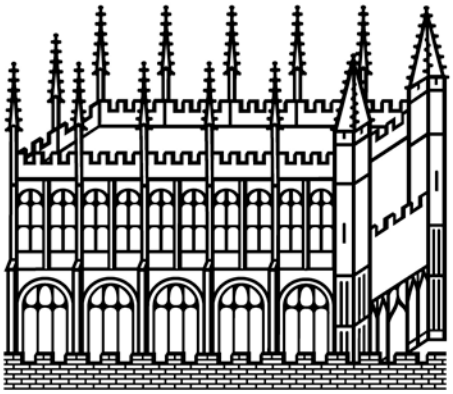

46.

1325.

NEWTON RESCUED FROM THE PRECIPITANCY OF HIS FOLLOWERS THROUGH A CENTURY AND A HALF.

A FEW

PRACTICAL REASONS

SUGGESTED BY FACT, AND SUPPORTED BY SCRIPTURE, FOR QUESTIONING THE SOUNDNESS OF THE

"NEWTONIAN THEORY OF THE UNIVERSE."

"Honor Deo!"

"Is it so rare for public men to err in their judgment of public events? Did not the council "of the Royal Society receive Franklin's proposition, to apply a conductor to draw lightning "from the clouds, with ridicule and laughter? and did not they refuse it a place in their "transactions? Did not scientific professors and practical engineers, and nautical men in 1815 "declare that the project of a Steamer between Dublin and Holyhead was impracticable and "absurd? Did not Mr. Nicholas Wood, the author of one of the best works extant on railways, "indignantly disclaim being one of those hot-headed enthusiasts who imagined that a locomotive "engine was capable of drawing carriages on a railway at 15 miles an hour?"—*Dr. Lardner's Ultimum in the Times Newspaper, on the Trans-Atlantic Steam Navigation Question.*

BY

WILLIAM PETERS.

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1846.

TO THE READER.

LE SAGE, in his Preface to Gil Blas, relates a story of two students of Salamanca, which is worth repeating, and of which we will attempt a free translation.

Two students were travelling from Pennafiel to Salamanca. Weary and athirst, they sat down at a brook by the road side. When they had refreshed themselves with its waters, they perused, graven on a stone, nearly level with the turf, certain words, already partially effaced by time and the feet of the flocks watered at the brook. Having washed the stone, they read these words: "Aqui "esta encerrada el alma del licenciado Pedro Garcias." "Here lies buried the "soul of the licentiate, Pedro Garcias."

The younger of the students laughed immoderately. "Here lies buried, the "soul! A soul buried! I should like to know what wiseacre penned so ridiculous "an epitaph." With these words he departed. His more shrewd companion bethought himself, "There is some mystery beneath this stone; I will remain "here to unravel it." So he let his sprightly young friend proceed on his journey, and set himself in good earnest to dig with his knife around the stone. He soon accomplished his purpose, lifted it, and upturned a leathern purse, containing a hundred ducats and a card, whereon were inscribed these words in Latin: "Be "my heir, thou who hast had sense enough to discover the meaning of the "inscription, and make a better use of my money than I have done." The student rejoiced at the discovery, restored the stone to its place, and pursued his journey to Salamanca with the soul of the licentiate.

Le Sage classes all his readers with the one or the other of these students. It is not our object, in introducing this story, to assert, like Le Sage, with an air of authority, that the perusal of our pages will be followed by a harvest—much less a harvest of ducats—to every one who is ready to reap it.

The story was, in early life, impressed on our mind,—not as verified by the history of Gil Blas, which, though a common school-book, is likely in the hands of the young, to lead to as much of mischief as of good; but as an encouragement to perseverance—not exactly after the ducats, but in the object of surmounting difficulties generally, as they have crossed our path in life; and we have had our share of them, without being disheartened by them. The story has often recurred to us during the progress of the investigations which have led to the publication of this pamphlet, the particulars of which we have briefly narrated towards its close. We have been more than once twitted for daring, in our ignorance, to differ regarding a system "descended from Copernicus to be esta-"blished by Newton." But to cite "authority," without concurrent fact to establish it, or to be unable to explain satisfactorily the simplest circumstances in nature, was not, to our mind, a sufficient answer to objection, suggested by fact, and sustained, as we thought, by argument. Philosophical arguments frequently turn on infinitesimally nice distinctions. If, therefore, having altogether a new train of ideas, we failed to satisfy one who well understood us, but at the same time were judged by another party to be correct in the basis of our notions, it did not discourage us altogether to find minds, even of high intellectual attainments, both practical and theoretical, unable to come at a correct understanding of our meaning.

Under all circumstances,—steady, solid argumentwe were thankful for, ridicule we cared not for;—whenever foiled, we did not argue on, but set ourselves still, TO THINK. Scientific treatises, we were told, would satisfy every objection, but

they tended only to shew how little is accounted for in our physical condition. We found much of assumption, little or nothing of actual explanation. Books and scientific lectures, albeit abounding in information regarding effects, avowedly leave us in the dark as to main springs and causes: like the herds watered at the brook, they seemed to hinder rather than facilitate the deciphering of the inscription of the stone which we may suppose Newton to have left by the brook-side. All this while, we imagined that there was, in that inscription, some proof to mathematical demonstration that "All was light;" that the first principles of the system must be based on solid grounds, and that unexplained physical operations and difficulties of analogy, referred only to some minor questions connected with chemical action, rather than to purely physical *demonstranda*. But when we read Jones and Maclaurin, and found that Newton did not profess to define the mainspring of his system; that he knew not what gravitation was; knew not what attraction was, and that a centrifugal force was a compound of effects, and might be anything; and when, added to this, we found a probability that the doubling up of these into attraction of gravitation, a law of gravitation, and central forces, had been the work of a century and a half of dependance on Newton's adaptation of effects, which his successors have transmuted into laws, and into causes *which he was seeking at the period of his* LATEST *works*, we felt that we could read the inscription as he left it on the stone; that all was darkness then; and that the great philosopher would declare that all is darkness still. We found in the end that Newton advised future philosophers to enquire into the very essence of the system. The stone was then upturned. The student of Salamanca found 100 ducats; we miss £100 through our philosophy—OR NOTHING.

But shall we wish that we had never touched Philosophy? O no! The desire of knowledge has been coupled with a key to information in the Word of God, and a source of highly interesting research and of enjoyment, which the longest life cannot satisfy, is opened to us. This appears to afford us an insight into the wonders of Revelation, viewing them, if we may so speak, in a more sober light than the philosopher who expatiates on "worlds on worlds unnumbered," where we incline to think *but one world* is revealed to us. This however, is not the place for theory, and we purposely avoid it till our objections are tested.

In the following pages there are many stones to be upturned, and hints for immediate application, by those who have the control in madhouses, and the desire and power to benefit their fellow-creatures. It is a grievous fact, that a man actually insane is, as far as our observation goes, a thing to be buffeted, trifled and played with, roughly handled, or neglected; if not treated with absolute cruelty, by men not without feeling, but who seem to think it, in many instances, *a part of their duty and of the system to show none;* and we *know* instances—we do not allude to our own, which may or may not come under the category—in which resort is had to incarceration in a madhouse, rather as a school for cantankerousness in matters of conscience, than for any prevailing, or even attributed disease of the mind.

There is one stone which the public need not be concerned about; we have felt its weight, and have borne it without crushing. We have no desire to pretend that we have not felt it; we have, and felt it severely, as the ensuing pages will show; but still, were the stone upturned, the public would find NOTHING under it.

PREFACE.

THE Author is induced to bring this pamphlet before the public, under the impression, derived from personal experience, that it will be safer to argue with the multitude, than to discuss his opinions privately amongst friends. Physics, moreover, in the existing condition of our philosophical definitions, afford too wide a field for close *viva voce* argument; and argument in print is much more practicable than in manuscript, because much more convenient to the reader.

But *why*, the reader will ask, why *safer* to argue, with the multitude? We refer him, in reply, to the introduction to "Valentine Vox, the Ventriloquist," and assure him, that the law does, really and indeed, afford marvellous facilities for pitching a sane man into a mad-house; which public or private, be a man sane or insane, if he be certificated, and the certificates be legal, is ready to receive him without allowing him to say a word, and hold him fast for months, without giving him opportunity for explanation.

There is not a more mischievous "divided responsibility," than that which is exercised on these occasions, nor a more mistaken confidence than is reposed on all hands in those nominally responsible. Those who certify in the first instance, we are led to believe, often certify without seeing at the time, a man to whom they never have spoken, and satisfy their consciences, we suppose, when his reception into a public establishment is accomplished. All are then content to leave him there, as being in the best hands possible. There is probably a latent horror of butchery, or torture, or drugging, in the *impenetralia* of private mad-houses, which breaks out in the parties who plunge, *as soon as they have plunged* a poor wretch—a poor relative, male or female—into one of these horrid and secret dens of iniquity. The great concern, then, as we understand the process, is to get him out as soon as possible, and transfer him to a public institution. *Then* it is supposed that the physicians determine upon the state of the mind of "the patient," his detention or discharge.

There is not a more grievous mistake, unless perhaps it be another erroneous notion which is almost universally entertained by those who know nothing at all about the matter; but which materially affects the public opinion. We allude to the impression that the room which a man occupies is too precious to be wasted, and that no one can be kept a moment longer than necessary, because other poor objects are excluded. This might be all very good reasoning if it were fact; *but we take occasion solemnly to*

*deny it.** Some men it suits to be locked up; they like it, and are no sooner out than in again—"walk in of themselves." Some it is convenient to retain: they work well, and their labour, purchased at a cheap rate, serves to decorate a "whited sepulchre." We might enlarge upon this subject; but have neither money nor space at present.

There is not a matter in which a man is so unwilling to bear his own burthen, or so ready to shift it over to another, as on this question of detaining a fellow-creature on the plea that he is insane. A "patient" may be the victim of mendacity, white and black: a mixture of the *two*, in crafty and reckless hands, may give any colouring it pleases to any thing that passes and pass current the plausible compound—false as it is plausible.

Committees who *can* and *do* act in opposition to advice,—which may be the best medical advice in Europe in such matters—should beware of the sources whence they derive their information. Committee men the most compassionate and best intentioned, misled under such influences, may be betrayed into an unwarranted judgment regarding the sanity of a man, from whom they refuse to hear a syllable. We have had some months to correct an opinion, if we brought out an erroneous one; but we hesitate not to remark, that it is, or ought to be, incumbent upon a Committee, who detain a man from his wife and family, against the highest medical authority, not to exercise such a serious responsibility, wholly upon other than medical representations, without one word of communication with the patient upon whose release they set their *veto*.

A Committee overrules or sanctions as it pleases, without any communication with the patient, the opinion of the physician. The physician depends for his information—we quote from authority— upon "those who "are constantly with" the patient, and amongst "those" there sets an under current towards the Committee. Information thus flows in two ways, through many channels, delivered in by the physician,—or some officious non-medical official underling!

We have said that when a man's reception into a public establishment is accomplished, friends are content to leave him there, as being in the best hands possible. Their work is done! But the miserable being thus cut off from the world and liberty, if he attempt to show, however coolly and collectedly, to any authority, medical or non-medical—(and those who are not, assume vastly more than the doctors)—that he ought not to have been placed there, is ever met with the poor consolation that the responsibility, upon the strength of which he has been wheedled or forced into a madhouse, and of which friends out of doors have disburthened themselves, is cast back upon them by parties who show no concern whatever to make themselves acquainted with his case; but simply tell him that "the friends who have put" him there "know that he ought to be" there,

* Nor will we deny it without instances. In our limited experience we know of two returning "of themselves;" of four admitted on one day, three were old cases; and when we left, one was expected back for the fourth or fifth time, we were told, as soon as the season was up for letting his lodgings at a watering-place. We know of one instance of a man discharged, continuing to occupy room, (to the exclusion perhaps of some poor object!)—kept to finish his work. We were told that one patient wrote so sensible a letter on the day of his entry, that the Committee thought he ought not to be there; but he chuckled that he had got in, and would not go, till the time came round for getting work in his own line of business, for which the then season did not suit. There is a story current of a patient who, on being cautioned by the Committee on his release to "keep well," now he was "well," said, "Gentlemen, my disease is in my breeches' pockets: "mine are empty, yours are full—do you fill mine from amongst you, and you "may depend upon it you will not see me back again."

or they "would not have brought him." In other words, "The certificate," like Sir Lucius O'Trigger's "quarrel," "is a very pretty" certificate "as it stands. Explanation would spoil it."

Nay, more than this: we have absolutely been told by a medical man,—at least we believe so, for he was represented to us as such,—that, to suggest that we ought not to have been brought into such a place, and though with the suavity of a Bengalee, instead of the spirit of an Englishman, to express an opinion that we ought to be released, is a sure sign that we ought not to be let out. Oh, husbands and fathers! it is a bitter, bitter thing to be forcibly kept from a wife and family by such delusion and mad-reasoning as this! Britons! it is a cruel thing to be confined under locks and bolts, without a shadow of insanity, for five long dreary months;—liberty sacrificed to gross absurdity like this!

Not only should the law look sharply to the original certificates, but in our great public establishments, Committees ought to be required to call up the patient himself, and in a public court, to which we cannot imagine any sound objection can exist,—they should not be allowed, under heavy responsibility, to deprive a man of his liberty on weaker grounds than a jury would deprive him of the control of his property. They should take down in writing his replies, if he can answer questions, and the record should be public and accessible to any person sufficiently interested for the patient, to see that he is not imprisoned without cause.

We may be told that there is a Habeas Corpus. We know there is: but in these instances it is practicable to suspend it, by taking away a wife who refuses to sanction a husband's removal, and putting her after him into a lunatic asylum. When she is let out, if she, satisfied of her husband's sanity, insist upon his release, threaten to put her back again, and him out of her way; and what is the use of the Habeas Corpus? Blackstone tells us of many writs of Habeas Corpus, besides that "*ad satisfi-*" *ciendum,*" the great writ, *the* Habeas Corpus Act, the suspension of which, in all cases but this, creates a greater stir than the stir which creates the suspension. There are Habeas Corpusses *ad faciendum et recipiendum; ad respondendum; at deliberandum et recipiendum; ad satisfaciendum, ad testificandum.** There are all these writs, but this certificate of insanity surpasses all in its sovereign efficacy: it is a HABEAS CORPUS AD LIBITUM, and suspends all the rest, especially if the man's

* *Ad faciendum et recipiendum.* This does *not* mean to drive a man mad in order that he may be taken in.

Ad respondendum. This does not mean that a man must not ask a civil question, and is to hold his peace under penalty of a broken head; for which, as the keeper will have to answer, he forthwith proceeds to put shackles on the patient's hands and feet, by way of accounting for the blood shed and the head broken.

Ad deliberandum et recipiendum. This might well mean that a Committee ought to deliberate before they order or allow a man to be locked up; and not let him flit past a door held ajar; so that he has no more time even to catch a glimpse of the Chairman, than a marksman to take aim at a swallow on the wing.

Ad satisfaciendum. This may well mean that he will soon "have satisfac-" tion," other hands about his head than his own; that he will soon "have "enough of it."

Ad testificandum. This may mean that if a "patient" at one asylum happens to know something of an atrocious case at another; which he bears in recollection, because even more grievous than his own; and thinks that he can further the course of public justice by writing to the Coroner; his letter, though written on legitimate paper, duly obtained, and delivered open for inspection, and transmission to the Coroner, (see Appendix, No. 2,) will not be forwarded by "the "authorities," and he will be held the tighter, "with a witness."

wife can be put out of the way at the same time; which can be done, though she show no symptom of insanity whatever, and may be done, though it be necessary to tear her away from a young family, and a nursing infant. We know this—all this—*practically* too, but cannot trust our feelings to write much about it. It is a formidable thing this *Habeas Corpus ad libitum*, by which a Briton's liberty is sacrificed to the opinion of a medical gentleman, who, however high his character and reputed skill—however extensive his observation and practice—*does* little more than ask the man how he is; and tell him to "keep quiet;" depending, though he may discover no symptom of insanity whatever, day after day, week after week, month after month—upon the reports of others, as to the state of the patient's mind; whilst those reports may be tempered by feelings of personal annoyance or petty revenge for supposed disrespect—a cap fitted where not intended—or for a contempt which may be warrantable, if, under any circumstances, contempt can be warrantable at all.

The author of Valentine Vox had a laudable object, but he has overshot it,—not so much by overdrawing his pictures—for as well in the case of others as our own, we unhappily have sad reason to know that his fictions are too often the realities of fact;—but because the world will rather be merry than sad, and is too readily disposed to imagine that which is grossly inhuman to be a ridiculous exaggeration; and to laugh at what they suppose to be an eccentric joke of the author, *instead of combining to search into and put down a crying, a fearful, and an increasing evil.* For instance, we do not mean to say that we know of any man having been tickled with feathers at the soles of his feet into a temporary delirium, in order that he might pass muster before Commissioners; but we know enough to see that the thing is far from impossible, and to believe that men's feelings are so deadened by old and absurd notions regarding the necessity for coercion and the constant practice of it, that this part of the story is likely to be founded on truth, rather than on exaggeration or imagination. Moreover, we have occasion to know that the supervision of Committees and Commissioners is the very merest farce in the world.

We know that a man may be taken to a madhouse without a shadow of resistance, without the disposition to resist, having the consciousness, derived from experience, that resistance, nay, opposition in any shape, is worse than useless—affording a shadow of excuse to those who are committing him to such custody; and then, thoroughly in his senses, and still altogether unresisting, simply for asking where he is to be taken to next, is liable to have his head cut by a smart blow on the one side, with or without consideration of an iron grating within an inch or two of the other side; the blow being administered by a powerful man, to whose keeping he is confided, and who will not be over careful to administer it tenderly. The upshot will probably be, as we found it, that "the patient" will for a season be altogether unconscious of what passes, and he will awake to the reality of blood on his forehead, his mouth wrenched open with a key, and three or four fellows assisting to drench him with a stuff which (if something else be not substituted for the doctor's prescription) is, we will suppose, to be called medicine.

He will find himself chained, both hands and feet, stretched out upon straw, and if his experience be no more miserable than ours, he will for a long time be conscious of little else than intense physical suffering, light and darkness. The pain produced by "the medicine," which will bring out blisters wherever it touches the tender parts of the lips, mouth, and throat, will let a man know what doctors, or those who have physicked him, can accomplish in the way of counter-irritation. It is a mercy that, although occasionally alive to the fact that he is in chains, these medicines, probably

compounded with mischievous extracts from opium, more mischievous than the pernicious drug itself, excite where they may, *or may not*, be *intended* to sooth; and distress and trouble the aching brain with wilder fancies than it would ever entertain without them; and that between these effects and physical suffering, the mind, albeit sound if let alone, cannot dwell on an absent beloved wife and family, and carry with it the bitter misery left behind. The poor wretch under this discipline will, in his solitude, think of little, but how and where he can reach an empty ear out of the wheat straw, and chew it to raise moisture in his parched mouth; until, by dint of perseverance, though the pain is not got under, exhaustion compels the wearied body to take rest. He will wake to the like pain, and the like remedy of chewing the straw he lies on, till he sleeps his "fitful slumber" o'er again. Food we suppose would do mischief, and starvation, or something akin to it, is the sharp practice at this time. It was our lot to have entered one of these establishments, and to have passed six days in it previously to removal to another. We remember five small meals during the whole time, and do not think that a sixth could have escaped our notice. Apart from the next to absolute starvation of the thing, a bason of beef tea or a slice of bread and butter is softer to a blistered mouth, than the rough straw, and not to be forgotten.

Chains endured—and they gall as bitterly in the reality as in the abstract idea—we might incline, having been sustained by God's mercy, in nerve and mind, through five month's forced cheerfulness on the surface of an often sinking and half broken heart,—we write soberly, for we have felt acutely,—to smile, and well we might, at the ludicrous absurdity of many of the grave scenes which we have witnessed, or in which we have been compelled to bear a part. But in the joy of our release, we have a tear for many a sorrowing, sane, suffering prisoner left behind; and a voice of sympathy for others free again like ourselves, but free to the bitter imputation that they have been mad for months, and have this inheritance, if no better, for their sons and daughters; to say nothing of ruin attending themselves, which we have to thank the liberality of our employers we have escaped. We must not fall into the error which we attribute to the author of Valentine Vox.

As an Englishman, we have a right, if we please, as far as our neighbour is concerned, though we deny it is our general character to quarrel with any body, to be doggedly obstinate; perseveringly determined; resolutely opposed to those who wish us well; perverse to pertinacity; though we may consider the veriest trifle in the world just the matter in which we are called upon to offend God for man's pleasure or caprice. We have a right to shut our eyes to our own immediate interests, and to bear the accusation of being careless of prospects or reckless of our family, because in an inoffensive spirit we dare to offend man, and bear, instead of resenting, insult and injury. We may dare to think that a man's own conscience, not the conscience or interpretation of his neighbour, is his guide or his judge to accuse or to excuse him; and if put to the last test, we may at the age of three and forty, cast ourselves upon the world, rather than hold on our course as a parasite and a hypocrite. We may be cheerful under the sacred assurance, that "it is better to trust in the Lord than to put any con-"fidence in man." We may be and do all this, and we may entertain notions, sound or unsound, about philosophy; and yet not necessarily, we hope, leave to our children the imputation of being the children of a man whom it was necessary to confine for five months, as a maniac, because Mr. This, or Doctor That, is pleased to certify to that effect, upon the strength of a multitude of opinions regarding facts of which he eschews explanation.

We have known what it is, from our earliest childhood, to glory in our country; we have known what it is to join heart to heart, with the poet who wrote,

" I could endure
" Chains no where patiently, but chains at home,
" Where I am free by birthright, not at all."

We have known what it is to endure chains actually: and chains, actually chains upon a persecuted wife, who has been drugged and chained, and suffered more than ourselves in mad-houses, gall more bitterly now we are both free, than chains on our own limbs did then :

We have borne all this. We have borne for five months, a mind enchained in a shell at liberty; but pent up with maniacs, woeful objects of pity—*of ten-fold pity, because the* BUTTS *of those who never ought to be shut up with them, if shut up at all:*

We have known, what it is at times, to sink almost to desperation and disease, under the rack of suspense, cruelly administered as a medicine for " anxiety of mind;" the victim, we have felt of mendacity, we have borne the unintentional scourge of the " white lie," and have spurned the bolder lash of the other:

We have brought out a tolerably hardy frame and have carried a cheerful countenance, since we found that our beloved wife had *twice* sustained a shock which few women, we dare venture to say, would bear at all and live:

We have been sustained by God, and God alone, encouraged by the *determined perseverance of a wife* to hope for an end of what seemed endless.

All this we have borne and can bear, and look above and feel above it all.

But this we cannot bear. We cannot bear the reasonable continued terror of a wife, nor the terror of a child, whose alarm a mother's assurances cannot quiet. " You need not be afraid my child " (of the stranger that knocked). " But Mama, did they not take you away before, and " there was nothing the matter with you then any more than there is now? *" This we cannot bear, take advice and be quiet.

We may, for ought we know, be daring a repetition of that we have undergone, by putting our name at the foot of this preface. We may be challenging again a threat of immediate poverty, manacles, shackles, bolts, bars, and locks, if we dare to repeat resolutely out of doors, what we said in our dungeon to one who talked to us of conditions—conditions forsooth to a madman! " You may lock up an independent man from day to day, " but you will never let out a dependent one." Dependent we are, dependent every man must be, from the serf to the prince and the prince to his God. But that is not the style of dependence which was to have been forced upon us; and which would have been tried, we are persuaded. had we been altogether cast off in our misery by influential friends; for our poor wife was threatened if she persisted in making a stir, if she exercised a right which the law gives her if we mistake not, of insisting on our release, *with*

* Evidence worth five hundred " doctor's certificates " of the insanity of a wife taken away in the act of writing a letter to a friend, whilst we were chained both hands and feet safe enough from committing any breach of the peace.

During progress of the work, circumstances have led to correspondence with two of the medical gentlemen alludcd to at page 86. Their letters, which with ours to them we are ready to publish *at their desire*, throw off all responsibility as to the *manner in which the public authorities exercised their's*, in removing our poor wife *between two men* in a cab, without a relative, friend or female to protect her; one was without " influence," the other " could have no control."

being taken to the place whence she had been released, whilst we should be removed somewhither that she should not be able to find us.

But why, the reader will ask again, why all this autobiography?

Reader! We are about to "talk about Sir Isaac Newton," and it is a grievous fact, that we dare not write a book on the philosophy of the day, without committing ourselves and a wife, who has twice been severed from her family, and thrust after us into lunatic asylums, to the watchful eye of a British public!

Eccentricity is, or rather ought to be, the privilege of the philosopher. The great Newton used to work out his mathematical problems three hours at a time, with one leg in his "small-clothes" and the other out. Busied with study, or our ordinary occupations, we may sometimes have overlooked that the breakfast or dinner hour was passing, and hunger may have delayed its calls to a more convenient season for satisfying them. But we never remember to have fallen, like Sir Isaac, into the eccentricity of being satisfied by the sight of the empty dish, and the picked bones on our friend's plate, that *we had eaten the chicken.**

Stephenson, not a score of years ago, was pronounced to be "either a "foreigner or a madman," by a Parliamentary Committee, whom he could not understand, and who could not understand him, when his object was to explain that a locomotive engine could be made to travel at the rate of *ten miles an hour*. "Many of our most eminent engineers" may declare a thing an "impossibility" and experiment may show that it can be "accomplished with the greatest ease imaginable."† All these may escape, but it is a grievous fact that a man, because he is poor, and dares to act as he thinks prudent and best, in a subordinate station, under preterpluparticular circumstances, cannot differ from his neighbours, *who do not even profess to know any thing about his philosophical pursuits which they condemn*, without feeling it necessary for the safety of himself and his wife and children, to intrude his private affairs upon the public, in order to be protected from "the doctors."

We do not mean to say that to "talk about Sir Isaac Newton," in private is sufficient of itself to consign a man to a madhouse—though we know that it requires no symptom of insanity at all to consign a wife and mother to one—but we have *medical advice* that *once in*, it will certainly help to *keep him there*; and without much fine-drawing of the argument, without begging the question in the least, we may say as a corollary, that it will assist, if circumstances fit, *to help him in*.

Believe us, courteous readers, who have borne with us so long, these are dangerous matters to touch in private. To be guilty of the eccentricity of talking about Sir Isaac Newton, (if you differ from him, or from philosophers—and that is *not* the same thing, though all the world does not know it) and especially if you should dare (for "religious madness" is the worst of all) to connect the Bible with philosophy, and suppose than an inspired account of creation can assist an inquiry into the mechanism of the works of God,—will, if you be poor, and it be convenient in other respects to put you out of the way, be one step towards pitching you into a madhouse.

Though a preface be forced upon us of rather an extraordinary description, it recurs to us that we now are writing one, and not an autobiography.

* The reader may not be aware that Sir Isaac Newton therewithal was somewhat "cantankerous," and the proceedings towards him somewhat equivocal. See Enc. Brit. Art. Newton.

† See the Sun, cited in the "Times," of the 23d of August, 1845, containing an account of experiments on the Croydon Atmospheric Railway.

On the abstract question, whether we should publish at all—whether we shall write ourselves down philosopher or A double S, it matters little to us. As long as, through God's mercy and blessing, we continue able to perform our daily duties satisfactorily to our employers, we may, perhaps, escape the latter cognomen. If not, such a trifle can be of little moment to a man who has been once—twice—shut up as a madman.

W. PETERS.

For "tract," read "track" in the quotation Page 22; and at the end of a paragraph, Page 24, for "style" read "stile."

A FEW PRACTICAL REASONS, &c.

CHAPTER I.

REASONS DEDUCED FROM INACCURACY OF DEFINITION.

JOHNSON has defined "network" to be "any thing reticulated or "decussated at equal distances, with interstices between the intersections."

With no better definition than this, it would puzzle us, if we had not a good practical notion of a net, to understand what our great lexicographer means, even with the best help which he affords us.

"Reticulated" is "made of network, formed with interstitial vacuities."

Now, "made of network" begs the question, or, as philosophers would say, "gives the proposition itself for its solution;"* and "formed "with interstitial vacuities," is something very like having "interstices "between the intersections," which throws our inquiry back on its starting point.

"To decussate," again, is "to intersect at acute angles." Now, if a net be stretched one way, the angles are acute,—stretched the other way, the same angles become obtuse; and the same net may be so stretched (we speak philosophically, of course, for it would be a puzzler to do the thing practically) that all the angles shall be right angles;—and, if not right angles, wherever there are acute angles there are obtuse, and wherever there are obtuse, there must necessarily be acute angles in any four-sided figure, whether of equal or unequal sides.

Network, we know practically, is not always of necessity "intersected" at "equal distances;" there are long "interstices" or stitches, and short stitches, but still it is "network." "Decussation," moreover, is the "act "of crossing, the state of being crossed, at unequal angles." The farther we pursue our inquiry, the more we get entangled.

* "On the contrary, the axiom assumed is a result of the proposition which "it is employed to prove; or, rather, it is the proposition itself."—*Enc. Brit., Article Mechanics: on Maclaurin's illustration of the lever.* How much of our philosophy depends on a right understanding of the principle of the lever!

It is not our intention to proceed at greater length with the critique upon Johnson. We have a tolerable notion of network, from the lady's collar to the net which the mouse gnawed when he let out the lion: we know the lady's collar to be generally diversified with a pretty light variety of figure, whilst we can imagine the lion's net to have been wrought out of a good stubborn material, and in all probability to have been "reticulated "at equal distances," like the nets which our fishermen use to catch mackerel on our coasts: we have our notions of a casting net or a hand net, a hammock net or an orange net, net lace, a net purse, a spider's web, or many a kind of network:—any or all of these may, for aught that we need care, be "reticulated or decussated at equal distances, with interstices "between the intersections;" and it matters little, or nothing, whether the definition of the etymologist tends to puzzle or enlighten those who may be at the pains of pursuing the investigation to its close. It may serve to amuse, but it is useless for any practical purpose, like Canning's "Cri-"tique on the Heroic Poem of the Queen of Hearts."

It has served our purpose as an introduction to the startling remark, that Newton defined nothing! Others have raised upon his discoveries of certain uniform movements of celestial bodies, such as must subsist in the mechanism of an Almighty Creator and Regulator, the structure of an "attraction of gravitation," and a "universal law of gravitation," pervading all nature, to which every thing subserves; leading to most extraordinary deductions and calculations, accommodating times to distances, and distances to times, which are reconciled in some manner, we suppose, to the law laid down, just at the philosopher's pleasure. Our days are not longer nor shorter, nor our summers a whit hotter (or colder, rather; for, according to modern astronomy, the nearer the sun the colder the earth, and *vice versa*) since the discovery was made that the sun "has parallax;" which brought him nearer to our globe by thirteen millions of miles!

Pope has written the epitaph of Newton—

> "Nature and Nature's laws lay hid in night;
> God said, 'Let Newton be,'—and all was light."

Pope knew nothing about the matter. Newton would never have sanctioned such an epitaph; not merely because he was modest in these matters to a fault; like ourselves, till cured of that kind of thing, and driven to stand our ground before a discerning public; but simply because he knew that nothing had been defined; that he could not reconcile what he calls *gravity* with other physical forces,* and that he did not know whether it was a physical force at all, for he thought it might be the "effect "of impulse,"†—and because *attraction* was alike undefinable, and its effects, or such effects as he attributed to it, unaccountable.

Though it is the fashion to look up to the philosopher, and down upon the "mere" mechanic, the mechanic as yet takes place of the philosopher; even to the present day. We take a rod of iron. We call it a lever. We have another piece of iron which we call a fulcrum. We wish to lift a weight which the strength of one man, or five men, cannot accomplish unassisted. The fulcrum is adjusted as near as convenient to the end of

* "Newton himself appears to have had no such persuasion that the problem he "had solved" (the universe) "was unique and final. He laboured to reduce gravity "to some higher law, and the forces of other physical operations to an analogy "with those of gravity."—*Whewell's Bridgewater Treatise*, p. 341.

† Physiological Disquisitions, by the Rev. W. Jones: Introduction, p. iii: edition, 1781.

the bar which is thrust under the object to be lifted. One man's effort is applied at the long end of the lever; the weight is raised. But why did not the man who adjusted the fulcrum place it nearer the man that lifted the weight? The lever is a stubborn, inert, material. The fulcrum the same. The will of the man and his physical strength must be the same, in one case as the other. Why matters it then where the fulcrum is is placed? The best answer which philosophy can give, is what has been called "the ladies reason." "Because it is" so, "because it does." "It," says the philosopher, "you do not put the fulcrum nearer to the weight than "to the man, he cannot lift it." The mechanic knew this before he asked the philosopher for his "exquisite reason." "But *why*," still asks the persevering mechanic, "*why* cannot he lift it in that case?" The farthest stretch the philosopher can go is this: "It is *position*, position's every "thing; *distance*, distance does it. The weight is one space; the man "four, five, six, times the distance off the fulcrum, and has four, five, or six "times the power." This is worse than "network," "formed of network." The one gives a pretty accurate notion of the other; to say the least of it, some resemblance may be traced between the two—the notions coincide. But, by what possible association of ideas, can we connect any other way than practically, the notions of *distance* and *position* with power? What would a man think who had never used a lever, or seen it used, if he were told that the farther he got off, the easier he would lift the weight. In the midst of physical forces and elements for the exercise of thought, all, after all, is attributable, in the end, to the rough iron; and the philosopher is content to bow to the enquirer, "the effect is mechanical." Fair ladies, laugh at your husbands when they see your long milliner's or jeweller's bill, ask "*how* it is," and laugh or growl at your "because it is;" tell them it is the "philosopher's reason," and bid them stay at home from the race course or the gaming table, and find out why it is that a man can lift a heavy weight on the short arm, which he cannot lift at the other end of a lever.

This is one enquiry, which we hope to pursue until we find out the reason; not however in the present pamphlet. Our object is to adduce practical reasons for our scepticism in the matter of the philosophy of a Newton. We may fairly call evidences of the incompleteness of definition "practical reasons" for questioning the soundness of a physical theory; if we can show one effect attributed to many causes, and those causes adapted in theory only, not in fact. But we shall go farther. We shall show, ere we finish, the incompatibility of conclusions with each other, as well as with the ordinary evidence of our senses.

We have said that a critique upon Johnson might serve to amuse, but may be useless for any practical purpose. The same may be said of the labours and researches of philosophy. What matters it to the practical man, the merchant for instance, who lives by his trade, whilst the magnet regulates the course of the vessel that carries it, and a good sextant and chronometer enable the navigator to determine within a mile or two the the spot on the surface of the ocean, where a solar meridian or a stellar observation is taken, whether the earth revolve round the sun, or the sun round the earth; or whether the distance between these bodies be nine hundred, nine thousand, nine millions, ninety or nine hundred millions of miles. His latitude is determined by the angular observation, not by a trigometrical calculation, one element of which is the distance of the two bodies; and the angle would be the same, whether the lowest, or the highest, or any intermediate number of miles, be the real distance. Ships voyaged as well as now, when the sun had no parallax. As to the longitude, although the world accused Hooke, the inventor of spiral springs for

watches, of being "jealous and illiberal in the extreme, appropriating to "himself the inventions of all the world, and accusing all the world of "appropriating his;"* we are inclined to think that he has done more towards the perfection of our navigation, than the discoverer or adapter of a universal law of gravitation. Lunars are taken rather to try the skill and aptitude of the observers, to be tested by the watch, than to determine with greater precision the position of the vessel. Astronomical observations serve the purpose well, where we have plenty of sea-room; but, as we near the shore, we require buoys, and beacons, and land marks. To say nothing of shifting sands, tides, and currents, but to speak philosophically, as we did of the rectangular adjustment of a piece of network, it would be rather a dangerous experiment to thread, or even to approach, the Delta of the Ganges, with nothing to depend upon but a clear sky, the sun and moon, the polar star, or Jupiter and his satellites; though we should have the finest possibly graduated sextant, the line of coast and soundings delineated on our chart to a hair's breadth, an eye quick as the eagle's, and some newly patented calculating machine, for working our reckoning with fifty-horse steam power, and the rapidity of galvanic communication.

Our title page promises practical reasons for questioning the soundness of a theory which nine hundred and ninety-nine thousand nine hundred, or thereabouts, out of the million, accept upon much the same grounds as the midshipman, or the schipper himself, in making allowance for parallax in working his day's work, understands what parallax is. The very act of questioning such a theory may be one of great temerity. But we ask the patience of our readers, whilst we endeavour to show, that we are at least competent to argue in our own coat instead of a straight waistcoat, and whilst we further explain our reason for alluding to "network," and Dr. Johnson, in connexion with philosophy and Sir Isaac Newton.

We argue, first, that the ground work of philosophy should be clear and accurate—unassailable definition; that the definitions of the philosopher ought not to be like the references in an imperfect index or dictionary, which carry us from one heading to another, and from that other to a third, or back to the one, with a closely analogous explanation of the same thing under all the heads. Now, let whatever may, be written under the heads of gravitation and attraction, we appeal to every candid man of plain understanding, whether, twist and turn what is written as we may, we can clearly distinguish the effects attributed to these prime movers in the system—those of the one, from those of the other. Nay, are they not so identified that we have an "attraction *of* gravitation?"

Apply this to the story of "the fall of the apple," which used to be the key of the system from which the lock was manufactured, although the notion is repudiated by the philosophy of the day. Whether this really was the groundwork of the Newtonian theory or not, we may take the fact in illustration of our protest against an "attraction *of* gravitation."

What is gravity? The apple falls. It is a body of greater specific gravity than the atmospheric air in which it is detached from the tree. It *has* gravity—gravity prevents its remaining in the air, and it falls. But what is it to fall? A child falls, tumbles down; we tell him to tumble up again: this is a solecism.

The falling tower at Pisa, if it reclined a little more, might recline till it reclined beyond the centre of gravity, till it "lost its centre of gravity," and then would fall: the gravity of the portion on one side of the centre of gravity would prevail against that of the portion on the other side of

* Third preliminary dissertation. Enc. Brit., vol. I., p. 479.

the centre of gravity, or the larger would carry with it the less weighty portion,—or all would fall together for one of these, or for some other reason connected with gravity and gravitation. The centre of gravity no longer within the tower, down it comes: the tower falls.

A bird shot on the wing falls. Slip the wall from under "humpty dumpty," or an elephant from under a tall gentleman, down he comes, "has a great fall;" push humpty dumpty off the wall, let the tall gentleman jump off the elephant, down he comes; animate or inaminate, it is all the same; the egg is broken, the tall gentleman is lamed: neither mischief would have happened but for gravity.

A stone dropped from a precipice falls, whether in freer air or into a well or the shaft of a mine, whether we drop it from the surface or from above the surface of the earth; or whether we descend into the well or mine, and drop it from below the surface; still the stone falls, and all these phenomena depend on gravity. We do not observe one instance in which the philosopher would not tell us that the immediate cause is gravity, and that the falling body "gravitates towards the earth."

The phenomenon occurs at every point of the earth's surface; whether the apple, the stone, or other body be used for the experiment by us or by our antipodes, the effect is the same: a solid of greater specific gravity sinks in air—falls to earth.

We were once proposing an argument on atmospheric forces to a friend who was talking to us about a "momentum." We asked him to define it. We were not aware at the time that "motion" itself, to say nothing of the many sources of a "momentum," "is now generally considered as "incapable of definition being merely a simple idea or notion received by "the senses."* A few minutes further conversation soon convinced us both of the necessity, before discussing any new fact, for clearly understanding each other in the matter of terms and definitions. "To fall," then, for we must find words to express our ideas, is to sink through air to earth by reason of gravity; the effect is, however, the same whether the object be left to sink of its own weight, or to fall with a force accelerated by some other effort, but then it may be impelled in addition to the impulse derived from gravity.

Maclaurin blames antagonist philosophers for treating gravity as an "occult quality," because Newton did not "pretend to deduce this prin-"ciple fully from its cause."† Gravity not only produces but "accelerates "the motion of falling bodies, by acting incessantly upon them,"‡ Gravity is a "universal principle," the "power of gravity decreases in proportion "as the square of the distance increases." The power of gravity would act against a violent effort to a very great degree—to an infinity or not to an infinity, just as the reader pleases, who weighs well the following passage —not our own, courteous reader, but a quotation. We are really told that "if a body was projected from our earth in a line perpendicular to our "horizon with a certain force (viz. that which would carry it over about 420 "miles with a uniform motion in a minute) it would rise in that line for "ever, and return to the earth no more. Its gravity would indeed retard "its motion continually but never be able to exhaust it, the force of gravity "decreasing as it rises to a greater height."§

Professor Whewell, in his Bridgwater treatise, tells us that the whole system is held together by a "universal law of gravitation," and to take

* Enc. Brit. Art. Motion, Vol. XV. p. 573.

† Maclaurin's Account of Sir I. Newton's philosophical discoveries, Ed. 1748. page 10.

‡ *Ibid*, p. 106.

§ *Ibid*, p. 270,

gravity in every accepted phase, we are instructed that "a body at rest, "supported by the ground or suspended by a string, or line of any kind, or "that is in any way kept from falling, endeavours, however," (by reason of gravity) "always to move, and in such cases, its gravity is measured by "the pressure of the quiescent body upon the obstacle that hinders its "motion." *

"Occult," or discoverable, (though undiscovered,) there appears certainly to be, according to the philosophy of the day, a certain property subsisting in an apple or a stone—to say nothing of the tall gentleman whom we lamed, and who falls perhaps under another category, though doubtless he has gravity withal—a quality which Maclaurin calls a "well "known quality in nature," which is calculated to bring about a contact between the apple, or the stone and the earth, just as the loaded scale falls.

Practically, physically, we know that these bodies do, if there be nothing to hinder them, as they ought philosophically, if from no other cause than their greater specific gravity, *fall*. Philosophically they cannot remain, like Ovid's earth,

"Circumfuso pendebat in aëre tellus,
"Ponderibus librata suis,"

suspended in air, poised by their own weight.

We may here casually remark that the earth is said to gravitate towards the apple as well as the apple towards the earth—the earth towards every mountain and the mountain towards the earth—nay "the earth gravitates "towards every projectile while it is moving in the air, as well as the pro-"jectile gravitates towards it." † We may have occasion to argue this point at greater length: but we think that we have gone far enough to establish that gravity or gravitation, however occult the reason, its cause hidden, is, nevertheless, an active, moving power, a motive principle of the prevailing philosophy; and we seem to have identified falling through air with gravitation. But when we reflect that the earth and mountain are in contact, or, in fact, one and the same solid, and the apple lying on the ground still gravitates towards the earth, we lose the other condition of our physical problem; for neither the united bodies, earth and mountain, nor earth and apple, as such united bodies, though both possess what we vulgarly call weight, move either upwards or downwards out of the "plane of the "ecliptic."

This argument must not be lost sight of altogether in this place, though we merely glance at it incidentally in the present stage of our inquiry into the accuracy of our philosophical definitions of physical forces or powers. We dismiss "gravity" for a while, by recurring to the fact that Newton "in his latest works" confesses that "what he calls *gravity* might, for "any thing he knew to the contrary, be the effect of *impulse*." ‡

But the Encyclopædia Britannica tells us, that impulse is not a more satisfactory definition than attraction. §

Proceed we then to "attraction." And what says Newton of attraction? We cannot afford time from our more interesting studies in the field of natural philosophy to rub up our old Latin, and read Newton in original. We therefore quote, on the responsibility of his expositors; generally Maclaurin or the Rev. William Jones.

Maclaurin, an out-and-out Newtonian, tells us, that Sir Isaac Newton "gives repeated cautions that he pretends not by the use of this term"

* Maclaurin, p. 242. † Maclaurin, p. 273.
‡ Jones, already cited, Introduction, p. iii.
§ See Enc. Brit. Art. Motion.

(attraction) " to define the nature of the power, or the manner in which it " acts. Nor does he ever affirm or insinuate " (we hope our readers will mark the peculiarly guarded expressions of this quotation) " that a body can act " upon another at a distance, but by the intervention of other bodies."*

Yet the same author tells us that Newton " overthrows the foundation of " of Spinoza's doctrine, by showing that there not only may be, but that " there actually is a vacuum, and that instead of an infinite, necessary and " indivisible plenitude, matter appears to occupy but a very small portion " of space, and to have its parts actually divided and separated from each " other."†

If, then, a vacuum subsist (if the expression may be allowed) and a body cannot " act upon another at a distance but by the intervention of " other bodies," a difficulty appears to arise in rightly apprehending the nature of attraction.

Let us suppose " space " to be a vacuum, and that in " space " we see suspended three bodies—numbers one, two, and three. If No. 1 will not attract No. 3 without the intervention of No. 2, *why should it with the intervention of No.* 2? We would fain meet the passage, for it is an important one, at every point: but imagine that in this suggestion we have gone deeper into it than its intended meaning. The passage, we rather take to involve the admission that Newton could not account for the action of this principle, or power which appeared evidently to prevail in our system; that he could not explain the fact of an attraction between any two bodies in " space," inasmuch as he felt that he had proved that there was no intervening body, and " space" or "vacuum" not being "matter," communicability of power appeared to be cut off.

This latter reading accords with what Maclaurin has written as to the demonstration of a vacuum, and with an observation of the Rev. W. Jones, that Newton discovered " certain constant and regular effects to which he " gave the names of attraction and repulsion;" whilst " as to the cause of " those effects, he advised future philosophers to inquire further into them."‡

In this and in future essays, should we again come before the public, we may frequently have occasion to quote from the Rev. William Jones, an author whose views, though not adopted, are cited with great respect in the last edition of the Encyclopœdia Britannica.§ The Irish author complained that " the ancients had stolen all his thoughts from him." We can assure the reader that, long after we had raised objections to accepted theories, definitions, and illustrations, we found those very objections, purely original with ourselves, urged by this author upwards of sixty years ago. Our notions differ essentially; but our objections tend continually to the same points.

We cannot proceed further without giving our readers a summary of Newton's discoveries, drawn up by this philosopher in his own words.

" It was generally believed by learned men, that a vacuum had actually, " been demonstrated by our great Newton; and, consequently, that no " powers were to be admitted in nature but such only as were consistent with " that principle. It must be allowed that this celebrated author, by the " help of numerous and judicious experiments, settled all the laws of com- " municated motion; computed the resistance of fluids; dissected the " subtile body of light; and with indefatigable industry and sagacity, dis- " covered certain constant and regular effects, to which he gave the names " of attraction and repulsion; and by the most profound skill in geometry " demonstrated the proportions of those effects in almost all possible cases,

* Maclaurin, p. 107.
† *Ibid*, p. 77.
‡Jones, Introduction, p. iii.
§ Article, Motion.

"and showed by experiment how the phenomena of nature agree with his "calculations. This is his philosophy, which stands upon the firm basis of "demonstration; but, as to the demonstration of a vacuum, he left it in "suspense, as we shall see hereafter; and as to the *causes* of those effects "above-mentioned, he advised future philosophers to inquire further into "them, confessing, in his latest works, that what he calls *gravity* might, for "any thing he knew to the contrary, be the effect of *impulse*."*

Doctors disagree—medical doctors about every thing under the sun but locking up a man *ad libitum*. Jones and Maclaurin cannot tell the like tale regarding Sir Isaac Newton's demonstration of a vacuum. This will not be wondered at when we show how physical powers may be transtwistified and multimystified at the will of the philosopher. It is not at all incomprehensible that Maclaurin should say that Newton *has*, Jones that he *has not* demonstrated a vacuum!

We here take occasion to remark, that our objections to existing definitions and some of the prominent conclusions of the philosophy of the day, have not been casually caught up as they will be brought forward in the present essay; but appear to us to have ascended from minute investigation of facts, not fully understood and generalized; and to depend upon fresh discoveries, which we have no desire to conceal. But, as we imagine it to be the duty of a wise soldier to look well over the field of action, and clearly to ascertain the position and strength of the enemy, before he makes his attack—to reconnoitre the defences, and to certify himself as to the strength of the citadel, and whether there be unanimity in the councils within—so we have considered it prudent to search into the condition of the philosophy of the day; and, if we can, adduce "practical reasons" why the system will not, either as to its definitions or its conclusions, bear the test of close scrutiny, before we attempt to start theory in opposition to theory.

We cannot conceal the fact that the definitions have appeared to us calculated altogether to bewilder, not to enlighten. In this suggestion we write advisedly, and hope to carry with us, in adducing passages from some of our highest reachers, a pretty general opinion, that, however orthodox, they are marvellous "*usque ad*" sea-serpentism.

We have been advised, that "the best way to do justice to any impor-"tant discovery, would be to publish it in its own shape." We may defer this until we ascertain whether our objections to accepted notions are sufficiently strong, to set other men a-thinking, out of their own track, if not in ours. All we can now say is, that if we meet with encouragement, we shall not be idle, nor backward to communicate, and to publish.

We appear, to our own mind, to be considerably advanced in a process of generalization of facts and ideas. We have pursued this generalization under great disadvantages, for want of sufficient means of experiment; and we have found that imperfect instruments will not satisfy philosophers, though their very imperfections tell in favour of the objector.

Our objections are comprehensive. For instance, if our notions be sound, it would puzzle Professor Whewell to re-write his Bridgewater Treatise; unless, peradventure the re-writing of a treatise be like the improvement of public building, of which it is said, when a new structure is raised upon an old foundation, or even on another site, that the old building is rebuilt and perfected. "HENRICO VIII. REGE FUNDATUM "CIVIUM LARGITAS PERFECIT"—"ANNO ELIZABETHÆ, R. XIII. "CONDITUM, VICTORIÆ, R. VIII. RESTAURATUM." We have not the stimulant of a literary douceur, but if we can write, "HONOR DEO," upon

* Jones, Introduction, p. iii.

title page, with reverence and thanksgiving for preservation of us and ours through evils past, and can trust to His mercy for protection from misery and distress, such as few have to bear, we care not to begin with a short essay, and an emphatically empty purse.

We do not despair of coadjutors. If the world will protect us in the English privilege of thinking aloud through the press, we may send "other "little barks" upon the waters, and, "if their vein be good, the world will "find them after many days." Should any of our readers see ground to consider that our objections are sound, and desire any farther information, we shall be happy to see the object in other and better prepared hands. Our public lecturers freely acknowledge difficulties as they proceed; and, in many instances, the train of our thoughts, whether we follow the chemist, the physiologist, the naturalist, the geologist, the astronomer, appears likely to lead, in experienced hands, to remove some obstacle or other, in each department of science, where the lecturer confesses himself at fault. Beginning our studies in ignorance on all these matters, and being led step by step, more or less, into all of these and other sciences, pursuing our objects, though diligently, for a few months only; and then having the generalization of our subjects cut off by individualizing the subject himself under lock and key, under circumstances of the bitterest misery, we may be excused if we confine our first pamphlet to objection, although we have been asked to point out what we would "substitute for "gravitation." We shall only add further on this point, that we hold it sufficient apology for our present work, if we shew in the end that the results attained by mathematical calculations are incompatible with physics; and, as to acquaintance with any science in particular, it may be sufficient to attain it in its place as we proceed; and, if peradventure we have any "talent" in store to let out to fructify, not, "lay it up in ordinary" till, like Newton, we can understand and read Euclid off hand, as we would Waverley or Pickwick.

To pursue our subject. The most ready illustration of "attraction" is the magnet. This is, as it were, a supernatural, certainly it is a supra-philosophical power. No one has yet explained it. The cause of the attraction of the magnet is yet beyond published comprehension. Yet it is philosophically, physically, *a power*, and gives us the idea of a power subsisting, in order to bring bodies together by some unknown law; a law which is palpable, however inexplicable. It is a curious, a wonderful power. Hundred-weights have been upheld by the magnet, and our enquiries regarding this power become complicated by the fact, that we have magnetic repulsion, alike incomprehensible. The two together, or either apart from the other, we have a very beautiful idea of contending forces, calculated to be the medium through which an unerring Being might establish a unity of action, which should be fitted to keep a solar system or a universe in order. But we imagine that the actual effects of magnetic attraction and repulsion, or of attraction or repulsion alone, have never been so minutely investigated, adjusted, and arranged, as to enable the philosopher to attribute to these principles or properties together, or either of them separately, the sustentation of our globe in "space;" else we should not have need of centripetal and centrifugal forces and gravitation.

"Attraction" has been preferred, but "repulsion" seems a more likely property to account for objects *never meeting* in space. It is true that this notion is repugnant to the fall of the apple. It may be said on the other hand, that the moon and earth do not come together. But we must eschew theory.

We have an *attraction of aggregation* or *cohesion*. Here we travel out of

the range of "natural philosophy," and are rather within the chemist's province; though we must not forget that the earth itself is an aggregation of atoms.

Our more simple illustrations of an *attraction* are found in large and small pieces of cork in a bason—ships at sea in a calm: these left free to float approach each other, and if left to themselves approach to contact.

We have also the attraction of electricity, whether Franklinian or Galvanic.

But, in all these, our notions of attraction involve contact, if the bodies acted upon are apart from other influences than those which we attribute to that power. Just as we are ready to say that any thing falls *down*, so we feel that, wherever attraction subsists between two bodies, they are *attracted to*. We cannot carry in the mind's eye an attraction commencing between two bodies, without approximation commencing at the same moment; and, as a natural consequence, the bodies meeting at last; unless intercepted, or withheld by some stronger power.

We hope that we fully understand what the author of the treatise on attraction, in the Encyclopædia Britannica, means, when he says,—

"We say, likewise, that the earth attracts the moon; by this mode of "expression, meaning no more than that the moon is continually deflected "towards the earth from the rectilineal course which it would otherwise "pursue. It is, likewise, in this sense, we must be understood when we "say, that the sun attracts all the planets."*

To deflect is "to turn aside; to deviate from a true course." The etymology of the word and its philosophical application in the passage before us appear to be clearly the same; especially if we may take advantage (and why not?) of the accepted notion, that all motion proceeds, unless the effect of compound forces, in right lines.

We can imagine a force, not rectilineal, by means of which, through an Almighty fiat, an earth or a moon should move in any direction, and for any time the Creator wills, and pleases to sustain it; we can conceive no power that could slacken or accelerate its pace, or deflect it from its course, whether the prescribed orbit be circular or elliptical. But then, what becomes of attraction? The philosopher might as well sleep as talk of an attraction deflecting the moon towards the earth, against the action of such a power as this—an ant tugging at an antelope with a spider's thread.

We throw out this notion of a centrifugal force incidentally. Our text leads us rather to shew that philosophical attraction, if it be what is represented by the author of the treatise in the Encyclopædia Britannica, cannot be an active moving power as in the case of the magnet.

We may understand that we are *called upon to believe* that such a power as an attraction subsists in the instance under notice; this we fully comprehend; but we cannot reconcile to our senses, that there *is* a deflection of the moon towards the earth—an attraction drawing the moon out of a rectilinear course, but at the instant it acts, stopping at the very point of action, and then subsisting still, *an attraction without traction*. Let the course of the moon in the heavens, originally the result of a rectilinear impulse, no matter how communicated, become curvilinear, the deflection must arise from some power or force analogous, in the common acceptation of the terms, to either the one,—whether we call it gravitation or attraction, —or the other, repulsion—"pressure from without," instead of attraction from within the eventual orbit. If an attraction subsist, overcoming the rectilinear tendency into space, in the minutest possible degree, the moon, under the influence of that power is, by the earth, brought nearer

* *Article*, "ATTRACTION."

to the earth; and then, however minute the degree, *in that degree increasing*, the earth's attraction preponderating the more strongly, the attraction would philosophically become stronger; for if attraction deflect the moon at all, we repeat, it must deflect it to a point in space nearer to, not farther from, the centre of attraction. This "*premier pas*," *coute qu'il coute*, attained the addition of the adverb "continually" ("continually," "incessantly," are words frequently used to step over a hitch of this nature) increases rather than solves, nay, clenches the difficulty.

We are clearly to understand that the deflection is not transient nor irregular; but the idea intended to be conveyed by this word, "contin-"ually," is, that this deflection is incessant, uninterrupted, uniform. The every effort of philosophy is to overcome all possibility of instability; it works its system on the supposition of undeviating laws; but here we have the idea of an attraction which has subsisted from the beginning, and will subsist until the final disruption of all things; yet never bringing the objects one hair's breadth nearer to each other. If any extraneous force, apart from attraction, deflect the moon, change her rectilinear to a curvilinear course, attraction is at hand, "momentum," "gravitation," all are ready to assist:—the rectilinear course once broken, deflection once established, if attraction be the cause of any deflection, the moon must have a tendency, reason how we may, to approach the earth; and sooner or later these objects must come together. But the cause, especially in the notions of some geologists, has been a very long while in operation without the effect.

We have not forgotten the apple. The apple falls to the ground—not towards the sky; not because, philosophically, it cannot gravitate upwards —the wise saw that "there is neither upwards nor downwards in space," tells as well one way as another—but because a large piece of cork attracts a small one to it in a bason of water; because large bodies *attract* small ones. Wherefore gravity, which wants no assistance from attraction, has attraction superadded to account for the apple falling to, not from, the earth. As, however, the earth is a large body and the moon a smaller, but, nevertheless, we have as yet no contact, and do not expect it; attraction, which is palpably necessary in the case of the apple, becomes a continual deflection, and no attraction at all, when we speak of the moon.

In making use of the expression, that the earth and moon do not come "one hair's breadth nearer to each other," we do not overlook the objection, that there are a transverse and a conjugate diameter to an ellipse, or, in simple words, that an oval has length and breadth; consequently, that, as the moon's orbit is not circular but elliptical, we make a mistake in saying that the moon is never nearer to the earth at one time than another. Granted. But we were arguing philosophically, as in the matter of the network. It is an argument by which we get off a wrong road, to lead the objector to our reasoning into the mud; and there we trust to leave him, whilst we extricate ourselves from the difficulty into which we have seemingly suffered ourselves to be led, by taking hold, for a season, upon an attraction diminishing or increasing in proportion to distance.

Very little reflection will shew that the objection regarding an elliptical orbit, if advanced by the philosopher, increases, not removes, the difficulties in his way, as they regard the point that we have now in hand—which is, to prove that attraction is ill defined and has more meanings than one; or, in this one instance at least, no meaning at all.

Attraction fixes the needle to the magnet; the large cork and the small are brought together by attraction. By attraction the ships fall foul of each other, and the apple falls *to*, not from, and is held by the earth.

Attraction deflects the moon continually towards the earth from the rectilineal course which it would otherwise pursue.

It may be easier, and we believe it is, to lunge a restive horse with a long rope, than with a short one; and easier, we think, to keep him in when he would "fly off at a tangent," after we have established our circle, than when he endeavours to bolt in a right line from the centre; and there may, or may not, be an analogy, proximate or remote, between such an illustration and the objects now under our review: as much perhaps as subsists between a ball and a string, or a few balls in a marble wash-hand-bason, and a centrifugal force; but we are bold to say that the moon, held by the earth at the extreme of the conjugate of an elliptical orbit, would find it a vast deal easier philosophically to go round in a smaller circle, than to get to the end of the transverse diameter of the ellipse. This is not, however, exactly our present point; neither does it matter much to our purpose now, whether, if the earth tugs or attracts at all, it tugs in this instance with effect or without effect. The fact with which we have now to deal, is this—that attraction is ill-defined, and that an "attraction *of* gravitation" is a compound, and consequently an unphilosophical principle. We are not arguing now upon the orbicular motion of the moon. We merely contend that if the earth attract the apple, and the moon be not out of reach, the moon and the earth, as well as the apple and the earth, might, could, would, should, or ought to come together. Philosophers must not have every thing, every way they please. Facts must not be fitted to suit the laws of philosophy any more than the laws of Bramincraft.

We remember the story of a Bramin, who read in his Shaster, that "money draws money." Thereupon he started forthwith to the shop of a shroff or money-changer. In the bazars of India, midst crowds of uneducated Hindoos and fiery Mussulmans, piles of thousands on thousands of rupees may be seen exposed within a hand's breadth of the multitude in open shops, without any windows, in the public streets. It is a curious fact, which a Londoner would hardly believe, if he thought as he read. But so it is. Perhaps it is because, in those countries, there are no pockets to pick for the initiation of a rising generation into the dexterity, which, as we sometimes read, induces the fist to penetrate into a jeweller's shop window, regardless of consequences. The Bramin pitched a rupee near to one of these heaps, squatted himself close at hand, and with the patience of a Hindoo, awaited the magnetico-alchemical process by which he was to be enriched, as by the Shaster is made and provided. The day drew to its close, the shroff was about to shut up shop. "Stop!" said the Bramin, "that heap is mine; the Shaster "says money draws money." "So it does," replied the shroff, as he gathered in the Bramin's bait, "but you see it is the large heap that "draws the smaller." So says the railway speculator—and so says our philosopher, "Your apple is too little and too close to the earth, and so "the earth draws it in and prevents it gravitating elsewhere." If it be so, the Shaster of philosophy is right; "money draws money;" "earth "draws apple;" there *is* such a thing as attraction, there *is* such a motive power; the philosopher is right in talking about it. But let him tell us *which*, and *in what proportion if both, gravity or attraction, or gravity and attraction combined, bring the apple to the earth.* Till then, we argue that he is not entitled to tell us of an "attraction *of* gravitation," and until then, or till we can pin our faith to the Shaster of gravitation, acting by a universal law in the midst of attraction, we must consider ourselves independent of his Shaster, as the shroff of the Bramin's, prefer our own intrepretation to his, meet him with his own arguments, and walk off, in the independence of our scepticism, with the moon in our pocket.

When we talk of walking off with the moon in our pocket, we speak figuratively, of course. Do not suppose, courteous reader, that we have any serious intention of perpetrating such a misappropriation, as to *take the moon to ourselves.* We know many a one with as good a title to it. We merely "mean to insinuate," that we have an illustration to propose, calculated, we hope, to elucidate our objections; and show the instability of the system which is now so generally accepted. We mean to suggest that we have arrived at that point, in which we find the moon equipoised between a centrifugal force and an attraction; but still moving, it is said, with a velocity of about thirty-five miles in a minute. The force which gives this impulse is, *we are directed to understand,* just exactly overcome, so that the rectilinear motion is subdued, and the motion become orbicular. Wherefore, philosophically, if we were at the orbit of the moon, (and elliptical movements are fitted as accurately as circular,) not the bold effort with which we may pocket a moon, and walk off with it; not the dexterous twitch with which the well-trained urchin eases us of the actual contents of our pocket unperceived; but the veriest touch in the world—in the moon's atmosphere, we should say, if it has an atmosphere—exerted towards "space" beyond the orbit, the simple tugging of the ant with the spider's thread, superadded to the tendency to rectilinear motion, would upset the moon's rotation in its orbit.

But when we would walk off with the moon in our pocket, the philosopher says, "That will never do! We have a centripetal force to stop you." This is the very reticulation of network. What is a centripetal force? It is something having a tendency, a desire to get to a centre.

A little work excellently arranged and replete with information—so much so, that we have often wondered how so much information, on so many subjects, is packed into so small a compass; "Watkins portable "Cyclopædia" tells us that a—

"Centripetal force" is "that by which a body is every where impelled, "or tends towards some point as a centre; as gravity, or that force by "which all bodies tend to the centre of the earth; magnetical attraction "whereby the loadstone draws iron; and that force by which the planets "are drawn continually back from right lined motions, and made to move "in curves."

The big book in twenty and odd volumes, the Encyclopædia Britannica, does not tell us nearly so much under the heading "Centripetal Force," as this little duodecimo. It confines itself to the definition without the exempla. Compare with the foregoing, what follows from the last edition.

"Centripetal force is that force by which a body is every where im-"pelled, or *any how* tends towards some point as a centre."

The two words which we have *italicised* have somehow found their way into the latest edition of the Encyclopædia.

We will not inquire, it is not worth the time, how it happens that those little words appear in one and not in the other book. In either instance, the definition is a most comprehensive one, and just suits our purpose. It is the very thing we want. It furnishes us with an innocent revelry of objection. A force by which a body *is* every where *impelled,* or ANY HOW *tends* towards some point as a centre. How exquisitely philosophical! There is no possibility of creating a difficulty.—Philosophy has leaped the Rubicon.

"Opium facit dormire,
"Quia est in eo virtus dormitiva,
"Cujus est natura, sensus assoupire."

If one thing *attracts* another, it is a centripetal force that causes the motion; earth draws apple by a centripetal force.

If any thing is driven to another, gravitates towards it, is impelled by gravity towards it—it is a centripetal force that causes the motion. Apple falls to earth!

We had thought to show that the apple after all came to earth, not by an attraction of gravitation, but by a centripetattractigravitation-towards the-earth's-centre; but we must, perhaps, be content, hoping that we have hit the euphony of the word, to admit that the centripetal force is not in itself a new element of definition, but another way of rolling up two ideas into one.

We had an anecdote in mind. We thought of a Governor-General of India, who once on receipt of a despatch, reporting some small local outbreak, or what he thought to be so, represented in *glowing colors* by the head military, as well as by the head civil authority of the district, wrote in the margin of the dispatch in pencil,—"General Suchaone and Mr. "Soandso would do well to walk off in a curricle together." Now we thought that by harnessing attraction and gravitation, we could make our escape from philosophy; and we were inclined to tack on a centripetal force, and see whether we should get on better in a Unicorn, like a Greenwich and Woolwich omnibus; or whether we could make the leader run restive and capsize "the concern," and then stand our own ground in the universe. But we fear that we have been under a mistake, and that instead of being able to tack on the other horse to increase the speed and risk, we must look upon the centripetal force as the "curricle bar," keeping the two nags from the mischief of too loose a rein, and connecting them together; just as in algebra, we (or they, for we do not know much of algebra,) tie two quantities together by a bar at the top; when those two quantities which, without it, can be used any way,—with it, can only be used by operating upon the two together.

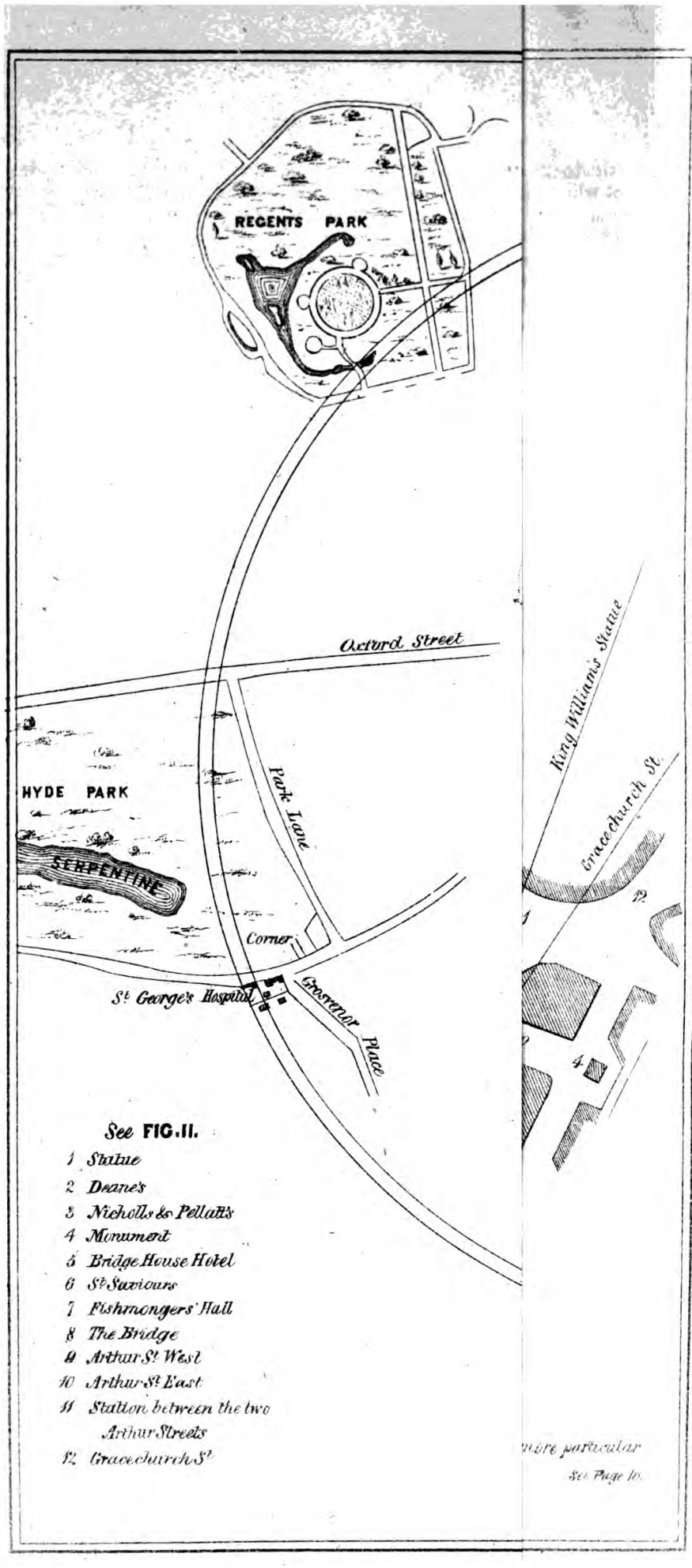
When we talked of harnessing together attraction and gravitation, we were about to show that an attraction of gravitation would unhinge the system; that gravitation must be kept out of sight: for all, and perhaps more than enough, being already accomplished by attraction alone, it would endanger the curriculum of science to tack on the pair, instead of being contented to leave one horse in the stable, and allow philosophy to make use of the other, or keep the other in the stable and use only the one; just as she pleased.

For, although we have got rid of what we called a centripetattractigravitation, we were still hampered by this "attraction of gravitation."

We do not think that we could have hit npon a more apt illustration than this of a curricle and pair; in which we will accordingly suppose ourselves to be seated at the side of Philosophy, giving Philosophy the whip-hand, but keeping an eye upon both horses, and watching how the one or the other bears upon the curricle bar.

We will suppose ourselves starting from the Middlesex side of London Bridge, with an impulse of 35 miles per minute, which is just half as much velocity, minus $2\frac{1}{2}$ miles, *in a minute*, as the best speed which Mr. Samuda has yet accomplished, on the Croydon Atmospheric, *per hour*. It is not, however, any great approach towards the rate which would involve the danger of our "Gravity" flying off into space; the pace which would endanger our curricle in this respect is a "uniform rate of about "420 miles per minute."* Philosophy will, therefore, be able to hold in Gravity; and as to the placing of the horses, considering that we have the curricle bar of a centripetal force, connecting the two, and keeping "Gravity," if restive, tied to the other horse "Attraction," it matters

* See Quotation from Maclaurin, p. 270; at page 5.



See FIG. II.

1 Statue
2 Deane's
3 Nicholls & Pellatt's
4 Monument
5 Bridge House Hotel
6 St Saviours
7 Fishmongers' Hall
8 The Bridge
9 Arthur St West
10 Arthur St East
11 Station between the two Arthur Streets
12 Gracechurch St

more particular
See Page 10.

little to us whether we have him on the "near" or "off" side; we care not which, just as philosophy pleases. But let us call "Gravity" the "off" horse, and "Attraction" the "near," just to identify them in their places, and by way of distinction; for, change the stables or the tickets, and the odds are, that philosophy would not know the one from the other.

Now all the world knows, or will know, for we trust all the world will read our book and as many as can afford it, buy it; that "right ahead," as the sailors say, from the middle of the bridge, stands the statue of King William, the "Sailor King."

About half way (we have not measured it, and the distance, actual or relative, is not, as the lawyers say, "material to the issue,") there are two cross streets, opposite to each other, Arthur Street East and Arthur Street West; Arthur Street East is on the "off," or right hand side, Arthur Street West is on the "left" or "near" side.

Now our "impulse" is in a direct line from the middle of the bridge to the statue; we have no inclination or tendency whatever to move one hair's breadth out of the direct line; and if our horses did as we wish them, we should soon reach the statue. We have no disposition to turn round by Deane's shop into Arthur Street East, nor to "hedge off" towards Nicholls & Pellatt's, and turn down Arthur Street West; but somehow or other we never, from the first, have kept a direct course.

We are seated, not in Apollo's chariot of the Sun, but in our curricle of the moon. Our business is now only to try the temper of our horses and their dispositions; and to see whether they tug together or against each other, whilst they endeavour to do, just the very thing stubborn horses are wont to do, what their masters don't want—in other words, having said a good deal about "attraction," and "gravity" apart, we are inclined to aim at a practical notion of the two tied algebraically together.

But although our object is to shew the incompleteness of definition, we may have occasion to hint first at effects, before we proceed to search minutely into causes.

And we will first look for a moment, at the difference between our physical problem and our illustration.

We have, perhaps, taken an unwarrantable start of philosophy in getting in a right line from the bridge to our point midway between the two Arthur Streets; but we are told that the impulse is tangential, and—as philosophy has not yet, we believe, determined how or where the moon got, through other influences, into its orbit,—there *is* a perhaps in the case; we may be right, or we may be wrong; and whilst philosophy is finding out which, we shall proceed.

Our horses do not incline to run restive; to carry us out of our intended course, which is to the statue, till we get to the cross streets. We have supposed them to have been whipped up to a thirty-fold railway pace of 2,100 miles an hour, the moon's attributed rate of travelling in its orbit; and here we shall sink for an instant the idea of a neat light curricle, in order to take our imagination into "space," and for that short while, fix it upon the moon, in order to judge of the strength of the forces wherewith we have actually to deal.

Every tyro is told of the difference between the force required to set a heavy body in motion, and a light one; and of the consequent danger of attempting to stop a nearly spent cannon ball, deceived by the slowness of its approach. We must, therefore, bear in mind, that the idea which we have to entertain, is not that of a light vehicle, but that of a vast orb in motion with enormous velocity. Saturn, we believe, is understood to be of the specific gravity of cork; we forget the specific gravity of the moon—our impression is that the *materiel* is much heavier than that of Saturn.

To revert to our illustration, and to couple it with the facts and conditions physical, of philosophy, as we proceed, we are free to admit that although our original impulse is direct towards the statue, our horses are appointed to get the better of us half way, and to take our curricle somewhat in the direction of the upper part of King William Street, through the Exchange, up Bartholomew Lane, between the Bank and Capel Court,* crossing Old Street, at the top of Whitecross Street, up to the Angel at Islington. Thence—we should not be particular about interruptions from houses—consider the pace—through Pentonville, passing Clarendon Square on the north side, we should cut off the corner of the Regent's Park, and skirting Portman Square, we should drive by the corner of Oxford Street and Park Lane, and, through a part of Hyde Park, should reach St. George's Hospital. From St. George's Hospital, in the direction nearly parallel to Grosvenor Place, we should pass not far from Eaton Square, cutting right through the Penitentiary at Millbank, where we cross the Thames. Every thing on the Surrey side gets, sometime or other, to the Elephant and Castle, and so should we, giving *as wide a berth as possible to New Bethlehem Hospital.* From "the Elephant" we should make a course running very nearly parallel and close to Blackman Street and High Street, Borough, till we—and we must be rather more particular here—till we pass St. Saviour's Church, and close by the Bridge House Hotel; crossing the river, not by the Bridge, but so as to fall into the segment of a circle, which may pass between Fishmonger's Hall and the N.W. corner of the Bridge, and bring us at last to the identical spot where our horses first ran restive, in a direct line between the middle of the Bridge and of the Statue; not one inch have we lost, not one inch gained: and all this because there is a particular bag of oats somewhere about Covent Garden Market, where we suppose "Earth" to be to which "Attrac-"tion" has a particular fancy, or because Gravity *will have* that particular bag of oats, or if he *won't*, we will let him have *no other;* nor *that.*

But then again, somehow or other, (and somehow is as good in illustration as "any how" or "nearly so" in philosophical definition) although the oats want to be eaten as well as the nags to eat the oats, (for there is an attraction of the earth to the moon, as well as of the moon to the earth, and the earth gravitates towards the moon as well as the moon towards the earth) they are doomed never to come together; for it is necessary to understand that, although Philosophy supposes the force impressed at a tangent to the orbit which we have described, and although she has created these horses of her imagination, and ought to be able to "do what she likes with her own," what she wants to do, the horses won't let her do; so between the two—between the horses which will not let Philosophy do what she intends, and Philosophy which will not let the horses do what they intend, though Philosophy has not changed horses for upwards of a century and a half, and drives the identical pair she did in Newton's time, neither can we get to the statue of King William from the middle of the road close by, nor they to the bag of oats in Covent Garden market.

We all know the power of a horse to fly off "at a tangent," in or any other direction from a bag of oats; but on the contrary, some riders have found the inconvenience of an attraction subsisting between two such bodies, when a hungry horse has "bolted" towards the stable—just in the direction he should not—but this consequence is one of the inert material, attracting through the agency of mind or instinct in the horse; and, albeit,

* It would be a pity to turn into Capel Court, though we have had at times an inkling that way, with a new Railway scheme to supersede all others.

the head of the rider may come in contact with the stable door on such an occasion, the bag of oats is reached, and contact—we mean that between horse and oats, not between head and door-frame, which may be effected under some other category—is accomplished; the attraction is complete.

This, we argue, is not, in any sense, the sort of attraction subsisting between the oats and our horses, or the earth and the moon. It is true, that in order to accommodate ourselves to Philosophy, we have called one of the horses "Attraction;" but we never meant to admit, "affirm, or "insinuate,"* that the disposition towards the oats was a power acting mechanically upon the horse, without the "intervention of any other body."

"Attraction" wants the oats, and so the same effect is produced as if the oats mechanically affected him. To attribute an effect arising out of volition to matter is not altogether philosophical.

Attraction may be supposed to have tugged hard to avoid being brought from Covent Garden Market (if he ever was there) to King William Street; and the nearer we got to the curricle, the easier we found it to drag him along; we do not exactly know how far we were assisted or impeded by a very peculiar force—a "*centrifugal force.*"

As *we* understand it, the student in natural philosophy *must understand* at one and the same time, that this is just the force which "attraction" has just power to deflect, and which, but for such deflection, would have taken us up Gracechurch Street, as we passed up between Fishmonger's Hall and the north-west corner of the Bridge; or to King William's statue, from our station between the two Arthur Streets, had we come through the Borough, and across the Bridge.

We are aware, that in pointing out our course, we have indicated neither a true circle nor an ellipse; but as all happens amidst contending influences—for the sun attracts all the planets, and all the planets the sun;—and inasmuch as attraction is less the greater the distance, and greater the less the distance; and further, inasmuch as the moon, in its orbit round the earth, is at one time 480,000 miles nearer to the sun, the mainspring of attraction, than at another; yet, nevertheless, contrives to get back to the starting-point, as it were, from Hyde Park Corner, notwithstanding that the sun attracts much more powerfully at Hyde Park Corner or St. George's Hospital, than at King William Street; and, moreover, as the sun is now thirteen millions of miles nearer to us than he used to be; we have little doubt that all the ins and outs of the course which we have indicated, might, in the hands of a skilful whip of philosophy, be as accurately determined as they are now according to a "universal law of gravi-"tation." The curricle would, doubtless, thread beautifully through streets and alleys, instead of levelling houses with the impetus of an Act of Parliament: although Newton endeavoured, in a manner which his commentators do not very carefully explain, to reconcile that law of universal gravitation to other physical forces, and other physical forces to that law; and although we may take it for granted that what we are told, a century and a half after, he "endeavoured" to do, remains yet to be done.

Following up our argument, however, still with reference to our illustration, we may be told, that we have run riot in our fancy; that Philosophy never told us that attraction, even with gravitation to boot, would carry round the moon in her orbit, and that if we must put the pair in harness, their heads should be turned—not exactly where their tails should be—but towards Arthur Street West and Covent Garden Market.

We know this, O Philosophy! It is at this point we try the mettle of Attraction and Gravity, as we contemplated. We have been looking into effects: let us search into causes.

* See Maclaurin on Newton, p. 107; cited at page 7.

We know the effect is attributed to a centrifugal force, and a centrifugal force has also been styled "repulsion." What is a centrifugal force?

"Centrifugal force is that force by which all bodies that move round any "other body in a curve endeavour to fly off from the axis of the motion in "a tangent to the periphery of the curve; and that in every part of it."*

Repulsion and a centrifugal force will not, then, agree together. For, if repulsion subsist as an agent, where there is an orbicular motion, it must subsist, from the centre, equally towards every portion of the circumference of the circle, or the periphery of a sphere. Connected with repulsion we can entertain no notion of flying off "in a tangent to the periphery of "the curve." Attraction may perhaps serve, with or without the aid of another centripetal force, to deflect a tangent into a circle; but repulsion from a centre would meet attraction at all points, and if exerted at any point not the centre, could not, by any possibility that we see, be twisted, with attraction into an orbit. Hence we do not wonder that repulsion does not flourish in the philosophical field; though we have been told, by thinking men too, that "repulsion" and a "centrifugal force" are the same thing.

Centrifugal force, then, cannot, we imagine, be a force in direct antagonism to attraction; though centrifugal, it does not proceed *out of the centre*. What, then, philosophically, is a centrifugal force?

The definition ill fits the term. If, in the abstract idea, it has anything to do with the centre, it is not intrinsically a philosophical, but a supra-philosophical power. All philosophically uncompounded forces move in right lines; this, if it has anything to do with a centre, shoots round corners: it must proceed, against attraction, from the centre to the periphery, and we know nothing to hinder its taking the shortest road, the radius; and then, though it does not, like a ray of light, which, if it "falls "upon a surface in a direction perpendicular to the surface, is reflected "again in the same perpendicular;"† or like a sprightly sylph in the dance, pirouette and turn back again;—it does something philosophically as extraordinary, for it shoots a-head at an angle of ninety to its course, to be deflected immediately into an orbit.

If the force be centrifugal *from the centre*, it has proceeded, through the region in which prevails the attraction which is to give it its orbicular tendency, as soon as it arrives at the point from which it is to fly off at a tangent.

But again, how can the force of which we now treat be centrifugal in any other sense? Suppose it to proceed originally in the direction of a tangent to the orbit, is it in any sense intrinsically a centrifugal force? A line drawn at right angles to the extreme of the radius of a circle is independent of the circle; is no more centrifugal than it is centripetal; an original impulse in a tangent is neither the one nor the other; the force, philosophically, cannot of itself be centrifugal, neither as a compound force deflected by an attraction, can it be centrifugal: if anything, the deflection would make it centripetal and the term "centrifugal" is altogether a misnomer. Philosophically, we apprehend, a tangent is neither within nor without the circle—certainly not within, possibly without; it touches, but cannot trench upon the precincts of the circle: we may say, therefore, with equal certainty, that, in our curricle, as we do not near Covent Garden, philosophically speaking, to use our own expression, one hair's-breadth, and as King William's statue, to which our original impulse was directed, is a few feet farther from Covent Garden than any point of our course or orbit, the circumstance of our horses tugging us the great round cannot make that force centrifugal which was not centrifugal before.

* Enc. Brit. † Jones, p. 84.

To reverse the position fits better with the definitions of philosophy;—namely, to suppose that attraction being a centripetal force, the moon under this influence, or under the impulse of gravitation, proceeding in its course towards the earth, is deflected by this tangential force, and which would, in this sense, be centrifugal, as *interrupting that which is centripetal.* This would, however, in that case, be the deflecting force; and then attraction overcome, and attractigravitation to boot, we should reach the statue, or pass up Gracechurch Street, instead of King William Street, as we might cross the Thames near the Bridge, or over the Bridge.

We must return to our curricle before we allude more particularly to a centrifugal force, and to the prevailing illustrations by which it is explained.

Our curricle was supposed to be at our station between the two Arthur Streets; and Philosophy has just told us, that *the horses* have not brought us from the Bridge—that our original impulse, a centrifugal force in a tangent to the orbit, has done it; and that, in order to ascertain how they act, we must place the horses' heads in the direction of Covent Garden Market, or towards Arthur Street west.

Now, this done, we shall find it, we think, as difficult to philosophise ourselves into King William Street beyond the statue, as before. Firstly, Are we right in turning round the heads of *both* horses? "Attraction," we admit, must be slued round, as the sailors say—it is the nature of the animal; but why should the rule of philosophy for the guidance of "gravity" be the same as the "rule of the road"—"If you go left you go right, if you go right you go wrong?" For no other reason that we know but the ladies' reason again, "because it must?"

But what is the nature of this great power which is to deflect the moon into its orbit—the moon from a direct course of 2100 miles per hour? It surely must be a power fully equal to that which it deflects, which can keep a vehicle propelled at such a rate, from going off out of a circle, and compel us to go a round of nine miles, in the direction we have pointed out, instead of going nine miles right a-head in the direction of the Kingsland Road. Therefore, as we understand it, "Attraction" must tug with his full force "incessantly, continually," and we were not so much out in our reckoning, when we supposed that our horses were lending a hand towards dragging us the round.

Now gravity, according to Sir Isaac Newton, may be "the effect of "impulse:" but gravity, in the case of the apple, has been enlisted as a power tending towards the earth's centre; so gravity cannot be the effect of this tangential impulse which we have been considering; for although we do not admit it to be intrinsically centrifugal, it certainly is not centripetal, until assisted by attraction: and we never can have it argued, we imagine, that a ball stopped in air or space in a rapid course, by an attraction proceeding from another body, can, if the impulse be concentrated in the effort required to move it, move on for ever in a curvilinear or circular course. What happens when we swing round a ball vertically at the end of a string? Let the impulse stop, down comes the ball, and according to the accepted philosophical notions, we should find that the deflection toward our knuckles once prevailing, a cork or a bullet would hit us the softer or the harder, both falling by—but the latter accelerated in its fall by its "greater—specific gravity."

Giving all due consideration to this fact; although we entertain notions different from other people on the subject of gravity and gravitation, we cannot but imagine, as far as we understand the philosophy of the day, that if we had not turned the head of "Gravity" as philosophy desired, towards Arthur Street West, but to suit our own fancy had harnessed him with his head towards the monument and Arthur Street East, our companion in

the curricle would have felt that we were a very Phaëton in physics; and must,—unless peradventure the bar kept us at a "stand still"—carry away the vehicle into Space.

But "Gravity," says philosophy, "*is* centripetal." Philosophy will not allow of our notion of gravity tugging one way and attraction the other, but with our horses algebraically connected by the bar, and the curricle impelled by the joint impulse of two contending forces, circular or elliptical, a very slight peripherical direction would be all that is necessary. By this means we might have contrived an orbit perhaps; particularly if the horses were disposed to depart, like Moses, from the grandiloquent inhabitant of Nimshi, at an angle of 45 degrees; but wherever we are inclined to assist philosophy, we are resolutely opposed by some dogma such as a "uniform tendency towards the earth's centre."

Well, then, there we are again at our station between the two Arthur Streets. We had "slued" round attraction, we now "slue" round gravity, and as *we are determined* to keep the two together, we suppose we must be allowed or compelled, either will do, to keep on the curricle bar and slue that round too.

We must now, to answer our purpose of illustration, convert our pretty little curricle into one of the more unseemly machines which we call "Locomotives," and if philosophy has no objection *we will drive the engine.* We have a tolerably mighty power to get up to move one of these; not at the snail's pace at which they ordinarily travel, by express, on our rails as at present; not at the more rapid pace at which Mr. Samuda's piston shot a-head of the train which we may suppose to have been hobbling on at some 60 or 70 miles an hour, when the said piston broke loose and carried every thing out of its way, at the end of the Atmospheric tube at Croydon, the other day; but we must suppose our locomotive pelting along at the "slapping pace" of 2100 miles per hour, as before, in a direct line from the Bridge to the Statue. The earth at a distance of 240,000 miles, is prepared to "attract" or throw out the grappling iron and lay on the horses which are to divert us from our course towards the Sailor King, as soon as we get within reach; that is to the tangential point. And here we take occasion to say, that as we on the Earth have the moon to ourselves during the whole of our course round the sun in the orbit which is attributed to us, we need not be particular about the attraction of other bodies, which must at times be so differently situated that they cannot well be instruments assisting, but must be unconcerned spectators of our experiment.

Well then, gentle reader, we have wrought up our pace to 2,100 miles per hour, and as friction cannot be any material hindrance when the pace is so astounding, it is no great stretch of the imagination which we require, when we ask you to familiarize your ideas to the evidence of the senses, by bringing you out of space upon *terram firmam.* Still you must keep your ideas upon a moving moon, not even a moving "locomotive," speeding on at this tremendous pace. We have, then, the attraction, subsisting 240,000 miles off, laid on; the grappling iron catches the locomotive; "Attraction" tugs away with all his might. We do not know that the resistance or force which would pull a power of 2,100 miles an hour, exercised on a moon 2,160 miles in diameter, out of a straight line into an ellipse, has yet been computed; but attraction tugs nobly—he *just manages* with a Captain Smyth's "*or nearly so*" power, which we shall presently explain, to "keep the steam up," a little beyond us in our locomotive; and there away we go, round by the Angel, Clarendon Square, Hyde Park Corner, the Penitentiary, "the Elephant,"—just as before, avoiding the New Bethlehem Hospital; back over the Thames to our station between the two Arthur Streets. Neither, as we propounded, do we think we have

now a sounder philosophical idea of the cause and nature of our progress than before. Tug hard, Attraction must, to deflect us. Let even the two horses tug together, we confess that, to our minds, we have not come a whit nearer to an explanation of the great physical problem presented for our solution, whether we drive our horses in the usual way in a curricle, or "at right angles" in a locomotive.

One difficulty occurs to us, and, as it is a physical difficulty, we think it worth while to introduce it here; before we proceed to say a few words more soberly, after dismounting from our locomotive engine.

The deflection of the moon is attributed to attraction. We have on our table a small magnet and a fine needle. The reader must not forget that the impulse is tangential, and a tangent, "all the world over," is a *right line.* Now, it occurs to us that if this doctrine of a deflection by attraction were sound, it ought to fit to a hair the analogous experiment which we are about to produce; but somehow or other the consequences are just the reverse of what they ought to be to suit philosophy. If the line of impulse be tangential, it is clear that attraction cannot have commenced till the moon reached the orbit; had the attraction operated before, the deflection must have caused a deviation from the right line, and the course could not be tangential. Let us now see what happens in the case of the magnet: we bring it near the needle,* gradually or rapidly, the *instant the needle feels the magnet, sufficiently to deflect it from the table, it starts to it with a spring.* We have neither time nor money for the experiment, but we should like to see it tried; and let the pace be never so slow, we are bold to say, that if we were to take a toy, such as the China clock toy, give it a gentle movement on a plane surface in a direct line, and apply to it a powerful magnet, so as to interrupt its course, it would not go round in a circle or an ellipse, but, like the needle on our table, would be *attracted to* the magnet. Till we see the reverse, we hope we shall carry our readers with us, that this is a sound argument against what we will not exactly call an attraction of gravitation, but what we might call, to meet our idea, a centripetattraction, such as we attribute to the explanation of an attraction as applied to the moon, in the Encyclopædia Britannica.†

We would ask the author of that passage, whether we have not correctly hit his idea, when we assume him to mean that attraction is a power just sufficient, and no more, to overcome what is called the centrifugal tendency of the moon to fly off at a tangent? If we are right, (to debate the matter soberly with the pen, instead of riding in a curricle or driving a locomotive,) as we asked *before* in the case of the apple, when we were talking anent the force of gravity, "What becomes of attraction?" So *now*, we ask, when talking anent attraction, "What becomes of gravitation?" We have an attraction operating to draw the moon out of its "rectilinear "course which it would otherwise pursue," by which, somehow, it must tend towards the earth's centre; Why does not gravity act as it did to bring the apple to the ground? Attraction deflects the moon to its orbit. How is it, then, that gravity does nothing when the moon is deflected? Has gravity no power in Space? And, if none, how does a law of gravitation regulate a universe?

Gravity, the moon has—and we are also told that it gravitates. What does this mean? Is "to gravitate" to move or not to move? "That is

* The experiment should be made by using the magnet above the needle. What philosophers call "friction," and of which we may venture, after all that we have written, to entertain notions different from those of Professor Whewell, will prevent the perfection of the experiment horizontally.

† See our Quotation, page 10.

"the question." Why does not the moon gravitate now, when there is nothing to hinder,—every thing to assist? Let gravity help, the veriest hair's breadth, that moment attraction becomes philosophically stronger.

Is this, then, the condition of the moon in its orbit? The earth's attraction tugs one way, the centrifugal force drives the moon another way; the union of the two "somehow" produces a curvilinear course, not exactly in a circle but somewhat elliptical. Suppose we grant all this, and that the moon is like Plato's, "youth of talents rare," (we are not going to mount our curricle again.) As

"Along the indented plain,
"The self-same tract *he* marks again;
"Pursues with care the nice design,
"Nor ever deviates from the line;"—

so does the "philosophic" moon along the "trackless space."

All the beautiful ideas, soundly or unsoundly, deducible from the parallelogram of forces, understood,—all the exquisitely fine movements attendant on increased and diminished velocity fully comprehended,—all of which may be reducible to the theory of this restraining, but nontractant, attraction, (without *accounting for it* any more now than in Newton's time, when *he* tells us *they did not*)—we still ask, "What becomes of the moon's "gravity?"

Let it be admitted that the moon cannot fall up or down in space, even for some better reason than that, "there is neither upwards nor down-"in space," the "ladies' reason" still; that, if the moon falls at all, it must fall, *for the same reason*, towards the earth's centre; Why does it not fall? Why not "sink in air," or in space, under the influence of gravity,—gravitate towards the earth's centre, as it is said to do, and like the apple come in contact with it? Because it does not, is a good practical reason; but is it a sound mechanical or philosophical one?

We may be made to understand the idea of an attraction subsisting for an infinitesimal portion of time "continually" or "incessantly" renewed, or even a power applied uniformly, without relaxation, just as the author of the article in the Encyclopædia desires; we might even comprehend what might be meant by an impulse in infinitesimal sudden fits and starts, alternately tugging and relaxing; but then it is our business to keep gravitation out of mind, inasmuch as the earth must overshoot the mark if it move, by reason of its gravity, if it gravitate at all; if "to gravitate," be "to move," as it ought to be, when gravitation keeps all in motion.

As we cannot divest the moon of its gravity, we are constrained, having admitted, for argument's sake, that attraction might do what we cannot from any analogy attribute to it physically, much less attribute to it in connexion with gravitation; viz. begin to tug and leave off tugging just to suit the notions of the philosopher; we find that he leads us back to the days of Ovid, and does but tell us after all, that, in "circumfuso aëre" the moon maintains her course, tugged, it is true, this way and that, but still,

"Ponderibus librata suis."

Neither after all the thought we have been able to give the matter, whilst reasons upon reasons "as thick as blackberries" crowd on our thoughts, to confirm us in our opinion that the definitions of philosophy are no definitions at all, are we a whit better satisfied at being told that "*Action and reaction are equal:*" though we are inclined to agree with Maclaurin, that, "*without this law,* nothing would be steady or constant "in nature."

We look upon the passage in which this quotation occurs as such a "clencher" of our argument, that we cannot help giving it entire, though our readers have nearly had it all piecemeal already.

"As action and reaction are always equal and in opposite directions, so "that the earth for example, gravitates towards every mountain, as well as "every mountain towards the earth, and gravitates towards every pro-"jectile while it is moving in the air, as well as the projectile gravitates "towards it, and without this law nothing would be steady or constant in "nature; hence it follows that the sun gravitates towards all the bodies in "the system, and that the primary planets gravitate towards their satel-"lites. The primary planets also gravitate towards one another," &c.

Minute irregularities are subsequently explained, and Maclaurin continues.

"From so many indications, we may at length conclude, that all the "bodies in the solar system gravitate toward each other; and though we "cannot consider gravity as essential to matter, we must allow that we "have as much evidence, from the phenomena, for its universality as for "that of any other affection of bodies whatsoever."*

Philosophy may satisfy us, that, after all its explanations, the system would be in a "shaky" condition if "action and reaction" were *not* "equal;" but to tell us what Maclaurin tells us in this passage, or as regards the elements of our illustrations, that the earth is attracted by the moon, and the moon by the earth, and that the earth gravitates towards the moon, the mountain, or the apple, and *vice versa*; and that this system of gravitation and orbicularity, or attraction with non-orbicularity prevails throughout all the intertwistifications of moon, mountain, and apple, planets, and satellites, some round the others, and all round the sun, a common centre, whose centre of orbicularity is not in his centre, but somewhere within himself, still appears to us a system of the veriest contradictions that we can well imagine—a very punch of physics.

That mutual attraction should subsist between two bodies, one moving round the other, and both being supposed to gravitate towards each other, and yet that a force impelling a body at a tangent to the orbit, should preserve or keep the one in the centre, whether of a circle or of an ellipse, whilst the other goes round it, is to us altogether unaccountable; and the multitude of bodies, instead of two or three, seems very unlikely to remove difficulties in such a case.

Lest it should be urged against us that we cite Maclaurin, who wrote so far back as A.D. 1748, let us, ere we conclude this chapter on definitions, refer to a more recent publication. We have promised an explanation of an "or nearly so" power some pages back.

We have said that the philosopher might as well sleep as talk about an attraction operating against a fixed law of the Creator, that the path of the earth, the moon, or a planet should be just such as the Creator wills it. We are not disposed to withdraw a syllable of this, after an attentive perusal of the following passage from Captain Smyth's Cycle.†

"But a proper impulse was given to each planet in a direction perpen-"dicular, *or nearly so*," (we have taken the liberty to italicise here and there) "to a line joining the sun and planets. These impulses must have "been given at the creation, for they required, to use the words of Newton, "'the Divine arm to impress them, according to the tangents of their "'orbits.' And surely, none but the OMNIPOTENT CREATOR, who fram-"ed the universe, could have so beautifully *proportioned*, as well as "originated the *adverse centripetal* and *centrifugal forces* thus *wonderfully*

* Maclaurin, p. 273. † Vol. I. p. 77. Ed. 1844.

"called into action. The celestial motions exhibit at once the existence "of a *power acting under different circumstances;* a power *originally* "*impressed* upon the bodies, and a power *continually acting* upon them. "And the motive forces indicate an external cause; for no internal powers "of a material body can give it motion, or when in motion alter its state."

Now, without dwelling upon the contradiction, which the last clause of these sentences gives to Maclaurin and others, who talk of gravity accelerating the motion of falling bodies,—let any of our readers follow us through the passage dispassionately, and they will see how its philosophy, or its want of philosophical accuracy, bears out our arguments.

We contend that like the "any how," of which we have before spoken, the words which we have italicised "or nearly so," imply the very want which it is the object of philosophy to remove. Sift as we may the philosophy of the day, and we have viewed its definitions in many a phase, and under many physical conditions, to which we have not space to advert, and all comes to this "or nearly so:" and "incessant action," "continual "action;" (we are now uncertain whether we should give the singular or the plural verb) help, or helps the philosopher over the style.

Newton writes that the Divine arm impressed the planets, "*according to "the tangents of their orbits.*" This is palpable, and leaves no place for Captain Smyth's "perpendicular to a line from the sun, or nearly so." Admit the "or nearly so," and we come to the deflection which we have talked about; and What follows? Effects are seen to prevail, produced by *a power acting under different circumstances*—a power *originally impressed*, and a *power acting* (under different circumstances of course) *continually*. Is this the power of which Newton wrote? or, which Professor Whewell has expounded as a *universal law* of gravitation? If Newton be right, without the qualification of Captain Smyth, we imagine that all we have said of our curricle and locomotive must be sound in objection, because the definitions are complex and ill explained, vague and inconclusive.

We contend that Capt. Smyth's conclusion is one "in which nothing is "concluded." To tell us that we see the effects of a power originally impressed and a power acting continually in the sense in which we understand these expressions, is no more than to tell us that the Deity regulates all, but *how we know not;* and to revert to Newton, and with him, to attribute all beyond, to an attraction which may be impulse, and to a gravitation of which we know nothing definite, explains to our mind no more of the nature of things than we know of the nature of the lever. We come back to the "ladies' reason" and to Newton's advice to "future philo- "sophers to enquire further into these constant and regular effects to "which he gave the names of 'attraction and repulsion.'" *

We have been credibly informed that philosophy—which we imagine, must have had its basis in Newton's—some time about that of the contemplated construction of the Liverpool and Manchester line of Railway, declared that it would be impossible for any locomotive to travel at the rate of thirty miles an hour,—that before it attained to that speed, "at- "mospheric resistance" would stop it. And further, which is perhaps out of Newton's line and more in the doctors' province, that human nature could not breathe, travelling through an atmosphere at a thirty mile pace. *Shall we not believe Newton, then, that attraction and repulsion are still an "open question" in philosophy?*

We have alluded just now to the lever, recollecting our previous observations at an earlier stage of our enquiries.

That a true understanding of the nature of the lever is important to the

* Jones, already quoted, at page 8.

"natural philosopher," nobody, who has dived at all into the investigation of physical forces, can doubt for a moment; if he has ascended, as we have, from minute facts into the region of cause and effect. The lever is the starting point of philosophical explanation, the groundwork of the diagrammatic exposition of forces, physical as well as mechanical. And what do we *know* of the lever? The author of "Mechanics," in the Encyclopædia Britannica, tells us, that, at this starting point, the "principle" of Sir Isaac Newton is far from being self-evident! "and therefore the de-"monstration founded upon it cannot be admitted as satisfactory" (!!!) *

It is well for the philosopher who penned this passage that he had the reputation of a philosopher, or that he was not poor, or that he was not wrought up to excitement, under a threat of ruin, if he did not rightly apprehend the difference between 10—4 and 10, 1, 2, 5; and brought into the condition of preferring ruin with a clear conscience and 10, 1, 2, 5, to 10—4 pickwickially correct and palpably wrong. We may have been doggedly obstinate, perseveringly determined, perverse to pertinacity on this point; but we might have got over it, and did get over it, and have got over it, and so there's an end of it. And now, fair ladies, if your husbands will not usefully employ their time, by trying to find out why a man cannot lift that on the long end, which he can lift on the short end of a lever, tell them to find out what 10—4, and 10, 1, 2, 5, mean. We do not tell you to find it out yourselves—though our book might sell if we could excite the curiosity of the ladies with a riddle. All we shall say towards a solution, is, that we have been told, (we do not mean to say where, the secret is a "very pretty secret" as it stands—"explanation would spoil it,") that although well understood by a great many, it would be impossible to make any body understand it, that does not understand it: so you see there may be no use in trying at it; but to be serious on the subject, we will solemnly ask those who may have thought us mad on this point, if they would have thought us mad if we had not talked about Sir Isaac Newton and matters of philosophy; and we will ask those who fully understand the difference between 10—4 and 10, 1, 2, 5, and the many phases and categories applicable to the solution, whether, if we were thought verging upon madness, whilst performing our duties to the very last moment, it was not a cruel, a dangerous experiment upon nerves stretched day after day, like a piece of caoutchouc, to hold what was thought to be the stroke of impending ruin over our heads, for so small a matter, till the blow fell harmless, after a nine days' wonder that we had held out so long. We can forgive what has happened to ourselves; what happened to our suffering wife was not, perhaps, taken into the calculation, though it was appointed immediately to follow, because we were poor already. But we are not now on our auto-biography, nor re-writing our preface; only, we could not cite the Commentator on Sir Isaac Newton's starting point, without retrospection of what we and ours have suffered, and he has escaped. "The principle of Sir Isaac Newton" (anent the lever) "is far "from being self-evident, and, therefore, the demonstration founded upon "it cannot be admitted as satisfactory." The author of this quotation proceeds to notice Maclaurin's illustration. "The demonstration given by "Maclaurin," (account of Sir Isaac Newton's discoveries) "is simple and "convincing, and has been highly approved of by Dr. T. Young and other "writers on Mechanics, *though it extends only to any commensurable "proportion of the arms.*" (The italics are ours.) Pursuing Maclaurin's demonstration, he continues "it involves an axiom which cannot be called "self-evident; on the contrary, the axiom assumed is a result of the pro-

* Scholium, page 361.

"position which it is employed to prove—or, rather, it is the proposition "itself."

Before we conclude this chapter of objections to current definitions and supposed physical powers and influences, we must allude to the ordinary illustrations of a centrifugal force, which we have not overlooked: these are, a ball whirled round at the end of a string, or twirled round a marble bason.

The objection to a ball and a string is one of those which the Rev. William Jones stole from us, sixty years ago. He philosophically states it as follows:—

"Centrifugal force, or force in the tangent, being *consequential* to the "artificial revolution of a whirling body, cannot be used as a cause of "motion; because it is the nature of all causes to be *prior* to the effect. "The body is never disposed to fly off at a tangent, till it has acquired its "revolution. Such a force, therefore, can never be applied to account for "any of the celestial motions, because it comes to this absurdity, that "there is nothing to account for the motion but the motion itself, or its "consequences, which is the same thing." *

We had, or have, in mind the difference between the gentle pace at which a ball will keep the string at its full tension; the acceleration of the ball by an impulse conveyed from the wrist or centre of motion; the increased force as well as the increased velocity under that condition of our materials for illustration; the question whether a ball released from the string would or would not fly off "at a tangent," which we think anything, but a necessary consequent to such a release—whether by letting go at the hand, or the breaking of the string either close to the ball or between it and the hand. We have also in mind the question whether, if the illustration be a sound one, as regards a circular orbit, the same force acting on the same materials, could by any possibility, under extraneous influences, however nicely arranged, be transmuted physically, not geometrically, from a circle into an ellipse; these and other points with which probably we might fill pages, if we would look into every possible category into which these materia can practically be brought, are before us; and it occurs to us that until so brought and argued, the cause and effect may not be philosophically understood. But before all, and after all this, there has been, and is to our mind, about as much analogy between a centrifugal force and the action of the ball and the string, and the ball and the marble bason, which Professor Whewell has preferred, as between those simple *non-sequiturs* of knocking down a man and expecting him to stand, and locking a man securely in the stocks and expecting him to follow you.

The Rev. Wm. Jones has, we think, judiciously handled the philosophy of the illustration. Let us attempt the mechanical objections.

The elements of our physical problem are in a liquid medium: for we imagine the space of philosophy not to be more solid than air; earth in air, moon in "space." The ball in the one illustration is restrained by the solid string; in the other it is retained "in its orbit" by the solid marble; we whirl round the ball to give it the tendency to fly off—it does not fly off but goes round; we twirl round the ball in the bason, and tell it to go off at a tangent—it won't; the string in the one case *on one side*, the marble bason in the other case *on the other side*, won't let it; and yet, forsooth, philosophers give us these two sets of materials, the whirl and the twirl, in opposite conditions, *in illustration of the same power*. What we want to see is a ball going round in the air without the string. This we cannot have. And why? Gravity won't let it—atttrac-

* Jones, page 50.

tion won't let it; just the very forces to which philosophy attributes the course of the moon in space.

As to the question of "going off at a tangent," very little reflection will show us that, though by some possibility it may be philosophically certain that it would, it is very certain that the earth or gravity would, according to accepted notions deflect it at the instant of its release; so, practically, the experiment can never be made; or, if made, and if the ball should hit the mark at a tangent, the application of the experiment must be philosophically wrong; because, though its course would be a tangent it could not, being liable to instant deflection, have "gone off" in one. The only way which occurs to us of testing this knotty point, would be to make a machine, calculated to work up the ball on a wheel placed vertically, to an impetus of "about 420 miles in a minute," and release it just at the point when the wheel being in full play would cast it off directly to the zenith, taking care by a sure aim at nothing, to avoid planets and fixed stars; and then, if the ball, after waiting for it a sufficient time, (and duly recording the date, time, and direction,) did not return, it might reasonably be concluded in *secula seculorum*, till it should drop into the identical spot, that the conditions of the experiment were philosophically complete, and the ball would be wending its course somewhere "in that direction for ever," with nothing but the highly attenuated remnant of gravity to indicate that it had ever been racked on the wheel of philosophy.* Our simple impression is that it would "stick at nothing," and come down somewhere.

After these somewhat discursive, but we hope not altogether unsound objections to prevailing definitions of the powers connected with our physical condition in "the universe," we shall now proceed to the explanation of the manner In which we have been led to connect Scripture with philosophy, and with objections which will be stated in our third chapter, to some of the prominent conclusions derived from the system which has been built upon the foundation of those definitions.

But we must remind our readers that in what we have written hitherto we have only argued in a plane, in order to show the incompleteness of definition; avoiding the details necessary to the investigation of orbicular movements, beyond the mere facts of their being orbicular, whether circular or elliptical.

An Indian taking his evening drive or convalescent ride, is said to "eat "the air." We rusticate in air,

"Studio fallente laborem."

If to make our observations palatable, our philosophy edible, if we may so speak, we have indulged in a less prosy style than suits the gravity of the subject and the dignity of the philosopher, we hope that our readers will do us the justice to admit, that while we err on one side, many of our precursors have erred, sound or unsound, in the opposite extreme. Learned treatises, philosophical and physical, seldom fail in a tendency to the metaphysical and soporific; and our excuse for endeavouring to avoid the catastrophe of inflicting an opiate upon our readers, must be found in the desire to refrain from minute discussions on abstract ideas and infinitesimal distinctions, which are seldom found to lead to any practical result. With those that like such discussions, we should not desire to "shirk" them. But although we do not quite go the length of some satirical wight, whom we do not remember, or we would quote his words, who wrote to the effect, that "when a man talks in a language which he does "not understand, to another who does not understand him, on a subject

* See quotation from Maclaurin p. 270 (at p. 5,) for our authority for this suggestion.

"neither understands,—that's metaphysics;" we cannot help remarking, that we have often thought that the man who penned the passage well understood *his subject*, and might have been right in questioning the wisdom of splitting hairs to infinity.

Physics themselves afford a wide field for discursive remark; but the wider the field the more abundant the materials for caution. We think decidedly, if we may be allowed to say we think at all, that philosophy may have gone wrong through reasoning from diagrams, and confining herself to a sheet of paper and a plane, instead of fixing her thoughts, bewildered, perhaps, in immensity, on the sphere which surrounds us. That her results in the abstract are attended with *prima facie* contradictions, we trust we have clearly shown. One philosopher tells us that Newton has demonstrated a vacuum,—another, that he did not. Encke's comet has, we are told, demonstrated an exceedingly subtile medium. Whether this be a highly attenuated atmosphere, or a densely conglomerated space, the creation of any resisting medium, must throw difficulties in the way of an exquisitely balanced system of attractions and repulsions calculated to subsist only through a vacuum. We may be as obtuse as the opposite angles of a piece of network, placed accurately to suit Johnson's definition, but we cannot clearly comprehend what the "plane of the ecliptic" means. It seems to us a belt of contradictions. We know what a geometrical plane is, and our philosophers have been great geometers; but our astronomical plane looks more like a carpenter's than a geometrician's. We have absolutely before us "Vertical sections of the plane of the ecliptic, "showing the inclinations of the orbits of the primary planets to it." * We will not now stop to sift this sentence, penned, perhaps, by some one in the civil engineering line, not the philosophic; content for the present with absolute, and not diving into relative or reciprocal attractions. There may be much beauty—we doubt not that there is—in the system which shows to demonstration, as we are told it does, the universality of an Almighty law regulating the movements of the celestial bodies with an unerring uniformity of effect; but we cannot be satisfied that that law is a "law of "gravitation;" the LAW OF A POWER which itself may be "an effect of "impulse," exercised under the impulse of another power, the characteristic of which is, that the author, Newton himself, who has built his structure upon it, pretends not to define its nature, or the manner in which it acts; being careful, at the same time, to tell us, that he does not see clearly how it *can act at all*, and advising us to *search for ourselves*.

One fact may be seen under many phases, and one contrariety is like the "twine that untwisteth," untwisting "the twist." Its consequence may not be like the breaking the link of a chain; but "the strand" must be mended, the hitch must be got over, before the rope can be *perfect*. We have many a fact to investigate besides the action of a ball and string, or a ball and a marble bason.

Neither are we the only investigator of physical forces who has thought disparagingly of diagrammatic explanation.

The Rev. William Jones observes, that "Mathematicians are wont to "illustrate their thoughts by lines and their properties, and they sometimes "give the name of demonstrations to their arguments, when they are "nothing more than illustrations or diagrams, which express the mind of "the illustrator, but prove nothing. According to the different lights in "which a subject is considered, the application of different lines will lead "to contrary conclusions. It would be easy enough to show, on such "principles, that a given quantity of matter is both finite and infinite; that

* Frontispiece, Watkins' Portable Cyclopædia.

"it may be divided without end, and that there must necessarily be an end "of the division. Therefore it is safer on many occasions to be guided by "reason and the nature of things, at least in matters of argumentation, "than by diagrams, which are applicable to contradictions, and may, "indeed, be accommodated to anything." *

We have shown that Maclaurin's demonstration of the lever is questioned; and have had apparatus constructed on purpose to test his diagrams practically. We venture to pronounce the process, as we expected from an attentive consideration of the diagrams themselves, altogether impracticable.

Our position is a difficult one under all its circumstances, and there are other circumstances which it is not necessary to explain to all the world, which render it more difficult than we have yet shown it to be. But confident that we pursue our task with a good object, and in a reverential spirit, we commit our work to Him, whose glorious works in creation we take a delight in investigating for ourselves; and we believe that we are under no delusion, when, in the generalization of our facts, after an encounter with the philosophy of the day, we have fallen back upon the Bible, in explanation of physical difficulties. A gentleman, for whose opinions we have a very high respect, once met us in a course of objection to much that is accepted in the theory of physical forces, with the startling observation, "Well! if you are right the sun is wrong." This was our introduction to the Bible, as an arbiter in a matter of philosophical controversy. We felt fresh vigour for the encounter, and returned to the charge; we did not convince, but on the other hand, were far from satisfied that we were wrong; and we were struck with a remark, which this further conversation elicited from our friend,—"I have often thought "that there is more in that first chapter of Genesis than the world is "inclined to give it credit for." We have read a little, studied a little, seen a little, reflected a little, *suffered not a little* since that time; but the general bearing of all our speculations, under circumstances propitious or adverse, has been toward the persuasion, that if the Bible is right, Newton somewhere is wrong; and with implicit confidence that the word of God cannot err, and that, in the points where the two differ, the Bible cannot be merely figurative, we feel convinced, that, if not in these pages, certainly when we have the means, if we should ever possess them, of perfecting our investigations, we shall be able to show to demonstration how Newton is wrong, and the Bible is right.

We have been told, that if we connect the Bible with the philosophy of physics, we shall not obtain a dozen subscribers to our book; but, out of a dozen we may find one coadjutor. In taking up a new notion in physics, if we see facts in a light different to that in which they are viewed by our neighbours; and, if in generalizing our ideas, we have met with encouragement to proceed, we feel warranted, in endeavouring to set to work in a new track, abler heads and pens, in the hands of others, who know vastly more about these matters than ourselves. We feel that we have advanced far enough in practical objection, to set others a-thinking, though we do not profess to have arrived at that stage of our inquiry into the physical condition of the creation, which enables us at present to propound a system of our own.

* Jones, page 4,

CHAPTER II.

SUPPORT DERIVED FROM SCRIPTURE, IN A COURSE OF PRACTICAL OBJECTION TO THE ACCEPTED THEORY OF THE UNIVERSE.

We would approach this portion of our subject with the solemn considerations, which should attend every appeal to the word of inspiration, and with the fervent prayer, that we may not be permitted to be misled, nor be instrumental in misleading others. Much of the reverential feeling which man entertains, arises from his capacity to view the Creator in his works; in the magnitude and magnificence of his creation; and we are far from denying that such feelings of awful adoration, may well be connected with the impressions to be derived from allowing the imagination to penetrate, as it were, into an infinity, through "worlds on worlds unnumbered," immensurably remote, multiplied beyond the capacity of the mind to conceive, and expanding into boundless space. Often, in a bright night at sea, have we travelled in idea to some distant star; whence, not the fine vessel, a mere speck on the ocean, within the sensible horizon, not that "horizon's bound" a mere speck in the mass of waters, but the globe itself would be lost in space:—and thence have we surveyed other worlds or systems, opening from circle to circle, "in endless circles on the sight," and have paused at the thought, how men, who with the eye of reflection, have watched the movements of such a wondrous mechanism, could dare to doubt the existence of a Divine Being, an Almighty God, regulating and harmonising systems on systems, visible and invisible, and in extent incomprehensible.

It is not, therefore, on the mere ground of the "immensity" connected with the astronomer's contemplations, that we should incline to cast a doubt upon the soundness of his views of "the universe" around us; although if we could not bring forward, as we hope to do, palpable evidence of the incorrectness of his conclusions as to the distances and magnitudes of the heavenly bodies, we might incline *prima facie*, to look upon them as being incompatible with the revealed word of God, applied to our physical condition, and that of the objects around us, and within our unassisted view.

If the following extracts, which we have promised, as indicating that the definitions of philosophy seem calculated to bewilder rather than to enlighten us, * are introduced in this place, it is because we have looked upon them as inconsistent with the views which we entertain of the Mosaic account of creation. The propriety of introducing them here will be apparent, from the close connexion which they bear to the object we have in hand in the present chapter—that, of contrasting the prevailing system with the inspired record. We have before characterised them as marvellous, not so much with referenee to the vastness of their scope, as to

* See page 8.

the want of order which they appeared to indicate; as for instance, when the nearest measurable star is found to be *twenty millions of times the volume of the Sun*. We are free to confess, too, that we had in mind an experimental advantage of the philosopher; and having read somewhere that Lord Rosse's telescope * had discovered the disks of the stars in Orion, we were about to ask how long was required for the disk of the moon, only 240,000 miles off, to cross the field of the "monster glass," inasmuch as it is to be supposed that those stars in Orion, the parallax of which has not been discovered, are more remote than 67 Cygni, which Bessel has accurately determined to be 657,000 times the distance of the sun from us, or sixty-two billions, four hundred and eighty-one thousand, five hundred millions of miles off.

62,481,500,000,000!

And we are inclined to think that a glass, which, at a distance more remote than this, could give a defined outline to the star, must turn a moon into something enormous indeed.

We can hardly afford space for lengthened quotations. Our object is to contract them as closely as possible, without misrepresenting the authors: and, at the same time, to show the immensity of the conceptions derived from the contemplation of "parallax."

We have more than once been told that we "must be a clever fellow "indeed," if we could explain what parallax is; hence, we may infer, that if hours which we have spent upon the search for it, (not the parallax of a star, but for the parallax of the philosopher), leave us in the darkness of mere abstract notions of what some of the best authorities mean by the term, the confession ought not to compel us to throw our papers behind the fire, or resume the strait waistcoat.

How to go to work to find parallax, we have some distant idea that we know; and, we hope we shall thus show that it is not a mere boast when we profess to have searched into the matter.

The angles being found, as we understand it, the observations are to be corrected, so as to bring both observers to the earth's centre, and then try the difference. Now, inasmuch as at the earth's centre there can be room but for one, (just as at the north pole we can only start south, whilst the veriest fraction of a hair's breadth off, we can go east, or west, or south, or back again north), we cannot exactly see how we can philosophically do what philosophy requires us to do; or, having done it, how, if by any possible manœuvre, the two single gentlemen could be rolled into one, they could jointly or severally at that centre, find any other than an angle of ninety degrees for any object near or remote, in whatever quarter of the sphere of the heavens.

Not to enter into the question what parallax is, we shall proceed to quotations, showing conclusions to which astronomers have arrived. The contemplation of some of these, and particularly the observations of Struve, and of Mr. Pond, the Astronomer Royal, have emboldened us to give, in part, the result of our own inquiry into the subject.

From parallactic notions, "It follows, therefore," says the Encyclopædia Britannica, "that seen from the distance of the fixed stars, the ecliptic, "which exceeds one hundred and ninety millions of miles, subtends an "angle of less than one second." †

But, "in a series of fourteen stars, Struve found the parallax *to be* "*negative*—that is, the small change of position, which the observations

* What is this stupendous telescope about? are philosophers constructing a new system upon its discoveries?

† Article Astronomy, p. 43.

"seemed to indicate, *was in a direction contrary to what it would have been, "if it had arisen from the annual motion of the earth.*" *

"Mr. Pond, the Astronomer Royal, thinks the probable value of parallax "cannot exceed 0″.018, a quantity so extremely minute, as to be alto- "gether lost in the uncertainties of instrumental errors, and the errors of "refraction, *which are at least twenty times greater.*"†

Captain Smyth, in his Cycle, gives us the idea of two astronomers as it were angling for stars, like "giants bobbing for whale." The stars nibbled, as it were; one thought he had caught it; the other, that the one had not. Astronomy *now knows* that the first was wrong, but both got medals. ‡ The stars seemed to laugh at the astronomers, and escape into space.§ There is then an uncertainty about parallax! We were forcibly reminded of angling in our early days in the Bay of Gibraltar, on a rocky shore, where the bait and fish were visible some fathoms deep; a fish would rise, stroll towards the hook, eye it, perhaps nibble and dart back into the centre of the shoal. A father, standing by, with a sagacious look would say to us boys, "*the fish are too deep!*"

But, parallax is not too deep for the astronomer. Sir William Herschell has caught three stars; and Bessel has shown to demonstration the parallax of 67 Cygni.

The calculation of the distance of the nearest star is twenty billions of English miles.‖

"But a star having a parallax of 1″, is at a moderate distance in com- "parison of innumerable others, in which no parallactic motion can be "distinguished. Supposing the distance of one of these to be only a "thousand times greater, a ray of light directed from it would travel "between three thousand and four thousand years before it reached the "earth; and, if the star was annihilated by any sudden convulsion, it "would appear to shine in its proper place, during that immense period, "after it had been extinguished from the face of the heavens.

"Pursuing speculations of this kind we may concur with Huygens, that "it is not impossible that there may exist stars placed at such enormous "distances, that their light has not yet reached the earth since the "creation."¶

* Article Astronomy p. 43. † Ibid.

‡ "Dr. Brinkley prosecuted his observations with the Dublin eight feet alti- "tude and azimuth circle; Mr. Pond, with the Greenwich six feet mural circle. "The first contended that he had established the parallax of Wega, Deneb, and "Altair; while the second maintained that no sensible parallax was shown in any "of these stars. The controversy lasted several years, and as usual, there were "partizans on both sides, who, provided they actually read the able expositions "produced on either hand, must have been instructed as well as interested in the "discussion. We *now* know that Dr. Brinkley was mistaken, and that Mr. Pond "was right in his conclusions; but the Royal Society availed itself of an excusable "latitude, and awarded their Copley Medal to each of the disputants."—*Captain Smyth's Cycle*, vol. I, p. 227.

§ "The task was evidently too delicate for meridional circles, and every "attempt at it, by way of declination and right ascension broke down, till the "late attacks of Messrs. Henderson and Maclear upon α Centauri. Sirius seems "to be upon the point of yielding, but α Lyræ, after showing terms of capitulation, "to Mr. Struve, has again entrenched itself in the vastness of space, from which "our Astronomer Royal cannot dislodge it, by any meridional operations."—*Ibid. p.* 278.

‖ Enc. Brit. Article Astronomy.

¶ What a paltry idea is this of a universe! There *may* exist stars, &c. This is in idea giving a boundary to space.

In the telescope the dimensions are entirely inappreciable, the greater the power with which they are viewed, the smaller are their apparent diameters, because they are then more completely divested of the effects of irradiation."

(This, by the way, seems rather an awkward difficulty in determining as to an accurately adjusted parallax.)

"A star having a diameter of 1″ and an annual parallax of 1″ would be "more than a million of times larger than the sun, nevertheless Sir "William Herschell assures us, that, by means of the great powers which his "telescopes carried, he had seen the disks of some stars perfectly round, and "had even succeeded in measuring their apparent diameters. He found the "diameter of Wega to be one-third" that of Aldebaran, 1″ .5, and that of "Capella 2″ .5. Supposing this measurement accurate, and the annual "parallax of this last not to exceed 1″, its volume would be equal to *twenty "million times that of the sun.*" *

We have freely confessed that we do not fully comprehend the meaning of these passages, which we have extracted from the Encyclopædia Britannica; neither can we closely follow Captain Smyth through the next, which we quote from his "Celestial Cycle." We introduce it as corresponding with the foregoing observations, and as evidence that we have not been mistaken in the impressions conveyed to our minds regarding the enormous distances attributed to celestial objects.

"A tolerable notion of the effect of the parallactic change, may be "obtained by taking the angles of distant objects from various parts of a "measured circle, only a few yards in diameter. The observer will find in "every different position, a different reading; and circular instruments "are constructed of such nicety, that their several readings would give "differences in the angles observed, even when the distance of the ob-"served objects was at least a hundred thousand times the diameter of the "circle itself. Now, as Sir John Herschell has pointed out, instruments "of this perfect kind have been employed to observe the angular distances "of stars from opposite points of a great circle of the earth; but, "however effective the method and principle have been in determining the "diurnal parallax of the sun, they have never yielded a trace of the *vera "causa* sought. It would therefore follow, that the distance of the stars "is more than a hundred thousand times the diameter of the earth; but, "how insignificant is this distance, when even the angle formed by two "lines drawn to a fixed star, from diametrically opposite points of the "earth's orbit, which in round terms may be assumed a base of nearly "200,000,000 of miles, is too small for observation. Yet, as we know that "if the earth's orbit subtended, at the nearest fixed star, the angle of a single "second, the parallax could not have escaped detection, the least assigna-"ble distance would be 4,800,000,000 of radii of the earth; an expression "of no common unit, each radius being equal to 4000 of our miles." †

For amusement we have calculated as follows:

4,800,000,000 multiplied by 4,000 . .	19,200,000,000,000
Estimate per Enc. Brit.	20,000,000,000,000
Difference	800,000,000,000

* Enc. Brit., Article Astronomy, vol. IV. p. 43. It has been suggested to us that this is a mistake. Now we cannot find out how an astronomer can *unsee* a star, especially after he has *measured it*. In a later page we have talked of a "parallactic" process: this we imagine is done supraparallactically.

† Cycle, p. 277.

This difference we do not look upon as indicating any *material* error; the per centage is not very considerable, and we are not calculating a transfer of railway scrip, though they are working "no common units" in Capel Court, in the amount of capital required for their "speculations."

The last passage which we will now quote is shorter than the foregoing:

"A change in the star," 67 Cygni, whose distance we have before given, "relates its history a thousand years ago," although "light flies along "at the rate of almost twelve millions of miles in a minute." *

The only casual observation which we shall venture upon these wonder-exploring passages is, that, to place next in order of succession to the planets of our system, a body distant nearly sixty two and a half billions of miles, or another twenty millions of times larger in volume than the sun, savours somewhat of what Pope would call wishing

"To invert the laws of order";

but we do not follow up the quotation, which we apply in no uncharitable spirit: on the contrary, we have already admitted that these notions, properly entertained, are not, however marvellous, in the least degree incompatible with the highest reverence. There is nothing too grand, too magnificent, too extensive for our conceptions of the compass of the Creator's will, the span of his unerring direction and universal order. But whilst we admit this, to reduce our notions into what may be called more natural limits, is not to limit the Creator's glory; for we see a demonstration no less glorious of the Creator's power and wisdom, and of his majesty too, in the exquisitely measured crystal, the opening bud, the reticulation of the petal or the leaf, the mechanism of the minutest shell, nay, of the simplest grain of sand on the sea shore. If we could believe Him more wonderful in the one than in the other, we might attribute to Him the exercise of this attribute of a "God of Wonders," rather in the more palpable discoveries of the incalculably small objects of the microscope, whose infinitesimally minute structure we can see clearly with the eye, than in those of the telescope, which exercise the understanding in comparative darknesss.

In the one or the other, THE GOD is manifest, and what more can be said? If we seek greater miracles, we must seek them in the revelation of the mind of God, of His mercy as well as His eternal power; and let the Divine glory shine supremely in our hearts, in the wonders of redemption, through Jesus Christ!

We proceed to connect these ideas with what we imagine to be scriptural objections to the accepted theory of the universe.

We are not aware of any practical endeavour having been made to deduce a system of physics purely from Holy Writ; neither, as we have said, are we yet in condition to propound a system of our own. Our present is but a work of objection, although we imagine ourselves to be somewhat advanced in a process of generalisation upon this substantial basis; and, if we have thought to any purpose at all, we feel confident that we have proceeded considerably beyond any notion of our views which can be gathered from these pages.

Our object in the foregoing quotations has been to place before our readers the views of modern astronomy, as to the dimensions of our earth compared with objects surrounding us, and within the compass of our assisted or unassisted vision. We have read somewhere, that as a grain of sand to our eye on a plane surface, so would the highest mountain be if its height were viewed with relation to the earth's circumference. This gives us a grand idea of the "planet" on which we dwell. The height of

* Cycle, p. 278.

the highest mountain, compared with the diameter of the earth, is as five miles to eight thousand; but, how does our world sink in the estimation of the astronomer, when, with the "earth as unity," we have a Sun 1,384,472 times its volume, and a star twenty millions of times larger than the sun; or, compared with the earth as one to twenty-seven billions, six hundred and eighty-nine thousand, four hundred and forty millions.

Now, without reference to those mystical passages of "the Revelation," in which we read of stars falling from Heaven, and which, it may be retorted upon us, are mysterious and past our present comprehension, we would ask our readers to peruse, with some degree of attention, the first nineteen verses of their Bible, which relate circumstantially, though in a very small compass, the order of the inanimate creation, closing with "the "greater light to rule the day, and the lesser light to rule the night; the "stars also;" and all "set in the firmament of heaven to give light upon "the earth." We confess, (though we would not dwell upon the point, nor beg the question at starting upon what might be called a cursory observation like this;) that it does appear to us, that the best indications which we can find in the few works of men who write with the creation and the scripture too before them, to which we have hitherto referred, run counter to the notions which these nineteen verses convey to our minds of the relative importance of this terrestial orb, and of bodies celestial, in the structure of creation.

"The ascribing so extraordinary a preeminence to the earth, to which "it appears to have no title, argues," says Maclaurin, the expositor of Newton, "a partiality unworthy of philosophers." *

"The more remote the stars are, the more absurd it must appear to "suppose so immense a space to revolve about our earth, *an inconsider-* "*able point.*" †

"How can it be imagined, that those immense bodies, sunk so deep in "the abyss of space, describe daily such vast rounds about *so mean a centre?*" ‡

We do not enlarge on points upon which it is not our purpose to depend, and derived from the mere impressions which the perusal of passages having relation to the same objects, will convey to different readers; although we may be permitted to say, that, in the Mosaic account, the Earth appears to have the "pre-eminence;" in the astronomer's, (no wonder after the passages which we have quoted, and in an inverse ratio too, increasing with the squares of the distances,) we have in order first the star, then the sun, and then the earth.

Let us now return to the Mosaic account of the inanimate creation. "In the beginning God created the Heaven and the Earth." On the first day the *light;* on the second the firmament, *heaven;* on the third the *earth,* and its vegetation—its herbs, its fruits; and lastly, the sun, moon, and stars; "the greater light to rule the day, and the lesser light to rule "the night;" these and the stars, "set in the firmament of heaven, to give "light upon the earth."

It is foreign to our declared object, and our limits will not permit us to expatiate upon this order of creation; but we cannot pass it over without expressing the conviction, that these nineteen verses contain a development of the process of creation, which, viewed in a right light by men of piety and observation, and practical experience in the sciences involved—chemistry, botany, and astronomy, in connexion with what is ordinarily called "natural philosophy," would soon silence the scoff of an infidel geology. We have heard that men have pronounced it impossible that the

* Maclaurin, p. 238. † *Ibid.* p. 263. ‡ *Ibid.* p. 264.

"day" of the first chapter of Genesis can be other than a *long epoch*. If astronomers travel in a curricle with such objectors, we do not pretend to decide the point, or to give our opinion whether a day means four-and-twenty hours or a longer period; it is a point of which man can adduce no practical proof, and which he must receive on the authority of the revealed word, or not at all. But without contending for the expression, "and the evening and the morning were "the first," "second," "third," or "fourth day," we would almost engage, under the impression that the phrase is decisive, to produce analogies as strong, from natural science, in favour of the four-and-twenty hours, as can be advanced against that interpretation; short though the time has been during which we have thought on such matters, and interrupted as our contemplations have been by the miseries of madhouses.

If the astronomer chooses to make common cause with the geologist, who talks of epochs in the creation, instead of days, he only enhances the first practical difficulty which we now proceed to cast in his way, as one insuperable; insuperable to a mind disposed to receive the revelation as it is, even though definitions were more lucid, and more adapted than we have found them, to the "evidence of the senses."

The Sun was created on the fourth day. Whether the prevailing theory would admit of the existence of the planets in space for three days, or epochs, shorter or longer, (and we are free to admit that a longer period will not increase the difficulty, though *the first step must be got over,*) and establish any other law than the law of gravitation,—which will hardly hold good,—to regulate their physical condition, course, and changes of position, before the creation of the sun, it may not have occurred to any follower of the great Newton to investigate. Neither, perhaps, has any philosopher yet taken into consideration the effect of the introduction of this supposed enormous orb, into a centre, from whence, with the attendant difficulty of the contemporaneous, or nearly contemporaneous insertion of our moon into the system, it should regulate the movements of its revolving attendants, which philosophy must suppose to have been already created, and by some means kept in order without its assistance. We cannot well imagine how philosophy can in any manner reconcile its views of the sun regulating a system of such divine symmetry, and at the same time picture to itself a condition of things subsisting

"Ere the infant sun
"Was rolled together, or had tried his beams
"Athwart the gloom profound;"—

at all events we believe, that we may now safely say, that to remove the sun out of the centre, or to remove it altogether, would, if the accepted explanations of our physical position be sound, issue in the practical demolition of the entire system, theory, theorists, and all!

This may be thought a *very weak objection;* to us it is conclusive, until we can learn how a law of universal gravitation can be brought to bear, not only upon the planets, as existing in the system before the sun's creation; —not only as it exists now, with the sun in the centre;—but as it prevailed *during the operation of the introduction of the sun and moon,* the one to take its place as regulator of the whole, and the other to circumambulate the earth. Our notion of the difficulties attending such a problem may be drawn from the illustration of those difficulties which we have attempted when we were proceeding from the Bridge to King William's statue, and were diverted, between the two Arthur Streets, into the great round; and when, our readers may remember, we left philosophy to determine whether we were right or wrong in getting "in a tangent" to our station there.*

* Page 15.

It may be urged that Scripture does not say that the planets were created before the sun; BUT THE EARTH WAS. It suffices for us that one planet was, to make us question a law of mutual attraction, which argues contemporaneous movements *ab initio:* unless, as we say, the introduction of the sun and moon, a post-creation, can be accounted for "on scientific "principles."

If we were inclined to follow what we think a wrong example, we might begin to trace analogies to the condition of a "solar" system, with relation to a post-created sun and moon, in the structure of a watch. There are wheels within wheels to turn the second, the minute, and the hour-hand; all accurately fitted to each other, and all, we will suppose, spread out on the table, with the rest of the mechanism, ready to be adjusted at the will of the watchmaker. He fits all these together, and moves the whole to see that every one is made of its proper dimensions: he tries them with a key; the cogs act on cogs and the wheels fly glibly round; the hands turn as he moves the wheels, and all is right. But he has yet to fit into their places the mainspring and the balance with the pendulum spring, which may represent the sun and moon of our physical problem. The mainspring is introduced; the balance and pendulum spring dropped into their proper places; and the watch, duly wound up, goes "of itself;" and it may be taken to the Admiralty and proved to be as correct, if possible, as Mr. Eiffe's, or Mr. Dent's, or Mr. Carter's—or Mr. Dent's, or Mr. Eiffe's, or Carter's—or Mr. Carter's, or Mr, Dent's, or Mr. Eiffe's, or any body's else; we would not be understood as giving a preference to either one over the other. All we wish to be understood is, that the watch is a perfect watch—as perfect as watch can be, and goes *well* with the mainspring and the pendulum and balance, which it would not do at all, "of "itself," till those were fitted into their proper places. Nevertheless, in the hand of the watchmaker the wheels were applied to their proper purposes, and performed their revolutions under the guidance of his hand, quite correctly as to their action; although the maker of the whole could ill order their going as to time and regularity of movement. This is beyond his power, even for five minutes; though he should set to work and persevere at it, for a day, with the best will in the world to do it, and with the patience of the governor of a steam-engine, or of the "governor" of a lunatic asylum.

These latter "governors," we suppose, are considered by all the Members of Committees, and by the Medical Profession generally, to be of the order "*imperturbabilis*" and genus "*patientissimus:*" which means, (for things act inversely there,) that these "governors" are great men, whilst the inmates are, or are supposed to be, miserably poor; and there is a sort of inverse law increasing with the squares of the distances between governor and patient, which inculcates the exercise of authority by the one, and patience on the other. They think themselves commissioned (being commissioned one way, and, according to the "inverse law" aforesaid, going to work another) to worry the patient in every way they can; and if they cannot screw him up after one fashion, into showing that he is not "im-"perturbable," to try him in another way until they do.

Now we cannot imagine a more effectual way to "make the watch go," under these circumstances, after the physician has reported the patient sane—"convalescent," and fit to be at large, (the patient, mind, reader, not the "governor,") than for the governor to tell him that, *in his opinion*, he is not fit to return to his daily occupation.

When we speak of a "governor," we do not mean a governor, such as an Earl of Shaftesbury, or a Sir Peter Laurie, who, we feel assured, would not presume to harass, after such a fashion, the feelings of a sane man,

who had been shut up for three months from his family and home; *much less, we should hope, of a madman:*—we fight with a two stringed bow, though not a long one. It is bad enough, we know, for such a man (with a key in his pocket, for the purpose of locking up sentient Englishmen, as well as bread and cheese, his proper *custodiæ,*) to tell a sane man that he is insane; but to tell a madman that he is mad, to insult, perhaps, incipient reason in a convalescent body with a sneer and a taunt, must be outrageous indeed! * At least we imagine that "the world we live in" *now,* will concur with us in thinking so; and we should rejoice indeed to know that the same feelings could be introduced into the world which we have left. Both offences we look upon, apart from personal feelings, to be grievous offences against the rules which ought to prevail for the government of the "governors" towards the governed in madhouses. We wanted an illustration of patience, and we are free to confess that we could not adduce ourselves as a *perfect example,* under such discipline; we have been screwed up to defiance for *two minutes* or *thereabouts*—but, though ourselves now in a condition, duly certificated the right way, to pass judgment, we should be content to let our "governor" plead guilty to the minor offence, and let off all minor offenders; but the spectacle of men playing with the feelings, and making a jest of the miseries of the really insane, or passing a ribald joke upon the sufferings of a man bent on suicide, under an accumulation of bodily pain and moral misery, have so racked our feelings, with many other instances of a less atrocious kind, though as objectionable in principle;—mad though we were reputed at the time, and for months after;—that we cannot let pass this opportunity of directing the attention of those who will know what we mean, to the impropriety of allowing other than medical and clerical communications with the patients, "*as to the state of their minds.*" Medical, we suppose, there must be; clerical there ought to be. "Clerical!" we hear all the governors of all the bedlams exclaim; "clerical, indeed! we ought to have that fellow "back again!" But we cannot give more space to these digressions. We wanted an example of patience for comparison with that of the watchmaker, who should sit, ineffectually, for four-and-twenty hours, attempting to regulate the movements of his chains and wheels, which he cannot do for five minutes without his springs. Madmen may be as difficult to manage; and sane men, shut up as madmen, worse; but we could not help thinking of what ought to be the patience of the regulator of a lunatic asylum, and contrasting things as they ought to be with things as they are.

A word or two here, on what we think a retrograde sign of the times. As we hope that a great many will read our book, we cannot help entering our protest against the term "governor," applied to the heads of domestic establishments. They used to be called "fathers," in our younger days. We would not be censorious, but the custom is, we think, an introduction of a period when we were far away from our native home, since the time when we left it some eight and twenty, peradventure, even, some seventeen years ago. We think that even then, this term of "governor" was not in

* "Much has been written on the kind treatment of the insane. The mind, "by the circumstance of its being diseased, is made morbidly sensitive to all phy- "sical and moral impressions; and even a look, every trifling expression of a "slight approach to unkindness, will produce the most grating and injurious "effect upon the disordered imagination."—*Dr. Forbes Winslow on Insanity.*

Mente sana, in corpore sano, we wanted no mawkish compassion from our "governor," and are content, as we say in the text, to look upon the declaration of his opinion as an unmixed falsehood and insult—or worse, and allow him to "plead guilty to the minor offence" of talking thus to a sane man and not to a madman.

vogue. If we are right on this point, it is of the nature of an evil weed which grows apace, for "every one" uses it,—so we may attack it without personality. We do not like the practice. We think it savours not of the "honor" due to parentage and increasing age; the respect which should be felt and expressed, even though children of small or "larger growth" have to bear with increasing infirmity. It may be urged that the phrase "the "governor," may have no more meaning; convey no more, perhaps less, intentional disrespect, than the many gross epithets which we may hear from female lips as well as male, in our crowded thoroughfares, of low repute; but nicknames ill-befit the relations of son or daughter to a father, and we should rejoice to see this feeble effort transferred to the daily press; when, peradventure, it may tend to setting aside "a custom more honored in the "breach than the observance." We write for children, not for fathers—the mischief is to them, in the adoption of an idle disrespectful habit.

We do not care so much about the practice in public "establishments;" but in private families it is unseemly. "Governors" of the former may take too much upon themselves, may interfere with matters which are beyond the "*sutor's* last," and it would be well if they saw that *shoes were better mended*, instead of meddling and mending with other men's brains,—the brains of men whose cocoa-nuts have more of the milk of sense and human kindness in them, and are no more "cracked" than their own. But in private families, though the father "rule with a rod of iron" instead of "governing with a silken string," we are sorry to hear him styled in any other way than "father."

To return to our watchmaker. We observed that he was able to set his wheels in motion without the springs; and so he is; and we cannot doubt the power of an Almighty Creator to create an Earth, with or without the planets, and after, to create a sun to set in motion a system, which, by some other means, he had meanwhile sustained.

The watchmaker applies the springs, and the watch moves until it requires winding up. The Almighty, we know, could in like manner, having introduced the sun and moon, or sun, moon, planets, satellites, and stars, whatever their dimensions, where he had placed the earth, set all in motion "of themselves" to traverse space in circles or ellipses, large or small, some around others, and all round a common centre, and that common centre near or in the sun, and all in perfect harmony, until HIS MIGHTY WILL brings round the appointed season when "heaven and earth shall pass away, and

> "Like the baseless fabric of a vision,
> "Leave not a wreck behind;"—

when, with the earth, a solar or a stellar system, or ten thousand stellar systems, might be annihilated.

It is not that God cannot regulate the accuracy of movement of the worlds of his own creation; though the best of watchmakers cannot regulate the work of his own hands, so well under his own guidance, as under that of the inanimate spring which his own hands have made;—

It is not that the creation wants fresh impulses, fresh winding, as the watch: an Eternal will, as well as an Almighty arm, appointed the beginning of time and of the world; and has determined when *heaven* or *hell*, throughout eternity, shall dawn upon a wrecked creation:—

But we may use the watch and watchmaker by way of contrast, to show what *is not*—not in illustration to show what *is*.

The negative assumption, to our minds, suits best the idea conveyed to us by the inspired account of the creation. We mean, that if we should seek physical analogies to explain the introduction of the earth into the

system of a post-created sun,—or of a sun and moon, post-created, into a system of which the earth forms a part,—we might not, perhaps, hit upon closer artificial and physical coincidences, than happen between the watch and our solar system; but still we believe these considerations to be altogether as inapplicable for the philosophical solution of our physical problem, as the ball and the string, or the ball and the marble bason in explanation of a centrifugal force acting in a tangent to the periphery of a curve, and subdued by a somehow-appointed attraction, whether through an atmosphere or space, either or both, into a circle or an ellipse.

"The heavens shall pass away with a great noise, and the elements "shall melt with fervent heat; the earth also and the works that are "therein shall be burned up." The association of ideas, in former times, connected, with such passages as these, the huge cauldron, or the "burning "fiery furnace." But in these or even in furnaces, such as may be seen at the great iron works of the present day, we know of substances which will resist such heat as this, yet not be proof against the effect of the contact of two wires completing the galvanic circle. We will not speculate on the connection of the Scriptures with such thoughts as these: of causes Philosophy knows but very little beyond the mere adjustment of the materials which are used to produce effects, which cannot but indicate to the chemist, that we live, as it were, amidst the elements of annihilation. On the other hand, we believe that the first nineteen verses of the Bible will, one day, be found to show clearly, not only the time of the creation, but to give us a definite and physical view of the means by which, and the manner in which the wondrous mechanism was wrought—and even in our present state of knowledge in the practical sciences, enable man to trace the operations of an Almighty hand in the production of our globe and its sustentation, on notions of stability very different from those which now prevail. The manner of its dissolution, in the abstract, is declared, The earth shall be "burned up." Into the process by which, in the order of an Almighty adaptation of means to ends, this will be accomplished, man is not forbidden to enquire, but the time when, "the angels of heaven" know not. For man it suffices, as regards the time, that far or near, *his* time is short; and that there is neither "repentance," nor "knowledge, "nor wisdom in the grave."

We are encouraged by the remark of one who has studied every work on natural philosophy within his reach, and is content, if out of a volume he can find a page of instruction, that he has "often thought that there is "more in that first chapter of Genesis than the world is inclined to give it "credit for." The search into the mechanism of creation has occupied the highest minds in their highest aspirations after knowledge; peradventure they have given too little credit to that record. Some have cast it aside, with the bold determination of unbelief; others, with notions preconceived may have reckoned it to be obscure, instead of looking up to it as a guide, and sifting its philosophy step by step; whilst others, with, perhaps, an implicit belief, have, like the commentator Scott, upon the strength of accepted opinions amongst learned men and approved theorists, held its language to be unphilosophical. We believe, to use a common, but forcible expression, that every word *tells*. Speculations, arising out of these views of the Mosaic account of the creation, which may be grasped at a thought, may require elaboration, with a persevering scrutiny and a watchful criticism over our investigations; but we cannot concur with those reasoners who think, that, because gravity and attraction, the nature of a centrifugal force, and the principle of the lever, have not been found out, up to the middle of the nineteenth century, the Creator has ordained that these, or the physical elements which they involve, shall never be

discovered. If we do not dwell at greater length, in this place, upon the adaptation of Scripture to objection, it is because we have not space; and because, for want of the means of experiment, our notions have not yet been put to a sufficient practical test; but we feel, at the same time, that the objections to which we now proceed, practical as they unquestionably are, and applicable to much which we have written in this chapter, will satisfy our readers that we have not intruded ourselves before the public on insufficient grounds; and that as we meet astronomers on their own conclusions, as they stand, incompatible with each other and the evidence of the senses, it is time to seek the opinion of the world and the co-operation of others of more extensive acquirements and practical experience: and, if we can introduce able and qualified men into a field of highly interesting research, not to keep that field to ourselves.

CHAPTER III.

REASONS DEDUCED FROM THE INCOMPATIBILITY OF THE CONCLUSIONS OF PHILOSOPHERS—ONE CONCLUSION WITH ANOTHER, AND OF SOME WITH THE EVIDENCE OF THE SENSES.

We have heard of one of a party of gentlemen, who amused his friends by taking up "absurd notions" and arguing them out as realities: he started, and pursued his purpose only to amuse; but the tenor of his observations had so much of versimilitude about it, that the vigour with which he maintained his positions rendered the conversation highly interesting, although he appeared to be, and perhaps was, arguing only for argument's sake. Since we heard the story, it has often occurred to us, that if this gentleman made "physics," as, if we remember rightly, he did, the subject of his discourse, the conversation, pursued more closely and philosophically than suited the *badinage* of a mere lively party, might have ended in the discovery, that the reality, not the mere imagination, furnished many a ground of objection, which, though sported in jest, might have been maintained in earnest.

It would certainly be very curious if we should be found right—and the matter, we think, does admit of proof—when upwards of a century and a half from the publication of the "Principia," we take our first practical ground of objection, and contend that the Newtonian theory is incompatible with the every-day evidence of our senses, and the alternations of day and night. But we are bold enough to imagine and hope clearly to explain, that with a sun, the immediate source of light, be it 883,000 miles in diameter, set in the centre of a system of planets and satellites, such as are described by the astronomy of the day, it is not possible that, on an earth 8000 miles in diameter, be it ninety-five millions of miles distant from the sun, we should have that succession of changes, which we experience every four-and-twenty hours; a succession of changes which, it is believed, has never varied a second in time since the creation.

This is one of the instances in which we incline to think that astronomy has gone wrong, from not viewing its physical problems in all their phases. It is plain enough that if the earth, a spherical, or an oblate-spheroidical body, move on its axis in the face of the sun, one hemisphere is exposed to the light and the other is in the shade; under the shadow, as it were, of the hemisphere which is in the light. Hold up an ivory billiard ball, an apple, or an orange, in a room in which one candle is burning, and observe the effect; it is plain; the one half receives the light which is hid from the other half. "There you have fact and illustration," says the astronomer, "one hemisphere is in the light, that is day; the other hemis-

"phere is in darkness, that is night. The thing is as plain as a pikestaff; "burn your papers, and go back to Bedlam!"

But, "Avast heaving there!" as the sailor said when he got his leg between the cable and the windlass,—or, when a messmate was imposing upon him a long story which he could not exactly receive as entitled to implicit credence. "Avast heaving! do not jump at conclusions." We will give you another anecdote about implicit credence, before we proceed further. We remember the story of an auctioneer in Calcutta, who was about to sell a very fine dog, which had just been imported from England —an "uncommon fine" dog, with an "uncommon fine" pedigree, which pedigree was of course transferred to the catalogue. When the lot was put up, the auctioneer read the flaming particulars, and made sundry remarks of his own, suitable to the occasion: then, turning with the utmost confidence to an honest tar, who was, perhaps, thinking of parting from his companion of the voyage, as he held him by a bit of rope, ready to transfer him to the purchaser, or wondering, perhaps, how they came at all these particulars about his charge,—"Well, Jack!" said he, "you'll vouch for "all this, won't you?" "Really, "your honor," replied the sailor, "you go "too fast for me; I cannot keep up with you!" Astronomy must give us time to think, before we give up the point. Neither because astronomy is disposed to ride the "high horse" can we consent, like the judicious Courtier, when King George the Third mounted a new charger, to name him "Perfection," because he "bears the best of characters." Philosophy may "ride the high horse," if it pleases. We will try the mettle of our own steed, at all events, before we condemn him: but we are not going to mount a curricle or a locomotive again!

We hardly know how to express ourselves. Where we see so much ground of objection, we must constantly make use of phrases and terms implying what our reasonings may, in the end, lead us to doubt; for we are free to confess, that, when we find two conclusions which are incompatible with each other, we do not know which to choose; if even we may take either the one or the other to be right. We hope that we shall cite the philosophy of the day correctly, as we trace it to its conclusions; and we continue expressly to avoid the introduction of any new notions of our own.

The earth revolves, has revolved since the creation, uniformly, once in four and twenty hours; during this period one hemisphere is exposed to the sun, the other not. The sun "rises in the eastern," "sinks in the "western horizon." These are figures explaining this fact to meet the evidence of the natural senses:—The sun "rises" and "sets," or when he does rise and set, (for at the poles he does not always rise and set,) it is day when he is present, night when he is absent. We have perpetrated some diagrams for our own investigations, and feel far advanced in generalisations, which would enable us to account, in a new way, for the variations of twilight, and possibly the aurora borealis and the visible revolution of the sun, during the twenty-four hours at either pole, as the case may be; but we would rather disencumber this small work of any minute discussions upon minor points; we will, therefore, suppose ourselves on the equator, or in latitude 45°, north or south, or in the latitude of London, as the case may require.

The latitude of London will answer our present purpose, and we will talk of day and night, as from sunrise to sunset, and from sunset to sunrise, without reference to the twilight.

We contend then, broadly, that as at London we have days and nights, such as those which we experience at all seasons, the sun, such as it is described in our books of modern astronomy, cannot be the centre of a

system in which the earth holds so "mean" a part as those books would lead us to believe.

We may come before the public, in the minds of some of our mistaken friends, "under a cloud;" but we trust we are in no fog: and we are prepared to argue this point alike, whether the night be dismal or clear, bright moon and starlight, or pitch dark; either appears to give evidence to us that *the earth is no mean object in a revealed creation*—that as the sun and moon and stars were appointed "to give light unto the earth," that Earth is no secondary object—that the Bible narrative is most consonant to our senses—and that the Newtonian Theory is wrong.

We do not profess to show ourselves clearly through every possible objection; but we have sifted many which may be raised: so many that, supported as we feel ourselves to be on other points, by the harmony of scriptural record, and the contradictions of the philosophic, we make this assertion with confidence, and proceed to show practical grounds for it.

We are free to confess that we have not read through *all that has been written* on these subjects; depending that we have come at the pith of every thing in those treatises which we have read, and in Encyclopædias and the like. We incline, at the expense of a little digression, now and then, to tell our readers, who must see that we have launched our bark upon a turbulent ocean, and who may feel that our frail vessel may founder in the gale—which we fear we have been too bold for an indignant philosophy to stir up—of any little encouragement which we may pick up by the way. They will remember Struve and the Astronomer Royal.

We have consulted elementary works, as well as treatises of greater magnitude and authority. Amongst the former we cite, not as authority but in corroboration, the "Scientific Dialogues" of the Rev. J. Joyce. In this matter of "Day and Night,"* we think that "Charles" and "James" press "Tutor" into rather an awkward position, and involve him in some degree of confusion, in the matter of a "sensible" and "rational" horizon; and the tutor seems to us to "blink" the question, (we believe that is the term, we do not find "to shirk" in our abridged Johnson,) with a hint that "the proper time" has not arrived "to explain that *peculiar difference* "connected with what astronomers call *parallax*." It is curious that the tutor, after all, forgets *parallax* altogether, or takes occasion to "slur it "over," when he falls in with it again, at the close of the twelfth conversation anent the "Seasons." Is this because the reverend author of these highly interesting and instructive practical dialogues found the difficulty of the task of explaining to "young people" the nature of this "peculiar "difference,"—this extraordinary subject which *went the wrong way* when Struve was looking for it, and was *extinguished by errors of refraction* in the mind of the Astronomer Royal; to say nothing of stars nibbling and biting and never hooked, or, if hooked at last, breaking the line and escaping into "space"?

We would avoid diagrams as much as we can; and hope that our readers will be able to follow up our ideas better by taking them to familiar objects and practical illustrations, than to As and Bs and Cs and Xs and Ys and Zs, and A′ B″ C‴, with which, if we have not before now bewildered ourselves, we plead guilty to having bewildered others: we become especially perplexed with these when they are like the plums in a Christmas pudding. It would be a good rule when diagrams become confused, to split them if possible into sets of three, six, or a dozen, in order that the letters and symbols like the plums in the midshipman's "dough," might be "not "within hail of each other."

* Conversation VIII. Astronomy.

To proceed then without further digression.

Let our readers make, in the mind's eye, or draw it on paper if they prefer it, never so small a circle; and however small they may imagine or make it, we shall soon show them that they cannot make it small enough for our purpose; much less find a sheet of paper large enough for a diagram, if they will have one;—unless they incline to have one made for the purpose, and take it to the dome of St. Paul's, which, as one of the objects most familiar to our English readers, we shall eventually arrive at: though our route will be somewhat circuitous.

Let us however, begin with a neat circle, that we may have something definite for a starting point. Let us suppose this a neat little circle of one-tenth of an inch, to represent the earth's diameter, and it may be shaded, and imagined to be a ball or globe, whose diameter is eight thousand miles: we work now on a scale "eight thousand miles to the tenth of an inch." The difficulty of illustrating our subject by diagrams will soon be palpable, but the more difficult we find it to diagrammatise, (we fear the word is not in Johnson), the easier it will be to pursue our subject to conviction, if we can make ourselves understood without them.

The reader, may imagine, for we write we hope for all sorts of readers—a very small pea or a bead of the size described, one-tenth of an inch: an ordinarily sized caraway comfit, rolled into a globe would be too large; a harlequin's egg *, or a grain of mustard seed, would be rather too small.

"What, papa, the earth only as big as a harlequin's egg, or as a grain of mustard seed, or not very much larger; how big then is the sun, that is made to give light upon the earth? And how come you to talk about the dome of St. Pauls? What has that to do with it?" We can imagine our child asking this, if we could make her understand our object; and we might reply, "Do not be afraid, my child, we can reason on steadily; we are not going to stop railway carriages, if they dare to go thirty miles an hour, nor to hint that Mr. Samuda cannot do seventy, over the Mendip Hills. — *Do not be afraid!*" What an idea to come across the mind of an Englishman talking philosophy to his little girl, in the middle of the nineteenth century! "We know, my dear, that the sun is said to be 883,000 miles in diameter, so my child you can put, or imagine, 110 of these little peas laid in a line by the side of the one little pea, and you may split one pea, or take a split pea and lay it at the further end of the 110 peas, and then, you will have an idea, my child, of the sun, very like your own little idea; for it does look very like a body about a foot in diameter, as it rises or sets behind a light cloud; and if it does look a little larger, my dear, then, than a foot, it is nearer to a foot when higher up in the heavens, and Astronomy can, and does account for that difference, and we will look to that point by the bye.

"If you want an idea of the sun's disk, as compared with the earth's diameter, you may find a sheet of paper large enough for that, so take your compasses, my child, measure off five inches and about a half, and draw a circle round another, whose radius is one-twentieth of an inch, and it will be very like holding a small pea in the middle of a moderate or even a large-sized wash-hand bason; and all we wish you now to bear in mind is, that it is the wash-hand bason which is created to give light upon the pea."

Our next step is to remind our readers that they would want a very large sheet of paper, if they would have a diagram, even though they made so small a circle as this; albeit this one-tenth of an inch, measures 8000 miles. For the distance, between the earth and sun, is estimated, at about 95 millions of miles. This brings us at once to St. Pauls, and we will en-

* It may be necessary to explain to philosophers that harlequin's eggs are the wee wee sugar plums of all colors, used for decorating cakes.

deavour to confine ourselves to the dome, which we see towering in the distance, rather than take our readers into the Church-yard, which we should hardly find to be large enough, upon the scale with which we have have begun, though it is still "8000 miles to the tenth of an inch."

If we divide 95 millions by 8000, we have 11,875 tenths of inches; or (1187. 5), eleven hundred, and eighty-seven inches and a half, which divided again by 12, gives us nearly ninety-nine feet; or for convenience say 100 feet, which we believe to be about the interior measurement of the dome of St. Paul's.

But 95 millions of miles represents but the earth's distance, and as the earth's orbit is twice that sum, or 190 millions, we should want a sheet of paper, nearly 200 feet in diameter for our next circle. As this would carry our diagram beyond all bounds, we must now endeavour to contract our "space," reducing our objects and our scale in proportion.

We therefore come down half, at once, reduce our earth to one twentieth of an inch in diameter, the sun from about eleven inches, to five inches and a half; and we now compass, we hope, with tolerable facility, the notion which we intend to convey without any diagram, Our scale is now "16000 "miles to the tenth of an inch," and for palpable objects about which we need not be particular, for we must soon lose sight of some of them, we have a slop bason instead of a wash-hand bason to represent the size of the sun, and a grain of mustard seed will now about fit a full-sized earth, in its orbit around the inside of the dome of St. Paul's.

Suppose, now, that we could have a ball of very brilliant light, on a dark night, suspended just in the centre of the dome; or a stream of gas in a circle 5½ inches in diameter, would answer very well; we can easily imagine that such a light would well enlighten all parts of the dome, though we cannot, with an artificial light, screw up our imagination to the splendour of an eastern sun.

But we now stumble upon another astronomical difficulty. We must reduce our sun and earth still more. We shall come to the harlequin's egg and the mere speck, before long; and even something very much less than the mere speck.

We must proceed, however, step by step; and hope to find reasoning step by step far better than jumping at conclusions with diagrams.

We have reduced our earth to 1-20th of an inch, and our sun to about five inches and a half in diameter, and have got the dome of St. Paul's for our Orrery: (the ordinary Orreries, by the bye, show us "the plane," not "vertical sections of the plane of the ecliptic;") but we must now remember that our earth is but the third planet from the sun, and that the dome is not large enough to represent the system of our sun even at its reduced dimensions.

Turning to the scheme of the planets, without troubling ourselves to place, or calculate the places of 67 Cygni, and Wega and Aldebaran and Capella, which may be somewhat about as big as St. Paul's itself, and somewhere, perhaps, between St. Paul's and the Land's End;—at all events, we think, on the other side of Covent Garden market;—we shall not go farther than the planet Uranus or Herschell, which is distant from the sun one thousand eight hundred millions of miles. In order to introduce Uranus into the dome of St. Paul's, we must bring our sun and earth into a very small compass indeed, reminding our readers that the passage of light from the Sun to Jupiter *has been accurately determined;* and the mean distance of that planet is four hundred and ninety millions of miles; whilst Saturn is just half way from the Sun to Herschell or Uranus.

Let us try how our calculations stand.*

Our scale, accommodating St. Paul's dome to the Earth's orbit, *was* 16,000 miles to a tenth of an inch; and we had

	Miles.
Sun's diameter . . . . 11½ reduced to 5½ inches . .	883,000
Earth's diameter . . . 1-10th „ 1-20th . .	8000
Dome (originally 95 millions now) 100 feet . . .	190,000,000

If 50 feet from our light to the periphery of the dome, represented 95 millions of miles, it must *now* represent 1800 millions of miles, the distance or radius of the orbit of Uranus.

The proportions, therefore, will be,

For the Sun—1800 millions: 95 millions :: 5.525 : 0.29 inches, or somewhat less than 3-10ths of an inch.

For the earth—1800 millions: 95 millions :: .05 : .00264 inch; or somewhat more than two and a half thousandths of an inch.

And let us now propound our Orrery, in which we will introduce only the Sun, the Earth, and Uranus—namely, the centre and the extreme of our Solar system, which the Sun is understood to illuminate; and between them the planet, with which we have now most concern, our own Earth.

Scale 300,000 *miles to the tenth of an inch.*

	Feet.	In.	Miles.
Uranus' orbit, inner circle, St. Paul's dome	100	0	3,600,000,000
Radius of Earth's orbit, or distance from Sun to Earth, about	2	7	95,000,000
Diameter of Earth's orbit	5	2	190,000,000
Sun's diameter		0.291	883,000
Earth's diameter		0.00264	8,000

We have now brought down our calculations to a very small sun, about 3-10ths of an inch, or the rushlight's blaze, by travelling as far as Uranus; but we are not aware that we tread a single inch of forbidden ground.

At this point, we request our readers to pause and ponder over our Orrery. We imagine the dome of St. Paul's to be the compass of one-half the solar system, supposing that system a sphere; and an imaginary plane at the base of the dome will represent the "plane of the ecliptic." Herschell, or Uranus revolves round the dome somewhere, though not exactly in the plane; but we need not trouble ourselves with that distant planet nor his course just now; nor about any of the other planets, except our own Earth. It is only necessary to bear in the eye of the mind, the scope of the dome, the Sun in the centre, just .291 decimal of an inch; and the Earth, .00264 decimal of an inch, as described in the table just given, revolving at a distance of about thirty-one inches from the Sun.

Shall we now say that we have St. Paul's dome illuminated by a rushlight in the centre of it? Is this our mighty conclusion, and all that we are going to make of our Orrery? And are we going to contend, that according to the Newtonian Theory we cannot have day? O no! But we are just taking the other position; and are only offering suggestions why, if astronomy be right in all these points, in which we have followed up its conclusions, we cannot have night.

We know that the sun shines with greater brilliancy than even a "far-"thing rush"—(they used to be "farthing rushlights," but they have grown into "ha'penny rushes" with the march of the times;) and it is precisely for that reason—just because it would not be *quite* like "darkness visible,"

* We had wrought out all these to niceties of fraction, but decimals would embarrass the argument; so we have remodelled our calculations, reserving only the decimals when nicety is desirable.

had we even a farthing rushlight in St. Paul's dome—especially only thirty-one inches off, that we think there must be some hitch in the physics of modern astronomy; inasmuch as we know what a "pitch dark" night is, with a Sun in the system.

We allow the Sun's transcendant brilliancy, and have not the slightest disposition to think otherwise than that it is, as it were, the depository of light, the source of light. The Scripture tells us it is a light, the greater of two great lights. "God made two great lights, the greater light to rule "the day, and the lesser light to rule the night." There can be no question about it: the sun is that greater light of the two, made to rule the day. But then the moon rules the night, was made to rule the night, *does* rule the night; but could not, we contend, rule the night, if the solar system were such as it is represented to be by philosophers.

It is not upon the mere abstract notion conveyed by cogitating on the effect of a rushlight in the dome of St. Paul's, that we hasten to this conclusion. We look deliberately into the physical condition of the objects around us, with an occasional, though at present imperfect glance at their movements.

It is not that we doubt the power of the Creator, out of a speck which bears the proportion to the system which 3-10ths of an inch bear to the dome of St. Paul's, to produce an intensity of brilliancy, to give the light of the brightest day to the solar system, though planets should be found, step by step, 3600, or 7200 millions of miles off, as Uranus has been discovered, just twice the distance of Saturn. Let us grant all this; we have the day as bright, as glorious, as the astronomer pleases; but we still ask, Where is the night?

The admission which we have just made does not lead us one whit nearer to the notion that what might be, *is*.

We profess, even in this small work, to show to demonstration, either that the sun is not 883,000 miles in diameter, or that it is not ninety-five millions of miles from the earth; that both of these conclusions cannot be correct; but this is not the place for the discussion of this point. We recur to our Orrery, and pursue our investigations into day and night.

Creation affords us abundant scope for analogy; but, as we have often observed before, physical facts have many phases. We do not hastily catch a circumstance, and call it "a fact,"—to apply it in one way, without endeavouring at least to look at our materials in others, which may give it a different character as connected with the object of our research. We strive to look into things, and beyond one discovery into others. When we cannot find the means of experimental proof, we look into the records of others; and our illustrations should correspond, if possible, at all points, with the objects upon which we bring our reasonings to bear.

We know, with reference to these considerations, that in taking the dome of St. Paul's for our Orrery, we are reasoning upon the effects of light projected upon a solid surface; light, which, after traversing our atmosphere, is free, the astronomer believes, to escape into "space." Though the sun does not illumine the fixed stars, which shine with a light of their own; we are told, on the other hand, that the moon shines with a borrowed light, that the moon's is a reflected light, and reflected rays must pass through the atmosphere from the moon. We feel satisfied of the fact that the sun's light is reflected from all points of the atmosphere or space surrounding us, but we will not assume this, neverthelesss. We have read somewhere, of the blackness of the atmosphere, beyond the height of the "ethereal blue." It may, therefore, be a consideration, whether, for the effect contemplated, the dome should be blackened or whitewashed. We believe all these circumstances (and many others might occur to us, if we

sifted the matter further) would give a different character to our Orrery, had we other objects than our present one. But for our present purpose we deal simply with direct distributed light; if reflected, it will assist, but cannot hinder our conclusions.

If, then, the sun be three tenths of an inch, distributing a light, the more brilliant the better for our arguments; we have next to look at the earth, a little more than three thousandths of an inch in diameter, at a distance of about thirty-one inches from the sun.

The sun is reduced to the size of a fashionable gentleman's breast pin, or a gentleman's fashionable breast pin;—But where is the earth? We want a miscroscope. The oxy-hydrogen at the Poletychnic would, it is true, do more than resuscitate it, but it would require a very considerable power of the olden time, to give palpability to such a speck.

Now we will not bewilder ourselves or our readers by endeavouring, algebraically or otherwise, to determine how many split hair's breadths, go to a thousandth of an inch—for split hairs we must to get at any practical notion of the diameter of our earth, at our present scale of 300,000 miles to the tenth of an inch; but bearing in mind the minuteness of the object, as compared with the dome of St. Paul's, on which, the imagination is to be fixed, we will leave those who choose to remain, in order to take objections, in the dome aforesaid; whilst we remove our readers into a room of moderate dimensions, and look at larger objects which will afford us more palpable illustrations. In this process we can take no unfair advantage of astronomy. Our main object is to show, that a mere speck can cast no shadow; and if we take objects which do cast a shadow, and a large shadow, and yet find light where we ought to find darkness, we surely cannot go very far wrong in our conclusions, when we end by asking, *Where is the night?*

We have sought in vain for a stronger analogy, a better illustration, than the orange, the apple, or the billiard ball, which we supposed the astronomer to produce. We of course take it for granted that he produces this fairly in an open room, before an open light,—as the earth is supposed to be in an open system, in the face of the open sun; and we now proceed to adduce analogies to the matter in hand, connected with the small billiard ball of the astronomer, and with other objects which may be found in every room where two gentlemen may meet. These clearly show that the astronomer has seen his illustration but in one light. Janus must look both ways before the temple's shut.

We now proceed steadily to enquire how the alternations of day and night on our earth, 8000 miles in diameter, occur in a system 3600 millions of miles across, deriving its light from the centre, or very nearly the centre, the place of the sun.

Day, we are free to admit, is the consequence of our being in the enlightened hemisphere; but in the astronomer's system, we contend that it ought nevertheless to be day throughout the whole four-and-twenty hours.

We are exposed during the day to the direct rays of the sun, and we have strong evidence to the senses, that these radiate from the sun's centre or from the periphery of the sun, at an obtuse angle to the diameter of that body; not at an acute angle from the periphery of the sun's disk. This is palpable, we think, in the rainbow, and in the rays projected from behind a cloud.

But the Earth is a small body in space. The Moon is smaller. The Moon, we are told, casts a conical shadow into space; and why should not the earth? Taking the astronomer's view of the system, we might argue the point upon this principle; and endeavour to reckon how far the conical shadow of the Earth could reach in space, so as to darken the concave of the

hemisphere opposed to, but within view of the inhabitants of the Earth,* to be deprived of the direct rays of the sun; but are not, we contend, necessarily be right, necessarily deprived of the sun's light. We are not writing of eclipses, but we cannot help doubting the projection of conical shadows from globular bodies, opposed to a single light, though larger than themselves. We think that the subject is more intricate than it appears at the first glance. We have tried till we are tired, with a moderate sized breast-pin, and a "six" or a "ten" dip, and with a double wicked Palmer's, twisted and turned in every direction, and used with and without its frosted shade; but have altogether failed, we think, to get a perfect shadow less than the diameter of the pin. But then, again, we have clearly got a conical shadow from bringing two lights to bear upon the same pin. We have found the apex, or an approximation to it, and have distinctly observed a shadow of the darker shade, smaller than the diameter of the pin, on a piece of white paper interposed between the pin and the paper, on which the speck which indicates the apex was thrown. But again, we have not two suns.

But let the earth's shadow be conical; or let it be cylindrical; or let it be the section of a cone, of which the apex is the sun's centre; or let it be the section of a cone of which the apex would be beyond the sun's centre, wheretosoever it may reach, so that the sides cut the periphery of the sun and earth;—and no other possible condition of a shadow occurs to us;—in either of these cases it is so palpable, that the "mean Earth" which we have been considering, the Earth of the astronomer, can throw a shadow over so very small a portion of the system which we have been explaining, whether we look to the firmament or to the dome of St. Paul's, that we do not feel it worth while to reckon the angle at which the shadow would fall, if projected at the orbit of Uranus,—or the distance it would reach, if dwindling off to a point from the Earth's circumference. All we contend is, that the setting of the sun, or the revolution of the earth on its axis, understand it in what sense we may, could not bring about the change which the night-coming produces to the inhabitants of the darkened hemisphere; inasmuch as to darken a hemisphere of the earth, whilst the concave of the heavens receives, as it must, uninterruptedly, the sun's rays, be those rays reflected back or not, could not bring about that effect.

We have tried again with a moderately large, not a fashionably large breast-pin, by daylight; and we find that we are equally unsuccessful in producing a clear deep shadow less than the diameter of the pin. The pin-head measures about 1-5th of an inch in diameter. On a sheet of white paper, at a distance of a few inches, it casts a shadow, a dark palpable shadow, about the size of the diameter, its proper disk; but after the focus is passed, say two or three feet off, the shadow becomes diffused, and gradually increases in size as it loses its intensity; the stem of the pin is soon lost, and a haze is shown about the spot where the head of the pin projects its shadow. The shadow may be identified, till it arrives at the size of a shilling, by increasing the distance; but ten or twelve feet from the object upon which the shadow is projected, the light is not at all intercepted, as far as we could observe, where the pin, interposed, ought to cast its shade. The experiment was not made with any great accuracy; one is content to catch a November's sun as one best may; but the sun was clear at the time, though his light shone through a very dirty window; still the experiment is sufficient for our purpose. It is a simple, and, we think, an apposite one, and in its main features may be relied on; and the result

* "The shadow of the earth is projected into space, between three and four times further than the distance of the moon."—*Enc. Brit.* Astronomy, p. 7.

induces us to ask, If a solid body, of one-fifth of an inch in diameter, at a distance of ten or twelve feet, casts no palpable shadow, what shadow can an Earth, only 8000 miles in diameter, cast, at the orbit of Uranus, one thousand seven hundred and five millions of miles off?

How far may we imagine Mr. Green's balloon to ascend, before its shadow is lost to the earth on a bright sunny day? Yet the balloon is a large object. Large as it is, we know that Mr. Green's balloon soon rises till out of sight. Shall we ask for its shadow then? It wants but little reflection to show, that we might look long enough for a shadow of the Earth from the planet Uranus.

A tree at mid-day, under the brightest vertical sun, will cast as deep, as dark a shade, as far as we know experimentally,—and if a tree will not, a dead wall will,—as an Earth's hemisphere; a two or three inch wall, such as they build houses with now-a-days, as a twenty feet fortification with a mound at the back of it, to boot; but, Whilst sitting under the shadow of a mountain, of a fort, or "*recubans sub tegmine fagi*," is the surrounding country, an approaching enemy, or the bleating flock, if the sun shine upon them, nay if the sun do not shine upon them, hid from our vision, because we happen to be enjoying the refreshing shade? *Where*, then, we again ask, *is the night*?

Let us stand at a window with our back to it, and the sun shining through it; the eye is in the darkened hemisphere of the head, but it can see the tints, shades, and colours of the objects in the room, though they be, or be not, exposed to the sun's rays.

Let the astronomer hold his orange before a candle, its shadow is projected upon the opposite wall; but the objects beyond its shadow are in no wise altered to the eye of the person that holds it.

Would a fly on the darkened half of the orange see a whit worse the objects in the room, because his eye is on the shaded part of the orange? or would the features of the holder of the orange be the less clear, and their light and shade less palpable to the fly, than if it were on the bright side?

As regards the visual organs of man, Is it not the fact, that they are relieved, and have the capacity to see objects more clearly from contrast, when looking at them from within the shade, than in the broad glare of a midday sun? And then, are not the objects upon which we look more, not less, palpable, in proportion as the eye is in darkness?

John and Thomas are in a room, with one light burning; John with his back to the light; Thomas with his face to it;—Are the features of Thomas, in the light, at all obscured to John from the circumstance of John's eyes being in the darkened hemisphere of John's head?

But, says Thomas, "Come you between me and the light, John, and then "you will not see me so plainly." Agreed. John and Thomas may then stand face to face; but What is the consequence? The shadow of John is projected on Thomas. But by the light, the mere light of a rushlight, will this hide Thomas from John's view? O no! John and Thomas will see each other in a moderate-sized room, especially if the walls be white. A rushlight might not answer in St. Paul's dome; but if we had John and Thomas there, and a good brilliant gas-light of the size of our sun, 0.291 of an inch, let John be thirty-one inches off the light, and Thomas be standing with his back to the dome, we feel tolerably certain that probably the figure of Thomas, perhaps his features, certainly his white neckcloth, or white waistcoat—if not his ruddy face, "red as Mars," who has changed to "white" at Madras,—would be clearly visible, although the shadow of John would be thrown directly upon him. But, in applying this analogy, where is the body to cast the shadow in the astronomer's system? Whence comes the darkness over a concave hemisphere upon

which the sun shines, "continually," "incessantly," projecting its rays? The sun has not a dark and a bright hemisphere, which is what the astronomer seems to want: his rays proceed from a centre, and are dispersed throughout his system; but what casts shadows throughout the immensity of that system?

If a shadow is cast, what is to cast it? If no shadow is cast, *Where, we again ask, is the night of the astronomer?*

The foregoing are not the only analogies which we shall bring to bear upon this point; though they are sufficient, with the Bible before us, to lead us to the persuasion that, as there can be no night without darkness, and as astronomy does not provide that darkness, we must look for physical causes in explanation of the manner in which the "lesser light" rules the night, widely differing from prevailing notions. We should not be surprised, if encouraged to a second publication, should we eventually show that the earth is not the mere speck in a system which it is represeuted to be; that it has an importance in the revealed creation, which the first impressions derived from the Mosaic record would attribute to it; and, in fact, that it *does cast a shadow over the entire firmament in view, to produce that darkness which is night.*

This notion is, we are free to admit, altogether opposed to the Newtonian Theory, as applied to distances. How far the pursuit of the subject may lead to strange conclusions, connected with the science of Optics, into which we shall dip presently, we know not; but we must talk of things as they are understood, however we may eventually find them. With this reservation we pursue our subject.

The stars shine, we are told, with their own light. Our sun's light could not, for instance, reach Sixty-seven Cygni; but the light of Sixty-seven Cygni can reach us, when the darkness will let it—that is, when the sun's light is intercepted. We do not return to the question, How? We believe the sun's light *is* intercepted; we hope we *know* how; but if we go into every by-path as it turns up, we shall never reach the end of our journey. The moon and planets shine, we are told, with a reflected light—a borrowed light.

We reserve the moon and the planets for a future opportunity. We do not now enquire how these, and the satellites of those which have any, receive their light from the sun. We confine ourselves to the stars, as the astronomer views them. They shine with their own light; but, in our day, the intensity of the sun's light puts them out, unless we go into a deep mine, and then they may be seen.

Some facts, to be well understood, require also to be seen. The eye of the imagination cannot always penetrate into causes or effects, unassisted by the eye of sense. The depth attained, the size of the shaft, the consequent angles of incidence and reflection, are the first and most prominent points that we hit upon as relevant; but in endeavouring to discover the the reason why the stars are seen in such a position, there may be twenty other circumstances which may be brought to bear upon the solution of the question. It is an interesting fact. It is introduced to show why we have day and night, in the Rev. Mr. Joyce's little book, and, if we remember rightly, we have seen it in bigger ones. We may qualify the expression. We see it is not introduced to show why we have day and night, but to explain that we do not see the stars in the day as well as the night; "because in the day-time the sun's rays are so powerful, as to "render those coming from the fixed stars invisible."* The fact tends towards the point on which our present argument turns; but the fact itself

* Scientific Dialogues, p. 106.—Liverpool Edition.

seems to us to have about as much bearing, in accounting for day and night, though it may fit the shining of the stars in the night only, for aught we have clearly found out to the contrary, as if we were to lock a man up in an oven and tell him, some bright day at noon, "Now, my good "fellow, you *clearly see what night is:* there you are: the sun's rays are "intercepted: it is pitch dark—*and you can see nothing.*"

After this hint, lest we should be deceived by an illustration which seems to us in no wise to the point of day and night, though it may be to the fact of the stars shining with their own light, when they shine at all, we proceed.

The capacity of the weaker light to shine, is dependant on the absence of the greater light. If, then, the greater light be not removed, or shaded, so that the shadow of some opaque object is cast upon the weaker light, the weaker light cannot appear.

But if a shadow be cast upon the weaker light, the weaker will then appear.

Write on the wall of a dark room with a phosphorus match—one of the common lucifers will answer the purpose—the faint light of the pencilling and the fainter vapour will be plainly seen. Bring a light into the room, the pencilling vanishes. *Interpose your shadow between the light and the writings, the pencilling revives.* But in the firmament where have we, according to the modern astronomy, the shadow to account for the appearance of the stars, or the object to cast the shadow? Where have we the solid masonry of the oven, the deep dark solid sides of the mine's shaft? What have we in our luminiferous atmosphere which should bring us, merely because we are in the shade, into the condition of the man in the oven, or the miner excluded from the light of day?

It is inconsistent with the evidence of our senses, to attribute to the sun a dark and a bright hemisphere. If we are right in the impression that the concave heavens reflect the sun's rays, even such a supposition would not account for night; for then, there is not, that we can discover, any reason why the darkened hemisphere of the heavens should not partake of the reflection.

The earth's dimensions, in the creation of our system, must, we feel satisfied, from all considerations, be vastly greater than in the proportion of 8000 miles to 3600 millions of miles; to say nothing of systems on systems beyond.

We grant that to an observer on the earth, 8000 miles is a great distance—that we are the very most specks upon the earth's surface; and that to us the earth would cast a very wide shadow. But this is not the condition of our physical problem. Philosophically, astronomically, we must remember that we are 95 millions of miles from the sun, and but 8000 miles in space; and, unless it be thought necessary, that we should prove that Mr. Green's balloon, when out of sight from the earth, projects a shadow on the earth, we cannot imagine that it is our duty to worry our readers with further discussions on this point.

Our next practical objection will, moreover, have a tendency to lead us into similar considerations, and may help out our objection on the score of day and night, if we have not already brought conviction of the incompatibility of those alternations, under the Newtonian Theory, with Scripture and the evidence of the senses.

Our first objection, in the present chapter, has been sufficiently practical, and argued, we hope, practically, if not conclusively. Pursuing our subject, we proceed to show the utter impossibility that three of the grand conclusions of astronomy should *all three* be correct. We hope that it will be sufficient apology for our book, and for the vein in which we have indulged

in order to make it readable, if we succeed in proving that one or other *must* be wrong.

Captain Symth tells us that "the Sun, that mighty and animating prin-"ciple of our system, by exhibiting various magnitudes, according to his "altitude above the visible horizon, affords a notable lesson on the futility "of consulting the 'evidence of the senses,' instead of the deductions of "reason; and such inconclusive evidence ought always to be suspected by "the cautious inquirer."*

"The elements of this fountain of light, heat, and vegetation," Captain Smyth immediately proceeds, "upon which our astronomical creed is "founded, shall now be given."

Out of this "creed" we take four items—namely,

Sun's mean distance	miles	95,000,000.
True diameter	„	883,000.
Maximum diameter in Perihelion . .	minutes	32′, 35″. 6.
Minimum diameter in Aphelion . . .	„	31′, 31″.

Now we mean not preterplupickwickially, but preterplupositively, to insinuate that all these three articles of this "astronomer's creed" cannot be correct. We say three, for we shall reckon on the mean of the diameters for our purpose, as we have taken the mean distance, in order to disencumber our investigations, as much as possible, of needless figures. For the same reason we shall argue the points to be debated, in "circles of the sphere," as others have done before us, and not in elliptical orbits, wherever we have occasion to talk of orbicular motions or distances.

We have adopted the above for our calculations, preferring to take these elements of our objections, from a recent and approved work. But we must, at the same time, inform our readers, that the sun's diameter, by observation, is not very accurately, or positively determined.

"The precision of modern observations, shows that the apparent dia-"meter, is greatest, about the time of the winter solstice, and least, about "the summer solstice:"—

(For somehow it is proved, that the nearer the sun, the colder we are, and the farther off it the hotter; and unless we investigate, we must wonder and admire, and believe, that we are three millions of miles nearer to the source of light and heat, at Christmas than at Midsummer)—"but there is "some discrepancy among the results of different astronomers with respect "to its" (the sun's) "actual magnitude."†

From Aristarchus of Samos, A. C., 260, to the publication of Delambre's tables, Dr. Rees, in his Cyclopædia, gives us the result of the observations of five and twenty astronomers—Aristarchus gives 30′, or exactly half a degree. His instruments, we may suppose, were not so accurately divided as those of modern times, nor most likely so expensive. We have not presumed to have an opinion of our own, or to take any observation of the sun's disk—indeed, we could not afford it. A man, who should provide himself with instruments, that will satisfy philosophers of the soundness of any new conclusions, must work "no common units" of pounds, shillings and pence; and the railways, we suppose, must have made the matter vastly worse than it used to be, in this respect. It was bad enough some months ago, which is one reason, for our coming before the public in the first instance, as a mere "objectioner." Instruments were expensive enough before they came into use to blot out every village from our maps, which if not already done, will soon be, if they go on engineering, at the present pace. Nothing in the instrument way, in the railway line, is to be got at

* Cycle, Vol. I., p. 83.

† Enc. Brit. Art. Astronomy, Vol. III. p. 769.

any price, we have been told; and Theodolites are as scarce as Camel-leopards. It will be sad indeed for old England (which may happen when the Post-office is removed to Tamworth) if the country should be covered with railroads, as well as the map of England with "lines;" so that—as it is next to impossible, now, within two miles and a half of the present General Post-office, to find a spot to plant a cabbage in—if a man want to remove out of the way of them, he will not find fifty square feet to build a house upon, within fifty miles of London, or any other of the "Grand "Central" termini:—and when a man wants to go anywhere out of London, instead of going now as we fondly expect to a "Central Terminus" in Fleet Street,—where the old prison stands,—he will find the intended Heart of all Railways, so choked from the influx and efflux of the arteries around, that a man in a hurry will save time by going through passages under houses and over them on viaducts, tunnelled or constructed to save a second or a third train, at some station on the rail which he wants, some fifteen or twenty miles off. We throw out this hint, having seen some strange things, even in our time, for the consideration of all Central Termini and Grand Junction Companies.

Leaving railways, and reverting to philosophical instruments before we proceed with our dry calculations, we will tell our readers what once happened to us.

We have before mentioned that we did not begin with objection in a captious spirit, but were led to it step by step, *through investigation of facts*. We wanted a particular instrument made to test a particular point. Friends who have looked, and looked deeply, into these matters, told us that nothing was more easy than to make such an instrument as we wanted —a very simple one. We hoped that we were in the way of getting support in a grand scheme, and had obtained a note from a public lecturer expressing his "firm conviction of the importance of giving" our "theories a more "defined and experimental character." We were then on the practical not on the philosophic tack. We went to the practical man, to the mechanic, and explained what we wanted, at one of the best houses in London. "We cannot make it, Sir," was the reply,—*the very reply expected.* The cost of an ordinary instrument of the kind is a few shillings. "Could you not make "such an instrument as is wanted, for this particular purpose, if the parties "who might employ us, were ready to give £50 for one?" "We would "try hard for the £50, but we could not warrant to make such an instru-"ment; we know what you want, and are clearly of opinion that it cannot be "made." When Otto Guericke, about the year 1654, burst a barrel in a pneumatic experiment, he was reputed to have proved the point he aimed at "by the failure of his experiment as effectually as it could have been by "its success." * We got no credit for our discrimination. Philosophy, we believe, thought the mechanic a bungler, and we continued to be a Monomaniac, though dabbling with every science under the sun, because we thought it possible, that there might be "a hitch," in the Newtonian Theory, and that one science or other—one or all, might prove it.

We give this anecdote, by way of encouragement, to the many, who we hope go with us in our objections, as they join us to charge, "full tilt," against the conclusions of philosophy; just as we see, in Mr. Laird, the stationer's window, by way of encouragement to the Addiscombe lads that pass by, to take up their appointments at Leadenhall Street, the beautiful and compact line our troops maintained as they *charged to the very muzzles of the batteries* at Maharajpoor.

We imagine, it is not a forlorn hope, but we have often wished for

* Enc. Brit. Prelim. Dissert. Vol. I. p. 480.

"Tyro Modestus" (not where we were introduced to him, for we had the Mechanic's Magazine, where we were denied our own Prayer Book in our cell), and a writer in the "Parthenon," (which we picked up in the same locality), who dared (and we hope escaped, what we one way or another did not escape) absolutely dared to laugh at the measurement of mountains in the moon. We had thought of craving the assistance of these writers, and others whom we might have fished up out of existent or defunct periodicals, to carry on a new periodical of our own, to be styled "Peter "Puzzlewig or the Laughing Philosopher;" but, somehow or other, we found a hitch in the way of that plan, and it is abandoned; for the present at all events.

Whether with "Tyro Modestus," and his six pounds of mercury (which was too heavy artillery for our finances) we could have made a physical attack upon the gates of philosophy, like Capt. Thomson with his powder bags on the gates of Ghuznee; and have accomplished our purpose by a *coup-de-main*, if the editor of the Mechanic's Magazine would have let us, we know not; but there appeared to us, much of soundness in some of Tyro's objections, though we had not *heart* to study them, at that time, as they deserved to be studied; and we have not had *time* since; for this is the third book we have begun upon since the beginning of August. We had two or three manœuvres afloat, and had considerably advanced in two other fashions of making our approaches to the gates of philosophy, before we decided upon the present plan. The other two savoured more of the nature of generalship and military approach; sober debate; a sort of philosophical field engineering, giving one the idea of fascines, sandbags, redoubts, palisades, and angular hocus pocus, under ground in zig-zag ditches, to ward off the shot of the enemy; but we decided in the end, that there is nothing like a "bold face and a full front," and we determined that in philosophy, if not in war, (as some have ventured to say it is not) General Gough's plan is decidedly the best. We have, however, done a bit of generalship in a curricle and locomotive to pave the way.

Unless we should be terribly roughly handled, we hope to stand our ground. If we should lend a hand to demolish an old structure, we shall be ready enough to help to build up a new one. If we amuse, and can earn our hire and get it, we may try to instruct, when we have done with objection. We do not expect much assault from Philosophy. Philosophers are too high at the top of the tree to see what is going on at its roots—when a train which *ought not* to go fifteen miles an hour goes seventy to a hundred, they don't think it worth while to think how they came to be wrong. Our numskull may escape, or it is hard enough to bear a good battering. The German said that he had made a fiddle "out "of his own head," and had "wood enough left to make another." Let us but meet public encouragement, and, as we have before hinted, we have wood enough in the building line, assuming a shipshape appearance, to launch forth another bark upon the ocean, calm or stormy, as we may find it, in order to show *how* Scripture is right, and Newton is wrong.

We are now in the mind's eye, about to draw a ground-plan of a portion of the Solar system. We are not aware, that it is accurately determined, whether the radius of the orbit is measured from the edge of the sun, or the sun's centre; but we shall differ so very materially from our masters, that we need not be particular about such a small matter as 445,500, or 441,500, or 4,000 miles, which will be the differences, whether we work from the centre of the sun to the centre of the earth, or from disk to centre of one or other. We would be particular if we could, but we believe the point is not accurately determined. We shall, at all events, take the calculation as it turns up, for we cannot fall into any error of importance.

For the same reason, we will not worry ourselves with the many places of decimals, already ascertained in progress to the measurement of the circumference; which it appears to us, must go to a much greater length, even the distance of 67 Cygni would be a trifle to it, if mathematicians work at it till they show, by figures, the measure of an infinitesimal polygon, coincident with a circle: the old rule—as 113 is to 355, or 7 is to 22, so is the diameter to the circumference, will suffice for us; and we may drop decimals altogether, and cast adrift all remainders.

We take, then, the sun's mean distance as the radius of a circle, which, drawn from the attributed orbit of the earth, say through the sun's centre, will extend into space 95 millions of miles the other way. This is not the astronomer's condition; but, barring ellipticity, the sun is always that distance from us; and as we go round him, we see his disk on that imaginary circle: the difference is not very material; but it is a difference, and so we note it.

Now, the measure of the circumference, according to the approximation proposed, is (as 113:—335::—190 millions:) 596,902,655.

For the diameter in Perihelion.

		Miles.
30′	(596,902,655÷720=) . . .	829,032.
2′	(1-15th)	55,269.
30″	(1-4th)	13,567.
5″	(1-6th)	2,261.
.5	(1-10th)	226.
.1	(1-5th)	45.
32′,35″.6.	The angle represents, miles,	900,400.

For the diameter in Aphelion.

30′	(596,902,655÷720=)	829,032.
1′	(1-30th)	27,634.
30″	(½)	13,567.
1″	(1-30th)	452.
31′,31″	The angle represents, miles,	870,685.

Diameter in Perihelion	Miles	900,400.
„ Aphelion	„	870,685.
The two added together, miles,		1,771,085.
Divide by 2		885,542.
"What," says astronomy, "can you want more? You want		883,000,
"The difference is but, miles, . .		2,542,

"and is not that near enough?" *

So near, we reply, that we care not to let it stand, for argument's sake, at 883,000 precisely. We are on too sure ground, the deductions of reason, *coupled with the evidences of the senses*, to care for a mile or two. Our object was to bring out the *exact sum* in miles, in order to identify the measure of the angle in miles, with the sun's "true diameter," which we imagine to be derived from some other source: some source connected with an attraction of gravitation, by which the sun tugs all round and

* The difference between the measure of the chord or side of the Polygon, represented by the angle, is, we suppose, the right thing, and brings us nearer to the mark.

resists the tugging of the circumcirclarorellipticorevolving planets of the system.

The hit is at all events so close, that we almost suspect the size of the sun has been determined by the diameter; and, if not near enough for our purpose, we will take it for granted, that out of the numerous observations particularized in Rees, we might just light upon the one which fits the case exactly; but this is not worth while: we will assume them identical.

We really imagine the sun's "true diameter" to arise from some other source, and under this impression, we remark, in the first place, that of the three limbs of our proposition, the observed angle is the only one strictly physical; the others are dependent, not on observation, but on theory, or on calculations according to laws, which, however uniform, are theoretically laid down.

Now, as we differ very widely from our masters, we may as well say boldly at once, that any thing that savours of an approximation between the sun's disk, as measured on a ground plan of the system, and the measurement of the angle or chord of the segment of the orbit is altogether preposterous; and the objection, however broad, admits, we think, of proof to demonstration; if we may place any dependance on analogical reasoning derived from physical facts, and are not bound, in order to get a correct notion of the system in which we live, to throw overboard altogether the "evidence of the senses."

We have been told that the "whole system hinges" upon the direct projection of the rays, from celestial or other bodies to the eye. We contend that this is *not* the fact, and that if projected at all, (for though Newton "dissected the subtile body of light," it is not yet altogether anatomized so as to be thoroughly understood), the rays are not projected from the bodies in a direct line to the eye. We take courage from being able to maintain this position broadly, on the evidence of fact and the senses; and hope to render it clear without the aid of diagrams or instruments. Our illustrations shall be so simple that any body may make a diagram, and if he thinks it will assist him, we hope that he will.

Mr. Green's balloon ascends till it goes "clean out of sight;" let the philosopher "mark him down" where he pleases. There is *then* no direct projection of the rays at all events. Mr. Green's balloon descends, returns into sight; philosophically speaking, it appears at first a mere speck, something just perceptible—not exactly a geometrical point, but an infinitesmally minute, though palpable object. What angle does it then describe to the eye? Next to none: an infinitesimal chord of a circle large or small. If we have any notion what parallax is, "it has no parallax." It descends lower, gradually increasing in apparent size till (say) it seems to be half its size. Is the diameter of the balloon, at this stage of its approach, projected to the eye from the periphery in space which the balloon actually occupies? We argue not. In its progress out of sight, it appeared an impalpable speck, as it did when we supposed it to reappear. In its progress to that point, it became less and less. The farther off, the longer was the radius from the point of vision, the larger the circle; but the disk was reduced to an impalpable point upon that circle, as the balloon was presented to the eye, whilst its diameter upon that circle would have been a something, and the angle of its disk appreciable, probably calculable.

But Mr. Green's balloon is an opaque object. We treat of luminous objects, which may be under a different category. And here we feel the peculiarity of our situation in a populous neighbourhood; and what neighbourhood is not populous within five miles of London? or, rather, what neighbourhood, within a circle of thirty miles, is not London itself? In a pursuit of this kind we should not care for rain, or hail, or frost, hedge or

ditch, mud or snow, but would set our "sinumbra," or a blazing tallow candle in the window, and place a mile or two, or as much as necessary between us and it, to determine a point of this kind. In India, which the British Advocate tells us is the land of "the slave," we might have done as we pleased; but here, if we should venture to stroll out of the house in a November's night, after all that is past, we might, expect soon to "have "other hands about our head than our own"—we are in a land of liberty here, and cannot do as we please. We must, therefore, resort to our "woodwork," and see what we can make of the argument "out of our own "head."

It appears to us, that the effect with a fire balloon would be very closely analogous, if not identical, on a dark night, with that of Mr. Green's balloon in a bright day. A fire balloon of the same size might, we think, perhaps be seen at a greater height on a dark night, than Mr. Green's of the same size on a bright day; but, if so, we think, also, that when its disk or identity as a body was lost, it would appear with a radiating light; just as the lamps on London Bridge are identifiable about two-thirds of the way across, but the more distant ones look like stars, the disk or lamp itself, being lost in the distance.

But, again, the glass is "pervious to the light," which the material of a fire balloon may not be; pervious, we mean, to the direct rays, like a clear glass shade; not intercepting the rays like a frosted shade. But we are getting into a by-path.

We do not depend entirely on Mr. Green's balloon. We may just observe that the fact which we have remarked, and just noted, regarding the lamps on London Bridge, seems to connect the idea of a disk with propinquity, and of a radiated light with distance; but we do not consider this, although a "fact," conclusive for or against the great distance attributed to the sun; only sufficient to raise our curiosity to inquire, even if our objections were not more fully supported by other, and we think, incontestable facts.

Although we are diving into the niceties of objection, we shall strive to convey our ideas by taking our illustrations from familiar objects; and shall endeavour at security for our arguments, by selecting such as afford us sure ground and ample scope. For instance, if we think that an object will be out of sight a quarter or half a mile off, we may assume that the effect will be observed at a mile; and thus we hope that we shall leave no room for cavil.

We proceed now to the analogies which warrant us in contending that the rays of light do not proceed from the body to the eye in a direct line. It appears, from our calculations of the diameter of the Sun, as measured on the arc of the Great Circle, and the size ascribed in miles of diameter to the Sun, to be necessary that they should so proceed, in order to the correctness of modern astronomical deductions.

We will first take our readers to the end of a long tunnel, such as we find on our railways. We will suppose this tunnel to be thirty feet across, and to be straight throughout. We all know that the opening at the farther end will be large or small to the eye, according to the length of the tunnel; and we will suppose the tunnel to be *just so long* that the opening seen from the end at which we stand is to the eye *just two feet.* The opening is *two feet*—"That is light;" as the astronomer was supposed to tell us about the bright hemisphere of the billiard ball, some time ago. But the opening at the further end is *thirty feet* Does the eye "receive "the ray," or whatever the philosopher in optics may phrase it, from the "dead wall," or only from one foot on each side of the centre of the tunnel,

as he stands at the other end? Granted that the light ends where the darkness begins, and *vice versa*; but still the fact is plain, that in the distance a body of light, like Mr. Green's balloon or any opaque object, loses in size; and, whatever the distance may be, which is required to reduce the appearance of the light from thirty feet to two feet, thirty feet, by removal from the eye, or of the eye from it, loses twenty-eight feet in size or breadth. We contend, with reference to this experiment, that if we had a ground plan of the tunnel, and drew upon that ground plan the line of direction of the light, we could not draw it from the extremities of the tunnel to the eye, but from the smaller light, as perceived by the eye; consequently that the representation of the sun, upon the ground plan, as it were, of the solar system, could not be from the 883,000 miles *corresponding with an angle of thirty minutes, or half a degree.* Had we constructed a diagram when we made our calculation of the Sun's diameter in miles, we should have found it to correspond with the attributed angular measurement. Had we plotted out the solar system, we should have drawn our circle of observation of the sun with a radius of ninety-five millions of miles; and although, on that circle, we should, with our compasses fixed at 883,000 miles have pricked off an angle of thirty minutes, we must not forget that 883,000 miles accords with the actual size, the "true diameter," according to Captain Smyth's "creed," of the great body of light which we have to represent; corresponding with the *thirty* feet, not the two feet of our tunnel illustration.

This seems almost, nay quite conclusive of a "hitch," a "screw "loose," somewhere; for it is very clear, that nothing interferes to intercept our view of the whole thirty-feet opening at the end of the tunnel which appears but two feet to the eye.

We imagine that the effect we contemplate in the tunnel, might take place in a couple of miles, at the farthest; and, if our conjecture in this respect, be right, we cannot help asking, If thirty feet of light in two miles would lose twenty-eight feet, how is it that the sun loses nothing?—keeps his integrity of 883,000 miles, in space, at a distance of ninety-five millions of miles, without losing an inch? We believe that, according to the astronomers, the moon, in eclipsing the sun, exactly occupies its position "in space," without a whit of diminution in apparent diameter, by being removed 240,000 miles from the earth; and that she covers no more of the sun's disk in consideration of being the nearer body, than the extended angle would indicate: of this more anon. All this tells well and looks very pretty, for the diagram of an eclipse; but it does not coincide with our views of fact, and the evidence of the senses, coupled with the conclusions of reason.

An avenue of trees affords us the same description of illustration as a tunnel,—one more agreeable to the eye, and drawing less upon the imagination of those who have been afraid to travel by rail. We strongly incline, from observation of the streets as we pass through the town, to think, that an avenue of trees, twenty-five to thirty feet apart, and two miles long, would present to the eye a bare speck of light between their trunks at the farther end; although it is plain that there is nothing whatever to intercept the view of the trunks of the two last trees. It might be said that in the former instance, the dark walls of the tunnel produced the effect; here we have interstices open to the light; yet, from their gradual diminution in the distance, as, to use the common expression, the objects recede from the eye, those interstices grow smaller and smaller, and the space at the farther end, walled in by the trees, is, if we are right in our conjecture, brought to a mere speck of light. But, right or wrong, unless

we see clearly the light throughout the whole space between the trunks of the two last trees, *at the angle which the trunks of those trees make to the eye*, we do not see the sun as the astronomer does.

It is idle to say, that the sun *does lose by distance*,—that we see him a foot in size, and measure him at 883,000 miles. We repeat that *we measure him at an angle of thirty seconds*, and the twenty-five or thirty feet of our present illustration, is the measure of the angle corresponding to the angle which the 883,000 miles makes on the earth's orbit: consequently, although the sun may appear but a foot to the eye, we contend that one foot, or be it what it may, representing 883,000 miles—(that is, thirty minutes, or 1-720th of the measure of the circumference of the great circle,) represents a body vastly larger than the sun; or else, and we have no desire to theorize just now, that there is some great error in attributing to the sun a distance of ninety-five millions of miles.

When we think of the speck which the island of St. Helena appears a few miles off; how soon the whole island is within compass of the eye as we leave it; what a long line of coast is within scope of our vision as we near the shores of Southern Africa; what mole-hills the high mountains appear, as we round the Cape of Good Hope, at a moderate distance from the land—a few miles off—let us entertain as we may our notions of 883,000 miles, let it be "no common unit" to the imagination;—But still—Look, reader, at St. Paul's from the Churchyard; look at it again from London Bridge;* look at it again from the foot of the Surrey hills; look at it again from the top of those hills between four and five miles off; or look at the range of those hills from the Monument; if, reader, you have never been at sea, and "made the land," do this or something like it; bring your reason to bear on the evidence of the senses, and determine the question soberly in your own mind, without bias and without prejudice; and tell us freely, large as we imagine the sun to be, when we attribute to him a diameter of 883,000 miles,—Do you really think, with the analogies of nature around you, that such a body would be visible, of the size we see it, at NINETY-FIVE MILLIONS OF MILES off? Think of the size gentle reader, if you please; but *think of the distance!*

We have shown, we think, to demonstration, that, diagramatically the conclusions of philosophers, will not stand the test. What think you, with these simple illustrations from the creation around you? Surely astronomy has bewildered itself in the grandeur and immensity of its speculations.

We may however, we hope, bring to bear many simple facts, without tiring our readers.

We will suppose that we are looking from a short distance at the side along the line of pillars of a colonnade. Is it not plain, to the eye of reason and of sense, that although the first pillar should appear to the eye of its natural size,—which, we are inclined to think, that, however near, it cannot,—the second, third, fourth, fifth, and so forth, would become less and less, and that in proportion to the distance from the eye, a circle drawn from the observer to the second, third, fourth, fifth pillar, would be larger than the first, and at every successive step would become larger and larger, and consequently that the measure of the angle would become less and less in proportion as the circles grew larger and larger, in order to represent the same distance; or, that any given distance would represent a smaller proportion, or a smaller angle of the larger circle, on the ground-plan of the colonnade, as we draw it? "This you have in your plan of the Solar system," says

* We hope our readers *will* look at St. Paul's from London Bridge, with reference to what we shall presently say about sizes of objects, and the outline of it and its parts.

the astronomer, "The angle is correct. What angle would the sun 883,000 "miles in diameter, give close to you?" This is not *the* question, but we will answer it. Certainly, not more than 180 degrees, or, no angle at all. If close to the eye 180°, but the measure of the angle 180° is 190 millions of miles. Here the two do not fit. We must remove the sun 95 millions of miles, before it finds a circle to fit it, so as to give the correct angle of the ground-plan. In removing it thither, we ask, What would become of it?

Close to the eye, although, the eye could not compass the whole disk, the eye, give it a little space, could see a part of it. How much of that part would be lost, even in five, to say nothing of 95,000,000, miles. Look at a high hill, five miles off. Look at a line of coast, five miles off. Think, how small the hill, how much, the eye can compass, five miles off; how the stray sheep, and then the flock, have passed off the picture, in the distance;—how the large mansion is but like the humble cot, and the humble cot, a mere white speck;—how the large town itself has become a mere sheet of paper, as it were; and now imagine that you had a rope attached to either end of the town, and "bowsed taut," as the sailors say with a coil round the capstan. Do not you know, that although the lines on the coast, would be separated by the two or three miles, as the breadth of the town may be, there is an optical deception, and that the picture of the town as projected to the eye is scarcely, perhaps, as many feet? and consequently that if you took the actual angle, told from the capstan to the ends of the town, you must go vastly wrong, though close to the capstan, the angle might be seen correctly. Yet what does astronomy? It supposes that directed along the ropes, the eye would see the town at that angle which the ropes subtend or comprise: but we must remember that if the vision is directed towards the centre of the town, although, if we could see the rope all the way, it would of course be tacked on to the town, the extreme points, would, as it were, "approach each other," as do the sides of a canal or opposite sides of a street, and the angle at which the town would be viewed, would not, as in the case of the astronomer's sun, be that formed by the rope, but that which would be given by the white space not much larger, perhaps, than a sheet of paper, to which the eye of an observer would be directed, *who should use a circular instrument upon the top of the capstan.* By the "optical deception," or whatever means we may attribute the fact to, the whole town would be brought into a narrower compass, *and a smaller angle;* as the sheep, the flock, the cottage and the mansion were all reduced in the same manner as the town, and some lost sight of altogether, as the vessel fell off from the land.

Suppose a tunnel 883,000 miles in width from hence to the sun, and the eye in the centre, at the end of it—the sides of the astronomer's tunnel, just like the railway tunnel of which we spoke, would be at right angles to a line drawn across the mouth of the tunnel, and these would meet the actual, not the apparent disk of the sun. Consequently, such a tunnel, unlike the railway tunnel, could not close in upon the sight, but the rays must be projected from the sun's actual disk to the eye. Now we know no reason for believing that the effect would be different; nor why, as we see but the two feet, as it were, of the tunnel in the one case, instead of the thirty, we should see the whole 883,000, *through the* 441,500 *miles, minus but six inches, of darkness on each side;* for we must see every inch of the sun, according to the astronomer's diagram, in the same manner as we should if in our illustration of the tunnel, we had obtained an angle corresponding with the thirty feet, and not the two.

We do not pretend to determine the size of the sun or moon by calculation; it may or may not be possible; but, we hope that we have shown that it is not to be determined in this manner by angular measurement.

At this stage of our argument, we were induced to pursue the subject by resorting to diagrams. But, once in the region of circles and lines, lines parallel, and angles acute and obtuse, we find many a labyrinth; and we really believe, that in puzzling ourselves in, by reasoning after this fashion, and *puzzling ourselves out again*, we have, in more instances than one, found out how others have allowed themselves to be puzzled, and have not been at the pains of extricating themselves, but are content to puzzle on, and puzzle their neighbours into the bargain.

We would rather eschew diagrams and their explanations in this small work. We remember a neat "retort courteous" of Bishop Middleton, the first Bishop of Calcutta. On the occasion of one of the college examinations, a young Writer, when the students were holding forth in the native languages, addressed him,—"I suppose this is all Greek to your lordship." "No:" replied the Bishop, "if it had been Greek, I should have under-"stood it." We recollect another story of a friend who had an altercation with a Highland gentleman, who was very indignant at being told that there was no such language as the Gaelic. "But there is," replied the Highlander, "it is not only a spoken, but a written language, I can both speak "it and write it myself," "That is impossible," retorted the Englishman; "it is impossible to read and write a language which *is not*." Both parties backed their opinions with a wager, and the stakes were held by a friend, who agreed to be *custos* of two papers, one written by each of the contending parties; the Englishman engaging to write out in Greek, *not* his vernacular, a certain passage to be selected for the purpose, and which the Highlander was to write out *in* his vernacular, the Gaelic. The papers were to be read after two months, and the stakes given to the party whose translation came nearest to the original. A tough piece of composition was selected from the introduction to some Encyclopædia. At the end of the time the papers were opened. Our facetious friend the Englishman, who told the story, declared, that notwithstanding hammering and stammering, nothing could be elicited by the translator out of the Gaelic version; whilst he read off his English word for word; "for," he added, "I had written out the "*English* in the *Greek character*: they never found it out, and gave me the "stakes."

Now, we have no desire to talk Hindoostanee, as it were, to the philosopher by writing in a language which he cannot understand, although we have lots of his Greek to encumber the royal road to science as now Macadamized. Nor will we hamper a simple case by drawing diagrams, which, however satisfactory to ourselves, can only be well understood with reference to our own more extended views, in our own way of thinking; with the means at hand of explaining our own experiments. Besides, to discuss the intricacies connected with the diagrams which we have been considering, would occupy too much space in this mere pamphlet; which, as we have before mentioned, is intended only to show that physics have "*gone wrong*," not to suggest *how* they have gone wrong.

It is dangerous in more ways than one, to write in a language which cannot be understood. We have, we firmly believe, good ground for asserting, that we were kept under locks and keys, for two long months, out of five, because we wrote in a language which a person looking over our shoulder could not understand.

Finding that letters addressed to a wife were sent, not to her, but to a third party, we thought it just as well to manœuvre out of our prison-house, a letter, which we did not care much to have intercepted; in as much as it was written, not in English with the Greek character, but in Hindoostanee in the English character; not exactly Trevelyanized, nor in a correct idiom, such as most old Indians would, but in a peculiar idiom

such as *she could*, understand. Our gaoler caught us engaged on *a duplicate;* and a gentle tap on the shoulder, from a hand attached to a body whose "footstep was not heard," announced the august presence of what the Hindoostanees would call the Hoozoor Buhadoor, "*the* presence," or the "essence of high mightiness." There were caps to fit, but he must have been puzzled to get them on. We were unconscious how long we had been overlooked; but, conscious that the overlooker had not seen much to the purpose. The paper was not the "best satin post," nor "the Queen's own note," nor the ordinary "post," such as might be obtained on application to the Hoozoor aforesaid, even without a doctor's order; but not with *a* doctor's, nor even *the* doctor's order, unless it suited the pleasure, the convenience, or the caprice of the other to give it. Hoozoors and Doctors, or Hoozoors in opposition to Doctors, are wont to suppose themselves better judges of a wife's feelings, than her own husband can be: that they know better what will give relief to misery and distress, such as hers, than a husband can know who has passed with her through many a season of care and anxiety, of affliction and grief, but none such as that last. Nay, we will be bold to say that *a man may write* TOO *sensibly on these occasions.* "You will see my wife this afternoon," we said one day to a visitor, "tell her I am quite well in body and in mind."—"But how can "I tell her that?—She will say, why is he kept there then?" "And what "will you have the conscience to tell her in reply," was our answer? We had to endure between three and four month's incarceration after that.

We were describing our paper and have told what it was *not*.—It *was* of the quality ordinarily denominated whited-brown. Ink was not the medium of our communication. We were writing with a pencil, cut, not in the usual way, but manœuvred and hocus-pocussed to a tolerably good point with a piece of broken glass.

To the gentle tap on the shoulder, was added, an enquiry of the "Hoozoor Buhadoor," naturally enough, "What are you writing now?" The temptation to shuffle an answer came across us in an instant, but was instantly dismissed, though we felt confident that we were really in a tremendous scrape, and had committed the offence *medico-ethically tantamount to insanity, of insubordination in a madhouse.* Without endeavouring to conceal on the one hand, or, on the other hand, to throw into our manner any indication that we considered the question an impertinent one, we coolasacucumberly replied "A letter to my wife Sir." The Hoozoor looked Domine Sampson when the gun went off—"Prodigious!" "Curious paper "to write it on." "The best I can get Sir." "And how do you mean to send it?" "The best way I can, Sir." The mine had sprung.

We recollect an old Indian friend, a keen sportsman, who, hog-hunting one day, ran in upon his own spear, which his servant had carelessly left poised upon the top of the long grass; he told us how the spear had cut him about the leg, and how his boot was full of blood, and how he fainted and found himself "in the hands of the doctors" in his tent: but the pith of the story, was the quaint manner, in which, whenever, or to whomsoever he told it, our friend concluded, "It was a two months' business!" Our friend had encountered a hog-spear: we had offended a Hoozoor. To shorten our story, and not to distress our readers *as some of our companions were distressed to tears when they saw our poor wife sent away week after week whilst* EVERY ONE IN THE BUILDING KNEW THERE WAS NOTHING THE MATTER WITH HER HUSBAND—"It was a two months' business!"

Now we will neither puzzle the philosopher as we did our gaolor, nor will we take advantage of the general reader, whom we hope to convince by simple practical means, by imposing upon him a long string of hard words, such as aphelion and perihelion and syzygy, and apogee, and perigee,

with the like; nor signs and symbols and algebraical quantities, in order to deceive him, because he may not be a philosopher, into a belief that we know a great deal more than we can account for, simply because we make ourselves unintelligible; neither will we clothe plain English in a foreign garb, and set our Greek in opposition to the Scotchman's Gaelic; but we will revert to our simple practical illustrations, and take our readers back with us into the neighbourhood of St. Paul's, with, perhaps, a glance at the disk on which the objects of the microscope are displayed at the Polytechnic. We may have to connect the two together; not by a railway, but by a simple effort of the imagination.

But, first let us disencumber St. Paul's of the surrounding houses—we wish we could do it practically; and our first remark is that from just three miles off, in an upper room not five and twenty feet from the ground, we *look down* upon this magnificent structure; although the fall of the earth is actually only about eighteen to twenty-four inches; and inequalities of surface are not, we think, against the illustration. This certainly does not look like a direct projection of the rays from the building, to the eye.

We hope that we have already said enough to satisfy the reader, whether learned or unlearned in physics, that there is not any such direct projection of the rays: but we have a fancy for sifting an experiment or a notion through more phases than one; and if they coincide we have corrobation. We now proceed to canvass the effects produced by the intervention of other bodies, between the eye of the observer and the one, St. Paul's dome, to which the attention is specially directed. From three miles off we seldom see St. Paul's; but we cannot well remember that, when we did see it, we saw more than the bare outline. All our observations, we must observe, are made with the naked eye, and we are prepared to argue, that we cannot argue justly in a matter of distance, possibly in spectacles—certainly through a telescope with, or without, the "spectacles on." Those who are inclined to be the most sceptical in the matter of our illustrations will, at all events, hardly argue that we could see, three miles off, an orange on the top of St. Paul's,—or an apple. Put William Tell's child under the apple; and the child, would, if we mistake not, be the "invisible girl," or boy, we forget which, if the world ever were told whether Tell's child was a son or daughter. Nay, we question whether Tell himself, a man of ordinary dimensions, would not have been invisible too, three miles from St. Paul's: if visible, certainly not distinguishable as "Tell." Had Daniel Lambert been stuck up there, he might have been visible perhaps, and by his peculiar *contour* and *tout-ensemble*, being *one* of a species, passers-by might, even at that distance, if they could see him at all, have exclaimed, "Well now, surely that *is* curious, there is Daniel Lambert at the top of "St. Paul's!" even without thinking for a moment how he could get, or be got up. But we are bold to say, that the difference between any two aldermen, or any other two fat gentlemen, could not have been noticed, nor the identity of this or that gentleman, or alderman, determined, three miles off.

Now we will not contend in the matter of Lambert, nor of the alderman, nor of Tell, nor even of the child; but we do contend that an orange on St. Paul's dome would not be visible, by the naked eye, from a distance of three miles, although there should be nothing to intercept the view of it. Let us suppose the orange placed at the centre of the diameter of the dome. If it be no longer visible, it is reasonable to conclude, that, by distance, the radius of the dome has lost so much, say three inches of its size; and, if the radius, in like manner the circumference. We care not how the eye receives the ray, if it "receive the ray" at all; but it can-

not receive it from a height, be that height what it may, if that height is reduced by even three inches.

If our readers think that the child would not be visible, they will cut off his, or her height from the circumference; if the men (for we introduced Daniel Lambert on account of his horizontal, not his vertical, dimensions), they must, in like manner, strike off from five to six feet from the representation of St. Paul's dome, as "projected to the eye." We still fall short, very short of the actual effect as open to any body's observation.

Philosophically, perhaps, it may be said that the rays are projected direct to the eye, because lines interposed—say a six inch rule or a measure of fifty feet, may diminish in exact proportion as it recedes towards St. Paul's. We are not quite sure that this objection will stand the test of scrutiny; but, even if it should be found that there is a direct projection of the rays in this sense,—a projection in right lines, there is a fallacy in reasoning upon a mere philosophical delusion, an effect upon the imagination, as if it were a practical one. For the rod, or rule, would diminish to wherever it might be fixed: and *thence* the dome, if removed, would continue to diminish still, till it arrived at the three miles. There are philosophical deceptions or delusions, as well as philosophical facts. We must not forget our tunnel nor the fact that, if direct, the line is from one foot, not fifteen feet on each side of the eye, the actual light existing in "space" being thirty feet, *the visual representation, two feet.* We have not completely elucidated the *how-it-comes-about* in this case: it is what we were at with the diagrams which we spoke of, just now. But we will suggest to philosophy, that a pair of compasses may be made with one leg long and the other short; and queer as it may seem, we have found a train of connection, between our multifarious and discursive ideas regarding parallax and this simple fact. It is curious too that whilst, somehow, astronomy cannot get an angle at all, and distance increases the difficulty, we cannot divest two parallel lines, however close together and however short, of a sensible approach as we look between them; a sensible visual angle. We believe that we can anticipate and follow up the objection which the philosopher will make here; but unlike Moore, in his Lalla Rookh introducing his "Fadladeen," we will not be the critic of our own work to answer all possible objections before they occur to others. We will only suggest that whilst every star in the universe has, to the astronomer, no other than an angle of 90°, an observer in latitude 45°, has never, night or day, since the creation, had any other than an angle of 45° with the north pole of the heavens. How the north star has been manipulated to an angle of 90°, we are puzzled to discover; and imagine that it must be found "parallactically."

Whether "guesses, which serve to give mental unity and wholeness to a "chaos of scattered particulars, are accidents which occur to no minds but "those abounding in knowledge and disciplined in scientific combina-"tions,"* we are not inclined to dispute; but we might, in our own case, if this guess about the long and short leg should turn out to be a useful and successful one. We venture to propound this as a fact likely to clear away a host of difficulties in astronomical questions; and shall proceed to "work "it up," when we have perfected our "ratiocination" in the matter of the diagrams. We lay no claim to "abundance of knowledge," or discipline in "scientific combinations;" but for the sake of our family, if not our own, we hope that we have left some powers of "ratiocination;" and we are determined to employ them if we can, in the investigation of scientific truth, and in carrying out the notion that an inspired account of creation

* Mill's Logic, p. 364.

may be a better guide to philosophical discovery than "skilful" guesses, or laws laid down on the mere observation of uniform and regular effects proved only to partial demonstration. We throw out the hint for others to improve upon with better means; our space is limited; for the loss of £100, a nauseous pill, medically administered by renewed certificates of insanity, by way of counter-irritation, we suppose, as an antidote to "mental anxiety," has materially cramped our impoverished facilities for "scientific combinations." We were treated, we doubt not, on the most approved principles of mad-doctoring. Introduced as suffering under "mental anxiety," we were told nothing but falsehood about our poor wife, and pronounced mad by the *under-hoozoors*, the first springs of medical and other information in the place, because we had too much sense to believe them;* to know a "white lie" when we heard it, and to gather all the bitter miseries of suspense and alarm from uncertainty, where the truth might have eased a mind that had reason to fear the worst. Yet, notwithstanding all this, though the nerves may be stretched and played with, like a child plays with a piece of India-rubber, a man must not dare to shed a tear in Bedlam under any accumulation of mental affliction; nor must he rejoice at glad tidings. If cheerful, he is "excited;" if sad, he is "low,"—"in a low way." Any how, and under all circumstances, he is "queer," *ad libitum*.

We may be wrong in our "philosophy of the mind;" but it has always been to us the evidence of a strong mind, not a weak one, that the tear should start unbidden, or even the heart overflow, under circumstances of deep mental anguish; such as bitter "providential afflictions," which would not be salutary without the suffering; or even a conscientious difference with friends, which, one may fear, must be mistaken for pertinacity, and involve the loss of their esteem. But we will not make this work the vehicle of purely personal appeal; and return to St. Paul's and the orange, having done with the child, William Tell, and Daniel Lambert.

Reverting, however, to the train of our arguments, there may arise a question, if we were dealing with niceties instead of broad facts, as to what may be seen clearly and distinctly, and what not; as well as where not distinctly, and when not at all. Without going into diagrams, a few passing words on this point may not be out of place in the present stage of our enquiries. It was but a day or two ago that we heard an able lecturer observe, that we know not what "gravity" is. We know it relatively; we know it with reference to what we call "specific gravity;" we know it practically; we know that platinum is what we call heavy; we call cork, light; but we know not gravity philosophically. Why platinum is what we call heavy, we know not; why cork should be what we call light, we know not. We have a standard by which we can judge relatively, and that is all. We apprehend that remarks, closely analogous, may be made in regard to size and measurement. We call a man tall or short, and have a notion of a middle-sized man. We have a more imperfect notion of these relative sizes in proportion to the distance at which we see the person; but, *at some distance*, though we might determine when we saw a man and a boy together, we could hardly judge whether either, singly, was a boy or a man. To come closer, we have a standard by which we judge of sizes, lengths, and breadths; and we determine upon a "uniform standard," which we may practically, and, barring extreme niceties of measurement, philosophically adopt and reason upon, as an inch, a foot, or a mile. But all this is still mere comparison; so much so, that all objects must come into contact, direct and actual, or by proxy of a line, a pair of compasses,

* A simple fact related just as it occurred, though not in the coarse language of the under-hoozoor.

or some such expedient, in order to be measured, If we had to cut a hundred sticks of equal length, it is curious, but we believe it to be true, that unless we use the pattern stick for all, we should go sensibly wide of our mark. And if this be true, where there is actual contract, how shall we judge of measurement by the eye? We plot off the plan of a railway, or any thing else in *esse* or in *posse;* we apply the compasses to an inch scale if we wish to draw a circle two inches in diameter; and we have results suitable to practical and most philosophical purposes. But we do not know of any case in which we come at measurement, with any thing like an approximation to accuracy, with the naked eye, but by measurement; and, curious as may be the notion, we believe that it may safely be said that nothing appears to the eye of the size that it is.

When Pope asks

> "Why has not man a microscopic eye?
> "For this plain reason, man is not a fly,"

is his answer.

In the matter of the fly we do not know how the Poet came at his information. In the matter of the man we incline to question the soundness of his notion; although we confess ourselves unequal to the solution of the problem involved in our illustration, and must leave to others the explanation of what seems a curious phenomenon, however simple it may be, to those who understand it.

We have talked of the sun as giving the appearance of a foot: it has that appearance to the eye; but we cannot in any way *measure* its diameter at more than about a sixth of an inch. We used for our experiment a small gold pin, before spoken of. About a foot from the eye, this pin, between 1-5th and 1-6th of an inch in diameter, just covered the entire disk of the sun; at arm's length it left a third of the disk clear all round it. We do not ground any argument on this, but the experiment appears to us apposite to the remark that we see nothing as it is.

But whether the eye of man can or cannot magnify an object, we can very soon cover a pane of glass a foot wide with a six inch rule, by removing our eye a short distance from it. But then, again, we could not in any position make the pane of glass coincide with the sun's disk; neither can we make the gold pin, which will cover the sun's disk at a foot, and cover one third only of its diameter at arm's length, cover more than about a third of an inch upon a six inch rule, however closely the objects are brought to the eye.* The fact is curious and seems worthy of investigation, for few, we think, will be disposed to say that the sun looks nearer the size of a breast pin, very considerably under fashionable dimensions, than of a twelve inch globe or a Christmas pudding.

We will descend from these general observations to particulars. We have heretofore looked at St. Paul's dome in its integrity. Our readers will now favor us by cutting the dome, the dome mind (*not* the orange), in two, and supposing it to represent to the eye a disk, such as many of them will recollect to have seen used for the exhibition of the dissolving views and opaque microscope. Sometimes we may talk of the dome, thus prepared for our exhibition, with a strong light behind the curtain, and then suddenly of the whole dome, or of the cathedral itself; sometimes of a night, sometimes of a day scene; but, our readers will, we hope, accom-

* In this illustration we write of the six inch rule at a moderate distance, where we consider it calculated to represent six inches or thereabouts; the pin will eclipse six inches removed some feet off; and this same pin, at a distance of 650 yards, can be made to cover distinctly, a sign board some six or eight feet broad, and indeed much more, even the whole house.

modate their ideas to the exigencies. Let them suppose themselves an audience, and deal with us as they do with our public lecturers, and we shall never want kindly encouragement. We will not endeavour to mystify or confuse them, nor make mistakes if we can help it; for it is satisfactory to mark the generosity of their applause, which is always very liberally bestowed to help a philosopher over the failure of an experiment.

It is day—St. Paul's before us unmutilated, at a distance of three miles. Let a large orange be interposed between the observer and the dome. Long before we remove the orange to the distance of one mile out of the three, it would be "clean out of sight."

Close to the eye, the orange would intercept the whole of the dome. But what is the condition of the experiment, when the orange, which we know *is* between us and the dome, is *not visible?*

We have clearly no reason for thinking that we can see *through the orange,* any more then, than when it was closer to the eye: nevertheless, we still see the dome of St. Paul's. It is true that our understanding denies the supposition, that we see through the orange; but, still it is equally plain to the understanding, the deductions of reason, and the evidence of the senses, that, if the orange be brought nearer to the eye it will, as it approaches, become visible, at first, only as a mere speck, like Mr. Green's Balloon returning from a distant aerial excursion; and, inasmuch as it dwindled to a mere speck, in going out of sight, it is equally plain, that, when no longer even a speck, it could be no hindrance to our viewing St. Paul's dome, or any other object which may be beyond it.

We begin to like this plan of reasoning without diagrams; a diagram in the mind's eye, if we can convey our own ideas to our readers, will enable us to explain matters much more satisfactorily, than with lines and circles, imaginary or actual, upon paper. It will create less confusion; lines, symbols, and explanatory letters will not fall foul of each other, nor be mistaken, the one for the other; and, although ideas and explanations should be intertwisted like eels in a basket, we do really depend, that we shall be better able to select any particular eel out of the basket, and hold him up to view, whilst the rest of the eels are interlacing each other in the imagination, each ready to be pulled out in his turn; than to point to this or that angle or diameter, and direct the eye to it, on the most approved principles for constructing diagrams. Besides, it would be very difficult, as we have once before hinted, to "express" in a diagram, what we want here to be "understood": *i. e.*, what ought always to be discovered of friendships,—not "out of sight, out of mind," but out of sight, in mind, whenever wanted.

We want our readers now to imagine an orange removed from the eye, three miles off, in the direction of St. Paul's dome; but out of sight. If we had been drawing a diagram, we should have had occasion for the explanation of this effect, to draw a "section" of this process—philosophically, an infinitesimal number of lines gradually smaller and smaller till they dwindled to a point, from somewhere we cannot tell, to somewhere we cannot decide upon:—only we know, that no one of these lines, representing throughout the diameter of the orange, could ever be larger, or be represented larger than the actual diameter of the orange, which we will suppose to be three inches.

What, then, is the condition of St. Paul's dome with reference to our vision? Close to the eye, the orange eclipsed it entirely. We know that the capacity of the eye differs materially, that of one man from that of another; but we know also, that no man can, with his unassisted vision, see an orange a mile off. Let us then pursue our illustration under the supposition that, at the distance of a mile, *exactly,* the orange is *entirely* lost to

the eye. It will readily be granted, that, in process of removal from the eye, it soon "loses size" in its progress towards ultimate disappearance.

We must be wary of taking any thing upon assumption. A question now arises, knowing that the orange can eclipse the whole dome, whether it at any time can eclipse it *only to the extent of its own diameter.* We should say, decidedly not. Supposing, that there *is* a point at which the orange presents to the eye *its actual diameter in space,*—which we believe to be very uncertain,—can we say that when farther removed, whilst the orange is, as it were, growing less and less, it still intercepts the view of the dome to the extent of its size? We contend that we may—and we may as well say at once, that it intercepts the view of a great deal more, as long as it is a mere speck.

We should have found it difficult to cut a hole of the size of an orange through the dome of St. Paul's; neither the masonry nor the imagination would bear it, for we must have unity and good keeping in philosophising as well as in sculpture or painting; besides we should have had a little tunnel surrounded with philosophical difficulties. We have therefore suggested the easier process of cutting the whole dome through, and, before the demihemisphere thus prepared we will place a curtain, and in that curtain shall be a hole cut just the size of the orange, three inches in diameter, and covered with a piece of frosted glass, with a light beyond within the half of the dome; and we will now have dark night outside instead of day.

By this means we hope to arrive at a correct notion, whether, whilst the disk of the orange was in the day time growing less and less, it still intercepted the dome to the extent only of its diameter or three inches; in answer to which question we may put several. Did not the orange, which went out of sight by reason of distance, by reason of its opacity cover the whole dome? Did it not, in its opacity, cover the dome by reason of propinquity? Would it not after removal out of sight, return into sight, and become larger and larger by reason of greater and greater propinquity? Would it not, a foot from the light in the curtain and three miles minus one foot off, be nearer to the eye than the piece of frosted glass, and consequently, if it could be seen would not it intercept rather more, be it never so little more, than the measure of its own disk? We might fill our basket with eels; we might multiply questions upon questions about this simple point, and yet not so intertwistify and multimanœuvre the argument, that we should fail in the end to bring out the answer to every one so as to be readily recognized as proving our position; whether we brought them out by ones, or by twos, like the infant Hercules is shown in the picture displaying the brace of serpents; not because we profess to be Hercules, but because we deal with eels not serpents; harmless creatures which can do us no mischief;—simply because we are reasoning upon palpable fact by simple illustration, in endeavouring to show clearly, what every body knows, although philosophy has overlooked the fact, that objects "go out "of sight," and consequently that the visual angle is not in a direct line from the object to the eye.

It appears plain to us that, wherever the orange may be seen in a direct line between the light and the eye, as, by reason of propinquity, it would be the larger body, the light would be intercepted; and as, at the point where it would be intercepted, the light would be no larger than the orange, and as the orange lost by *distance,* so would the light lose more by *farther distance:* therefore, whatever portion of the dome might be covered by the orange, that portion round the light, would be greater and greater, in proportion to the distance from the orange, wherever the observation upon the disk of the orange might be made.

We should not be at all surprised if we should one day hit upon a diminution of size according to distance, in the proportions of squares and cubes; especially when we go to work with a pair of compasses with uneven lengths of leg: by which means we may remark that we *keep the eye in its place;* and although we cannot draw a circle which takes in all three points of the disk of a sun or moon, viz. the centre and the extremes of the diameter; we get the two extremes, the eye and the scope of vision comprehended in our physical problem: whilst we may possibly go wrong and bring about false conclusions, by drawing a circle with the distance as a radius, in the common way, with compasses of an even length of leg; by which means, as we do not reach the extremes of the disk, our "scope of vision" is improperly represented on the diagram, and the eye, instead of being stationary, is carried round as we draw our circle. We hope one day to explain better what we mean, if not now understood. We caught the idea in endeavoring to establish a fixed circle, as well as fixed points for celestial observations in what astronomers call "space," and we commend it to the school of the "Earth's Centrality" of which we have, very recently, seen a notice in Captain Smyth's Celestial Cycle; long after we began to draw the data of philosophy from that work: and we again caught the same idea in connection with the physical problems which we are now working out, in relation to loss of size by distance and in a renewed search after that "monster idea," that indomitable "pa-"rallax" which we have not yet mastered.

Astronomers, when they give us a diagram in illustration of an eclipse, such as we see in the shop windows, give us a something which is understood at a moment according to their way of thinking:—the angles fit admirably; the conical or conic-sectional shadows hit the desired point to a hair; there is no mistaking the effect; there is a due proportion of "digits" exposed to the light, and covered by darkness, from a very tangible disk, whether of the sun, moon, or earth.

Now this very nicety of illustration, comparative or superlative, as we may observe it in the Rev. J. Joyce's 24mo., and the coarser diagrams, about a foot long, of the shop windows, as compared with the smaller and finer in the new Encyclopœdia Britannica, is just the very thing which leads us to question them: when we see effects depicted on a few inches of paper, which would require, to give the effect if they could, a sheet perhaps as long as the Chartists' petition, which some years ago was rolled up, and rolled into the House of Commons.

Until we can accomplish the means of arguing out the impossibility of a moon, 2160 miles in diameter at a distance of 240,000 miles eclipsing annularly a sun only 883,000 miles in diameter distant 95 millions of miles, we must content ourselves with pointing out the connection of ideas between what we have said of Mr. Green's balloon going out of sight and then enquiring for its shadow—and generally in the matter of shadows projected into space:—but we may casually notice, that the doctrine of eclipses is closely concerned with the observations which we are now about to make in regard to the orange and the disk, in which we have placed the light just its size, at St. Paul's, three miles off the observer.

We requested the reader to understand that the orange was no longer visible *exactly* at a mile off—one-third of the way to St. Paul's; and we contended, we hope justly, that all along, whilst visible, the orange would actually cover, if interposed in a direct line, the light at the dome; even as long as it might be a mere speck to the eye; because, wherever that might be, *there the light itself would be no larger:* consequently that, however minute the angle, the distance between the extreme points, if the angle be extended from the diminished disk of the orange, must, we con-

tend, cover a larger space, the more distant the object; whilst, on the other hand, in furtherance of our argument, the apparent size, or what we have called the "visual angle," would, decreasing step by step, become gradually less and less in proportion, [but in what proportion we do not now pretend to enquire] to the actual distance from the eye: on this ground we contend that the orange, whilst a mere speck, would actually cover, by reason of opacity and greater propinquity, very much more than the three-inch disk.

Let us attempt to argue out this question philosophically, as well as practically; and to this end let us suppose the whole of the disk at the dome to be studded with lights throughout, of the size of our orange, or circular lights, touching each other, three inches in diameter: and, holding to the notion that exactly at a mile the orange would be out of sight and the single light invisible, we might *approach the dome* and stand on a dark night, *just a mile* from the disk or the system of small disks. Philosophically, we might argue; and there is more soundness and less of the *argumentum ad absurdum* than may appear at first sight; that, as all the little lights are in the condition of the one, if we stepped a few feet back the whole would be out of sight. This would be tantamount to arguing that by day, as the orange would be out of sight in a mile, St. Paul's, being for the nonce a mere system of oranges, would be out of sight too. Practically we know that neither would be the effect. By day we know that we see St. Paul's a mile off. And although we believe that a ground glass light three inches in diameter would not at night be visible a mile off, we do believe that such a system of lights would be visible; but we are inclined to think that *as such system of lights* the disk would no longer be visible, but that the effect of distance (actually long before we reached the mile, but as we suppose in our illustration at a mile) would bring the light into a conglomeration of lights,—a uniform disk such as an illuminated clock displays, or the sun behind a light cloud: near the dome the dark spaces would be perceptible; removed at a distance we should be unconscious of any thing but the light.

Though we do not in reasoning from the philosophy of the thing arrive so readily at conclusions where we have not distinctions of light and darkness; still we may illustrate the point in hand by day as well as by night, after a little reflection. Philosophically we should have a "system "of points" which is nothing. Practically we should have a dome a mile off; but as it now makes no difference to our argument we may as well take in the whole structure. And, although at that distance, we might possibly distinguish the ball, and the cross, and the gallery, and the dome; the statues of the apostles, the windows and pillars; yet it seems equally certain, that we should not be able to discern and identify,—any more than the orange,—a nose or eye, or a joint of a finger of one of the large figures, nor any portion of the structure or its ornaments, which in itself, is less in size than the orange, which would have gone out of sight at that distance.

Although we should not have thought it necessary to prove that objects lose size by removal from the eye, and might at once have stated the fact, as one self-evident—our readers must not forget that the astronomer's sun and moon do not lose size by distance; nor is the moon's capacity for eclipsing the sun one whit the greater because it is the nearer body, although 94,760,000 miles closer to the earth than the sun.

We were strongly inclined at this point to revert to our diagrams; for the very simplicity of the matter, as we now view it, coupled with the difficulty of arriving at the same point with a diagram, would lead us to introduce a multiplicity of lines, and endeavour lucidly to disentangle them, in order to bring home to the minds of our readers, who prefer reasoning

on paper to the imagination; first, the notion of the difficulties to which they lead; and then, the manner in which those difficulties can be surmounted, step by step.

But we are compelled, by many considerations, to contract our space, and state our conclusions in the abstract, leaving the detail to be wrought out at another time.

We will first look at effects at short distances, then at moderate, and then at great distances; premising that we cannot correctly do as astronomy does, insert a moon of its attributed dimensions in a diagram, at its assigned distance, between the eye and a sun of its attributed dimensions and at its proper attributed distance, and thus find the moon's capacity for eclipsing the sun to be as it stands in such a diagram.

We have striven to show that the sun's size cannot be correctly represented at 883,000 miles, occupying a space or angle of the "great circle" of thirty-two minutes or thereabouts. In like manner, we contend that we cannot correctly lay down the moon, upon the same principles, at 2160 miles, as it is done, on a circle 480,000 miles in diameter.

If the illustration of the tunnel does not satisfy the philosopher in the matter of the sun, it will not in that of the moon; for both arguments are founded upon precisely the same principles.

But we have yet left, a series of illustrations for further explaining ourselves, by looking both at the effect of the removal of objects from the eye, and of interposing objects between the eye and others more distant.

First, of very short distances. When we see a book, if we know the symbol in which the language is printed we call it an English, a Greek, a Persian, an Arabic book, a Latin, or a French. We know it also, perhaps, by peculiarity of the style of the type, or paper, or minor distinctions, independently of a different symbolical character. At the proper distance any one of these may be read. Removed farther from the eye—and we need not go very far for the effect,—a book in our own language is not legible, but nevertheless it is neither Greek, nor Arabic, nor Persian to us. Nay, it might be still either French or Latin, or a book of any other language usually printed in the ordinary English type.

Perhaps, although we might not be able well to read the words, the letters at this stage, particularly those near the margins, might be so defined that we could recognize a book printed in France, by its peculiar type: and probably at the same distance we could well distinguish the Greek from the Arabic, and even the stiffer Arabic from the more graceful Persian; or all foreign types from the English, even to the length of saying correctly of the same sized page, "That is a Persian, that an Arabic, that "a Hebrew book," although not one word of either language could be read.

Not far off, within a few feet from the eye, the books, though still recognized by the eye as books, would lose their distinctive character as books of any particular language: and all alike would be "Greek" to the bishop; until brought back to the eye, when he would be able to read and understand the subject, wherever the language was familiar to him.

Now, we wish our readers who desire to argue the matter philosophically, not metaphysically, to apply the foregoing to what we said about the orange and St. Paul's and the *argumentum ad absurdum*, a few pages back. We were not, we "calculate,"—to use an Americanism,—very far out, when we said, that St. Paul's had lost its identity, and, philosophically speaking, was no longer St. Paul's, but a "system of points," at a mile off. We will now ask the reader to go a little farther with us in the same train of reasoning.

The casual reader may laugh at us when we say that nobody has ever seen St. Panl's; that is, if the "church yard" has never been larger than

at present. A man may have been in it, around it, on the top of it, in all parts of it; have admired it, here and there and in every part, but yet never may have *seen St. Paul's*. He may see it, as a sculptor, in its monuments and decorations—as an architect he may admire this or that portion or proportion; but he cannot see through bricks and mortar; he cannot see St. Paul's cathedral:—the houses block up the view of the monument of Sir Christopher Wren.

We may read the highly honorable and suitable legend,

"Lector! si monumentum quæris, circumspice!" We may cast our eyes up to the stupendous dome, but our imagination is first fixed on the grandeur of the structure, not on its proportions; peradventure it is contrasted with the few feet of earth which enshroud the remains of the great architect; and the thought brings with it the appropriate reflections on the nothingness of the dust, and the value at which we should prize the cultivation of the immortal part of man;—for time even, and for our fellow creatures, but far above all, for eternity!

All these considerations suit the place and subject; but they are dissipated when we pass the door:—then, if England would do honor to the man and to the architect, we should not look on shops and stores and warehouses, so close at hand;—then, we believe it to be the fact, and it is a grievous one, that the monument of Sir Christopher Wren is no longer seen.

We once heard of somebody, who, not very expert in the rules of perspective, contrived to get into his picture three sides of a square building, and was puzzled where to put the fourth, when a friend suggested that he had better "put it on top of it." We do not allude, in the foregoing remarks, to seeing *through* St. Paul's, and accomplishing the view of all four sides at once;—nor even to the obstacle which one part of this most magnificent structure opposes to the view of another. Nay, we know that we may get a front view, rather imperfect, descending Ludgate Hill: but unless we can get a clear view of a building, whether a direct or a side view, from a distance at which the eye can compass the whole at one glance, we cannot be said actually to *see the building*—to see it as Sir Christopher Wren would have delighted to see this work, his monument. We may see *parts* in their integrity, as parts, but we cannot, we imagine, see *a building in its integrity*, unless the eye be removed to a distance equal to the extent of the object. We hope that we have practical grounds for assuming—the point in which the illustration meets our arguments—that the effect cannot take place nearer to the eye than the length presented to it for its observation, when the angle subtended *to the eye* from the building would, we shall show, if our diagrams do not "break down," *be less than that drawn on the ground from the building to the feet of the observer*.

We have seen that we lose sight of the orange; that the distinctive character of the symbols used in the different languages is lost in a few feet; that, at that distance, the most we can say is that the books are books. There will consequently, we hope, be no difficulty in satisfying the reader, that although, if we could see St. Paul's from the proper distance, we might arrive at the architect's idea of the symmetry of the work, and its accuracy in character, as in its proportions, we nevertheless must lose the identity of particular parts. If we wanted to admire the cathedral, we should take our station much farther off than we can, entombed as it is;—if we wanted to see the ornamental work about it, we must come nearer. Whether, then, we peruse a book or a great work of architecture, the capacity of the eye is less the greater the distance: and we contend further that *the nearer the eye the greater the capacity of an*

object interposed to intercept the view of another at a distance: and that, for two reasons,—viz. not only as regards the advantage derived from its own propinquity, but as regards, also, the diminution which the object intercepted would undergo by removal from the place where the other objeet intercepts. One only, nay, neither of these effects. is represented in astronomical diagrams of eclipses: we contend that *both* occur in all those physical problems; and, therefore, that not only as regards the attributed distances or sizes of the celestial bodies intrinsically, but relatively as to their capacity for eclipsing each other, science has gone wrong.

We have shown that, according to the astronomer, both the sun and the moon represent the 30 feet exactly, not the two feet of the tunnel.

Philosophy represents the sun no smaller *in proportion* than the moon, the moon no larger *in proportion* than the sun, notwithstanding the vast distance between them and from our earth: it divides for its purpose both disks into " digits" when one eclipses the other; and as both have nearly the same angular measurement, digit eclipses digit with exquisite regularity; showing how exactly alike the two *appear in size,* and how beautifully 883,000 is reducible to fit 2160. But is this sound and philosophical? How comes the moon, how the sun, to retain unimpaired its angular measurement?

If it does not, like Mr. Green's balloon go out of sight, it has no tendency to go out of sight. If we desired to explain to a child, how Mr. Green's balloon goes out of sight, we should suggest that an extinguisher would better convey to him the idea than any object now within our reach; we should say " It goes out of sight, tapering off like that ex-" tinguisher," and with our last reminiscence of the Table Mountain and adjacent line of coast, should be inclined to add, that reason would " put " an extinguisher" on an object only 2,160 miles in diameter 240,000 miles off. " But no!" says astronomy, " That will never do. Extinguish the " moon, indeed! Take a round ruler, or a parallel ruler well stretched; " that will give your child a better notion how Mr. Green's balloon goes " out of sight;—and, *if not of that,* of the manner in which we remove " the moon from the eye, and fix it in space 240,000 miles off." Now we hold to the extinguisher. Reader! which is right?

We argue, therefore, that *ab initio,* these diagrams cannot be right: the moon is wrongly introduced. Philosophy *turns the extinguisher the wrong way:* the representation of the moon's course, as it is removed to be placed in the diagram, should at least taper off towards the apex of a cone: the representation as it stands would make the moon spring up in space, and not acquire its natural size, till the end of its journey. The representation shows the ultimate effect of such a movement: that effect being the effect of removal of the object, which ought, as all other objects, to diminish in apparent size and consequently ought not to be represented as seen from where it is, but where it appears to be. The astronomer's diagram would carry Mr. Green's balloon out of sight in parallel lines; and would resuscitate it when out of sight; and, if between us and the sun it ought *then* to eclipse it, as our small gold pin can nearer the eye; i. e. if the moon can eclipse the sun to the *full extent* of its digits or diameter, as drawn on a diagram, in space.

In describing Mr. Green's ascent, or the moon's removal, we ought to draw concentric circles diminishing in size at every step, till, in the first case, we get the speck, and then lose it. In the latter case, the astronomer looks " continually" through a circle of the same size; or he draws two lines parallel to each other, reckoning, as he cuts these with perpendiculars step by step, and obtains a less angle at every step, that by lessening the angle he *lessens the object,* whereas the object loses nothing.

The sun in like manner, we contend, would lose not only in removal as far as the moon; but as from thence he would continue to undergo greater and greater diminution, *till he reached his ninety-four millions, seven hundred and sixty thousand miles farther*, the moon's capacity for eclipsing the sun would be infinitely greater than it could, if both could keep their integrity in space, as represented on the diagrams of the astronomer.

Our objections are now fairly before the world. We owe some apology perhaps, for our presumption, in our comparative, and in some cases, absolute ignorance, beyond points of immediate investigation, of some of the sciences involved, for applying the tactics of a General Gough to an essay in philosophy.

We shall, therefore, conclude with a few passing explanations, relating the manner in which we have been led to the course which we now pursue. We did not *volunteer* for the forlorn hope; we are rather driven to it as the best position. This will show how our natural modesty overcame us, and stood in our way, on other occasions.

Like many other dabblers in physics, we early entertained shemes of abundant advantage from new discoveries; but, until lately, these notions were entirely practical. In Calcutta, about the year 1833 or 1834, having occasion for filtration with rapidity, and on a large scale, we remembered a machine which we had seen at a gunmaker's shop there, for forcing water, by means of simple pressure applied to the valve of a forcing pump, through a filtering medium. This was elaborate, slow, and much too expensive for our purpose. We thought of the atmospheric filter, now generally known; applied the mouth with a quill and a leather valve, to a Lipscombe's machine, and established the soundness of the notion. This filter was not patented, we believe, till some years after; we wrote home from India about it at the time, but could not accomplish our purpose of bringing it into notice. Our schemes for the application of it were very comprehensive. Amongst others we offered to purify the whole of the salt consumed in Bengal. The late Lord William Bentinck honored us with an interview, and spoke favourably to us of the scheme generally, though he did not enquire into the means, which we represented to him as a new discovery, and which were certainly "original" with us. Those who know that the salt is all made in pans by ebullition and evaporation, will not doubt the feasibility of the scheme, great as its compass was, when told that we found a strong brine passed clear through eighteen inches of a filtering medium of mixed charcoal and sand, and of these in alternate layers, without any great exhaustion from underneath; and the process was adapted to be used with large vats instead of small pans, and a strong instead of a weak solution. Considerations connected with the state of the monopoly were favorable at the time; but innovation was not in the end deemed advisable; and a supposed preference of the natives of dirty salt to clean, especially as salt is sometimes cleaned with bullock's blood, was also urged against the adoption of the plan; but if there be any merit or credit,—and we do not see why there should be, in the mere fact of being the first discoverer of a new thing, where the discovery of the one is apart from that of the other,—we may, perhaps, justly lay claim to the invention of the atmospheric filter. We allude to the circumstance, because it was our introduction to the consideration and investigation of atmospheric forces.

We had, at this time, a scheme in mind for the rapid transmission of letters, and looked to no difficulties from ascending hills; we had notions too of an atmospheric railway, before we heard of one; but, of course, the main credit of that discovery rests with him who contrived the air-tight valve, which we thought an insuperable difficulty.

At one time we had a scheme for facilitating locomotion, at a *vast saving of fuel and its stowage.* This was condemned by Major Forbes, in Calcutta, as "introducing friction-creating masses between power and "effect." This was about 1833, perhaps; we need not be "particular in "dates." We bowed to "authority," and thought little about this affair, until our notions revived and improvements occurred to us, from seeing what was going on around us, after our return to England. Conversing on such matters, a friend told us of a little locomotive which he had seen, "*which went against all the books.*" This was encouraging. The machinery described seemed to correspond very much in principle with that on which we had consulted Major Forbes; and we had already written many pages in defence of our notions regarding the working of a modified machinery, finding ourselves at issue, at every step, with the three treatises of the "Useful Knowledge Society," on hydrostatics, hydraulics, and pneumatics. The early portion of our papers we read to a scientific lecturer; to whose opinion, concurring with our own, we naturally attached, and independently of that consideration, do attach, a high value. He pronounced much of what we had written "altogether philosophical," which first gave us the notion of the use of the word in the sense in which it has been uniformly applied in these pages. In a letter, already noticed, which we were authorized, by this gentleman, to communicate to Sir Robert Peel and to the Chairman of the Court of Directors of the East India Company, he expressed himself "greatly pleased" with our "Theory of Atmospheric "Forces;" and expressed his "firm conviction of the importance of giving" our "Theories," generally, "a more defined and experimental character."

We have been told that we "talked of Captain Warner and blowing up "ships," as a reason for shutting us up the longer amongst madmen, and under locks and keys, if not for sending us there. We did this. We have not changed our opinion about that matter. Those who choose may ridicule, jeer, taunt us about believing what nobody believes; they may *think us* mad about that, if they please; *but we will thank them to stop there!* Our purposes were not Captain Warner's; we may surely come to a determination, if we know any thing about such a matter—regarding which, philosophy and the world is mightily indignant, because most exquisitely puzzled,—to have nothing to do with it. We may honor and admire Lord Ingestre, and may think Captain Warner to have been too much encouraged, unless it had been determined to deal more generously with him, and give him better facilities for the trial of his "long range" than a "cutter five miles off," especially with our notions of the manner in which objects lose by distance, and yet not be set down as a lunatic, and our imprisonment lengthened on that score.

Our purposes were more pacific. We had a scheme, amongst others, for extensive irrigation in India. We thought of it before we went last into madhouses; we thought of it there at times, we think quite as well of it still. This project we mentioned in confidence to the gentleman of whom we have just spoken; he thought well of it; but, if he did not, we did, foresee some such hitches in the way of our schemes, as experimenters in the steaming and the railway line had met with before us. We knew that public bodies could not be moved, without "scientific" opinions, to any great scheme; and as philosophers have not yet explained how locomotives contrive to overcome Professor Whewell's "friction," and go the pace they accomplish, against all rule and a philosophical resistance as strong as ever, we thought it better to search for ourselves than to submit our scheme to others. The deeper we dived, the more encouragement we found; and the more and more were we convinced of the hindrances

resulting from dependance upon prevailing views and opinions in these matters.

We may, however, have shot too far a-head for the gentleman to whom we have referred, his other occupations precluded his co-operation, or we may have offended. We never heard a word from him *against*, much *in concurrence with*, our peculiar notions; indeed, in the first few sentences which we interchanged, he caught our idea, the basis of our generalisations, and followed it up *quite in our own way*.

We returned with renewed confidence to our investigations, and argued our objections with two friends, separately. Both were Newtonians of course; and both assisted us to a greater insight into a system of which we knew very little; but arguments on the working of this or that valve or piston soon penetrate into the higher regions of physical discussion. Both these gentlemen argued with a patience and attention for which we shall always feel grateful; both well understood their subject. We found no flaw in their arguments, when we consulted books, except in minor matters, for the two did not altogether agree. The results were different. In the one case we could not make ourselves understood; notwithstanding all our pains-taking and all our hearer's patience. So high is our opiniou of this gentleman's knowledge, that we should have been content to stop there, *if we had not understood him*. The other did understand us; but, holding to accepted notions, he pronounced us wrong; yet even he has told us, whether in joke or earnest, that we always seemed "to fall upon "our legs." But we never argued for argument's sake; instruction, information, *conviction* was our object; we got the two first, but our friends never accomplished the last.

We afterwards had the opportunity of communication with two gentlemen, well versed in the operations of the system as it is supposed to work. We drew up another paper in which we explained, or endeavoured to explain, our views, rather on the physical than on the mechanical tack, and we were led in the ardour of, what we thought, new discovery, to vaporize and fly off, continually, at a tangent to the periphery of our arguments. The end—the consequence too, of this, and of diagrams, and of the want of opportunity for personal explanation, was an intimation that the debate was not as to whether we were right but as to what we meant; but, at the same time, these gentlemen did not arrive at any fact or phenomenon which was not to be explained on the received principles of mathematical science.

This was discouraging, but not conclusive. We were only in the position in which we had found ourselves before, with the friend whom we understood, but whom we could not make to understand us: with all we had argued without ocular demonstration of experiments.

We left what was speculative, and confined our reply to what was tangible. We asked explanation of an experiment in which we held that we had shown, that a power philosophically fifteen, overcame powers philosophically fifty-eight; we admit, but for a moment. Yet, although the *materiel* of the experiment returns to a philosophical *status*, we argue, that that the effect of the moment, is an effect *to be accounted for*. We had suggested, that we had arguments against a "momentum;" we were met by the explanation, that the effect was that of "impulse."

An illustration was given to us of a ship passing through the water; it appeared to us, and still appears to us, that the application of the illustration to the experiment, made the ship create the gale of wind, and always shoot a-head of it.

We took other opinions on this matter. A friend concurred entirely with the explanation of these gentlemen, but considered that they were

wrong in the illustration, which did not apply to the matter in hand; they should have said nothing about the ship.

The accuracy of our experiments being called into question, the *minutiæ of calculations* were declined; but we argue that the defectiveness of our apparatus must necessarily have operated against us, not for us.

Our experiment was referred to a stranger at a distance. His reply was to the effect that we were wrong: that fifteen did not overcome fifty-eight, but *forty-three!* There we had something tangible. We incline still to the fifty-eight. But let it be forty-three, and we ask how, philosophically, fifteen can overcome forty-three, *even for a moment?* This gentleman's opinion, if we can remember rightly, was against the ship and an impulse; his solution was a "momentum."

But, to say that it is an "impulse," to say that it is a "momentum," appears to us to be "the ladies reason" still; and not to go one whit beyond the fact itself; namely, that fifteen overcomes forty-three, or fifteen overcomes fifty-eight, "because it is" so, "because it does."

Through all our endeavours to come at a right understanding of our subject, we have been grievously deficient of the means of practical experiment. We have wanted the most common materials of the philosopher. Astronomically the best instrument we have had has been a six pen'orth or two of the telescope on the beach at Brighton. We have a moderately good balance, which we have had made after a fashion of our own, with which we have arrived at some curious questions in the matter of gravitation and the lever, the result of which, we hope, to perfect hereafter. We have neither an air pump, nor a condenser, nor a good galvanic battery; with these, we believe that we should have gone very far a-head of our present position. But, as we have said, we cannot hear a scientific lecture, and see such instruments used, without finding the lecturer hit our peculiar notions; and when he has hit our mark, declaring that he *misses his own,* and is content with relative explanations, instead of palpable conclusions.

We have read Maclaurin, and the later editions of Encyclopædias. These do not lead us to think, that anything materially new has sprung up in the definition of the principles of things since Newton wrote. Every effect is attributed to those unexplained causes, which we have investigated in our first chapter, and all effects are, of course, adjusted to them; but, wherever practice shows philosophical principles to be unsound, philosophy, if it has attempted to account, stops short, hitherto, in accounting for her mistakes. Where have we seen the reason *why* a heavy train can start upwards on an inclined plane without an "impulse," or even go (and there has been time to account for this last) fifteen, thirty, or one hundred miles an hour against a resistance of the atmosphere, which prevails, philosophically, as strong as ever? Yet, philosophy is dogmatical. As late as August, 1844, we were told, on the Brighton Rail, that the most eminent men had declared, that no projectile could be carried five miles against this resistance of the atmosphere. Dr. Lardner has given in his "ultimum," from which we have extracted on our title page: but, with all the dignity of the public man, who, like other public men, is liable to error, he succumbs under this admission, *plus* the Ossa on Pelion of sundry tons of coals.

Rightly or wrongly, we hope that we have shown that we can reason; and, if Dr. Lardner and philosophers take privilege to err, surely, under the preterpluparticularly grievous burthen which we now bear — that of leaving the inheritance of a madman in the world's opinion, to a growing family, unless we enter the lists of philosophy, we may venture to assert our claim to public commiseration; and to public protection, in the first privilege of an Englishman, that of expressing and publishing his own thoughts unmolested.

It would be idle to suppose, that, if we be right in objection, this work will not make a stir in the world; though, the end may be to establish it on its foundations, on a firmer, and we hope, a more scriptural basis. We shall be happy indeed, to find coadjutors; and will give what leisure we can command, to obtain practical information, and to communicate any new notions, if we have any, for improvement, in the hands of others who take an interest in the matter.

We are above—Warner-proof against ridicule. We can give and take an honest joke in good humour; but the ridicule that avoids argument, with which we hope that we are not chargeable, will be wasted, and fall harmless.

We have a glorious task, if our objections be sound, and the train of our ideas be setting in a right track.

We once began a more sententious and prosy essay, of which we might have calculated that the public would hardly have got over the initiatory passages in the following terms:—

After alluding to Moore and his Fadladeen, we wrote:—

"But in the more sober labors of physical research, it is imperative upon an author to criticise his own work rather in the closet, than on the arena; especially if he attempt to strike out any new road, or to pursue one step farther any path already trodden in the world of science. He must not spare pains in the investigation and generalisation of his ideas; he must scrutinize his own views assiduously; place his every argument in every possible light; dive into all his facts, each under every possible phase of which patient study appears to render it susceptible; he must arrange his facts, all, in their bearings together, and towards each other; he must attack every position of his own, with the unflinching perseverance with which it is his duty to canvass the *dogmata* of others, before he rejects them; and, when he has done all this, or, at all events, when he has taken a wide range in the process of generalisation, and the fabric stands the test:—then, and not till then, will he be justified in bringing his notions before the public."

Reader,—philosopher or no philosopher,—would you rather have hobbled on with us in this jog trot way? And have you not been better pleased to travel at our railway—*but not heedless*—pace, in the curricle of philosophy and a locomotive of our own.

We have sought opinions of philosophers privately—found courtesy from the many, a rebuff from one. Earls of Bridgewater do not discover themselves every day; and philosophical douceurs are oftener available to a succeeding than a present generation. In the prosy passage which we have just cited, we have shown at all events that we know our duty to the public. We have not found a hitch in our arguments, after careful deliberation;—we would not publish if we had. Those who will take the pains to understand us will, we feel assured, find reason to question the present state of things.

It is curious, that, whilst our work is at the printer's, a fact should occur which shows that we have had some inkling of the opinions of our neighbours, and have not been arguing altogether hoodwinked with new notions of our own. We confess, however, that we were not aware that the four asteroids were supposed to be four quarters of a split planet, and were unprepared for a *new notion* in the scientific world; viz. that this *old notion* of theirs must be a mistake, and that the planet was split into *five* parts, not *four*, and the fifth has now turned up.*

* "If then the new planet be one of the Asteroids hitherto undiscovered, a fifth fragment of the exploded planet, its distance and periodical time must be the same." *G. W. H., who dates from Sandhurst, in the Times.* If this be

We remember that Astræa fled trembling at the Progress of the Iron Age, and we suppose the planet must have been split about that period —long, long before Ovid wrote, and two chapters, a long and a short one, before Deucalion's Flood. It is just as well that Astræa should come back again; her re-appearance is a happy omen, when we reflect that good Old England in the wisdom of the nineteenth century holds to many an absurd custom in her legal halls; where a judge compels a man, whether he will or not, though probably on the verge of eternity, to tell a falsehood, before he will put him upon his trial. Let him plead the truth, "guilty," and then recal his plea, the investigation proceeds; the evidence, with or without his own, may be sufficient to carry moral conviction of his guilt to every one in court; but if there be a legal flaw or insufficient legal evidence, twelve men may next be called upon to perjure themselves because the judge will take no other verdict than "not guilty." Of course the judges are legally right; but we imagine the illegally convicted and legally rescued murderer would be let loose upon society. Perhaps not; but the lying part of the process is curious. The civil law is equally curious—a jury sits and determines a case after a "careful and conscientious consideration." The judge, after a long legal roundaboutation, gives a decision, "the plain English of which is, that "he ordered the clerk to record a verdict for the defendant, although the "foreman declared it was for the plaintiff."* Exquisitely legal, no doubt, but of questionable justice in the eyes of the jury.

We were once asked if we had ever seen a plaint in an English lawsuit; and were told it was a tissue of falsehoods from first to last; and we understand that the commonest transfer of property cannot be perpetrated without a falsehood on the face of the document; "a nominal "consideration;" the interchange of five shillings which never passes. It is well that Astræa is on the way back to us: Can there be some tractant attraction in some of these recent law acts, wiser than their predecessors, which have brought her within hail of us again?

But although we did not contemplate the upturning of an Astræa Rediviva, showing the integrity (5-5ths) of an "exploded planet," shattered into five "fragments," *until a sixth shall turn up*, the other limb of one of the notions of the day was hit within a few millions of miles—a mere trifle—at page 48 of the present work: viz. that Saturn was the *hop*, Uranus the *step*, and Astræa, if not the fifth of a split planet, *is* the *jump* beyond, and a "spick and span" new planet, 3,686,000,000 miles from the Sun!

"Bode's Law" beats us by just 86 millions of miles.† We remember having suggested the idea of splitting a pea, or using a split pea at the end of a row of peas, instead of .5 dec, or a diagram; but can assure the reader that we are not conscious of having pirated the illustration from any preinfused,—and certainly it was not any preconceived, impression that there was a split planet in the firmament.

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sound, the philosophisation of the explosion of a planet must be a curious process into which we purpose to inquire one of these days. As G. W. H. is not certain of his mark, he will allow us to be puzzled to make out how five-fifths of a planet contrive to travel in the same orbit as the entire planet before "the explosion;" and how all five, *pendente lite*, like a company of sharpshooters preparing for retreat, or Plato's youth again, contrive never to "deviate "from the line."

* One of the jury.—Times, 31 Dec. 1845.

† "If, however, it be not one of the asteroids, then probably it is a planet beyond Herschell; and if so, according to Bode's Law, it is probably not less than 3,686,000,000 miles off."—G. W. H. in the Times.

If we can compass anything worth knowing, or write any thing worth reading, we hope that our friends and the public will not be backward to encourage, from any *fear of overworking us.** Next to protection of ourselves, wife and children, the furtherance of our inquiries, through their favor will be our best and most salutary reward. We may or may not interlace our next or other publications on matters of science, with reminiscences of the madhouse; we have, however, much worth communicating, in the way of suggestion, after five months of better opportunity, than is at the command of the "doctors" and "authorities," of seeing the working of the present system. They see with their backs turned;—we have seen with our eyes open: and with every disposition, in these matters as well as in philosophy, to view things in all their phases, we can assure the public that we have written with the firm conviction of the solemn duty of truthfulness in the face of an Almighty God; and that we are not conscious of having set one word down in malice or exaggeration. The intrusion of our private affairs upon the public in a work of this nature, may, by some, nay, by many be deemed imprudent and unwise;—we have learned better wisdom in the school of bitter experience.†

If we can benefit our fellow creatures by turning the attention of those in power to a state of things which requires great amelioration, we are above the morbid feeling of shame, because we are poor and have been shut up by others who seem to have no more compunction at depriving people of their liberty, when they are a little medically puzzled, than the doctors in Calcutta at sending their patients off to sea: the mad-house in England, the Sand-heads in India:—"a living death"† in the one case—a cure in the other. It is too bad that this state of things in England is becoming so common.

"Every undue flight of fancy," we are told, "must be checked in the "bud"‡ by discharged patients of the New Bethlehem Hospital; which is "good authority" for those circumstanced as we unhappily are. If we are guilty of "undue" flights of fancy in thinking it possible that the followers of Newton, rather than Newton himself are wrong, what a deal the world would have lost, had we followed *medical advice*, should our arguments turn out sound in the end!

Upon the best authority in Europe—wise enough to let us in entirely on the opinion of others, without allowing us opportunity to say a word—we cannot believe ourselves capable of having written these pages without some capacity of understanding others, and connecting ideas of our own. But for considerations of misery entailed on our wife and children, we could have argued as carefully in Bedlam.

"No opinion," we are told by the same authority, "must be entertained,

* We wrote to a friend the other day as follows:

"I may never convince you and others that over-work never affected my mind at all: and this is no small addition to the present heavy burthen which it is left to me to bear. But if you cannot believe me, though I would not deceive you by the profession of *knowing* what I have any doubt about, I can only find refuge in the consolation, that, if my faculties did not sink under the discipline of a forced cheerfulness in a depth of misery such as, I hesitate not to say, you, who have never felt it, cannot appreciate, there can be no risk, whilst health of body continues through God's mercy to be vouchsafed to me, in encountering any mental exertion whatever."

† *Cavendo tutus* is an old maxim. But it was written of Lord John Russell the other day, (See R. Fellowes, to the Examiner,) that "there are times when temerity is safety, and then to dare is to be wise."

‡ See Times Editorial in the Appendix.

" unless it be well considered, and ascertained to be founded on truth." Why, Newton told all the world that his system had no solid foundation,—philosophically solid we mean,—and we are inclined to think, from stray passages which we have turned up here and there, regarding discoveries which he had made and noted, that he knew he was but *on the search for one.*

Is this medical injunction then to shut out thought? What a damper would such an injunction have been to all the philosophers who have lived since Newton's time; and have been building upon attraction of gravitation, a universal law of gravitation, central forces, incessant action, continual action, equal action and reaction and " or nearly so" powers, " somehow" brought into action and " any how" accounted for; depending upon these where the great master found no resting place.

We cannot close this pamphlet without introducing a remark in connection with that *inexplicable* " simple idea or notion received by the " senses," which we call " motion."

Alluding to a theory of the Rev. Wm. Jones, in his " First Principles of Natural Philosophy," to which we have frequently referred, the author of the article in the Encyclopædia Britannica writes as follows:—

" That the motion of the heavenly bodies should result from the per-
" petual agency of such a medium appears to us a much more rational
" hypothesis, than that which makes them act upon each other, at im-
" mense distances, through empty space."*

This at least gives us the impression, that, to the writer of this passage the Newtonian theory, if it be the Newtonian theory after all, *is not as rational as it might be;* and that the structure of a system upon what Newton deemed imperfect, may have been an " undue flight of fancy," on the part of some of his successors; who if they have not misrepresented him, have misunderstood him and misled others.

We will add two passages which bear out these last assertions or suggestions, and which, coupled with others already cited, have induced the heading of our title-page.

" Sir Isaac Newton observing that a thermometer suspended *in vacuo,*
" and in that state removed to a warm or cold room, receives the heat or
" cold, rises or falls, almost as soon as another in open air, takes thence
" occasion to suspect, that the heat of the warm room is conveyed through
" the vacuum by the vibrations of a much subtiler medium than air,
" which remained in the vacuum after the air was drawn out."

" Sir Isaac Newton was of opinion that the ultimate particles of cer-
" tain bodies attract each other with a certain UNKNOWN but *enormous*
" force."†

These, we imagine, were amongst the difficulties with which Newton contended in labouring " to reduce gravity to some higher law and the " forces of other physical operations to an analogy with those of " gravity."‡ And they appear to us serious difficulties in the way of the system as now generally understood and accepted. Having hit upon these matters *in fact,* before we lighted upon the passages which we have just cited, we are strongly tempted to enlarge upon them, but we finish, as we began, with the determination to eschew theory to the last.

* Enc. Brit. Article Motion. † Enc. Brit. Article Chemistry.
‡ Professor Whewell, page 341, quoted at p. 2.

APPENDIX.

We entertained, till very recently, some distant hope that the necessity for our preface might be avoided; that we might have found protection, or even some assurance of it, without intruding our private affairs, at all events so prominently, upon the public notice. But, if not grievously disappointed, we have been most fully certified, that, in taking advice and being silent, three years ago, we neglected an absolute duty, and have subjected a wife to a cruel persecution.

We are far from desirous of avoiding the discussion of many very unaccountable points connected with our own very curious case; unaccountable, like most other things, until explained; but more simple than the parties concerned may suppose, after explanation. We shall, however, confine ourselves to a few recent facts and comments.

We sought explanation,—mind, reader,—not of the fact of a wife having been removed, *not* of ourselves having been removed, to a mad-house: those were after-considerations to be dealt with when another fact was accounted for.

We asked explanation of the simple fact of a wife having been taken away from home to a mad-house, a distance of half a mile, in a cab or fly, *between two men, without a relation, a friend, or even a female to protect her.* The first indication of brutality, the hand thrust at an eye-glass (which was tucked into her bosom), with the insolent question, What have you got there? was checked by one of those solemn appeals, before which the most abandoned tremble; the shield of an Almighty Protector was thrown over a weak female, bereft of all other help; and no further insult was offered.

Not to harrow up the feelings of our readers, as we might, with details of the horrors which she afterwards underwent, shut up with the most abandoned of her sex, in language, if not in character; buffeted without offence, chained and forcibly drugged, and brought into a very dangerous state of health,—we confined our enquiries to the simple circumstances of her removal. We were told, in reply, that "permission to act" for our "benefit" was "asked" of her, and "by her refused;" and that "the "consequence of her refusal was the assumption of power (the only legal "one) by the local authorities; and their officer acted under their own "medical adviser."

Others, we are told, were "thus left without influence."

This was to end the explanation where it should have begun. We repeated the call for *explanation of the circumstances* of a wife's removal.

We asked, "was protection (obviously necessary) offered? If not, why "not?" "Was it prohibited?"—and we sought the co-operation of the party addressed, "cordially and zealously," "not to avenge, but to ex-"pose the perpetrators of so gross an outrage."

In rejoinder we are told that "every thing was done for the benefit of ourselves, "wife and children."

This, if we have, or ever had, a shadow of ratiocination about us, is to tell us, not only that what's done cannot be undone; but, that the best was done, and would under the recurrence of such circumstances,—which God in his mercy, through our Saviour Jesus Christ forbid!—be done again.

"The subject," we are told, "is of too painful a nature to recur to." We think it of too painful a nature, too serious in its features and its threatenings, to allow it to drop, with such an explanation.

We can imagine some difficulty as regarded ourselves; difficulties which we may one day explain: but as regards our wife, the proceeding was monstrous. She was forcibly removed from her home, *in the act of writing a letter to a friend.* Whether the local authorities were "Parish" or "Police," the crime of removal, the crime of the manner of removal, the crime of assault in process of removal are the same: we had been safely housed and chained, both hands and feet, at the time the removal took place.*

If "Parish," why? Our income is not large, but it is respectable. If our debts are burthensome, our creditors, all heavy ones amongst the rich, are kind and generous in the extreme; and we will be bold to say, that tradesmen would have allowed credit to double the amount of their small bills to keep her out of a mad-house.

If "Police," why? She was not inclined to make—she made no disturbance. On both occasions of her removal from home she was, on the best evidence which we can get, so thoroughly cool and collected as not to afford the merest pretence for violence towards her. She was in condition, on this last occasion, according to one medical opinion on the spot, at all events, to *allow another to act* for our benefit; "permission" was "by her refused." And why? Because she knew that her husband had borne up for ten days perseveringly, under most trying circumstances to the feelings, and with little rest; and she knew that nought but rest was wanting, and that his eccentricities were as likely to be the effect of drugs, and the fear of the mad-house, as of excitement. She desired the medical gentleman who attended the family to get a keeper, if necessary, explaining that there were ample means in the house to pay the expense; and she had coolly and deliberately protested at our bedside, where we were quiet at the time, against our removal.

This, we are bold to say, was a sensible and proper course, and *the only legal one*, for the parties concerned to pursue: unless whilst the great may, in their drunken fits, deal destruction on all sides, and be let off with a fine, or allowed to "speak to" a broken-headed police-officer, a supposed madman of the middle classes is to be dealt with vindictively—*summa auctoritatis injuria*—the extreme vengeance of a parish doctor; and consigned to the *ultimum supplicium* of chains and bolts and bars without trying what rest could do; *and what rest did.* We woke, as it were, from the influence, no doubt, of opium or its extracts, which a natural flow of spirits had at first overcome, when the cab stopped at the mad-house; and we were determinedly passive, cool and collected, when we put to the keeper the question, the reply to which was a broken head.†

The medical attendant of the family had left our wife, she expected, to do as she desired. Three medical men we suppose laid their heads together; it appears one head, of which we shall presently speak, acted; and *against* the only legal power, (common sense tells us that it was the only legal power which was set at nought) we were removed: and then, the legal power must be put out of the way—as she had been three years before, for refusing to sign certificates—to give a shadow of legality to the double infraction of the liberty of the subject.

In the matter, as it regards ourselves, we would find all the excuses

* See the Preface. † Ibid.

that we can; and they are many. As regards our poor wife, the proceeding of the parish authorities has been cruel, heartless, and brutal.

Of the local medical authority, who, we are told, "assumed" the power in this pitiable case, and committed our wife to the brutality of the two men, we shall take privilege as a husband to say thus much, We well remember this man, and whilst he thought us out of our senses, we "marked him well," and had we the limner's art, could draw his picture "to a hair."

The fault we should say is in those who could select such a man for such an office; a man who could bestow such exquisite pains upon the cultivation of the exterior of his own head, to exercise any authority, even to pass an opinion, in matters which concern the interior of other peoples! If ever vacuity decorated* indicated incapacity for judging of the sanity of another, that was a head to meet the *beau ideal* of such incapacity. But we should not have expected, even under the direction of such a head, so gross an outrage. The punishment might perhaps be too severe, if the "*effigies*" could be placed between the two noted statues of Roubillac of Raving and Melancholy Madness, as that of a man, not exactly beside himself, but beside all others—a "rara avis," a being of a *genus* undefined; human without the final *e*. This must be the characteristic, if he plead *negligence* as an excuse; if he avow *purpose*, we want not the final *e*, and must put an *in* before the designation of the animal. May these remarks lead him to consult his proper feelings, instead of his gait and his looking-glass; we shall then have done him a service in return for a grievous injury, and our end would be answered. If not, we are told he was the responsible party: there are secretaries of state, there are commissioners in lunacy, there are poor-law commissioners, boards of guardians, *cum totis aliis:* such conduct ought not to escape their enquiry and their censure; and such measures as will ensure kindness instead of brutality, even to the poorest of her majesty's subjects.

Freed from the chains and from some of the effects of drugs, we desired to be removed home. With determination, but without resistance when opposed, *further than to compel a legal assault*, we laid our hand upon the door of our prison, from which we were to be removed to another, professing our readiness to walk home unassisted. The medical man of the mad-house laid hands on and prevented us: and we were forcibly, but without resistance, conveyed to the public establishment. Remonstrance was useless; resistance would have been madness. Everything indicated the utmost composure, unless perhaps a quickness of speaking, partly produced by the difficulty of articulation, owing to the soreness of the mouth, arising from the drugs which had been administered, and from which we did not entirely recover for weeks.

In the establishment or institution to which we were removed, we know of no shadow of excuse for our admission or detention; our protest is *in limine;* but our objections are against a system generally, rather than against the men who work it: like all other divided responsibilities it works ill. The institution of our domicile was a world out of a world; and in a volume we could not set down material points of observation, which we still bear in mind, of high interest to the philanthropist; to every man whose pleasure it would be to heal the broken-hearted, to let the oppressed go free and to break every unnecessary yoke.

Our protest is, under the circumstances of admission without examination and detention under all sorts of misrepresentations when in, altogether against any incarceration at all, in that place. In the first months

* Nigræ simillimum cauliforæ.

we had to undergo the usual discipline of succumbing without murmur to be answered every question with insolence, and denied every simple request, even when asking for our own property; the refusal being given in the same temper and spirit. But after a time we generally experienced kindness and commiseration—never as regarded the "state of our mind," for in that sense there was nothing to commiserate,—but, as regarded the course pursued towards us; compassion for our misery under the cruel separation which we had to undergo from a persevering and affectionate wife and family. We felt, grievously, the bitterness of absence from a sick child; and had all along the sympathy of many of our companions in misery, who had hearts better attuned to compassion, though certificated as madmen, than those who presumed to shut us out from our family and our duties; increasing heavy incumbrances, which we have borne without undue care; and have hitherto striven against with perseverance, though but partial success.

We remember the following story. Our readers will wonder how it can be relevant, but we have an end to answer in inserting it.

An officer of a ship in the Port of Calcutta, some years ago, received from a solicitor of that place, a letter to the following purport; an ordinary lawyer's letter.

Mr. Richard Love,
Sir,

Ramtoon, sircar,* has put into my hands a demand against you for 153 rupees; and I trust that you will save all further trouble by sending the amount forthwith, to

Your obedient servant,
JAMES FORBES,
Attorney at law.

The attorney was surprised by the following reply. We are sorry we cannot give it entire, owing to the phraseology here and there.

"Mr. Lawyer, I've receiv'd your chit,†
And really, sir, 'tis most extremely odd,
That you to me in such a style have writ,
* * * * *
I wish both style and subject had been better,
The most disgusting that I ever saw:—
I thought myself above your lawyer's letter;
Indeed above the letter of the law.
Ramtoon I take to be an arrant knave;
You are, I hope, a very honest man;
And will, no doubt, all further trouble save,
By straight adopting this my gen'rous plan.
At present being rather short of pelf,
And this a joyous season through the nation,‡
I beg you'll just discharge the debt yourself;
I shall esteem it, sir, an obligation.
But if, attorney-like, you this refuse,
And to my *modest* wish averse should prove,—
(Here follows an anathema upon the lawyer in the event of refusal.)

* A sircar is a native servant who attends ships; keeping the accounts and lending money occasionally to the officers and others.

† Letter; the native term. ‡ Christmas, or some season of public rejoicing.

For money, Sir, I'll try a gen'rous friend;
And in the course of a short week or two,
You may rely, I shall the needful send,
And faithfully discharge the debt that's due.
And now, James Forbes, my tight, my honest lad,
This chit must from your breast all doubts remove,
At present I have nothing more to add,
But am,
Your humble servant,
RICHARD LOVE.

Now, the story runs that the lawyer was highly pleased with this reply; that he did advance the money, invited the gentleman to his house and his parties, made much of him, and was honestly repaid.

Now, what has all this to do with what we have been writing about?

Though we read in our cell the story of Peter Williamson, who successfully prosecuted the authorities of Glasgow, and got damages, [which may be some small encouragement to a sane man, shut up *ad libitum*] we should find it difficult, we fear, to go to law effectually as a pauper, though we have, in our legal duality as man and wife been separated, and jointly and separately, and effectually *shut up as one*. But as the generous lawyer advanced money to the defendant in the suit, we would suggest that the Committee who held us in thrall, at the latter end of our imprisonment, in defiance of the "best medical advice in Europe," [*which we know on the word of one of the best medical advisers himself*] would do well to act a generous part, and advance us money to prosecute themselves;* aye, and the medical Parish, and Police authorities too; whose conduct was as unaccountable as ever ours had been in our most unaccountable moments.

We will take upon ourselves to assert, that, if we had time and money, we could obtain, what Captain Smyth, a philosopher, whom we have so often quoted, would call "no common unit" of damages; and out of the amount we would faithfully and satisfactorily repay the advance.

We say satisfactorily, for it would, in the end, be satisfactory, or ought to be satisfactory to all parties; for them to pay and us to receive. But it would, above all, be satisfactory, as bringing helps and remedies to those who bear, and bear in terror, unnecessary hardships, cruelty, and distress. It would open the eyes of highly responsible men to the manner in which their responsibility is shifted from link to link, till the chain galls bitterly—chains of the mind as well as chains of the body—where there should be no chain at all.

We will undertake to show that authorities, medical and non-medical, have been deluded, if they have not fallen naturally, as a matter of course, into delusions themselves. Practised in the art of treating all alike, and receiving it as an axiom in mad-doctoring that a man certificated must be insane, and can know nothing of himself, we commend to their attention the remarks of "the Times," on the poor girl Donovan's case, which we reprint in this Appendix.

Now, if what we propose could be done; or if, instead of trying the matter in a court of law, it could be done "*in foro conscientiæ*;" if we could examine all the individuals comprehended in this "divided respon-
"sibility," of which we speak, one by one, and kept apart at the time of giving evidence and during the discussion—all parties upon whose testimony we have been confined being at hand; we would put one or other into the box from the highest to the lowest; we would give them all pos-

* We would dispense with the receiving us [back] into their house and making much of us any more.

sible opportunity of concocting their evidence, some true and some false* so that there were no intercommunication when once given; and the whole process is such a system of gross absurdity, and such ridiculous mummery, that we are confident the public would be more astonished at the exhibition of it, even than they will have been at finding the "Newtonian Theory" assailed, and assailed we think on sound and sufficient grounds, by one not yet six months out of mad-houses, after five months' incarceration.

In order, however, to the better understanding of the question between "the doctors" and "authorities" at our last domicile and ourselves, we take the liberty of intruding upon the public, a document or two, in addition to the desultory remarks which we have introduced here and there, in the course of our Preface and Essay.

On the morning after our admission, which took place on the 14th of March last, we asked for a sheet of paper, and penned the following, which was written off hand—duly delivered to "the authorities," sent by them not to our beloved wife, but to another party, and by that party retained from and refused to her throughout the period of our imprisonment. We shall take the liberty of adding a note or two; but as it is of too much importance that in such a case we should neither deceive our readers nor be deceived ourselves, the letter itself is entire, barring names, which it is unnccessary to introduce.

No. 1.

"Saturday morning, 15th March, 1845.

My best beloved ———,

Be cheerful till we meet, which I trust through the blessing of our God and Saviour, may not be long. I know not how long I may have to write, so will hasten on and get as much as I can into the sheet, and satisfy you and my precious bairns that there is no fear, either for the head or heart of your fond and attached William. How I write at all is the most curious part of the business; for I have got the queerest pen that ever man wrote with; and I hope that I may be able to show it to you. I hope soon to account for the curious proceedings that have occurred since I saw you last; and I told you that I had determined to strive for us all, honestly and honorably, if Mr. ——— would let me have the room—den, as I called it, you know why—in King William Street. There I was determined, not to defy others, but to strive as well as a poor man might for a competence, and whatever God in his great goodness and mercy might see fit to bestow. It is cold, love, (and my fingers are cold,) but I shall have time to write. As to the last week's proceedings, all I will now say is, that this is a palace to a prison, in comparison with the place which I have left. If Lord Ashley wishes to serve the insane, the best way to do it would be to level to the dust every private mad-house in the country. ——— was bad enough, but that at ——— is a fearful place indeed! But enough of that. Other times and places may serve for explaining all this, both to you and to others, if ever my advice, opinion, or practical suggestions, should be sought in this matter. All I will now say about that, is, that if you have a few shillings left at your own disposal, I beg that you will write a post letter to "———, keeper at Mr. "———," and ask him to call at 5, Grove Terrace, as soon as you can provide a good plain plum cake for him, and another for "——— "———." Into one of them put half-a-crown, and tell him,(———)†,

* We write every word of this deliberately and without excitement.

† The man to whom we owed a broken head, and by whom we were put in fetters to account for it: but he was kind afterwards. We remembered and forgave him. Perhaps the rule's as good as "forget," till something goes wrong, "and forgive" till then. "To forgive" is not always to overlook and neglect

to tell the truth about scars on the forehead; and if ——— gave him the half-crown, as I requested yesterday, in the cab, he will give the other out of the cake to ———. If not, and he got less or more, tell ——— that if he got less or nothing, I hope he will divide the half-crown with ————, and if there is enough in store to enable you to do all this, let us trust in God's blessing that we shall never want; and send to these two men three each of good coloured cotton handkerchiefs.

Now, as to our affairs. The ———— will, I hope, give you what money you want. I shall, as I intended to do, as soon as I could find time, request them to take up Bushby's case, and to give me some consideration for the ——— statements, which Mr. ——— promised to bring before the ————, when I hoped that, instead of about £33 or £35, which was cut, but *not* improperly cut, out of my salary-bills or warrants, about three years ago, they would have granted me, perhaps, a little more, or £50, for hard work, when I was very ill, and they were pressed for a parliamentary return. You know all about this. Rather than throw a poor man on the world pennyless, the ——— would, I think, look into the " Bushby affair," and, though late, come to a creditable decision in a case of official injury and hardship, which I believe was never reported to them at all, so as to attract attention at the ————. It is not now too late to do right; nor is it an improper request to make, when I am here, and you, I know not where. But though I have had two or three different accounts of my family from those who, I cannot but fear, know but one, I cannot be certain as to the true one. But let that pass. You can send the ———— an extract from this letter, of the parts concerning them. How " the book" has told for or against me in making out the warrants I know not; but soon, on the application which you can tear off from this sheet, they will, I hope, pay you my last quarter's salary; unless I draw it myself at their treasury. I will beg —— to act as my attorney, to save you the trouble, and all other worries attending your doing this yourself. I will ask him to call on you with it; when — tell him to give my kindest regard to all friends there, —— every one; there is not one but feels concerned for, and respects my principles in this matter. I am grieved for the position in which I have placed myself with Mr. ——— and Mr. ———. If they and Mr. ——— forgive the stir this business has created, I am satisfied indeed. Enough of this, at present. I must tell you of a few wants. But now let me tell you that my *real* impression is that you have not been at all removed from home; that you have been trusting in God for your William's deliverance; that Mr. ——— has given me credit to enable you to have the broken windows* repaired, and that I shall, through God's blessing, soon see you again.

But I want, love, a pair of warm drawers, half a dozen cotton handkerchiefs, a tooth-brush, and some charcoal. This place is vastly improved, and they have a library, CARDS, bagatelle, and many other accommodations, such as mugs instead of wooden bowls, &c. They have the Encyclopædia Londinensis, and some very good books; but the library hours are rather short. With them there is the advantage of comfortable

one who has done us an injury when the opportunity offers, *under whatever circumstances*, of doing him an act of kindness. Acts of kindness, like other facts, have many phases; caution is necessary in applying the rule.

* Under the " *suggestionem insanitatis*," and when nearly exhausted for want of rest, we smashed some windows of our own, which we knew were cracked, hoping to bring about us some neighbours who would show some commiseration, and protect us. We remembered at the time that a careless servant had cracked these by setting a blind on fire, at a long passage window, a long time before.

fires and flued rooms; and you can accommodate yourself to any temperature. Altogether, love, I trust that (as I am now well, and have got over all mischievous effects of the pernicious stuff which was forced down my throat at Mr. ————, by the orders of a "surgeon," who told Dr. ————, that I had been five days there) I may soon be permitted to return to you; at all events you can write to, and I hope see me, and perhaps Mrs. ——— may contrive for my seeing the bairns too.

Remember me very kindly to all friends. Ask ——— for the last £3. 10s. (I do not remember getting it) and there is also a small dividend at the bank which you can call for, or Mr. ———; and you can get money from him, if not from the ————, though it will not last long. If I stay here, I should like to have the memorandum book I bought from Mr. ———. I will not ask for any thing more at present, except one pound or two pounds of good Manilla segars, and a few ounces of tobacco, for smoking; a carraway loaf of your own making, or a plum cake; not that I think I shall be hungry; but I should like to eat when I want to eat, and to give away a bit to one or two lads here, who have obliged me with a cup of tea, out of their own: if it is necessary to pay for this, kindly send the needful, as soon as possible, to the gentleman who manages here: but you may leave this; I dare say he will do me the favour to order it for me without, when this is read, and payment can be made by and bye.

And now, love, may our good and merciful God bless you and our beloved bairns, and speedily reunite us. My poor Susy, what a night she had, and you all!!! But when we meet, we may one day, and that soon I hope, laugh* over the scenes I have gone through, [even with Mrs. ——— at our table, and her son] since the day when I went to ———— instead of ————; and though you thought I was going to ———— or ————, we had both forgotten ———— was on the way to the latter place. Again, my own ——, God bless you!

Your own WILLIAM.

Mr. Peters respectfully presents his compliments to Mr. ———, and begs that he will allow or obtain a ———— order for the last quarter's, or rather the current quarter's warrant in his name, to be given to Mr. ——, and made payable to him, if Mr. —— will kindly pay the money to Mrs. Peters, which Mr. Peters feels assured that he will oblige him by doing.

——, —— 15th March, 1845.

PS. My loved one, I am now comparatively happy.† I see you have the management at home. I have just got the things, combs, slippers, and the dressing-gown, which I shall adopt, and set my coat aside for the present. Send, however, love, the warm drawers, and a pair of braces. Let Willie buy me a good pair at ——'s, not coloured, with rollers (as young Mr. —— knows I like) of the best kind, and add to my other requisitions a small basket of oranges, for my mouth has been in a sad state from the drugs I got at ————. It is nearly well,§ so do not worry yourself a moment about my health.

This will of course be read; and if I am to stay here till another Com-

* This may seem strange, but by the exercise of good humour, we thought there might be a possibility of satisfying people that we contemplated no injury to any body. If any amongst the crowd who entered into our good humour, and laughed at our jokes, in the midst of our tribulation, were alarmed or afraid of us, we wonder why, and are heartily sorry for their mistake.

† Seeing small articles which she had ordered for us, and having been told that it was but for a short time, we were thankful to get these things, and took courage.

§ The soreness of the mouth lasted much longer than we expected.

mittee can let me out, and may not flit out as easily as I flitted in, I should like to have my new writing-book, (the foolscap one, with lock and key, I mean), and some pens, as well as the memorandum-book, if I am to stay here till it is discovered that I am able to manage my own affairs. There are lots of books in the library, and I shall be glad to make the best use of them; and they will not, I dare say, allow notes in books here, any more than at the —— ——

I find I have no handkerchiefs. Mind, I want, love, half a dozen for myself, (not that I have a cold, but may catch one) besides the three each for the men at ————'s.

Let Willie take this letter to ——. I could not get a sheet more paper here, I fear, to write.

You may send a plum cake here too, as well as the caraway cake, the tobacco, and segars. I came in very unwell in some respects, from soreness of my mouth and want of rest, and have found friends here already. I slept soundly last night.

Kiss the bairns again and again for me. You may as well show this letter to Mr. ——, for it will look queerer still to send the strip at the end, only, to him; or better still either send it enclosed to Mr. —— or send Willie with it to him, and ask —— in a note, to show the whole or part of it to Mr. ———.

Send me, love, four more towels."

This letter was of course sent through the authorities; for no letter can be sent sealed, even from a husband to a wife: but having been very unnecessarily made public by them, we give it word for word, and ask all the world if it was not a cruel thing to keep this letter, in which to this hour we cannot trace a shadow of insanity, from a wife who, *certificated as we were*, might,—but she knew her husband too well,—have been persuaded that his mind was unsound. It was imprudent, perhaps, to send for so much of tobacco and segars; but we were not aware of the price, (we were mad enough not to know the price of tobacco: was that it?) and thought that it was but about a third of what it is. The mention of the cakes may seem trifling; but bread is not allowed; and though we did not know that we should soon suffer from very want of food, we were one amongst upwards of a hundred, many of whom never had any *delicacy* beyond the homely fare of the establishment. *We never smoke;* but the quantity of tobacco for which we sent would have been a fortune to us, for the purchase of acts of kindness and even of food. Starvation may be salutary for madmen, but it is "sharp practice" *in the treatment of the sane under a mistake.** We are as fastidious as most of our neighbours as to cleanliness in eating and drinking. Some might never touch bread in Bengal, after seeing the baker kneading the dough; but we did eat bread there, with or without thinking of the baker;—still we have known what it is to beg a bone, thoroughly picked with a bone fork, that we might gnaw off the gristle; and literally to gather up a few crumbs off the keeper's table, from sheer want and hunger; and this in one of the best regulated establishments in Europe. When our poor wife did get other letters, and did send us some home-made buns, and oranges and apples, they were kept for weeks, and we had to learn that buns, literally hard as stone, and musty rotten fruit and radishes in a state of incipient decay, were *then* in a proper state of decomposition, and of preparation for our eating, and that of the poor fellows with whom we were associated.

We may be blamed for publishing the private or official matter contained in this letter, even in its asterisks; *but concern for the family de-*

* See the italics which we have introduced into the extract from the Times. Page 96.

pendant on us outweighs all personal considerations whatsoever. A word left out might, with the ungenerous, be suspected of insanity.

We remember to have read of the most melancholy suicide of a medical gentleman in Calcutta, who shot himself in the most determined manner, after deliberately, *for his family's sake,* writing a forcible protest against a coroner's verdict of insanity! We hope in other ways to protect ours from the delusions of "the faculty," and from any such imputation;* and friends or foes, if we have any, need not be backward in asking for explanation of any of our acts, or thoughts, however extraordinary, out of consideration for ourselves. Let them speak out, and we will answer. We do not *explain* unasked, on account of other feelings than our own. We bless God as we write, that we never entertained either the temerity in His presence, or the cowardice in the face of man, to contemplate suicide.

Our long letter, which we have just printed, was written on the 15th of March, the day next after our admission. We were *released on the 25th July.*

On the 6th of June, 1845, we addressed the following letter to the Coroner.†

No. 2.

"To T. Wakley, Esq., Coroner for Middlesex.

Sir,

An extract from ————, of the ———, which I have just given to ————, came under my notice on Monday or Tuesday last: it relates to the case of the poor boy, regarding whose death you have lately held an inquest. I was in Mr. ———— asylum, ————, during part of the week ending ————, and removed hither on the 14th, if I remember rightly. I was in hopes of waiting on you personally to-morrow, after my discharge, but I am still a patient in ————. I was in the same room with the boy, or one answering the description of the lad on whom the inquest was held; and may be able, if my evidence be available, to give you or any other authority to whom you may refer this letter, a clue to particulars which may not have transpired: and I have other particulars concerning the case, which I am desirous of communicating to you, or to such other authority as soon as possible.

Mr. ———, who will of course peruse this letter, will, I trust, forward it by the first post to its address.

I have the honour to be, Sir,

Your obedient servant,

WILLIAM PETERS,

Of No. 5, Grove Terrace, New Peckham.

Now an inmate of ———, on leave of absence from the ———, where I am on the books as ——."

We were conscious that the "*Habeas Corpus ad testificandum*" might be suspended in our case, but we might have directed the Coroner or other authority to *other* evidence worth having. An excellent friend of ours will remember, as he reads this, the circumstance of a stylish butler, or *khansaman,* telling, in a fit of delirium, where his fellow-servant had locked up

* To show how far this notion goes, an aged relative has been asked whether there was not, some time or other, something the matter with a gentleman whose sister married, if we are right, a son of our mother's second cousin. This is, we think, the degree of relationship, and we never heard of the gentleman being even "queer."

† See one of the notes to the Preface.

something. "He put it there," was repeated continually, in the native language of India, till it was thought worth while to look; and a dozen of Madeira, *minus* one bottle only, was upturned. It might have been worth while to ask a question of a man who was in the habit of reading, playing chess, and showing no symptom of insanity whatever; but the letter written on legitimate paper regularly obtained, was never sent to the Coroner.

We now give, as apposite, in explanation of our feelings on the "*suggestio "insanitatis,*" whilst we were performing our office duties to the last, the promised extract* from the Times of the 27th of December last.

No. 3.

"A case, which is reported under the head of 'Police,' in our paper of yesterday, presents a frightful picture of the facility with which a poor person may be transferred from the union workhouse to an asylum for lunatics. Considering the horror that is naturally felt at the idea of dooming one who is sane to the companionship of those who are bereft of intellect, the step ought assuredly not to be taken except upon the most thorough conviction of the insanity of the individual whom it is proposed to place in a madhouse. To be, while in possession of one's own faculties, immured among those who are bereft of reason, and to be treated like them, it is no exaggeration to say must be almost literally a living death. Constant association with the insane, as one of themselves, must have an effect on the strongest intellect; and that it is almost certain to terminate in the insanity of a person not previously affected by the disease, is a truth so generally admitted, that the assertion of it amounts to common place.

"It will be seen, by referring to the report in our yesterday's paper, that a young woman only nineteen years of age, was brought before the magistrate at Worship Street, that his authority might be obtained to transfer her from the Whitechapel Union to the Lunatic Asylum at Hanwell. These matters are usually very briefly disposed of in the ordinary routine. The magistrate sees that the provisions of the act are complied with by the production of the necessary certificates in the usual form, the order is made out, and away to the madhouse the alleged lunatic goes. In the case, however, which has suggested these remarks, the manner of the unhappy creature before him happened to attract the magistrate's attention, and he was induced to put a few questions to her, all of which were answered in the most sensible manner. There was, of course, considerable earnestness in the tone of the alleged lunatic, who was very naturally labouring under great excitement. But which of us would not be earnest and excited if placed in a similar position? Already had the necessary certificates been prepared, and there seemed nothing to be done but that the magistrate should give his formal sanction to the incarceration of the wretched creature in a madhouse, when she makes one more desperate effort to assert her sanity. By her earnestness she succeeds in convincing some, at least, of her hearers that she was being needlessly consigned to the most horrible fate, and she is sent back to the union whence she had been brought. The poor thing, however, seemed to regard the workhouse with hardly less horror than that with which she recoiled from the lunatic asylum, and we do not wonder at the dread she felt of being taken again to the union." †

"What authority there may be for placing alleged lunatics in shackles and chains, we are not aware. If the practice has the sanction of the Poor

* See Page 82.

† We have left out a portion of the Editorial explained by Mr. Hughes.

Law Commissioners, we presume we must not ask whether there is any act of Parliament to warrant such a barbarous practice. Mr. Broughton, the magistrate, said, very properly, 'This is the first time a supposed lunatic was ever brought before me in fetters, and I sincerely hope that it will be the last.' We commend the whole of his conduct on this occasion, for had it not been that he somewhat stepped out of the ordinary course prescribed to him by the act of Parliament, the poor creature brought before him must have gone at once to the asylum as a confirmed lunatic. Mr. Broughton, however, thought and thought very justly, that a mere certificate from 'a medical man' who has had one opportunity only of examining an alleged lunatic, is not sufficient, unsupported by other testimony, to warrant the conclusion that the person to whom the certificate refers is insane. The diseases of the mind are the most subtle and delicate of all, requiring the greatest discrimination and accuracy of judgment to draw the line between temporary excitement or delusion and a state of confirmed lunacy, which is the state at which the patient must have arrived before he can be legally imprisoned in a lunatic asylum. *Some of the ablest physicians, and men who have devoted themselves constantly to the pathology of the human mind, are sometimes deceived;* and it is not to be expected that a medical practitioner happening to live in the neighbourhood of a workhouse, who has had little or no experience in cases of the kind, should be competent to give an opinion that may doom a fellow-creature to imprisonment in a madhouse for the remainder of his days. In civil cases (if we may use the distinction), where the management of property is the chief question at issue, the lunacy of an individual is never decreed until after the most patient and deliberate inquiry, aided by the personal examination of the alleged lunatic by the judges who are about to decide. Surely there should be at least as much precaution taken in a matter where the liberty, the happiness, and perhaps eventually the sanity, of the individual are at stake. A commission of lunacy is cautious and deliberate in its proceedings, but a pauper may be examined by a medical man, chained up, carried before a magistrate, and confined in a madhouse, without manifesting any greater signs of insanity than such as powerful excitement would be very likely to produce."

We commend to the serious attention of our readers the account of this poor girl's case, in the Worship Street report in the Times of the 26th of December, and again in that of the 5th of January last. We do not wonder at the general impression that the poor girl is mad—was mad. But all have not had—God be praised! may those say that have not had—the experience of these cases, which, in our duality, we have had—and compassion for the poor girl induces us to offer a few remarks on the case to our readers. They must be brief. We would republish the whole case, but we feel assured the benevolent Mr. Broughton will not overlook the poor girl in her distress: if her reason survive, it will be owing to a surviving ray of hope from his kind aid; and her trust in God is a surer stay than most who deal with lunatics imagine. We know this experimentally.

" Rich and rare were the gems she wore,
" And a snow-white wand in her hand she bore."

She brought over from Ireland, industry, diligence, RELIGION, PURITY.

" Mother! she had no mother—no, she was dead; and the only father " she had left was the Father of all—the great God above!"

She was earning nine shillings or ten shillings per week. The tailor, Donovan, was surprised, and well he might be, to hear that she had been " accused" of being mad.

A man sent her " a filthy paper," she " resented the insult," and the people " annoyed her" with " silly superstitions" to " frighten" her.

Asked how insulted, she replied, " trying to evade it, ' Insult? why, the " grossest possible insult,' and covered her face with both her hands."

She is accused of being mad, taken to the workhouse, the *suggestio insanitatis* does its work, and, last of horrors, she is certificated—it is said, for life!

Now, we will close our remarks by simply asking, Was a period of ten days time to recover from all this? Watched by "workhouse authorities," be they the kindest in the world, " police," the most benevolent; and, above all, however benevolent, still, we add, by the doctor who had certificated her! Let men exercise their reason,—and we would ask those who value the reason of a fellow-creature, as God's best gift to man,—and we ask it soberly, not to excite a laugh,—let the medical man be the kindest in the world,—Would it not be as prudent to put a red hot poker to a barrel of gunpowder, as to bring the man who had, rightly or wrongly, we care not which, passed his certificate of insanity, into the presence of a poor girl thus circumstanced?

Let the reader remember too,—we write without the most distant imputation on Mr. Bingham or others—that she looked for Mr. Broughton on the bench, and found a stranger there!

Would the poor girl have frightened Donovan and his family? attacked the cat? broke the poker? or done fifty extraordinary things, *twelve days before?*—or before her honor, and IF HONOR BE NOT HERE, WHERE IS IT? was assailed?

Another question may be asked—Had she any medicine? Morphine, perhaps. We know something of its effects, and may one day offer a few suggestions upon extracts from drugs, pernicious enough, but which may be salutary to some in themselves. The goat crops hemlock, and the milk is good. Let the chemist extract the " Novercæine" and the "viscerescha- " rotine," or whatever he may please to call them, and he might kill the goat who takes the extract, or child that tastes the milk. We may be mistaken in our analogies, but after experience of mischief, close bordering we think upon death, about four years ago, we feel ourselves warranted in offering the suggestion, that morphine, as we had it, is poison, not medicine; and we think we detected physic this time in a bit of a pork pie, administered when *writhing* under the " *suggestionem insanitatis,*" and when we asked for something else.

The reader may perhaps ask after all, How we came to get into a madhouse? It would be too long to tell what we did—a very long story—but we may hint at what we did not, by way of illustration. We did not, with a full purse, nor even a title, sally forth to attack police, or other men, on the Queen's highway. We did not, inflamed with liquor, and habituated to such scenes, trust to a giant's strength, or a double-headed " life pre- " server," to turn it as a last resort to the opposite purpose—depending, after " manly" attack and " manly" resistance, upon paying our way out. We did not, like " medical students,"* sally forth to attack, instead of men, street lamps, and wrench off knockers, and then hide in holes and corners, and, if that would not do, plead drunkenness in excuse—but we did under the effect of the *suggestio insanitatis*, or of drugs, many curious things—nearly every one of which we remember well, and its object; and it would be a curious book were we to write all down. But as all these were somewhat foreign to the usual " even tenor of our way," we would suggest to all the world, medical and non-medical, that it would at least have shown common sense to ask us for explanation, who were best able to afford it;

* We suppose all who once " pass" are qualified to " certificate" their neighbours.

and not cast a deaf ear, or talk on to others, whilst we were attempting to account for what might be curious, but was not insane.

We close our book with thanksgiving to the great God, who has sustained us through no common misery. We carried a cheerful countenance throughout, when at length assured, under our dear wife's own hand, of her life and liberty. But we did not conceal from the "medical authorities" that it was a bitter trial to "carry a cheerful countenance over a heavy heart." Our most trying minutes (for we dared not seek the solace of our own grief in our misery) were on our knees at our bedside at night; then, we are not ashamed to write it, the tears would gush in torrents to our eyes; —the heart, sick with hope deferred, would seem near breaking;—but still we felt a responsibility as we prayed for strength and manliness to control our feelings, and seeing that we were acquiring knowledge from day to day, which might one day be serviceable to our fellow-creatures,—or even to one amongst them—we could add to our prayer for release, these words —IN THINE OWN GOOD TIME O LORD! AMEN.