the pack into three heaps, observing to put the long card in the middle heap, as that is most commonly chosen;—you then demand of the person which of the heaps the card he drew shall be in. If he reply in the middle parcel, you immediately shew him the card; but if he says in either of the others, you take all the cards in your hand, placing the parcel he has named over the other two, observing to put your little finger between that and the middle heap, at the top of which is the card he drew; you then ask at what number in that heap he will have his card appear; if he says, for example, the sixth card, you tell down five cards from the top of the pack, and then dexterously making the pass, you bring the long card to the top, and tell it down as the sixth.

The Inverted Cards.

Prepare a pack of cards, by cutting one end of them about one-tenth of an inch narrower than the other; then offer

the pack to any one that he may draw a card; place the pack upon the table, and observe carefully if he turn the card while he is looking at it; if he do not, when you take the pack from the table, you offer the other end of it for him to insert that card; but if he turn the card, you then offer him the same end of the pack. You afterwards offer the cards to a second or third person, for them to draw and replace a card in the same manner. You then let any one shuffle the cards, and taking them again in your own hand, as you turn them up one by one, you easily perceive by the touch which those cards are that have been inverted, and laying the first of them down on the table, you ask the person if that card be his; if he say no, you ask the same of the second person: and if he say no, you tell the third person it is his card; and so of the second and third cards. You should lay the pack on the table after each person has drawn his card, and turn it dexterously in taking it up, when it is to be turned, that the experiment may not appear to depend on the cards being inverted.

The Card discovered by the Touch or Smell.

You offer the long card, or any other that you know, and as the person who has drawn it holds it in his hand, you pretend to feel the pips or figure on the under side by your fore finger; or you sagaciously smell to it, and then pronounce what card it is.

If it be the long card, you may give the pack to the person who drew it, and leave him at liberty either to replace it, or not; then taking the pack, you feel immediately whether it be there or not, and shuffling the cards in a careless manner, without looking at them, you pronounce accordingly.

The incomprehensible Transposition.

Take a card, the same as your long card, and rolling it up very closely, put it in an egg, by making a hole as small as possible, and which you are to fill up carefully with white wax. You then offer the long card to be drawn, and when it is replaced in the pack, you shuffle the cards several times, giving the egg to the person who drew the card; and while he is breaking it, you privately withdraw the long card, that it may appear, upon examining the cards, to have gone from the pack into the egg. This recreation may be rendered more surprising by having several eggs, in each of which is placed a card of

the same sort, and then giving the person the liberty to choose which egg he thinks fit.

This deception may be still further diversified, by having, as most public performers have, a confederate, who is previously to know the egg in which the card is placed ; for you may then break the other eggs, and shew that the only one that contains a card is that in which you directed it to be.

The Card in the Pocket-book.

This recreation is to be performed by a confederate, who is previously to know the card you have taken from the pack and put in your pocket-book ; you then present the pack to your confederate, and desire him to fix on a card, which we will suppose to be the queen of diamonds, and then place the pack on the table ;—you then ask him the name of the card, and when he says the queen of diamonds, you ask him if he be not mistaken, and if he be sure that card is in the pack ; when he replies in the affirmative, you say, it might be there when you looked over the cards, but I believe it is now in my pocket ; then desire a third person to put his hand in your pocket, and take out your book, and when it is opened the card will appear.

Experiments of this kind appear as wonderful to those who have no idea of a confederacy as they do simple and trifling to those that are in the secret.

To tell the Card that a Person has only touched with his Finger.

This recreation also is to be performed by confederacy. You previously agree with your confederate on certain signs, by which he is to denote the suit, and the particular card of each suit, as thus ; if he touches the first button of his coat, it signifies an ace ; if the second, a king, &c. and then again if he takes out his handkerchief, it denotes the suit to be hearts ; if he takes snuff, diamonds, &c. these preliminaries being settled, you give the pack to a person who is near your confederate, and tell him to separate any one card from the rest, while you are absent, and draw his finger once over it ; he is then to return you the pack, and while you are shuffling the cards, you carefully note the signals made by your confederate : then turning the cards over one by one, you directly fix on the card he touched.

To name several Cards that two Persons have drawn from the Pack.

Divide a piquet pack of cards into two parts by a long card : let the first part contain a quint to a king in clubs and spades, the four eights, the ten of diamonds and ten of hearts ; and let the other part contain the two quart majors in hearts and diamonds, the four sevens and the four nines.—The cards may be divided in any other manner that is easy to be remembered.

Then shuffle the cards, but be careful not to displace any of those cards of the last part which are under the long card : you then cut at that card, and leave the pack in two parts ; next, present the first of those parts to a person, and tell him to draw two or three cards, and place the remainder on the table ; you present the second parcel in like manner to another ; then having dexterously placed the cards drawn by the first person in the second parcel, and those drawn by the second person in the first parcel, you shuffle the cards, observing not to displace any but the upper cards : then spreading the cards on the table, you name those that each person drew ; which you may very easily do, by observing the cards that are changed in each parcel.

The two convertible Aces.

On the ace of spades, fix with soap a heart, and on the ace of hearts a spade, in such manner that they will easily slip off.

Shew these two aces to the company ; then taking the ace of spades, you desire a person to put his foot upon it, and as you place it on the ground, draw away the spade : in like manner you place the seeming ace of hearts under the foot of another person : you then command the two cards to change their places ; and that they obey your commands, the two persons on taking up their cards will have ocular demonstration.

A deception similar to this is sometimes practised with one card, suppose the ace of spades, over which a heart is pasted slightly ; after shewing a person the card, you let him hold one end of it, and you hold the other, and while you amuse him with discourse, you slide off the heart ; then laying the card on the table, you bid him cover it with his hand : you then knock under the table, and command the heart to turn into the ace of

spades. By deceptions like these, people of little experience and much conceit are frequently deprived of their money, and rendered ridiculous.

To shuffle Cards in such a manner as always to keep one certain Card at the Bottom.

A person with a hard hand and stiff joints should never think of playing deceptions with the cards, as clumsy fingers will not do. In shewing tricks with cards, the principal point consists in shuffling them nimbly, and yet keeping one certain card, either at the bottom or in some known place of the pack, four or five cards from the bottom; for by this you may seem to work wonders, since it is easy for you to see, or take notice of a card; which, though you are perceived to do, it will not be suspected, if you shuffle them well together afterwards by the method here taught, which is this: in shuffling, let the bottom card be always kept a little before, or, which is best, a little behind all the rest of the cards; put it a little beyond the rest before, right over your fore finger, or else, which is the best, a little behind the rest, so that the little finger of the left hand may slip up, and meet with it; at the first, shuffle as thick as you can, and at last, throw upon the board the bottom card, with as many more as you would preserve for any purpose, a little before or a little behind the rest; and be sure to let your fore finger, if the pack be laid before, or your little finger, if the pack be laid behind, always creep up to meet with the bottom card; and when you feel it, you may there hold it till you have shuffled over again; which being done, the card which was first at the bottom will come there again: thus you may shuffle them before their faces, and yet leave your noted card at the bottom:—you must try to be very perfect in this method of shuffling; and having once attained it, you may do almost what you please; for whatever pack you make, though it is ten, twelve, or twenty cards, you may still keep it next the bottom, and yet shuffle them often, to please the curious.

To call for any Card in the Pack.

This trick, which requires very little practice or indeed understanding, to perform, is done in the following manner.

Having privately seen a card, put it at the bottom of the pack; then shuffle the cards till it comes to the bottom again;

then put the cards behind you, and say here I call for, naming the bottom card, which you have seen; and as you hold them behind you, turn the top card with its face upwards; then hold forth the cards, and as you hold them you may see what the next card is; then put the cards behind you again, and take the top card and put it at the bottom, with its face downwards, and turn the next card with its face upwards, and whilst you are doing this, say, here I call for, naming the card you saw last; then hold forth the cards again, shewing the bottom card, which will be that you call for; then put the cards behind you again, and proceed in the same manner as you did before:—you may by this method go through them all, and call for all the cards in the pack, to the admiration of the beholders, who will be surprised how you could find them out when you hold them behind you.

How to make a Card jump out of the Pack and run on the Table.

Take a pack of cards, and let any one draw any card that they fancy best, and afterwards take and put it into the pack, but so that you may know where to find it at pleasure: for by this time, I suppose, you know how to shuffle the cards, and where to find any card when it is put into the pack; then take a piece of wax, and put it under the thumb-nail of your right hand, and there fasten a hair to your thumb, and the other end of the hair to the card; then spread the pack of cards open on the table: then say, if you are a pure virgin, the card will jump out of the pack; then by your words or charms seem to make it jump on the table.

How to tell what Card any Man thinks on, and how to convey the same into a Kernel of a Nut or Cherry-stone, and the same again into one's Pocket; and how to make him draw the same, or any Card you please, and all under one device.

Take a nut, or cherry-stone, and burn a hole through the side of the top of the shell, and also through the kernel if you will, with a hot bodkin, or bore it with an awl, and with a needle pull out the kernel, so as the same may be as wide as the hole of the shell: then write the name of the card on a piece of fine paper, and roll it up hard; then put it into the nut or cherry-stone, and stop the hole up with wax, and rub the same over with a little dust, and it will not be perceived: then let some stander by draw a card, saying, it is no matter

what card you draw : and if your hands so serve you to use the card well, you shall proffer him, and he shall receive the same card that you have rolled up in the nut ; then take another nut and fill it up with ink, and then stop the hole up with wax, and then give that nut which is filled with ink to some boy to crack, and when he finds the ink come out of his mouth, it will cause great laughter. By this feat on the cards, many wonders may be done.

How to let twenty Gentlemen draw twenty Cards, and to make one Card every Man's Card.

Take a pack of cards, let any gentleman draw a card, and let him put it in the pack again, but be you sure that you know where to find it again at pleasure ; then shuffle the cards again as you are taught before, and then let another gentleman draw a card, but be sure that you let him draw no other but the same card as the other did draw, and so till 10 or 12, or as many cards as you think fit : when you have so done, let another gentleman draw another card, but not the same, and put the card into the pack where you have kept the other card, and shuffle them till you have brought both the cards together ; then shewing the last card to the company, the other will shew the trick. By this means many other feats may be done.

How to change a Pack of Cards into all manner of Pictures.

You must take a pack of cards, and paint upon the back-side of one half of the pack, what manner of figures shall please your fancy best ; as men, women, birds, flowers, &c. then paint the other half of the cards, viz. on that side where the spots are on, after the same manner you did the other half ; so between them both you will have a compleat pack of all pictures : and when you will perform this trick you must shew the cards but half-way. This is one of the best tricks on the cards.

To make the Constable catch the Knave.

Take a pack of cards, and look out the four knaves ; lay one of them privately on the top of the pack, and lay the other three down upon the table, saying, here you see are three knaves got together, about no good you may be sure ; then lay down a king beside them, saying, but here comes the constable, and catches

them together ; Oh, says he, have I caught you together ? Well, the next time I catch you together, I'll punish you severely for all your rogueries. Oh, but, say they, you shan't catch us together in haste ; for they conclude to run three several ways. Well, I'll go here, says one, so take one of the knaves and put him at the top of the pack ; and I'll go here, says another, so put him at the bottom ; then I'll go here, says the third, so put him in the middle : nay, says the constable, if you run, I'll make sure of one, so I'll follow the first : then take the king, and put him at the top, and let any one cut the cards asunder two or three times, then deal out the cards one by one, and you shall find the three knaves together, and the constable with them.

Note.—This feat would be best done with a pack of cards that has two knaves of that sort of which you put one in the middle.

How to make a Card jump out of an egg.

To do this wonderful feat, you must have two sticks made of a size, and both of a likeness, so that no person can know one from the other ; one of these sticks must be made so artificially as to conceal a card in the middle, as thus : you must have one of your sticks turned hollow quite through, and then an artificial spring to throw the card in the egg at your pleasure. The operation is thus : take and peal any card in the pack, which you please, and so roll it up, and then put it into your false stick, and there let it be till you have occasion to make use of it ; then take a pack of cards, and let any one draw a card, but be sure let it be the same sort of card that you have in the stick already ; then let them put it in the pack again, and when you have shuffled them, let that card fall into your lap which the party drew ; so calling for some eggs, desire the party that drew the card, or any other person in the company, to chuse any one of these eggs, and when they have chosen one, ask them if there be any thing in it, and they will answer no : then take the egg in your left hand, and the false stick in your right, and so break the egg with your stick ; then let the spring go, and the card will appear in the egg, to the amazement of the beholders ! then conceal that stick, and produce the true one upon the table.

For a Person to chuse a Card, you being supposed not to know what it is, and then for the Person to hold the Cards between his Finger and Thumb, to strike them all out of his Hand, except the very Card he had taken.

This is called the nerve trick, and is thus performed; having previously looked at a card, bid the person draw one, taking care to shove that to him which you know; when he has looked at it, let him put it at the bottom; let him shuffle the cards; then you look at them again, and finding the card, place it at the bottom; then cut them in half; give the party that part which contains his chosen card at the bottom, to hold between his finger and thumb just at the corner; bid him pinch them as tight as he can; then striking them pretty sharp, they will all fall to the ground, except the bottom one, which is the card he had chosen.

This is a very curious trick, and if cleanly done, is really astonishing: but may be accounted for from the nature of the nerves, which are always more retentive when any thing is attempted to be taken either by force or surprize.

To tell what Card a Person thinks upon, though you are not in the room, or which Card he has touched or waved his Hand over.

To do this trick, you must lay a wager that you will tell the card the person has touched, though you do not see it: let several cards be laid out on a table, 1, 2, 3, 4, 5, 6, or any number; then turn your back, or leave the room, while the person makes choice; on your return, you must inquire what he will lay, having your eye upon the cards laid out; if he says he will lay six to one, or ten to one, you must take the highest number, as that will, in all probability, be the card he had fixed on. You must seem to pause about counting the cards as they lay, and choosing the farthest off.

How to deliver out four Aces, and convert them to four Knives.

This trick is one among the many which is effected by a quick sleight; for if it is done in a bungling manner, it may easily be detected, and the pretender will be liable to contempt instead of applause.

To do this, make a pack of eight cards, viz. four aces and four knaves, and let them be laid in this order: an ace and a

knave, and so alternately through all the eight cards; then shuffle them, so as always at the second shuffling, or at least when you have done shuffling them, one of the aces may be the nethermost card; then use some words or device, and putting your hand with the cards to the edge of the table, let out privately a piece of the second card, which is one of the knaves; then shewing to the standers-by the nether card, which is one of the aces, be sure to cover the piece of the knave with your fingers; then draw out the same knave, laying it down on the table; then shuffle the cards as before, and you will have two aces at bottom; therefore take off the uppermost card, and thrust it into the middle of the pack; do the same with the nethermost card, which is one of the aces, then you may show another ace as before; and instead of that lay down another knave; proceed in the same method, till, instead of the four aces, you have laid down the four knaves.

The beholders, all the time thinking that they lay four aces on the table, are greatly deceived when the cards are turned up, and will wonder at the transformation.

To tell what Card a Person pitches on, without seeing the Card till you find it in the Pack.

The many different tricks which may be done with cards must have been invented by various persons, at different periods, as it cannot be supposed that any one person could be the inventor of all. This trick is done in the following manner; as you hold the cards in your hand, let any one take a card out of the pack, and look at it; then take the card from them with your eyes shut, and put it at the bottom of the pack; then shuffle the cards till you know it is come to the bottom again: then putting the cards behind you, pretend to shuffle them behind you, but let your shuffling be only this; take off the uppermost card, and put it at the bottom, reckon that two: then take off another card, and reckon that three; then take off as many as you please from the top, and put them at the bottom, counting to yourself, how many you take off: then bring the cards forth; and hold them with their faces towards you; then take off one by one, privately counting the number, and smell to them, as though you found it out by your nose, till you come to the right card; then produce it, saying this is it; and they will wonder how you found it out.

A little practice will serve to perfect any person in this trick; and indeed most of them depend on practice, as well as other manual operations.

To discover the Number of Points on three Cards, placed under three different Parcels of Cards.

You are first to agree that the ace shall tell eleven, the pictured cards ten each, and the others according to their number of points; as at the game of piquet: then propose to any one to choose three cards, and over each of them to put as many cards as will make the number of the points of that card fifteen;—suppose for example, he chooses a 7, a 10, and an ace; then over the 7 he must place eight cards; over the 10, five cards; and over the ace, four: take the remainder of the cards, and seeming to look for some card among them, tell how many there are, and adding sixteen to that number, you will have the number of points on the three cards. As in this instance, where there will remain Twelve cards, if you add sixteen to that number, it will make Twenty-eight, which is the number of points on the three cards*.

The Ten Duplicates.

Take twenty cards, and after any one has shuffled them, lay them down by pairs on the board, without looking at them; then desire several persons to look each of them at different pairs, and remember what cards compose them; you then take up all the cards in the order they lay, and place them again on the table, according to the order of the letters in the following words.

M	U	T	U	S
1	2	3	4	5
D	E	D	I	T
6	7	8	9	10
N	O	M	E	N
11	12	13	14	15
C	O	C	I	S†
16	17	18	19	20

* If this recreation be performed with a pack of quadrille cards, the number added to the remaining cards must be eight.

† These words convey no meaning: the last word is sometimes written Coecis; but that being no Latin word, can make no sense with the others; if, indeed, it was Cæcis, a sort of sense might be made out; but then the æ would by no means answer the o in *Nomen*, as it must do to perform the recreation.

Now you will observe that these words contain ten letters repeated, or ten pair of letters; therefore you ask each person which row, or rows, the cards he looked at are in; if he says they are in the first row, you know that they must be the second and fourth; if in the second and fourth rows, they must be the ninth and nineteenth, and so of the rest.

To name the Number of Cards that a Person shall take out of the Pack.

To perform this recreation, you must so dispose a piquet pack of cards, that you can easily remember the order in which they are placed;—suppose for example, that they are placed according to the words in the following line.

Seven aces, eight kings, nine queens, and ten knaves;—

And that every card be of a different suit, following each other in this order, spades, clubs, hearts, and diamonds: then the eight first cards will be the seven of spades, ace of clubs, eight of hearts, king of diamonds, nine of spades, queen of clubs, ten of hearts, and knave of diamonds; and so of the rest*.

You shew that the cards are placed promiscuously, and then offer them with the backs upward to any one, that he may draw what quantity he pleases; which, when he has done, you dexterously look at the card that precedes, and that which follows those he has taken: after he has well regarded the cards, you take them from him, and putting them into different parts of the pack, shuffle them, or give them to him to shuffle; during which you recollect, by the foregoing line, all the cards he took out, and as you lay them down, one by one, you name each card.

This is a pleasing recreation for those that have a good memory; they that have not should never attempt it.

A Century of different Names being written on the Cards, to tell the particular Name which any Person has thought on†.

On ten cards, write a hundred different names, observing only, that the last name on each card begins with one of the

* This recreation may be further diversified, by placing the cards in such manner, by the table for thirty-two numbers, that after they have been shuffled once or twice, they may come into the above order.

† This is called the impenetrable Secret.

letters of the word **INDROMACUS**, which letters, in the order they stand, answer to the numbers 1, 2, 3, &c. to 10: on ten other cards, write the same names, with this restriction, that the first name on every card must be taken from the first of the other cards, whose last name begins with **I**; the second name must be taken from that whose last name begins with **N**; and so of the rest: then let any one choose a card out of the first ten, and after he has fixed on a name give it you again, when you carefully note the last name, by which you know the number of that card. You then take the other ten cards, and after shuffling them, shew them to the person one by one, and ask if he sees the name he chose, and when he says he does, you look to that name which is the same in number from the top with the number of the card he took from the other parcel, and that will be the name he fixed on. As for example, suppose he took out the card that had the word **Daphnis** at the bottom, which is the third card, and that he fixed on the name **Galatea**, then that would necessarily be the third on the other card.

Order of the Words on the first Ten Cards.

<i>First Card.</i>	<i>Second.</i>	<i>Third.</i>	<i>Fourth.</i>
Celadon	Pomona	Deucalion	Licas
Andromeda	Omphalus	Hesiona	Calypso
Silenus	Ariadne	Galatea	Medea
Acis	Lisis	Thetis	Adonis
Eglea	Flora	Atys	Ceres
Sirincus	Danae	Palamedes	Cassandra
Thyrsis	Alcander	Melibæus	Pales
Polyphemus	Tiresias	Orion	Menelaus
Proteus	Issoria	Nisus	Glaucus
Jason	Narcissus	Daphnis	Rophelina

<i>Fifth.</i>	<i>Sixth.</i>	<i>Seventh.</i>	<i>Eighth.</i>
Latona	Icarus	Ganymede	Leander
Hilas	Clitander	Aristea	Peleus
Thisbe	Alcinous	Hyacinthus	Calista
Diana	Endimion	Circe	Cadmus
Palæmon	Alcidon	Mopsa	Psyche
Hebe	Iphis	Piramus	Semele
Sappho	Achelous	Philemon	Iphigenia
Acteon	Philomela	Astrea	Silvia
Medusa	Cephalus	Pelias	Alpheus
Orpheus	Mirtilus	Adrianus	Coridon

<i>Ninth.</i>	<i>Tenth.</i>
Hipolitus	Isander
Corilas	Isidora
Procris	Melicerte
Caparissa	Riblis
Arethusus	Silvander
Eson	Dryope
Calistus	Nessus
Arachne	Philoctetes
Pirus	Marsias
Vertumnus	Licas

Order of the Words on the last Ten Cards:

<i>First Card</i>	<i>Second</i>	<i>Third</i>	<i>Fourth</i>
Celadon	Andromeda	Silenus	Acis
Pomona	Omphalus	Ariadne	Lisis
Deucalion	Hesiona	Galatea	Thetis
Licas	Calypso	Medea	Adonis
Latona	Hilas	Thisbe	Diana
Icarus	Clitander	Alcinous	Endimion
Ganymede	Aristea	Hiacinthus	Circe
Leander	Peleus	Calista	Cadmus
Hypolitus	Corilas	Procris	Caparissa
Dryope	Nessus	Philoctetes	Marsias
<i>Fifth</i>	<i>Sixth</i>	<i>Seventh</i>	<i>Eighth</i>
Eglea	Sirineus	Thyrsis	Polyphemus
Flora	Danae	Alcander	Tiresias
Atys	Palamedes	Melibæus	Orion
Ceres	Cassandra	Pales	Menelaus
Palæmon	Hebe	Sappho	Acteon
Alcidon	Iphis	Archelous	Philomela
Mopsa	Piramus	Philemon	Astrea
Psyche	Semele	Iphigenia	Silvia
Arethusus	Eson	Calistus	Arachne
Licas	Isander	Isidora	Melicerte
	<i>Ninth</i>		<i>Tenth</i>
Proteus	Cephalus	Jason	Myrtilus
Issoria	Pelias	Narcissus	Adrianus
Nisus	Alpheus	Daphnis	Corydon
Glaucus	Pirus	Rophelina	Vertumnus
Medusa	Riblis	Orpheus	Silvander

Instead of ten cards, there may be twenty to each parcel, by adding duplicates to each card, which will make the recreation appear the more mysterious, and will not at all embarrass it, as you have nothing to remember but the last name on each card; or, instead of names, you may write questions on one of the parcels, and answers on the other.

Of the Combination of the Cards.

The tables we here give are the basis of many recreations, as well on numbers, letters, and other subjects, as on the cards; and the effect here produced by them is the more surprising, as that which should seem to prevent any collusion, that is, the shuffling of the cards, is, on the contrary, the cause from whence it proceeds.

It is a matter of indifference what numbers are made use of in forming these tables: we shall here confine ourselves to such as are applicable to the subsequent recreations: any one may construct them in such manner as is agreeable to the purpose he intends they shall answer.

To make them, for example, correspond to the nine digits and a cypher, there must be ten cards, and at the top of nine of them must be written one of the digits, and on the tenth a cypher; these cards must be placed upon each other in the regular order, the number 1 being on the first, and the cypher at bottom: you then take the cards in your left hand, as is commonly done in shuffling, and taking off the two top cards, 1 and 2, you place the two following, 3 and 4, upon them; and under those four cards the three following, 5, 6, and 7: at the top you put the cards 8 and 9, and at the bottom the card marked 0; constantly placing in succession 2 at top and 3 at the bottom, and they will then be in the following order:

8.9..3.4..1.2...5.6.7..0

If you shuffle them a second time, in the same manner, they will then stand in this order:

6.7..3.4..8.9..1.2.5..0

Thus, at every new shuffle, they will have a different order, as expressed in the following line :

1	shuffle	8.9.3.4,1.2.5.6.7.0
2		6.7.3.4.8.9.1.2.5.0
3		2.5.3.4.6.7.8.9.1.0
4		9.1.3.4.2.5.6.7.8.0
5		7.8.3.4.9.1.2.4.6.0
6		5.6.3.4.7.8.9.1.2.0
7		1.2.3.4.5.6.7.8.9.0

It is a remarkable property of this number, that the cards return to the order in which they were first placed, after a number of shuffles, which added to the number of columns that never change the order, is equal to the number of cards: thus the number of shuffles is 7, and the number of columns in which the cards marked 3, 4, &c. never change their places is 3, which are equal to 10, the number of the cards: this property is not common to all numbers; the cards sometimes returning to the first order in less number, and sometimes in a greater number of shuffles than that of the cards.

Though the cards are here directed to be shuffled by twos and threes only, yet tables may be constructed with equal facility for shuffling them by 2, and 1, 3, and 4, or any other number whatever; observing that the fewer cards are taken together, the less liable you will be to err.

Note.—Before you venture to perform these recreations, you should accustom yourself to shuffle the cards exactly and readily, which will be easily attained by practice.

TABLES OF COMBINATIONS,
Constructed on the foregoing principles.

TABLE I.
FOR TEN NUMBERS.

Order before shuffling.	After 1st shuffle.	After 2nd.	After 3rd.
1	8	6	2
2	9	7	5
3	3	3	3
4	4	4	4
5	1	8	6
6	2	9	7
7	5	1	8
8	6	2	9
9	7	1	1
0	0	0	0

TABLE II.

FOR TWENTY-FOUR NUMBERS.

Order before shuffling.	After 1st shuffle.	After 2d.	After 3d.
1	23	21	17
2	24	22	20
3	18	12	2
4	19	15	7
5	13	5	13
6	14	6	14
7	8	9	3
8	9	3	18
9	3	18	12
10	4	19	15
11	1	23	21
12	2	24	22
13	5	13	5
14	6	14	6
15	7	8	9
16	10	4	19
17	11	1	23
18	12	2	24
19	15	7	8
20	16	10	4
21	17	11	1
22	20	16	10
23	21	17	11
24	22	20	16

TABLE III.

FOR TWENTY-SEVEN NUMBERS.

Order before shuffling.	After 1st shuffle.	After 2d.	After 3d.
1	23	21	17
2	24	22	20
3	18	12	2
4	19	15	7
5	13	5	13
6	14	6	14
7	8	9	3
8	9	3	13
9	3	18	12
10	4	19	16
11	1	23	21
12	2	24	22
13	5	13	5
14	6	14	6
15	7	8	9
16	10	4	19
17	11	1	23
18	12	2	24
19	15	~	8
20	16	10	4
21	17	11	1
22	20	16	10
23	21	17	11
24	22	20	16
25	25	25	25
26	26	26	26
27	27	27	27

TABLE IV.

FOR THIRTY-TWO NUMBERS.

Order before shuffling.	After 1st shuffle.	After 2nd.	After 3rd.
1	28	26	22
2	29	27	25
3	23	17	7
4	24	20	12
5	18	10	9
6	19	11	3
7	13	1	28
8	14	2	29
9	8	14	2
10	9	8	14
11	3	23	17
12	4	24	20
13	1	28	26
14	2	29	27
15	5	18	10
16	6	19	11
17	7	13	1
18	10	9	8
19	11	3	23
20	12	4	24
21	15	5	18
22	16	6	19
23	17	7	13
24	20	12	4
25	21	15	5
26	22	16	6
27	25	21	15
28	26	22	16
29	27	25	21
30	30	30	30
31	31	31	31
32	32	32	32

K 2

Several Letters that contain no meaning, being written upon Cards, to make them, after they have been twice shuffled, give an Answer to a question that shall be proposed: as for Example, what is Love?

Let 24 letters be written on as many cards, which, after they have been twice shuffled, shall give the following answer:

A Dream of Joy that soon is over.

First write one of the letters in that line on each of the cards^{*}; then write the answer on a paper, and assign one of the 24 first numbers to each card, in the following order:

A	D	R	E	A	M	O	F	J	O	Y	T	H	A	T
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
						S	O	O	N	I	S	O	'	E
						16	17	18	19	20	21	22	23	24

Next, write on another paper a line of numbers, from 1 to 24, and looking in the table for 24 combinations, you will see that the first number after the second shuffle is 21; therefore the card that has the first letter of the answer, which is A, must be placed against that number in the line of numbers you have just made †; in like manner the number 22 being the second of the same column, indicates that the card which answers to the second letter, D, of the answer, must be placed against that number; and so of the rest; the cards will then stand in the following order:

O	O	F	S	A	M	N	T	O	I	S	R	H	A	E	O	'	E
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
						J	O	R	A	D	Y	T					
						18	19	20	21	22	23	24					

From whence it follows, that after these cards have been twice shuffled, they must infallibly stand in the order of the letters in the answer.

Observe 1, you should have several questions with their answers, consisting of 24 letters, written on cards: these cards should be put in cases, and numbered, that you may know to

* These letters should be written in capitals on one of the corners of each card, that the words may be easily legible when the cards are spread open.

† For the same reason, if you would have the answer after one shuffle, the cards must be placed according to the first column of the table; or if after three shuffles, according to the third column.

which question each answer belongs: you then present the questions; and when any one of them is chosen, you pull out the case that contains the answer, and shewing that the letters written on them make no sense, you then shuffle them, and the answer becomes obvious.

2. To make this recreation the more extraordinary, you may have three cards, on each of which an answer is written; one of which cards must be a little wider, and another a little longer, than the others; you give these three cards to any one, and when he has privately chosen one of them, he gives you the other two, which you put into your pocket, without looking at them, having discovered by feeling which he has chosen. You then pull out the case that contains the cards that answer to his question, and perform as before.

3. You may also contrive to have a long card at the bottom after the second shuffle; the cards may be then cut several times, till you perceive by the touch that the long card is at the bottom, and then give the answer; for the repeated cuttings, however often, will make no alteration in the order of the cards.

The second of these observations is applicable to some of the subsequent recreations, and the third may be practised in almost all experiments with the cards. You should take care to put up the cards as soon as the answer has been shewn; so that if any one should desire the recreation to be repeated, you may offer another question, and pull out those cards that contain the answer.

Though this recreation cannot fail of exciting at all times pleasure and surprise, yet it must be owned that a great part of the applause it receives arises from the address with which it is performed.

The twenty-four letters of the Alphabet being written upon so many Cards, to shuffle them and pronounce the letters shall then be in their natural Order; but that not succeeding, to shuffle them a second time, and then shew them in proper Order:

Write the 24 letters on the cards in the following order:

1	2	3	4	5	6	7	8	9	10	11	12
R	S	H	Q	E	F	T	P	G	U	X	C
13	14	15	16	17	18	19	20	21	22	23	24
N	O	D	Y	Z	I	K	&	A	B	L	M

K 3

The cards being disposed in this manner, shew them upon the table, that it may appear they are promiscuously marked; then shuffle and lay them again on the table, pronouncing that they will be then in alphabetical order: appear to be surprised that you have failed: take them up again, and give them a second shuffle, and then counting them down on the table, they will all be in their natural order.

Several Letters being written promiscuously upon 32 Cards, after they have been once shuffled, to find in a Part of them a Question; and then shuffling the Remainder a second Time, to shew the Answer.

Suppose the question to be, What is each Briton's boast? and the answer, His liberty; which taken together contain 32 letters.

After you have written those letters on 32 cards, write on a paper the words, his liberty, and annex to the letters the first ten numbers, thus:

H I S L I B E R T Y
1 2 3 4 5 6 7 8 9 10

Then have recourse to the table of combinations for ten numbers, and apply the respective numbers to them in the same manner as in the former recreation, taking the first column, as these are to be shuffled only once, according to that order.

I B S L E R T H I Y
1 2 3 4 5 6 7 8 9 10

This is the order in which these cards must stand after the whole number 32 has been once shuffled, so that after a second shuffle they may stand in their proper order: next dispose the whole number of the letters according to the first column for 32 letters: the last ten are to be here placed in the order above; as follows:

W H A T I S E A C H B R I T O N ' S
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
B O A S T ?
18 19 20 21 22
I B S L E R T H I Y
23 24 25 26 27 28 29 30 31 32

Therefore, by the first column of the table, they will next stand thus :

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
I	T	B	R	O	N	S	C	H	B	O	A	E	A	S	T
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
I	I	S	B	S	L	I	B	E	R	T	W	H	H	I	Y

You must observe, that the card here placed the 16th in order, being the last of the question, is a long card ; that you may cut them, or have them cut, after the first shuffle, at that part, and by that means separate them from the other ten cards that contain the answer.

Your cards being thus disposed, you shew that they make no meaning ; then shuffle them once, and cutting them at the long card, you give the first part to any one who reads the question, but can find no answer in the others, which you open before him ; you then shuffle them a second time, and shew the answer as above.

To write 32 Letters on so many Cards, then shuffle and deal them by twos to two Persons, in such manner, that the Cards of one shall contain a Question, and those of the other an Answer.

Suppose the question to be, Is nothing certain ? and the answer, Yes, disappointment.

Over the letters of this question and answer, write the following numbers, which correspond to the order in which the cards are to be dealt by two and two.

I	S	N	O	T	H	I	N	G	C	E	R	T	A	I	N
31	32	27	28	23	24	19	20	15	16	11	12	7	8	3	4
Y	E	S	D	I	S	A	P	O	I	N	T	M	E	N	T
29	30	25	26	21	22	17	18	13	14	9	10	5	6	1	2

Then have recourse to the first column of the table for 32 numbers, and dispose these 32 cards in the following order, by that column :

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
O	I	E	R	G	C	A	N	T	P	I	N	T	A	I	S
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
T	M	E	H	S	D	I	N	N	O	Y	N	T	E	I	S

The cards being thus disposed, shuffle them once, and deal them two and two ; when one of the parties will necessarily have the question, and the other the answer.

Instead of letters, you may write words upon the 32 cards, 16 of which may contain a question, and the remainder the answer; or what other matter you please. If there be found difficulty in accommodating the words to the number of cards, there may be two or more letters or syllables written upon one card.

The Five Beatitudes.

The five blessings we will suppose to be, 1. Science, 2. Courage, 3. Health, 4. Riches, and 5. Virtue: these are to be found upon cards that you deal, one by one, to five persons: first write the letters of these words successively, in the order they stand, and then add the numbers here annexed to them

S	C	I	E	N	C	E	C	O	U	R	A	G	E
31	26	21	16	11	6	1	32	27	22	17	12	7	2
H	E	A	L	T	H	R	I	C	H	E	S		
28	23	18	13	8	3	29	24	19	14	9	4		
V	I	R	T	U	E								
30	25	20	15	10	5								

Then range them in order agreeable to the first column of the table for 31 numbers, as in the last recreation—thus:

L	H	N	A	T	E	R	E	U	A	C	R	G	T	I	U
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
E	E	C	I	I	C	H	S	O	H	R	E	E	V	S	C
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

Next take a pack of cards, and write on the four first the word science; on the four next the word courage; and so of rest.

Matters being thus prepared, you shew that the cards on which the letters are written convey no meaning: then take the pack on which the words are written, and spreading open the first four cards, with their backs upwards, you desire the first person to choose one; then close those cards, and spread the next four to the second person; and so to all five; telling them to hold up their cards, lest you should have a confederate in the room.

You then shuffle the cards, and deal them one by one, in the common order, beginning with the person who chose the first card, and each one will find in his hand the same word as is written on his card. You will observe, that after the sixth

round of dealing, there will be two cards left, which you give to the first and second persons, as their words contain a letter more than the others.

The Cards of the Game of Piquet being mixed together, after shuffling them, to bring, by cutting them, all the Cards of each suit together.

The order in which the cards must be placed to produce the effect desired, being established on the same principle as that which has been before explained, except that the shuffling is here to be repeated three times, we think it will be sufficient to give the order in which they are to be placed before the first shuffle.

Order of the Cards.

1 Ace clubs	17 King clubs
2 Knave clubs	18 Ten hearts
3 Eight diamonds	19 Nine hearts
4 Seven diamonds wide card	20 Seven clubs
5 Ten clubs	21 Ace diamonds
6 Eight spades	22 Knave spades
7 Seven spades wide card	23 Queen hearts
8 Ten diamonds	24 Knave hearts
9 Nine diamonds	25 Ace spades
10 Queen diamonds	26 King diamonds
11 Knave diamonds	27 Nine clubs
12 Queen clubs	28 Ace hearts
13 Eight hearts	29 King hearts
14 Seven hearts wide card	30 Eight clubs
15 Ten spades	31 King spades
16 Nine spades	32 Queen spades

You then shuffle the cards, and cutting at the wide card, which will be the seven of hearts, you lay the eight cards that are cut, which will be the suit of hearts, down on the table; then shuffling the remaining cards a second time, you cut at the second wide card, which will be the seven of spades, and lay in like manner, the eight spades down on the table: you shuffle the cards a third time, and offering them to any one to

cut, he will naturally cut them at the wide card*, which is the seven of diamonds, and consequently divide the remaining cards into two equal parts, one of which will be diamonds and the other clubs.

The Cards at Piquet being all mixed together, to divide the Pack into two equal Parts, and Name the Number of Points contained in each Part.

You are first to agree, that each king, queen, and knave, shall count, as usual, 10, the ace 1, and the other cards according to the number of the points; then dispose the cards, by the table for 32 numbers, in the following order, and observe, that the last card of the first division must be a wide card.

Order of the Cards before shuffling :

1 Seven hearts	17 Nine diamonds
2 Nine clubs	18 Ace spades
3 Eight hearts	19 Ten clubs
4 Eight spades	20 Knave diamonds
5 Knave spades	21 Eight diamonds
6 Ten spades	22 King diamonds
7 Queen clubs	23 Seven spades
8 Ace clubs	24 Seven diamonds
9 Ace hearts	25 Queen diamonds
10 Nine hearts	26 Knave hearts
11 Queen spades	27 King clubs
12 Knave clubs	28 Nine spades
13 Ten diamonds	29 King spades
14 Ten hearts	30 Ace diamonds
15 King hearts	31 Seven clubs
16 Queen hearts	32 Eight clubs

* You must take particular notice, whether they be cut at the wide card, and if they are not, you must have them cut, or cut them again yourself.

You then shuffle them carefully, according to the method before described, and they will stand in the following order :

Cards.	Numbers.	Cards.	Numbers.
		Brought up	34
1 Nine spades	9	6 Ten clubs	10
2 King spades	10	7 Ten diamonds	10
3 Seven spades	7	8 Ten hearts	10
4 Seven diamonds	7	9 Ace clubs	1
5 Ace spades	1	10 Ace hearts (wide card)	1
	<hr/>		<hr/>
	Carried up		Total
	34		66
	<hr/>		<hr/>

		Brought up	101
11 Eight hearts	8	22 Queen hearts	10
12 Eight spades	8	23 Nine diamonds	9
13 Seven hearts	7	24 Knave diamonds	10
14 Nine clubs	9	25 Eight diamonds	8
15 Knave spades	10	26 King diamonds	10
16 Ten spades	10	27 Queen diamonds	10
17 Queen clubs	10	28 Knave hearts	10
18 Nine hearts	9	29 King clubs	10
19 Queen spades	10	30 Ace diamonds	1
20 Knave clubs	10	31 Seven clubs	7
21 King hearts	10	32 Eight clubs	8
	<hr/>		<hr/>
	Carried up		Total
	101		194
	<hr/>		<hr/>

When the cards are by shuffling disposed in this order, you cut them at the wide card, and pronounce that the cards you have cut off contain 66 points, and consequently the remaining part 194. This recreation excites a great degree of admiration, but the applying these cards to the next recreation produces a much greater.

The inconceivable Repique.

When you would perform this recreation with the cards used in the last, you must observe not to disorder the first ten cards in laying them down on the table; putting those cards together in their proper order; therefore you shuffle them a second time in the same manner, and offer them to any one to cut, observing carefully if he cut them at the wide card, which will be the ace of hearts, and will then be at top; if not, you

must make him, under some pretence or other, cut them till it is ; and the cards will then be ranged in such order that you will repique the person against whom you play, though you let him choose, even after he has cut, in what suit you shall make the repique.

Order of the Cards after they have been shuffled and cut.

1 Eight hearts	17 Nine diamonds
2 Eight spades,	18 Knave diamonds
3 Knave spades	19 Nine hearts
4 Ten spades	23 Queen spades
5 Queen clubs	21 Seven hearts
6 Knave clubs	22 Nine clubs
7 King hearts	23 Ten hearts
8 Queen hearts	24 Ace clubs
9 Eight diamonds	25 Seven spades
10 King diamonds	26 Seven diamonds
11 Queen diamonds	27 Nine spades
12 Ace diamonds	28 King spades
13 Seven clubs	29 Ace spades
14 Eight clubs	30 Ten clubs
15 Knave hearts	31 Ten diamonds
16 King clubs	32 Ace hearts wide card

The cards being thus disposed, you ask your adversary in what suit you shall repique him : if he say in clubs, or diamonds, you must deal the cards by threes, and the hands will be as follows :

Elder.
 Hearts, king
 ——— queen
 ——— knave
 ——— nine
 ——— eight
 ——— seven
 spades, queen
 ——— knave
 ——— eight
 Diamonds, eight
 Clubs, eight
 ——— seven

Younger.
 Clubs, ace
 ——— king
 ——— queen
 ——— knave
 ——— nine
 Diamonds, ace
 ——— king
 ——— queen
 ——— knave
 ——— nine
 Spades, ten
 Hearts, ten

Rentrée, or take in
of the elder.
Seven spades
Seven diamonds
Nine spades
King spades
Ace spades

Rentrée of the
younger
Ten clubs
Ten diamonds
Ace hearts.

If he against whom you play, who is supposed to be elder hand, has named clubs for the repique, and has taken in five cards, you must then lay out the queen, knave, and nine of diamonds, and you will have, with the three cards you take in, a sixiem major in clubs, and quatorze tens. If he leave one or two cards, you must discard all the diamonds.

If he require to be repiqued in diamonds, then discard the queen, knave, and nine of clubs; or all the clubs, if he leave two cards; and you will then have a hand of the same strength as before.

Note—If the adversary should discard five of his hearts, you will not repique him, as he will then have a septiem in spades; or if he only take one card; but neither of these any one can do who has the least knowledge of the game. If the person against whom you play would be requied in hearts or spades, you must deal the cards by twos, and the game will stand thus:

Elder hand.
King diamonds
Knave diamonds
Nine diamonds
Eight diamonds
Queen clubs
Knave clubs
Nine clubs
Eight clubs
Seven clubs
Eight hearts
Seven hearts
Eight spades
Rentrée.
Seven spades
Seven diamonds
Nine spades
King spades
Ace spades

Younger hand.
Ace clubs
King clubs
Ace diamonds
Queen diamonds
Queen spades
Knave spades
Ten spades
King hearts
Queen hearts
Knave hearts
Ten hearts
Nine hearts
Rentrée.
Ten clubs
Ten diamonds
Ace hearts

If he require to be repiqued in hearts, you keep the quint to a king in hearts, and the ten of spades, and lay out which of the rest you please: then, even if he should leave two cards, you will have a sixiem major in hearts, and quatorze tens, which will make a repique.

But if he demand to be repiqued in spades; at the end of the deal you must dexterously pass the three cards that are at the bottom of the stock (viz. the ten of clubs, ten of diamonds, and ace of hearts) to the top, and by that means you reserve the nine, king, and ace of spades for yourself; so that by keeping the quint in hearts, though you should be obliged to lay out four cards, you will have a sixiem to a king in spades, with which, and the quint of hearts, you must make a repique.

Observe here likewise, that if the adversary lay out only three cards, you will not make the repique; but that he will never do, unless he be quite ignorant of the game, or has some knowledge of your intention.

This last stroke of piquet has gained great applause, when those that have publicly performed it have known how to conduct it dexterously. Many persons who understand the nature of combining the cards, have gone as far as the passing the three cards from the bottom of the stock, and have then been forced to confess their ignorance of the manner in which it was performed.

The Metamorphosed Cards.

Provide thirty two cards that are differently coloured; on which several different words are written, and different objects painted: these cards are to be dealt two and two, to four persons, and at three different times, shuffling them each time: after the first deal, every one's cards are to be of the same colour: after the second deal, they are all to have objects that are similar; and after the third, words that convey a sentiment.

Dispose of the cards in the following order :

Order of the cards.	Colours.	Objects.	Words.
1	Yellow	Bird	I find
2	Yellow	Bird	In you
3	Green	Flower	Charming
4	Green	Flower	Flowers
5	White	Bird	To hear
6	White	Orange	Beauty
7	Red	Butterfly	My
8	Red	Flower	Notes
9	Red	Flower	In
10	Red	Butterfly	Shepherdess
11	Green	Butterfly	Lover
12	Green	Butterfly	Your
13	White	Flower	Of
14	White	Flower	an inconstant
15	Yellow	Orange	Image
16	Yellow	Flower	Inchanting
17	White	Orange	Ardor
18	Yellow	Butterfly	My
19	Yellow	Butterfly	Phyllis
20	White	Bird	Birds
21	Red	Orange	Sing
22	Red	Orange	Dear
23	Green	Orange	and Sweetness
24	Green	Orange	The
25	Green	Bird	Of
26	Green	Bird	Present
27	Yellow	Flower	As
28	Red	Bird	Changes
29	Red	Bird	Bosom
30	Yellow	Orange	Me
31	White	Butterfly	Your
32	White	Butterfly	I long

The cards thus coloured, figured and transcribed, are to be put in a case, in the order they here stand.

When you would perform this recreation, you take the cards out of the case, and shew, without changing the order in which they were put, that the colours, objects, and words, are all placed promiscuously: you then shuffle them in the

same manner as before, and deal them two and two, to four persons, observing that they do not take up their cards till all are dealt, nor mix them together; and the eight cards dealt to each person will be found all of one colour: you then take each person's cards, and put those of the second person under those of the first, and those of the fourth person under those of the third: after which, you shuffle them a second time, and having dealt them in the same manner, on the first person's cards will be painted all the birds; on the second person's cards, all the butterflies; on those of the third, the oranges; and on those of the fourth, the flowers. You take the cards a second time, and observing the same precautions, shuffle and deal them as before, and then the first person, who had the last time the birds in his hands, will have the words in his hand that compose this sentence—

Sing, dear birds, I long to hear your enchanting notes;

The second person, who had the last deal, the butterflies, will now have these words,

Of an inconstant lover your changes present me the image;

The third, who had the oranges, will have this sentence,

As in my Phyllis, I find in you beauty and sweetness;

The fourth, who had the flowers, will have these words,

Charming flowers, adorn the bosom of my shepherdess.

It seems quite unnecessary to give any farther detail, as they who understand the foregoing recreations will easily perform this.

The Repique with Carte Blanche.

In the following recreations relative to piquet, we shall confine ourselves to the order in which the cards must stand after they are cut, and ready to be dealt: they who choose to shuffle them first, in order to make the performance appear the more extraordinary, may easily dispose them in a proper order for that purpose, by having recourse to the table of combinations for 32 numbers.

Order of the Cards :

Elder	1	Ace spades	
	2	Seven spades	
Younger	3	Seven clubs	
	4	Ten hearts	
E.	5	Ace hearts	
	6	Knave spades	
Y.	7	Nine hearts	
	8	Eight clubs	
E.	9	Queen spades	
	10	Ace diamonds	
Y.	11	Eight hearts	
	12	Eight spades	
E.	13	Queen diamonds	
	14	Ace clubs	
Y.	15	Nine diamonds	
	16	Nine clubs	
E.	17	King diamonds	
	18	Ten diamonds	
Y.	19	Seven hearts	
	20	Seven diamonds	
E.	21	Nine spades	
	22	Knave diamonds	
Y.	23	Ten clubs	
	24	Eight diamonds	
	25	King hearts	} Elder's rentrée
	26	King clubs	
	27	Queen hearts	
	28	King spades	
	29	Ten spades	} Younger's rentrée
	30	Queen clubs	
	31	Knave clubs	
	32	Knave hearts	

The cards being thus disposed, the hands of the players, after they have been dealt two and two, will be as follows :

Elder.	Younger.
Ace spades	Ten clubs
Queen spades	Nine clubs
Knave spades	Eight clubs
Nine spades	Seven clubs
Seven spades	Ten hearts
Ace diamonds	Nine hearts
King diamonds	Eight hearts
Queen diamonds	Seven hearts
Knave diamonds	Nine diamonds
Ten diamonds	Eight diamonds
Ace hearts	Seven diamonds
Ace clubs	Eight spades

The Rentrée

King hearts	Queen clubs
Queen hearts	Knave clubs
King clubs	Knave hearts
King spades	
Ten spades	

The cards being thus dealt, you desire the other player to cast his eye over the two hands, and take which he pleases, on condition, that if he keep the hand dealt him he shall be eldest ; but if he take the other hand he shall be youngest.

If he keep the hand dealt him, which in appearance is much preferable to the other, he will naturally lay out the four lowest spades, and leave a card, by carrying the quint in diamonds and four aces : you then tell down your carte blanche, and keeping the two quarts in clubs and hearts, lay out the others, and with your rentrée you will have a sixiem in clubs, and a quint in hearts, with which you will make a repique, counting 107 points ; though if the cards were played, you would be capot.

If the opposite player choose the youngest hand, you then discard the quart to a king in diamonds with the seven of spades, and with your rentrée you will have a sixiem major in spades, and quatorze of aces ; by which you will make repique and capot.

Here also you may miss the repique, if the other player keep the hand dealt him, and discard his diamonds; but this, as in the other cases, no one will do who has any knowledge of the game.

Case at Piquet, where you repique the elder Hand, though he have the Choice of the Cards after they are dealt.

The cards must here stand, after they have been cut, in the following order:

Elder	1	Ace spades
	2	Eight spades
Younger	3	Knave clubs
	4	Ten clubs
E.	5	Ace clubs
	6	Nine hearts
Y.	7	Eight clubs
	8	Nine diamonds
E.	9	Queen clubs
	10	Eight diamonds
Y.	11	Seven clubs
	12	Ten diamonds
E.	13	Ten spades
	14	Eight hearts
Y.	15	Nine clubs
	16	King clubs
E.	17	King spades
	18	Queen spades
Y.	19	Knave diamonds
	20	Seven spades
E.	21	Seven diamonds
	22	Knave spades
Y.	23	Seven diamonds
	24	Knave spades
	25	King hearts
	26	Knave hearts
Rentrée E.	27	Queen hearts
	28	Seven hearts
	29	Ten hearts
	30	Ace hearts
Rentrée Y.	31	Queen diamonds
	32	King diamonds

The cards being thus disposed* when they are dealt, the hand of the two players will be as follows :

Elder.	Younger.
Spades, ace	Diamonds, ace
—— king	—— knave
—— queen	—— ten
—— knave	—— nine
—— ten	Clubs, king
—— eight	—— knave
Clubs, ace	—— ten
—— queen	—— nine
Hearts, nine	—— eight
—— eight	—— seven
Diamonds, eight	Spades, nine
—— seven	—— seven
Rentrée	Rentrée
King hearts	Seven hearts
Queen hearts	Ace hearts
Knave hearts	King diamonds
Ten hearts	Queen diamonds

You then give the other players the liberty of choosing either hand, but without seeing them ; if he choose the elder hand, you discard the king of clubs, with the nine and seven of spades, and by your rentrée you will have a sixiem in diamonds and the point, which will make 22, and then added to the quint in clubs will make 97, and you will necessarily win, as the adversary will not fail to lay out his two small hearts.

If, on the contrary, he choose the younger hand, you discard the knave, ten and eight of spades, with the seven and eight of diamonds ; then by taking in the quint to a king in hearts, you will have a septiem in hearts, a tierce major in spades, and three queens, which will tell 90, though the adversary should discard to the most advantage possible.

* In all these recreations with piquet, there should be a wide card last, that they may be properly cut.

Case at Piquet, where you give the other Player not only the Choice of the suit in which he will be requir'd, but that of dealing the Cards by Twos or by Threes, and of taking either Hand after they are dealt, you being to tell and play first.

The cards must be disposed as follows :

1 Queen clubs	17 Queen spades
2 Nine clubs	18 Nine spades
3 Eight clubs	19 Eight spades
4 Seven clubs	20 Seven spades
wide card	wide card
5 Ace hearts	21 Ace diamonds
6 King hearts	22 King diamonds
7 Knave hearts	23 Knave diamonds
8 Ten hearts	24 Ten diamonds
9 Queen hearts	25 Queen diamonds
10 Nine hearts	26 Nine diamonds
11 Eight hearts	27 Eight diamonds
12 Seven hearts	28 Seven diamonds
wide card	wide card
13 Ace spades	29 Ace clubs
14 King spades	30 King clubs
15 Knave spades	31 Knave clubs
16 Ten spades	32 Ten clubs

It is evident, by this disposition of the cards, that if they are cut at any one of the wide cards, which are the last of each suit, there will be always a stock of eight cards of the same suit; consequently, if he with whom you play require to be requir'd in clubs, by cutting at the first wide card, which is the seven of clubs, the eight clubs will necessarily be at the bottom of the pack; and you will have for your rentrée a quint major in clubs: the same will happen in all the other suits, by cutting at the seven of each. If he deal the cards by twos, the hands will be as follows* :

*The hands will be always the same, though in different suits.

Elder.

Ace hearts
 King hearts
 Queen hearts
 Nine hearts
 Ace spades
 King spades
 Queen spades
 Nine spades
 Ace diamonds
 King diamonds
 Queen diamonds
 Nine diamonds

Younger.

Knave hearts
 Ten hearts
 Eight hearts
 Seven hearts
 Knave spades
 Ten spades
 Eight spades
 Seven spades
 Knave diamonds
 Ten diamonds
 Eight diamonds
 Seven diamonds

Rentrée

Ace clubs
 King clubs
 Knave clubs
 Ten clubs
 Queen clubs

Nine clubs
 Eight clubs
 Seven clubs

But if he deal the cards by threes, the hands will stand thus :

Elder.

Ace hearts
 King hearts
 Knave hearts
 Seven hearts
 Ace spades
 Queen spades
 Nine spades
 Eight spades
 Knave diamonds
 Ten diamonds
 Queen diamonds

Younger.

Ten hearts
 Queen hearts
 Nine hearts
 King spades
 Knave spades
 Ten spades
 Seven spades
 Ace diamonds
 King diamonds
 Nine diamonds
 Eight diamonds
 Seven diamonds

Rentree.

Ace clubs
 King clubs
 Knave clubs
 Ten clubs
 Queen clubs

Nine clubs
 Eight clubs
 Seven clubs

If the other player require to be repiqued in spades, you cut them at the 7 of that suit, and tell him he is at liberty to deal them by twos or threes*; if he deal them by twos, he is to choose which hand he will have, without seeing them; you being still eldest.

If he keep his own hand, you discard the nine of hearts, spades, and diamonds, and either of the two queens; and by your rentrée you will have a quint major in clubs, quatorze aces, and quatorze kings, by which you make a repique; but if he choose the cards dealt for the elder, you discard the seven of hearts, spades, and diamonds, and any two of the eights; and you will have by your rentrée the same quint in clubs, quatorze queens and quatorze knaves; which will also make a repique.

If the adversary deal the cards by threes, and keep his hand, you discard the king, eight, and seven of hearts, with the nine and eight of spades; and by your rentrée you will have the quint major in clubs, a tierce to a queen in diamonds, three aces, three queens, and three knaves, with which you make a repique; but if he choose the cards dealt for the elder, you discard the queen and nine of hearts, the knave and seven of spades, and the ace of diamonds; and you will then have the same quint in clubs, a tierce to a nine in diamonds, three kings and three tens, with which you will tell 29 points; therefore by playing one, you can in this case make a pique only.

An exemplary Case at Piquet, where you repique your Adversary after giving him the Choice of having the Cards dealt either by Twos or Threes.

To dispose the cards in the order necessary to produce the effect here required, and in all others where you give the choice of having the cards dealt either by twos or threes, you must have recourse to the following table:

* You are to take care he does not shuffle the cards; and the better to prevent it, you may so dispose them as to shuffle them before him, after the manner explained in some of the foregoing recreations.

Cards that will go to the eldest	Numb. of the Cards.	Cards that will come to the youngest.	Variable cards.
1 ♣	1		
2 ♣	2		
	3	- - -	3 ♠
	4	- 4 ♣	
	5	- - -	5 ♣
	6	- - -	6 ♣
	7	- - -	7 ♣
	8	- - -	8 ♣
9 ♣	9		
	10	- - -	10 ♣
	11	- 11 ♣	
	12	- 12 ♣	
13 ♣	13		
14 ♣	14		
	15	- - -	15 ♣
	16	- 16 ♣	
	17	- - -	17 ♣
	18	- - -	18 ♣
	19	- - -	19 ♣
	20	- - -	20 ♣
21 ♣	21		
	22	- - -	22 ♣
	23	- 23 ♣	
	24	- 24 ♣	

This table shews the different hands that result from the two different methods of dealing the cards; that the eldest hand has always, in some order or other, the six cards placed against the numbers, 1, 2, 9, 13, 14, and 21; and the younger, the six cards placed against 4, 11, 12, 16, 23, and 24: it shews likewise, that the 12 cards marked 3, 5, 6, 7, 8, 10, 15, 17, 18, 19, 20, and 22, may be in either hand, so far as concerns the manner of dealing the cards.

Being therefore certain when you deal that the cards marked 1, 2, 9, 13, 14, and 21, will always be in the adversary's hand, and those marked 4, 11, 12, 16, 23, and 24, will be in your own hand, you must apply your six numbers to such cards as with the three of the *rentrée* (which you may choose as you please) will always make a great hand, and superior to the adversary: the great cards which you are forced to leave, you must distribute among the variable cards, in such manner that they can have no remarkable effect, when dealt either way

This method we have observed in the following example, which we here give for the satisfaction of those who would compose these sorts of games themselves: to the numbers 4, 11, 12, 16, 23, and 24, annex a *sixiem major* in hearts, which joined to the three tens of the *rentrée* are sufficient to make a *repique*, youngest hand; but as you must prevent the elder hand from defeating your point, by having seven cards in any of the other suits, you are so to dispose some part of each suit, by the column of variable cards, that he may never have, whether the cards are dealt by twos or threes, any large sequence; as you will see by the following disposition of the cards.

1 King diamonds	17 Ace clubs
2 Ace diamonds	18 Seven spades
3 Nine diamonds	19 King spades
4 Ace hearts	20 Ace spades
5 Queen spades	21 Knave diamonds
6 Eight diamonds	22 Eight clubs
7 Queen clubs	23 Ten hearts
8 Eight spades	24 Queen hearts
9 King clubs	25 Knave spades
10 Seven hearts	26 Nine spades
11 King hearts	27 Knave clubs
12 Nine hearts	28 Eight hearts
13 Queen diamonds	29 Nine clubs
14 Seven diamonds	30 Ten diamonds
15 Seven clubs	31 Ten spades
16 Knave hearts	32 Ten clubs

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* If you cannot effect this by the cards that are to be dealt the adversary, you must so dispose his *rentree*, that he may lay out his game, as in the metamorphosed cards.

By this arrangement of the cards, you will be sure to succeed, whether you deal the cards by twos or threes ; even though the adversary, thinking to frustrate your intention, should leave three cards.

Remark—There is no danger that any of these recreations at piquet should be applied to a bad purpose, for after the cards have been once shuffled by both players, it will be impossible to succeed in any one of them : there are, however, tricks to be played at this, as at all other games with the cards ; such as changing the whole pack, or some particular cards, or taking in part, or all the discard, or making the pass, that is, bringing part of the cards at bottom to the top, as will be more fully explained ; all of which many persons can perform so dexterously, that it is impossible for the eye to discover them. We say nothing of the practice of marking the cards, for of that almost every one's experience will afford sufficient proof. To aggravate the misfortune, it is indubitably true, that many persons, who are strictly honest in all other respects, are dishonest at cards ; and that no rank or condition of men, no, nor women neither, is entirely free from this vice.

Several different Cards being shewn to different Persons, that each of them may fix on one of those Cards, to name that on which each Person fixed.

There must be as many different cards shewn to each person as there are persons to choose ; therefore suppose there are three persons, then to each of them you must shew three cards, and telling the first person to retain one in his memory, you lay those three cards down, and shew three others to the second person, and so to the third : you then take up the first person's cards, and lay them down, one by one, separately, with their faces upwards : you next place the second person's card over the first ; and in like manner the third person's card over the second's ; so that in each parcel there will be one card belonging to each person : you then ask each of them in which parcel his card is, and when you know that, you immediately know which card it is ; for the first person's card will always be the first, the second person's the second, and the third person's the third, in that parcel where they each say his card is.

This recreation may be performed with a single person, by letting him fix on three, four, or more cards : in this case

you must shew him as many parcels as he is to choose cards, and every parcel must consist of that number out of which he must fix on one; and you then proceed as before, he telling you the parcel that contains each of his cards.

To name the Rank of the Card that a Person has drawn from a Piquet Pack.

By the rank of the card, we mean whether it be ace, king, queen, &c. you are therefore first to fix a certain number to each card; thus, you call the king 4, the queen 3, the knave 2, the ace 1, and the others according to the number of their pips.

You then shuffle the cards, and let the person draw any one of them: then turning up the remaining cards, you add the number of the first to that of the second, that to the third, and so on, till it amount to ten, which you then reject and begin again; or if it be more, you reject the ten, and carry the remainder to the next card; and so continue till you come to the last card; and to the last amount you must add 4, and subtract that sum from 10, if it be less; or from 20, if it be more than 10, and the remainder will be the number of the card that was drawn: as for example, if the remainder be 2, the card drawn was a knave; if 3, a queen, &c.

To tell the Amount of the Numbers of two Cards that a Person has drawn from a common Pack of Cards.

The small cards here tell, as before, according to the number of their pips, but each pictured card tells for 10: let the person add as many more cards to each of those he has drawn, as will make each of their numbers 25; then take the remaining cards in your hand, and seeming to search for some card among them, tell them over to yourself, and their number will be the amount of the two cards drawn. An example will make this plain: suppose the person has drawn a 10 and a 7, then he must add 15 cards to the first, to make the number 25; and 18 cards to the last, for the same reason; now 15 and 18 make 33, and the two cards themselves make 35, which deducted from 52 leaves 17, which must be the number of the remaining cards, and also of the two cards drawn.

This recreation may be performed without your touching the cards, thus: let the person who has drawn the two cards

deduct the numbers of each of them from 26, which is half the number of the pack, and after adding the remainders together, let him tell you the amount, which you privately deduct from 52, the number of all the cards, and the remainder will be the amount of the two cards. For example, suppose the two cards to be, as before, 10 and 7; then the person deducting 10 from 26, there remain 16; and deducting 7 from 26, there remain 19; those two remainders added together will make 35, which you subtract from 52, and there must remain 17 for the amount of the two cards as before.

As the number 26 may be thought to lead to a discovery of the principle on which the recreation is founded, it being manifestly the half of the pack, to render it more mysterious, you may take any other number less than 26, but greater than 10, as for example 24, and let the party subtract the number of each of his cards from that; therefore, supposing the numbers to be as before 10 and 7, the remainders will be 14 and 17, which make 31, to which you must add 4, for the double of the 2 you took from 26, and the amount will be 35, which is to be deducted from 52, as before. By this alteration the performance will not only be rendered more abstruse, but also more diversified, as you may change the number from which those of the two cards are to be deducted, every time you repeat the experiment.

This recreation may be performed equally well with a pack of piquet cards, and then the numbers of the two cards must be deducted from 16, which is the half of the pack; or if you choose to make it more mysterious, from any other number less than 16 and more than 10; afterwards adding, as in the last case, the double of what that number wants to make it 16.

To tell the Amount of the Numbers of any three Cards that a Person shall draw from the Pack.

After the party has drawn his three cards, you are to draw one yourself, and lay it aside; for it is necessary that the number of the remaining cards be divisible by 3, which they will not be in a pack of 52 cards, if only 3 be drawn: the card you draw, you may call the confederate, and pretend it is by the aid of that card you discover the amount of the others: then tell the party to add as many more to each of his cards as will make its number 16, which is the third part of the

remaining 48 cards; therefore, suppose he has drawn a 10, a 7, and a 6; to the first he must add 6 cards, to the second 9, and to the third 10, which together make 25, and the 4 cards drawn being added to them make 29:—you then take the remaining cards, and telling them over, as in the last recreation, you find their number to be 25, which must be the amount of the three cards the person drew.

You may perform this recreation likewise without touching the cards, as thus: after the party has drawn his three cards, and you have drawn one, let him deduct the number of each of the cards he has drawn from 17, which is one third of the pack, after you have drawn your card; and let him tell you the amount of the several remainders, to which you privately add one for the card you drew, and deducting that amount from 52, the whole number of cards, the remainder will be the amount of the three cards drawn;—for example, suppose the three cards to be 10, 7, and 6, as before; then each of those numbers being subtracted from 17, the remainders will be respectively 7, 10, and 11, which, added together, make 28, to which the single card you drew being added makes 29, and that number deducted from 52 leaves 23, which is the amount of the three cards the party drew.

There is little reason to imagine any one will discover why you here make choice of the number 17; but if you are desirous of rendering the recreation still more abstruse, and at the same time susceptible of greater variety, you may fix on any other number less than 17, but more than 10; and afterwards add to the amount of the remainders the double of what that number is less than 17; in the same manner as in the last recreation.

This recreation may also be performed with a pack of piquet cards; but then you must draw, or, what will answer the same purpose, deduct 2, in your own mind, from the whole number 32, that the remainder may be divisible by 3; and let him deduct the number of each of his cards from that sum, which is 10, and add the remainders together, as before: thus, if his three cards be 10, 7, and 6, he is to deduct each of them from 10, which is the third part of 30; therefore the remainders will be 0, 3, and 4, which added together, make 7, and that added to the 2 you deducted from the whole number, makes 9, which taken from 32, leaves 23, and that must be the amount of his three cards.

Among the different purposes to which the doctrine of combinations may be applied, those of writing in cypher, and decyphering, hold a principal place, as will appear by the following recreations.

To communicate Intelligence by a Pack of Piquet Cards.

The parties must previously agree in what manner the cards shall be first placed, and then how they shall be shuffled: thus, suppose the cards are to be first placed in the order as hereafter follows, and then shuffled by taking off 3 from the top, putting the next 2 over them, and the following three under them*, and so alternately; therefore the party who sends the cypher first writes the contents of it on a separate paper, and then copies the first 32 letters on the cards, by writing one letter on every card; he then shuffles them in the manner described, and writes the second 32 letters; he shuffles them a second time and writes the third 32 letters, and so of the rest. An example will make this plain: suppose the letters to be as follows:

I am in full march to relieve you; within| three days I shall be with you; if the ene|my in the mean time should make an assau|lt, remember what you owe to your countr|y, to your family and yourself; live with ho|nour, or die with glory.

Order of the cards before
the 1st shuffle.

Ace spades	i a d u y i
Ten diamonds	a l e u l
Eight hearts	m l m o i u
King spades	i s u m l
Nine clubs	n h l e o
Seven diamonds	f b m r i
Nine Diamonds	u e a c t n
Ace clubs	l w k r y i
Knave hearts	l s e e a e
Seven spades	m i a r m w
Ten clubs	a i t h e r
Ten hearts	r r h o f
Queen spades	c h e e i
Eight diamonds	h a b y w
Eight clubs	t y o o l

* By shuffling the cards in this manner, there will remain only two to put under at last.

Seven hearts	o y a o h o
Queen clubs	r o n u y h
Nine spades	e u i y f y
King hearts	l e t e u o
Queen diamonds	e d s o e
Eight spades	i i n w s o
Knave clubs	v f a n t g
Seven clubs	e t s l y
Ace hearts	y r e b r
Nine hearts	o l n w o t
Ace diamonds	u h s t & d
Knave spades	w l m a l
Ten spades	i e y t r r
King diamonds	t t i b u r
Queen hearts	h h m m u
King clubs	i n a t h
Knave diamonds	n e u r o

The person that receives these cards first places them in the order agreed on, and transcribes the first letter on every card; he then shuffles them, according to order, and transcribes the second letter on each card; he shuffles them a second time, and transcribes the third letter; and so of the rest.

If the cards were to be shuffled the second time by threes and fours, the third time by twos and fours, &c. it would make the cypher still more difficult to discover; though as all cyphers depend on the combination of letters, there are scarcely any that may not be decyphered with time and pains; as we shall shew farther on: those cyphers are the best that are by their nature most free from suspicion of being cyphers; as for example, if the letters were here written with one of the sympathetic inks, the cards might then pass for a common pack.

The Card discovered under the Handkerchief.

Let a person draw any card from the rest, and put it in the middle of the pack: you make the pass at that place, and the card will consequently be at top; then placing the pack on the table, cover it with a handkerchief, and putting your hand under it, take off the top card, and after seeming to search among the cards for some time, draw it out.

This recreation may be performed by putting the cards in another person's pocket, after the pass is made: several cards

may also be drawn and placed together in the middle of the pack, and the pass then made.

To change the Cards that several persons have drawn from the Pack.

On the top of the pack, put any card you please ; suppose the queen of clubs : make the pass, and bring that card to the middle of the pack, and offer it a person to draw ; then, by cutting the cards, bring the queen again to the middle of the pack : make the pass a second time, and bring it to the top, and shuffle the cards without displacing those on the top ; make the pass a third time, and bring it to the middle of the pack, and offer it to a second person to draw ; who must be at a proper distance from the first person, that he may not perceive it is the same card : after the like manner did five persons draw the same card.

Shuffle the pack, without losing sight of the queen of clubs, and laying down four other cards with the queen, ask each person, if he sees his card there : they will all reply, yes, as they all drew the queen of clubs : place four of those cards to the pack, and drawing the queen privately away ; you approach the first person, and shewing him that card, so that the others cannot see it, ask if that be his card : then putting it on the top of the pack, blow on it or give it a stroke with your hand, and shew it in the same manner to the second person ; and so of the rest.

The Four inseparable Kings.

Take the four kings, and behind the last of them place two other cards so that they may not be seen : then spread open the four kings to the company, and put the six cards at the bottom of the pack : draw one of the kings, and put him at the top of the pack ; draw one of the two cards at the bottom, and put it towards the middle : draw the other, and put it at some distance from the last, and then shew that there remains a king at bottom : then let any one cut the cards, and as there remained three kings at bottom, they will then be all together in the middle of the pack.

To tell the Number of Cards by their Weight.

Take a parcel of cards, suppose 40, among which insert two long cards ; let the first be, for example, the 15th, and the other the 26th from the top : seem to shuffle the cards, and then

cutting them at the first long card, poise those you have cut off in your left hand, and say, "there should be here fifteen cards:" cut them again at the second long card, and say, "there are here only eleven cards:" then poising the remainder, you say, "here are fourteen cards."

To discover the Card that is drawn by the throw of a Die.

Prepare a pack of cards in which six different cards are contained six times; that is, in which there are only six sorts of cards: dispose these cards in such manner that each of the six different cards shall follow each other, and let the last of each suit be a long card: the cards being thus disposed, it follows, that if you divide them into six parcels, by cutting at each of the long cards, those parcels will all consist of similar cards.

Let a person draw a card from the pack, and let him replace it in the parcel from whence it was drawn by dexterously offering that part: cut the cards several times, so that a long card may be always at bottom: divide the cards in this manner into six heaps, and giving a die to the person who drew the card, tell him that the point he throws shall indicate the parcel in which is the card he drew; then take up that parcel, and shew him the card.

You should put the cards in your pocket immediately after performing this recreation, and have another pack ready to shew, if any one should ask to see the cards.

To separate the two Colours of a Pack of Cards by one cut.

The pack must be prepared thus: all the cards of one colour must be cut something narrower at one end than the other: you shew the cards, and give them to any one that he may shuffle them; then holding them between your hands, one hand being at each extremity, with one motion you separate the hearts and diamonds from the spades and clubs.

This recreation is easy and pleasant to perform, but should not be repeated; unless you have another pack of cards which you can adroitly substitute in the place of the former, and with them you may separate the pictured cards from the others, they being prepared for that purpose; which will afford a fresh surprise. You may also write on a number of blank cards certain letters or words that form a question, and on

others the answer. Several other recreations may likewise be performed by the same method.

The metamorphosed Cards.

In the middle of a pack, place a card that is something wider than the rest, which we will suppose to be the knave of spades, under which place the seven of diamonds, and under that the ten of clubs; on the top of the pack, put cards similar to these, and others on which are painted different objects, in the manner following :

First card	A bird
2	A seven of diamonds
3	A flower
4	Another seven of diamonds
5	A bird
6	Ten of clubs
7	A flower
8	Another ten of clubs.

Then seven or eight indifferent cards; the knave of spades, which is the wide card; the seven of diamonds; the ten of clubs; and the rest any indifferent cards.

Two persons are then to draw the two cards that are under the wide card, which are the seven of diamonds and the ten of clubs: you then take the pack in your left hand, and open it at the wide card, as you open a book, and tell him who drew the seven of diamonds to place it in that opening: you then blow on the cards, and without closing them, you instantly bring the card which is at top, and on which a bird is painted over that seven of diamonds; which, to do this dexterously, you must wet the middle finger of your left hand, with which you are to bring the card to the middle of the pack: you then bid the person look at his card, and when he has remarked the change, to place it where it was before; then blow on the cards a second time, and bringing the seven of diamonds, which is at the top of the pack, to the opening, you bid him look at his card again, when he will see it is that he drew. You may do the same with all the other painted cards, either with the same person, or with him who drew the ten of clubs.

The whole artifice in this recreation consists in bringing the card at the top of the pack to the opening in the middle,

by the wet finger, which requires no great practice. You must observe not to let the pack go out of your hands while you are performing this recreation.

The Cards in the Opera Glass.

Provide an opera glass about two inches and a half long, the tube of which is to be ivory, and so thin that the light may pass through it: in this tube, place a lens of two inches and a quarter focus, so that a card of about three quarters of an inch long may appear of the size of a common card; at the bottom of the tube there is to be a circle of black pasteboard, to which must be fastened a small card with figures on both sides, by two threads of silk, in such manner that, by turning the tube, either side of the card may be visible.

You then offer two cards in a pack to two persons, which they are to draw, and that are the same as those in the glass: after which, you shew each of them the card he has drawn in the glass, by turning it to the proper position.

The better to induce the parties to draw the two cards, place them first on the top of the pack, and then by making the pass, bring them to the middle: when you can make the pass in a dexterous manner, it is preferable, on many occasions, to the long card, which obliges you to change the pack frequently; for otherwise it would be observed that the same card is always drawn, and doubtless occasion suspicion.

The Cards in Tea Caddies.

Two cards being drawn by different persons are put into separate tea caddies and locked up: the performer changes the cards without touching them, or any confederacy.—

The caddies are made with a copper flap, which has a hinge at the bottom, opens against the front, where it catches under the bolt of the lock, so as when the lid is shut and locked, the flap will fall down upon the bottom; the performer places two cards that he intends to be chosen between the flap and the front, which being lined with green cloth, may be handled without any suspicion; he then desires the first person to put his card into one of the caddies, taking care it be that which contains the contrary card from the one that he chose, and the second into the other; he then desires they will lock them up.

which unlocks the flaps, covers their cards, and when opened, presents the contrary ones to the view of the company.

To guess the Thoughts of any person, assuring him that you will write beforehand on a Piece of Paper the amount of the Parcel of Cards he shall happen to choose out of the two placed on the Table.

Take some cards, divide them into two parcels, taking care that in one there are only two or three sevens, and in the other seven court cards; call for a pen and ink, and write on a bit of paper the sevens; then turn the bit of paper down, that what you have written may not be seen: then tell the person to make his choice: let him choose whatever he pleases, your number will be good, since, if he should choose the greatest parcel, you may shew your paper on which is written the sevens; then desire him to count the number of cards contained in the parcel he has chosen, and he will find it to be seven, as you had guessed. This will appear astonishing to him and to the company; but they will easily recover from their surprise, when, on raising the other parcel, you will shew it contains only sevens, and consequently whatever parcel he had chosen, your number which you had set down was good, since one parcel contained seven cards, and the other nothing but sevens.—This trick must not be done twice before the same company, for then it would become tiresome;—but generally, whenever you do a trick before a company, you must never begin it again before the same.

The Magic Ring.

Make a ring large enough to go on the second or third finger, in which let there be set a large transparent stone; to the bottom of which must be fixed a small piece of black silk, that may be either drawn aside or expanded by turning the stone round: under the silk is to be the figure of a small card.

Then make a person draw the same sort of card as that at the bottom of the ring, and tell him to burn it in the candle: having first shewn him the ring, you take part of the burnt card, and reducing it to powder, you rub the stone with it, and at the same time turn it artfully about, so that the small card at bottom may come in view.

The Card in the Mirror.

Provide a mirror, either round, or oval, the frame of which must be at least as wide as a card: the glass in the middle must be made to move in the two grooves, and so much of the quicksilver must be scraped off as is equal to the size of a common card: you will observe that the glass must likewise be wider than the distance between the frame, by at least the width of a card.

Then paste over the part where the quicksilver is rubbed off, a piece of pasteboard, on which is a card that must exactly fit the space, which must at first be placed behind the frame.

This mirror must be placed against a partition, through which is to go two strings, by which an assistant in the adjoining room can easily move the glass in the grooves, and consequently make the card appear or disappear at pleasure.

This recreation may be performed without an assistant, if a table be placed against the partition, and the string from the glass be made to pass through a leg of it, and communicate with a small trigger, which you may easily push down with your foot, and at the same time be wiping the glass with your handkerchief, that the card may appear the more conspicuous. It may also be diversified by having the figure of a head, suppose that of some absent friend, in the place of the card.

Matters being thus prepared, you contrive to make a person draw the same sort of card with that fixed to the mirror, and place it in the middle of the pack; you then make the pass, and bring it to the bottom; you then direct the person to look for his card in the mirror, when the confederate behind the partition is to draw it slowly forward, and it will appear as placed between the glass and the quicksilver. While the glass is drawing forward, you slide off the card from the bottom of the pack, and convey it away.

The card fixed to the mirror may easily be changed each time the experiment is performed: this recreation may be also made with a print that has a glass before it, and a frame of sufficient width, by making a slit in the frame through which the card is to pass; but the effect will not be so striking as in the mirror.

The divinating perspective Glass.

Let a small perspective glass be made that is wide enough at the end where the object glass is placed to hold a table similar to the following :

1.131	10..132	19.133
2.231	11..232	20.233
3.331	12..332	21.333
4.121	13..122	22.123
5.221	14..222	23.223
6.321	15..322	24.323
7.111	16..112	25.113
8.211	17..212	26.213
9.311	18..312	27.313

Take a pack of cards that consists of 27 only, and giving them to a person, desire him to fix on any one, then shuffle them and give the pack to you: place the twenty-seven cards in three heaps, by laying down one alternately on each heap; but before you lay each card down, shew it to the person without seeing it yourself; and when the three heaps are finished, ask him at what number, from 1 to 27, he will have his card appear, and in which heap it then is? then look at the heap through the glass, and if the first of the three numbers which stands against that number it is to appear at be 1, put that heap at top; if the number be 2, put it in the middle; and if it be three, put it at bottom: then divide the cards into three heaps in the same manner, a second and a third time, and his card will then be at the number he chose.

For example: suppose he desires that his card shall be the 20th from the top, and the first time of making the heaps he says it is in the third heap; you then look at the table in the perspective, holding it at the same time over that heap, and you see that the first figure is 2, you therefore put that heap in the middle of the pack: the second and third times you in like manner put the heap in which he says it is, at the bottom, the number each time being 3: then looking at

the pack with your glass, as if to discover which the card was, you lay the cards down one by one, and the twentieth card will be that he fixed on.

You may shew the person his card in the same manner, without asking him at what number it shall appear, by fixing on any number yourself; you may also perform this recreation with the magnetical dial, by making the hand point to any number, from 1 to 27, at which you intend the card shall be found.

The foregoing recreations with the cards will be found sufficient to explain all others of a similar nature that have or may be made, the number of which is very great. To perform these we have described requires no great practice; the two principal points are, the making the pass in a dexterous manner, and a certain address by which you influence a person to draw the card you present.

Those recreations that are performed by the long card are, in general, the most easy, but they are confined to a pack of cards that is ready prepared; whereas, those that depend on making the pass, may be performed with any pack that is offered.

The Dancing Card.

One of the company is desired to draw a card, which the conjurer shuffles again with the others, and then orders it to appear upon the wall; the card instantly obeys, then advancing by degrees, and according to orders, it ascends in a straight line, from right to left; it disappears on the top of the wall, and a moment after it appears again, and continues to dance upon an horizontal line, &c. &c.

EXPLANATION.

This trick is so simple that I could have dispensed with speaking of it; it consists in the first place, in obtaining a forced card drawn, which is easily known by the card being larger than the rest; after having shuffled it with the others, it is taken out of the pack, the better to impose upon the company: the instant it is ordered to appear on the wall, the compeer, or invisible agent, very expertly draws a thread, at the end of which is fastened a similar card, which comes out from behind a glass; another thread drawn very tight, on which it slides, by the means of some very small silk rings fastened, running thereon, prescribes its motion and progress.

Si parva heit componere magnis.

The Card nailed to the Wall with a Pistol shot.

The conjurer obtains a card drawn, and requests the person who has chosen it to tear off one of its corners, and to observe it well to know it again; he takes the card thus torn and tears it all to pieces, burns it, and reduces it to ashes; he then gets a pistol loaded with powder, mixed and confounded with the said ashes, and instead of a leaden ball, a nail, marked by one of the company, is put into the barrel; then the pack of cards is thrown up into the air, the pistol is fired, and the burnt card is found nailed against the wall, the piece torn from it is then produced, and found to fit exactly the place from whence it was torn, and the nail is acknowledged to be the same by the person who marked it.

EXPLANATION.

A corner of the chosen card being torn, the conjurer steps into his closet, takes a similar card, and tears a corner of it exactly in the same manner; returning, he asks for the chosen card, places it subtly under the pack, and expertly substitutes that which he has prepared, in order to burn it in its stead; he then lays hold of the pistol for the first time, under pretence of shewing how it should be cocked, fired, and handled; one of the company is then desired to load the pistol with some powder and paper; he seizes this interval to convey the card to his invisible agent, who speedily nails it upon a square piece of board, which serves to shut up hermetically, a hole made in the partition, and the hangings, but which is invisible, being covered with a piece of the same; by this means the card nailed to the wall or partition does not yet appear: the piece of tapestry with which it is covered is slightly fastened on one side with two pins, and on the other to a thread, the loose end of which the compeer holds in his hand: as soon as this last hears the pistol fired, he draws the thread, and rapidly transports the piece of tapestry behind the glass, the card consequently appears, and as it is the same that had been marked with the nail just put into the pistol, it is no wonder that this trick, so difficult to account for, obtains the applause of a numerous assembly: it depends entirely on first loading the pistol with powder, after which a tin tube is covered on the charge of powder, the card and nail being rammed down in the tin tube; the pistol being inverted, the tube

and its contents fall into the conjurer's hand to convey to his invisible agent.

N. B. If any one should suspect that the nail in the pistol has been juggled, his suspicion is protested against, and he is desired to come again the next day to be convinced of his error; then he is presented with a pistol which is taken to pieces, to shew him that there is not the least preparation.

The burnt Card shut up in a Watch.

Here the conjurer presents the company with a pack of cards, and gets one of them to draw at random; he borrows three watches, which one of the spectators is desired to fold up in three different pieces of paper; they are then laid on a table and covered with a napkin; the chosen card is burnt, and its ashes are put into a box; shortly after the box is opened, but the ashes are gone: the three watches are laid on a plate, and one of the company is desired to choose one of them, and open it, in which he finds under the glass a piece of the burnt card, and under the watch case, a small card representing in miniature that reduced to ashes.

EXPLANATION.

The chosen card is known directly by the disposition of the pack; the watches, well enveloped in paper, are laid on the little trap, which opens and lets it fall into a drawer; as soon as the compeer is acquainted with the card drawn, he stretches out his arm under the table and takes one of the watches, in which he deposits the card destined to be produced before the company: the watches should be covered with a napkin, sustained by several bottles, or something similar, otherwise the compeer's hand would be perceived moving the napkin: the three watches are presented to a by-stander upon a plate, with care to turn next to him that which contains the card in miniature, and which is marked by having a little of its corner torn:—if the person should be cunning, and waggishly affects to take the watch next to him, he is desired to mix and confound them well together, under the pretence of embellishing the trick, and the stratagem is put in execution. The method of causing the ashes of a burnt card to disappear in a box, consists in depositing a bit of wood or pasteboard within the lid, which fills it exactly in length and breadth, and which nevertheless is loose enough to fall down into the

bottom of the box when it is shut; the piece of wood or pasteboard being of the same colour as the inside of the box, forms a double bottom, hides the ashes from the eyes of the dazzled spectator, who, in the same moment, is induced to think that the ashes are taken out in order to be combined anew, to produce the card in miniature which is found in the watch.

The Cards named, discovered with the Eyes blinded.

A pack of cards are caused to be drawn by some person: a woman arriving in the room, names all the cards just drawn, without making the least mistake, with regard to their colour, number, &c.

EXPLANATION.

The cards are disposed as we observed before: the conjurer having, unnoticed, observed the card drawn, he informs his wife, or agent, even at the very instant he promises he will take particular care he or she shall know nothing about it: he says he will not speak a word, while his wife names the cards, and that the person who holds them shall be confined to shew them to the company, by saying this is such or such a card, &c. it is in this last phrase he names the card which is underneath; his wife, who hears him, and who knows by heart the disposition of the pack, names the cards which follow it; that is to say, for instance, if she is given to understand that the 19th is underneath, she names the 10th, the 17th, &c. having mentioned the whole pack, her husband, who, during this time never speaks a word, resumes the use of his speech, and begs of the person who had chosen them, to ask what are the others that remain unnamed; the wife is informed by this question, that there is not one remaining, and answers accordingly.

The Card springing up into the Air from the Pack without being touched.

One of the cards is drawn, which is afterwards put in and shuffled with the rest of the pack; then the pack is put into a kind of square spoon, placed upright upon a bottle, which serves it as a pedestal, and at the company's pleasure the card instantly flies up into the air.

EXPLANATION.

In the first place, a forced card must be chosen in the manner described; then the pack must be placed in the spoon, so that the chosen card may lean on a pin, bent in the form of a

hook ; this pin is fastened to a thread, and ascending through the pack, leans upon the upper end of the spoon ; then it descends under the room through the table : in this disposition, the compeer cannot pull the thread without dragging along with it the hook and card, which causes it to be perceived as flying in the air : the thread slides upon the blunt edge of the spoon as easily as if it run in a pulley.

In order to place the cards in the spoon quick enough, that the spectators may perceive no preparation, care must be taken that another pack is presented dexterously on the table : the chosen card in the other, with the hook and thread, must be previously prepared as above described.

The burnt Writing restored.

Cover the outside of a small memorandum book with black paper, and in one of its inside covers, make a flap, to open secretly, and observe there must be nothing over the flap but the black paper that covers the book.

Mix soot with black or brown soap, with which rub the side of the black paper next the flap : then wipe it quite clean, so that a white paper pressed against it will not receive any mark.

Provide a black lead pencil that will not mark without pressing hard on the paper. Have likewise a small box, about the size of the memorandum book, and that opens on both sides, but on one of them by a private method. Give a person a pencil, and a slip of thin paper, on which he is to write what he thinks proper : you present him the memorandum book at the same time, that he may not write on the bare board. You tell him to keep what he writes to himself, and direct him to burn it on an iron plate laid on a chafindish of coals, and give you the ashes. You then go into another room to fetch your magic box before described, and take with you the memorandum book.

Having previously placed a paper under the flap in the cover of the book, when he presses hard with the pencil to write on his paper, every stroke, by means of the stuff rubbed on the black paper, will appear on that under the flap ; you therefore take it out, and put it into one side of the box.

You then return to the other room, and taking a slip of blank paper, you put it into the other side of the box, strewing the ashes of the burnt paper over it. Then shaking the box

for a few moments, and at the same time turning it dexterously over, you open the other side, and shew the person the paper you first put in, the writing of which he will readily acknowledge to be his.

There may likewise be a flap in the other cover of the book, and you may rub the paper against that with red lead. In this case you give the person the choice of writing either with a red or black pencil; and present him the proper side of the book accordingly.

The opaque Box rendered Transparent.

Make a box of three or four inches long, and two or three wide, and have a sort of perspective glass, the bottom of which is of the same size with the box, and slides out, that you may privately place a paper on it. The sides of this perspective are to be of glass, covered on the inside with fine paper.

Let a person write on a slip of paper, putting your memorandum book under it, as in the last recreation: then give him the little box, and let him put what he has written into it. In the mean time, you put the memorandum book into the press, where the perspective is already placed: your assistant then takes the paper out of the book, and puts it at the bottom of the perspective; which you presently take out of the press, and direct the person to put the little box that contains his paper under it: you then look in at the top of the perspective; and feigning to see through the top of the box, you read what is written on the paper at the bottom of the perspective.

With this perspective box you may perform another recreation, which is, by having in a bag twelve or more ivory counters, numbered, which you shew to the company, that they may see all the numbers are different: you tell a person to draw any one of them, and keep it close in his hand: you then put the bag in the press, when your assistant examines the counters, and sees which is wanting, and puts another of the same number at the bottom of the perspective, which you then take out; and placing the person's hand close to it, look in at the top, and pretending to see through his hand, you name the number on the counter in it.

The penetrative Guinea.

Provide a round tin box, of the size of a large snuff box, and in this place eight other boxes, which will go easily into

each other, and let the least of them be of a size to hold a guinea:—each of these boxes should shut with a hinge, and to the least of them there must be a small lock that is fastened with a spring, but cannot be opened without a key; and observe that all these boxes must shut so freely, that they may be all closed at once: place these boxes in each other, with their tops open, in the drawer of the table on which you may make your experiments; or if you please, in your pocket, in such manner that they cannot be displaced.

Then ask a person to lend you a new guinea, and desire him to mark it, that it may not be changed: you take this piece in one hand, and in the other you have another of the same appearance, and putting your hand into the drawer, you slip the piece that is marked into the least box, and shutting them all at once, you take them out; then shewing the piece you have in your hand, and which the company supposes to be the same that was marked, you pretend to make it pass through the box, and dexterously convey it away.

You then present the box, for the spectators do not yet know there are more than one, to any person in company, who when he opens it finds another, and another, till he comes to the last, but that he cannot open without the key, which you then give him, and retiring to a distant part of the room, you tell him to take out the guinea himself, and see if it be that he marked.

This recreation may be made more surprising, by putting the key into the snuff box of one of the company, which you may do by asking him for a pinch of snuff, and at the same time conceal the key, which must be very small, among the snuff: and when the person who is to open the box asks for the key, you tell him that one of the company has it in his snuff box. This part of the recreation may likewise be performed by means of a confederate.

An artificial Memory.

The reader must have observed, that to perform several of the recreations in this book; it is necessary to have a good memory; but as that is a gift every one has not from nature, many methods have been contrived to supply that defect by art: the most material of which we shall here describe.

An artificial memory respects either figures or words; for the former let the five vowels *a, e, i, o, u*, represent the first five digits: the diphthongs that begin with the first four vowels, as *au, ea, ie,*

ou, representing the remaining four digits, and let *y* stand for an 0, or cypher. Let the ten first consonants also stand for the nine digits and the cypher; as in the following table.

a	e	i	o	u	au	ea	ie	ou	y
1	2	3	4	5	6	7	8	9	0
b	c	d	f	g	h	k	l	m	n

Then to represent any number, let the first letter be a vowel or diphthong, the second a consonant, the third a vowel, the fourth a consonant, &c. thus for the number 1763, you write or remember the word *akaud*: if there are several sums to be retained, you place the words in forms of verses, which will make them more pleasing to repeat and more easy to remember: for example, if you would remember the dates of the accession of the family of Stuart to the crown of England; the powder plot; the decapitation of Charles I. the Restoration; the Revolution; the Union of England and Scotland; the accession of the House of Hanover and the last rebellion, which were in 1603, 1605, 1649, 1660, 1689, 1707, 1714, and 1746, you write as follows; for you are to observe that in this, and in similar cases, where the first figure is always the same, it is unnecessary to write it after the first time:

Ahyd hyg ham haun
liem kyk kaf koh.

This method is rendered in some instances still more easy by adding parts of words to dates; thus, to remember the date of the accession of the monarchs from James I. to the present king, you may write as follows, omitting the letter that would stand for one thousand:

Jamhyd Charheg Charhom Jamhieq
Willhiem Ankcy Georkaf Seckek Thikaun

When several cyphers come together, instead of repeating *y* or *n*, you may write *y* or *n* 2, 3, &c. thus for 3400, write *ify*2, and for 256,000, write *ehun*3.

To remember any number of words, select the initial letters of those words, and to the first add *a*, if it begins with a consonant, or *b*, if it begins with a vowel.⁴ In like manner, add *e* or *c* to the second initial letter; to the third add *i* or *d*; to the fourth *o* or *f*; and to the fifth *u* or *g*. So that of the five initials you make

five syllables, which are joined together in one word : then of the next five initials you make, in the same manner, another word, and of every two words you make a verse: for example, suppose you would remember the names of all the kings since the conquest in the order in which they reigned, you then write as follows :

Wawehisohu	Rajehiefeg
Ebreihohu	Ebecrihohu
Ebmeedjocu	Cajewiafgu Gage

Or if you would remember the letters that begin any number of verses, suppose the twenty first lines of Pope's Essay on Man, you write as follows :

Abtelitoeg	Abacodtotu
Taoecedafu	Basewiofju.

The Handkerchief marked, cut, torn, and mended.

Two persons of the company are desired to step forward ; a handkerchief is given them, which they are to hold by the four corners ; several other handkerchiefs are asked from the company, and as they are received, they are put within the first, in order to make them a bundle ; when there are about a dozen of them heaped up together, the two persons who hold the bundle, cause one of them to be drawn at random by a third spectator ; this last is desired to examine its mark and number, if any such there be, and to cut off one of the corners with a pair of scissars ; any one may cut a piece also ; after that the handkerchief is torn in pieces : the bits and scraps being gathered together, on which are poured certain pretended drugs or liquors, all are folded and firmly bound with a riband, in order to reduce them to a small parcel, then they are put under a glass ; a few moments after the handkerchief is taken to be unfolded, and every body acknowledges the mark, and the spectators are surprized to see it has not received the least damage in the operation.

EXPLANATION.

This operation, which produces so general an illusion, is very simple : one of the company with whom the juggler is acquainted, having two handkerchiefs perfectly alike, having previously deposited one of them in the hands of the compeer concealed behind the curtain, throws the other upon the floor

to perform the trick with: the operator takes care to put this handkerchief uppermost in making the bundle, though he affects to mix them together promiscuously; the person whom he desires to draw one of the handkerchiefs takes naturally that which comes first to hand; he desires to shake them again, on pretence to embellish the operation: the juggler having shook them over again himself, to bring the right handkerchief uppermost, desires somebody less penetrating, whose mien denotes simplicity, and who, in putting his hand into the bundle, takes without ceremony the first that presents itself:—when the handkerchief is torn and carefully folded up, it is put under a glass, on a table placed near a partition; in that part of the table on which it is deposited, is a little trap, which opens, and lets it fall into a drawer; the compeer hid behind the curtain passes his hand within the table, opens the trap, and substitutes a second handkerchief instead of the first, then shuts the trap, which fits so exactly the hole it closes, it seems one and the same piece with the surface of the table; and deceives by this means the eyes of the most incredulous and penetrating spectator.

The Artificial Bird, singing at the company's command.

This bird, perched on a bottle, sings without any preliminary exercise, any tune demanded of him, even composed upon the spot by the most consummate musicians: he sings equally as well when transported from one bottle to another upon different tables: the wind issuing out of his beak is strong enough to extinguish a candle, and to relight it; this may be done when he is even taken away from the bottle and held in the hand.

EXPLANATION.

Behind the curtain, a part of which covers the partition, are two hollow metal cones, these cones, which are unequal, serve the compeer as a speaking trumpet, in the same manner as the speaking figure sometimes exhibited in London: the compeer imitating the voice of a bird, as the celebrated Rossignol, follows the tunes which the musicians play by heart, or from a music book laid before them: if the tune proposed should be too difficult for the musicians and the compeer to execute, without previous exercise, the company is informed, that to render the trick more surprising, the bird

will begin by singing some tune well known, from which it will pass suddenly to the tune in question: this is done to gain time; some of the musicians avail themselves of the interval, by observing more particularly the music, and the compeer makes use of the two different echoes, to convey his voice to two different points, according to the table and bottle on which the bird stands: the bird contains in its belly a little double pair of bellows, like those of a serenata, and between its feet is a moveable pin which works the bellows; this pin in entering the neck of the bottle, leans on a piece of wood, which cannot be perceived from the bottle's opacity: this piece laying vertically on the moveable bottom of the bottle, can easily move the bellows, and be made to move by the engines placed under the carpet, when the compeer draws the wire concealed in the feet of the table; by this means the bellows are moved to extinguish the candle, and to convince the spectators that the voice is really formed in the bird's throat by the wind that issues forth from the beak. When the conjurer takes the bird in his hand, he works the bellows himself with his thumb, and the wind extinguishing the candle, persuades the company that the bird sings, independent of the machine concealed in the table and behind the partition: the candle being but just extinguished, and the wick still hot, cannot possibly approach the bird's beak without being illuminated; for care is taken to put a little flour of brimstone in it which produces the effects of a match.

The Piece of Money shut up in a Box, from whence it escapes without its being touched.

One of the company is entreated to hold a box, into which a piece of money or a ring is deposited in his presence; the conjurer withdraws from the person, and begs of him to shake the box a little, when the piece is consequently heard to rattle within: at the third shake it is still heard; but at the fourth, it is no more in the box, for it is found in the shoe of one of the company.

EXPLANATION.

Every conjurer carries a quantity of these boxes about for sale; that which caused so much admiration differs from the others only in being a little better made, and belonging to a man who knows how to embellish his tricks by all sorts of

favourable circumstances: this box is made so, that in shaking it softly up and down, you hear the piece it contains; but shaking it strongly in an horizontal direction, a little spring falls upon the piece and hinders it from sounding, which excites the opinion of its being no more therein: he who does the trick then touches the box, on pretence of shewing how it should be shaken; and though it be locked, the piece drops into your hand, through a little chink, which opens secretly; he leaves the box with the same person, and causes the company to imagine the piece is still in the box, or it is not according to the manner in which it is shaken: in fine, he causes the piece to be found in the shoe of a person who is, or is not, in correspondence with him, and has furnished him with a similar piece; or by sending some person to slip it dexterously over the floor: in this last case, it is found on the ground only, and the person is made to believe that he let it fall in taking off his shoe.

The Writing concealed in a Snuff Box, from whence it is taken out, without touching the Box, and found in a Wax Candle.

The conjurer borrows a snuff box from one of the company, whom he desires to write a phrase of his own choice on a little piece of paper: this writing is put into the box; another person soon after takes it out reduced to ashes, and at last it is caused to be found in a wax candle at the choice of one of the spectators.

EXPLANATION.

The box borrowed should be neither gold, silver, nor hinged: a plain round box of pasteboard will suffice, of which the inside is blackish, and whose lid may be taken off. While the spectator writes the phrase, the lid is conveyed away into the adjacent closet: it is quickly placed there upon a sheet of lead, which is cut round with a pair of scissars, to make a double bottom: it is put into the lid with a little piece of paper, folded up in four, hid underneath it: the conjurer returns, and gets the written paper folded up, in the same manner as that concealed in the lid: the spectator is desired to put his writing in the snuff box; then it is covered, and the double bottom, which the lid contains, falls into the box, hides the writing, and leaves visible only the other paper: in taking this paper, in order to burn it, the spectator is duped, for he

innocently leaves his writing in the box: then he is desired to put this false paper into a tin shovel, and to present it to the flames, in order to burn it, and to hold it at a certain distance to heat slowly: this last circumstance is only a pretence to gain time, while the conjurer carries the box and the writing to his closet; he has there a wax candle prepared, of which one end, like those of church tapers, is pierced with an iron of a conic form: it is in this hollow cone he puts hastily the writing in question, and fills up the aperture with some warm wax, the better to incorporate with the candle: he mixes and confounds this candle with several others, and causes it to be chosen preferably, by means of the stratagem mentioned before.

The same means are employed to produce the writing in an orange, a guinea in a casket, or a lemon, &c. &c.

Three Pen Knives having been put into a Silver Cup, one of which jumps out at the Command of any of the Spectators.

Three pen knives are borrowed from different persons of the company; they are put into a cup which stands upon a table; it is shewn that the table has no communication with the cup, and that this last contains no kind of preparation; nevertheless, one of the knives, at any one of the spectator's desire, jumps upon the ground, and the other two remain motionless.

EXPLANATION.

When the cup is laid upon the table, a half crown piece is slipt into the bottom of it, fastened in the middle to a small black silk thread; this thread mounts perpendicularly to the ceiling, and goes to join the hand of the compeer, who draws the thread upon a moment's notice, and dexterously makes that pen knife jump out of the middle which was the only one placed on the half crown piece; the others fall immediately to the bottom of the cup.

The Dance of the Egg.

Three eggs are carried into the room; two are laid upon the table; the third is put into a hat: a little cane, or a switch, borrowed from one of the company, which is shewn not to have been in any manner prepared, is laid across the hat; at the same instant the hat falls upon the ground, the egg adheres

fast to the cane, as if it were glued to it; then the music begins to play, and the egg, as if sensible of the harmony, slips in tuning from one end of the cane to the other, and continues to move till the music ceases.

EXPLANATION.

The egg is fastened to a thread, with a little peg, put in lengthways, and which leans transversely upon the inside surface of the shell: the hole made to introduce the peg, is stopt up with a little white wax; the other end of the thread is fastened to the conjurer's chest or his body, with a pin bent in the form of a hook; the cane passing underneath the thread, very near the egg, serves to support it: as soon as the music begins, the conjurer pushes the cane from left to right, or from right to left, and moves his body unperceived, and at the first sight the egg seems to run along the cane, without any visible assistance; but this is only a delusion of the sight, for it is constantly fastened to the thread; its centre of gravity remains always at the same distance from the hook which retains it; it is the cane which in sliding presents successively its different points to the surface of the egg as it moves or dances.

Of the Bird's Death and Resurrection.

The egg chosen out of the three to dance on the cane being broken, but presently changed by the conjurer to the real egg, to shew that it had not been previously prepared, the two others left upon the table are taken up; one of which is chosen by a spectator, and in breaking out flies a living canary bird: a lady of the company is desired to take the bird into her hand, and soon after it is found to be dead: then it is taken from her, and laid under a glass upon a table; some minutes after, the glass is taken off, and the bird flies away.

EXPLANATION.

Two eggs are emptied, and the half of the shells are taken and adjusted together with two little strips of paper, glued in the form of a zone, or an equator: being thus prepared, they represent an egg, and can contain a little living canary bird, provided a little hole be made in it with a pin, to permit its free respiration.

The instant this bird is delivered into the hands of a person who condescends to hold it, the conjurer stifles it by a hard

squeeze between his finger and thumb: it is then put under a glass, upon the trap before mentioned, that the compeer may place a living one in its stead.

The Golden Head on three Rings dancing and jumping in a Glass, to answer different Questions.

To shew that this head is desolate and void of communication, several crown pieces are placed in the bottom of a glass, covered with a close lid, which notwithstanding does not hinder his head, described to be of massy gold, to jump into the glass to answer many questions proposed: at the same time a bunch of rings, seen in another glass at a little distance, perform the same motions as by sympathy.

EXPLANATION.

A second head is put in the place of the first shewn to the company, and taken off the table on which the operation is to be made: this second head is fastened to a silk thread, which, passing through the table, reaches under the floor to join the compeer, who dances either the rings, or head, at pleasure, in order to correspond properly with the conjurer; and the rings jump in like manner at pleasure.

The Rings passed on a double Riband.

In a great number of rings furnished by the company, two ribands are introduced, of which the ends are given to two couple of the spectators to hold; soon after, without hurting the ribands, and without taking off the rings over either of the ends, they are loosed from the ribands, and returned to their owners.

These strings or ribands, with the balls, or beads, are sold at most toy shops in London, as well as many other commodities for such kind of experiments.

EXPLANATION.

Ozanam, about a century since, published in his mathematical recreations, the manner of doing this trick; it is known by all conjurers by the name of my grandmother's beads, from their using little balls instead of rings: to perform this trick with success, first double one of the ribands so that the two ends of it touch one another; do the same with the second, and then fasten them both together with a thread of

the same colour round their middle: this being previously prepared, when you are going to perform the trick, give one of the spectators the two ends of the riband to hold, and those of the second to another, by this means their eyes are deceived; each thinking he holds in his hands the extremities of two different ribands, but it is quite otherwise; for if in this position they were to pull hard enough to break the thread, the ribands would consequently separate, and the rings fall upon the ground; but to avoid this accident, and to finish the trick with success, you must beg of them to approach one another, and ask each of them to give one of the ends they hold; involve them together so as to make a knot, and render to each that which the other held before; by this means each of them then hold the extremities of two different ribands: soon after the cheat can no longer be perceived, the rings, which have never been passed on both ribands are taken off much more easily when the thread is broken, and the spectator who thought them really passed on both is surprised to see them disengaged.

The Sympathetic Lamp.

This lamp is put upon a table; the conjurer gives a signal to the compeer to blow in a pipe, without directing the wind to the place where it is laid, and nevertheless it extinguishes it immediately, as if some person had blown it out.

EXPLANATION.

The candlestick which bears the lamp contains a pair of bellows in its basis, by which the wind is conveyed straight to the flame through a little pipe: the compeer, under the floor, or behind the curtain, in moving the machinery, concealed under the table, makes the bellows blow to extinguish the lamp in the moment desired.

The Little Huntsman.

It is a little image about the size of the little Turk: it holds a bow in its hand, with an arrow, which is shot the very instant the company think proper, and strikes a pasteboard marked and placed on the top of a column: this pasteboard is divided into several circles, which are numbered, and the arrow always enters a number previously chosen by one of the spectators.

EXPLANATION.

The action of the spring which pushes the arrow is retained for a moment by a pin, which the compeer takes off at pleasure, in moving the machinery concealed in the table: when this pin is pushed, the shaft flies rapidly towards the pasteboard, as the cock of the pistol falls upon the hammer when one draws the trigger.

In laying the automaton on the table, it must be placed so, that the arrow points exactly at one of the numbered circles, which will be the easier done the less this is distant from the mark: to cause the number to which the dart is pointed to be chosen, forced cards must be presented to one of the spectators, who must, according to art, choose the number in question: this depends upon a particular address of the conjurer, very difficult to be described by words; however it may be said in general to consist, first, in putting the card pitched upon under the pack; secondly, on keeping it always in the same place, though one shuffles, or seems to shuffle the cards, to make people think that neither of the cards has been seen; thirdly, to pass this card into the middle of the pack the very instant it is presented; fourthly, on making several cards pass before the spectator's hand, to cause him to think he may choose either of them indifferently; fifthly, in making these cards pass rapidly, that he may not have time to take any other; in fine, in slipping dexterously the card intended into his hand, entreating him at the same time very civilly, in order to deceive him, to take which he pleases; for it requires no small share of impudence to perform experiments of this kind.

The Ball thrown into the little three-doored House, and issuing from either at Command.

EXPLANATION.

An inclined pipe, in which the ball rolls downwards, has in its lower part, at different heights, two holes, which are shut by valves opened by the compeer's playing the machinery under the stage: these two holes, from the opening and extremity of two other pipes, reach the one to the right, the other to the left, to two different doors; the first pipe reaches to the middle door: if it be desired that the ball should issue from the right hand door, the compeer plays the

machinery to open the first valve which the ball meets in coming down: this valve being open, the ball naturally falls into the second tube, which conveys it to the right hand door.

If it be desired that the ball should pass at the left hand door, the compeer, by means of another piece of machinery, opens the second valve, and the ball passing over the first, which is shut, necessarily falls into the third tube, which conveys it to the door demanded: in short, if it be desired that the ball should come out at the middle door, the compeer has nothing to do; because the ball runs directly to it in following the first tube, without falling into either of the two others.

Theophrastus Paracelsus; or, The Pigeon killed by the Thrust of a Sword given to its Shade or Image.

The name of Theophrastus Paracelsus is given to this trick, because it is pretended, that a man so called killed his brother, by stabbing his picture with a dagger: this anecdote, which undoubtedly is not related by cotemporary historians, nor by eye witnesses, should be considered without doubt, as apocryphal; however, the trick in question consists in fastening a pigeon by the neck to a double riband, drawn very tight, and sustained by two columns; and in cutting off the animal's head without touching it, in the very instant the sword is thrust at, or drawn against the shadow of the bird.

EXPLANATION.

The two double ribands to which the pigeon is fastened, conceal a very sharp little steel blade, bent in the form of a sickle: the blade is fastened to a silk string, which, passing between the two ribands, and through one of the columns, reaches the hands of the compeer underneath the floor: the pigeon's neck should be controuled by a kind of a silken ring, to hinder it from advancing or retreating: he who performs the trick draws his sword upon the bird's shadow, and at this instant giving a hard stamp with his foot, as a signal for the compeer to draw the string, causes the sickle which embraces the pigeon's neck to cut off its head.

The Magic Nosegay blowing at the Word of Command.

EXPLANATION.

The branches of this nosegay may be made of rolled paper, of tin, or any other matter whatever, provided they be hollow or empty: they must, in the first place, be pierced in several places, in order to apply to them little masses of wax, representing flowers and fruits; secondly, this wax must be enveloped with some gummed taffety, or a very thin gold beater's skin; thirdly, these envelopings must be quickly glued to the branches, so as to seem a part of them, or at least a prolongation: fourthly, the colours of the flowers and fruits they represent must be given them; fifthly, the wax must be heated till it melts, and runs down the branches and handle of the nosegay.

After this preparation, if you pump the air through the stem of the nosegay, the envelopings will of course contract themselves, so as to appear withered, &c. and as you blow, the wind penetrating into the ramifications of the branches, the envelopings, like little aërostatical balloons, dilate themselves so as to resume their primitive and blowing appearance.

To perform this trick, you must begin by twisting and dressing lightly all these envelopings, and render them almost invisible, by making them to enter into the branches of the nosegay; then the nosegay must be placed in a kind of bottle containing a little pair of bellows, and of which the moveable bottom being put in motion by the machinery in the table, may swell the envelopings at the moment required.

The Ring in a Pistol, found afterwards in the Beak of a Turtle Dove, in a Box previously visited, and sealed up.

One of the company is desired to put his ring into a pistol, loaded by one of the spectators; an empty box is shewn to the company, which is caused to be shut by a third person, who fastens it with a riband, which he seals with his own arms; then this box is put upon a table, of which the company never lose sight; nevertheless, after having fired the pistol, on opening the box, this same ring is discovered in the beak of a dove.

EXPLANATION.

On pretence to shew how to handle the pistol, the conjurer lays hold of it, and dexterously withdraws the ring, in the same manner he did the nail spoken of before: it is carried to the compeer, who puts it directly in the beak of a tame dove; he then extends his arm to the inside of the table, placed near the partition, in order to open the trap mentioned before, and puts the bird into the box, of which the bottom opens secretly; the sealed riband which surrounds the box cannot hinder it from opening, because it is done only by one half of the bottom opening inside instead of outside; and great care is before taken not to make a second turn with the riband, which, crossing the first, would oppose the introduction of the dove.

We shall not mention here the means for making such a box. for it would not only require a long discourse to explain, since there is not a joiner, ebonist, or cabinet-maker, of any intelligence, who does not invent, or know, several secrets of this kind.

The Coffin that opens at pleasure.

EXPLANATION.

This coffin contains a puppet, whose carcass forms a kind of a pudding spring, i. e. a wire wound up in a spiral form; thus the little image, though higher than the coffin, may stand upright therein when it is shut, as its body is contracted by pressure: the coffin leans upon the machinery, which has a communication with the bolt of the lock, and the centre of the table: when the bolt is disengaged from the staple, the above spring, finding no other resistance than the weight of the lid, forces it easily to rise: this the invisible agent can always perform in concert with the conjurer.

The Watch pounded in a Mortar.

A watch is borrowed from one of the company, which is immediately put into a mortar: some moments after another person is desired to break it, the wheels, the fusee, the spring, and the barrel shewn crushed and fractured; finally, in a few minutes after, the watch is returned to the lender uninjured, who acknowledges it to be his own.

EXPLANATION.

In order to succeed, and produce an illusion in doing this trick, care must be taken to put into the mortar a second watch, whose hands, chain, and trinkets, resemble in some measure those of the first, which is not very difficult, because we may be acquainted with the person who lends the watch, or address ourselves to a person whose watch we have had an opportunity elsewhere to examine.

After having replaced the fractured watch in the mortar, the company must be amused an instant with a new trick, while all the pieces are gathered out of the mortar, and the first watch placed in their room.

A Pistol loaded with Powder and Ball, and discharged at any Person, who dexterously receives the Ball on the point of a Knife.

The conjurer presents one of the company with a common pistol, some powder, and a real leaden ball, to load: the conjurer then, at the distance of six yards, desires the person to cock the pistol, and discharge it at him, who holds a knife immediately directed to the mouth of the pistol, and thus catches the ball on the point of the said knife.

EXPLANATION.

The stratagem in the latter end of a former experiment is also used in the above, in which a ball is fixed instead of a nail; excepting, that the conjurer has a double headed knife, on one of which blades is previously fixed a ball, which is concealed by his hand; and the moment the pistol is fired, this ball is exposed to the observance of the audience, as if instantaneously caught from the said pistol's discharge.

The Mystical Dial.

On a piece of square pasteboard ABCD (Plate 1. Fig. 3.) draw the circle EFGH, and divide it into twenty six equal parts, in each of which must be written one of the letters of the alphabet.

On the inside of this, there must be another circle of pasteboard, ILMN, moveable round the centre O, and the extremity of this must be divided into the same number of equal parts as the other: on this also must be written the letters of the alphabet, which however, need not be disposed in the same

order: the person with whom you correspond must have a similar dial, and at the beginning of your letter, you must put any two letters that answer to each other when you have fixed the dial.

EXAMPLE.

Suppose you would write as follows :

If you will come over to us, you shall have a pension, and you may still make a sham opposition.

You begin with the letters *Ma*, which shew how the dial is fixed ; then for *if you*, you write *un juc*, and so for the rest, as will see at the bottom of the plate.

The same intention may be answered by a ruler, the upper part of which is fixed, and the lower part made to slide ; but in this case the upper part must contain two alphabets in succession, that some letter of that part may constantly correspond to one in the lower part: the divisions standing directly over each other in a straight line will be much more obvious than in the circumference of a circle ; or two straight pieces of pasteboard regularly divided, the one containing a single and the other a double alphabet, would answer exactly the same purpose : in this case a blank space may be left at each end of the single alphabet, and one or two weights being placed on both the pieces will keep them steady.

The Corresponding Spaces.

Take two pieces of pasteboard or stiff paper, through which you must cut long squares, at different distances, as you will see in the following example ; one of these pieces you keep yourself, and the other you give to your correspondent : when you would send him any secret intelligence, you lay the pasteboard upon a paper of the same size, and in the spaces cut out, you write what you would have understood by him only, and then fill up the intermediate spaces with somewhat that makes with those words a different sense.

I shall be much obliged to you, as reading alone engages my attention at present, if you will lend me any one of the eight volumes of the Spectator. I hope you will excuse this freedom, but for a winter's evening I don't know a better entertainment. If I fail to return it soon, never trust me for the time to come.

A paper of this sort may be placed four different ways, either by putting the bottom at top, or by turning it over, and by those means the superfluous words may be the more easily adapted to the sense of the others.

This is a very eligible cypher, as it is free from suspicion, but it will do only for short messages, for if the spaces be frequent, it will be very difficult to make the concealed and obvious meanings agree together: and if the sense be not clear, the writing will be liable to suspicion.

The Musical Cypher.

The construction of this cypher is similar to that of the mystical dial: the circle EFGH (Plate II.) is to be divided into twenty six equal parts, in each part there must be written one of the letters of the alphabet; and on the interior circle ILMN, moveable round the centre O, there is to be the same number of divisions: the circumference of the inner circle must be ruled in the manner of music paper, and in each division there is to be placed a note, different either in figure or position; lastly, within the musical lines place the three keys, and on the outer circle, the figures that are commonly used to denote the time.

Then provide yourself with a ruled paper, and place one of the keys, as suppose that of *ge re sol*, against the time two-fourths at the beginning of the paper, which will inform your correspondent how to fix his circle: you then copy the

notes that answer to the several letters of the words you intend to write, in the manner expressed at the bottom of the plate.

A cypher of this sort may be made more difficult to discover by frequently changing the key, and that will not in the least embarrass the reader. You may likewise add the mark * or † to the note that begins a word, which will make it more easy to read, and at the same time give the music a more natural aspect: this cypher is preferable to that of the mystical dial, as it may be enclosed in a letter about common affairs, and pass unsuspected; unless it should fall into the hands of any one who understands composition, for he would very likely surmise, from the odd disposition of the notes, "that more is meant than meets the ear."

A Person making choice of several Numbers, another shall name him the Number by which the Sum of those Numbers is divisible.

Provide a small bag, divided into two parts: in one part put several tickets, on each of which is written a number divisible by three, as 6, 9, 15, 36, 63, 120, 213, 309, &c. and in the other part put tickets marked with the number 3 only: from the first part draw a handful of tickets, and after shewing them, put them in again; then open the bag, and desire any one to take out as many tickets as he thinks proper; shut the bag, and when you open it again offer the other part to another person, telling him to take out one ticket only: you then pronounce that ticket to contain the number by which the amount of the other numbers is divisible; for each of those numbers being divisible by 3, the sum also must be divisible by the same number.

To find the Difference between two Numbers, the greatest of which is unknown.

Take as many nines as there are figures in the smallest number, and subtract that sum from the number of nines; let another person add that difference to the largest number, and taking away the first figure of the amount, add it to the last figure, and that sum will be the difference of the two numbers.

For example: Matthew, who is 22, tells Henry, who is older, that he can discover the difference of their ages; he therefore privately deducts 22 from 99, and the difference, which is 77, he tells Henry to add to his age, and to take away the first figure from the amount, and add it to the last

figure, and that last sum will be the difference of their ages, as thus :

The difference between Matthew's age and 99 is	77
To which Henry adding his age	35

The sum is	112
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12

1

Then by taking away the first figure 1 and adding it to the last figure 2, the sum is	13
Which added to Matthew's age	22

Gives the age of Henry, which is	35
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To tell, by the Dial of a Watch, at what hour any Person intends to rise.

Let the person set the hand of the dial to any hour he pleases, and tell you what hour that is, and to the number of that hour you add, in your mind, 12 : then tell him to count privately the number of that amount upon the dial beginning with the next hour to that on which he proposes to rise, and counting backwards, first reckoning the number of the hour at which he has placed the hand. An example will make this plain.

Suppose the hour at which he intends to rise be 8, and that he has placed the hand at 5, you add 12 to 5, and tell him to count 17 on the dial, first reckoning 5, the hour at which the index stands, and counting backwards from the hour at which he intends to rise, and the number 17 will necessarily end at 8, which shews that to be the hour he chose.

That the hour at which the counting ends must be that on which he proposed to rise will be evident on a little reflection ; for if he had begun at that hour, and counted 12, he would necessarily have come to it again ; and calling the number 17, by adding 5 to it, only serves to disguise the matter, but can make no sort of difference in the counting.

A Person choosing any two out of several given Numbers, and after adding them together, striking out one of the Figures from the Amount to tell you what that Figure was.

Such numbers must be offered as are divisible by 9; and when any two of them are added together, there must be no cypher in the amount; the figures of that amount, moreover, must make either 9 or 18: such are the numbers following: 36, 63, 81, 117, 126, 162, 207, 226, 252, 261, 306, 315, 360, and 432.

These numbers must be written on cards: and when any two of them are added together, if a figure be struck out of the sum, it will be what would make the other figures either 9 or 18; for example: if a person chose 126 and 252, their sum will be 378, from which he strikes out the 7, the remaining figures 3 and 8 will make 11, to which 7 must be added to make 18.

Two Persons choosing two Numbers, and multiplying them together, by knowing the last Figure of the Product to tell the other Figures.

If the number 73 be multiplied by the numbers of the following arithmetical progressions, 3, 6, 9, 12, 15, 18, 21, 24, and 27, their products will terminate with the nine digits in this order, 9, 8, 7, 6, 5, 4, 3, 2, 1; the numbers being as follows, 219, 438, 657, 867, 1095, 1314, 1533, 1755, 1971; therefore put into one of the divisions of the little bag, mentioned in a former recreation, several tickets marked with the number 73, and in the other part of the bag, the numbers 3, 6, 9, 12, 15, 18, 21, 24, and 27.

Then open that part of the bag where are the numbers 73, and desire a person to take out one ticket only, then dexterously change the opening, and desire another person to take a ticket from that part, and when you have multiplied their two numbers together, by knowing the last figure of the product, you will readily tell them by the foregoing series what the other figures are.

The Magical Century.

If the number 11 be multiplied by any one of the nine digits, the two figures of the product will always be similar; as follows :

11	11	11	11	11	11	11	11	11
1	2	3	4	5	6	7	8	9
—	—	—	—	—	—	—	—	—
11	22	33	44	55	66	77	88	99

Place a parcel of counters on a table, and propose to any one to add, alternately, a certain number of those counters till they amount to a hundred, but never to add more than 10 at one time; you tell him, moreover, that if you stake first, he shall never make the even century, but you will: in order to which you must first stake 1, and remembering the order of the above series, 11, 22, 33, &c. you constantly add to what he stakes as many as will make one more than the numbers of that series, that is, as will make 12, 23, 34, &c. till you come to 89, after which the other party cannot make the century himself, or prevent you from making it.

If the other party has no knowledge of numbers, you may stake any number first, under 10, provided you take care to secure some one of the last terms, as 56, 67, 78, &c.

This recreation may be performed with other numbers; and in order to succeed, you must divide the number to be attained by a number that has one digit more than what you can stake each time, and the remainder will be the number you must first stake. Observe, that to be sure of success, there must be always a remainder; suppose, for example, the number to be attained is 52, making use of a pack of cards instead of counters, and that you are never to add more than 6; then divide 52 by the next number above 6, that is by 7, and the remainder, which is 3, will be the number you must stake first; and whatever the other stakes, you must add as much to it as will make it equal to the number by which you divided, that is seven; therefore if his first stake be 1, you must stake 6, &c. so that your second stake will make the heap 10, your third stake will make it 17, and so on, till you come to 45, when as he cannot stake more than 6, you must make the number 52.

In this, as in the former case, if the other person has no knowledge of numbers, you may stake any number first under 7; or you may let him stake first, only taking care to secure either of the numbers 10, 17, 24, 31, &c. after which he cannot make 52, if you constantly add as many to his stake as will make it 7.

The Confederate Counters.

Present to three persons a ring, a seal, and a snuff box, of which desire each person to choose one privately: the three persons you discriminate in your mind by the letters A, E, I, and by the same letters you distinguish the ring, the seal, and the box; provide 24 counters, of which give the first person A, 1, the second person E, 2, and the third person I, 3; put the 18 remaining counters on the table, and let him that has the ring take as many counters more as he already has; him that has the seal, take twice as many as he has; and him that has the box four times as many; while they are taking the counters, you retire out of sight; and when they have done, you return, and casting your eyes on the table, take notice how many counters are left.

The remaining counters will be either 1, 2, 3, 5, 6, or 7, which you are to refer to the vowels in the syllables of the following verse:

1	2	3	5	6
—	—	—	—	—
P	C	j	d	s
a	e	a	e	i
r	s	d	v	g
f	a	r	i	n
e	r	e	s	d
r	e	s	a	r
d	e	s	i	g
e	r	a	n	d
p	r	i	n	c
r	i	n	c	e

If there be but one counter left, the two vowels in the syllables *par fer* denote that the first person has the ring, to which you have assigned the letter A; the second person has the seal, to which you have assigned the letter E; and consequently the third person must have the box. In like manner, if there be six counters remaining, the two vowels in the syllables *si grand* shew that the first person has the box, denoted by the letter I; the second person has the ring, to which the letter A is assigned; and consequently the third person has the seal; and so of the rest; for the three articles can be taken only six different ways: now each of these ways necessarily changes the

number of counters to be taken by the three persons; from whence it follows, that the counters remaining on the table will be of six different numbers; the vowels in the syllables of the verse serve only to aid the memory in discovering the manner in which the three articles are taken.

Question.

There are an hundred apples and one basket, ranged in a straight line at the distance of a pace one from another; the question is, how many paces must he walk that pretends to gather the apples one after another, and so put them into the basket, which is not to be removed from its place?

It is certain, that for the first apple he must make 2 paces, one to go and another to return; for the second 4, two to go and two to return; for the third 6, three to go, and so on in this arithmetical progression, 2, 4, 6, 8, 10, &c. of which the last and greatest term will be 200, that is, double the number of apples: to 200, the last term, add 2, the first term, and multiply the sum 202 by 50, which is half the number of apples, or the number of the multitude of the terms; and the product, 10,100, will be the sum of all the terms to the number of paces demanded; and if 1 pace be called 1 yard, the distance of space gone over is equal to 5 miles and 3 quarters, all to about 20 yards.

Several Dice being thrown, to find the Number of Points that arise from them after some operations.

Suppose three dice thrown upon a table, which we shall call A, B, C; bid the person that threw them add together all the uppermost points, and likewise those underneath of any two of the three; for instance, B and C, A being set apart, without altering its face: then bid him throw again the same two dice, B and C, and make him add to the foregoing sum, all the points of the upper faces, and withal the lowermost points, or those underneath of one of them, C for instance, B being set apart near A without changing its face, for giving a second sum; in fine, order him once more to throw the last dye C, and bid him add to the foregoing second sum the upper points, for a third sum, which is thus to be discovered: after the third dye C is set by the other two, without changing its posture, do you come up, and compute all the points upon the faces of the three dice, and add to their sum as many 7's as

there are dice ; that is, in this example 21, and the sum of these is what you look for ; for when a dye is well made, 7 is the number of the points of the opposite faces.

To exemplify the matter ; suppose the first throw of the three dice, A, B, C, brought up 1, 4, 5 ; setting apart the first 1, we add to these three points 1, 4, 5, the points 3 and 2 that are found under or opposite to the upper points 4 and 5, of the other two dice ; and this gives me the first sum 15 :—now suppose again, that the two last dice are thrown, and shew uppermost the two points 3 and 6, we set that with the three points apart, near the dye that had 1 before, and add to the foregoing sum (15) these two points 3 and 6, and withal 1, the point that is found lowermost in the dye that is still kept in service, and add 6 for its face at this throw ; thus we have 25 for the second sum : we suppose at last that this third and last dye being thrown a third time, it comes up 6, which we add to the second sum 25, and so make the third sum 31 ; and this sum is to be found out by adding 21 to 10, the sum of the points 1, 3, 6, that appear upon the faces or uppermost sides of the three dice then set by.

The Dice being thrown, to find the upper Points of each Dye without seeing them.

Make any one throw two dice upon a table, and add 5 to the the double of the upper points of one of them, and add to the sum multiplied by 5, the number of the uppermost points of the other, or the second dye ; after that, having asked him the joint sum, throw out of it 25, the square of the number 5 that you gave to him, and the remainder will be a number consisting of two figures ; the first of which to the left representing the tens is the number of the upper points of the first dye, and the second figure to the right representing units, is the number of the upper points of the second dye.

We will suppose that the number of the points of the first dye that comes up is 2, and that of the second 3 ; we add 5 to 4, the double of the points of the first, and multiply the sum 9 by the same number 5, the product of which operation is 45, to which we add 3, the number of the upper points of the second dye, and so make it 48 ; then we throw out of it 25, the square of the same number 5*, and the remainder is 23, the first figure of which 2, represents the number of points of

* The square of a number is multiplying it by itself.

the first dye, and the second, 3, the number of points of the second dye.

Another way of answering this problem, is this: ask him who threw the dice, what the points underneath make together, and how much the under points of one surpass those of the other; and if this excess is, for example, 1, and the sum of all the lower points is 9, add these two numbers 1 and 9, and subtract the sum 10 from 14; then take 2, the half of the remainder 4, for the number of the upper points of one of the dice; and as for the upper dye, instead of adding the excess 1 to the sum 9, subtract it out of 9, and take the remainder 8 out of 14, 6 is the remainder, the half of which, 3, is the number of the upper points of the second dye.

A third way is this: bid the person who threw the dice add together the upper points, and tell you their sum, which we here suppose to be 5; then give him orders to multiply the number of the upper points of one dye by the number of upper points of the other dye, and to acquaint you in like manner with their product, which we here suppose to be 6: now having this product six, and the preceding sum 5, square 5, and from its square 25 subtract 24, the quadruple of the product 6, and the remainder is 1: then take the square root of the remainder, which in this case is 1, and by adding it to and subtracting it from the foregoing sum 5, you have these two numbers, 6, 4, the halves of which 3, 2, are the numbers of the upper points of each dye.

Upon the throw of three Dice, to find the upper Points of each Dye without seeing them.

Order the person that has thrown the dice, to place them near one another in a straight line, and ask him the sum of the lowermost points of the first and second dye, which we here suppose to be 9; then ask him the sum of the points underneath of the second and third, which we here suppose to be 5: and at last the under points of the first and third, which we put 6: now, having these numbers given you, 9, 5, 6, subtract the second number 5 from 15, the sum of the first and third, 9 and 6; and the remainder 10 from 14; so there remains 4, the half of which, 2, is the number of the upper points of the first dye: to find the number of the upper points of the second, subtract the third number 6 from 14, the sum of the two first 9 and 5; and the remainder 8

from 14 again; so you have a second remainder 6, the half of which, 3, is the number demanded: at last for the third dye, subtract the first number 9 from 11, the sum of the second and third, 5, 6, and the remainder 2 from 14; so you have a second remainder 12, the half of which, 6, is the number of the upper points of the third dye.

To find a Number thought of by another.

Order the person to take 1 from the number thought upon, and after doubling the remainder, to take 1 from it and add to the last remainder, the number thought upon: then ask him what the sum is, and after adding 3 to it, take the third part of it for the number thought of: for example, let 5 be the number, take 1 from it, there remains 4; then take 1 from 8, the double of that 4, and the remainder is 7, which becomes 12, by the addition of 5, the number thought of; and that 12, by the addition of 3, makes 15, the third part of which 5, is the number thought of.

Another way is this: after taking 1 from the number thought of, let the remainder be tripled; then let him take 1 from that triple, and add to the remainder the number thought of; at last, ask him the number arising from that addition, and if you add 4 to it, you will find the fourth part of the sum to be the number thought of: thus 5, bating 1, makes 4, that tripled makes 12, which losing 1, sinks to 11, and enlarged by the accession of 5, comes to 16, which by the addition of 4 is 20, and the fourth part of that, viz. 5, is the number thought of.

A curious and agreeable Wager, which you are sure of winning.

Address some person in the company, and say, madam, or sir, have you a watch, a ring, an etwee, or any other trinket? begin by examining what has been given you, in order to form an idea of its value, since you are to lay your bet considerably under the intrinsic value of the trinket, to avoid being duped.

Suppose what has been offered to you is a watch, you are to propose a guinea as a wager against it; saying to the lady or gentleman, I lay a guinea that you do not say three times, my watch: when it is put on the table, and your wager is accepted, ask the person, presenting him his watch, what is that; he will not fail to answer, it is my watch.

Present him afterwards another object, making him the same question ; suppose the object you present to be a pen, a piece of paper, or any other thing ; if the person names the object you present, he has lost ; if on the contrary, he is on his guard, and answers, my watch, he must certainly win ; but if I lose, what will you give me ; the person, being always on his guard, will answer again, my watch ; then, appealing to his own words, you will take the watch, and leave him the stake.

Method of Melting Steel, and to see it liquify.

Melt a piece of steel quite in the fire ; then holding it with a pair of pincers or tongs, take in the other hand a stick of brimstone, and touch the piece of steel with it ; immediately after the contact, you will see the steel melt and drop like a liquid.

To pull off any Person's Shirt without undressing him, or having occasion for a Confederate.

The means of performing this trick are the following : only observing that the clothes of the person whose shirt is to be pulled off be wide and easy.

Begin by making him pull off his stock and unbuttoning his shirt at the neck and sleeves, afterwards tye a little string in the button hole of the left sleeve ; then passing your hand behind his back, pull the shirt out of his breeches, and slide it over his head ; then pulling it out before in the same manner, you will leave it on his stomach ; after that go to the right hand, and pull the sleeve down, so as to have it all out of the arm ; the shirt being then all of a heap, as well in the right sleeve as before the stomach, you are to make use of the little string fastened to the button hole of the left sleeve, to get back the sleeve that must have slipt up, and pull the whole shirt out that way.

To hide your way of operating from the person whom you unshirt, and from the assembly, you may cover his head with a lady's cloak, holding a corner of it in your teeth.

In order to be more at your ease, you may mount on a chair, and do the whole operation under the cloak.

How to dispose two little Figures, so that one shall light a Candle, and the other put it out.

Take two little figures of wood or clay, or any other materials you please, *only* taking care that there is a little hole at the mouth of each: put in the mouth of one a few grains of bruised gunpowder, and a little bit of phosphorus in the mouth of the other; taking care that these preparations are made beforehand.

Then take a lighted wax candle, and present it to the mouth of the figure with the gunpowder, which taking fire will put the candle out; then present your candle, having the snuff still hot, to the other figure; it will immediately light again by means of the phosphorus.

You may propose the same effects to be produced by two figures drawn on a wall with a pencil or coal, by applying with a little starch or water a few grains of bruised gunpowder to the mouth of one, and a bit of phosphorus to the mouth of the other.

Optical Illusions.

On the bottom of the vessel A B C D, (Plate III. Fig. 1.) place three pieces of money, as a shilling, a half-crown, and crown; the first at E, the second at F, and the last at G: then place a person at H, where he can see no farther into the vessel than I; and tell him that by pouring water into the vessel you will make him see three different pieces of money; bidding him observe carefully, whether any money goes in with the water.

You must either pour it in very gently, or contrive to fix the pieces, that they may not move out of their places by the motion of the water

When the water comes up to K, the piece at E will become visible; when it comes up to L, the pieces at E and F will appear; and when it rises to M, all the three pieces will be visible.

From what has been said of the refraction of light*, the cause of this phenomenon will be evident; for while the vessel is empty, the ray H I will naturally proceed in a straight line; but in proportion as it becomes immersed in water, it will be

See Appendix,

necessarily refracted into the several directions NE, OF, PG, and consequently the several pieces must become visible.

Optical Augmentation.

Take a large drinking glass of a conical figure, that is small at bottom and wide at top; in which put a shilling, and fill the glass about half full of water: then place a plate on the top of it, and turn it quickly over, that the water may not get out: you will then see on the plate a piece of the size of a half crown; and somewhat higher up, another piece of the size of a shilling.

This phenomenon arises from seeing the piece through the conical surface of the water at the side of the glass, and through the flat surface at the top of the water at the same time; for the conical surface dilates the rays, and makes the piece appear larger; but by the flat surface the rays are only refracted, by which the piece is seen higher up in the glass, but still of its natural size: that this is the cause will be further evident by filling the glass with water, for as the shilling cannot be then seen from the top, the large piece only will be visible.

After you have amused yourself with this remarkable phenomenon, you may give the glass to a servant, telling him to throw out the water, and take care of the two pieces of money; and if he has no suspicion of the deception, he will be not a little surprised to find one piece only.

Optical Subtraction.

Against the wainscot of a room fix three small pieces of paper, as A, B, C, (Plate III. Fig. 2.) at the height of your eye, and placing yourself directly before them, at a few yards distance, shut your right eye, and look at them with the left; when you will see only two of those papers, suppose A and B; but altering the position of your eye, you will then see the third and one of the first, suppose A; and by altering your position a second time, you will see B and C; but never all three of them together.

The cause of this phenomenon is, that one of the three pencils of rays that come from these objects, falls on the optic nerve at D; whereas to produce distinct vision, it is necessary that the rays of light fall on some part of the retina E, F, G, H: we see by this experiment, one of the uses of having two eyes; for he that has one only can never see three objects

placed in this position, nor all the parts of one object of the same extent, without altering the situation of his eye.

The Camera Obscura, or dark Chamber.

We shall here give a short description of this optical invention; for though it is very common, it is also very pleasing: and though almost every one has seen it, every one knows not how to construct it.

Make a circular hole in the shutter of a window, from whence there is a prospect of the fields, or any other object not too near; and in this hole place a convex glass, either double or single, whose focus is at the distance of five or six feet: the distance should not be less than three feet; for if it be, the images will be too small, and there will not be sufficient room for the spectators to stand conveniently; on the other hand, the focus should never be more than 15 or 20 feet, for then the images would be obscure, and the colouring faint: the best distance is from six to twelve feet:—take care that no light enters the room but by this glass: at a distance from it, equal to that of its focus, place a pasteboard, covered with the whitest paper; this paper should have a black border, to prevent any of the side rays from disturbing the picture; let it be two feet and a half long, and eighteen or twenty inches high; bend the length of it inwards to the form of part of a circle whose diameter is equal to double the focal distance of the glass: then fix it on a frame of the same figure, and put it on a moveable foot, that it may be easily fixed at that exact distance from the glass where the objects paint themselves to the greatest perfection: when it is thus placed, all the objects that are in the front of the window will be painted on the paper, in an inverted position, this inverted position of the images may be deemed an imperfection, but it is easily remedied; for if you stand above the board on which they are received, and look down on it, they will appear in their natural position; or if you stand before it, and placing a common mirror against your breast in an oblique direction, look down in it, you will there see the images erect, and they will receive an additional lustre from the reflection of the glass: or place two lenses in a tube that draws out; or, lastly, if you place a large concave mirror at a proper distance before the picture, it will appear before the mirror in the air, and in an erect

position, with the greatest regularity, and in the most natural colours.

If you place a moveable mirror without the window, by turning it more or less, you will have on the paper all the objects that are on each side of the window.

There is another method of making the dark chamber, which is by a scioptic ball, that is, a ball of wood, through which a hole is made, in which hole a lens is fixed: this ball is placed in a wooden frame, in which it turns freely round: the frame is fixed to the hole in the shutter, and the ball by turning about answers, in great part, the use of the mirror on the outside of the window: if the hole in the window be no bigger than a pea, the objects will be represented without any lens.

If instead of placing the mirror without the window, you place it in the room, and above the hole (which must then be made near the top of the shutter), you may receive the representation on a paper placed horizontally on a table: and draw at your leisure all the objects that are there painted.

Nothing can be more pleasing than this recreation, especially when the objects are strongly enlightened by the sun; and not only land prospects, but a sea port, when the water is somewhat agitated, or at the setting of the sun, presents a very delightful appearance.

This representation affords the most perfect model for painters, as well for the tone of colours as that degradation of shades, occasioned by the interposition of the air, which has been so justly expressed by some modern painters.

It is necessary that the paper have a circular form, for otherwise, when the center of it was in the focus of the glass, the two sides would be beyond it, and consequently the images would be confused: if the frame were contrived of a spherical figure, and the glass were in its center, the representation would be still more accurate. If the object without be at the distance of twice the focal length of the glass, the image in the room will be of the same magnitude with the object.

The lights, shades, and colours in the camera obscura appear not only just, but, by the images being reduced to a smaller compass, much stronger than in nature; add to this, that these pictures exceed all others by representing the motion of the several objects; thus we see the animals walk, run, or

fly, the clouds float in the air, the leaves quiver, the waves roll, &c. and all in strict conformity to the laws of nature. The best situation for a dark chamber is directly North, and the best time of the day is noon.

To shew the Spots on the Sun's Disk by its Image in the Camera Obscura.

Put the object glass of a ten or twelve foot telescope into the scioptric ball, and turn it about till it be directly opposite the sun: when the sun is directly opposite the hole, the lens will itself be sufficient; or by means of the mirror on the outside of the window, as in the last recreation, the lens will answer the purpose at any time: then place the pasteboard, mentioned in the last recreation, in the focus of the lens, and you will see a clear bright image of the sun, of about an inch diameter, in which the spots on the sun's surface will be exactly described.

As this image is too bright to be seen with pleasure by the naked eye, you may view it through a lens, whose focus is 6 or 8 inches distant, which at the same time that it prevents the light from being offensive, will, by magnifying both the image and the spots, make them appear to greater advantage.

To magnify small Objects by means of the Sun's Rays let into a dark Chamber.

Let the rays of light that pass through the lens in the shutter be thrown on a large concave mirror, properly fixed in a frame; then take a slip, or thin plate of glass, and sticking any small object on it, hold it in the incident rays, at a little more than the focal distance from the mirror, and you will see, on the opposite wall, amidst the reflected rays, the image of that object, very large, and extremely clear and bright. This experiment never fails to give the spectator the highest satisfaction.

The Magic Lantern.

This very remarkable machine, which is now known over all the world, caused great astonishment at its origin: it is still beheld with pleasing admiration, and the spectator very frequently contents himself with wondering at its effects, without endeavouring to investigate their cause: the invention of this ingenious illusion is attributed to the celebrated

P. Kircher, who has published, on various sciences, works equally learned, curious, and entertaining.

The design of this machine is to represent at large, on a cloth or board, placed in the dark, the images of small objects, painted with transparent colours on plates of glass.

Its construction is as follows: let ABCD (Pl. III. Fig. 3) be a tin box, eight inches high, ten long, and six wide (or any other similar dimensions); at the top must be a funnel E, of four inches in diameter, with a cover F, which at the same time that it gives a passage to the smoke, prevents the light from coming out of the box.

On the side AC there is a door, by which is adjusted a concave mirror G, of metal or tin, and of five inches diameter; being part of a sphere whose diameter is eighteen inches, this mirror must be so disposed that it may be pushed forward or drawn back by means of the handle H, that enters the tin tube I, which is soldered to the door.

In the middle of the box must be placed a low tin lamp K, which is to be moveable: it should have three or four lights, that must be at the height of the focus of the mirror G.

In the side BD, and opposite to the mirror, there must be an aperture of three inches wide and two inches and a half high, in which is to be fixed a convex glass L, of the same dimension: I prefer this form for the glass, says M. Guyot, that the picture thrown upon the cloth may have the same form, which is much preferable to a circular aperture, through which the figures can never be completely seen but when they are at the center of the glass: it is surprising that this imperfection has been suffered to continue so long, when it is so easily remedied; the focus must be from four inches and a half to five inches, so that the lamp may be placed both in its focus, and in that of the concave mirror.

On the same side, place a piece of tin MN, of four inches and a half square, having an opening at the sides about four inches and a half high, and a quarter of an inch wide: through this opening or groove are to pass the glasses, on which are painted the figures that are to be seen on the cloth: in this tin piece, and opposite the glass L, let there be an aperture of three inches and a quarter long, and two inches and a quarter high, to which must be adjusted a tube O, of the same form, and six inches long: this tube is to be fixed into the piece MN:—another tube, six inches long, and

moveable, must enter that just mentioned, in which must be placed two convex lenses, P and Q; that of P may have a focus of about three inches, and that of Q, which is to be placed at the extremity of the tube, one of ten or twelve inches: the distance between these glasses is to be regulated by their foci: between these glasses, there must be placed a pasteboard R, in which is an aperture of an inch wide, and 4-5ths of an inch high: by placing this tube farther in or out of the other, the images on the cloth will appear larger or smaller.

From what has been said of the preceding machines, the construction of this will be easily understood: the foci of the concave mirror, and the lens L, meeting in the flame of the lamp, they together throw a strong light on the figures painted on the glasses that pass through the groove MN, and by that means render their colours distinct on the cloth: the rays from those glasses passing through the lens P are collected by the aperture in the pasteboard R, and conveyed to the lens Q, by which they are thrown on the cloth.

The lantern being thus adjusted, you must provide plates of clear glass, of twelve or fifteen inches long, and three inches wide, which are to be placed in thin frames, that they may pass freely through the groove MN, after being painted in the manner we shall now describe.

Method of Painting the Glasses for the Lantern.

Draw on a paper the subject you intend to paint, and fix it at each end to the glass; provide a varnish with which you have mixed some black paint, and with a fine pencil draw on the other side of the glass, with very light touches, the design drawn on the paper: if you are desirous of making the painting as perfect as possible, you should draw some of the outlines in their proper colours, provided they are the strongest tints of those colours that are used:—when the outlines are dry, you colour the figures with their proper tints or degradations; and those colours will not peel off, if you temper them with a strong white varnish. All those colours that are not terrestrial, as Prussian blue, carmine, calcined verdigris, &c. may be used to advantage, when tempered with a proper varnish: you are then to shade them with black mixed with the same varnish, or white bistre, as you find convenient: you may also leave strong lights in some parts, without any colours,

in order to produce a more striking effect. Observe, in particular, not to use more than four or five colours, such as blue, red, green, and yellow. You should employ however a great variety of tints, to give your painting a more natural air, without which they will represent vulgar objects, which are by no means the more pleasing, because they are gaudy.

When the lamp in this lantern is lighted, and by drawing out the tube to a proper length, the figures painted on the glass appear bright and well defined, the spectator cannot fail of being highly entertained by the succession of natural or grotesque figures that are painted on the glasses.

This piece of optics may be rendered much more amusing, and at the same time more marvellous, by preparing figures to which different natural motions may be given: there are in the Philosophical Essays of M. Muschenbroek, different methods of performing all these various movements, by some mechanical contrivances that are not difficult to execute, which every one may perform according to his own taste; either by movements in the figures themselves, or by painting the subject on two glasses, and passing them at the same time through the groove.

How to rub out Twenty Chalks at five Times rubbing out, every Time an odd one.

Tricks of this kind are more generally the diversion of low mechanics, who, having studied what is trifling more than what is useful, fancy themselves conjurers, and not a little proud, often affront and insult those of superior knowledge; always ready to lay wagers, when in their cups, offer five to one, ten to one, or any odds that come uppermost, that none can do the like but themselves; yet sometimes these cunning men find themselves at a loss, when they meet with a person who is equally knowing, who makes their pockets pay for their boasting;—from these sort of wagers arise quarrels; for if one is not equal to another in point of calculation, he thinks he may be in point of manhood; a challenge is given and accepted; and the combatants, fierce as bull-dogs, begin throwing their athletic arms at each other, the stones are rammed deeper with their falls, the noisy attendants make confusion, ashamed with their vociferous clamouring: “Well struck, Dick, that was a nice one; Tom, at him again, under his ribs, darken his day-lights, mind your points, find out his bread

basket, tip him Slack's favorite, give him a cross-buttock, and come Ben Bosle over his jaw-bone. Huzza! huzza! huzza!" Then the valiant heroes, encouraged by their friends, the rabble, bruise one another's flesh; and at last, the victor, perhaps, gains for his triumph a black eye, bloody nose, and dislocated jaw, and all his comfort is, that his antagonist has the same sort of honour doubled: after all this, a few tankards of porter make friends; but their wives and families are the greatest sufferers, who are at home pining in rags and want, while their husbands are losing their time, and abusing themselves.

The following trick is one of those most in practice amongst them:

To do this trick, you must make twenty chalks or long strokes upon a board, as in the margin:

Then begin and count backwards, as 20, 19,	1—
18, 17, rub out these four, then proceed saying,	2—
16, 15, 14, 13, rub out these four, and begin	3—
again, 12, 11, 10, 9, and rub out these, and pro-	4—
ceed again, 8, 7, 6, 5, then rub out these, and	5—
lastly say, 4, 3, 2, 1; when these four are rubbed	6—
out, the whole twenty are rubbed out at five times,	7—
and every time an odd one, that is the 17th, 13th,	8—
9th, 5th, and 1st.	9—

This is a trick, which, if once seen, may be	10—
easily retained; and the only puzzle at first is, it	11—
not occurring immediately to the mind, to begin	12—
to rub them out backwards: it is as simple as	13—
any thing possibly can be, and might do very well	14—
when people are social and good-humoured to-	15—
gether; but when they are flushed with liquor,	16—
and fractious by nature, I advise all those who	17—
love peace and quietness not to be curious to	18—
know what they cannot directly comprehend, as	19—
one word brings on another, and the consequences	20—
may be what is displayed in the preface to this trick.	

To cut a Looking-glass, or Piece of Chrystal, lct it be ever so thick, without the help of a Diamond, in the same shape as the Mark of the Drawing made on it with Ink.

This remarkable operation unites utility with amusement; for being in the country, or in a place where there is no gla-

zier nor glassman to be had, the following means will answer the purpose without their help.

Take a bit of a walnut-tree, about the thickness of a candle, and cut one of its ends to a point; put that end in the fire, and let it burn till it is quite red: while the stick is burning, draw on the glass or chrystal, with ink, the design or outline of the form in which you mean to cut it out: then take a file, or bit of glass, and scratch a little the place where you mean to begin your section; then take the wood red hot from the fire, and lay the point of it about the twentieth part of an inch, or thickness of a guinea, from the marked place, taking care to blow always on that point, in order to keep it red; following the drawing traced on the glass, leaving, as before, about the twentieth part of an inch interval every time that you present your piece of wood, which you must take care to blow often.

After having followed exactly the outlines of your drawing, to separate the two pieces thus cut, you need only pull them up and down, and they will divide.

To change the Colour of a Rose.

Nothing more is wanting to change the colour of a rose, whether it is on its stalk or not, than to burn some sulphur under it; which will make it turn white, and it will not regain its primitive colour in less than two hours.

Blind Abbess and her Nuns.

A blind abbess visiting her nuns, who were equally distributed in eight cells, built at the four corners of a square, and in the middle of each side, finds an equal number of persons in each row or side containing three cells: at a second visit, she finds the same number of persons in each row, though their number was enlarged by the accession of four men: and coming a third time, she still finds the same number of persons in each row, though the four men were then gone, and had carried each of them a nun with them.

To resolve the first case, when the four men were got into the cells, we must conceive it so, that there was a man in each corner cell, and that two nuns removed from thence to each

3	3	3
3		3
3	3	3

of the middle cells : at this rate, each corner cell contained one person less than before ; and each middle cell two more than before : suppose then, that at the first visitation each cell contained 3 nuns ; and so, that there were nine in each row, and twenty-four in all ; at the second visit, which is the first case in question, there must have been five nuns in each middle cell, and two persons, viz. a man and a nun in each corner cell ; which still makes nine persons in each row.

2	5	2
5		5
2	5	2

To account for the second case, when the four men were gone, and four nuns with them, each corner cell must have contained one nun more than at the first visit, and each middle cell two fewer ; and thus, according to the supposition laid down, each corner cell contained four nuns, and there was only one in each middle cell, which still make nine in a row, though the whole number was but twenty.

4	1	4
1		1
4	1	4

To find the Number remaining, after some Operations, without asking any Questions.

Bid a person add what number you will to the number thought of, and multiply the sum by the number thought of ; for if you make him subtract the square of the number thought of from the product, and tell you the remainder, you have nothing to do but to divide the remainder by the number you gave him to add before ; for the quotient is the number thought of : thus 4 added to the 5 (the number thought of) makes 9, which being multiplied by 5, makes 45 : from which take 25, the square of the number thought of, and there remains 20, which being divided by 4, you have 5 in the quotient.

Or else bid the person that thinks take a certain lesser number from the number thought of, and multiply the remainder by the same number thought of ; for if you make him take the square of the number thought of from the product, and tell the remainder, by dividing the remainder by the number you

ordered to be taken from the number thought of, you have the number thought of in the quotient.

But of all the ways of finding out a number thought of, the following is certainly the easiest: make him take from the number thought of what number you pitch upon that is less than it, and set the remainder apart; then make him add the same number to the number thought upon, and the preceding remainder to the sum, for a second sum; which he is to discover to you, and the half of that sum is the number thought of: thus 5 being thought of, and three taken from it, the remainder is 2; and the same number 3 added to 5 makes 8, and that with the preceding remainder, 10, the half of which, 5, is the number thought of.

To find the Number thought of by another without asking any Questions.

Bid the other person add to the number thought of its half, if it be even; or its greatest half, if it be odd; and to that sum its half or greatest half, according as it is even or odd, for the second sum, from which bid him subtract the double of the number thought of, and take the half of the remainder, or its least half, if the remainder be odd; and thus he is to continue to take half after half, till he comes to an unit: in the mean time you are to observe how many subdivisions he makes, retaining in your mind for the first division 2, for the second 4, for the third 8, and so on in a double proportion, remembering still to add 1 every time he took the least half; and that when he can make no subdivision, you are to retain only 1:—by this means you have the number that he has halved so often, and the quadruple of that number is the number thought of, if so be he was not obliged to take the greatest half at the beginning, which can only happen when the number thought of is evenly even, or divisible by 4: in other cases, if the greatest half was taken at the first division, you must subtract 5 from that quadruple; if the greatest half was taken only at the second division, you subtract but 2; and if he took the greatest half at each of the two divisions, you are to subtract 5 from the quadruple, and the remainder is the number thought of.

For example, let 4 be the number thought of, which by the addition of its half, 2, becomes 6, and that by the addition of its half 3, is 9; from which 8, the double of the number

thought of, being subtracted, the remainder is 1, that admits of no division: and for this reason you retain only 1 in your mind, the quadruple of which, 4, is the number thought of.

Again; let 7 be the number thought of; this being odd, the greatest half of it, 4, added to it makes 11, which is odd again; and so to the greatest half of 11 added to 11, makes 17, from which we take 14, the double of the number thought of, and so the remainder is 3, the least half of which is 1, that admits of no farther division: here there being but one sub-division, we retain 2, and to that add 1 for the least half taken, so we have 3, the quadruple of which is 12; but because the greatest moiety was taken both in the first and second division, we must subtract 5 from 12, and the remainder 7 is the number thought of.

To find out Two Numbers thought of by any one.

Bid a person multiply the two numbers 5, 3, together; and then multiply the sum of two numbers 8 by the number you want to find, whether the greater or lesser, and subtract the product of the two numbers 15 from that product (which is 40, if you want the greater, and 24, if you look for the lesser number) and tell you the remainder, 25, or 9, the square roots of which satisfies the demand.

When the least of the two numbers does not exceed 9, it is easier to find them out after this manner: let 1 be added to the triple of the greatest (of the two numbers thought of, the triple of that sum, and the total sum discovered; from which you are to take off 3, and then the right hand figure is the least, and the left hand figure the greatest number thought of; thus 3 times 5, more, 1, and the triple of that 48 added to 8, the sum of the two numbers, makes 56, which losing 3, is 53; 3 the right hand figure being the least, and 5 on the left the greatest number thought of: or to 9 times the greatest number, add the sum of them both, then is the left hand figure the greatest, and the right hand one the least; thus 9 times 5 is 45, to which add 8, the sum is 53.

Strange Tricks performed by Electricity.

Among the wonderful discoveries of human nature, there is hardly any that rank higher than electricity.

This phenomenon, like many others, was found out merely by accident; yet it has proved not only a source for various experiments, but likewise extremely beneficial to mankind.

The great Dr. Franklin has improved more in this branch of knowledge than any other person; he even contrived to bring lightning from the clouds by means of conductors; these conductors are of great service, when fixed to churches, and other public edifices, to preserve them from the dreadful effects of the rapidness of elemental fire.

When electricity is made use of physically, it is of great utility, and has been known to relieve, and sometimes entirely cure, various disorders; it is very serviceable in the rheumatism, and other chronic disorders.

One circumstance I shall mention, which I received* from a gentleman who has been dead some years, but whose character as an artist, and an ingenious person, will be a long time remembered; I mean Mr. Benjamin Rackstrow, of Fleet-street.

He told me, that having some company one day to see his museum, and his electrical experiments, they were rather fearful of undergoing the shock; when a person who was much given to inebriety, being in the room, and rather intoxicated, voluntarily offered to let the experiment be tried on him: this was agreed to, upon which he received it pretty smartly three or four times, and thought no more about it at that time:—a few days afterwards he had occasion to go to Chichester, in Sussex, and being rather low in circumstances, was obliged to walk.

This man had been affected for many years with a rupture, which was extremely troublesome, but on his journey he had not the least symptom of it; on which he wrote a letter to Mr. Rackstrow, informing him of this agreeable circumstance, and imputing it entirely to his receiving the shock from his electrical apparatus: the man lived to confirm this by word of mouth; and what is really extraordinary, the rupture never returned, which is sufficient to establish its physical consequence; it is of farther service in palsies and contractions, and is performed by sparks, drawn by friction, from the electrical machine.

Its real use being thus established, we may now, without offending, be a little merry with other circumstances which have, and may happen again, by means of electricity.

R

* The person from whom it is taken.

Some ladies and gentlemen, coming to Mr. Rackstrow's, brought with them a negro servant who had not been long in England: after they had seen his natural and artificial curiosities, they desired to see some of his electrical experiments, and gave him a hint to play a trick or two upon poor Mungo: Mungo was not a little surprised at the shocks he received, but could not guess from whence they came; but when the room was darkened, and fire made to come out of his fingers' ends, he roared out like a mad bull, crying, the devil! the devil! and in endeavouring to get out of the room, overset the skeleton of a Rhinoceros, run his head against a case full of butterflies, and broke to pieces a fine bust of the Marquis of Granby; and having once more gained day light, made a sudden spring into the street, and run immediately home, to the no small diversion of his master and family.

Mrs. Bulky being troubled with a tympany, was recommended to be electrified; she accordingly went to a professor in that way, who asked her if she could bear a pretty hard shock? O, yes, Sir, said she, as hard as you please, and as often as you please, I am very fond of being *shocked*: the man by this supposed she had before undergone the operation, and was not sparing to give her what she seemed so well to understand; but, alas! he wound up his instrument too high: so that he not only overset his patient, but actually conveyed her into a cellar where they sold ox check and peas soup; down went the streaming pan full of savory broth, and off flew her monument of a cap into the other boiling cauldron.

The cook reddened like a heated poker, the customers rose from their seats, and confusion took place in this subterraneous abode.

All culinary business was at an end for the present; the electrical doctor came running to the assistance of his patient; but as soon as the cause of the disaster was explained, the occupier of the place declared the damages should be made good; her pan of leg of beef was entirely lost, her peas soup spoiled by the powder and pomatum of the lady's head dress, the doctor was the cause of all, and he should pay for all; but he declared he would, sooner than pay a farthing, electrify the house till it fell about their ears.

At last the lady, however, having adjusted herself in the best manner she could, gave the good woman a crown, and so

compromised the matter; however, it cured her of her tympany, for she never went to the doctor afterwards.

Many are the tricks played by means of an electrifying machine: a person in the city had one in his shop which was not seen by the passers by; he hung at the door an old steelyard, which, from its make, seemed to be very ancient; this attracted the attention and notice of many, who no sooner went to examine it than they received the shock; those that knew what it was only smiled, and went on; others stared, and could not guess from whence it came.

A drunken porter being called one day, and asked what he would have to carry the steelyard to a certain place, went to examine it, but he no sooner touched it than he felt a blow, and turning round, with an oath, declared, if he knew who it was, he would pay them well for their impudence: he then returned to speak about his job, and received another shock, and another after that, till, irritated by the supposed assaults, given by he could not tell whom, he stripped in buff to fight all that came in his way, till he got a mob of boys and dogs at his heels, and was glad to get away at any rate.

Such tricks are not recommended as proper to be practised, for they are really dangerous; a strange person might, on finding the truth, break the windows, or keep it in his mind, and do the electrifying gentleman some injury, which might make him repent of his experiments.

Small electrical machines are often introduced in company, and create not only mirth, but produce real rational amusement; such can never be disagreeable, but must give satisfaction to all who have any idea of philosophical knowledge, and wish to improve their minds by mathematical experiments: to all such, we may safely recommend the electrical apparatus, which will be both useful and profitable.

MAGNETISM.

Definitions.

1 Magnetism is the science that explains the several properties of the attractive and repellant powers in the magnet or load-stone.

2. The magnet is a rich, heavy, iron ore, of a hard substance, a dusky grey colour, with some mixture of a reddish brown, and sparkling when broken.

3. The magnetic virtue is called the third species of attraction; gravity being the first, and electricity the second.

4. The two ends of a magnet, when it is properly formed, are called its poles; and when it is placed on a pivot, in just equilibrium, one end will turn towards the North, and is called its North pole, and the other end the South pole: the poles of a magnet are found by holding a very fine short needle over it; for where the poles are, the needle will stand upright, but no where else: the exterior parts are then to be filed or ground off, and the two extremities which contain the poles to be made quite smooth.

5. When the two poles of a magnet are surrounded with plates of steel, it is said to be armed.

6. If the end of a small iron bar be rubbed against one of the poles of a magnet, it is said to be touched, and is then called an artificial magnet.

7. If such a magnet be supported on a pivot, it is called a magnetic needle; one end of it turning towards the North, and the other towards the South.

8. The difference between the position of the needle, and the exact points of North and South, is called its declination.

9. A needle which is touched will incline towards the earth, and that is called its inclination, or dipping.

APHORISMS.

1. The magnetic attraction is produced by effluvia emitted by the magnet, and passing from one pole to the other: the direction of the magnetic effluvia is shewn by the following experiment: let A B, C D, (Plate IV. Fig. 1.) be the poles of a magnet; round every side lightly strew steel filings on a sheet of white paper; the particles of the filings will be so affected by the effluvia of the stone, as to shew the course they take every way: in the middle of each pole, between A B and C D, they appear to proceed in lines nearly straight; towards the ends they are more and more curved, till at last the lines from both sides coinciding with each other, form numberless curves round the stone, which are nearly of a circular figure, as in the plate. This experiment seems to shew that the magnetic effluvia issuing from one pole circulates to the other.

2. One pole of a magnet will attract iron, and the other repel it, but no other body. The property of the magnet to

attract iron has been known many ages ; but those of its polar direction, and of its communicating that property to iron, was not discovered till the 14th century.

3. The magnet attracts iron as well in vacuo as in the air.

4. The magnetic attraction will be continued through several pieces of iron placed contiguous to each other.

5. The magnetic effluvia pervades all bodies.

6. The magnetic attraction extends to a considerable distance. The learned Muschenbroek made a number of experiments, with great care and assiduity, to determine the extent and progress of the magnetic attraction ; but was never able to discover any regular proportion between the force and distance, but merely that the force increased as the iron approached the magnet ; nor does there seem to be any prospect of establishing the proportion of attraction to the distance, till a method is found, if it can be found, of separating the attracting from the repelling parts : a needle has been known to be attracted by an iron bar at the distance of eight or ten feet.

7. The North pole of one magnet will attract the South pole of another ; and the similar poles will repel each other. If a magnet be gently cut through the middle of its axis, each piece becomes a complete magnet ; for the parts that were contiguous become poles, and even opposite poles ; so that the end of each piece may become a North or South pole according as the section is made nearest to the North or South pole of the large magnet. Upon cutting a magnet longitudinally, there will be four poles, in the same position as before the cutting. Sometimes a strong stroke with a hammer will bring all the magnetic power from one end of a needle to the other ; sometimes make it more strong where it was before, and at other times totally destroy it.

8. The end of a needle touched by the North pole of a magnet will turn South, and that touched by the South pole will turn North.

9. The declination of the magnetic needle is different in different parts of the earth, and in the same part at different times : the declination of the needle at London in the year 1580 was 11 degrees, 15 minutes, East : in the year 1657, there was no declination, that is, the needle stood exactly

North and South; at present, the declination is more than 22 degrees westward.

10. The inclination of the needle is not always the same in different places, nor at the same place at different times: the inclination of the needle when it was first observed, in the year 1576, was found to be 71 degrees, 50 minutes; at present it is between 74 and 75 degrees.

To prevent the dipping of the needle in the common compass, the end that is not touched is made something heavier, by which it is kept in equilibrio. Under the equator, the needle has no inclination, being equally attracted by the two poles of the earth.

11. The strength of natural magnets differs in those of different magnitudes, but not in proportion to their magnitudes: the smallest magnets have generally the greatest power, in proportion to their bulk:—a large magnet will seldom take up more than three or four times its own weight; whereas a small one will frequently take up more than ten times its weight: a magnet that weighs scarce three grains, and that a gentleman wears in his ring, will take up 746 grains, or 250 times its own weight. A magnetic bar made by Mr. Canton, according to the method we shall hereafter describe, and that weighed 10 ounces, 12 pennyweights, took up something more than 79 ounces: and a flat semicircular steel magnet that weighed an ounce and 13 pennyweights, lifted an iron wedge of 90 ounces.

12. The strength of a natural magnet is considerably increased by its being armed: there are various ways of arming magnets; the most eligible seems to be that of placing two pieces of steel against the two poles, so that they may come down below the bottom of the stone, and binding them on with one or more pieces of brass: the two ends of the steel pieces then become the poles of the magnet: to determine the quantity of steel to be applied, try the magnet with several steel bars, and the greatest weight it takes up, with a bar on, is to be the weight of its armour.

Though an armed magnet has a great degree of force, it may be easily counteracted: if an oblong piece of iron be suspended by one of its poles, and the pole of a different denomination of a weaker and unarmed magnet be placed under the iron, it will quit the first magnet and adhere to the other: in like manner, when a needle hangs by its point to a magnet,

if a common bar of iron be applied to the head of the needle, it will directly quit the magnet and adhere to the bar; but if it hangs by its head to the magnet, neither the iron, nor a weak magnet, will disengage it. Though the pole of an armed magnet has great power, yet if an iron bar of great length be placed under it, the magnet will not appear to have any force whatever.

If a magnet by laying a long time unused has lost part of its power, it may sometimes be recovered: an armed magnet that weighed 14 ounces and a half, and would take up 16 times its own weight, by laying by some years lost one fourth part of its power; but as much weight being applied to it as it would then take up, and being suffered to hang to it some weeks, it would then take up an additional quantity; and the quantity being continually increased, at different periods, for the space of two years, it would then take up more than 20 pounds; whereas, before its virtue was impaired, it would not take up 15.

13. Iron acquires a magnetic power by being continually rubbed in the same direction; from hence files, augurs, and such like tools, have always some magnetic power.

14. Iron bars become magnetic by standing a long time nearly upright; therefore pokers, tongs, and other irons, that always stand with the same end downwards, are constantly magnetic; and the continual friction they receive, in keeping them clean, contributes much to this. Some bars acquire several magnetic poles alternately, North and South.

15. The magnetic virtue may be communicated by electricity. When the electric shock is very strong, it will give a polarity to needles; and sometimes it will reverse their poles.

16. A strong blow at the end of a magnetic bar will give it a magnetic power: if such a bar, or a pair of pincers, be struck hard, or thrown forcibly against a stone floor, they will manifestly attract a small needle that floats upon the surface of the water in a glass.

17. Fire totally destroys the power of magnets, as well natural as artificial.

Method of making Artificial Magnets.

Procure a dozen bars; six of soft steel, each three inches long, a quarter of an inch broad, and one twentieth of an inch thick, with two pieces of iron, each half the length of one of the bars, but of the same breadth and thickness; and six of hard steel, each five inches and a half long, half an inch broad, and three twentieths of an inch thick, with two pieces of iron of one half the length, but the same breadth and thickness as one of the hard bars; and let all the bars be marked with a line quite round them at one end.

Then take an iron poker and tongs (Plate IV. Fig. 2.) the larger they are and the longer they have been used, the better; and fixing the poker upright between the knees, hold to it, near the top, one of the soft bars, having its marked end downward, by a piece of sewing silk, which must be pulled tight with the left hand, that the bar may not slide; then grasping the tongs with the right hand, a little below the middle, and holding them nearly in a vertical position, let the bar be stroked by the lower end, from the bottom to the top, about ten times on each side, which will give it a magnetic power sufficient to lift a small key at the marked end; which end, if the bar was suspended on a point, would turn towards the North, and is therefore called the North pole, and the unmarked end is, for the same reason, called the South pole of the bar.

Four of the soft bars being impregnated after this manner, lay the other two (Fig. 3) parallel to each other, at the distance of about a quarter of an inch between the two pieces of iron belonging to them, a North and South pole against each piece of iron; then take two of the four bars already made magnetical, and place them together, so as to make a double bar in thickness, the North pole of one even with the South pole of the other; and the remaining two being put to these in such manner as to have two North and two South poles together, separate the North from the South poles at one end by a large pin, and place them perpendicularly with that end downwards, on the middle of one of the parallel bars, the two North poles towards its South, and the two South poles towards its North end; slide them backward and forward, three or four times, the whole length of the bar; and removing them from the middle of this, place them on the middle of

the other bar as before directed, and go over that in the same manner; then turn both the bars the other side upwards, and repeat the former operation;—this being done, take the two from between the pieces of iron, and placing the outermost of the touching bars in their room, let the other two be the outermost of the four to touch these with; and this process being repeated till each pair of bars have been touched three or four times over, which will give them a considerable magnetic power, put the half dozen together after the manner of the four, (Fig. .) and touch with them two pair of hard bars, placed between their irons, at the distance of about half an inch from each other; then lay the soft bars aside, and with the four hard ones, let the other two be impregnated, (Fig. .) holding the touching bars apart, at the lower end, near two tenths of an inch, to which distance let them be separated, after they are set on the parallel bar, and brought together again before they are taken off.

This being observed, proceed according to the method described above till each pair has been touched two or three times over; but as this vertical way of touching a bar will not give it quite so much of the magnetic virtue as it will receive, let each pair be now touched once or twice over, in their parallel position between the irons, (Fig. .) with two of the bars held horizontally, or nearly so; by drawing at the same time the north of one from the middle over the south end, and the south of the other from the middle over the north end of a parallel bar; then bringing them to the middle again, without touching the parallel bar, give three or four of these horizontal strokes to each side: the horizontal touch after the vertical will make the bars as strong as they can possibly be made; as appears by their not receiving any additional strength, when the vertical touch is given by a great number, and the horizontal by bars of a superior magnetic power:—this whole process may be gone through in about half an hour; and each of the large bars, if well hardened, may be made to lift 28 troy ounces: and sometimes more: and when these bars are thus impregnated, they will give to an hard bar of the same size its full virtue in less than two minutes; and therefore will answer all the purposes of magnetism in navigation and experimental philosophy, much better than the loadstone, which is well known not to have sufficient power to impregnate hard bars. The half dozen being put into a

case, (Fig. 7,) in such manner, as that two poles of the same denomination may not be together, and their irons with them as one bar, they will retain the virtue they have received; but if their power should, by making experiments, be ever so far impaired, it may be restored without any foreign assistance in a few minutes; and if, out of curiosity, a much larger set of bars should be required, these will communicate to them a sufficient power to proceed with, and they may in a short time, by the same method, be brought to their full strength.

The Magnetic Perspective Glass.

Provide an ivory tube, about two inches and a half long, and of the form expressed in plate V. Fig. 1; the sides of this tube must be thin enough to admit a considerable quantity of light: it is to open at one end with a screw; at that end there must be placed an eye glass A, Fig. 2. of about two inches focus, and at the other end any glass you please.

Have a small magnetic needle, like that placed on a compass: it must be strongly touched, and so placed at the bottom of the tube, that it may turn freely round; it is to be fixed on the center of a small ivory circle, C, of the thickness of a counter, which is placed on the object glass D, and painted on the object glass D, and painted black on the side next it: this circle must be kept fast by a circular rim of pasteboard, that the needle may not rise off its pivot, after the same manner as in the compass: this tube will thus become a compass sufficiently transparent to shew the motions of the needle: the eye-glass serves more clearly to distinguish the direction of the needle; and the glass at the other end, merely to give the tube the appearance of a common perspective.

It will appear, by aphorism 8, that the needle in this tube, when placed over, and at a small distance from a magnet, or any machine in which it is contained, will necessarily place itself in a position directed by that magnet, and consequently shew where the North and South pole of it is placed; the North end of the needle constantly pointing to the South end of the magnet.

This effect will take place though the magnet be inclosed in a case of wood, or even metal, as the magnetic effluvia penetrates all bodies; you must observe, however, that the af-

tracting magnet must not be very far distant from the needle, especially if it be small, as in that case its influence extends but to a short distance.

This tube may be differently constructed by placing the needle in a perpendicular direction, on a small axis of iron, on which it must turn quite freely, between two small plates of brass placed on each side the tube; the two ends of the needle should be in exact equilibrium: the north and south ends of this needle will, in like manner, be attracted by the south and north ends of the magnetic bar; the former construction, however, appears preferable, as it is more easily excited, and the situation of the needle much more easily distinguished.

The Magnetic Table.

Under the top of a common table, place a magnet that turns on a pivot, and fix a board under it, that nothing may appear; there may also be a drawer under the table, which you pull out to shew that there is nothing concealed: at one end of the table, there must be a pin that communicates with the magnet, and by which it may be placed in different positions: this pin must be so placed as not to be visible by the spectators:—strew some steel filings, or very small nails, over that part of the table where the magnet is; then ask any one to lend you a knife, or a key, which will then attract part of the nails or filings, in the same manner as the iron attracts the needle, as may be seen in the 12th aphorism; then placing your hand, in a careless manner, on the pin at the end of the table, you alter the position of the magnet; and giving the key to any person, you desire him to make the experiment, which he will then not be able to perform: you then give the key to another person, at the same time placing the magnet, by means of the pin, in the first position, when that person will immediately perform the experiment.

The communicative Crown.

Take a crown piece, and bore a hole in the side of it, in which place a piece of wire, or a large needle, well polished, and strongly touched with a magnet; then close the hole with a small piece of pewter, that it may not be perceived: now the needle in the magnetic perspective (before described,) when it is brought near to this piece of money, will fix itself

in a direction correspondent to the wire or needle in that piece.

Desire any person to lend you a crown piece, which you dexterously change for one that you have prepared as above; then give the latter piece to another person, and leave him at liberty either to put it privately in a snuff-box, or not; he is then to place the box on a table, and you are to tell him, by means of your glass, if the crown is or is not in the box; then bringing your perspective close to the box, you will know, by the motion of the needle, whether it be there or not: for as the needle in the perspective will always keep to the north of itself, if you do not perceive it has any motion, you conclude the crown is not in the box;—it may happen however, that the wire in the crown may be placed to the north, in which case you will be deceived; therefore to be sure of success, when you find the needle in the perspective remains stationary, you may make some pretence to desire the person to move the box into another position, by which you will certainly know if the crown piece be there or not.

You must remember, that the needle in the perspective must here be very sensible, as the wire in the crown cannot possibly have any great attractive force.

The Magician's Mirrors.

In the wainscot of a room, make two overtures of a foot high and ten inches wide, and about a foot distant from each other: let them be at the common height of a man's head, and in each of them place a transparent glass, surrounded with a frame like a common mirror.

Behind this partition place two mirrors, one on the outward side of each overture, inclined to the wainscot in an angle of forty-five degrees*: let them both be eighteen inches square; let all the space between them be enclosed by boards or pasteboards, painted black, and well closed, that no light may enter; let there be also two curtains to cover them, which may be drawn aside at pleasure.

When a person looks into one of these supposed mirrors, instead of seeing his own face, he will perceive the object that is in the front of the other; so that if two persons present

* Every square or right angle is 90 degrees, half of which is 45, and is readily formed by making the two angles equal.

themselves at the same time before these mirrors, instead of each one seeing himself, they will reciprocally see each other.

Note.—There should be a sconce with a candle placed on each side of the two glasses in the wainscot, to enlighten the faces of the persons who look in them, otherwise this experiment will have no remarkable effect.

This recreation may be considerably improved by placing the two glasses in the wainscot, in adjoining rooms, and a number of persons being previously placed in one room, when a stranger enters the other, you may tell him his face is dirty, and desire him to look in the glass, which he will naturally do; and on seeing a strange face, he will instantly draw back; but returning to it, and seeing another, another, and another, like the phantom kings in *Macbeth*, what his surprise will be is more easy to conceive than express: after this, a real mirror may be privately let down on the back of the glass, and if he can be prevailed on to look in it once more, he will then, to his farther astonishment, see his own face; and may be told, perhaps persuaded, that all he thought he saw before was mere imagination.

How many tricks less artful than this, have passed in former times for sorcery; and pass at this time, in some countries, for apparitions!

Note—When a man looks in a mirror that is placed perpendicular to another, his face will appear entirely deformed: if the mirror be a little inclined, so as to make an angle of eighty degrees (that is, one ninth part from the perpendicular) he will then see all the parts of his face, except the nose and forehead; if it be inclined to sixty degrees (that is, one third part), he will appear with three noses and six eyes; in short, the apparent deformity will vary at each degree of inclination; and when the glass comes to forty five degrees (that is, half way down), the face will vanish: if instead of placing the two mirrors in this situation, they are so disposed that their junction may be vertical, their different inclinations will produce other effects; as the situation of the object relative to these mirrors is quite different: the effects of these mirrors, though remarkable enough, occasion but little surprise, as there is no method of concealing the cause by which they are produced.

Polemoscopes.

By the term Polemoscope is meant any instrument, whether catoptric or dioptric, by which you may see what passes in another place, without being seen from thence: the machines contain one or more plain mirrors, which convey by reflection the image of the object to the eye of the spectator: there are small instruments of this kind, made in the form of an opera glass, by which, while you seem to look straight forward, you see what passes on one side, and by that means gratify your curiosity without the appearance of incivility.

To the constructing of this sort of polemoscope, nothing more is necessary than to fix in a common opera glass a small mirror, inclined to an angle of forty five degrees, and adjust a proper object glass: this glass at the same time may answer its common use, by adding an object glass, and so contriving the small tube that it may remove the mirror at pleasure.

The tube of a polemoscope may be placed against a wall, the inclined mirror being a little above it, and turned outwards; by which means you will discover what passes on the other side without being seen yourself. An instrument of this sort would be of use in sieges, where there is danger without the wall from the fire of the enemy, and on other occasions: this instrument may also be constructed that the tube may turn round, and the mirror be elevated or depressed, that you may see successively, and at pleasure, all the objects that you would perceive, if you were at the top of the wall against which the instrument is placed.

The Artificial Rainbow.

Opposite a window into which the sun shines direct, suspend a glass globe filled with water, by a string that runs over a pulley, so that the sun's rays may fall on it; then drawing the globe gradually up, when it comes to the height of about forty degrees, you will see, by placing yourself in a proper situation, a purple colour in the glass, and by drawing it gradually up higher, the other prismatic colours, blue, green, yellow, and red, will successively appear; after which the colours will disappear, till the globe is raised to about fifty degrees, when they will again be seen, but in an inverted order, the red appearing first, and the blue or violet last; and when the globe

comes up to little or more than fifty four degrees, they will totally vanish.

These appearances serve to explain the phenomena of natural rainbows, of which there are frequently two; the one being about eight degrees above the other, and the order of their colours is inverted, as in this experiment, red being the uppermost colour in the lower bow, and violet the other.

The rainbow is not in the clouds, but in the falling rain, and always opposite the sun: the different order of the colours in the bow arises from their different reflections; those of the under bow being caused by two refractions and two reflections, and therefore the colours of this are less bright than the other, their strength being diminished by every reflection.

Now it has been proved by repeated experiments that forty degrees form the greatest angle by which the most refrangible rays can, after one reflection, be refracted to the eye; and that something more than forty two degrees forms the greatest angle under which the least refrangible ray can come to the eye after one reflection; therefore, all the colours of the lower bow must lie in the space of less than two degrees: in like manner, it has been proved, that fifty degrees make the least angle under which the least refrangible rays can be visible to the eye after two reflections; and that about fifty four degrees will be the least angle under which the most refrangible rays can come to the eye after two reflections; therefore, all the colours of the upper bow must be in less than four degrees.

It follows, from what is here said, that all rainbows are of a circular form and equal magnitude, and as they are always opposite the sun, the parts we see of them must be in proportion to his height above the horizon; when his altitude is forty degrees, only the upper rainbow can be visible, and when it is fifty four degrees there can be no rainbow; but as the sun's height, during the winter half year, is never equal to forty degrees, there may be always then two bows visible.

By the means of two plain Looking Glasses to make a Face appear under different Forms

Having placed one of the two glasses horizontally, raise the other to about right angles over the first; and while the two glasses continue in this posture, if you come up to the

perpendicular glass, you will see your face quite deformed and imperfect; for it will appear without forehead, eyes, nose, or ears, and nothing will be seen but a mouth and a chin raised bold: do but incline the glass ever so little from the perpendicular, and your face will appear with all its parts, excepting the eyes and the forehead; stoop a little more, and you will see two noses and four eyes; and then a little further, and you will see three noses and six eyes;—continue to incline it still a little more, and you will see nothing but two noses, two mouths, and two chins; and then a little further again, and you will see one nose and one mouth;—at last incline a little further, that is, till the angle of inclination comes to be 44 degrees, and your face will quite disappear.

If you incline the two glasses, the one towards the other, you will see your face perfect and entire; and by the different inclinations, you will see the representation of your face, upright and inverted alternately, &c.

By the means of Water to make a Counter appear that, while the Vessel was empty of Water, was hid from the Eye.

Take an empty vessel, and put a counter in it, at such a distance from the eye, that the height of the sides of the vessel keeps it hid: you may make the eye to see this counter without altering the place of either the eye, the vessel, or the counter, viz. by pouring water into it; for as sight, which is performed in a straight line, does upon encountering a thicker medium, refract towards a perpendicular, so in this case the water poured into the vessel being a thicker medium than the air, will make the rays darted from the eyes to refract towards the line that is perpendicular to its surface; and so the eye will see the counter at the bottom of the vessel, which, without that refraction, could not be seen.

To know which of two different Waters is the lightest without any Scales.

Take a solid body, the specific gravity of which is less than that of water, deal, or fir-wood, for instance, and put it into each of the two waters, and rest assured that it will sink deeper in the lighter than in the heavier water; and so by observing the difference of the sinking, you will know which is the lightest water, and consequently the wholsomest for drinking.

To contrive a Cask to hold three different Liquors that may be drawn unmixed at one and the same Tap.

The cask (Pl. V. Fig. 3.) must be divided into three parts or cells, A, B, C, for containing the three different liquors, as red wine, white wine, and water; which you may put into their respective cells at one and the same bung, thus;

Put into the bung a funnel D, with three pipes, E, F, G, each of which terminates in its respective cell: upon this funnel clap another funnel H with three holes, that may answer when you fill the orifices of each pipe; for thus, if you turn the funnel H so as to make each hole answer successively to its corresponding pipe, the liquor you pour into the funnel H will enter that pipe, it being still supposed, that when one pipe is open the other two are shut.

Now to draw these liquors without mixing, you must have three pipes, K, L, M, each of which answers to a cell, and a sort of cock or spigot I N, with three holes answering the three pipes, and so turning it till one of the holes fits its respective pipe, you draw the respective liquor by itself.

To know if a suspicious Piece of Money is good or bad.

If it be a piece of silver that is not very thick, as a crown, or half a crown, the goodness of which you want to try; take another piece of good silver of equal balance with it, and tie both pieces with thread or horse hair to the scales of an exact balance (to avoid the wetting of the scales themselves), and dip the two pieces thus tied in water; for then if they are of equal goodness, that is, of equal purity, they will hang in equilibrium in the water as well as in the air; but if the piece in question is lighter in the water than the other, it is certainly false, that is, there is some other metal mixed with it that has less specific gravity than silver, such as copper; if it is heavier than the other, it is likewise bad, as being mixed with a metal of greater specific gravity than silver, such as lead.

If the piece proposed is very thick, such as that crown of gold that Hiero, king of Syracuse, sent to Archimedes to know if the goldsmith had put into it all the eighteen pounds of gold that he had given him for that end; take a piece of pure gold of equal weight with the crown proposed, viz. eighteen pounds; and without taking the trouble of weighing

them in water, put them into a vessel full of water, one after another, and that which drives out most water, must necessarily be mixed with another metal of less specific gravity than gold, as taking up more space, though of equal weight.

To find the Burden of a Ship at Sea, or in the River.

It is a certain truth, that a ship will carry a weight equal to that of a quantity of water of the same bigness with itself; subtracting from it the weight of the iron about the ship, for the wood is of much the same weight with water; and so, if it were not for the iron, a ship might sail full of water.

The consequence of this is, that, however a ship be loaded, it will not sink quite, as long as the weight of its cargo is less than that of an equal bulk of water: now to know this bulk or extent, you must measure the capacity or solidity of the ship, which we here suppose to be 1000 cubical feet, and multiply that by 73 pounds, the weight of a cubical foot of sea water; for then you have in the product 73,000 pounds for the weight of a bulk of water equal to that of the ship; so that in this example, we may call the burden of the ship 73,000 pounds, or 36 tons and a half, reckoning a ton 2,000 pounds, that being the weight of a ton of sea water; if the cargo of this ship exceeds 36 tons and a half, she will sink; and if her loading is just 73,000 lb. she will swim very deep in the water upon the very point of sinking; so that she cannot sail safe and easy, unless her loading be considerably short of 73,000 pounds weight; if the loading comes near to 73,000 pounds, as being, for example, just 36 tons, she will swim at sea, but will sink when she comes into the mouth of a fresh water river; for this water being lighter than sea water will be surmounted by the weight of the vessel, especially if that weight is greater than the weight of an equal bulk of the same water.

When two Vessels or Chests are like one another, and of equal Weight, being filled with different Metals, to distinguish the one from the other.

This is easily resolved, if we consider that two pieces of different metals of equal weight in air do not weigh equally in water, because that of the greatest specific gravity takes up a lesser space in water; it being a certain truth, that any metal weighs less in water than in air, by reason of the water,

the room of which it fills; for example, if the water weighs a pound, the metal will weigh in that water a pound less than in the air: this gravitation diminishes more or less according as the specific gravity of the metal is greater than that of the water.

We will suppose then two chests perfectly like one another, of equal weight in the air, one of which is full of gold, and the other of silver; we weigh them in water, and that which then weighs down the other must needs be the gold chest, the specific gravity of gold being greater than that of silver, which makes the gold lose less of its gravitation in water than silver. We know by experience, that gold loses in water about an eighteenth part only, whereas silver loses near a tenth part; so that if each of the two chests weighs in the air, for example, 180 pounds, the chest that is full of gold will lose in the water ten pounds of its weight; and the chest that is full of silver will lose eighteen; that is, the chest full of gold will weigh 170 pounds, and that of silver only 162.

Or, if you will, considering that gold is of a greater specific gravity than silver, the chest full of gold, though similar and of equal weight with the other, must needs have a lesser bulk than the other; and, therefore, if you dip separately each of them into a vessel full of water, you may conclude that the chest which expels less water has the lesser bulk, and consequently contains the gold.

To measure the Depth of the Sea.

Tie a great weight to a very long cord, or rope, and let it fall into the sea till you find it can descend no further, which will happen when the weight touches the bottom of the sea, if the quantity or bulk of water, the room of which is taken up by the weight, and the rope, weighs less than the weight and rope themselves; for if they weighed more, the weight would cease to descend, though it did not touch the bottom of the sea.

Thus one may be deceived in measuring the length of a rope let down into the water, in order to determine the depth of the sea; and therefore, to prevent mistakes, you had best tie to the end of the same rope another weight heavier than the former, and if this weight does not sink the rope deeper than the other did, you may rest assured that the length of the rope is the true depth of the sea; if it does sink the rope deeper, you must tie

a third weight yet heavier, and so on, till you find two weights of unequal gravitation that run just the same length of the rope, upon which you may conclude, that the length of the wet rope is certainly the same with the depth of the sea.

To make a Deaf Man hear the Sound of a Musical Instrument.

It must be a stringed instrument, with a neck of some length, as a lute, a guitar, or the like; and before you begin to play, you must by signs direct the deaf man to take hold with his teeth of the end of the neck of the instrument; for then if one strikes the strings with the bow one after another, the sound will enter the deaf man's mouth, and be conveyed to the organ of hearing through the hole in the palate; and thus the deaf man will hear with a great deal of pleasure the sound of the instrument, as has been several times experienced; nay, those who are not deaf may make the experiment upon themselves, by stopping their ears so as not to hear the instrument, and then holding the end of the instrument in their teeth, while another touches the strings.

To make an Egg enter a Phial without breaking.

Let the neck of a vial be ever so straight, an egg will go into it without breaking, if it be first steeped in very strong vinegar, for in process of time the vinegar does so soften it, that the shell will bend and extend lengthways without breaking; and when it is in, cold water thrown upon it will recover its primitive hardness, and, as Cardan says, its primitive figure.

To hold a Glass full of Water with the Mouth down, so that the Water shall not run out.

Take a glass full of water, cover it with a cup that is a little hollow, inverting the cup upon the glass; hold the cup firm in this position with one hand, and the glass with the other; then with a jerk turn the glass and the cup upside down, and so the cup will stand upright, and the glass will be inverted, resting its mouth upon the interior bottom of the cup: this done, you will find that part of the water contained in the glass will run out by the void space between the bottom of the cup, and the brim of the glass; and when that space is filled, so that the water in it reaches the brim of the glass, all passage being then denied to the air, so that it cannot

enter the glass, nor succeed in the room of the water, the water remaining in the glass will not fall lower, but continue suspended in the glass.

If you would have a little more water descend into the cup, you must, with a pipe or otherwise, draw the water out of the cup, to give passage to the air in the glass; upon which, part of the water will fall into the glass till it has stopped up the passage of the air afresh, in which case no more will come down; or, without sucking out the water in the cup, you may incline the cup and glass so that the water in the cup shall quit one side of the brim of the glass, and so give passage to the air, which will then suffer the water in the glass to descend till the passage is stopped again.

This may likewise be resolved by covering the brim of the glass that is full of water, with a leaf of strong paper, and then turn the glass as above; and without holding your hand any longer upon the paper, you will find it as it were glued for some time to the brim of the glass, and during that time the water will be kept in the glass.

The Mysterious Watch.

You desire any person to lend you his watch, and ask him if he thinks it will or will not go when it is laid on the table: if he says it will, you place it over the end of the magnet, and it will presently stop: you then mark with chalk, or a pencil, the precise point where you placed the watch, and moving the position of the magnet, you give the watch to another person, and desire him to make the experiment, in which he not succeeding, you give it to a third person, at the same time replacing the magnet, and he will immediately perform the experiment.

The Magnetic Dial.

Provide a circle of wood or ivory, of about five or six inches diameter, as Pl. V. Fig. 4. which must turn quite free on the stand B, in the circular border A: on the circle must be placed the dial of pasteboard C, whose circumference is to be divided into twelve equal parts, in which must be inscribed the numbers from one to twelve, as on a common dial: there must be a small groove in the circular frame A to receive the pasteboard circle; and observe that the dial must

be made to turn free, that it may go round without moving the circular border in which it is placed.

Between the pasteboard circle and the bottom of the frame, place a small artificial magnet E, (Fig. 5.) that has a hole in its middle, or a small protuberance. On the outside of the frame, place a small pin P, which serves to shew where the magnetic needle I, that is placed on a pivot at the centre of the dial, is to stop: this needle must turn quite free on its pivot, and its two sides should be in exact equilibrio.

Then provide a small bag that has five or six divisions, like a lady's work bag, but smaller: in one of these divisions, put small square pieces of pasteboard, on which are written the numbers from one to twelve; and if you please, you may put several of each number: in each of the other divisions, you must put twelve or more like pieces, observing that all the pieces in each division must be marked with the same number.

Now the needle being placed upon its pivot, and turned quickly about, it will necessarily stop at that point where the north end of the magnetic bar is placed; and which you previously know by the situation of the small pin in the circular border.

You therefore present to any person that division of the bag which contains the several pieces on which is written the number opposite to the north end of the bar, and tell him to draw any one of them he pleases; then placing the needle on the pivot, you turn it quickly about, and it will necessarily stop, as we have already said, at that particular number.

Another may be made with the same dial, by desiring two persons to draw, each of them, one number out of two different divisions of the bag, and if their numbers, when added together, exceed twelve, the needle or index will stop at the number they exceed it; but if they do not amount to twelve, the index will stop at the sum of those two numbers. In order to perform this, you must place the pin against the number five, if the two numbers to be drawn from the bag be ten and seven; or against nine, if they be seven and two.

If this be made immediately after the former, as it easily may be dexterously moving the pin, it will appear still the more extraordinary.

The Intelligent Fly.

At the center of a box about six inches square and one inch deep (Pl. VI. Fig. 1), place a pivot; have a touched needle L, three inches and a half long, and at the end of it that is touched fix a fly made of enamel; the other end of the needle must be somewhat heavier to keep it in equilibrio: this needle is to be placed on the pivot.

On a piece of square pasteboard that will just go into the box, draw a circle ABCD, three inches and a half diameter; and another at a small distance, concentric with the former: the part within the last circle must be cut out: this pasteboard circle is to be placed about half an inch from the bottom of the box, and divided into ten equal parts, in which are to be written the letters A, E, I, O, U, D, G, L, N, R, as in the figure.

Place a glass about half an inch above the circle, and cover it with a circle of paper C, large enough to hide the needle, and leave only the fly visible; on this paper you may paint some allegoric figures, that its use may not be suspected: you must next write on 24 cards the following questions: these cards are to be packed and shuffled, so that they may be in the order the questions are here placed.

Questions.

1. Which is the land of liberty? 2. Which is the first city in the world? 3. Whom do many men despise, though they have not half his merit? 4. Who is the poorest man in the world? 5. Who is the meanest of all mankind? 6. For what do all young women long? 7. Who, by station, is the most miserable of all beings? 8. By what does a man discover his weakness? 9. What would every married woman do if she could? 10. In what does a man shew his pride and folly? 11. What makes a woman cry more than the loss of her husband? 12. How does a man talk who has nothing to say? 13. What most resembles a fine lady? 14. What frequently reminds us of a great loss without giving disgust? 15. What makes a young woman in love with an old man? 16. What does the poet want to cover his empty skull? 17. What should a man never take from the woman he loves? 18. What must that man be who would gain the esteem of all? 19. Who is he that seeks a man's company when his money and friends are

all gone? 20. What gains the good will of the physician, the lawyer, and the harlot? 21. What do good men revere and knaves abuse? 22. What does a man depend on when he trusts to his friends for support? 23. What can he be sure of who leaves his affairs to another? 24. What makes as great a difference almost, if not altogether, between this man and that as between that and a brute?

After you have ranged the cards in the manner beforementioned, you place them on the table, and ask any person which of them, in the order they then stand, shall contain the question to which the fly shall give him the answer. As he says, for example, your confederate, who has the following copy of answers, will make the needle, at the end of which the fly is, successively point to the letters that compose that word, then counting the cards over till you come to the 20th, you will find that word answers the question.

Answers.

1. England. 2. London. 3. A dog. 4. Aniggard. 5. A liar. 6. A ring. 7. A nun. 8. Anger. 9. Rule. 10. A duel. 11. An onion. 12. Loud. 13. An Angel. 14. A dial. 15. Gold. 16. A laurel. 17. A denial. 18. Generous. 19. A dum. 20. A guinea. 21. Religion. 22. A reed. 23. Ruin. 24. Learning.

Many others may be performed by this intelligent fly, by numbers, cards, &c. similar to those we have already explained, on other occasions, and which, to avoid the appearance of repetition, we shall not here describe.

To break a Pole or Cylindrical Staff, the extremes of which shall be laid upon two glasses, without hurting the said glasses.

Take two equal tumblers, or wine glasses, which fill with water, and place them at such a distance, that the ends of the staff may just rest upon the edges of the glass; then with another staff, strike the one suspended betwixt the two glasses just in the middle, and the staff, if not very strong, will be broken, whilst the glasses remain unhurt.

The real Apparition.

Behind the partition AB (Pl. VI. Fig. 2.) place in a position something oblique, the concave mirror EF, which must

be at least ten inches in diameter, and its distance from the partition equal to three fourths of the distance of its centre.

In the partition, make an opening of seven or eight inches, either square or circular; it must face the mirror, and be of the same height with it: behind this partition, place a strong light, so disposed, that it may not be seen at the opening, and may illumine an object placed at C, without throwing any light on the mirror.

Beneath the aperture in the partition, place the object C, which you intend shall appear on the outside of the partition, in an inverted position; and which we will suppose to be a flower: before the partition, and beneath the aperture, place a little flower pot, D, the top of which should be even with the bottom of the aperture, that the eye placed at G, may see the flower in the same position as if its stalk came out of the pot.

Take care to paint the space between the back part of the partition and the mirror, black, to prevent any reflections of light from being thrown on the mirror; in a word, so dispose the whole that it may be as little enlightened as possible.

When a person is placed at the point G, he will perceive the flower that is behind the partition, at the top of the pot at D; but on putting out his hand to pluck it, he will find that he attempts to grasp a shadow.

OBSERVATION.

The phenomena that may be produced by means of concave mirrors are highly curious and astonishing: by their aid, spectres of various kinds may be exhibited. Suppose, for example, you were to tell any one, that at such an hour, and in such a place, he should see the apparition of an absent or deceased friend (of whose portrait you are in possession); in order to produce this phantom, instead of the hole in the partition AB, in the last figure, there must be a door, which opens into an apartment to which there is a considerable descent; under that door you are to place the portrait, which must be inverted and strongly illuminated, that it may be livelily reflected by the mirror, which must be large and well polished; then having introduced the incredulous spectator at another door, and placed him in the proper point of view,

T

you suddenly throw open the door at AB, when to his great astonishment, he will immediately see the apparition of his friend.

It will objected, perhaps, that this is not a perfect apparition, because it is only visible at one point of view, and by one person; but it should be remembered, that it was an established maxim in the last centuries, that a spectre might be visible to one person, and not to others; so Shakspeare makes both Hamlet and Macbeth see apparitions which were not visible to others present at the same time: it is not unlikely moreover that this maxim took its rise from certain apparitions of this kind that were raised by the monks, to serve some purposes they called religious; as they alone were in possession of what little learning there then was in the world.

There is one phenomenon we must not here omit; for though it be common enough, it is also pleasing, and easy to be performed: if you place yourself before a concave mirror, and at a proper distance, your figure will appear inverted, and if you stretch out your hand towards the mirror, you will perceive another hand that seems to meet and join it, though imperceptible to the touch. If instead of your hand, you make use of a drawn sword, and present it in such manner that its point may be directed towards the focus of the parallel rays of the mirror, another sword will appear, and seem to encounter that in your hand. You are to observe, that to make this experiment succeed well, you must have a mirror of at least a foot in diameter, that you may see yourself in part. If you have a mirror large enough to see your whole person, the illusion will be much more striking. This phenomenon, with which so much parade has been made by some modern experimental philosophers, was described by Baptista Porta, more than 200 years since.

A Solar Sonata.

In a large case, such as is used for dials and spring clocks, the front of which, or at least the lower part of it, must be of glass, covered on the inside with gauze, let there be placed a barrel organ, which, when wound up, is prevented from playing, by a catch that takes a toothed wheel at the end of the barrel: to one end of this catch, there must be joined a wire, at the end of which there is a flat circle of cork, of the same dimensions with the inside of a glass tube, in which it is to

rise and fall; this tube must communicate with a reservoir that goes across the front part of the bottom of the case, which is to be filled with spirits, such as are used in thermometers, but not coloured, that it may be the better concealed by the gauze.

This case being placed in the sun, the spirits will be rarefied by the heat, and rising in the tube will lift up the catch, or trigger, and set the organ in play; which it will continue to do as long as it is kept in the sun; for the spirits cannot run out of the tube, and that part of the catch to which the circle is fixed being prevented from rising beyond a certain point, by a check placed over it. Care must be taken to remove the machine out of the sun before the organ runs down, that is, stopping may be evidently effected by the cold.

When the machine is placed against the side of a room on which the sun shines strong, it may constantly remain in the same place, if you inclose in it a second case, made of thick wood, and placed at a little distance from the other. When you want it to perform, it will only be necessary to throw open the door of the outer case, and expose it to the sun.

But if the machine be moveable, it will perform in all seasons by being placed before the fire; and in the winter it will more readily stop when removed into the cold.

A machine of this sort is said to have been invented by Cornelius Dreble, in the last century: what the construction of that was we know not, but might very likely be more complex, though it could scarcely answer the intention more readily.

An Automaton Harpsichord.

Under the keys of a common harpsichord, let there be fixed a barrel, something like that in a chamber organ, with stops or pins corresponding to the tunes you would have it play: these stops must be moveable, so that the tunes may be varied at pleasure: from each of the keys, let there go a wire perpendicularly down; the ends of these wires must be turned up for about one fourth of an inch; behind these wires, let there be an iron bar, to prevent them from going too far back: now as the barrel turns round, its pins take the ends of the wires, which pull down the keys, and play the harpsichord. The barrel and wires are to be all enclosed in a case.

In the chimney of the same room where the harpsichord stands, or at least in one adjacent, there must be a smoke jack, from whence comes down a wire, or cord, that passing behind the wainscot adjoining the chimney, goes under the floor, and up one of the legs of the harpsichord into the case, and round a small wheel fixed on the axis of that first mentioned: there should be pulleys at different distances behind the wainscot and under the floor, to facilitate the motion of the cord.

This machinery may be applied to any other keyed instrument, as well as to chimes, and to many other purposes where a regular continued motion is required.

An instrument of this sort may be considered as a perpetual motion, according to the common acceptance of the term, for it will never cease going till the fire be extinguished, or some parts of the machinery be worn out.

The Nocturnal Reveilleur.

Against the wall of a room, near the ceiling, fix a wheel of 12 or 18 inches diameter: on the rim of which place a number of bells in tune, and, if you please, of different sizes: to the axis of this wheel, there should be fixed a fly to regulate its motion; and round the circumference there must be wound a rope, to the end of which should be hung a weight.

Near to the wheel, let a stand be fixed, on which is an upright piece that holds a balance or moveable lever, on one end of which rests the weight just mentioned, and to the other end must hang an inverted hollow cone, or funnel, the aperture of which is very small: this cone must be graduated on the inside, that the sand put in may answer to the number of hours it is to run: against the upright piece, on the side next the cone, there must be fixed a check, to prevent it from descending: this stand, together with the wheel, may be enclosed in a case, and so contrived as to be moved from one room to another with very little trouble.

It is evident from the construction of this machine, that when a certain quantity of the sand is run out, the weight will descend, and put the wheel in motion, which motion will continue till the weight comes to the ground; if the wheel be required to continue longer in motion, two or more pulleys may be added, over which the rope may run.

The size of the bells should be adapted to the somniferous

disposition of the party they are intended to rouse ; or if you please, a drum or tabor may be added, the stick to which may be fixed in the side of the room by a swivel that goes through the middle of it ; and one end of it being lifted up by teeth placed on the circumference of the wheel, the other end will alternately strike the drum.

To make Water in a Glass seem to boil and sparkle.

Take a glass nearly full of water, or other liquor, and setting one hand upon the foot of it to hold it fast, turn slightly one of the fingers of your other hand upon the brim or edge of the glass (having before privately wet your finger), and so passing softly on with your finger pressing a little—then the glass will begin to make a noise—the parts of the glass will sensibly appear to tremble, with notable rarefaction and condensation—the water will shake, seem to boil, cast itself out of the glass, and leap out by small drops, to the great astonishment of the observers, if they are ignorant of the cause—which is only the rarefaction of the parts of the glass, occasioned by the motion and pressure of the finger.

END OF THE SECOND PART.

INSTRUCTIVE

QUERIES, PARADOXES,

Anagrams, &c.

PART III.

Paradox.

ALL men will readily agree, that no one can transmit
A title to posterity he never enjoyed ; and yet
A certain honourable man, a baronet was born,
Altho' his father ne'er was one !—nor laugh my tale to scorn,
When I affirm the title came by lineal descent ;
But strive to reconcile the same, for no deceit is in't.

Answer.

A baronet, living in Westminster city,
Whose father resigning his breath
Before the old grandfather, was (which is pity),
Born after his grandfather's death ;
Who, a baronet being, the infant became
Heir both to his title and pelf,
The minute when born, tho' his father the same
Had never enjoyed himself.

*Enigma.**Ladies and Gentlemen,*

I am come to tell you in plain prose, that I am a very great poet; Dactyls and Spondees are familiar to me; many of the most elegant productions of the age are indebted to me for no small share of their merit; I smooth their rugged numbers, and supply vacancies of wit.

Sometimes I am a fiddler, and consequently somebody of note.

I open the balls at court, and lead up the ragged regiment of St. Giles's. Your Giardinis and Geminianis without me are less significant than the poor blind scraper of Bedlam. I preside over your concerts, and always make one with the four-and-twenty.

In physic more renowned than the High German Doctor. Let stupid drones study—I practice. Without a word of Hypocrates, I have done wonders, where the whole stiff-rumped faculty have failed: it stands on record that I have cured the fever; and for a certain distemper that shall be nameless, am a most amazing specific.

As a dancing master, I as much excel the red-heeled *petit maitres* of the age, as roast beef and plumb pudding are beyond *soup maigre les grenouilles fricassees*, Avaunt ye minuet-mongers! No more of your *coupees* and your ballances! I teach without the clog of rules, and my pupils learn by instinct: I have taken an awkward bumpkin, without a grain of mercury in him, and led him like a tame bear through all the modes and attitudes of dancing; thus realizing the poet's fiction, and making beast dance after me.

Nor do I want activity myself as a dancer: I have hopped you many a hornpipe and rigadon upon the tight rope.

I served my time with a sawyer, and there I learned—see-saw; my master was desperately enamoured of Miss K—Cripes, and used me as a spokesman; I managed matters so well with her, that many's the good time and often I have made the slut's guts warble again: offering once to salute her with greasy lips, the nymph was struck speechless at the affront, and my master in a pet discarded poor Pill Garlic.

Answer.

A FIDDLESTICK.

Paradox.

One grandfather and two grandsons—one father and his son ;
 Another with two other sons (so strange their kindred run ;)
 Two first cousins and two seconds—uncle and nephew dear ;
 But yet still no more than four men there are included here,
 And their surnames are all the same, 'tis true without all doubt,
 Now all that is desired, is to find the paradox out.

Answer.

A had a loving brother named E ;
 Who was own father unto master D, }
 Therefore A's D's own uncle as you see ; }
 D married B's daughter (we'll suppose)
 From whence B father and D son arose ;
 Then D (pray mind if I be right), I say,
 Must needs be grandson to his uncle A :
 But B and D first cousins were before,
 Made two grandsons—two second cousins more
 Arise when we find that C and D
 Are brothers too (by marriage) unto B.

Anagram.

One fam'd physician when transpos'd, a being great will
 shew,
 Who, when commissioned from above, takes care of men
 below.

Answer.

The physician Galen, when transpos'd will shew
 That an Angel may guard a poor mortal below.

Paradox.

If from six ye take nine, and from nine ye take ten,
 Ye wits now the mystery explain,
 And if fifty from forty be taken, there then
 Shall be just half a dozen remain.

Paradox.

Nothing and six, with five hundred when fram'd,
 Will tell you a poet in ancient times fam'd.

Answers.

If from SIX ye take nine, and from IX take X,
 And from XL take fifty, then SIX does remain ;
 A cypher and VI, with a D, when right fram'd,
 Shews the poet's name OVID, in ancient times fam'd.

Query.

Whence arose the custom of smoaking tobacco in England, and how long since ?

Answer.

The custom of smoaking tobacco in England arose about the year 1585, in the 27th of the reign of Queen Elizabeth : when one Mr. Ralph Lane, a military man of note, and a Captain Philip Amides, returned to England from the island Roanoke, at the mouth of Albemarle Sound. Mr. Lane and his company brought home some tobacco, the first (Mr. Camden thinks) brought into England. Sir Walter Raleigh, then in high vogue, and much esteemed by the gay, as well as the gallant world, soon brought this odoriferous plant into much esteem ; so that many ladies as well as noblemen made no scruple sometimes to take a pipe, and which the Queen did not fail to encourage ; and, some say, used it herself.

Query.

Whence arose the custom of frying pancakes on Shrove-Tuesday, and how long since ?

Answer.

One Simon Eyre, a shoemaker, being chosen lord-mayor of London, made a pancake feast on Shrove Tuesday for all the apprentices in London ; and from that it became a custom.

He ordered, that upon ringing of a bell in every parish the apprentices should leave work, and shut up their shops for that day ; which being ever since yearly observed, is called the pancake bell : he made them a large feast of puddings, pies, and pancakes, and what remained, when all had dined, was given to the poor : then after, in that year (1446), he built Leadenhall.

Query.

Who was the first man that introduced coaches into England, and how long is it since ?

Answer.

Coaches were first introduced into England in the year 1589, and hackney coaches in the year 1693 : the first statesman that ever set up this equipage was John de Laval de Bois, Dauphin, who could not travel on horseback on account of his enormous bulk. Queen Elizabeth, as we find by history, used to go even to the parliament house on horseback.

Paradox.

I have twelve times seen bissextile, pray tell how that can be ?
Since twelve times four make forty-eight, and I am but forty three.

Answer.

If a person be born on the 25th of February, and travel westward the globe about, he may see twelve bissextile years before he be completely forty-four years of age, if he was born in a bissextile year.

Paradox.

One and two when they're wrote down fair,
Will make one hundred, I declare.

Answer.

The figure 1 and 00s will make 100.

Paradox.

Take one from nineteen, the remainder you'll see
Is twenty exactly—Pray how can this be ?

Answer.

XIX make nineteen, from which take 1, there will remain XX.

Paradox.

Come tell to me what figures three,
When multiplied by four,

Make five exact, 'tis truth in fact,
This unto me explore ?

Answer.

In decimals 1.25 is $\frac{5}{4}$, which being multiplied by 4, the product is 5.

Paradox.

The sum of four figures in value will be
Above seven thousand, nine hundred and three ;
But when they are halved, you'll find very fair
The sum will be nothing, in truth to declare.

Answer.

The four figures are 8888, which, by drawing a line through the middle of the same thus 0000 the sum will be eight 0s or nothing.

Paradox.

Six hundred³ and sixty so ordered may be,
That if you divide the whole number by three,
The quote will exactly in numbers express
The half of six hundred and sixty, not less.

Answer.

If the tails of the sixes in the said number be reversed, the sum will be 990, the third of which is 330, equal to half of 660.

Paradox.

The sum of nine figures a number will make,
From which, if just fifty you're pleased to take,
One third of that number remains still behind,
This number, young Tyro, be pleased to find.

Answer.

Reverse the figure six, and it will become nine, and write the figure 3 in the ten's place, which will present 30 ; to which add the eight digits, their sum will be 75 ; from which take 50, remains 25, being the third of 75.

Paradox.

Just one pound ten (shillings) will name a man,
 His sign likewise, 'tis not the swan :
 Come tell this landlord's name and sign,
 That John may know to call and dine.

Answer.

The man's name was Mark Noble, who lived at the sign of the Angel.

Paradox.

A truss of hay, weighing but half a hundred weight in a scale, weighed two hundred weight stuck upon the end of a fork, carried upon Hodge's shoulder : How could that be ?

Answer.

The fork was as the steelyard—Roger's shoulder as the fulcrum sustaining the burthen between the two powers, acting at both ends of the fork.

Paradox.

How can a mechanic file a square hole with a round file, and fill up an oval hole with a round stopper ?

Answer.

A piece of pliable metal being doubled, by applying a round file to the double edge, and filing a half square gap, on opening the metal, a square will appear. Again, if two corners and an edge, at the end of a miser's iron chest, be filed away, with a round or any other file, there may be an exact square hole left. And further, if a cylindrical body being cut obliquely, the plane of the section will be an oval ; and consequently a round body, situated obliquely in an oval hole, will completely fill it.

Query.

Ye lovely fair, the truth declare,
 Do blushes more dispense
 A mark within of conscious sin
 Or spotless innocence,

Answer.

The rosy cheek more frequently does shine
 From innocence than from a sense of crime :
 The man who knows no honour knows no shame ;
 And he that's lost to truth is lost to fame.

A delicacy peculiar to the fair has often been observed to produce a blush, when impropriety so far prevails as to introduce an immodest subject ; and it is no uncommon thing for a person to blush on being discovered in an error of any kind ; and farther, diffident and very delicate people will blush when speaking to their superiors, &c. in either case a crime cannot be implied. On the other hand, observation convinces us, that the hardened wretch, when before a dispenser of justice, and indubitably guilty of flagrant crimes, does not even change countenance : hence a blush cannot be considered as an infallible criterion of either innocence or guilt ; but much more frequently the former than the latter.

Query.

Ye lovely fair, who every heart engage,
 Whose learn'd productions grace many a page,
 Inform me, what is love ? that soft regard
 Which you create, you only can reward ?

Answer.

Love is a tender fondness, a strong desire,
 An ardent wish, an unextinguished fire ;
 A longing soul, a chaste imploring mind,
 To share those charms we in another find.

Pythagoras says, " Love breaketh the brain, but never
 " bruise the brow ; consumeth the heart, but never touches
 " the skin ; and maketh a deep wound to be felt before any scar
 " be seen."

An Arithmetical Paradox.

In an Arabic manuscript was found this remarkable decision of a dispute : " Two Arabians sat down to dinner ;
 " one had five loaves, the other three ; a stranger passing by,
 " desired permission to eat with them ; which they agreed to :
 " the stranger dined, laid down eight pieces of money, and

“ departed: the proprietor of the five loaves took up five
 “ pieces, and left three for the other, who objected, and
 “ insisted for one half: the cause came before Ali (the ma-
 “ gistrate), who gave the following judgement: let the
 “ owner of the five loaves have seven pieces of money; and
 “ the owner of the three loaves one.”—Query the justice of
 this sentence.

Answer.

Ali's sentence was just; for suppose the loaves to be di-
 vided each into three equal parts, making twenty-four parts in
 all the eight loaves, and each person to eat an equal or eighth
 part; therefore the stranger had seven parts of the person
 who contributed five loaves, or fifteen parts, and only one of
 him who contributed only three loaves, which make nine
 parts.

Query.

Take a cup of cold water, fill'd up to the brim,
 Then one after t'other slip ten shillings in;
 When this you've perform'd, I'd have you discover
 What is the reason the cup won't run over.

Answer.

It is a natural quality of all dry substances to resist water
 in a small degree: hence the top of the cup being supposed
 to be dry, the shillings, or any other small thing, being not so
 great as to overcome the resistance, and slipped in with a steady
 hand, the water will rise above the dry edge, without running
 over, till so many are put in as to cause the weight of the
 heaped up part to overcome the repulsion of the dry edge.
 The truth of this proposition may be proved various ways,
 but by none more simply and easily than by dipping your finger
 in the water and wetting the edge of the cup with it, upon
 which all the water which is above the rim of the cup will
 run over.

A Paradox.

Mathematicians affirm, that of all bodies contained under
 the same superficies, a sphere is the most capacious; but
 surely they have never considered the amazing capaciousness
 of a body whose name is now required, and of which it may

be truly affirmed, that supposing it's greatest length nine inches, greatest breadth four inches, and greatest depth three inches, yet under these dimensions it contains a solid foot.

Answer.

A SHOE.

Query.

Which is more free of cares and strife,
A married or a single life ?

Answer.

Celibacy, on the one hand, is free from the contentions of jarring couples ; and on the other, utterly insensible of those endearing faculties which are the frequent attendants on a happy pair.

'Tis without doubt a single life
Must be most free from cares and strife.

Query.

Modesty and bashfulness are often spoken of indiscriminately. What is their distinction ?

Answer.

Modesty is an emblem of chastity and humility, and is very becoming : it is decent without being forward, and can assume a modest assurance without diffidence ; whereas bashfulness is childish and rustic, awkward and unbecoming ; and is mostly caused by fear, or diffidence, or the want of keeping company.

Query.

Ingenious nymphs, if e'er you wish to share
The joys connubial, and desire to wear
The pledge of love, its origin declare ;
Say from what motive first the custom sprung,
And why on the fourth finger always hung.

Answer.

The custom was introduced by the ancients, who used to present their mistresses with a ring, meaning thereby to express, as a ring has no end, so there should be no end of that love

which is necessary to constitute connubial felicity; and it was put upon the fourth finger of the left hand, because anatomists affirm, that there is a vein in it having a direct conveyance to the heart, which is the source of love and affection.

Query.

What system of philosophy gives the most convincing and demonstrative proof of the immortality of man?

Answer.

It may be said, without incurring the imputation of atheism, that no system of philosophy gives us either convincing or demonstrative proofs of the immortality of man; perhaps metaphysics bid fairest to answer the conditions of the query; inferences may be drawn from anatomy, and even from botany; but every argument drawn from philosophy seems to be weak; and it is from inspiration only that we have convincing proofs of the immortality of man.

Query.

The origin of Valentines declare,
From what it sprang, from whom, and when, and where.

Answer.

It is supposed that the origin of Valentines was from one Valentine, a priest, who lived in the third century, and who, upon his being disappointed of a bishopric, forsook the christian faith: he published that there were thirty gods and goddesses, fifteen of each sex, whom he called aones crages, and taught, that our Saviour, like another Pandora, sprung from their correspondences, and farther affirmed, that he passed through the Virgin Mary with a body he brought out of Heaven, as through a pipe or conduit, and that all men should not rise again: his followers, who were unmarried, usually met together on the 14th of February each year, and each chose one of the opposite sex, who were to instruct and advise each other on religious and other affairs during the following year.

But some persons are of opinion, that it had its origin from the observation of the birds, who choose their mates about this time of the year.

Query.

Required an explanation of all the letters on a Guinea.

Answer.

The inscription on a Guinea runs thus :

GEORGIUS III. DEI GRATIA, M. B. F. ET. H. REX,
F. D. B, ETLDSR. I. A. T. ET. E.

That is, Georgius Tertius, Dei Gratia, Magnæ Britanniae, Franciæ et Hiberniæ Rex, Fidii Defensor, Brunswicii et Lunenburgi Dux, Sacri Romani Imperii Archi-Thesaurarius et Elector.

In English.

George the 3d. by the Grace of God, King of Great Britain, France and Ireland, Defender of the Faith, Duke of Brunswick and Lunenburgh, Arch Treasurer and Elector of the Holy Roman Empire.

Paradox.

I'm neither man, beast, fish, nor bird,
Insect nor reptile none ;
Yet live and breathe, tho' (on my word)
My origin was bone :
As soon as you have found my name,
All doubt will disappear ;
Then fail not to reveal the same
Unto us without fear.

Answer.

The bone that's meant, if right I hit,
Has often tried men's sharpest wit ;
Since with woe from man's side it came,
Woman therefore is its name.

Paradox.

I was to-morrow, but am not to-day ;
Yet shall be two days past : my name display.

Answer.

Yesterday's past, which once was call'd to-morrow ;
This some perhaps do find unto their sorrow.

Paradox.

Fam'd arborist, display your pow'r,
 And shew how I may plant a bow'r
 With verdant fir and yew ;
 Twelve trees of each I'd fain dispose,
 And only eight and twenty rows,
 Four trees in each to view.

Answer.

First make a circle, (Plate VI. fig. 3.) which divide into eight equal parts, and inscribe two geometric squares, in each of which draw two diagonals ; then draw the lines A B, A C, &c. from all the angles of both the squares ; after which draw the parallels, as per figure, and it will answer the conditions of the problem.

Query.

By what motive is a lady who has several admirers, induced to place her affections on that man who is the least anxious to obtain her favour, and disregard him, the disinterestedness and ardency of whose passion is conspicuous in every part of his conduct, when from the former nothing but coldness and indifference, if not an aversion to her, is to be expected after the marriage-knot is tied ; but from the latter the most affectionate, endearing and indulgent tenderness, on every emergency, to the latest period of life ?

Answer.

A man who has a real esteem for a lady approaches her with fear and diffidence, which appears in his whole behaviour : this, though the greatest proof of real esteem*, the lady, from a thoughtless gaiety, despises ; for whilst a man is indifferent about obliging a lady, he can behave with ease and gaiety (I might add with assurance) ; this being more adapted to the gay disposition of a lady, she is taken with it : the ladies are certainly more apt to be governed by their own airy inclinations than by their better judgments.

- * " Every passion but fond love
- " Unto its own redress will move ;
- " But that alone the wretch inclines
- " To what prevents his own designs ;

“ Makes him lament, and sigh and weep
 “ Disorder'd, tremble, fawn and creep;
 “ Tortures which render him despis'd
 “ Where he endeavours to be priz'd.”

Query.

Why do the generality of mankind incline more to inebriety than sobriety?

Answer.

All mankind, at some time or other, are involved in care and trouble; and as drinking plentifully is thought by many to be an antidote against it, man seizes, with too much eagerness, the much-loved habit, and frequently custom draws him on more to inebriety than sobriety.

Query.

Why is every hangman call'd Jack Ketch?

Answer.

Probably from the dog Harpalus (in English catch or ketch, as vulgarly written) mentioned by Ovid, and Jack, a word of derision.

Query.

Why may news be said to be the true and genuine food of the mind?

Answer.

That every thing novel pleases the mind, we allow, even though it is in itself tragical; variety is also found to be pleasing; news is variety, and consequently may be said to be the genuine food of the soul.

Query.

Which is supremest in woe, a king without the love of his subjects, or subjects without the love or favour of their king?

Answer.

When that reciprocal love and affection is broken which ought to subsist between the prince and people, it is indeed

very difficult to point out which is in the worst state: the one is filled with fears and apprehensions, and the other is full of doubt and anxiety. The prince who considers himself as the common father of his people must undoubtedly wear a crown of thorns, if his subjects prove froward and disobedient children, and therefore will strive to hold their hearts in his bosom; but when that fatherly affection is lost, what are the subjects but wretched orphans, void of the protection they had a right to expect? They wander up and down despairing and despised, without power of redress or hope of enjoyment. Oh! wretched state of both! But, oh, how blest the state when kings are served through love, unawed by fear; it is hard to say however which is the severest state, but I humbly imagine the subject must be the supremest in woe.

Query.

Tell me, ye sons of freedom, what must be
The only thing to make us all agree.

Answer.

Ye sons of freedom sure must be,
The only thing to make us all agree.

Query.

Whether is love or hatred most prejudicial?

Answer.

If taken in a scriptural sense, hatred must certainly be most prejudicial; but taken politically, love may sometimes be productive of more prejudice than hatred.

Query.

Whether is the miser or the spendthrift the greatest enemy to themselves, and the most hurtful to public society.

Answer.

The injury sustained by a spendthrift is generally confined to a few individuals; but the miser is superlatively wretched, being a professed enemy to God, his neighbour, and himself.

Paradox.

When life and breath forsake a body, what doth that body stand in need of?

Answer.

Both life and breath, when you were born,
Did from your mother go ;
'Twas nourishment you needed then,
That you and I both know.

Paradox.

One day I saw the sun arise,
I'm sure I saw him set likewise ;
But, wonderful ! that day,
I vouch again he rose, and 'gain
Beneath the horizon went : explain
How this could be, I pray.

Answer .

In leap year, by statute law,
The intercal'ry day,
And that preceding, reckon'd are
To be but one ; I'll lay
A bet, this will the paradox
Sufficiently explain,
For the sun in such a day doth rise,
Set, rise, and set again.

Paradox.

Our neighbour Randle's loving wife
Has brought him at one birth,
Three goats and six calves, all with life,
Strange wonder here on earth
Is come to pass ! dear people, say
How this could be ?—make no delay.

Answer.

Without stretch of wit,
I have readily hit,
For Goat sure her name must display

If the children were three,
Six legs there must be,
Six calves to those legs must convey.

Query.

As water is a thin fluid, what is the reason that vessels will contain it that will not contain the thick syrup of sugar, treacle, &c ?

Answer.

The very small particles of water by capillary attraction penetrating into the pores of the wood, and there expanding closely the chinks, they contain the water; but the thick syrup of treacle, sugar, &c. not entering the pores of wood, consequently does not close the chinks; therefore the vessel will not contain them.

Query.

There are two letters in the alphabet which always go together and are never parted; which are they ?

Answer.

Who can miss of the query, but solve it that tries,
When the letters Q U are so plain to their eyes.

Paradox.

You may say what you will of a true bosom friend,
If ever it is in their power,
At the risk of their lives, they mischief intend,
And are seeking it every hour.

Answer.

The blessing how great, when possessed of a friend
Who for us his life will expose,
To baffle the schemes our en'mies intend,
And mischief brings on to our foes.

Paradox.

Tho' perhaps you'll deny it, it's true I assure you,
Most women are quietest when in a fury.

Answer.

When in a passion women fly,
 And strive to gain the victory ;
 If overcome, revenge is sought,
 In female breasts a dreadful thought !
 Unto their chamber they repair,
 Their looks, their anger to declare ;
 In silence then they sit and cry,
 Till their revenge they satisfy.

Paradox.

A paradox I've made this morn,
 My subject is quite new,
 I dy'd before that I was born,
 Gents, how can this be true ?

Answer.

I puzzled was, but found this morn,
 That Eve was made, but never born.

Query.

How many kings have been crowned in England since the Conquest ?

Answer.

James the first was made a muckle king
 Of Caledonia's shore ;
 'The only king in England crown'd
 That was a king before.

Query.

Why will the sun be longer in burning white cloth, paper, &c. with a mirror than any other colour ?

Answer.

It is because white bodies have the property of reflecting all the rays of light, and therefore do not admit the sun to have such power on them as other colours ; for other colours (black especially) are known to absorb the rays of light ; and therefore the sun has a greater power to destroy them.

Query.

How can number 45 be divided into four such parts, that if to the first part you add two, from the second part you subtract two, the third part you multiply by two, and the fourth part you divide by two, that the sum of the addition, the remainder of the subtraction, the product of the multiplication, and the quotient of the division, be all equal?

Answer.

The first is 8, to which add two, the sum is	10
2d—12, subtract 2, remainder is	- 10
3d— 5, multiplied by 2, product is	10
4th--20, divided by 2, quotient is	- 10
—	
	45

Query.

Whether is the man of bad morals and great resolution, or the worthy virtuous man, most fit to rule?

Answer.

Though the man of bad morals and great resolution may possibly do some great and good actions, yet his sphere of action being unlimited, it is probable he may do many vile and sinful ones, and such as may prove a snare to both the ruler and the ruled; on the contrary, the man whose actions are bounded by virtue, moves on steadily and uniformly; his actions are such as bring honor to himself and happiness to those under him; the worthy virtuous man is therefore most fit to rule.

Query.

What did money first purchase?

Answer.

The cave of Machpelah, for a burying place for Sarah, was the first purchase with money that history informs us of. See Genesis, chap. 23.

Paradox.

Dear people, my father did lay up for me,
 On the day of my birth, just pounds twenty-three ;
 On each birth-day since for me has lain by,
 Twenty-three pounds, or that sum very nigh,
 Until I arrive at the age twenty-one,
 My fortune's so odd you'll scarce think upon ;
 When I tell you it comes to the sum as below,*
 No more nor no less, how it is pray show.

Answer.

By what is propos'd, Sir, it plainly appears,
 That your birth-day arrives only once in four years.

Paradox.

I'm no algebraist, but this I do know,
 That three eights put together make just twenty-two.

Answer.

Take three eights of the number † that's given below,
 And the quotient you'll find to be just twenty-two.

Query.

What is the reason that ladies of fashion and quality prefer winter (the most unpleasant season of the year) before summer, and why do they dread the approach of the latter more than the former?

Answer.

The summer sun, I'm much afraid,
 Doth spoil the beauty of the maid ;
 But winter's cold she needs not fear,
 I think this makes the matter clear.

Query.

Will a voluntary submission to temporal punishment make any atonement for the sin?

* 138 Pounds.

† 59 two-thirds

Answer.

The bare act of a voluntary submission to temporal punishment will not be alone sufficient to atone for the sin; sincere repentance through the atonement of Christ being absolutely necessary for that great purpose.

Query.

What is the cause of those places on fields and commons of a circular form, vulgarly called the rings of the fairies?

Answer.

They are generally supposed to proceed from lightning; the second circle arising from the grass growing more plentifully where the first grass was burnt up, &c.

Query.

At what time of the year are most cavities open?

Answer.

As soon as harvest is cropt is the time of the year
Most cavities are open, I'll make them appear;
And if I guess right, and right can remember,
It must be near the end of the month September.

Query.

“ Is there not an appointed time to man upon earth ?”

JOB.

Answer.

The infinite power of the All-wise Creator has fixed, and does undoubtedly fix, an appointed time for every being of the divine species here on earth: nothing can remain a secret to him, as the holy Job justly intimates, that there was an appointed time for him to suffer his afflictions, till called to the heavenly mansions of eternity.

Query.

Why was the human, and other animal species, created with two ears and but one tongue?

Answer.

The human, and other animal species, were created with two ears, that various and opposite sounds should not lose their stroke or effect: whereas if each animal had been furnished but with one ear, the sounds propagated on the contrary side of the head would have failed in their effect; dangers among all could not so well have been avoided, or other notice so distinctly conveyed; and music and conversation among the human kind had fallen short of their present power to delight and instruct: one tongue is sufficient to act in obedience to all the organs of sensation and reflection from the human species to the brute, and to aid the conveyance of the food of all animals into the stomach.

Mankind may infer from their having two ears and but one tongue, that they should hear more than they speak.

Query.

Mr. Woolaston says, in his Religion of Nature Delineated, that all persons living beyond their circumstances at the expense of others live a lie: who are those in every state that live, indulge, and thrive by more palpable imposition?

Answer.

Pernicious petty-foggers in a nation, who live by the plunder of mankind, in stirring up strife, indulge and thrive by palpable imposition: and those who live beyond their circumstances, running in debt to support ambition and vanity. They know they are not, and never

regular Clergy as among the laity. We are told by attested revelation, that the Great Creator (whose Word is Truth) has enjoined our faith to assent to things above our comprehension, with an intent that, where our reason fails, faith should assist us in our duties to himself and man; for men may be strictly moral towards each other by the use of reason, while they remain vicious in themselves, by acknowledging no duty to their Maker; but faith lifts the mind to God, and influences the thoughts and passions to habits suitable for divine contemplation. Hope (a friend to all, and without which all men would be miserable) is likewise increased by faith more than by reason or morality; so that our reason is thus usefully and beneficially subservient to faith in what we ought to believe with respect to God and Providence. Faith, not grounded on reason, is superstition, which however, in many different modes, may be innocent and useful, while it serves to bind the will and the passions, and direct the mind to God.

Mr. John Cotton, reflecting on the greatness of the Creator, and his secrets of Providence, to the latter part of this query, speaks of man's frailty and faith as follows:

God's Acts which are to be—shall human flesh descry?
 Or shall proud dust pretend his will to prophecy?
 We may prognosticate, as far as fancy roves,
 The just in faith shall be bless'd, as the margin proves*.
 All shall converted be into the faith of Christ †,
 Free from Idolatry—ne'er mind the Popish priest ‡.
 Let us hold fast our faith, Death when it will may c

The quantity of duration perceived by each being is according to the swiftness or slowness of its successions perceived (i. e. according to the number of successive perceptions), whereby a superior Being, having as many successions in a day, as any man has during his whole life, may be said to live that man's life in a day; and hence men of quick parts and penetration may be said to live more than men of dull faculties in the same time. And by the same rule, the life-time of a man is indefinitely greater than the life of a reptile, &c.

Dwelling on a subject of entertainment, by which the attention is diverted from observing succession, makes time appear shorter than it really is; as does forgetfulness of what is past. On the other hand, by every moment of succession counted, when we endure pain, time then appears longer than it is; so that an age of pleasure is not so long as a few years of pain, with respect to the beings that enjoy and suffer them.

The Eternal Now, so called by some authors as the property of the Divine Perception, is as incomprehensible as time without beginning, or as the attribute assigned the Divine Being, of doing any thing, when it is evident he cannot destroy himself, nor yet the succession of time. If time were to be no more, according to the customary phrase, no thinking being could then exist, nor time be perceived. Moreover if God perceives all that ever was, or will be, in one vast idea, as present, yet we cannot truly affirm, that he actually saw Christ upon earth till he came; and therefore he must see by succession through the whole course of nature, though infinitely superior to the ways of human perception.

Query.

Whether it would not be vastly serviceable to this kingdom in general to have public registers of debts erected in every county, as well as in Middlesex, and one part of Yorkshire? And whether courts for the recovery of small debts should not likewise become general, as well as in London and Middlesex, to prevent the imposition of tricking petty-foggers, bailiffs, and their followers.

Answer.

Public registers of debts in every county would prevent fraud and extravagance, and inculcate the principles of honesty and good œconomy amongst us, as well as put an end

to the pernicious practice of double and treble mortgages on the same lands; and guard against lending money on bad security.

Incumbrances upon most considerable estates in this kingdom being already known, the discovery thereof can be no objection to the passing an act for registering debts in every county, as it would promote the welfare and tranquillity of the nation; while other political courts of Europe are endeavouring to reduce the number of their lawyers, and retrench their exorbitant fees.

If courts for the recovery of small debts were general, they would be of universal advantage by their easy expence, speedy issue, and security of the plaintiff's money not being paid into the hands of such (vermin of the law, and enemies to justice and mankind) as commonly withhold the best part of it.

Query.

How is the scripture doctrine of smiting one cheek, and turning the other, and giving your cloak to him who takes your coat, to be reconciled with the conduct of the Right Reverend and Reverend Teachers of the age, so tenacious of their own property, and ready to resent injuries? And why should not precept be preferred to example?

Answer.

This doctrine of smiting one cheek, and turning the other also, was probably first taught in the infancy of christianity, to propagate the Gospel, and the principles of patience and forbearance, among individuals; at a time when converts were few, and when resentment would have heightened their punishment from their powerful persecutors; for it never was a doctrine betwixt different nations, repelling force by force; and to reconcile this doctrine with the general conduct of the christian part of the same nations at this day seems to be as difficult as it would be to prevail with respective individuals, or those under different governments, to unite in the same form of worship. If what Mr. Dryden observes be true,

The Priests of all Religions are the same.

We shall find that the teachers are more revengeful and refractory than their hearers. An instance of which appears in

the news from Paris of the 5th of January, 1750-51. N. S. A few days ago, an extraordinary council was held at Versailles on the affairs of the clergy, many of whom shew a perverse spirit, and insist upon principles and sacred immunities, and talk as though they were ordained to draw the wealth of the nation to themselves, and contribute nothing towards its expence. This is a specimen of the submissive behaviour of the Catholic priesthood, who, in this point, I confess, outdo those of our country; for though no persons living are more tenacious of their own private property than the Protestant clergy, yet they never scruple to pay their proportion of taxes to the public; and however harsh this text may sound in an age of rapine and plunder, where property seems so precarious, the doctrine before us of smiting one cheek, and turning the other also, was certainly well calculated for the peace and welfare of society in government; and to prevent petty quarrels, and religious controversies about trifles.

And where example is so rare, the precept should be preferred as far as it will bear.

Query.

Which of these tradesmen, a Bookseller, Print-seller, Printer, Copper-Plate Printer, or Publisher, have the most honesty?

Answer.

Though the employments of Letter-Printer, Bookseller, Publisher, Plate-Printer, and Print-Seller differ, yet they are members of the same body, and consequently are possessed in some degree of the same principles, subject to the same temptations, and tainted with the same crimes: by comparing their respective artifices, the reader will the better judge of the truth and justice of our decision with respect to their several integrities.

The Letter-Printer, originally, had an undoubted title to the free exercise of all the five branches of business, but as the number of hands increased, and trade grew more extensive, they came to be divided into their present different classes: the Letter-Printer was reduced to a state of dependency, whose situation with the bookseller is like the Bailiffs with the Petty-fogger: they must keep their master's secrets, be accessory to their frauds, and submit to their will and pleasure, or else starve.

Self-interest, as well as self-preservation, is implanted in our natures, and if one will not do dirty work for gain, another will.

The Plate Printer has two masters to serve, the Bookseller and Printseller, who can hardly be supposed to serve both with integrity. We might as well expect he should be able to serve God and Mammon at the same time.

The Bookseller and Printseller are the grand corruptors, who communicate the infection through the whole tribe: these are wilfully fraudulent; whereas the others are only by compulsion.

The Bookseller preys upon Authors, as the Printseller does upon Engravers, whom they pursue as the Dolphins do the Flying-Fish, either instantly to devour, or to drive them aloft, that they may drop into their mouths; for if any Author refuses the price offered him for his copy, he is sure to have his work run down by the whole society: if, to secure his property, he hazards the printing and publishing his own performance, the sale of it is prevented; for such book being sent for out of the country, all orders are returned *ignoramus*, and a jury summoned thereupon to suppress it: they pretend to a vast fund of learning, but on enquiry you will find it all superficial, consisting in Title Pages; and they generally keep some poor pedant under their thumb, through whose eyes they see, and by whose judgement they are determined.

The Printers are the tools they work their wonders withal, without whom they can perform nothing: into these they early inculcate the doctrine laid down in the parable of the unjust steward, and for every hundred sheets they work off, bid them set down quickly and write fifty; then commend their integrity, and say they have done wisely. In short, it is hard to find such a ruling thing as conscience among the fraternity. All moral duties must truckle under to interest; nor will they make any scruple of invading the property of a stranger, of a neighbour, or even their own brethren.

The Publisher is a sort of Bookseller in miniature, but guilty of far greater extortion: he neither advances any money, nor runs the least hazard, and yet is hardly satisfied with 30l. per cent. per month for vending another's property. Upon the whole, as we are not able to discover the least tincture of any one virtue in above one out of twenty Booksellers, Printsellers, Letter-Printers, Plate-Printers, and Pub-

lishers, the small share of common honesty to be found in more than that number, we assign to the Letter-Printers.

N. B. The foregoing is not intended to reflect upon any of the worthy gentlemen in trade, whom we know to be men of integrity.

Query.

Whether British authors in general should not seek out foreign patrons to accept their Dedications, seeing their endeavours to promote useful knowledge meet with no encouragement at home?

Answer.

As prudence directs every artificer to send his manufacture to the best market, I think no author should hesitate a moment about dedicating his labours to any foreign Mæcenas (whether commoner, peer, prince, or potentate), from whom he has reason to expect the most encouragement or reward, whether he resides in Europe, Asia, Africa, or America.

In the 188th Spectator, it is observed, "That nothing can occur more monstrous than to see persons of ingenuity address their services and performances to men no way addicted to liberal arts; in which cases, the praise on one hand, and the patronage on the other, are equally the objects of ridicule. Dedications to ignorant men are as absurd as any of the speeches of Bulfinch in the Droll; such an address one is apt to translate into other words; and when the different parties are thoroughly considered, the panegyric generally implies no more than if the author should say to the patron—My very good lord, you and I can never understand one another, therefore I humbly desire we may be intimate friends for the future.

The rich may as well ask to borrow of the poor as the man of virtue and merit hope for addition to his character from any but such as himself. He that commends another engages so much of his own reputation as he gives to that person commended; and he that has nothing laudable in himself is not in ability to be such a surety. The wise Phocion was so sensible how dangerous it was to be touched with what the multitude approved, that, upon a general acclamation made when he was making an oration, he turned to an intelligent friend that stood near him, and asked, in a surprised manner, "What slip have I made?"

Query.

Would not the licensing of public brothel-houses in Britain, as well as in other christian countries, be of advantage to the public, and prevent diseases, rapes, robberies, murders, and the ruin of many families? And whether it would hurt the Protestant religion more than the Catholic?

Answer.

Public stews permitted in this nation would doubtless be of service to the government by the revenue arising therefrom, and would be a means of bringing more subjects into life, and of preventing the dismal effects of many lewd pernicious practices; and though they might be looked upon as novel schemes for the encouragement of debauchery, and destructive of the Protestant religion (because not habitual as among the Catholics), yet, if considered under their train of advantages, superior to the disadvantages attending their toleration, they are preferable to the present practices, by as much as regulated vice or passion is superior to a state of abandoned outrage; farther considering that human infirmities do not admit of a perfect cure.

Query.

As in a married state a man is obliged by the law to lay in prison for debts contracted by his wife without his knowledge and consent, is it not fit he should have power to imprison her for his own security, being not able to raise money on a jointure but by her own consent? And how is matrimony in this case consistent with reason and equity?

Answer.

It might be thought incredible for any woman to suffer her husband to starve in prison, and her children to live in a state of servility, when it is in her power to prevent both, had we not daily instances of such barbarity; and when the wife is the aggressor, and the husband blameless, as it sometimes happens, the barbarity is still more shocking; and wherein our laws are greatly defective in not providing a remedy. And a man's confinement in prison can answer no other end than to gratify the spleen or revenge of his creditors, who are sometimes his seducers, in hopes of gaining profit by his ruin.

reason and equity call aloud for a restraint upon the wife in cases of jointure, and running her husband in debt: the marriage institution is not herein blameable; but the evils attending marriage settlements made previous to the marriage itself.

Whenever an unreasonable jointure is made on a moderate estate, and three or four children happen to be provided for, experience shews, that such lands are commonly alienated in the second generation; and I have often wondered, that no better expedient could be found out for paying insolvents' debts than by loss of liberty.

Query.

What would have been the religion of the late Archbishop Tillotson, if he had been born and lived a few years at Pekin in China, and the rest of his days at Constantinople in Europe? And which has the best title to salvation, the Jew, Mahometan, Pagan, Papist, Methodist, Muggletonian, Lutheran, Calvinist, Quaker, Presbyterian, Independent, Anabaptist, or the followers of the pious Mr. Henly?

Answer.

Had the great prelate, spoken of, been born at Pekin in China, and continued there during his minority, doubtless he would have imbibed the Pagan principles; for the prejudice of education being so strong, made the Heathen poet observe,

Quo semel est inbota recens servabit odorem
Testa diu.———

After which, Mahomet would have worked no more effect upon him in Turkey than if he had gone from England to reside there, at the same age, for the rest of his life.

As no religion can entitle a man to salvation but by the right use of it, men may miscarry by all religions, and therein one religion not have preference to another, as some cannot be happy living under any government; but if we compare religions to governments, by which they are supported for ends of happiness, we shall find that the reformed christian religion is as preferable to other religions, as the christian government supporting it, is preferable to all others. As to Mr. Orator Henly's piety, it is equivalent to that of his constant hearers, of a piece with his modesty and truth.

Query.

If to Appollo's smiles you've just pretence,
 And claim from him your boasted influence,
 O tell a doubtful and enquiring fair,
 The reason why her sex so open are ?
 Why secrets in their breasts no safety find ?
 And why their vows are fleeting as the wind ?

Answer.

Your outward beauties inward thoughts betray,
 As men thro' curtains see the breaking day ;
 But sure, you sometimes keep the vows you make,
 And men accuse you by a gross mistake :
 Your faults are doubled by your being fair,
 White cloth shews spots much larger than they are, }
 And flaws most deep in brightest gems appear. }

Query.

Why are the blacks in Guinea woolly-headed, and with flat noses, when they are not so in other places ?

Answer.

First, in answer to that, why the blacks in Guinea are woolly-headed ? It is fit to observe, that by the help of the microscope, it has been found that hair and wool differ only in bigness, being otherwise made up quite after the same manner, and every single hair consisting of several other smaller, wrapped up as it were in bark, and that the number of these minute hairs in wool is less than it is in what we properly call hair : it remains then only to find out some reason why the hair of blacks does consist of a less number of these minute hairs than that of other nations, and it may very well be supposed, that this difference proceeds from the smallness of the pores of the skin, out of which they are bred and receive their increase.

Second, as to the flatness of their noses, if they come so into the world, it may easily be accounted for, by the likeness we see generally children bear to their parents ; but I should rather be induced to believe, that it being reckoned a piece of beauty amongst them, they artificially form themselves into that shape, and that may easily be done in new born infants,

since what we call the bridge of the nose is then only of a cartilaginous, or soft gristly substance.

Query.

You merry sons of god Apollo,
 Who this responding bus'ness follow,
 And can resolve in such a trice,
 Our question's difficult and nice ;
 Pray tell me what you do opine
 Of that same sprite, or thing divine,
 Which did in danger often give
 Old Socrates a tug by the sleeve ?
 And why the dæmon did not twitch,
 When he espous'd that bitter b—h ?

Answer.

Ingenious Sir, we must confess,
 We like your humour and address ;
 Therefore, without design to flatter,
 We'll tell you what we think o' the matter :
 'That dæmon, sprite, or what you please,
 Which was so kind to Socrates,
 Was wisdom, and right reason join'd,
 Which gave sound dictates to his mind :
 These only fail'd him when he chose
 That fiend Zantippe for his spouse ;
 Which shews, if matches are the care
 Of Heaven, the sage no fiend had there.

Query.

Supposing I have a challenge sent me to fight, and I am unwilling to do it, since it is against the laws of God and man, how shall I behave myself so as to save my honour ?

Answer.

Antiquity presents us with a memorable passage concerning two soldiers in Cæsar's army, who, upon a very hot contention, agreed upon this expedient to decide the quarrel, namely, vigorously to attack the common enemy, and vindicate their own by their country's honour: the resolution taken, one of them assaulted the thickest squadrons, and had like to have saved his reputation at the expence of his liberty ; but

the other reviewing the danger of his antagonist, flew after him with a generous emulation, bravely rescued him from his surrounding foes, and gloriously overthrew him by a prevention of his overthrow. Apollo is a strange admirer of such genuine bravery, and therefore pressingly recommends so noble an experiment.

Query.

Since you are mathematical, and resolve cases belonging to chance, you will oblige me to let me know whether there is any odds in playing at even or odd; if there is any, it seems very odd to me.

Answer.

Though you seem merrily disposed, and to have sent this question for the sake of a pun, yet there is more in it than perhaps you imagine, for the greatest number of pieces that you can grasp, is either an even number or an odd one; if it is an even number, then in this number, and all the numbers inferior to it, there is as many even numbers as odd ones, and therefore it is equal which is taken; if the greatest number of pieces you can grasp is odd, then there is advantage in guessing odd; for in an odd number, and the inferiors to it, there is one odd number more than there are even ones; and therefore, upon the whole, there is an advantage in taking odd preferably to even. We do not know whether this reason can convince you, but whether it does or no, we may assure you (to return pun for pun) that it is even so.

Query.

Why is it that so very few are qualified with just and sublime notions of friendship?

Answer.

We conceive the chief reason to be, the corruption of our manners; the generality of people living a life of sense, and not of reason, of which friendship is the offspring.

Query.

Offspring of Phæbus, sons of Delian sire,
 So we judge you by your parts and fire,

Tell us, why those the vulgar call the wise,
Do wit and witty men so much despise ?

Answer.

The man of wit, and not of judgement too,
Is justly slighted by the wiser few ;
But when both join and in one center fall,
That man, like thee, commands respect from all.

Query.

Why are some persons so chill, even to shaking, as in an
ague, after eating ? Your solution will oblige your humble
servant, Iris.

Answer.

The digestive faculty of the stomach attracts so much heat
to it for concoction of the food, that the rest of the body for
a while is left without a sufficient quantity to invigorate the
tendons, &c. to perform their offices ; but is a sign of healthful
constitution.

Query.

Learned Apollo, tell me why
So little wool, so great a cry ?

Answer.

A question taken in answer's stead,
Why such small brains, so great a head ?

Query.

Why does castration hinder the voice breaking ; and if
maturity alters the voice at such an age, why should it not have
the same influence upon women ?

Answer.

The breaking of the voice is caused by the heat of the
body, which dilates the aspera arteria, or wind-pipe ; now
castration diminisheth the heat of the body, and consequently
prevents such an alteration ; and the constitution of the female
sex being naturally colder than that of men, preserves their
voices shrill and tunable.

Query.

Tell me, ye learned offspring of Apollo,
 Why after riches avarice does follow,
 When the possessor ought by reason just,
 With wisdom to employ so great a trust?

Answer.

Wealth with magnetic force attracts the mind,
 To sordid earth ungenerously consign'd:
 Thence in proportion to its larger store,
 We need not wonder, if it draws the more;
 But tho' this loadstone fix the iron soul,
 The golden genius mounts without controul.

Query.

I desire your opinion of that passage in the Common-Prayer, (viz.) "Give peace in our time, O Lord! because there is none other that fighteth for us but only thou, O God!" For why should we desire peace when He fights for us, and we own his omnipotence?

Answer.

Since a true and solid peace ought to be the aim of all our fightings, and is the prosperous issue of a successful war, to whom should we address ourselves for so important a blessing, but to that God who fights our battles, and upon whom alone we can depend for so glorious a conclusion of them?

Query.

In what sense are these words to be expounded in 1 Pet. 4, 6. "For this cause the gospel was preached also to them that are dead?"

Answer.

The persons here designed were Gentiles, to whom the gospel was preached as well as to the Jews; and from the 1st. chapter to the Romans, we may clearly see, that the Gentiles were dead in a spiritual sense, dead in trespasses and sin.

Query.

Why when any thing is burnt, is it said the bishop's-foot has been in it ?

Answer.

We presume it is a proverb that took its origin from those unhappy times, when every thing that went wrong was thought to have been spoiled by the bishops.

Conundrums.

1. What is placed before gentlemen's houses, with what grows in their gardens ?
2. What pleases when in the air, and what a horse cannot abide ?
3. Half a carman and a whole country ?
4. The gift of Heaven and the motion attending it ?
5. The half of a private entertainment, and a part of a goose ?
6. What Goliath carried to battle, and the head of the nation ?
7. An animal common in Wales, and what is very common in England after marriage ?

Answer.

Wallflower, larkspur, and likewise a carnation,
 Snowdrop, and jonquil, for five gives explanation ;
 Kingspear and monk's-cap are next two no doubt,
 The last one is goat-rue, and now the secret's out.

Query.

—————Pray which wou'd you choose ;
 A wit without beauty, or a beauty without wit,
 When each is endors'd with a deal of conceit ?

Answer.

Were I from these to choose a mate,
 The wit I'd love, the beauty hate ;
 For in the witty head is sense
 Which ever will chase folly thence ;
 But beauty, with conceited brain,
 In folly ever will remain.

Query.

Which deserves the greatest punishment, the soul or the body, for the committing of sin? and which is the most guilty?

Answer.

The soul of man is a particle of the deity; and when first infused into the body was so perfect, had such lively characters of the deity impressed upon it, as were sufficient to enable it to repel the tempter, maintain its integrity, and obey the injunctions of its great original; which the body could not do, being only its receptacle, a place of residence for the soul to act in, and taken from the dust; consequently the soul is more culpable, and justly merits a greater degree of punishment than the body.

Query.

Whether do those monopolizers who, contrary to law, buy up corn, &c. with an intent to sell it at an advanced price, or those who, encouraged by law buy up the same for exportation, contribute the most towards distressing the poor by raising the price of provisions?

Answer.

Both parties, it is certain, distress the poor greatly; and it is hard to say which does it the most: now the monopolizers oft make a scarcity in the midst of plenty, it is true; yet they help the poor to corn, though at an extravagant price: whereas when it is exported, it can yield no relief to the poor at any rate, being quite gone; wherefore I think these last distress the poor most; for certainly it is better to have corn at any advanced price than to have none at any rate.

Query.

Whence did the custom first arrive
Of ringing bees unto their hive?

Answer.

This custom proceeded at first from observing that instinct in these sagacious insects to return to their hives, when they are out at labour, at the approach of a storm: the air at that

time undergoing a very sensible change in its denseness, they are undoubtedly apprehensive of the approaching danger, and immediately repair to their castle of security; the tinkling of a mortar has somewhat a similar effect on them, as it in some measure condenses the circumambient air, so far as the sound extends; but the fugitives then having no place of retreat, being driven from their hive by the old swarms, are obliged to seek security on whatever they find any way convenient for them.

Query.

Who first found out the Hot-Wells at Bath? and how long since?

Answer.

The first discovery of the hot-wells appears to be of a very ancient date. In the king's bath at Bath is the statue of king Bladud (whom Mr. Cambden calls the soothsayer), with an inscription under it, importing that he discovered the use of these baths three hundred years before Christ.

Paradox.

It was at my house but the other day,
 The following kindred a visit did pay;
 Two grandfathers, two grandmothers,
 They were the first that came;
 Next four sisters, and two mothers,
 (Tho' some were blind and lame)
 Two husbands and two fathers next,
 That happen'd to come there,
 Two wives, and then two mothers came,
 But did not close the rear;
 Two uncles, two aunts, with the rest came to dine,
 Four daughters, two sons, to taste of my wine;
 Two grand-daughters came along with the rest,
 Two nieces, two cousins, dress'd up in their best:
 This catalogue of kindred mention'd here
 Are only six; and all from incest clear.
 How their kin is grounded I would have you show,
 And you'll a favor great on me bestow.

Answer.

The father and his son married the mother and her daughter : the father married the daughter ; the son married the mother ; and they had each of them a girl.

Query.

Whether poverty impeacheth or staineth nobility ?

Answer.

Riches are an ornament, not the cause of nobility ; and many times we see more worth under a thread-bare cloak, and within a thatched cottage, than the richest robe and stateliest palace.

Query.

What passion is the most that can
Prevailing be o'er mortal man ?

Answer.

Since whatever way a man's mind is bent, it is influenced by love, with respect either to good or evil ; love is always the rule of the rest of the passions ; hence,

The most prevailing passion that I know,
Is love, the source of all our joy or woe !

Query.

If a man should throw himself from the top of a high tower, doth he fall to the ground by attraction, compression, or gravitation ?

Answer.

Whatever is projected from the earth, if the body that projects rests upon the earth, the motion of the earth is communicated to it ; hence the man's fall is by gravity in particular ; and by compression, gravity, and attraction in conjunction.

Paradox.

A man that was young at threescore and ten,
He gave it me in, and wrote it down then,

His friend was more old at twenty and two,
(You may think it false, but 'tis certainly true),
Ingenious wits, this secret now unfold,
For old died young, and young he died old.

Answer.

The young was nam'd Old, and the old was nam'd Young.
So a paradox from that odd circumstance sprung.

Query.

What is content?

Answer.

Content is that state of the mind, when it is not only free from all anxiety and uneasiness; but possesses a serenity, and even a pleasure in itself, which proceeds from a consciousness of the rectitude and uprightness of its intentions; for I dare venture to affirm, that no man with bad intentions ever at that time experienced real content: on the contrary, while a man knows that he does, to the utmost of his power and capacity, acknowledge his present and future dependance on his Creator, and endeavours at the good of all about him, he cannot be far from a contented mind: at least, this must be allowed to be the best method to procure one.

Query.

What is ridicule? and from whence does it spring?

Answer.

Ridicule, in matters of literature, is that species of writing which excites contempt with laughter: whence, in the examination of such kinds of writing, the mind naturally calls upon it to aid argument and reason, when its impressions on the imagination are consistent with the nature of things; but when it strikes the fancy and affections with fictitious images, it becomes the instrument of deceit. But however ridicule may impress the idea of apparent turpitude, or falsehood, in the imagination, yet still reason remains the supreme judge, or touchstone of truth.

Query.

Who first tied the gordian knot ?
 Can you tell—or can you not ?
 And for what reason ?—let me know
 And you'll oblige a friend at Stow.

Answer.

Gordion knot, a knot which one Gordius, a Phrygian, who being raised from the plough to the throne, hanging up his plough and furniture in the temple, tied up in so very intricate a manner, that the monarchy of the world was promised to him that untied it, which Alexander the Great, after several essays, not undoing, cut with his sword ; whence the reason is evident, that the person who had skill and penetration sufficient to untie it, should be deemed (after performed) capable to rule and govern the whole earth, from his great understanding and judgement, if any such could be found out.

Query.

Who are they that despise what they most do admire ?
 Dear gentlemen, tell me,—no more I require.

Answer.

Since it is so, that you are desirous to know
 Who despise what they most do admire ;
 Be it known to your sex, who delight to perplex,
 When you've set our affections on fire ;
 For if you can't gain us, you then will disdain us ;
 And rail at us all that you can :
 Like the fox by the grapes, are those leaders of apes,
 Who rave when they can't get a man !

Query.

Ye witty bards, indulge a youth
 'To know the under-written truth ;
 In doing which, you'll give relief :
 Pray, how do tears assuage one's grief ?

Answer.

The definition of grief is trouble, sorrow, and vexation of heart ; and that of tears, a drop of water distilled from the

head, and passing through the eye, &c. now when and where grief happens, it seizes upon and affects the animal spirits, which are fluid and belong to the brain; therefore sometimes when grief happens, it falls with such an heavy pressure upon the animal spirits as does not admit of, or produce any agitation therein; then the apparent symptoms are nothing but a heavy groaning, or deep sighing, as of one in sore affliction, or misery; but when grief comes with an effervency, so as to produce an agitation, and thereby a fermentation, of the animal spirits, it affects some one or more of the animal functions, (which Dr. Quinsey, in his *Lexicon Physico-Medium*, says, the learned Boerhaave defines to be twelve) which causes an ebullition, whereby the tears are distilled, and flow from the head through the eyes, as it were the spirits dropping from the beak of an alembick; and thereby may be said to give ease in, or assuage grief. A sudden surprise of joy sometimes may cause, and be the production of tears, and thereby prevent a syncope, which sometimes happens; but in that case, it cannot be said to be an easing of grief, &c.

Query.

What methods are most proper for the ladies to adopt to induce the men to enter into marriage?

Answer.

The only method is to be virtuous, good natured, and not too forward; to make the most of prudent affability, free from the least degree of affectation.

Query.

Whether the marriage act has done good or harm to the state?

Answer.

The restraint under which some must necessarily be laid by this act of parliament may seem little burdensome to their minds; but as the great good of a nation depends principally upon the number of its inhabitants; and as experience daily proves, that there is no power can bind the profligate and licentious in a proper degree, it is plain that more hurt than good has followed from it.

Query.

Why does dress and adulation attract the fair sex more than known plainness and sincerity?

Answer.

Dress certainly has a great effect upon female minds, who are too apt to be pleased with externals; but why it should be more attractive than honest plainness and sincerity, I know not (though it is a daily experienced truth), unless we account for it by the force the different senses have on different objects; for we often see two ladies who shall be pleased and displeas'd with the same object at the same time; and that object at a distance, I mean a man.

Query.

Who are they that despise what they are known most to admire?

Answer.

Prudes, who affect to hate, like the fox in the fable, what is out of their reach.

Query.

Why are some sorts of diversions, though extremely laborious, esteemed pleasure more than business?

Answer.

Business was a task impos'd on man;
Freedom alone was his unbounded plan;
Pleasure would be painful—his nature such,
And ease a trouble—if he had too much.

Query.

Which is soonest reconciled to his misfortune, a miser that has lost his gold, or a lover who has lost his flame?

Answer.

A despairing lover is a very wretched being, but yet there may be some hopes he will return to himself; other objects may entice or friends advise; but the miser, who makes gold

his god, having lost it, gives up all comfort, perishes like him who, the apostle says, dies without hope.

Paradox.

Dear Sirs, pray believe me, I'll make it appear,
That the sum of two numbers their difference are.

Answer.

Both latitude* and longitude†,
When on either side they lie,
Will answer well the paradox,
I'm sure you can't deny.

Paradox.

B and C own brothers be,
Own brothers to their mother D ;
And uncle to each other are ;
Own cousins too 'tis very clear :
Their pedigrees, I pray make out,
Ingenious wits, and clear each doubt.

Answer.

Ben-ammi and Moab, the sons of old Lot,
He (when senseless with wine) on his daughters begot,
Are the brothers, whose pedigree traced, no doubt,
Will infallibly make the affinity out.

Query.

It is said, Britain was discovered to be an island about the year 90. Who was the discoverer pray ?

Answer.

As to the name of Britain, there is no certainty of its original in history ; that which passed for current in former times, when most nations pretended to be of Trojan race, was, that Brutus, the son of Silvius, grand-child of Æneas, the third king of the Trojans, having, after a long voyage, and many wanderings, fallen upon this island, and conquered the race of Giants, and having given it the name of Britain, left the sovereignty to his posterity.

* Different side of the equinoctial.

† Different side of the first meridian.

Query.

Why do immodest Lawyers wear
Habits of clergy? make appear.

Answer.

There is no reason why Lawyers wear the habit or uniform of clergy, except from custom; or that the former (which indeed is most likely) are administrators of justice, the latter of truth; and I think might be termed brotherhood.

Query.

Why is the language of a scold
Most moving, Sirs? I pray unfold.
And for what reason? tell me then,
No more I ask, Sirs, from your pen.

Answer.

The reason why the language of a scold is most moving is, because no man that is in his senses will stay to hear it.

Query.

What is the cause of certain luminaries, if a cat is stroked in the dark?

Answer.

The skin of a cat, which nourisheth the hair, is impregnated with an oily substance; with friction, or rubbing in the dark, there seem fiery sparkles to proceed therefrom, &c.

Query.

Kind gentlemen, pray clear this doubt,
And tell the man who first found out
The Antipodes; and in what year?
Ingenious wits, this point pray clear.

Answer.

In the year 571 before Christ, Pythagoras of Samos discovered the Antipodes: he was the first among the antients who assumed the name of philosopher (by way of modesty), as condemning the pride and arrogance of others who would be called wise men.

Paradox.

To plant a grove, I would dispose
 Of fifteen trees in fifteen rows ;
 So that each row may three contain,
 And now the method pray explain.

Answer.

Thus as you see (Plate 6. fig. 4), you may dispose
 Of fifteen trees in fifteen rows :
 And in each row are three contain'd,
 Adepts, the method I've explain'd.

Query.

What is the true reason, philosophical, mathematical, or natural, why an egg, with its end placed horizontally against the palms of the hands, cannot be broken with the greatest human pressure ?

Answer.

The reason proceeds partly from all three causes mentioned in the query : 1. The air within it not only supports the ambient air, but also the two abutted elliptical domes : 2. Those elliptical domes bear a pressure equal to arches (every way) on this construction, which cannot be forced together so long as the materials last ; therefore, 3dly. The hands being of a softer texture than these materials, cannot break it.

Query.

What were crowns originally ? and who may be said to have worn the first gold one ?

Answer.

Crowns are designed to be an ornament, &c. and as such, I find they were originally used ; as may be seen Exodus 25, 5. 11 ; where a golden crown was to ornament the Ark, &c. and verse 25, the same ornament for the table, &c. (and per query) “ And who may be said to have worn the first gold “ one ? ” If we compare the 30th verse of the 29th chap. of Exodus with the 6th verse of the 29th chap. it will appear that Aaron was the first who wore a gold crown, &c.

Query.

Why do haddocks, as well as some other fresh fish, when hung up in dark places, appear to reflect a strong light?

Answer.

Some are of opinion, that the cause of light sought in this query proceeds from the quantity of phlogiston contained in this as well as other kinds of phosphoric: and others suppose, that all bodies no sooner partake of death, but they instantly, in some measure, fall under the state of putrefaction (though at first unperceivable to our sight, taste, or smell); this causes in a little time a violent fermentation; and all bodies under this state, containing lucid particles, will by that means be discernible in the dark.

Paradox.

Nay, prithee say no more, I'll plainly prove,
'Tis happiness to be in debt, or love.

Answer.

In love or in debt, both, or either to be,
Is happiness always to Ben;
For when I can't pay, I away to the sea,
And enjoy both my pipe and my can.

Query.

Of all human inventions, which may be said to be most serviceable to mankind?

Answer.

Of all human inventions, I hope you'll allow,
There's none of more service to man than the plough.

Query.

Who is the happy man?

Answer.

The man who keeps the golden mean,
And calmly steers his bark between

The rocks of hope, and gulphs of fear;
 Makes piety his only care,
 And whose pure life and conscience saith,
 He shall be happy after death.

Paradox.

I attest it for truth,
 A mistress that's kind,
 Be she ever so ugly,
 I beautiful find.

Answer.

Amorensis, 'tis true, three long years I've been blind,
 Not the least glimpse of light can I see;
 Tho' ugly my mistress appears to your mind,
 When kind, she is handsome to me.

Paradox.

'Tis true I protest with an absolute breath,
 That what is called life is natural death.

Answer.

When we receive our breath
 We enter upon death;
 'Tis therefore plain, that we each moment die;
 For life and death go hand in hand; and why?
 Death, tho' the foe of life, with us was born;
 Tho' life so often makes of death a scorn.

Paradox.

How is it, to you I appeal, my friend Ranger,
 That the pleasantest life's to be always in danger?

Answer.

When danger's expected,
 And still is neglected,
 What pleasure attends on the thought!
 The good and the brave
 Despise death and the grave,
 Tho' certain—so you and I ought.

Dangers seen from afar,
 Or in sickness or war,
 But enliven the flame of the soul ;
 Virtue cries with delight
 'Tis noble to fight,
 And pleasant these foes to controul :
 Had virtue no foes,
 No not one to oppose,
 No passions to conquer below ;
 Like a fool that stands still,
 Without reason or will,
 We could not subsist here you know.

Paradox.

Every true wife,
 Indeed 'tis true,
 Is false ; and I can prove it too.

Answer.

How a wife can be false, and at same time be true,
 Paradoxical really must be ;
 They sometimes approve of what sometimes they rue,
 And are false to themselves and not thee.

Paradox.

I have read (and pray tell me, Sirs, how it can be)
 To imprison a debtor is to set him free.

Answer.

If t'imprison a debtor, Sir, sets him quite free ;
 From bailiffs and duns, sure the meaning must be.

Paradox.

Pray tell me what that man intends
 Who asserts that our enemies are our best friends ?

Answer.

Our enemies a mirror be,
 By which our smallest faults we see,
 Friends seldom so sincere will be.

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Paradox.

Let who will love for me,
 I ne'er will fight a duel,
 No not for any she,
 The kindest is most cruel.

Answer.

The harlots in the street
 Most lovingly appear ;
 If some you chance to meet,
 A cruel devil's there.

Paradox.

A scholar boasting of his skill,
 Was met one day by country Will—
 Determin'd now to poze the clown,
 Ask'd him how far to yonder town ;
 If in a right line now it stood,
 'Twixt him and yon adjacent wood.
 The rustic thinking how't cou'd be,
 Thought in himself I'll puzzle thee ;
 And said, I little understand,
 But hope you'll answer out of hand :
 Say two from one can you subtract,
 And three remain to be exact ?
 The scholar now no more could say,
 But walked off, and bid good day,
 Hoping some friend will answer find,
 To clear the vapours of his mind.

Answer.

A woman delivered of two children.

Paradox.

Some say such a thing as a cuckold has been ;
 I deny it,—A cuckold has never been seen.

Answer.

Some say men are born,
 To be cuckolds and horn'd,
 But one I yet never could see ;

Therefore why should I,
Believe by the bye,
That such a thing ever can be.

Query.

What are the chemical ingredients in the composition of a modern physician? And what is the method of process for his extraction?

Answer.

A good likely young fellow, valet de chambre to some gentleman who has travelled abroad; make him member of a druggists' and apothecaries' club in London, where let him endeavour to get by heart the names of the principal drugs, medicines, diseases, and technical terms.

When he is well versed in the exercise of the said terms, and has got the Greek Alphabet by heart, with twelve select lines of the Schola Salernitana (to avoid breaking Priscian's head) he must suffer himself to be suspended naked in an Hippocrates's sleeve, filled with Elixir Salutis up to his chin, which being filtered, and only himself and the fæces left, he must repeat, without hesitation, all the said names and technical terms the whole society shall think proper, and also the Greek Alphabet, before he is suffered to come out; and for every Greek letter, or technical term, he misses perfectly pronouncing, he shall receive a smart lick through the flannel on his posteriors, with a large long liquorice stick, and be obliged to repeat the same till he says his lesson perfect, to the satisfaction of the audience.

Then he and the fæces must be suddenly tumbled out together (by cutting open the bottom of the bag) upon a blanket, held underneath by four lusty druggists or apothecaries, who are to toss him, together with the fæces, till he begins to grow sick: then let him be wrapt up in dry flannel, put into the shell of a coffin (cautioning him against dealing death) and carried to Haddock's Bagnio, near Charing Cross, to be there sweated, and his skin well mundified; where he may, if he pleases, sleep for that night: this done, he must be dressed, and carried from thence in a chair to Monmouth-street and Middle-row, Holborn, to be equipped with a second hand suit of black, a tye wig, large snuff-box, and short small sword: thence he is to be carried by the same

conveyance to Batson's, and the chairmen to receive his left off cloaths for their fare.

A diploma being next procured him from Edinburgh, Glasgow, or Leyden, he is to attend on the said society of druggists and apothecaries, at their next meeting, and deliver the same, kneeling on a cushion, upon the table, to their president for the time being; who, after reading it aloud, dubs him doctor, by waving a gold-headed cane three times over his head, and then delivers it into his hands for a present. At which time, all the members standing up, una voce, must cry out, *Long live the noble Esculapius!* and the president repeat, by whom the most obstinate and inveterate disorders, whether acute or chronical, shall quit their latent recesses, tremble at his sagacious nod, and fly before his awful fiat—Proceed to prosper—feel the ladies pulses, dive into family-secrets, insinuate your infallibility, augment your prescriptions, evacuate our shops, and rarify the people.

—————*opiferque per orbem*

Dicor. —————

N. B. The fees to be paid down on this admission are twenty guineas to the society, besides the whole expence of that meeting, in an elegant supper and treat; for which the doctor shall be allowed to visit at each of the members' shops gratis, and ask as many questions about the names and nature of drugs and medicines, as he chooses—and have ocular demonstration of the same—Likewise shall have liberty to feel Mamma's or Miss's pulse, to bring his hand among the ladies, for so small a present as a diamond ring, and thereby making himself acquainted with the female anatomy and disorders, he may soon after commence man-midwife, if he pleases.

Query.

God said, "Let there be light, and there was light," before the sun was created; whether then light is not a fluid substance, diffused through space, and other fluid substance, totally different from the substance of the sun, requiring the presence of his fiery rays to make it conspicuous, in like manner as light is conspicuous by the presence of the fiery rays of a candle, illustrating air or space in the sun's absence. And how are the sun's fiery rays (emitting heat and colour to sensation) which are continually exhausted in immense

quantities from that fountain of fire, naturally supplied? Also whether colours are real, or only apparent accidents, in respect of sensation; it being not certainly known, whether the animals discern colours and objects alike, or in all respects as they appear to human perception.

Answer.

If all the light were in the sun,
 Then in his absence would be none;
 But yet we find, that flame by night,
 As well as he, produces light:
 Before the sun if light was made,
 The light from him can't be convey'd:
 The fiery particles are such,
 As rouse the fluids by a touch;
 So lovers' touches cause surprise,
 And make the virgin's blushes rise.
 Attraction and repulsion join'd
 In the same body we do find;
 The sun attracts from every sphere,
 As he repels, when acting near;
 Exhausts his vigour and restores,
 Like a young rover in amours;
 So beauty with a smile invites,
 But with a sudden frown affrights.
 Apparent colours strike the eye,
 More than our sense reality.
 To diff'rent senses objects suit,
 As well in man as in the brute:
 These are suggestions from my quill,
 Referr'd to critic Answer's skill.

Query.

What is chance in nature, and what design? And how is the present existence of things governed in respect of both those distinctions?

Answer.

Design is a faculty of the human mind, by which, according to intellectual foresight and volition, things are executed hereafter; whereas chance or accident are things occurring without any previous perception of the same: and

things are governed in both these respects by infinite causes, of which man comprehends but few.

Query.

An acting cause implying a co-existence of effect, the Creator having no beginning, how could there be a beginning to creation, or a time when things were not, or not as they are now? seeing that a necessary general existence of all things, *ab origine*, under the various mutations of forms, is as comprehensible as a first necessary absolute existence, endowed with powers and qualities to create a successive order of existence in the infinite space? And that being all whatsoever (distinguished by absolute spirit, spirit and matter, or mere matter) is comprehended in the living and lifeless forms of substance, variously modified and supported in space; and also, that original space and substance, existing necessarily, *ab aeterno*, being, to conception, as utterly incapable of annihilation as absolute space, and the models of present substantial forms, perceived existing; the last appearing only subject to mutation, with the same quantity of substance in space, always existing. And how does living existence appear necessary at all, or that any being should exist more necessarily than, or before, another.

N. B. Substance is a general signification for material or immaterial forms.

Answer.

The Creator, from the beginning, might create particular worlds and beings, nearly co-existent with himself, and yet not create our present systems of things till after a certain period, during whose eternal existence a succession of new worlds and beings might decline, and again receive existence, alternately, according to the nature of succession observed in plants and animals. 2. The Sceptic's argument, that a general wise existence of all things might, of itself, as necessarily be *ab origine*, as an original Infinite Creator, of himself, *ab origine*, to produce them, is thus answered, and confuted.—Taking with us our conscious perception, we find that all things act, and are produced by a series of causes, which therefore refer backward to some first original, which is God. 3. There is neither absolute space, absolute spirit, absolute matter, nor absolute any thing, since the original cause, to which all effects and their causes produced, must refer, is of itself the only ab-

solute existence, filling immensity, and supporting all being; so that it is an absolute impropriety to mention annihilation of absolute space, and absolute forms of living and lifeless substance; for though we see forms composed of matter subject to continual mutation; yet it is not certain that the same quantity of matter always exists, since the particular substance, of which matter is constituted, may be varied by the Creator, so as to be infinitely reduced, or extended in its capacity.—
 4. Seeing all things that can possibly be, must be, if any existence can be perceived at all (as it is evident we do perceive) living existence will thereby appear necessary; and as one being may exist before, or after another, some beings must necessarily exist before, or after others.

Query.

What is the difference betwixt religion and morality?

Answer.

Religion consists in faith, and the observance of certain ceremonies, or modes of worshipping a superior being, to inculcate acts of morality;—whereas morality itself is independent of all religious forms; and, abstracted from all faith, is productive of human happiness, by its united and universal principles of benevolence to society. Hence it appears, that morality is as the sun, conspicuous to all, and religion as a lantern to give light in its absence.

Query.

What is the best method for preventing the frequent robberies in and about London, and throughout the kingdom?

Answer.

The first and best method to prevent frequent robberies in and about London would be by mending the morals of the common people; in order to which, they must be disarmed of gaming, and the pernicious use of drams, whereby the morals and health of a people are made corrupt; for there is nothing so base or inhuman, that a prostitute to drams, distracted in mind and reason, would scruple to commit.

Idleness and gaming are two endeared companions, and the grand seducers to madness and stupidity, spreading wider and wider. And by the present practices in vogue (the mis-

truss teaching the servant-maid, the master the footman, and the preacher the people, by precious example), it is difficult to find a discreet acquaintance uncorrupted with cards and drams;—for they are all gone astray, and there is none that doeth good, no not one.

Dram-drinking, like the p—x, euervates, corrupts, and destroys the stamina of the human race; as gaming destroys every great and good quality of the mind; rendering the nobility of a nation inferior to the beggars they are placed over to govern.

Drams, like opiates, or a miser's comfort, assuage pain for the present; but in the end produce gout, and torments of mind insupportable!

Drams and gaming abolished, the next step to ridding the nation of thieves and robbers would be by encouraging innocent and virtuous amusements; and also finding proper employment for the lazy, idle, and necessitous.

Query.

Why should any under the same government stigmatize others for their country, or place of nativity? And why should the name of Irishman, or Scotchman, be more odious than that of Englishman?

Answer.

National reflections proceed from want of national morals, for distinguishing the honest man who, according to Mr. Pope, "is the noblest work of God,"—let him come from what corner of the earth he will.

Query.

Which way, and how, might good be expected from a general naturalization?

Answer.

The good that might be expected from a general naturalization is from the increase of useful subjects, and consequently of industry, trade and commerce (Mr. Addison observing that each subject's life is worth so much per day to his sovereign); for the lazy could hardly be expected to stir from home for advantage, who already have too much neglected their own

interest. Pretended friends might hereby find opportunity of becoming snakes in our bosom.

Query.

How many subjects, possessed of ten thousand pounds per annum in land and houses, have we in England, Scotland, and Ireland, respectively?

Answer.

A great casuist in national affairs, known for expatiating on his own infallibility, affirms, that there are exactly ten subjects, and no more, in England, Scotland, and Ireland, possessed of ten thousand pounds a year clear of all incumbrances; and farther affirms, that there are ten times ten that number reputed to be worth as much, or a great deal more.

Query.

Whether assurance and impudence are not often imputed to merit and strength of spirits?

Answer.

Assurance and impudence are considered by some as the same quality, though they differ as essentially as knowledge and ignorance.

Query.

How is an offensive adversary in conversation best answered?

Answer.

An offensive adversary in conversation is best answered in terms of respect and friendship; as taking pleasure at all he says is the only means to prevent flame, and extinguish fire: sometimes leaving his company may be the best way to answer him.

Query.

Whether the reason commands the ruling passion, or the ruling passion the reason? And whether the will exerts itself as an ally, or despotic ruler, in respect of either?

Answer.

Reason commands the ruling passion no other ways than as a judge and admonisher. As far as the ruling passion and reason co-operate to one end, our will is determined to act; but we find the ruling passion so often despotic and powerful in respect of the reason, that it biasses the will to act against it.

The ruling passion not only seduces the reason to compliance with the will, but pleads excuses for the urgency of its tyranny over us.

Or from a judge turn pleader to persuade
The choice we make, or justify it made.

Pope's Essay on Man.

As appear from the vices and follies more conspicuous than true probity in the actions of mankind.

Men daily acting against their experience and conviction, have no remedy but from help implored of the Divine Being; which shews the necessity and good of religion to mankind.

The will, by which men act in their several stations, right or wrong, in respect of their present and future connection with God and their fellow-beings, is neither a firm ally, nor despotic ruler, but a passive prostitute to both, though commonly a volunteer in the service of the latter.

The passions, constituting the various modifications of the essentials of living beings, are those secret and dreadful sources from whence the most remarkable actions and events recorded in history proceed.

Two principles in human nature reign,
Self-love to urge, and reason to restrain;
Nor this a good, nor that a bad we call,
Each works its end, to move or govern all;
And to their proper operation still,
Ascribe all good to their improper ill.
Self-love, the spring of motion, acts the soul,
Reason's comparing balance rules the whole:
Man but for that, no action could attend,
And, but for this, were active to no end.

Pope's Essay on Man.

For a further account of the reasons and passions, read *Æthic. Epistle II.* throughout from this quotation.

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Query.

Who was he that first gave the name of Pope to the Bishop of Rome, and no one else ?

Answer.

Gregory the seventh was the first that commanded the name of Pope should peculiarly belong to the Bishop of Rome, and no one else.

Paradox.

This is truth (tho' the number's even)
The half of twelve's exactly seven !

Answer.

The half of twelve will seven be,
Cut thro' the middle, as you see.*

Query.

A law at Tarentum, as strict as Pope's bull,
Forbids importation of silks and of wool ;
A merchant, and one for the law who had voted,
Five hundred fat sheep in his next ship imported.
Sir Gravity Quiddity, where is the flaw,
Is the fault in the merchant, or else in the law ?

Answer.

My good Mr. Squa,
The fault's in the law.
The merchant's a knave,
If the truth you will have,
Or he ne'er had thus sneer'd
(When the sheep he had shear'd)
At the laws which were made
For the advantage of trade.

Query.

Whether is the bed most adored by the sluggard, a full
[tankard by the drunkard, or money by the usurer ?

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Answer.

The usurer his money he most doth adore ;
 He hoards up his pelf, and he starveth the poor ;
 Whilst the sluggard will rise, and a penny will give,
 The drunkard will spend it, and let the poor live ;
 So I think that the usurer is the worst of all three ;
 I have pass'd my opinion ;—if so, we agree.

Paradox.

Ingenious artists how may I dispose
 Of five and twenty trees in just twelve rows,
 That every row five lofty trees may grace,
 Explain the scheme, the trees completely place.

Answer.

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Accept this method, if you please,
 And like the drawing, plant your trees :
 They'll form a pleasant cool retreat,
 And shade you from the summer's heat ;
 As you sometimes may to them go
 When tir'd with bustle, noise and show.

Query.

It is observed, that the kidney bean and convolvulus, with some other plants, follow the sun's motion in their growth, or twine round a pole from east to west ; whilst on the other hand hops and honeysuckles, with many others, turn the contrary way. Can this difference be accounted for ?

Answer.

This difference is one of those operations of nature which doubtless will never be accounted for ; though probably ef-

fected by attraction and repulsion ; but in what manner ?—We observe, that the sun-flower generally keeps turning its blossom towards the sun ; we behold with admiration the phænomena of the sensitive plant, and venus-fly-trap, but when we would enquire the cause, our reason is at a stand, and we are left to lament the circumscribed state of human knowledge.

Query.

I have often observed certain animals exactly resembling horse-hairs, swimming to and fro in small rivulets ; now the country people in many places affirm, that they are the hairs of a horse's tail, animated by lying a considerable time in the water ; and that this has long been the current report appears from a passage in one of Marvell's poems, where he describes horses kicking at their tails, which had by a flood been transformed to leeches. Is this a vulgar error ? If so, what are those animals ?

Answer.

These seem to be the species of worms called by Linnæus, *Gordius aquaticus pallidus*, with black extremities, though I have seen some thousands of them entirely black ; but as he says they are bred in clay, it is probable that they change to a pale colour soon after coming into the water. Merrett, in his *Penax Britannicarum*, calls them *seta aquaticus*, and mentions the same thing of their being vulgarly taken for animated horse-hairs : his words are, "Vulgo creditur oriri, ex seta caudæ equinæ aquis immersa." He has not taken notice of their colour.

Query.

What is the difference between "to loose" and "to unloose ?

Answer.

Sound the s in unloose softly (as in loose morals) and the mystery will vanish ; so then unloose morals will be good morals, and unloose will signify to be tied.

Query.

What is the reason that dead bodies sooner rot in a dry than a moist church-yard ?

Answer.

A body will keep longer in moist ground than in dry, because in the former case the air is more excluded than in the latter.

Query.

Are not children naturally ambidextrous ?

Answer.

I believe experience teaches us, that when children begin to make use of their hands, both are used indifferently, which perhaps would be the case when grown, did they remain in a state of nature :—the preference given to the right hand was certainly owing to custom, for it does not seem to depend on the predominancy of any natural impulse.

Query.

Why does an object, when viewed with a magnifying lens, seem farther off than when viewed with the naked eye ?

Answer.

It has been a matter of dispute among optical writers, whether an object when viewed through a magnifying lens appears farther off, or nearer, than with the naked eye; but the following experiments, I think, will clear up the point.

1. Bring a small object nearer the eye than the limits of distinct vision, then if a lens of a sufficient magnifying power be properly placed between the eye and object, it will be seen distinctly;—here it is evident, that it seems further off now viewed through the lens, for before we thought, and which was true in fact, that it was too near.

2. Take the tube of a common refracting telescope, or any other tube, in one end of which is fixed a magnifying lens, through this look at the inside of the tube, and it will appear wider and longer according to the magnifying power of the lens; and the reason is this,—every object seen distinctly through the lens is magnified in length as well as breadth, and therefore a small object placed in the tube must seem further off than it would at the same distance, if we viewed with the naked eye; consequently, in any case, if we consider the space between the glass and object as a tube, this experiment suf-

ficiently determines the matter in question. Hence it follows, that the parts of an object when seen through a magnifying lens, cannot appear, with respect to each other, in their natural situation.

Query.

What is the reason that a body moving forward upon rollers moves twice as fast as the rollers themselves?

Answer.

When a body moves upon rollers, the diameters of the rollers become as perpetual radii to the body moved, and the motion of the body is as those radii; but the motion of the rollers is as their perpetual radii, therefore as the former radii are double of the latter, the motion produced from them must be so too.

Query.

What are we to understand by the two daughters of the horse-leach, which cry, "Give, give?" Prov. xxx. 15.

Answer.

According to father Calmet, the horse-leach in this place signifies lust, its two daughters are avarice and ambition, which are never satisfied. The septuagint say three daughters, instead of two. Bochart is of opinion, that the Hebrew word Halukah, which the septuagint and vulgate translate horse-leach, signifies destiny; and the two daughters of this destiny are hell and the grave, which never say it is enough.

Query.

Is there any practical method that will actually prevent the growth of human hair, or totally eradicate that already grown?

Answer.

It is not easy to give a satisfactory answer to this Query; some mention the blood of a bat having been used and recommended as a preventative; and several receipts may be found in Wecker, Porta, and others.

Query.

Whether laws have been upon the whole favourable or detrimental to the propagation of the human species?

Answer.

If all laws were at once to be abrogated, the consequence would be, that each person would be content with as much land as he could cultivate; and having no artificial wants to satiate, nor luxurious appetites to gratify, a much smaller quantity of ground would be sufficient for him than at present, and therefore there would be much more room for the multiplication of the species; besides, man being naturally a more humane and industrious animal, would have much stronger motives to labour for himself than to take from another; and there would then be none of those inhuman and extensive wars which now depopulate whole countries, and are infinitely more destructive than any little trifling private murders that might chance to happen if there were no laws; which murders, &c. never could be more numerous than those which happen at present, in defiance of all prohibitions to the contrary; and which indeed must happen, as they are the unavoidable consequences of the laws themselves: moreover, it is allowed by the greatest and most strenuous advocates for legal government, that the poor (which are incomparably the most numerous) have very little benefit from the laws in general; and therefore it may be affirmed, if not with certainty, at least with great probability, that laws have upon the whole been detrimental to the increase of the human species.

Query.

Whether is an impudent, or an hypocritical rogue the most detestable?

Answer.

Appearance is not always reality; if the laws in general be good, the hypocritical rogue can have no claim to merit for paying only an apparent respect to them, at the time he really infringes them; if they be bad, he has the additional villany of giving his sanction to what is evil; besides using them as a stalking horse to render his knavery more successful. In other

respects, the two rogues are equal, and therefore upon the whole, the hypocrite is the most to be detested.

Query.

Whether the souls of men departed are privy to our actions, and can appear or disappear to human sight!

Answer.

The expectation of a retribution hereafter, to compensate for the miseries and inequalities on earth, seems to be the grand argument of those that maintain the opinion of a future state; but this proves the beasts to have souls as much as it does man; and if this dogma has not prevailed, it has perhaps been for no other reason but because beasts have not been able to maintain a set of clergy. As to the dull mass of legendary stories about apparitions and ghosts, recorded by priests and monks, we have no reason to believe a word of it, since it was their interest to deceive the world; and they have likewise solemnly affirmed and particularized the existence of fairies and witches, that are now universally acknowledged to be absurdities, fit only to impose upon fools, and to be credited by idiots. However, begging the question, and allowing that there actually may be such things as ghosts, and that they can appear and disappear, yet I think we may confidently affirm, that they are not privy to our thoughts, nor to such of our actions as were unknown to them before death; for on perusing some hundred speeches made (as they say) by ghosts, I have been tempted to think, that if ever they had any sense in their lives, they must have lost it at their deaths; and that they were scarcely privy to their own actions, much less to ours, their discourses were so completely stupid.

Query.

Milton, in his *Paradise Regained*, says, "And either 'Tropic now 'gan thunder, and both ends of Heaven."—What is meant by both ends of Heaven?

Answer.

What can the Poet mean (I do declare)
But certain parts in the celestial sphere;
Either the Poles, or our terrestrial world,
There from the tropics, lightning soon was hurl'd.

Query.

In the account of the destruction of Sodom and Gomorrah, it is said, that Lot's wife was turned into a pillar of salt. Is this to be understood literally?

Answer.

The expression, "Lot's wife was turned into a pillar of salt," is to be understood literally, and according to the very letter of the text; for the plainest interpretation of scripture words is always the best; she looked back disobedient and unbelieving, and struck with the sulphureous fire from Heaven, was killed, and became a pillar of salt; therefore a lasting memorial to many generations. Josephus mentions to have seen it himself, and Mr. Maundrell's guides told him that some remains of the monument were still extant: and as to the difficulty of salt continuing undissolved in the open air so long, it is well known to naturalists, that rocks of salt are as lasting as any other rocks, nay more so, and that houses are built of them.

Query.

It is well known that fossil shells, petrified fish, and other marine productions are found in great quantities on the mountains in the inland parts of America. How is this to be accounted for?

Answer.

The general deluge, or earthquakes, or both, might have been the two great causes mentioned in this phænomena.

Query.

What is the meaning of the expression, "Protestant flail," so often used in songs and poems about a century and a half ago?

Answer.

This expression seems to mean any instrument in the hands of a protestant, wherewith to lash and satirise his antagonist.

Query.

Old Gobbo, in the Merchant of Venice, uses the foolish oath, "by gods sontis." What does he mean by "sontis?"

Answer.

Evil genii, or wicked, evil, blameful or hurtful persons; for the word *senticus*, used adjectively, signifies wicked, evil, blameful, hurtful, &c. but substantively a wicked person, &c. &c.

Query.

From whence does the whiteness of snow proceed?

Answer.

From the componency of its parts; which though singly transparent, yet must appear white when mixed together; as do the parts of froth of powerful glass, and other transparent bodies, whether soft or hard.

Query.

We generally observe, that the mercury in the barometer stands the highest upon the easterly and north easterly wind. How is this to be accounted for? And why does the rising of the quicksilver indicate fair weather, and its sinking foul weather, such as rain, wind, and so forth?

Answer.

It is proved by experiment, that mercury in the barometer settles as the barometer is removed upwards; which is occasioned by a smaller degree of density in the atmosphere. In a warm climate, the easterly and north easterly winds, mixing with the air that is more expanded, gives it a greater density, and the contrary when blowing southerly, which wind continually blowing generally produces much rain: why the mercury falls against rain, wind, and so forth, seems to proceed from similar causes. In fine weather, the clouds are observed to be situated very high in the air, at other times falling in rain to the earth, which produces changes in the barometer, in effect the same as if the barometer was removed upwards or downwards in the atmosphere.

Query.

From whence came the custom of putting laurel, box, holly, &c. in churches and houses at Christmas; and what is the signification thereof?

Answer.

When the son of God (according to the prophecy of Zachary) made his public entry into Jerusalem, the people strewed the way before him with ever-green palm branches, in token of the perpetuity and triumph of his kingdom; hence arose the custom, and this the signification of adorning our houses and churches with ever-greens at Christmas.

Query.

The grasshopper sings all the Summer away,
With his chirping noise—how he makes it I pray?

Answer.

The grasshopper is called in Latin, *cicada*, from singing with a little skin upon his side, against which he rubs the thick part of his leg, and so makes that noise wherewith he so disturbs the sleepy haymakers.

Query.

What is the cause of that phænomenon called the Aurora Borealis (or northern lights), and why is it now more common in our climate than formerly?

Answer.

Electricity seems to be the cause of the northern lights, which are streams of the electric fluid dispersed through a certain space of the aerial expanse; and this fluid may now more abound in our region than heretofore, or has altered its former, and taken a new direction.

Query.

How is it, that during a total eclipse of the moon, we can notwithstanding perceive the moon as a light body, and see her distinctly, though she is at the same time acknowledged to be in herself dark, and is eclipsed by the earth's shadow, the diameter of which is so much larger than the moon herself?

Answer.

It has been proved that the earth is surrounded with a sphere of air, called the atmosphere, of about 47 miles in height, which has such a refractive power, that it turns the rays of the sun out of their way when it falls upon it, and makes them enter the conical shadow, which therefore will illuminate the moon, as well as other bodies, with a faint light, and make her visible to the eye when she is even in the midst of the earth's shadow.

Query.

Has the cicindelo, or glow-worm, a natural power or not to raise and extinguish its native light, according to the direction of its will?

Answer.

The glow-worm has certainly a natural power to raise and extinguish its native light, but then only to be perceived in the dark, its skin being a kind of an electrified coat, which in the dark appears as fire out of the skin of the cicindelo.

Query.

Many people are so strongly fortified against the passions as not to shed tears for their own misfortunes, nor by sympathy for the misfortunes of others. Are people in general with this seeming insensibility void of pity and humanity?

Answer.

When and where grief happens, it seizes upon and affects the animal spirits, which are fluid, and belong to the brain; but sometimes when grief happens it falls with such a heavy pressure upon the animal spirits, as does not admit of, or produce any agitation therein; then the apparent symptoms are nothing but a heavy groaning, or deep sighing, as of one in sore affliction, or misery: in our opinion they have as much pity and humanity, or more so, than those who shed tears abundantly.

Query.

Required the reason and custom of having the figures of lions, goddesses, &c. at the head of ships?

Answer.

The ingenious traveller, Mr. Bruce, tells us, that according to the Abyssinian historians, the famous Sphinx, which stands near the Pyramids, is the figure that was at the head of the Ark, petrified; hence it is probable, the moderns derived the custom of having the figures of lions, goddesses, &c. at the head of their ships.

Query.

Ye learned, pray say, who dark myst'ries unfold,
Why razors cut better with hot water than cold?

Answer.

Every kind of knife or razor is a fine saw, though we cannot possibly see it with the naked eye; and on all the edges of those fine polished tools, there clings or sticks a kind of a resinous or gummy substance, which, when put into warm water, is taken off, and makes the razor cut more easily and freely.

Query.

In common brass-cocks that turn with a key, the liquor will flow to the top of the key-hole, and although it may be emptied, it will flow again to the same height and not run over, although the liquor may at the same time be one or two feet higher in the cask: required the reason of this.

Answer.

Because the air being a fluid body, presses upwards against the liquor, and in that hole is much greater pressure downwards and therefore will prevent its running out. See Martius Philo. p. 266.

Paradox.

My wife and I did disagree,
And for to part we both were free;
She set off east, and I steer'd west,
Believe me, Sirs, it is no jest;
When each had gone miles fifty-three,
Wife was not twenty yards from me;

B b 3

And tho' it was bad stormy weather,
 We all that time travell'd together :
 How can this be, pray clear all doubt,
 Tell how we made this different rout ?

Answer.

On ship board my wife and I did disagree,
 I to th' helm, to th' other end of the ship walk'd she ;
 'Tis true we travell'd fifty miles together
 On the same ship, not minding wind nor weather ;
 Yet all that time, upon my word and life,
 I was not twenty yards from my dear wife.

Paradox.

Dick Guzzle in cue, I heard him to say,
 He owed twenty shillings, had not it to pay ;
 Ye sages in numbers, he'd have you explore,
 How that debt shall be paid with nineteen and no more.

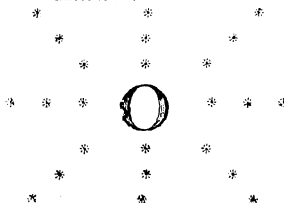
Answer.

The one-half, one-third, one-sixth, and one-nineteenth, of 19s
 are 9s. 6d. + 6s. 4d. + 3s. 2d. and + 1s. = 20s. = 1l.

Paradox.

Ingenious artists, pray dispose
 Twenty-four trees in twenty-four rows,
 Three trees I'd have in every row,
 A pond in the midst I'd have also ;
 A plan of it I fain would have,
 Which makes me for assistance crave.

Answer.



A plan here is drawn,
 In the scheme it is shewn,
 Will suit the curious request ;
 You may sit if you please,
 And view the sweet trees,
 Or fish if it pleases you best.

Paradox.

I thrash'd ten quarters of fine wheat,
 I eat just thirty pounds of meat,
 Besides a calf that weigh'd eight stone—
 I eat the whole, pick'd every bone ;
 Yet more—my appetite to satisfy,
 Eat three roast pigs—which made me dry ;
 Drank sixteen pints of cherry brandy,
 Then eat five pounds of sugar candy :
 All this I did—all in one day ;
 It's true, I assure you, what I say.

Answer.

Near the poles such a wonder as this might appear,
 Where one day and one night make up the whole year.

Paradox.

A general he had a small army of men,
 Which form'd a long square of just twelve times ten ;
 But still without having his number increas'd,
 In twelve equal rows he would have them plac'd ;
 Just eleven men he would have in every row,
 Himself equal distant from each row also,
 How he must place them I gladly would know. }

Answer.

To place the small army I thought I would venture,
 In a dodecagon therefore, and himself in the centre.

Paradox, by a Lady.

One summer's evening as I was abroad taking my pleasure,
 I heard the voice of somebody behind, calling to me ; I turned
 back, and saw it was a companion of mine at the distance of
 400 yards, wanting to overtake me ; we moved each of us 200

yards with our faces towards each other in a direct line, yet we were still 400 yards asunder.—How can this possibly be?

Answer.

The lady moved 200 yards backwards with her face towards her companion's, and her companion 200 yards forwards, with his face towards her.

Query.

Is hope or fear the greatest spur to action?

Answer.

Hope and fear are the two most predominant passions of the human mind; the hope of enjoying some good, or the fear of suffering some evil, is the spring of almost every action we perform, and it is difficult to say which is the greatest spur to action; but we rather think hope is, at least it is the most noble passion of the two.

Query.

What language is the best, impart,
To gain a virgin lover's heart?

Answer.

The language of Cupid's dart
Will win and fix the virgin's heart.

Query.

When, and by whom, was England divided into parishes?

Answer.

As Mr. Ashton tells us (supposed from his dictionary), that Alfred divided the kingdom into shires and hundreds; and by referring to the said dictionary may be seen who divided the kingdom into parishes.

Query.

What is the meaning and language of Crom aboo, the motto of the Duke of Leinster?

Answer.

Crom aboo, supposed to be an anagram, being an unknown language, makes Aboo crom by transposition; which, by corruption, may signify the Abercromby family of Scotland, from whence might spring the Duke of Leinster's family, and thence the motto; for Dean Swift discovered, that the Greek and all other languages may be derived from the Scotch; shewing us that the North Britons are part of the original people.

Query.

Whether the conception of the blessed Virgin Mary on December 8th, is not placed wrong in the calendar, seeing that the birth of Christ was on the 25th of that month? Or, how is the time of the conception and birth of Christ reconciled, as fixed by our ecclesiastical chronologers?

Answer.

Had the conception of Christ been placed on the 25th of March, or on what is usually called Lady Day, and the birth of Christ the 25th of December following, about nine months asunder, between the conception and the birth, according to what is observed to happen in the production of the human species (to which nature Christ was translated from the divine essence), the time of pregnancy would have appeared more consistent with the other parts of the Gospel; but why the conception should be placed on the 8th of December, and the birth on the 25th of December, following or preceding, (who can tell us which?) making 17 days, or a year wanting 17 days, in the time of the pregnancy, our divine legationist, and alters of Greek from its original propriety, must resolve, as their province of unfolding profound mysteries.

Query.

Whether an invalid (or invalidated) understanding, or weak body (according to the Scotch phrase), is the more to be pitied? or, whether folly or ignorance is the greatest misfortune?

Answer.

An invalidated understanding, and a weak body (in the Scotch phrase), imply the same sort of poor things; and are therefore alike to be pitied; like a charity-school teacher, and a smatterer in mathematics, weak enough, through vanity, to criticise works of eminence they never understood; like the Danmonium (as he stiled himself) and library-hall professors, exoniensis, &c. As to folly, separately considered, it is a greater misfortune than ignorance by itself, which would often rest satisfied; but being stirred up by folly in the same person, it is prompted to assume a false eminence, which is attended with contempt, ridicule, and disgrace; and so folly becomes a greater misfortune than ignorance to the same owner. To be ignorant and innocent are pitiable! to be ignorant and vain, despicable!

Query.

Whether giving a man what he wants, is (in a grammatical sense) not taking that want entirely away? And whether want of shame, in another sense, may not be given him, contrary to the sense of taking want of shame away from him?

Answer.

On the subject of lying, Hudibras says to Sidrophel, (Heroical Epistle, l. 105,) as follows:

Alas, that faculty betrays
 Those soonest it designs to raise;
 And all your vain renown will spoil,
 As guns o'ercharg'd the more recoil;
 Though he that has but impudence,
 To all things has a fair pretence;
 And put among his wants but shame,
 To all the world he may lay claim.
 But all impostors, when they are known,
 Are past their labour, and undone.

Giving truth to a person who wants it, is taking so much of his error away from him that he had before: now suppose you put shame among his wants, (want of truth, ability, &c.) according to the text, so that shame may be one of his

wants, and by his possessing impudence, he may then lay claim to any thing. In this sense, contrary to the former, by giving him shame among his wants, you furnish him with want of shame; and he having no shame, you furnish him with a negative, instead of taking one that he had (want of shame) away.

Query.

At a place called Catsgrove, near Reading, in Berks, is to be seen a natural curiosity, not noticed by Camden in his description of that county, where are different strata of earth, and, among the rest, beds of sea sand; from which the workmen, belonging to a limekiln on that spot, dig up perfect oysters, firm and unopened, and shew them to travellers. Without recurring to that general sea for all difficulties of this sort, Noah's flood, it is required to be known, if the spot whereon the town stands was ever recorded in history to have been overflowed by the sea, from an earthquake, or any other cause?

Answer.

The oysters and other substances dug up at Catsgrove, near Reading, in Berkshire, are, in my opinion, the consequence of some subterraneous eruption (as are the variety of strata in other parts), whereby the sea has shifted its place and boundary, and left the diversity of sea strata, oysters, and other marine substances, as they are found and appear from the said shifting cause, which cause is the change of situation of the sea, overflowing vast tracks of dry ground, and leaving others that were covered with sea to unbosom their variety of fossils, or textures of an earthly substance; or else to be covered with verdure, as the seeds of vegetables, scattered up and down the substance of the whole earth, and the impregnating air, took effect.

Query.

The word rest (meaning the remaining or remainder) is set down in Dr. Johnson's Dictionary both as a substantive and as an adjective: it will not stand the test of an adjective, because it will not be coupled with a known substantive (such as things) and make sense by such a conjunction, the rest things being nonsense; and it scarcely appears to be a substantive

for these reasons; 1. because some substantive seems understood to belong to it which is not named: 2. as it cannot be used in the singular number as equivalent to remainder, a known substantive, the rest is, being a solecism; and lastly, as there would then be no word that exactly corresponds with the Latin word *reliquus* or *reliqui*. Quere, then, whether it be a substantive or an adjective? or sometimes one and sometimes the other?

Answer.

The word residue retains the same sense as the word rest, or remainder; therefore it certainly is a substantive; and no adjective, like residual.

Query.

Bishop Lowth, among other of his ingenious and critical remarks on English solecisms, animadverts on the following expression:—"Who do you think me to be?"—and condemns it for a fault: he will have us say, "Whom do you think me to be?" Now, the question is, whether in this we are to follow the analogy of the Latin and Greek languages, which agree in putting the same case before as after the infinitive mood—as, *quem credis me esse?* or whether we are to examine the merits of the case by a transposition; which is a good method of explanation, and presents us with this seemingly uncouth expression, Do you think me to be whom? In a word, whether the apposition of cases ought here to predominate over that known rule that neuter verbs require a nominative case after them.

Answer

According to custom, in the English mode of speech, which is the greatest authority, Bishop Lowth is got into a dilemma here betwixt the English and Latin customs of speech, where the English custom, by the rule of transposition, ought to predominate: Do you think me to be who? or, Who do you think I am? somebody or nobody?

Query.

Upon what part of the terraqueous globe has a ship the least pressure upon the water.

Answer.

Any where on the sea, under the equinoctial, or at the equator; for there the power of gravity is less than at the poles, where the diameter of the earth's oblate spheroidal figure is the shortest, and consequently attraction greatest.

Query.

We read in Herodotus (Erato) that when it was objected to Demaratus, King of Sparta, by his rival Leutychides, that he was not the son of Ariston, his reputed father, but a supposititious child, he conjured his mother to reveal the truth; who, in answer, observed to him, that his enemy framed the objection merely because he was born before the expiration of ten months; but that the insinuation was suggested by ignorance; for women, she remarked, were not always so late in their delivery; some children having been born at the end of nine months from their conception, and some even at seven.—From this story, be it true or false, it appears that a child of nine months was judged an early visitant in Greece; at least by the Historian.—Query, Are the women of any country (particularly in that part of the world) known generally to exceed that term or not?

Answer.

When men lived to a greater age in ancient times, the time of a woman's pregnancy (to perfect a more durable birth) might be greater than at present, nine months. Some children have been born at the end of seven or eight months in England, but seldom lived long, or not so long as those born at their full time; however, nine Calendar months, of thirty days and a half each, making about two hundred and seventy-five days, are not much unequal to ten months of twenty-eight days each, making two hundred and eighty days; so that a difference of near a month in the time of a woman's pregnancy will arise from the different way of reckoning the time of one month; from whence the mistake of a month in the time of pregnancy (ten for nine months) by Leutychides, might proceed.

Most animals (except mankind) have stated seasons for procreation: the females go with young some a longer, some a shorter time: mares go from eleven to twelve months;

cows and hinds go nine months, the same as women; foxes and wolves five months; bitches go only seven weeks; cats nine weeks; and rabbits thirty-one days; most birds are hatched in twenty-one days; the canary birds, and some others, are hatched in thirteen or fourteen days; hence there appears to be endless variety in the time, as well as in the manner, of the generation of animals.

Query.

Ye lovely fair, ye soft enchanting maids,
That love the town, and haunt the rural shades,
Say, if you can, when kissing first arose,
That mark of love, and soft'ner of our woes;
Say if you can, inform your faithful swains,
And you shall have a hundred for your pains.

Answer.

When Adam first beheld his partner Eve,
Blest with more charms than we can well conceive,
A warmth unusual glow'd within his breast,
He kiss'd his bride, and own'd that he was blest.

Query.

Define the diff'rence of what you call
A conscience that's large, and no conscience at all.

Answer.

A country-woman begg'd a boon
Of a rich Merchant, here well known;
Who, generous heart! quite free to all,
Of packthread handed down a ball,
That measur'd twelve-score yards—to grant—
And bid her take what she might want.
She talk'd—roll'd off—to tire your patience,—
At last said, 'Here's enough in conscience.'
The Merchant smil'd,—and said, Let's see
'What may a woman's conscience be?'
He found it forty yards in all;
If she'd had none, she'd ta'en the ball!

Query.

A heavy body being sunk to the bottom of any fluid, will it require more or less weight than itself to raise it up?

Answer.

By the laws of Hydrostatics, a less weight than itself will raise it up; but in a stagnant or confined fluid, or one that has a great degree of tenacity, or if the body be in close contact with the bottom of the containing vessel, &c. it may require more weight than itself to raise it up.

Query.

Pray give your opinion, how the fishes can respire air in the sea?

Answer.

There are many sorts of fish endued with lungs; as whales, sea-calves, dolphins, with others; and these are generally observed to swim near the surface of the water, and receive pure air, never remaining long at the bottom; but in those fishes that are without lungs, it is presumed the gills perform the office of lungs; and that the æreal particles are admitted through the pores into the numerous vessels there inserted, and thence again expired.

Query.

When were guineas first coined in England? and why were they so called?

Answer.

In King Charles the Second's time, when Sir Robert Holmes, of the Isle of Wight, brought gold-dust from the coast of Guinea, a guinea first received its name from that country.

Query.

If whatever is, is right, in the natural world (according to Mr. Pope's Ethics, in his Essay on Man), and God has formed nature and her operations in all respects for the best, why is rain, or elementary weather, prayed for in churches? or why is any thing prayed for by the human species, of defective judgment (according to the wise Socrates), that God would

grant such things as are fit for us, and keep away such things as are not fit, in respect of particular and general good?— And why are not curses banished all catholic and christian churches, if God and his Providence can award justice to criminals without the imprecations bestowed from man's pitiful, partial, and weak judgment, in this respect; whose whole irregular race, governed by a lawless will, seems to be greatly favoured by a gracious and good God, in not being long ago extirpated from the face of the whole earth, for the enormous trespasses of the greater part of them, committed against their maker and one another?

Answer.

To pray for rain in churches, or elsewhere, appears to be the same as to pray for snow, dry weather, or sunshine, and for such things as people's fancies, or wrong judgments, or different views and vain imaginations, suggest to them; for the operations of nature are supposed to be universally carried on every where for the good of the whole; and if it be true, what Mr. Pope says in his Ethic Epistles, there can be no error in nature:

In spite of pride, in erring reason's spite,
One truth is clear, whatever is, is right.

To which may be subjoined—

Except man's will, exempt from nature's laws,
In spite of doubt, our good or evil draws.

Persons of the same or different occupations and interests pray for different elementary weather at the same time and place; so different armies pray to God for different successes, or destruction. And how is it consistent for God to oblige both parties?

If God's will be done on earth as it is in heaven (prayed for in the Lord's Prayer in churches), there is little occasion for other solicitations of the divine power and goodness, since asking what may be unfit for us will prove a hurt instead of benefit; as the farmer, in the fable, resigned the weather into Jupiter's hands again, when he had enjoyed what weather he asked for, and found his crops worse than his neighbour's.

One part of the Scripture teaches to bless them that curse you, and pray for them that despitefully use you, libellers,&c.

against the church doctrines of cursing our fellow beings! But though the texts of Scripture seem to clash with each other in different places as the statute laws in different acts of parliament differ so much as sometimes to require an adjustment (like a Hadley's quadrant); yet the divine and human commands, in general, are reconciled by a general obedience to morality and religion, and an abstinence from vice and injustice.

The irregularities of man's race require to be put under laws and government, as is evident from their various and irregular propensities and inclinations; yet the deviation of those wills from equity and justice, with respect to their conduct towards one another, is such, that sometimes no force or punishment, by cutting them off, is able to restrain their irregularities, and keep them in order.

The infinitely wise Being, permitting men's irregularities (for experiment or probation), to answer the ends of his glorious creation, he can dispose of them here, or remove them from this to another state of being, as he sees best fit. And since all created beings are within the grasp of the Divine Power, to do with them the way most suitable to his pleasure, therefore to submit (by resigning to his providence) is the right human wisdom.

Yet the race of mankind (corrupted as it is) is certainly at liberty to ask of God to grant what is fit and good for their happiness; and, while they ask, to beg that he would avert or refuse what is against their happiness, or hurtful to them, though asked.

Query.

Sagacious friends, inform me whence arise
Those Northern lights that stream along the skies?

Answer.

The cause of the Northern lights is from a thin, nitrous, sulphurous vapour, raised in our atmosphere, considerably higher than the clouds: this vapour, by fermentation, taking fire, the explosion of one portion of it kindles the next, so the flashes (of the Aurora Borealis or Northern lights) succeed one another, till the whole quantity of vapour within their reach is set on fire. See Rowning's Natural Philosophy, p. 158.

It is also said, that the Northern lights proceed from the vapours ascending by exhalation.

Query.

What became of the ark of the Lord, containing the two tables of stone, after being deposited in Solomon's Temple, as mentioned in the 8th. chapter of the 1st. book of Kings? The Jewish opinion is, that, when the Temple was destroyed, the earth opened and swallowed it.

Answer.

No doubt but the ark of the Lord was burnt with the Temple; which may be a sufficient reason for the extreme grief of the Jews; for as Josephus emphatically expresses it, they lifted up their heads and wept.

Query.

Why are those two months, March and October, reputed to be the best to brew in?

Answer.

Because in those two months the medium state of the air between the extremes of heat and cold, is most favourable to a due carrying on the process of fermentation; on the proper management of which, it is well known, that the perfection of malt liquors depend.

Query.

By whom, and about what time, were blisters made of cantharides, introduced into medical practice?

Answer.

Blisters made of cantharides were first introduced into medical practice by Aretæus, a Greek physician and medical writer; about 50 years before Christ. See Clerc's History of Physic.

Query.

Why does the horizon appear to our sight larger than any part else of the hemisphere?

Answer.

Nothing can come within the compass of our eyes so well, because the earth on plane of the horizon is decorated with

trees, herbs, plants and grass, which makes it appear of a fine azure green, and exactly suits our sight, better than any other colours under the creation; and therefore lets the eyes comprehend more of the horizon than any part else of the hemisphere.

Query.

What branch of natural philosophy affords the most convincing arguments of the existence of a Supreme Being?

Answer.

Astronomy; for it is impossible for any man to look round him, and view that amazing orb the sun, that loud herald of his Maker's praise, from whose benign agency nature receives her beauteous features—the moon, which when the sun goeth down lights up her silver lamp to bless mankind—those planetary worlds which run their rapid courses round the sun—or those bright spangles with which the empyreum arch is decorated, but he must be convinced that these are the works of a Being infinite in power, immense in wisdom, and unbounded in goodness.

Query.

What is the reason that the shells of crabs and lobsters on being boiled turn red?

Answer.

The deep purple inclining to blackness is only a superficial covering on the calcareous earth composing the shells of crabs, lobsters, &c. and when its density is attenuated by heat in the action of boiling, the light reflected from the white substance of the shell is transmitted more copiously through this film, and gives it the appearance of red, &c.

Query.

Why is King Henry the Eighth always, or generally, drawn with a cap on, instead of a crown?

Answer.

Henry the Eighth received from the Pope the title of Defender of the Faith, for having written against Luther, and

presented him a Cardinal's cap, in which he is generally delineated.

Query.

How long has the title of Lord Mayor been given to the Mayor of London, and on what occasion was it first conferred?

Answer.

In the history of England it is recorded, that about the year 1381, or 1382, in the reign of Richard II. when William Walworth, the then Mayor of London, had slain the rebel Wat Tyler, the King knighted Walworth, and ordered that the Mayor of London should ever after bear the title of Lord.

Query.

As black is no colour, and consequently reflects no rays to impress any colour on the retina of the eye, how comes it that bodies that are black are as visible as any other object?

Answer.

When bodies which are black are placed upon, or surrounded with bodies of any other colour, it is the coloured rays reflected from such bodies around the margin of the black that defines its shape.

Query.

Can love exist without jealousy?

Answer.

Whoever considers that what we love we always set a high value upon, will not think it an unreasonable consequence that we should be afraid of losing it; besides, what appears lovely to us, we are apt to think does so to others, which would naturally make them endeavour after the possession of it as well as ourselves, and therefore gives us no small uneasiness for fear of being disappointed: and even supposing the beloved person to be virtuous and constant, yet a great passion will be apt to suggest that it is not impossible, but an alteration may happen, either through some dislike, or by the intervening of a more worthy object; so that it is contrary to the nature of love to be free from jealousy before marriage; but after,

where the persons are good and generous, it seldom or never happens.

Query.

What is the origin of heraldry? and how remote is its antiquity?

Answer.

It seems very difficult to determine how long heraldry has been in use as it now is, but its origin is of very ancient date: the earliest account we have is in sacred writ, in the 2d. chap. of Numbers, when we have an account that each tribe of the Israelites had their particular standard, and there is no doubt but each standard had some particular mark or figure, and later Jewish writers inform us, that these figures were characteristic of the tribes; Judah had a lion on their standard; Dan a serpent; Isachar an ass, &c. whether these were of divine appointment originally, or borrowed from the Egyptians, who were famous for their hieroglyphics, is not certain? but after that time, standards were used in war, and are to this day, each regiment having its peculiar standard, or colours; and as these formerly had figures of birds and beasts, that were thought emblematical or ominous by the general or leader, the same figure was engraven on a seal, with which the general or chief stamp't all his orders to his inferior officers, and the descendants of such chiefs used those figures painted or engraven on their shields, &c. as a family distinction; and is thus used to this present day. It may farther be remarked, that the various tribes of Indians in North America, to this day use the figure of some bird or beast to distinguish them from other tribes. See Captain Carver's Travels.

Query.

Why is the thick part of the leg called the calf?

Answer.

The calf of the leg seems to have had its name from two cimbric words, cal, stout for large, with respect to the other parts of the leg, and lef, always bent, or of a bending form (vid. Goropius Be amus); and from thence the Dutch name kalf; from this the English is evidently borrowed.

Query.

When a piece of iron is heated red hot, and immediately cooled in water, it becomes harder; but if left to cool in the open air, softer: Can this be accounted for?

Answer.

When a piece of iron is heated red hot, and immediately cooled in the open air, its bulk becomes greater, or it occupies more space, and therefore the particles composing it are at a greater distance from each other than before, and consequently the whole is less compact and softer; but the contrary happens if cooled in water, for in heating, a great part of the air it contained is excluded by that operation, on account of its expansion and rarefaction; then suddenly plunging it in water, the air is thereby prevented from insinuating itself into the metal while it cools, and so the particles having more room, fall nearer together, which evidently must render it of a firmer texture.

Query.

Whether a practical geometer can execute the first problems of geometry truest with great or small distances!

Answer.

Problems in plain geometry can be drawn more exactly with great distances than with small, because all points and lines in practice are of the same breadth, and such breadths will hold a less proportion with great than with small distances, and consequently the errors in drawing will be less in using long lines than short ones. To explain this, suppose the circumference of a circle, whose diameter is one tenth of an inch, is to be divided into 1536 equal quarters, by lines drawn from the centre, this we will suppose to be done by a continual bisection of the cords; now when we come to the last divisions, we shall find, that the lines which are to divide the cords will be as broad as the cords are long, though perhaps the instrument may be as fine as possible; but this would not be the case if the diameter was two or three yards.

Query.

Whence proceeds the saltness of the sea,—and is it more so now than formerly?

Answer.

According to some naturalists, it is owing to the mines of salt gem in the bowels of the earth washed down by the rains: admitting this, the sea must grow continually saltier, because the water raised by evaporation is fresh. On this supposition, Dr. Halley proposed a theory to determine how long the world has subsisted; but as observations have not been made of the degree of its saltness at distant periods of time, it must be left to the determination of the curious in future ages.

Query.

Ingenious artists, make appear,
How long since hats first came in wear?

Answer.

Father Daniel relates, that hats became in use in the time of Charles II. about 1449; but the *Dictionnaire des Origines*, which is more to be depended upon, tells us, that they were not worn till the time of Charles VI. when they were used by the nobility when they rode a hunting.

Query.

If a person breathes upon the blade of a new knife, razor, &c. the moisture immediately flies off. What is the reason of this?

Answer.

Take a razor or knife, and heat it till it is as warm as the breath, and then the experiment fails; the reason is obvious: as the breath contains much moisture, when it meets with a body colder than itself, that moisture is condensed, and this is the cause why the breath is so discernible in frosty weather. Now if we breathe upon any fine polished reflecting surface, colder than the breath, the moisture thereby condensed becomes a kind of cover, and consequently visible; this cannot be the case when the body is sufficiently warm, for then no condensation can take place. The evaporation of so very small a quantity

of moisture must be performed almost suddenly, may be easily conceived by a comparison with Dr. Halley's experiments, who found that the common evaporation of water amounts to about one fifth of an inch per diem; and we may safely affirm, that the evaporation in question would not exceed that quantity, were it to continue for the same space of time. This circumstance must also happen, if we breathe upon bodies not polished; but that is the very reason why we do not perceive it.

Paradox.

One evening as I walk'd to take the air,
 I chanc'd to overtake two ladies fair;
 Each by the hand a lovely boy did lead,
 To whom, in courteous manner, thus I said:
 Ladies, so far oblige me, as to shew,
 How near akin these boys are unto you?
 They, smiling, quickly made this dark reply,
 Sons to our sons they are, we can't deny:
 Though it seems strange, they are our husbands' brothers,
 And likewise each is uncle to the other:
 They both begot and born in wedlock were,
 And we their mothers and grandmothers are;
 Now try if you this mystery can declare. }

Answer.

Two widow ladies married were,
 Each to the other's son;
 And they both pregnant did appear,
 E'er one full year was run;
 The consequence of which did prove,
 To each a charming boy:
 This did cement their husbands' love,
 And added to their joy.
 By this event likewise it's plain,
 They did commence grandmothers,
 And that their husbands did obtain,
 Two young delightful brothers.
 A brother you may justly call
 Each to the other's father;
 Uncles they were reciprocal,
 You easily may gather.

Paradox.

Two fav'rite fields near to my dwelling lie,
 Their soil the same in depth and quality:
 The furthest distance, twenty acres measures;
 The nearest ten, but fraught with latent treasures;
 For, till'd alike, this yields me as much grain
 As does the first, though full as big again.

Answer.

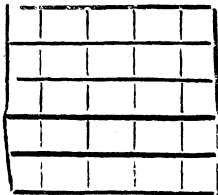
Because corn and trees always grow perpendicular to the horizon, an hemispherical hill of twenty acres surface will bear no more of either than a level field of ten acres surface, being equal to the horizontal and circular basis which the said hill stands upon. And no more pales are required to fence over any hill than would be required to fence over the level basis of the same, were the hill entirely removed, *i. e.* both palings being carried over the same horizontal direction.

Query.

There is a square piece of land containing 25 acres, designed for the reception of 24 poor men and their governor, who are each to have a house situated in his own ground, the governor's in the center. How many people's land must the governor pass through before he gets to the outside of the whole?

Answer.

Two: for the ground being a square, it will consist of 5 rows, each 5 acres, as per figure.



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Query.

If a servant sees any ill actions, or ill practices of a man or his wife one against the other, such as adultery, or the like, which tend to the ruin of each other—ought not such a servant to discover the same to the party injured? And if upon such discovery the man and his wife do part—Which is truly, properly, and equitably the cause of such separation, the informer, or the crime and criminal?

Answer.

So important a discovery ought never to be made without mature deliberation; if not, the advice of a faithful friend; for in many circumstances the injured party may be more happy in the supposed innocence of their adulterous mate, than under the torture of so ungrateful a disclosure: but if upon a prudent discussion of the matter, you have reason to conclude, that your discovery will prevent the ruin of one so heinously abused, you are under a strict obligation of performing so charitable an office;—and if upon so necessary a discovery a separation should ensue, the injured party is the efficient, the criminal the formal, the informer the instrumental cause of such a separation.

Query.

How old, and from whence is the custom of throwing at cocks on Shrove Tuesday?

Answer.

There are several different opinions concerning the origin of this custom; but we are most inclined to give credit to one Craenestein, an old German author, who, speaking of the customs observed by the Christian nations, gives us the following account of the original institution of the ceremony:

When the Danes were masters of England, and lording it over the natives of the island, the inhabitants of a certain great city, grown weary of their slavery, had formed a secret conspiracy to murder their masters in one bloody night, and twelve men had undertaken to enter the town-house by a stratagem, and seizing the arms, surprize the guard which kept it; at which time their fellows, upon a signal given, were to come out of their houses, and murder all opposers: but when

they were putting it into execution, the unusual crowing and fluttering of the cocks about the place they attempted to enter at, discovered their design: upon which the Danes became so enraged, that they doubled their cruelty, and used them with more severity than ever. Soon after, they were forced from the Danish yoke, and to revenge themselves on the cocks for the misfortune they involved them in, instituted this custom of knocking them on the head, on Shrove Tuesday, the day on which it happened. This sport, though at first only practised in one city, in process of time became a natural divertisement, and has continued ever since the Danes first lost this island.

Query.

Whether sage of virtue infused be more wholesome than Indian-tea?

Answer.

Bohea-tea has the pre-eminence, as corroborating the stomach, helping the concoction of aliments and cholick pains in the expelling of wind;—green-tea helps the suppression of urine, in the free excretion of it; which are much more efficacious properties than are in sage, &c.

Query.

Why Jesus Christ is said to be of the seed of David, and to what purpose is the genealogy of Joseph given, when Mary conceived before she came at him?

Answer.

To the first question we reply, that Jesus Christ is therefore said to be of the seed of David, because born of the Virgin Mary, who proceeded from David by lineal descent.

In answer to the second, we assign the following reasons of Joseph's genealogy, but founded on this necessary preliminary, that St. Matthew wrote his gospel primarily for the Jews, to whom, in the genealogy, he has a peculiar regard.

1. The Jews looked upon Joseph as real father to our Blessed Lord; if therefore they have suspected Joseph to have descended from any other line, this would have prejudiced their minds against the Gospel dispensation; St. Matthew therefore, to remove this mighty rock of offence, acquainted his countrymen, that in case Jesus Christ had been really the

son of Joseph, he had on that account been of the family and lineage of David.

2. St. Matthew, by tracing Joseph's ancestry, informed the Jews, that as Jesus Christ was naturally the son of David by his mother's, so he was legally so by his reputed father's side; and it would be no small satisfaction to them to behold their Messiah doubly the son of David, both by natural and imputative descent.

3. A mother's family was reputed as no family among the Jews, and therefore our Lord could be no otherwise inrolled than under Joseph's pedigree. Very pertinent was it then to give the Jews to know, that in one sense he would appear as the son of David in their public registers.

4. Joseph and Mary were both of the same family, and could not be unknown to the Jews, for whom St. Matthew wrote; while therefore he presented them with Joseph's genealogy, at the same time he acquainted them with that of Mary's, and he chose to give them Joseph's rather than Mary's, when either would suffice, in compliance with the received custom of his country, which (as is said above) made no account of the mother's family.

5. From the premises we may aver, that St. Matthew deduced Joseph's genealogy with design to shew that Jesus Christ was every way the son of David; that as he came to fulfil all righteousness, so he would evidence every punctilio of royal derivation.

Query.

When a man upon his trial says, he will be tried by God and his country, the clerk says, "Culprit, God send you a good deliverance:" Pray what is the signification of culprit?

Answer.

The Athenians have given some account of this. We are of opinion, that when the person pleaded not guilty, and put himself upon God and his country for a trial, the clerk pronounced these words, "*Qu'il le paroit*," let it appear so: i. e. Let it appear to God and your country, that you are not guilty of the crime you stand charged with; so that culprit appears to be a corruption of *qu'il le paroit*.

Query.

Whether a person that has compounded with his creditors, is not so strongly concluded by the above rule as to be incapable of performing any act of charity acceptable to God, before he has fully discharged the debts he compounded ?

Answer.

That acts of charity may be acceptable to God, they ought to be done with all the simplicity and sincerity of heart imaginable, out of a just sense of the duty we owe, and the dependance we have upon him, and not from our being struck with the misery of an object.

In the next place, what is so given ought to be strictly our own, which a person that has compounded with his creditors ought not to think so, till he has satisfied all their just demands upon him ; so that to make his charity acceptable to God, he must come up to those rules ; for though his creditors may give him a legal discharge for his composition, he can never be discharged in conscience till he has paid the last farthing ; but divines allow a liberty in small acts of charity, which can be no damage to creditors, and where we may presume upon reasonable men.

Query.

Whether persons who murder themselves may possibly be saved ; and if so, why are they denied christian burial ?

Answer.

That those guilty of suicide may be saved, we are extremely willing to hope, because it is presumed that nothing but a deprivation of reason could make a christian guilty of such an action ; agreeable to which, is the favourable opinion our courts of justice entertain in such case, where the person is generally brought in *non compos mentis* ; and certainly people deprived of reason will never be accountable for actions done contrary to it.

That they were denied christian burial by the law might be to deter others from such actions, since laws of that nature have been always made *in terrorem*.

Query.

Is it possible for mankind to attain to perfection? If not, why says our Saviour, "Be ye therefore perfect, as your Father which is in Heaven is perfect?"

Answer.

Sure man can never be so perfect as his Maker, since undeniable are those words of Eliphaz, "Behold, he putteth no trust in his saints; yea, the heavens are not clean in his sight." When therefore our blessed Lord commands to be perfect as our Father which is in Heaven is perfect, he proposes God as a pattern of perfection, which we should endeavour as accurately to imitate as our frail morality will permit; and while in this sense we set the Lord always before us, we shall be daily provoked to make nearer advances to the still distant object of our constant imitation.

Query.

Whether a man can properly be said to take cold?

Answer.

He may properly be said so to do, because the air being received in full draughts through the mouth into the Aspera Arteria, Bronchia and Vesicles of air belonging to the lungs, doth there encounter the blood, rendering it too thick, cold and clammy; whereupon, from the over-cooling of the blood, proceed coughs, catarrhs, &c.

Query.

How comes gaping to be catching?

Answer.

Gaping or yawning is infectious, because the steams of the blood being ejected out of the mouth do infect the ambient air, which being received by the nostrils into another man's mouth, doth irritate the fibres of the hypogastric muscle to open the mouth to discharge by expiration the unfortunate gust of air infected with the steams of blood as aforesaid.

Query.

Which is most to the advantage of a general, to end a war gloriously or have it continued ?

Answer.

The word advantage in the query appears to be drest in an ambiguous mantle : if it is meant that sordid interest which we distinguish by the name of gain, it is undoubtedly that way the advantage of a general to continue the war as long as possible ; but we believe the querist would be satisfied if the glorious ending of a war is not more honourable to a general than a continued bickering ; and to this we answer in the affirmative ; for if the war itself be justifiable, it must certainly be the highest pitch of merit in a general to watch every opportunity, and bravely screw the fortunes of his country to the elevated height of an illustrious victory.

Query.

Whether it is not a sin to say those words in the marriage ceremony, " With my body I thee worship ;" since it is promising, in the sight of God, to be guilty of idolatry ?

Answer.

There are two sorts of worship, a religious and a civil worship ; and as the one signifies that homage which we incommunicably pay to God ; so the other implies that respect which we pay to man : hence several magistrates are stiled worshipful ;—when the man therefore says to the woman, " I thee worship," he means no more than—I thee honour.

Query.

Pray how came crooked men by the title of my lord ?

Answer.

Among several probable accounts of this custom, the following appears most rational.

In the first year of the reign of king Richard III. commonly known by the name of Crookt-back, six persons, unhappily deformed in that part of their bodies, were made lords, as a reward for several services they had formerly done the king ; the novelty whereof occasioned the whole nation to make

merry with those sort of people, by advising them to go to court, and receive an honour which nature seemed to have designed them for: it is from this, we presume, the mock title of my lord has been ever since peculiar to such persons.

Query.

I have read in Jude, that Michael contended with the devil about the body of Moses. Pray inform me of the reason of their dispute?

Answer.

It is the opinion of some, that Moses was translated, like Elijab, into Heaven, and that the devil contended with Michael, that he ought not to be thus translated, in that he had been guilty of murder in slaying the Egyptian; but as Moses' translation has no other dependance than Jewish tradition, it is contrary to Deuteronomy xxxiv. 5. 6. "So Moses, the servant of the Lord, died in the land of Moab, according to the word of the Lord; and he buried him in a valley in the land of Moab." But since it immediately follows, no man knoweth of his sepulchre to this day; and the reason why his sepulchre was hid, was probably, lest the Jews (a people exceedingly prone to idolatry) should worship the body of so renowned a law giver; we may therefore not unreasonably suppose, that the devil would have discovered the concealed sepulchre, but was prevented by the arch-angel Michael, whence might arise that memorable contention mentioned by St. Jude.

Query.

Which is the most noble employment of a rational being, love or friendship?

Answer.

Friendship certainly is the most noble employment of a rational soul: love seems only the diversion of the mind, but friendship is its business; the first, in some measure, lessens the dignity of human nature; the latter raises and ennobles it, even to similitude of the Deity himself, for it gives us a taste of those joys which are only to be found in his presence, namely, a mutual desire of pleasing, and raising the felicity of each other;—but we ought to spend no time in

the proof of this, if we did but rightly consider, that friendship is the child of reason, love but the fondling of the passions.

Query.

What is the cause of little white spots which sometimes grow under the nails of the fingers? and what is the reason they say they are gifts?

Answer.

Those little spots are from white glittering particles which are mixed with red in the blood, and happen to remain there some time: the reason of their being called gifts is as wise a one as that of letters, winding-sheets, &c. in the candle.

Query.

Whether in admiring and meditating the lives, histories, humours, and sayings of men the most excellent, we do not run the hazard of losing our own natural advantages? For thinking to accord our humours to other men's examples, we forget or slight all that is our own, and scarcely ever do the other with a good grace.

Answer.

There is scarcely an excellence but what must be guarded with wariness and caution; and therefore as imitation is excellent in its kind, so it must be managed with wonderful circumspection: too nearly to copy after the sayings of other persons is to be parrots, and not men; to accommodate ourselves to their humours in the gross, is to ape, and not imitate; when therefore we set before us the most eminent examples, we must not be a servile herd, as the poet expresses it; we must separate the ore from the dross; we must not suffer any coin to be current among us, merely because it bears the image of the person we admire: in the most excellent of men, we must distinguish between their virtues and vices, their excellencies and defects; we must weigh the difference of conditions, of geniusses, of times, of places; and those other accidental circumstances which may entirely alter the nature of an action; we must endeavour accurately to know ourselves, that we may be thoroughly sensible, whether that be not awkward in us which is graceful in another; but above all, we must not

over-look our own talents, but must exert our faculties in refining, in improving, in inventing: and if we thus prudently direct our imitation, we shall make good that common simile, of a dwarf set upon a giant's shoulder.

Query.

Some men's spirits are visibly masters over those of others; the question is, Whether this does proceed from the excellency of education, or men's diversity of fortunes, or the real priority of souls?

Answer.

What propriety there is in the innate faculty of souls, human reason is incapable of judging; since whether those faculties be equal or unequal, a difference in the actual exertion of them may arise from the causes you have mentioned, to which we may prefix another.

1. That the natural contextures of our bodies may cause no inconsiderable difference in the actings of our souls is undeniably evident from undoubted instances: the capacities of some have been wonderfully impaired by accidental alterations in their bodies; and there have not been wanting those who, though of very eminent endowments, have yet, by some acute distemper, been unhappily reduced below the very level of common men; and this is further proved from the different geniusses in different countries, according to the difference in the nature of the climates.

2. The difference arising from education is so very palpable that we need not insist upon it: some men who, for natural abilities were once looked upon as of a common size, have, by industrious application, and the best opportunities of improvement, arrived to a quickness of understanding, and been in great esteem, not only for their studied acquirements, but also for the uncommon reach of their great capacities.

3. That the difference may arise also from the diversity of men's fortunes, we have a noted instance in the poet Ovid, who justly attributes the want of that sprightliness of thought he had formerly been master of, so conspicuous in his last compositions, to his very unhappy circumstances, which strangely enfeebles the natural vigour of aspiring souls.

Query.

Is it not better never to contract a friendship than to break it; and if the uneasiness of the loss of a friend be not greater than the satisfaction we find in having a friend.

Answer.

Friendship seems to be the supremest felicity of the soul, as to the conversation in this life, and consequently the pleasures which arise from it are above expression, where it is sincere, and placed on a deserving object; the breaking such a friendship therefore must be the greatest uneasiness that can happen to any person. But as we ought never to take up a friendship without the greatest consideration, and perfect knowledge of one another, so ought we never to break it, unless the greatest defects appear in the object; for the breaking such a friendship gives us a double wound, in depriving us of the good offices we expected from a friend, and arraigning our judgement which made so ill a choice; therefore the uneasiness of those reflections must be greater than the satisfaction which such friendship could bring us.

Query.

Why is it, when the mind is oppressed with extreme sorrow, it often inclines the afflicted person to sleep; whereas the vital parts being depressed, it should rather obstruct so peaceful an exercise?

Answer.

Extreme sorrow has usually the contrary effect: but as it must be allowed, that it sometimes has the effect you mention, so these different effects arise from the difference in the constitution; for as sleep is generally owing to the want of such a quantity of animal spirits as are sufficient to distend the nerves, so in most constitutions extreme sorrow so irritates the blood as to supply the nerves with a large store of animal spirits, whence consequently proceeds watchfulness; but in some constitutions the same degree of sorrow has a greater influence on the nerves to dissipate the animal spirits than on the blood to occasion proportionable supplies. But as our bodies are not at all times alike affected, so the same cause may produce different effects in the very same person at different times.

Query.

I have been taught, that if the product of any two factors be divided by either of those factors, the quotient will be the other: now if 2 is multiplied into 0, the product will be 0, therefore 0 being divided by 0, the quotient, which seems absurd, will be 2. Again, if infinite be multiplied by 2, the product will be infinite: therefore infinite being divided by infinite, the quotient will be 2, which seems as absurd as the other; pray be so kind as to explain this to me?

Answer.

You have explained it yourself very well, at least you have proved that it must of necessity be so, for when the two premises of an argument are true, the conclusion must also be true; yet as there is some difference between knowing that a thing is true, and having a clear idea of the truth of it, we will try whether we can so explain it as to make you conceive it clearly. Be pleased therefore to observe, that 0 is the term from which all quantities begin; now imagine that two mobiles set out from the same term, and that one of them moves with a velocity double to that with which the second moves, it is certain, that in all the instants of time, that which moves with a double velocity has described the double space of the other; therefore consider what has happened in one minute, and in half a minute, then in a quarter of a minute, and so on, till you come to the very instant of the beginning, you will have two progressions, whereof each term of one will be double to each corresponding term of the other; therefore the very beginning of one is double to the beginning of the other, that is, 0 in one case is double to 0 in the other; now if 0 may be double to 0, it is no absurdity that 0 divided by 0 is equal to 2; likewise, if the proportion be considered the other way, it is evident, that one infinite will be double to the other, therefore it is no absurdity, that infinite divided by infinite is equal to 2.

Query.

Whether we are not obliged to stand when we praise God; or to be in a standing posture when we sing psalms, especially since many of the psalms usually sung contain expressions of prayer and praise; and it being likewise the custom

to rise and stand, when we sing, *Gloria Patri*? And further, whether standing at singing was not customary in the primitive times?

Answer.

In what manner soever we are praising God, standing no doubt is the most agreeable posture; and therefore we suppose the custom of sitting, when the psalms are sung, to have proceeded from carelessness and inadvertency; though yet there are many pious and considerate christians who always stand at so divine an exercise; and this posture is punctually observed at St. Peter's, Cornhill, introduced, as we imagine, by the late pious Bishop of St. Asaph: and that the same posture obtained among the primitive Christians we have no reason to doubt, since they were used to stand at a less devotional employment.

Query.

What natural cause do we assign to that strange disturbance in the sleep which occasions persons to walk, and perform in many cases as if awake?

Answer.

The animal spirits, running through such passages of the brain as they find open to their admission, and consequently through the same passages they were used to pass, excite similar sensations in the soul, which disposes us to such actions in our sleep as, while awake, we were accustomed to perform.

Query.

What is the sin against the Holy Ghost; it being mentioned, but not told what it is?

Answer.

We cannot say, that we are not acquainted with the nature of this unpardonable sin; since the context gives us so clear a light into it. The Pharisees had maliciously and obstinately ascribed that wonderful power of God's holy spirit, whereby our Lord was enabled to cast out devils, to an impure, to an infernal agency; as therefore he reproves their inexcusable wickedness, so also he denounces an irreversible punishment. Does it not therefore plainly and naturally follow, from the

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common modes of speech, that so terrible a denunciation has a particular regard to that sin, that virulent sin of the Pharisees which gave occasion to it; but since after this our blessed Lord vouchsafed to promise the same delinquents that important sign of his resurrection from the dead; since upon the cross he condescended to implore their pardon at his father's hands; since we read, that the Holy Ghost was not yet given, that is, the public dispensation of that blessed Spirit which was not then commenced; since St. Peter in some measure excused their condemning the Lord of life; therefore some learned and judicious divines have not irrationally concluded, that the unpardonableness of thus blaspheming the Holy Spirit was not to take place till the day of Pentecost, till that signal time when God set as it were his last seal to the doctrine of his beloved Son, in whom he was well pleased.

Query.

In Gen. 1. we find that beasts were made before men; in Gen. 2. man seems to have been made before beasts. Your reconciliation of the matter?

Answer.

The sacred historian observes the order of time in chapter 1. but treats of things more promiscuously in the 2d. When therefore it is said, at verse 19, "Out of the ground the Lord formed every beast, &c. and brought them unto Adam," the meaning is, that he first formed every beast, and after that Adam was created,—brought them to him.

Query.

Where is Hell situated?

Answer.

The situation of Hell, or as it is called, a local hell, may justly be numbered among the secrets of Providence which are undiscoverable by man.

Query.

Does the punishment of Hell consist of a real fire, or of only the privation of the sight of God?

Answer.

Though it should not consist of a real fire, it will yet be more than a bare privation of the sight of God; for a consciousness of sin (however for a season it may be lulled asleep) is naturally and irrespectively a very exquisite tormentor. But though we cannot be positively assured, that the holy penmen intend any more by the mention they make of fire than to represent the torments of Hell under the most terrible resemblances (when yet they may infinitely exceed the images made use of), so neither can we say, that their expressions are not literally to be understood, since our bodies, as well as our souls, will be grievously tormented, which may be so ordered by Omnipotent displeasure as to be always burning and yet never burnt.

Paradox.

I did exist, and ever shall,
But now I don't exist at all.

Answer.

The* instant that we present call,
Did once exist, now, not at all.

Query.

Suppose one eye to be disposed so as to represent a man with his heels upwards, and that of the other to remain in its true posture, I ask, what idea would an intent looking on the man with both eyes frame in my mind?

Answer.

The eye that would represent the man with his heels upwards, would, or would not, be so disposed as to have the fibres of its optic nerve so correspondent to the fibres of the optic nerve of the other eye, as that an object represented by both may produce but one image in the brain: if the latter, you would behold a duplicate of the single object; the one in a right posture, the other in an inverted one;—that the object would be represented double, we learn from common observation; for when we so press one eye as that the rays emitted

* The least present part of time, flowing equally and continually, being gone, with other indefinite successions, before we can consider it.

from an object fall not on the correspondent fibres, each eye distinctly and separately exhibits the image of it to the perceptive faculty:—if the former be supposed, the object would be represented to us in so indistinct and confused a manner, that we should be at a loss to know what to make of it.

Query.

What is the reason that infants, hardly a week old, smile, no human object being, *in meo judicio*, capable to induce so merry a humour?

Answer.

Smiles arise not always from an impression made on the mind by outward objects, but sometimes from internal causes, viz. from a perfect state of health, &c. which disposeth the mind to alacrity, of which smiles are one effect, and may the rather be expected from children, not only from their never having suffered under any indisposition, but also from their not being sensible of the troubles of human life to allay their natural alacrity.

Query.

Pray your reason, why a cat when she falls, or is thrown from a house top, or any other place, always alights directly upon her feet?

Answer.

They are commonly, but not always, observed to light on their feet; and it is chiefly due to their tail, which they fan the air withal, whereby the swiftness of their descent is so far retarded, that they are enabled to prepare themselves in such a manner for their fall.

Query.

Why religion should make people ill-natured, and persecute one another? or whether it has not been the occasion of most of the barbarities in the world?

Answer.

That religion has been the occasion of the most barbarous and inhuman practices, both the Heathen and the Christian world afford us undoubted testimonies. That Paganism should

oblige its proselytes to so cruel a behaviour, we must forbear to wonder, since the great destroyer, the grand adversary of mankind, was the object of their worship; but if it be enquired (as we suppose it is by the Querist), why the professors of christianity, though the Prince of Peace, though that great preserver of men, be the author and finisher of their faith, should yet be guilty of such barbarous proceedings, as though their master came to destroy, and not to save men's lives? To this enquiry, we subjoin a very noted axiom—The best things, when corrupted, become the worst.

Query.

The godfathers and godmothers, when an infant is baptized by a minister of the church of England, solemnly promise and vow to God, in the name of the said child, or infant, that he or she shall live, and be perfect from sin all the days of its life: I think the ordinance of baptism imports thus much, yet the members of the said church generally, in discourse, argue against perfection, without, at, or near the point of death.

Answer.

The godfathers and godmothers do no where in the office of baptism, promise for the infant a perfect, an un-sinning obedience: it is true indeed they promise that the child shall conform to that which, if accurately and punctually conformed to, it will not fall short of absolute perfection; but then this conformity they promise is to take its estimation from the measures of sincerity, and not from the standard of perfection; that is, they promise in the child's name, that it shall sincerely endeavour to comply with the whole law of God, as far as frail mortality will permit; the promise therefore of godfathers and godmothers is to be taken in the same sense of that excellent petition in the Lord's Prayer, "Thy will be done on earth as it is in heaven;" for it is not supposeable, that men can be as perfect as angels; men encompassed with dust and ashes as perfect as those disencumbered, those unbodied spirits;—when therefore we put up that address to the throne of grace, we no more than implore our Heavenly Father, that he would enable us to come as near to those pure, to those spotless beings, as the necessary condition of our mortality will admit.

Query.

Why do we throw cold water in a man's face when he swooneth?

Answer.

Cold water thrown into the face, causes a contraction of the pores, surprizes the spirits, recalls them to their wonted emanations, and restores the blood to its due circulation.

Query.

Say, British youths, who with exalted heads,
Sitting next Pindia on sublime Parnassus,
Receive the laurels due to your great worth,
Why does the swelling Nile, thro' fertile plains,
Which runs tumultuous, overflow its banks?
And with its fat'ning slime rejoice the swain,
Who with his sharpen'd sickle comes to reap
A golden harvest; part, fruit of his care,
And partly caus'd by th' overflowing tide?

Answer.

When the warm sun from Æthiopian lands,
Remits the fervour, and bids winter reign,
Successive show'rs o'er distant mountains smoke,
And falling thence, in rapid torrents roll,
'Tearing as thro' the delug'd lands they fly,
'The muddy bottom of up-rooted earth,
And thick'ning with fat soil their growing streams:
Hence 'tis, that cov'ring with rich slime a ground
Which the hot sun had burnt to sand before,
Ægyptian plenty does with Nilus flow,
And by his fall, soon feels a sure decrease.

Query.

Why does a drunken man see double?

Answer.

The fumes of the liquor he is intoxicated with may be supposed so to disorder his eyes as that the representation of the object cannot fail upon the correspondent fibres of the optic nerves; whence it becomes impossible, that the two-

fold image exhibited by the two eyes should ever so unite as to produce but one resemblance in the brain.

Query.

I desire you will please to let me know, what sex the devil is of?

Answer.

By his roughness, one would take him to be of the masculine gender; but since he so often appears in petticoats, we have more reason to believe him an hermaphrodite.

Query.

Why doth a dog sweat only on the tongue, and not on the skin?

Answer.

Our opinion then is, that the dog's tongue doth not sweat, but we rather suppose the humour dropping from it in their pantings, to be saliva; and that the natural constriction, or straitness of their pores, prevents the perspiration of humours through their skins.

Query.

Why thunder turns beer, ale, &c. sour; and whether iron preserves or not?

Answer.

Thunder is apt to turn beer, ale, &c. sour, by the violent agitation and new fermentation it causeth in those liquors, by which their spirituous parts are in a great measure dissipated or depressed, and their tartarous parts exhaled:—several grounded, as they pretend, upon experience, will affirm, that iron hath that peculiar property to prevent that effect; but others will tell you, that it does it only by reason of its weight and pressure upon the vessel, and that any other ponderous body will have the same virtue; which last opinion seems more probable than the first, and may be confirmed only by repeated experiments.

Query.

Why is the nine of diamonds called the curse of Scotland ?

Answer.

Diamonds, as the ornamental jewels of a regal crown, imply no more in the above-named proverb than a mark of royalty, for Scotland's kings for many ages were observed each ninth to be a tyrant, who by civil wars, and all the fatal consequences of intestine discord, plunging the divided kingdom into strange disorders, gave occasion, in the course of time, to form the proverb.

Query.

From whence derived the origin of the word Dun ?

Answer.

Some falsely think it comes from French, where *donnez* signifies give me, implying a demand of something due ; but the true origin of this expression owes its birth to one Joe Dun, a famous bailiff of the town of Lincoln, so extremely active, and so dexterous at the management of his rough business, that it became a proverb, when a man refused to pay his debts, 'Why don't you dun him ? That is, why don't you send Dun to arrest him ; hence it grew a custom, and is now as old as since the days of king Henry VII.

Query.

Why fish, though bred in salt water, are yet fresh ?

Answer.

The solution of the question naturally follows from the necessary allowance of these undeniable propositions : 1. That the whole body receives its nourishment from the blood. 2. That the nutriment we take in cannot be secreted into the blood till rarefied by the heat of the stomach. And 3. That salt is incapable of such rarefaction.

Query.

Whether water, if drank from youth, would not be more agreeable to man than any artificial liquors ?

Answer.

The drinking of water may be beneficial to some constitutions, but destructive to others, and more especially to those who inhabit cold countries; nor do we find it agreeable in the hottest countries, for there the transpirations are so great, that the strongest liquors are scarcely powerful enough to supply the great expence of spirits.

Query.

Acknowledging that all dealings with the devil are abominably sinful, I desire to know, whether it is lawful to apply to those who profess fortune-telling.

Answer.

As the having recourse to such pretenders is too epidemical a distemper, so the solution of the question may be of public utility; but we may draw a very cogent argument against it, from your own acknowledgments; for what assurance can you have that the persons you apply to have no dealings with infernal spirits? and if they themselves imagine, that they have nothing to do with them, yet you know not but those subtile agents may have intercourse with them, as it were incognito, and influence their proceedings, though unknown to them. To this purpose we would present you with an authentic story: a gentleman used to busy himself that way, and from the schemes he had drawn, foretold several events; but perusing his schemes afterwards, and finding them notoriously false, he was strangely surprised, that true consequences should follow from such fallacious premises; whence, fearing the concurrence of an infernal agency, he wisely bid adieu to that suspected art.

But let us suppose nothing in the case but the rules of art; What art or science can acquaint us with the designs of Providence, with the intention of our all-wise disposer? What researches can make us know the mind of the Lord—can qualify us to become his counsellors? And, could human learning enable us to perform such wonders, what warrant have we to dive into the secrets of the Almighty, to invade our sovereign's prerogative, and boldly intrude upon those things which the Father hath reserved in his own breast, and you know withal, who has said, "It is not for you to know the times and seasons; take no thought for the morrow, for the morrow shall

take thought for the things of itself; sufficient for the day is the evil thereof?" And the same divine person is so far from allowing you to pry into futurity, that he commands you to pray only for your daily bread; and since God has forbid you the desire of knowing what shall be hereafter, you may well conclude, that it is best for you not to know it; and that such knowledge, as it is too wonderful for you, so also it is such as you cannot, without prejudice to yourself, attain to.

Under so unlawful a pretension, we may include palmistry, physiognomistry, &c. with the unwarrantable proceedings on St. Agnes' and other days, which are the unchristian relicts of Heathenish superstition. Let therefore this useful sentence restrain so unjustifiable a practice,—Commit your way unto the Lord, and he shall bring it to pass.

Query.

What occasions that numbness and pricking pain which sometimes happen in the hands and feet (commonly called their limbs asleep), whereby the parts so affected are for some time rendered incapable of feeling or motion?

Answer.

That numbness, or pricking pain, generally follows the compression, or constriction of the parts so affected, whereby the course of the animal spirits through the nerves is obstructed, and consequently the sense of feeling in a great measure diminished.

Query.

Is a man in point of conscience obliged to marry a woman whose affection he hath gained, if her father will not give her the fortune he hath promised, as it is evident he will not in the case of your humble Querist, who desires to know whether the breach of his promise doth not disengage me of mine, the one being so much the cause of the other, that without it, it had never been,

Answer.

If your contract was conditional, undoubtedly the lady's father breaking his part of the obligation, must of course dissolve your own; but if your circumstances will conveniently allow it, it would be but an act of honor and gene-

resity to marry, notwithstanding that, the object of your former courtship; for we find by your confession, you have gained her love, and in obtaining that, we must believe you have made other protestations than that you valued her for what she was to bring you.

Query.

Is there a passage from the nose to the brain by which the brain may be injured by taking of snuff?

Answer.

That there are passages from the brain to the nostrils is most certain, viz. the perforations of the Os Cribrosum, through which the nervous fibres descend; but they are so small, that snuff powder cannot be intermitted, or ascend through them to the brain; yet may the overmuch use of such powders so fur and clog that bone, that the discharge of excrementitious humours may be hindered, and the brain consequently very much injured thereby.

Query.

From whence did that saying arise, of nine tailors making a man?

Answer.

It happened (it is no great matter in what year) that eight tailors having finished considerable pieces of work, at a certain person of quality's house (whose name authors have thought fit to conceal), and receiving all the money due for the same, a Virago servant maid of the house, observing them to be but slender built animals, and in their mathematical postures on their shop-board, appearing but so many pieces of men, resolved to encounter and pillage them on the road: the better to compass her design, she procured a terrible great black-pudding, which (having way-laid them) she presented at the breast of the foremost; they mistaking this prop of life for an instrument of death, at least for a blunderbuss, readily yielded up their money; but she, not contented with that, severely disciplined them with a cudgel she carried in the other hand, all which they bore with a philosophical resignation: thus, eight not being able to deal with one woman, by consequence, could not make a man; on which account a ninth is added.

It is the opinion of our curious virtuosos, that this want of courage ariseth from their immoderate eating of cucumbers, which too much refrigerates their blood; however, to their eternal honour be it spoken, they have been often known to encounter a sort of canabals, to whose assaults they are often subject, not fictious, but real man eaters, and that with a lance, but two inches long, nay, and although they go armed no farther than their middle finger.

Query.

Whether the sun goes round the earth, and the earth stands still; or whether they both move, and how they move?

Answer.

We agree with the best modern astronomers, that the sun is an immoveable centre, round which the planets (of which the earth is one) move by different revolutions, but the figure which the earth annually describes is not circular, but elliptical; which is the reason why she does not continue equidistant from the sun; but as once a year she travels round the sun, so in the compass of 24 hours she moves round her own axis; whence arise the alternate successions of night and day.

Query.

Why do we sleep better on the right side than on the left?

Answer.

Your sleeping better on the right side than on the left is no general rule; since some sleep as well or better on the left than on the right, it being chiefly owing to custom; but if you ask why it is more wholesome to sleep on the right side, it may be answered, that such a posture is most convenient for the passage of the chyle through the pylorus, or nether orifice of the stomach, into the guts and clyliferous vessels, and consequently most proper for digestion.

Query, by a Lady.

What benefit doth one receive by kissing? and who was the inventor of it?

Answer.

Ah! Madam, if you had ever had a lover, you would not have required a solution, since there is no dispute but the kisses of a mutual lover give infinite satisfaction and pleasure, above description. As to the inventor of it, it is certain nature was its author, and that it began with the first courtship.

Query.

Whence arose the custom of drinking healths? and why is the King's drank before the church;

Answer.

The drinking of healths probably took its rise from the time of the Danes in this island; it being customary with the Danes, whilst an Englishman was drinking, to take that opportunity of stabbing him: the English upon this entered into combination to be mutual pledges of security for each other whilst drinking, so drank to each other's health and preservation; from thence also came the custom of pledging: the King being head of the church, his health claims precedence.

Query.

What are the excellencies and prejudices of Coffee?

Answer.

Coffee is a very great desiccative, it comforts the brain, dries up crudities in the stomach, and through its alcalous property is wonderfully beneficial in scrophulous and scorbutical habits of body; nor can we omit its inconveniences in respect to some partioular constitutions, as being subject to fur the stomach, engender obstructions, and to cause, rather than cure (as some will have it) splenetical and hypochondriacal distempers.

Query.

Why does tickling produce laughter?

Answer.

Because when tangible impressions pleasantly assault the fibres, the spirits implanted there are gathered together and

F f

delighted; and this sensation is communicated by the nerves to the common sensory, whence the imagination and præcordia are in such a manner affected.

Query.

What is the cause of the Cramp?

Answer.

It is caused by the evil disposition of the animal spirits, which being burdened with heterogeneous particles, and at length irritated, attempt an explosion thereof, but being thick and viscous, and consequently more tenacious, are shut up within the fleshy fibres, and the longer detained in the expansion; or it may be imputed to the constriction or ill conformation of the tendons, whereby the reflux of the spirits from the muscular fibres is obstructed.

Query.

Whence comes the proverb, As drunk as David's Sow?

Answer.

David Lloyd, a Welshman, kept an ale-house in the town of Hereford, and had a kind of monstrous sow, with six legs, which he showed to customers as a valuable rarity.

This David's wife would often use to make herself quite drunk, and then lie down to sleep an hour or two, that she might qualify herself for the performance of her business; but one day, the house was full, and she could find no other place to sleep in but the hog-stye, where her husband kept the sow above named, on clean straw, so she very orderly went in and fell asleep by her harmonious companion; but the sow no sooner found the door upon the jar, but out she slipt, and rambled to a considerable distance from the yard, in joy for her deliverance.

David had that day some relations come to see him, who had been against his marrying, and to give them an opinion of his prudent choice, he took occasion to inform them, he was sorry, that his wife was abroad, because he would have had them see her; "For," says David, "surely never man was better matched, or met with a more honest, sober wife than I am blest in."

They congratulated his good fortune, and were, after a short time, desired by David to see the greatest wonder of a sow that ever had been heard of in the world: he led them to the hog-stye door, and opening it to its full wideuess, the first thing they saw was his good wife, in such a posture and condition, as upon her starting up, and calling David husband, gave occasion for a hearty fit of laughter, and the proverb you have mentioned.

Query.

Doth the law of God, or the law of this land, forbid cousin germans to marry? If so, why is it ever allowed of? If not, why is it generally said that they never live happily and prosperously together?

Answer.

The marriage of cousin germans comes not within the prohibition prescribed us by our English laws; nor can we say, that it is forbid by a superior power, since not included in the catalogue of unlawful marriages, and so fully represented in Lev. 18. As for the usual saying, that such marriages never prosper, since it is the vulgar opinion, that the nearness of the kindred should forbid the banns, the notion therefore may proceed from hence, namely, that more notice may be taken of an unprosperous than of a prosperous match; but however that be, this must be allowed, that the rule is not without exception: but after all, we think it more eligible to forbear, since, as it would be thought generous to pay a deference to so common an opinion, so it may be accounted discreetly done not to venture upon the very first remove from so notorious an impiety as that of incest; and therefore, though we would not impose any restraint upon the couple specified, we would yet acquaint them, that though, if they marry, they may do well, yet, if they forbear, they will do better. We therefore think it more adviseable to refer the case to that apostolical assertion, "All things are lawful for me, but all things are not convenient."

Query.

Was the virgin Mary a perpetual virgin?

F f 2

Answer.

The argument drawn from that expression, "Thy mother and thy brethren stand without, &c."—to disprove her a perpetual virgin, carries no matter of conviction with it, since it was customary with the Jews to represent near relations under the endearing stile of brethren: and yet, had there been no such custom, they might have been Joseph's children by a former wife. If to this it be replied, that, as Joseph was the elder line, so his children were nearer to the crown than Mary's, and consequently her son could have no title to be king of the Jews, we answer, that God indeed made a sure oath unto David, that his seed should sit upon his seat for ever, but never promised the succession to the elder line; and this reply is the more confirmed, in that the son of David was to be a spiritual, not a temporal king; in that the prophecy, he shall have dominion also from sea to sea was to be fulfilled in a mystical intendment, agreeable to the profession of that very Son of David, my kingdom is not of this world: and as this is a confutation also to that similar objection which may be started in defence of the other side, namely, that Joseph never knew his wife, because his children by her must have been preferred to the Blessed Jesus, as, what has been already said, is equally a confutation to this objection also; so we may consider too, that Joseph might have known his wife without any necessity of having children by her; that if Mary would have naturally borne him children, yet since children are a gift that cometh of the Lord, that God, to whom, as the Jews express it, the key of the womb belongs, might have purposely restrained her natural fertility, and, as it were, have said to the blessed Virgin, thus far (namely to the birth of the Holy Jesus), thus far shalt thou go and no farther.

Some allege, that those expressions, Joseph knew her not, till she had brought forth her first born son, plainly intimates, that he knew her afterwards;—to which others (among whom is the excellent Bishop Pearson) make, as they think, a very clear reply, namely, that from parallel expressions in the scriptures it appears, that there is no necessity for such an intimation. But we beg leave to observe, that in the various instances they produce, there is not one parallel to the case before us; for if in them no such intimation presents itself, it is, because there is an obvious, an apparent reason for it. To give you a specimen.

In 1. Sam. 15. 35, we read, "And Samuel came no more to see Saul, until the day of his death." Now, since the passage signifies, that Samuel came no more to see Saul, as long as he lived, there is a palpable reason, why it cannot be intimated, that he came to see him afterwards; namely, because it was impossible he should: whereas no impossibility can be alledged in Joseph's case.

Our Lord, say some, is called the first born son of Mary; and the mention of a first, say they, implies a second; but this objection is readily confuted by the scripture usage of the phrase, as may appear from Exod. 13. 2. "Sanctify to me all the first-born;" for they who had but one child were from that command obliged to sanctify him to God.

A learned man concludes it at least improbable that Joseph should so long cohabit with his wife without the knowledge of her, since we no where read, that God had enjoined him so severe an abstinence; but to this we answer, that we no where read, that Joseph was commanded to abstain till she had brought forth her first-born son; and therefore the argument proves too much, since it proves withal, that he did not abstain till she had brought forth her first-born son: and yet this is contrary to the text.

We need not wonder, that the ancients were of opinion, that Mary was a perpetual virgin, since they exalted virginity to so high a pitch; nor that Origin was so strenuous a defender of that opinion, since he so grossly misapplied a sentence of our Lord's concerning virginity; nor that the Romanists are of the same mind with the ancients, since they look upon a marriage-state as not sufficiently pure for holy orders.

As we may be ready to conclude, that she remained a virgin, while we consider her high prerogative as mother of our Lord, as having been overshadowed by the Holy Ghost; so this consideration is wonderfully enfeebled by these suggestions, namely, what she was afterwards reflects nothing upon what she was before; that marriage is honourable and the bed undefiled; that that holy state is dignified with being an emblem of Christ's union with the church.

And thus we have thought it proper to examine the arguments on both sides, and propose the objections they are liable to, rather than determine the matter in debate, as thinking it best to follow the great St. Basil's advice, and leave so contro-

verted a point *ad huc sub dudice*, since it is of small concern to the mystery of the redemption.

Query.

May Pilate be accused of consenting to the death of Christ?

Answer.

Can we doubt of this, when the text expressly says, He delivered him to be crucified? It is true, indeed, he pronounced him innocent, but therefore inexcusable, since in the court of his own conscience he must be thence empleaded of knowingly, or wilfully shedding innocent blood; we cannot therefore sufficiently admire the preposterous behaviour of this unjust judge, who had the confidence to wash his hands, and declare himself guiltless of the very blood he was going spill: but if the man was so strangely stupid, (for it is of the nature of sin to infatuate the sinner) as that his heart condemned him not, God was greater than his heart, and knew all things: for vengeance overtook him with an unwelcome speed; for Vitellius, governor of Syria, deposed him from his government, and sent him to Rome, to answer before Tiberius to the charges that were laid against him: and though Tiberius died before his arrival, yet the guilty wretch received not his pardon from the new emperor, but was banished by Caligula to Vienna in Gaul; where being wearied out with the emperor's persecutions, he became his own executioner, and dispatched himself. As Judas had done the same before, so the betrayer and condemner of our Lord, in compensation as it were, both betrayed and condemned themselves. He who delivered up the Son of God, rather than be suspected as not a friend to Cæsar, found an enemy in himself and in Cæsar too. That very method (O the wonders of an over-ruling Providence!) whereby it was his design to promote his welfare, became unfortunately, but justly, the occasion of his falling.

“They, says our Lord to Pilate, who delivered me unto thee have the greater sin:” whence we have at once Pilate's sin plainly intimated to us, and are made acquainted too, that injustice, when proceeding from spite and malice, is more criminal than when proceeding from any other cause. And this may sure engage us to put away the old leaven, the leaven of malice and wickedness, the leaven of the Pharisees, as our

Saviour calls it, of those very Pharisees who delivered Christ to Pilate: to put away that old leaven, and eat the unleavened bread of sincerity and truth.

Query.

I desire to know the meaning of the third Heaven, 2. Cor. xii. 2.

Answer.

There is a number frequently made use of to denote a superiority of degrees: thus *ter felix*, thrice happy, signifies no more than very happy; and therefore the third Heaven is designed by the apostle to express the highest Heaven, the place where the shechinah, or divine presence, displays itself to the blessed angels. Not that from hence we can gather any thing of the situation of Heaven, or a local Heaven, since this may be no more than a condescensive accommodation to human capacity.

Query.

The Chinese give an account for 500 years (or thereabouts) before our bible: now, if their account be true, our's must be false, which I am well satisfied in myself it is not, but that will not do in argument; so I beg the favour of you to help me out.

Answer.

The Divine Providence, for the confirmation of believers and the conviction of infidels, has so wisely, (and give us leave to add) so mercifully contrived the matter, that the Chinese historians stand self-condemned, and are confuted by themselves; and this is observable in remarkable particulars:

1. They speak of a memorable conjunction of the five planets in one of their signs, while the sun and moon were also in conjunction, during the reign of their fifth monarch, Chuenbio; which observation, a celebrated astronomer, by a nice calculation, has, without danger of being objected to, placed about 500 years later than the tenor of their relations does infer.

2. They say also, that in the time of their seventh emperor, Yao, the winter solstice was about fifty degrees from the place where it was a few years ago; whence astronomers acquaint

us, that the phenomenon (if the observation was accurately taken), must have necessarily occurred near the forementioned number of years later than as represented in their chronology.

We insist not on the argument drawn from the common period of human life in the reigns of their early monarchs, since that depends upon a comparison with scripture history, whereas we are confuting those who deny the authority of the bible; and indeed we have no occasion for the argument, when furnished with two so indisputable as those above.

To point out the original of the Chinese mistake, it is a more than probable hypothesis, that they (as did also the Egyptians) reckoned some ancient collateral princes in a successive line; for there are remarkable passages in their histories, that evince, not only that this observation of a great chronologer has a probable foundation, but also that it is impossible it should be otherwise.

And now, since those opposers of our accounts do yet plead for us, and our very enemies (though unwillingly, nay, perhaps unknowingly) are at peace with us, shall we not believe the scriptures with a steady and unshaken mind; and learn, for the time to come, not to be startled at seeming difficulties.

Query.

Do Spirits see, or are they blind?

Answer.

They neither see, nor yet are blind: but then we must understand sight as the natural effects of corporeal sensation: for spirits have undoubtedly something analogous to it. But though we know little of immaterial substances, but by way of negation, yet we may form some imperfect idea concerning the object of the question from what metaphysicians acquaint us of the sensation of seeing; for they tell us (and that very rationally too), that the eye is but the instrument of sight, whereas it is the soul that really sees; but as that incomparable member is the vehicle by which embodied spirits enjoy the benefit of vision, so in what manner unembodied ones enjoy the same benefit, we shall ever be at a loss to know, till disengaged from these fleshy tabernacles.

Query.

Why are the rocks on which Sir Cloudesly, in return from his successful expedition to Thoulon, was cast away upon, commonly called the Bishop and his Clerks?

Answer.

A fleet of merchant ships in their return from Spain, about two hundred years ago, were shipwrecked on those fatal rocks, among whose miserable numbers none were saved but three, Miles Bishop, James and Henry Clerk, preserved miraculously on a broken mast: it was thence the scene of their misfortune took the name it bears at present, and has ever since that memorable accident vulgarly been known by.

Query.

A. commits a secret murder, for which he flew from justice, and in his exile comes acquainted with B. who in five or six years acquaintance, expresses great friendship to A. with signal and repeated obligations, till within this month, A. for a trifle highly disoblige B. who is so enraged to find himself so affronted, protests that his misdemeanour to B. shall cost him his life, for that he will discover the residence of the said A. to the relations of the deceased, so that A. may be brought to justice.

Now the fact being true, and the relation also impartial, whether it is a crime in B. to fulfil his protestations; and although it is coherent to the laws of the land, yet in the sight of the Almighty, whether it may be proper for men to imagine it *ipso facto* murder, since it is not done for the sake of justice, but to sacrifice A. to the resentments of the other, of what nature and degree do you think the crime?

Answer.

Since the blood of a murdered person crieth unto God for vengeance, and, unless pacified, defileth a land, our duty both to God and our country lays on us an indispensable obligation to detect, if in our power, the inhuman actor. Were not B. previously obliged to make a discovery of A. his protestations could no way engage him to the pursuit of his revenge, since nothing can oblige us to an unwarrantable action. When Herod had rashly sworn to what involved him in no small perplexity, he should have feared, not his oath as the murderer of

the innocent, and have penitently bewailed his rashness, in that he had made perjury become necessary. The best therefore, nay the only advice we can give B. is to repent of the protestations he has made with so wicked an intention, to divest himself of any revengeful thoughts, to put on the christian towards his offending brother, and yet at the same time, by a necessary discovery, to offer him up a sacrifice to his country, to his God: but if he refuses to make this atonement for the deceased, he does in a manner, repeat the language of the Jews,—His blood be upon me, and upon my children.

Query.

Why is it common in our church to sit when a chapter is read out of any evangelist, and yet to stand when the gospel for the day is read?

Answer.

It was the custom in the primitive church, to stand when any thing was read out of the evangelists; and therefore it is remarked by an ecclesiastical historian as an unprecedented thing in an Alexandrian bishop, in that he used not to rise at the reading of the gospels. But why we rise to the gospel for the day, and not to the second lesson, we presume to be, because the former is introduced with "Glory be to thee, O Lord!" which, as being an hymn of praise, is proper to be repeated in a standing posture.

Query.

I desire to know, why the masculine gender is generally said to be the more worthy gender, notwithstanding all or most virtues are of the feminine, by which man seems to have nothing to do with virtue?

Answer.

Though the virtues are of the feminine gender, yet men being, by their labours, studies and applications, masters of those virtues, the masculine gender is more worthy than the feminine; the possessor being more worthy than the possessed.

Query.

Why have beasts the faculty of moving their ears, and not men?

Answer.

Because several beasts have muscles, constituted for that end, which men have not, and may be called erectors and depressors, which move the ears upwards and downwards, though some beasts want them as well as men.

Query.

In what respect is Noah called the eighth preacher of righteousness, 2. Pet. 2. 5. seeing in the genealogy of the Patriarch, Gen. 5, he is reckoned the eleventh, inclusively ?

Answer.

As Noah is not the eleventh, but the tenth, in the genealogy you mention, so the ordinal eighth in St. Peter is joined to person, not to preacher of righteousness ; and relates to the number of those who were saved in the ark from perishing in the deluge, as the text evidently shews. But because the stiling of Noah the eighth person of those that were rescued from the flood, may seem to denote him the last of the eighth, whereas he was the first ; we must know, that the phrase may always signify one in eight, or that Noah, with seven more, was saved from that common calamity,—a propriety of speech to be found also in prophane authors.

Query.

Why does a seed taken from a flower of one colour produce a flower of various colours ?

Answer.

The diversity of colours proceeding only from the different, either figure or position of those particles which constitute the surface of a body, by making a different reflection and refraction of the rays of light falling upon them, to produce a variety of colours in a flower, nothing more is requisite than that some alteration be made in the situation of those parts, out of which its superficies is composed ; which may be easily effected by some small difference in its nutritious juice, or by the ambient air.

Query.

From whence rain first came.

Answer.

The rain first proceeds from the vapours attracted from the earth and waters, which meeting together, condense into clouds, and becoming at length too ponderous to be suspended in the air, break, and shower down again upon the earth and waters.

Query.

Whether the howling of a dog under the chamber of a sick person is any prognostic of the mortality of the patient's disease. If so, how do you imagine those creatures should be sensible of it? The Querist was induced to give you this trouble by some very particular observations.

Answer.

Whether the dog's howling may be a fatal prognostic or not, we cannot determine; but it is probable, that out of a sense of sorrow for the sickness or absence of his master, or the like, that creature may be so disturbed: an eminent instance whereof may be found in Dr. Lee's Nat. Hist. of a dog, that, during his master's illness, constantly attended him, and after the gentleman was expired, and his corpse moved, the dog every moment entered the room, making a mournful and whining noise, and prosecuted his researches for several days through all the rooms in the house, but in vain; then he retired into his kennel, where, refusing all manner of sustenance, he died. A greater sense of sorrow could not be shewn by any creature whatever.

Query.

Pray demonstrate that rule in specious arithmetic, that to take away an affirmative quantity is to add a negative, and to, &c.

Answer.

An affirmative quantity denotes the possession of such a sum, but a negative quantity implies the absence of it, or a debt of such a value; as therefore, when from my possession of 100l. the possession of 60l. is taken away, I am then worth 40l. so when to my possession of 100l. is added a debt which I must pay of 60l. I am then worth the same 40l.

Query.

Why springs in summer are more cold
Than winter, pray the cause unfold?

Answer.

Those limpid streams retrieve their heats
From earth's recluse sulphureous seats;
Which winter time preserves entire,
And which in summer time perspire.

Query.

Why is an egg so hard to break the length way, and yet so easy the other?

Answer.

Because the two ends of the egg are so globular, that the stress of the pressure declines towards the cohesion of its parts; which is the reason why an arch will bear more weight than a flat.

Query.

I desire your opinion of the following passage of scripture, Luke xxii. 36: "He that hath no sword, let him buy one;" which seems to contradict the other passage in Matth. xxvi. 52. "They that take the sword shall perish with the sword."

Answer.

As the latter shews us, that the true spirit of the gospel is abhorrent of the least tincture of revenge, productive of no other fruits than the peaceable fruits of righteousness; so the former is a kind of emblematical command, which hieroglyphically, as it were, pre-signifies the terrible persecutions that were approaching, so terrible indeed, that it would be necessary for the christian to purchase a sword at the expence of his very garment, would his religion but permit the use of it.

Query.

Whether the invention of Gunpowder has done most good or hurt.

Answer.

Most good undoubtedly; for as it is very useful on several accounts, without any mischievous effects attending it, so in war itself, where it is most destructive, it is rather a preserver than destroyer of men; since in our modern accounts we meet not with such proportional numbers slain in battle as we read of in ancient histories.

Query.

Condescend, I beseech you, to give me your opinion, whether the violent passion of love, very ill-treated, does not consequently turn to hatred.

Answer.

Not consequently, for it much oftener produces despair; but we see different effects of that ungovernable passion, according to the different constitutions of those it seizes.

Query.

Admit a person to see any inaccessible object situate across a river not too far off, and wishing to know the exact distance thereof—Required by what means he may find the same; he having no instrument, usual for that purpose, at that time about him.

Answer.

The line to be measured must not be extravagantly long, otherwise it will be hard to measure it exactly; for the least failure of a just aim, or departure from an upright position, would make very sensible errors in the measure of a very long line, especially if the ground is somewhat uneven.

To measure then the line A B (Plate VI. Fig. 5.) accessible at the extremity A, suppose the breadth of a small river, he who pretends to measure must stand very straight at the extremity A, and support his chin with a little stick, resting upon one of the buttons of his coat, so as to keep his head steady in one position: thus posited, he must pull his hat down upon his forehead, till the brim of his hat cover from his view the inaccessible extremity B of the line to be measured A B; then he must turn himself to a level uniform piece of ground, and with the same position of his hat, observe the point of the

ground where his view terminates, as C; then measuring with a line or chain the distance A C, he has the length of the line proposed, A B.

Query.

The genuine sense of Gen. vi. 2. "The sons of God saw the daughters of men, and that they were fair, and they took wives of all which they chose."

Answer.

The sons of God were the children of Seth, who were the holy seed; and the sons of men were the posterity of Cain, who were a prophane generation.



APPENDIX.

Optics.

There being several things in Optics which are easy to be understood, and not generally known; we shall here add a few, and first of all the

DEFINITIONS.

1. **W**HATEVER grants a passage to light is called a medium.
2. By rays of light are understood its least parts, either successive in the same lines, or cotemporary in several lines.
It is clear that light consists of parts both successive and cotemporary, because in the same place you may stop that which comes one moment, and let pass that which comes immediately after: the least sensible part which may be stopped, or suffered to proceed, is called a ray of light.
3. Refrangibility is that disposition of a ray of light to be refracted, or turned out of its course, when it passes out of one medium into another.

When a ray of light passes out of a rarer medium into a denser, Sir I. Newton supposes that it is refracted by the superior attraction of the denser medium, and by that means drawn out of its course.

4. Reflexibility is that disposition of a ray of light to be reflected, or turned back into the same medium from any other medium upon whose surface it may fall.

Sir I. Newton supposes that light is not reflected by impinging upon the solid parts of the body, but by some power of the body which is evenly diffused all over its surface, and by which it acts upon the ray, and impels it back without immediate contact.

5. Inflection is that disposition of a ray of light to be turned out of its course when it passes very near to the edges of bodies.

6. The angle of incidence is the angle which the line described by the incident ray makes with the perpendicular to the reflecting or refracting surface at the point of incidence.

7. The angle of reflection or refraction is the angle which the line described by the reflected or refracted ray makes with the perpendicular to the reflecting or refracting surface at the point of incidence.

8. Any parcel of rays diverging from a point, considered as separate from the rest, is called a pencil of rays.

9. A lens is a medium bounded by two spherical, or one plain and one spherical surface; and the line joining the centres, or which passes perpendicularly through each surface, is called the axis.

There are six lenses, a double convex, a double concave, a plano-convex, a plano-concave, a concave-convex, and a meniscus.

10. The focus of ray is that point from which they diverge, or to which they converge.

The focus of parallel rays is called the principal focus.

The sun's light consists of rays of different colours, and differently refrangible.

For if the sun's rays be admitted into a dark room through a small hole in a window shutter, and be refracted through a prism, the image is not round, but a long figure with parallel sides and semicircular ends, the length of which is above five times its breadth; that end which has suffered the least refraction is red, and that which has suffered the greatest is violet: the whole image consists of seven distinct colours, lying in the following order, red, orange, yellow, green, blue, indigo, violet; the red is the least refrangible, and the others more in their order: these are called primary colours, all other colours being only different combinations of these. Each colour forms

a distinct image of the sun, which images, in this experiment, running into each other, make a gradual change of colour in the image; but if a convex lens be placed before the prism, each image will be diminished, and by that means they will be separated, and each rendered distinct.

If two coloured images be formed with two prisms, and thrown one upon the other, then if that image be looked at through a prism, the images will be again separated.

The primary colours cannot be separated into other colours by any refraction.

For if in the last experiment all the colours but one be stopped, for instance, the red, and that be again refracted by a prism, it suffers no alteration in colour. By suffering the colours to pass in succession, from the red, each preserves its colour, but the quantity of refraction keeps increasing. The image of each colour is perfectly circular, which shews that the light of each colour is refracted regularly without any dilatation of the rays; it is therefore uncompounded, or homogeneous.

If the breadth of each colour in the spectrum formed by the prism be measured, it will appear that the breadth of the red, orange, yellow, green, blue, indigo, violet, are as the numbers 45, 27, 48, 60, 60, 40, 80, respectively.

If the circumference of a circle be divided into 45° , 27° , 48° , 60° , 60° , 40° , 80° , and the respective sectors be painted red, orange, yellow, green, blue, indigo, violet; and the circle be turned swiftly, it will appear nearly white; for the ideas we have from the impression of light remain for a short time, and thus the colours excite the same sensation as if they all entered the eye collected together.

If the direct image of the sun through a small hole be received upon a screen perpendicular to the rays, and the rays be then intercepted by a prism, and fall perpendicularly on the first side, if the distance from the place of the direct image to the nearest edge of the red and farthest of the violet be measured, they will be the tangents of the angles of deviation, and the radius of which is the distance from the point where the rays emerge to the place of the direct image.

The angle of incidence on the second side of the prism equal the refracting angle of the prism, to which add the deviations of the two extreme colours, and we get the two angles of refraction, the sines of which will be to the sines of

incidence as 77 and 78 to 50: hence, if the difference between 77 and 78 be divided in the ratio of the breadth of each colour, it gives for the sines of refraction, the common sine of incidence, being 50; that is, the sine of incidence: the sine of refraction of the red rays: : 50: not less than 77, nor greater than $77 \frac{1}{8}$ th, the boundary of the red; and the same for the rest.

Candle-light is of the same nature as the light from the sun; for rays from a candle may be separated into all the different colours, and they lie in the same order as in the light from the sun.

The sun's light consists of rays which differ in reflexivity, and those rays which are most refrangible are most reflexible.

For after forming a coloured image, as before, with a prism, by turning the prism about its axis, until the rays within it which, in going out into the air were refracted at its base, become so oblique to the base as to begin to be totally reflected thereby, those rays become first reflected which before, at equal incidences with the rest, had suffered the greatest refraction.

According to Sir I. Newton, the colours of natural bodies arise from hence, that some reflect one sort of rays, and another sort more copiously than the rest.

For every body looks most splendid in the light of its own colour, and therefore it reflects that the most copiously: besides, by reflection you cannot change the colour of any sort of rays; and as bodies are seen by reflection, they must appear of the colour of those rays which they reflect. This is the opinion of Sir I. Newton; but Mr. Delaval accounts for the colours of natural bodies in a manner different from this. See the Manchester Memoirs, Vol. II.

Thin transparent substances, as glass, water, air, &c. exhibit various colours according to their thickness.

For a very thin glass bubble, or a bubble of water, will appear to have concentric colours: the bubble blown with water, first made tenacious by dissolving a little soap in it, continually grows thinner at the top by the subsiding of the water, the rings of colours dilating slowly, and overspreading the whole bubble. A convex and concave lens of nearly the same curvature being pressed closely together, exhibit rings of colours about the point where they touch. Between the colours, there are dark rings, and when the glasses are very much compressed, the central spot is dark. Sir I. Newton, to whom

we owe all these discoveries, found the thickness of the air between the glasses where the colours appeared to be as 1, 3, 5, 7, 9, &c. and the thickness where the dark rings appeared to be as 0, 2, 4, 6, 8, &c. the coloured rings must have appeared from the reflection of the light, and the dark rings from the transmission of the light; the rays therefore were transmitted when the thickness of the air was 0, 2, 4, 6, 8, &c. and reflected at the thickness 1, 3, 5, 7, 9, &c. Sir I. Newton therefore supposes, that every ray of light in its passage through any refracting surface is put into a certain constitution or state, which in the progress of the ray returns at equal intervals, and disposes the ray at every return to be easily transmitted through the next refracting surface, and between the returns to be easily reflected by it. These he calls fits of easy transmission and reflection.

LIGHT AND HEAT TWO DISTINCT BEINGS..

The following propositions relating to the nature of Fire, and the following laws of its motion, are taken from Dr. Hillary's Book upon that subject, and are so curious, that a copy of them will, I believe, please many of our readers :

PROPOSITION.

I. Fire is a being which exists in all places, or in every part of space in the whole universe.

II. Pure fire is a real body, and consists of the most simple, solid, hard, smooth, and smallest elementary particles of all matter yet known.

III. Pure fire is one and the same being in all places; or there is but one species of fire existing in nature.

IV. Pure elementary fire penetrates, pervades, rarefies, and expands all other bodies in the universe, both solid and fluid, which fall under the observation of our senses; and this power is peculiar to fire only, and to no other body that we yet know of..

V. Pure fire is a body without gravity; and has no more tendency to any one part of space than it has to any other part.

VI. Pure fire exists in a state of equilibrium, and rests in every part of space, till that state is changed by the motion of other bodies, or by the directing power of the sun; and those ceasing to act on it, it restores itself by its repulsive power to the state of equilibrium and rest again.

L A W.

I. Fire is attracted and collected by the motion and attrition of all other bodies.

II. The elementary particles of fire are in a constant state of repulsion to each other; and the nearer they are brought to contact, the greater is their repulsive force from each other.

III. Fire is put in motion in parallel right lines, by light emitted from the sun, and caused to move with force, and produce heat and more light.

These propositions and laws, the Doctor proves by many curious experiments as well as arguments; and he concludes, that fire and light are two different and distinct beings, which he likewise proves by experiments as well as argument. One of the former sort of proofs he gives us as follows:

“First, it is evident and universally acknowledged, that the moon is a body which has no light but what it receives from the sun.”

“Then let us place a concave speculum, as that of *Villet's*, with which the experiment has been made, opposite to the moon when she is at the full, in a serene cold night, and the light which the moon receives from the sun will be reflected from it upon the speculum, and from thence into its focus, where a most resplendent and refulgent light will be seen, almost equal to that received and reflected by the same speculum from the sun, only a little paler; then place a thermometer, which is easily removed by the least degree of heat or fire, as that of *Drebellius* in that refulgent focus, and we shall find that the air in the thermometer will not be in the least expanded or moved; and shews, that there is no more fire in that focus than there was before the resplendent light was collected there, or was then in the circumambient air, though so great a quan-

tity of light was in that focus at the same time. This experiment demonstrates, that a great quantity of very bright refulgent light may be collected, and can exist alone in a given space, without any addition of heat, or any increase of the quantity of fire: it also shews, that this light, which comes from the sun, is, when thus reflected from the moon, so changed in its power of acting on fire, that it has totally lost its power of putting the pre-existing fire in motion in parallel right lines, and producing heat. The same experiment being made, though with a much less speculum, within the torrid zone, where so great a quantity of fire existed in the common air where the experiment was made, that it caused the mercury in Farenheit's thermometer to rise as high as 80 degrees; yet the reflected light from the moon, which was so refulgent in the focus of that glass speculum, did not in the least act on that pre-existing fire, so as to put its particles in motion, nor produce the least increase of fire or heat: hence it is evident, that as this great light neither acts as fire, nor produces the same effects which fire does, it consequently is not fire."

Query.

Why does the sun extinguish a culinary fire, and yet not put out the flame of a farthing candle?

Answer.

The properties of fire are not yet thoroughly known; thus for instance in many of our mines in England: in some, the miners are obliged to work by the light of a steel wheel striking against a number of flints, for the flame of a candle would at once set the whole mine on fire; in other mines, they are obliged to work by the light of a candle, and a single spark from a flint and steel would set the mine into a blaze: now with regard to the question in hand, the blaze of a culinary fire is of such a nature, that it requires a strong body of air for its support; but the warm sun beaming in through a window, rarefies the air, and takes away that fuel (if I may so call it) which feeds the fire: on the other hand, the flame of a candle is such, that it requires the smallest and evenest quantity of air to keep it alive; therefore the rarefaction caused by the beams of the sun can have no power upon it.

Query.

It is well known, from repeated observations, that in hot weather, when the sun has shined for several days successively, the effect of the burning glass is much weaker than when the sun shines immediately after a shower. Required the reason of this phenomenon.

Answer.

From experience it is well known, that heat exhales from the earth a prodigious number of sulphureous homogeneous particles, which by their gravity float in the atmosphere, absorb, and prevent the incorporating rays from falling parallel, or with such great coalescence upon the mirror; whence, immediately after a shower, the rain precipitating the sulphureous particles, purges the air of its absorbing matter, so that the numerous converging rays fall parallel upon the mirror, and are driven against the combustible body with an incredible, superlative, inflammable force.

A curious Query by Mr. Newton Bosworth, Peterborough, taken from Whiting's Mathematical and Philosophical Delights, No. 9, lately published, and an Answer by Mr. Gregory.

It has been proved by repeated experiments, that neither spirits of wine, nor any other inflammable liquor, can be set on fire by any burning glass yet made use of. How is this curious phenomenon to be accounted for?

Answer.

So long as it was the general received opinion that the sun was a body of fire, and that the solar rays were hot, it must appear a very singular phenomenon, that spirits of wine could not be set on fire by a burning glass, when the same means would fuse iron and gold, calcine fossils, and vitrify tiles and pumice stones. I know not what methods have been hitherto made use of to account for this, nor can I readily conceive how it can be done satisfactorily, without according to the opinions lately proposed concerning the nature of the sun.

Several weighty arguments have been offered by Dr. Herschel and others, to shew that in all probability the sun is but little hotter than the earth we inhabit, and that of course, the rays

which are emitted from him (or more probably from his atmosphere) are not hot: they produce heat, only when acting upon some peculiar kinds of matter, as the collision of flint and steel produce fire, though neither of them are hot.

Bodies are more heated from the action of the sun's rays, in proportion as they are more dense, or as they are more rough; they are also more heated in proportion as their colour deviates from white; and the more opaque bodies are, the more they are affected by this method of producing heat.

Perfectly white and perfectly transparent substances have very little, if any, heat produced in them by the action of the sun's rays. These observations are the result of repeated experiments; but to account for the different dispositions of various substances (as deduced from these experiments) is a task that cannot very readily be performed, without a further acquaintance with the arcana of nature than has yet fallen to the lot of short-sighted mortals.

The Great Architect has, we may be assured, for wise purposes, given to different substances different qualities and powers, and with this we perhaps ought to rest satisfied, until the time arrives when his people shall, separated from this veil of mortality, view him, and the grand plan of all his works, as designed from eternity, with enlarged faculties, rapture indescribable, and gratitude unbounded*.

AN ESSAY ON THE AURORA BOREALIS.

Suppose the earth a great magnet.—That magnetic effluvia are constantly issuing in great quantities from its North Pole, and that these move from the north to the southward in the direction of what is called the magnetic meridian; that these effluvia are of a martial or ferrugineous nature, nothing being magnetical but a substance of that kind, and *vice versa*.

* But may not the reason be this, viz. the focus falling upon one point or particle of the fluid that immediately quits its station for another, and so keeps in a continual state of agitation, still flying from the centre of the surface in all directions; consequently, that centre will be the hottest particle in the fluid, and must undoubtedly kindle, if it were not for the state of perturbation the fluid was now got into, which will resemble a fluid in a state of boiling; this I presume may be the reason why; for a fluid, though it may be inflammable, yet put into a vessel over the fire, will never kindle without boiling.

Iron and sulphur, even in their gross bodies, mixed with a little water, are exceedingly apt to take fire, much more so, when highly subtilized and attenuated.—The hot mineral waters probably arise from this, and so many volcanos. All chemists know with what eagerness sulphur acts upon iron. Several volcanos, or burning mountains, having been discovered of late years in and about the north-polar regions, which cast up sulphureous vapours to an immense height: there are springs near them the hottest in the world, their heat even equalling that of boiling water.—May not those sulphureous vapours, blended with the magnetic or ferruginous effluvia, catch fire and fulgurate?

The vapour or fume of iron dissolved in spirit of vitriol is most readily set on fire.—May not the magnetic effluvia give them a kind of magnetic direction; we see in fact, the lucid columns, or radiating flashes, of the Aurora Borealis, almost always shot off from the north to the south, correspondent in a great measure to the magnetic meridian.—And I have constantly observed the corona, concourse, or concentration, if I may so call it, of these lucid rays near the zenith so much to the east of it, as answered nearly to the western declination of the common magnetic needle; that is, a straight line, drawn from one to the other, would be nearly in the direction of the magnetic meridian:—I think I never observed the corona to the westward of it:—what seems not a little to confirm this notion is, that during the appearance of a considerably great and vivid northern light, the magnetic needle suffers very great agitations; caused, probably, by the colluctation and explosion of the sulphureous and magnetic effluvia. This is more particularly observed in Sweden and the north parts of Europe, as being near the source of these effluvia.

But further, as we scarcely ever see an Aurora Borealis, but when the wind blows from some point or other between the east and west of the northern semi-circle; this also may help to drive the sulphureous coruscating vapours southward; and when the wind is very strong from E. N. E. or W. N. W. it may not a little alter their magnetic direction, or current. I have several times observed, when a strong north-easterly wind hath blown, some faint appearances of a northern light here and there, and abundance of small, lucid, coruscating mibiculæ scattered up and down the hemisphere, now suddenly appearing, then disappearing, so that I imagined the wind had

dispersed the fund of luminous vapours; for we see such lucid, vibrating, broken, small clouds after the grand explosion, and at the end of a common Aurora Borealis;—nay frequently such small, bright, flashing clouds are seen up and down the heavens, without any other appearance of an Aurora Borealis, the lucid vapours being then but in small quantities, and much scattered; but it is remarkable, that these little, fitting luminous clouds seemed always in a vibrating, tremulous motion, and moving very fast from north to south, though sometimes there was little or no wind:—these nebulæ were so extremely thin, that even stars of the third and fourth magnitude were seen through them.

Those northern lights are seen vastly more frequent, more bright, more beautiful, and variously coloured, in the northern parts of Europe than here; and here much more than to the southward; because in the polar regions, the magnetic effluvia are vastly more strong and copious, and the neighbouring volcanos send up immense quantities of sulphureous vapours (which cannot but rise very high in such a dense, cold atmosphere), and these, as it were, fermenting with one another, catch fire.—In Sicily, and the surrounding seas, they see luminous appearances, very near resembling those of the Aurora Borealis, when Vesuvius or Etna burn, and these rays are commonly of various colours, as those of the northern lights, viz. red, yellow, greenish, crimson, &c. possibly both the one and the other are tinged by some mineral substance from the volcanos; for though globules of rain may refract light of different colours, there seems to be nothing in the matter of an Aurora Borealis that is apt to do it:—besides, it is unquestionable, that the Aurora shines by its own light, and not from the sun, as well as the lights of Vesuvius.

We well know, that different minerals will tinge flame of different colours:—may not then the diversity of colours of an Aurora be another argument that it arises from the exhalations of volcanos: the sulphureous vapours of volcanos are shot up to an inconceivable height (sometimes even great stones are thrown up from them to four or five hundred feet, and the ashes vastly higher, so as oftentimes to be carried by the wind fifty or a hundred miles, nay, leagues), so high indeed, that they may retain very little gravity, their centripetal force continually decreasing as their distance from the earth increases, and their centrifugal will be much increased by their re-

volving about the axis of the earth in a very large circle. But further, sulphureous vapours have a kind of vis centrifuga, and will rise in vacuo, whereas all other vapours sink. It is certain, the fumes of gunpowder will rise to the top of a tall exhausted receiver, and even prove lucid, though the gunpowder itself doth not flash.—Thus, the vapours over Vesuvius are sometimes very lucid, though the crater-magnet at the time actually belched out flame: we know that sulphureous vapours are sometimes carried to an astonishing height, and collected into vast bodies of inflammable matter, far above the gross terrestrial atmosphere.—The great Dr. Halley, from very just observations, estimated the meteor of the 19th of March, 1718-19, (which cast such an amazing brightness, and made such a very loud explosion), to be very near seventy miles perpendicular above the surface of the earth; whence it was seen over a great part of Europe at the same time: now if such a great body of sulphureous vapours as this could be sustained at the very top of our atmosphere, or even in the æther above it, how much higher may we suppose the mere subtile vapour of the lumen boreale to be carried?—This will account for the great height and distance some of the northern lights are seen at, without having recourse to M. Mairan's zodiacal light, or Professor Enlet's repulsion of the sun beams. It is possible these vapours, when carried to such a vast height, and in a medium so exceeding rare, may actually become lucid, especially when mixed with ætherial nitre, as the fumes of gunpowder mount and shine in vacuo: indeed this phœnomenon of the gunpowder suggests to me that a highly subtilized aerial nitre always enters the composition of an Aurora (for it is every where diffused throughout the whole atmosphere), and nothing is more like the vivid pearl-coloured flashes of an Aurora than a deflagration of nitre and sulphur; and the flame may be tinged with red, green, yellow, &c. by the addition of different minerals: certainly nitre, sulphur, and iron, are greatly disposed to inflame and coruscate.—The arctic regions abound with nitre. The northern lights are vastly more frequent in cold seasons, when the atmosphere is greatly stocked with nitre.—It is scarcely to be doubted, but that common lightning abounds with all these principles: hence may arise another conjecture, that as lightning is certainly of an electrical nature, so possibly may be the nature of an Aurora:—the incredible swiftness of its

flashes, and the instantaneous propagation of its coruscations through all the northern parts of the hemisphere, seem to favour such a thought.—May not the luminosity be conveyed on the magnetic effluvia, as the electric on the iron wire? But this is, I fear, indulging too far in whimsey. The accounts we have had from Iceland, Greenland, and other places within the arctic circle, by the whale fishers, and others, that have been given by the Jesuits, &c. who travelled to the N. E. parts of China and Tartary, assure us, that there are several volcanos in these parts, some of which have broken out within these few years.—Is it not then the fresh eruptions of some of these volcanos that have produced the northern lights so common of late years? Before this present century began, it is certain they did not appear for many years even in Sweden, Norway, and Lapland, or at least very seldom; whereas M. Morpertius says, they are now almost constant in these countries during the winter months.—Is it not then the more frequent and violent eruptions of these volcanos that make the Aurora Borealis more common and more illustrious? And is it not the cessation of these eruptions that puts a stop to these luminous phænomena, as we know they cease for weeks, for months, for years; and that too when all other circumstances seem to favour their productions?

They appear vastly more frequent and great in the most northern countries, as they lie near the source of the magnetic effluvia and sulphureous vapours. Doth not an appearance of a kind of these nocturnal lights and coruscations in Sicily, &c. on the eruption of Vesuvius, and sometimes merely from the sulphureous exhalations issuing from it, without actual flames, seem to confirm this opinion;—moreover it is not altogether improbable, that sulphureous exhalations from more southern volcanos, swimming on the top of the atmosphere, and revolving with the earth round its axis, may be carried towards the poles, and contribute somewhat to the formation of an Aurora. Persons acquainted with natural history and philosophy will readily see on what principles I have advanced this theory.

REMARKABLE PROPERTIES OF NUMBERS.



1. Twice any number is equal to the sum of any two numbers equally distant therefrom, the one so much the greater, and the other so much less than that number. As twice 9 is equal to 8 and 10, 7 and 11, 6 and 12, 5 and 13, 4 and 14, 3 and 15, 2 and 16, 1 and 17; for if n = given number, and a = the number less the greater, then $n-1$ = less, and $n+1$ = greater, whose sum is $=2n$, or double the number.

2. Only 2 and 2 whole numbers have their product and sum alike; though there are infinite broken numbers having that property.

3. The numbers 5 and 6 are called circular numbers; because, like the circle, terminating where it begins, these numbers multiplied by themselves ever so often always end in the same number: 5 by 5 make 25, and that product multiplied by 5 makes 125. So 6 by 6 make 36, and 6 times which make 216.

4. Any number divided by 9 will leave the same remainder as the sum of its figures divided by 9; consequently so will any number composed of the same figures transposed, and the sum of its figures divided by 9; thus 654 divided by 9 leaves 6 for a remainder; so will $6+5+4=15$, divided by 9, leave 6 also, and so will 645, 564, 546, 456, and 465, and the sum of any three figures so divided by 9, leave the same remainder.

5. If any number is divided by 9, the sum of its figures is also divisible by 9; consequently so will any number composed of its figures transposed, and its sum, be divisible by 9; by which means many numbers divisible by 9 may be quickly found: thus 135, 153, 315, 351, 513 531, by transposition are divisible by 9.—N. B. The property proves multiplication by casting away the nines; and division and extraction of the square root are proved in the same manner, by adding the nines cast away in the remainders.

GALE'S RECREATIONS.

6. Any number divided by 3, will leave the same remainder as the sum of its figures divided by 3, consequently so will any number composed of the same figures transposed, and the sum of its figures divided by 3:—thus 257 divided by 3, leaves 2 remaining; and $2+5+7=14$, divided by 3, leaves 2 remaining also.

7. If any number is divisible by 3, the sum of its figures will be also divisible by 3; consequently so will any number of the same figures transposed, and the sum of its figures being divisible by 3:—thus 123, 132, 213, 231, 312, 321, by transposition, and the sum of any three figures, are all divisible by 3.

8. Any odd square number added to half 1 less than that number squared, the sum will be a square number:—thus 9 added to half $(9-1)$ 8, or 4 squared = 16, will be 25, a square number; also any square number added to half 1 less than that number squared, the sum will be a square number; but will be a broken square number when the square number taken is an even number; for $a^2 + a^2 - 1$

$$\frac{a^4 - 2aa + 1}{2} \text{ squared} = \frac{a^4 + 2aa + 1}{4}, \text{ is a square}$$

whose root is $\frac{a^2 + 1}{2}$ hence $16 + \frac{15}{4}$ squared = $\frac{289}{4}$

whose root is $\frac{17}{2}$.

9. Any even number and its half squared, and 1 added together, the sum will be a square number:—thus 8 added to (its half square) 16 and 1 make 25, a square number. Also any number and its half squared, and 1 added together, will be a square; but will be a broken square number when the first number is taken odd; for

$$a + \frac{a^2}{2} \text{ squared, } + 1 = \frac{a^2 + 4a + 4}{4}, \text{ whose root is}$$

$\frac{a+2}{2}$: thus, $7 + \frac{7}{2}$ squared, $\frac{49}{4} + 1 = \frac{81}{4}$, whose root
 is $\frac{9}{2}$.

10. The property of 3, 4 and 5 (or twice three, &c. those numbers), are such that they will completely form a right-angled triangle. N. B. This property is of use among artificers, surveyors, &c. for adjusting their squares by a right angle, where the sides 3 and 4 meet. Lines or cords may be used of those lengths, or double, triple, &c. to lay down a right-angled triangle.

11. The number 11 multiplied by 2, 3, 4, 5, 6, 7, 8, 9, will end and begin with the like numbers, 22, 33, 44, 55, &c.

12. The numbers 220 and 284 have the aliquot parts of one number equal to the other number: thus the aliquot parts of 220 are 110, 55, 44, 22, 20, 11, 10, 5, 4, 2, 1, making 284; and the aliquot parts of 284 are 142, 71, 4, 2, 1, making 220.

13. Perfect numbers are those whose aliquot parts in one sum are equal to those numbers: as 6 is the first perfect number, whose half 3, third 2, and sixth 1, in one sum make 6; the next perfect number is 28, whose half 14, fourth 7, seventh 4, fourteenth 2, and twenty-eighth 1, in one sum make 28. Perfect numbers are so few, that between 1 and 1000000000000, with 12 places of cyphers, there are only these, viz. 6, 28, 496, 8128, 130816, 2096128, 33550336, 536854528, 8589869056, 137438691328, alternately ending in 6 and 8. The 20th perfect number is 15111727451553768931328, consisting of 23 figures. The general rule to find perfect numbers

is this: 2^n into $2^n + 1 - 1$ is a perfect number; where $2^n + 1 - 1$ must be a prime number, and $n = 1, 2, 4, 6, 8, 10, 12, \&c.$ the 1st, 2d, 3d, 4th, 5th &c. perfect number in succession;—hence the value of n , for any perfect

number according to its place will always be equal to the number of the place less one doubled : thus the value of n for the 20th perfect number will be $(20-1 = 19$ doubled) $= 38$; for the 3d perfect number $3-1=2$ doubled, $=4=n$, &c. whence the perfect number as above.

N. B. If n be any odd number above one, then $2^n + 1 - 1$, (above expressed) will be a composite, and no prime number.

A SPORTIVE PROBLEM.

To find the number of pieces of money any person holds in the right or left hand, first holding as many pieces in one hand as the other.

Bid the person holding the equal number of pieces in both hands, take a given number (possible) from the number of pieces held in one hand, and put them to the number of pieces held in the other hand ; then bid the same person take as many pieces out of that hand into which the said given number of pieces were just put, as remained in the hand whence those pieces were taken, and put them back into the same hand : then there will be left in the other hand, exactly twice the given number of pieces that were first taken out of the contrary hand.

DEMONSTRATION.

Let $x =$ No. pieces held in each hand, and n the given No. (less than x) to be taken out of one hand, and put into the other (suppose from the pieces in the left, and put them into the right hand), then there will be $x-n$ pieces in the left, and $x+n$ pieces in the right hand : now taking $x-n$, the pieces in the left, out of $x+n$ pieces in the right hand, and there will remain $x+n-x+n = 2n$ pieces in the right hand ; being exactly double the number of pieces first taken out of the contrary, or left hand.

ANOTHER.

Out of a common pack of fifty-two cards, let part be distributed into several distinct parcels or heaps in the manner following; upon the lowest card of every heap, let as many others be laid as are sufficient to make up its number twelve, as if four be the number of the lowest card, let eight others be laid upon it; if five, let seven; if a , let twelve — a , &c. It is required, having given the number of heaps, which we shall call n , as also the number of cards still remaining in the dealer's hand, which we shall call r , to find the sum of the numbers of all the bottom cards put together.

SOLUTION.

Let a, b, c , &c. express the number of the bottom cards in the several heaps; then will $12 - a$ express the number of all the cards lying upon the bottom card of the first heap; that is, the number of all the cards of the first heap, except the lowest, will be $12 - a$; therefore $13 - a$ will be the number of all the cards in the first heap; for the same reason $13 - b$ will be the number of all the cards in the second heap; and $13 - c$ the number of all those in the third, and so on; therefore the number of all the cards in all the heaps will be $13 + n - a - b - c$, &c. make $a + b + c$, &c. (or the sum of the number of all the bottom cards) = x , and then we shall have the number of all the cards drawn out into heaps = $13 n - x$; but these together with r , the number of cards undrawn out, make up the whole pack 52, therefore $x + 52 = 13 n + r$; therefore $x = 13 n - 52 + r$; but $52 = 13$
 $+ 4$; therefore $13 n - 52 = 13 + n - 4$; therefore

$x \equiv 13 + n - 4 + r$; in words thus: from the number of heaps subtract four; multiply the rest by thirteen; and this product added to the number of cards still remaining in the dealer's hand, will give the sum of the numbers of

all the bottom cards put together; as for example, let there be three heaps, and thirty cards remaining; now 4 subtracted from three leaves—1; this multiplied by 13 gives —13, and this product added to 30, the number of cards remaining, gives 17 for the sum of the numbers of all the bottom cards.

A more universal Theorem is as follows :

Let n be the number of heaps as before, p the number of cards in a pack; let as many cards be laid upon the lowest of every heap as are sufficient to make up its number q ; and lastly, let r be the number of remaining cards as before; and the sum of the numbers of all the bottom

cards will be found to be $q + 1 + n + r - p$.

IMPORTANT QUERIES.

1. The writers on Fluxions say, that if any quantity is a maximum, or minimum, that quantity being multiplied or divided by any known quantity, the product or quotient will be also a maximum or minimum:—then if any known quantity be added to or subtracted from it, will the sum or difference be also a maximum or minimum?

Answer.

Fluxions, deduced from an indefinitely or infinitely small increase or decrease of finite quantities, are nothing but the finite ratios of the indefinitely or infinitely small quantities by which the said finite quantities are increased or decreased according to a given condition:—now when any compound variable quantity is gradually increased or decreased, on certain conditions, till it becomes a maximum or minimum (as may be the case when constant are compounded with variable quantities, in an expression) its fluxion or variation will be nothing in respect of the fluxion of its simple variable quantity; it having then neither increase or decrease in those circumstances.

Proposition.

But in all cases of variation, if contemporary variable quantities be equal to each other, or in a given ratio, their fluxions will be also equal, or in a given ratio; and the contrary; therefore multiplying or dividing any compound variable quantity (having a maximum or minimum, or not) by a given constant quantity, its fluxion will have the same ratio to the fluxion of the simple variable quantity multiplied or divided by the same constant quantity.

Thus the fluxions of xx and x , axx and ax , or $\frac{xx}{a}$ and $\frac{x}{a}$ — and $\frac{2xx}{a}$ to x , $\frac{2axx}{a}$ to ax , and $\frac{2xx}{a}$ to $\frac{x}{a}$, respectively, all in the same ratio; being the same, had xx been a maximum or minimum; as are likewise the fluxions of $axx + b$, and $ax + b$, or $axx - b$, and $ax - b$, respectively; and the same fluxion of any value (and therefore of 0 value when its fluent is a maximum or minimum) may have an infinite number of fluents, as the fluent of x fluxion may be x , $a + x$, $b + x$, $x - a$, $x - b$, $x - c$, &c. consequently as the product or quantity of a maximum or minimum in quantity on certain conditions, is also a maximum or minimum, so likewise a given addition on subtraction, in quantity, to and from that given product or quantity (being a maximum or minimum, on certain conditions) will be a maximum or minimum also; making no alteration in the property of given conditions.

WHAT IS SPACE?

Answer.

Time is to duration as place is to space or expansion: they are so much of those boundless oceans of eternity and immensity as is set out and distinguished from the rest; and so are made use of to denote the position of finite beings in respect of one to another in some infinite oceans of duration and space;—each of these have a

Many have been the objections to Sir Isaac Newton, as if he represented infinite space as an attribute of the Deity: his words are, "He continues always, and is present every where; and by existing always and every where, he constitutes duration and space." But this is saying no more than that space and duration do not necessarily exist; because God is essentially and necessarily present in them. This appears from the words immediately preceding. God is eternal and infinite; omnipotent and omniscient; i. e. he continues from eternity to eternity; and is present from infinity to infinity; he governs all things, and knows all things which are done, or can be known: he is not eternity and infinity, but eternal and infinite: he is not duration and space, but has duration of existence, and is present; which last words are so clearly expressive of his meaning, that I am at a loss to conceive how they could be misunderstood: he accounts for the necessary existence of space in a way the most worthy of the Deity.

Suppose a clock has three hands on its dial plate, one of which goes round in seven days, another in 29 days, 12 hours, 44 minutes, 1 second, and 45 thirds, and the third in 365 days, 5 hours, and 49 minutes.—If all these hands are set together at any given point of the dial plate, Query, how many years, months, days, hours, minutes, seconds, and thirds of time must revolve, before all the hands can meet together again at the same point: the meaning of which may be, if a new moon happens at any given time, viz. in a given month, and day of the month, at a given hour and minute, and on a given week day, how long will it be before a new moon happens again, at the same given time, viz. month, day, hour, &c. on the same given week day, according to the given mean or equal motion?

GALE'S RECREATIONS.

Answer.

Stands.	Times of Revol.					Third.	Dif. thirds.
	d.	h.	m.	s.	th.		
A	7	0	0	0	0	36288000	116798505 1740329895
B	29	12	44	1	45	153086505	
C	365	5	49	0	0	1893416400	

Time. Rev. Time. A
 As B: 1 :: A : — B performs in A time.
 B,

Rev.—as und. Time. Rev.—as und. Time.
 A A A B
 And $1 - \frac{A}{B} : A :: 1 : \frac{A}{B - A}$ when
 A and B first meet. $1 - \frac{A}{B}$

General Rule.

The product of the times of any two revolutions of two revolving bodies, moving uniformly, divided by the difference of those times, will give the precise time of the next meeting of those bodies, after setting out together, and moving the same way.

Now $\frac{A B}{B - A}$ being the next time of A and B meeting to C's time of making one revolution; therefore a time must be found when a number of $\frac{A B}{B - A}$ will be equal to some other number of C's time, in ratio of $\frac{A B}{B - A}$ to $\frac{A \times C}{B - A}$, to be found in lowest terms. Or when $\frac{B - A \times C}{A B}$ side of the ratio, in lowest terms, $\times \frac{A B}{B - A} = A B$ side of the ratio, in lowest terms, $\times C = A B \times C$. This happens when the time is the least dividend to the times of

revolution to A, B, C, when those three hands meet. And so universally the least time of any number of hands meeting after setting out together, and moving the same way, will be a time which is the least dividend to the times of the several and respective revolutions of those hands.

Hence $\frac{A \ B}{B - A} = \frac{36288000 \times 153086505}{116798505}$ thirds = 9
 days, 4 hours, 11 minutes, 44 seconds, 39 thirds
 $\frac{11847105}{116798505}$, precisely, when A and B first meet. And
 the least dividend to 36288000, 153086505, and
 1893416400 thirds (each two reduced to lowest terms
 multiplied together, and that product multiplied into their
 greatest common measure) will be $15 \times 240 \times 10080 \times$
 $52594 \times 11 \times 927797 = 19478356745277830400$, to
 a third = (because $15 \times 240 = 60 \times 60$, and $10080 =$
 $24 \times 60 \times 7$) $7 \times 52594 \times 11 \times 927797$ days =
 102871979836 Julian years, and 82 days precisely,
 required.

N. B. The foregoing is the least time when a mean, new or full moon can happen again at the same point of time in the same week day, and also at the same point of time (beginning, middle, or end) of a solar year; when the sun and moon have precisely the same place, as at first setting out together.



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Fig. 1. p. 73.

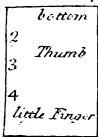


Fig. 2. p. 73

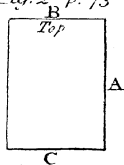
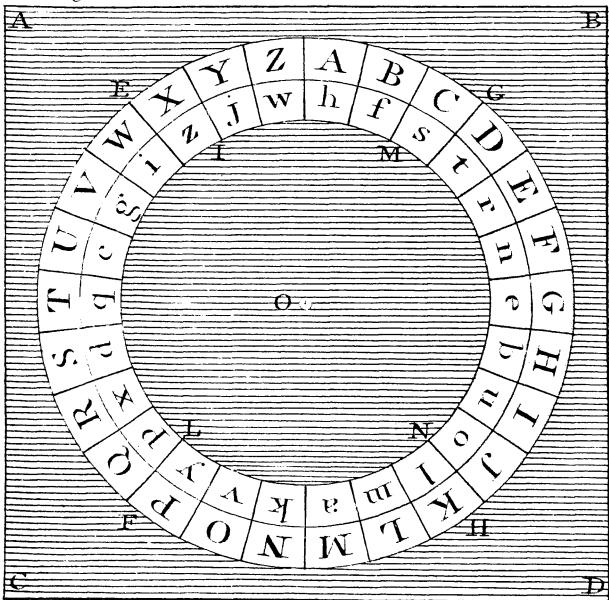


Fig. 3. p. 152.



*Ma un jvc iumm svar
 vgrx qv ed jvc dbhmm
 bhqr h yrkdvk hkt —
 jvc ahj dqumm ahlr
 h dbha vyyvduqv —*

Fig. 1. p. 164.

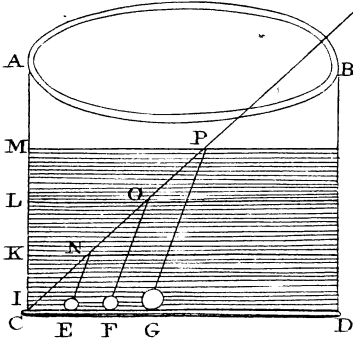


Fig. 2 p. 165.

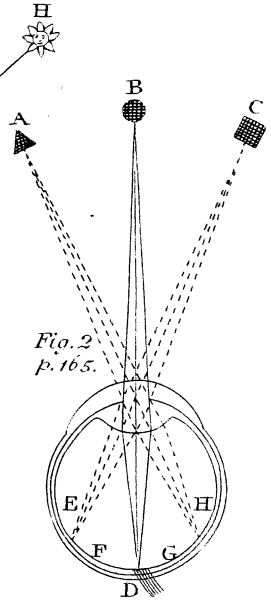


Fig. 3. p. 169.

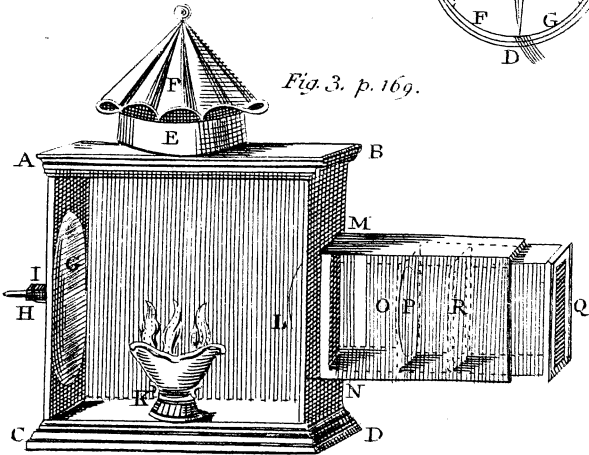


Fig. 3.
p. 184.

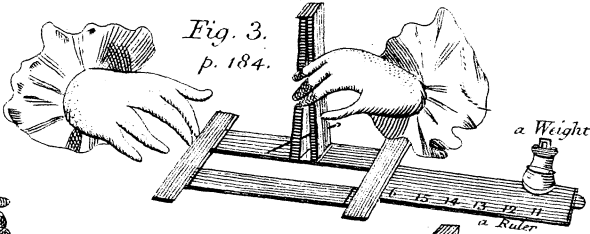


Fig. 2.
p. 184.

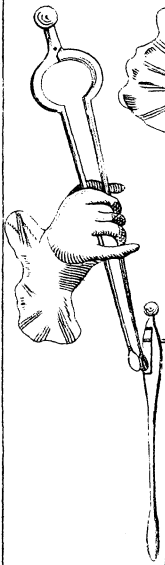


Fig. 4.
p. 185.

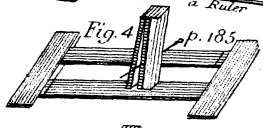


Fig. 5.
p. 185.

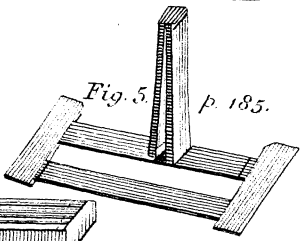


Fig. 7. p. 185.



Fig. 6. p. 185.

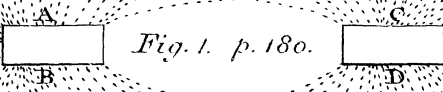
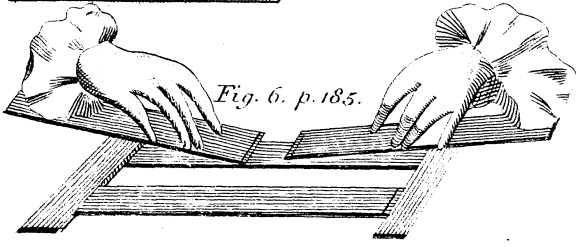


Fig. 1. p. 180.



Fig. 2. p. 186

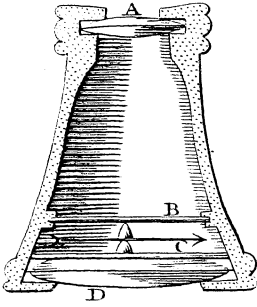


Fig. 1. p. 186.

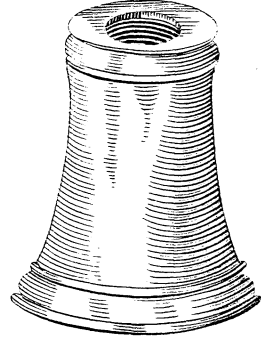


Fig. 4. p. 197.

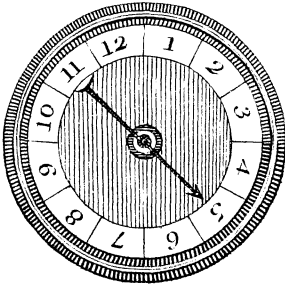


Fig. 3 p. 192.

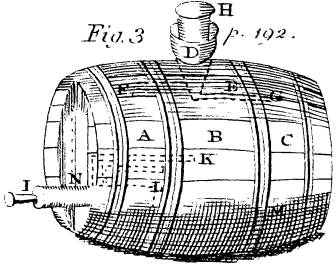
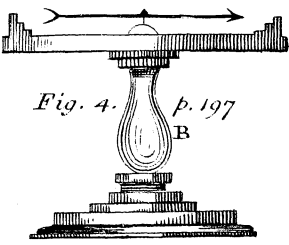


Fig. 4. p. 197



North E South



Fig. 5. p. 197



Fig. 4. p. 250.

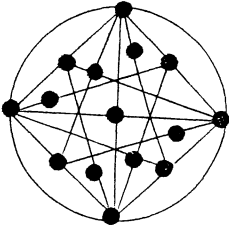


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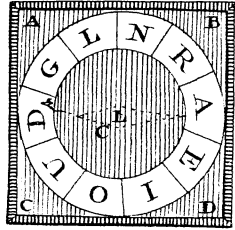


Fig. 2.

p. 200.

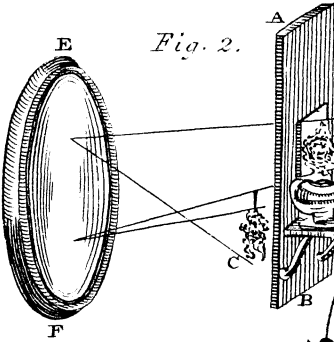


Fig. 3.
p. 216

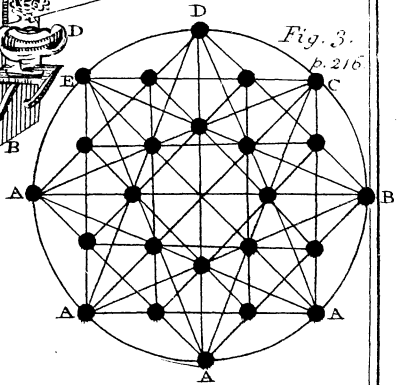
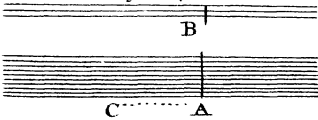


Fig. 5. p. 330.



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