CONVERSATIONS

ON THE

Plurality of Worlds.

BY

BERNARD DE FONTENELLE,

Author of Dialogues of the Dead, &c.

WITH

NOTES,

BY J. DE LA LANDE,

Senior Director of the Observatory at Paris;

AND

A Memoir of the Author's Life and Writings,

BY M. DE VOLTAIRE.

TRANSLATED FROM A LATE PARIS EDITION.

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Bernard Bouvier de Fontenelle, born at Rouen in 1658, may be considered as the most universal genius that the age of Louis XIV. has produced. He may be compared to those lands which are so happily situated as to be able to produce all kinds of fruit. He was scarcely twenty years old, when he wrote the greatest part of the tragic opera of Bellerophon, and afterwards composed the opera of Thetis and Peleus, in which he emulated Quinault, and which met with great success. That of Æneas and Lavinia was not so well received. He once tried his powers in tragedy, and assisted Mademoiselle Bernard in some of her pieces. He wrote two himself, one of which was performed in 1680, but he never printed it. He was a long time reproached with this neglect, but
unjustly; for he had the good sense to discover, that however extensive his genius might be, he possessed not the talent for Tragedy, by which Peter Corneille, his uncle, was distinguished. In 1686 he wrote the allegory of *Mero and Encgu*, by which he meant Rome and Geneva. This pleasantry, too well known, joined to the *History of the Oracles*, raised a persecution against him. He afterwards sustained another, though not so dangerous, as it was only a literary one, for having declared that in many points, the moderns excelled the ancients. Racine and Boileau, who, though they had an interest in Fontenelle's assertion, affected to despise it, excluded him from the Academy for a long time. They wrote epigrams against him, which he replied to in the same way, and they continued ever after his enemies. He wrote many light pieces, in which, however, are discernible that depth and acuteness which discover a man to be superior to his writings. In his verses, and his *Dialogues of the Dead*, the spirit of Voiture is discernible, but more extensive and philosophic. His *Plurality of Worlds* is a work singular in its kind, his design in which was, to present that part of philosophy to view in a gay and pleasing dress; for which purpose he has introduced a lady, and drawn up the whole in a most
agreeable as well as instructing dialogue. In the same manner he made an entertaining book out of "Vandale's Oracles." The delicate subjects touched upon in this book raised him up some violent enemies, whose malice, however, he had the good fortune to escape. He found how dangerous it is to be in the right, in matters where men in power are in the wrong. He turned his studies toward geometry and natural philosophy, with the same ease that he had cultivated the belles lettres; and being chosen perpetual secretary to the Academy of Sciences, he acted above forty years in this employ, with universal applause. His History of the Academy often threw a striking light upon the most obscure memoirs. He was the first who introduced elegance into the sciences; and if sometimes he happened to ornament them too much, it was because his stile resembled those luxuriant harvests, where flowers spring naturally amidst the corn. His History of the Academy of Sciences, would have proved as useful as it is well written, if it had been employed in giving an account of the truths discovered; but it explains the opinions that were combated against each other; the greatest part of which has been long since refuted. The eulogiums he spoke upon the Academicians who died, possess the singular merit of
rendering the sciences themselves more respectable, and their author also. In vain did the Abbe Des Fountaines, and others of the same class, attempt to obscure his fame. It is the common fate of great men to have despicable enemies. If he published, late in life, some indifferent comedies, and a defence of the vortices of Des Cartes, one may pardon the first on account of his old age, and excuse the latter from the consideration of the prejudices of his youth, when such opinions had taken possession of his mind, in common with all the philosophers of Europe. In fine, he was regarded as the first of men, for the uncommon art of diffusing a lustre and grace over the abstract sciences; and he had great merit also, in all the other kinds of literature he engaged in. All these talents were sustained by a perfect knowledge in languages and history, and he was certainly superior to all the genuises of his time, who possessed not the merit of invention. His History of the Oracles, which is only an abridgement, executed with discretion and moderation, of the great history of Vandalia, drew upon him enemies more violent than Racine or Boileau. Some Jesuits, who had compiled the lives of the saints, and who had the true spirit of compilers, wrote in their manner against the rational opinions of Vandalia and Fontenelle. The
philosopher of Paris made no reply; but his friend, the learned Basnage, a philosopher of Holland, answered them, and the compilers' nonsense was no longer read. Many years after this, the Jesuit Tellier, confessor of Louis XIV, that unhappy author of all those disputes which produced so much evil and so much ridicule in France, impeached Fontenelle to Louis XIV as an Atheist, and produced the allegory of Mero and Enegu, before mentioned. Marc-Rene de Paulmi, Marquis of Argenson, then lieutenant of the police, and since keeper of the seals, quashed the prosecution that was stirred up against him; a favour which the philosopher has fully acknowledged, in the eulogy he pronounced upon him in the Academy of Sciences. This anecdote is more curious than all that has been said by the Abbe Trublet about Fontenelle. He died on the 29th of January 1757, at the age of near a hundred.
I find myself nearly in the situation of Cicero, when he undertook to write in his own language on philosophical subjects, that, till then, had never been treated of but in Greek. He tells us that his works were said to be useless, because those who delighted in philosophy, having taken the pains to study the books written in Greek, would not afterwards think of examining his Latin ones, which were not originals; and that persons who had no taste for philosophy, would neither care for the Greek nor the Latin.

To which he answers, that exactly the contrary would happen; that the unlearned would be allured to philosophy by the facility of reading Latin works; and that the well-informed, after studying the Greek authors, would be pleased to see how the subjects were handled in Latin.

Cicero might with propriety speak in this manner; his superior genius and great celebrity assured him success in this untried project, but I have not the same advantages to inspire me with confidence, in a similar undertaking. I was desirous of representing philosophy in a way that was not philosophical! I have attempted to compose a book
that shall neither be too abstruse for the gay, nor too amusive for the learned. But if what was said to Cicero should be repeated to me, I could not venture to answer as he did: possibly in attempting to find a middle way which would accommodate philosophy to every class, I have chosen one that will not be agreeable to any. It is very difficult to maintain a medium, and I think I shall never be inclined to make a second attempt of this nature.

I should warn those that have some knowledge of natural philosophy, that I do not suppose this book capable of giving them any information; it will merely afford them some amusement, by presenting in a lively manner what they have already become acquainted with by dint of study. I would also inform those who are ignorant of these subjects that it has been my design to amuse and instruct them at the same time: the former will counteract my intention if they here expect improvement, and the latter if they only here seek for entertainment.

I need not say that of all philosophical subjects I have chosen that which is most calculated to excite curiosity: surely nothing ought to interest us more than to know how our own world is formed; and whether there be other worlds similar to it, and inhabited in the same way: but let no one be disquieted if unable to answer these enquiries; they who have time to spare may examine each subject; many have it not in their power.

In these Conversations I have represented a woman receiving information on things with which
she was entirely unacquainted. I thought this fiction would enable me to give the subject more ornament, and would encourage the female sex in the pursuit of knowledge, by the example of a woman who though ignorant of the sciences, is capable of understanding all she is told, and arranging in her ideas the worlds and vortices. Why should any woman allow the superiority of this imaginary Marchioness, who only believes what she could not avoid understanding.

'Tis true, she gives some attention to the subject, but what sort of attention is requisite! Not such as will laboriously penetrate into an obscure thing, or a thing that is spoken of in an obscure manner; it is needful only to read with sufficient application to render the ideas familiar. Women may understand this system of philosophy by giving it as much attention as they would bestow on the Princess of Cleves, in order to understand the story and see all the beauties of the work. I do not deny that the ideas contained in this book are less familiar to the generality of females than those in the Princess of Cleves, but they are not more abstruse, and I am convinced that on a second perusal they would be perfectly understood.

As I did not wish to establish an imaginary system that had no foundation, I have employed true philosophical arguments, and as many of them as were necessary to establish my opinions; but fortunately the ideas connected with natural philosophy are in themselves beautiful; and whilst they
satisfy the understanding, give as much pleasure as if formed only to charm the imagination.

To such parts of my subjects as did not possess these beauties I have given extraneous ornaments; Virgil has done this in his Georgics, where he renders a dry subject interesting by frequent and agreeable digressions: Ovid likewise in his Art of Love has pursued the same plan, although the matter of his poem was far more pleasing than any thing he could add to it: he seems to think it tiresome to speak constantly of one subject—even of love. I have more need of embellishments than he, yet I have used them sparingly. I have only given such as the freedom of conversation authorised; I have only placed them in parts that I thought required them; I have inserted most of them in the commencement of the work to accustom the mind by degrees to the objects I wish to present to its attention; in short, I have derived them from my subject, or formed them as much as possible to resemble my subject.

I did not venture to give any opinions on the inhabitants of the different worlds, since they must have been entirely chimerical; I have endeavoured to express all that might reasonably be imagined, and even the conjectures that are added are not without foundation. Truth and fiction are in some measure blended, but always so as to be distinguished from each other: I do not undertake to justify such a composition; the union of philosophy and amusement is the chief aim of this work, but
I know not whether I have adopted the right method.

It only remains for me now to address one class of persons; they are perhaps the most difficult to satisfy, not because my reasoning is inconclusive, but because they feel themselves privileged to disregard the best arguments; I am speaking of scrupulous people who may imagine religion is endangered by placing inhabitants anywhere but on the earth. I respect even an excessive scrupulousness when it arises from piety, nor would I willingly hurt the feelings of any one from whom I differed: but by rectifying a little error of the imagination we shall find that this objection cannot affect my system of giving inhabitants to an infinite number of worlds. When you are told that the moon is peopled, you immediately figure to yourself men like ourselves, and then a variety of theological difficulties occur. The posterity of Adam cannot have colonized the moon; therefore the inhabitants of that planet are not descendants of our first parents; now it would be a difficult point in theology to account for the existence of men who had any other ancestor. No more need be said; every imaginable difficulty is included in this, and the expressions that would be necessary for a more full explanation are too worthy of reverence to be employed in a work containing so little of the serious as this. The objection then turns on the existence of men in the moon, but it is the objectors themselves who talk of men as its inhabitants. I have asserted no such thing: I say there are inhabitants,
and I likewise say they may not at all resemble us. What are they then?—I have never seen them; I do not speak from acquaintance with them.

Do not consider it a subterfuge, to rid myself of the objection, when I affirm that the moon is not peopled by men; you will see that according to the idea I entertain of the endless diversity of the works of nature, it is impossible such beings as we, should be placed there. This opinion is supported throughout the book, and it is an opinion which no philosopher can deny: I think, therefore, on this ground, the following conversations will be objected to only by those who have never read them. But will this consideration suffice to deliver me from the fear of censure? No; it rather gives me cause to apprehend objections from every side.

-FONTENELLE.
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YOU desire me, dear Sir, to give you a particular account of the manner in which my time has been spent whilst at the Marchioness of G——'s* in the country. To obey your injunctions strictly, I shall be obliged to fill a volume, and what is still more formidable, a volume of philosophy.

You expect to be entertained with a history of splendid feasts, hunting and

* The lady here mentioned was Madame de la Mesangire of Rouen. She was a beautiful Brunette; but in compliance with her desire to be concealed, the author has spoken of her in the following pages, as having a fair complexion. The park belonging to her residence is described in the “first evening.”
card-parties; and you will hear of nothing but planets, worlds, and vortices:* for the discussion of these latter subjects formed our principal amusement. Fortunately you are a philosopher, therefore I have the less reason to dread raillery from such a quarter; on the reverse, I may even hope for your congratulations, on having rendered the Marchioness sensible to the charms of philosophy; we could not have made a more valuable acquisition; for youth and beauty, in every cause, holds such power, that if Wisdom herself were desirous of being welcomed by mortals, and would assume the form of this lovely woman, surely with such an

*The Vortices of Descartes occupied the attention of the learned for nearly a century; but his hypothesis was superseded by the discovery of the laws of attraction. Although Newton's famous book on principles was published in 1687, Fontenelle always retained his educational prejudice in favour of the vortices. A few years before his death he consulted me on a little work he had sometime since composed on the subject. I endeavoured to dissuade him from making it public; but Falconet was afterwards weak enough to do so. The book is intitled, "Theory of the Cartesian Vortices, with Reflections on attraction." The author's name was never affixed to the work.
exterior, and such fascinating eloquence, she could not fail to attract every heart.

Notwithstanding all this, you must not expect to be transported with admiration, whilst I repeat the conversations I have held with her ladyship: my genius should be equal with her's to relate what she said, in her own delightful manner. Conscious of inability, I must relinquish the attempt, and leave you to discern through the recital, that rapidity of apprehension, which characterizes the mind of the Marchioness. From the wonderful quickness with which she comprehends the most abstruse subjects, I consider her already learned: at least I may be allowed to say, that after a little study, she might attain the heights of science; when many who spend their lives amid the dull disputes of vast libraries remain for ever in the deepest ignorance.

Before I recount our various conversations, perhaps you expect some description of their scene; some picture of the romantic country, under whose shades the Marchioness is enjoying the autumn. If so, you will be disappointed: so many
people have exercised their talents on this gay species of writing, that I shall dispense with the ceremony; and merely say, that on my arrival I had the pleasure of finding myself the only visitor.

The two first days were passed in relating the news of Paris, which I had just quitted. When that subject was exhausted, an evening walk in the park suggested the discussion of these learned topics, the commencement of which you will find in the next page.
That the Earth is a Planet, which turns on itself, and round the Sun.

One evening, after supper, we went to take a turn in the park: the air, from the heat of the preceding day, was extremely refreshing; the moon about an hour high, and her lustre, between the trees, made a most agreeable mixture of light and shade; the stars were arrayed in all their glory, and not a cloud appeared throughout the hemisphere. I was musing on this awful prospect—but who can long contemplate on the moon or stars in the company of a pretty woman? I am much mistaken if that is a time for contemplation. Well, Madam, says I, to the Marchioness, is not the
night as pleasant as the day? The day, replied she, like a fair beauty is clear and dazzling; but the night, like a brown one, more soft and moving. You are generous, Madam, answered I, to prefer the brown, who have all the charms that belong to the fair: but is there anything more beautiful in nature than the day? the heroines of romances are generally fair; and that beauty must be perfect, which has all the advantages of imagination. Tell me not, says she, of perfect beauty; nothing can be so that is not moving: but since you talk of romances, why do lovers in their songs and elegies address themselves to the night? It is the night, Madam, replied I, that crowns their joys, and therefore deserves their thanks. But it is the night, answered she, that hears their complaints, and how comes it to pass the day is so little trusted with their secrets? I confess, Madam, says I, the night has somewhat a more melancholy air than the day; we fancy the stars march more silently than the sun, and our thoughts wander with the
more liberty whilst we think all the world
at rest but ourselves; besides, the day is
more uniform; we see nothing but the
sun, and one light in the firmament;
whilst the night shews us variety of ob-
jects, and gives us ten thousand stars,
which inspire us with as many pleasant
ideas. She replied, what you say is true;
I love the stars; there is somewhat
charming in them, I could almost be an-
gry with the sun for effacing them. And
I cannot, says I, pardon him, for keep-
ing all those worlds from my sight. What
worlds, says she, looking earnestly upon
me, do you mean?

I beg your pardon, Madam, replied I,
you have put me upon my folly, and I be-
gin to rave. What folly, said she, I disco-
ver none? Alas, answered I, I am asham-
ed, I must own it: I have had a strong
fancy that every star is a world; I will
not swear that it is true, but must think
so, because it is so pleasant to believe it;
It is a fancy come into my head which is
very diverting. If your folly be so di-
vert ing, said the Marchioness, pray make
me sensible of it; provided the pleasure be so great, I will believe as much of the stars as you would have me. I fear, Madam, replied I, it is a diversion you will not relish; it is not like reading one of Moliere's plays; it is a pleasure rather of the fancy than of the judgement. I hope, answered she, you do not think me incapable of it; teach me your stars, I will shew you the contrary. No, no, said I, it shall never be said I was talking philosophy at ten o'clock at night to the most amiable creature in the universe: find your philosophers somewhere else.

But in vain I excused myself: who could resist such charms? I was forced to yield, and yet I knew not where to begin; for to a person who understands nothing of natural philosophy, you must go a great way about to prove that the earth may be a planet, the planets so many earths, and all the stars worlds: however, to give her a general notion of philosophy, I at last resolved on this method. All philosophy, said I, Madam, is founded upon these two propositions,
1st, that we are too short sighted; or, 2d, that we are too curious; for if our eyes were better than they are, we should soon see whether the stars are worlds or not; and if, on the other hand, we were less curious, we should not care whether the stars are worlds or not; which I think is much to the same purpose. But the business is, we have a desire to know more than we see: And again, if we could discern well what we do see, it would be too much known to us; but we see things quite otherwise than they are. So that your true philosopher will not believe what he does see, and is always conjecturing at what he does not, which is a life not much to be envied. Upon this I fancy to myself, that nature very much resembles an opera; where you stand, you do not see the stage as it really is, but as it is placed with advantage, and all the wheels and movements are hid, to make the representation the more agreeable: Nor do you trouble yourself how, or by what means the machines are moved, though certainly an engineer in the
pit is affected with what does not touch you; he is pleased with the motion, and is demonstrating to himself on what it depends, and how it came to pass. This engineer is like a philosopher, though the difficulty be greater on the philosopher's part, the machines of the theatre being nothing so curious as those of nature, who disposes her wheels and springs so out of sight, that we have been long a-guessing at the movement of the universe.

Suppose then the sages to be at an opera, i.e. Pythagoras, Plato, Aristotle, and all the wise men who have made such a noise in the world for these many ages; we will suppose them at the representation of Phæton, where they see the aspiring youth lifted up by the winds, but do not discover the wires by which he mounts, nor know they any thing of what is done behind the scenes. Would you have all these Philosophers own themselves to be stark fools, and confess ingenuously they do not know how it comes to pass? No, no, they are not called wise men for nothing; though, let me tell you, most
of their wisdom depends upon the ignorance of their neighbours. Every man presently gives his opinion, and how improbable soever, there are fools enough of all sorts to believe them: One tells you Phæton is drawn up by a hidden magnetic virtue, no matter where it lies; and perhaps the grave gentleman will take pet if you ask him the question.—Another says, Phæton is composed of certain numbers that make him mount; and after all, the philosopher knows no more of those numbers than a sucking child of algebra. A third tells you, Phæton has a secret love for the top of the theatre, and, like a true lover, cannot be at rest out of his mistress's company, with an hundred such extravagant fancies, that a man must conclude the old sages were very good banterers. But now comes Monsieur Descartes, with some of the moderns, and they tell you Phæton ascends, because a greater weight than he descends, so that now we do not believe a body can move unless it is pushed and forced by another body, and as it
were drawn by cords; so that nothing can rise or fall but by means of a counterpoise: to see nature then, as she really is, one must stand behind the scenes at the opera. I perceive, said the lady, philosophy is now become very mechanical. Yes, Madam, replied I, so mechanical, that I fear we shall quickly be ashamed of it; they will have the world to be like a watch, that is very regular, and depends only upon the just disposition of the several parts of the movement. But pray tell me, Madam, had you not formerly a more sublime idea of the universe? Do not you think then that you honoured it more than it deserved? for most people have the less esteem for it, since they have pretended to know it. I am not of their opinion, said she; I value it the more, since I know it resembles a watch; and the more plain and easy the whole order of nature seems, to me it appears to be the more admirable.

I do not know, answered I, who has inspired you with these solid notions, but I am certain there are few who have them
besides yourself: people generally admire what they do not comprehend; they have a veneration for obscurity, and look upon nature, as a kind of magic, while they do not understand her; and despise below legerdemain, when once they are acquainted with her; but I find you, Madame, so much better disposed, that I have nothing to do but to draw the curtain, and shew you the world. That noble expanse which appears farthest from the earth, where we reside, is called the heavens, that azure firmament, where the stars are fastened like so many nails, and are called fixed, because they seem to have no other motion than that of their horizon, which carries them with itself from east to west. Between the earth and this great vault, as I may call it, hang, at different heights, the sun, and the moon, with the other five stars, Mercury, Venus, Mars, Jupiter, and Saturn, which we call the planets. These planets, not being fastened to the same heaven, and having very unequal motions, have diverse aspects and positions: whereas
the fixed stars, in respect to one another, are always in the same situation: for example, the Chariot, which you see is composed of these seven stars, has been, and ever will be as it now is, though the moon is sometimes nearer to the sun, and sometimes farther from it; and so it is with the rest of the planets. Thus, things appeared to the old Chaldean shepherds, whose great leisure produced these first observations, which have since been the foundation of astronomy; which science had its birth in Chaldea, as geometry sprung from Egypt, where the inundation of the Nile, confounding the bounds of the fields, occasioned their inventing more exact measures to distinguish every one's land from that of his neighbour. So that astronomy was the daughter of idleness, geometry the daughter of interest; and if we did but examine poetry, we should certainly find her the daughter of love.

I am glad, says the lady, I have learned the genealogy of the sciences, and am convinced I must stick to astronomy;
my soul is not mercenary enough for geometry, nor is it tender enough for poetry; but I have as much time to spare as astronomy requires; besides, we are now in the country, and lead a kind of pastoral life, all which suits best with astronomy. Do not deceive yourself, Madam, replied I, it is not a true shepherd's life, to talk of the stars and planets: see if they pass their time so in Astrea. That sort of shepherd's craft, answered she, is too dangerous for me to learn; I love the honest Chaldeans, and you must teach me their rules, if you would have me improve in their science. But let us proceed; when they had placed the heavens in the disposition you tell me, pray, what is the next question? The next, says I, is the disposing the several parts of the universe, which the learned call, making a system. But before I expound the first system, I would have you observe, we are all naturally like the Athenian idiot, who fancied all the ships that came into the Pyreum port, belonged to him; nor is our folly less...
gant; we believe all things in nature designed for our use; and do but ask a philosopher, to what purpose there is that prodigious company of fixed stars, when a far less number would perform the service they do us? he answers coldly, they were made to please our sight. Upon this principle they imagined the earth rested in the centre of the universe, while all the celestial bodies, which were made for it, took the pains to turn round to give light to it. They placed the moon above the earth, Mercury above the moon, after Venus, the sun, Mars, Jupiter, Saturn; above all these they set the heaven of fixed stars; the earth was just in the middle of those circles which contain the planets; and the greater the circles were they were the farther distant from the earth, and by consequence the farthest planets took up the most time in finishing their course; which in effect is true. But why, says the Marchioness, interrupting me, do you dislike this system? It seems to me very clear and intelligible. However, replied I, Madam, I will make
it plainer; for should I give it you as it came from Ptolemy, its author, or some others who have since studied it, I should frighten you, I fancy, instead of diverting you. Since the motions of the planets are not so regular, but that sometimes they go faster, sometimes slower, sometimes are nearer the earth, and sometimes farther from it, the ancients invented I do not know how many orbs or circles, involved one within another, which they thought would solve all objections. This confusion of circles was so great, that, at the time, when they knew no better, a certain king of Castile, a great mathematician, but not much troubled with religion, said, that, had God consulted him when he made the world, he would have told him how to have framed it better. The saying was very atheistical, and no doubt the instructions he would have given the Almighty, were the suppressing those circles with which he had clogged the celestial motions, and the taking away two or three superfluous heavens, which were placed
above the fixed stars; for the philosophers, to explain the motion of the celestial bodies, had above the uppermost heaven, which we see, found another of crystal, to influence and give motion to the inferior heavens; and wherever they heard of another motion, they presently clapped up a crystal heaven, which cost them nothing. But why, said the lady, must their heaven be of crystal, would nothing else serve as well? No, no, replied I, nothing so well; for the light is to come through them, and yet they are to be solid. Aristotle would have it so, he had found solidity to be one of their excellencies, and when he had once said it, no body would be so rude as to question him. But it seems there were comets much higher than the philosophers expected, which, as they passed along, broke the crystal heavens, and confounded the universe. But to make the best of a bad market, they presently melted down their broken glass, and to Aristotle's confusion, made the heaven fluid; and by the observation of these latter
ages; it is now out of doubt that Venus and Mercury turn round the sun, and not round the earth, according to the ancient system, which is now entirely exploded, and all the authorities not worth a rush. But that which I am going to lay down will solve all; and is so clear, that the King of Castile himself may spare his advice. Methinks, said the Marchioness, your philosophy is a kind of out-cry, where he that offers to do the work cheapest carries it from all the rest. This, said I, is very true; nature is a great house-wife, she always makes use of what costs least, let the difference be ever so inconsiderable; and yet this frugality is accompanied with an extraordinary magnificence, which shines through all her works; that is, she is magnificent in the design, but frugal in the execution; and what can be more praise worthy than a great design accomplished with a little expence? But in our ideas we turn things topsy-turvy; we place our thrift in the design, and are at ten times more charge in workmanship than
it requires; which is very ridiculous. Imitate nature then, replied she, in your system, and give me as little trouble as you can to comprehend you. Madam, said I, fear it not, we have done with our impertinencies: imagine, then, a German, called Copernicus, confounding every thing, tearing in pieces the beloved circles of antiquity, and shattering their crystal heavens like so many panes of glass; seized with the noble rage of astronomy, he snatches up the earth from the centre of the universe, sends her packing, and places the sun in the centre, to which it did more justly belong; the planets no longer turn round the earth, nor inclose it in the circles they describe; if they give us light, it is but by chance, and as they meet us in their way: all now turns round the sun, even the earth herself; and Copernicus, to punish the earth for her former laziness, makes her contribute all he can to the motion of the planets and heavens; and now stripped of all the heavenly equipage, with which she was so glorious-
ly attended; she has nothing left her but the moon, which still turns round about her. Fair and softly, replied the Marchioness, I fancy you yourself are seized with the noble fury of astronomy; a little less rapture, and I shall understand you the better. The sun, you affirm, is in the centre of the universe, and is immoveable; what follows next? It is Mercury, said I, he turns round the sun; so that the sun is the centre of the circle wherein Mercury moves; above Mercury is Venus, who turns also round the sun; after, comes the earth, which being placed higher than Mercury and Venus, makes a greater circle round the sun than either of them; at last comes Mars, Jupiter, and Saturn, in the same order I name them; so that Saturn has the greatest circle round the sun, which is the reason he is longer in making his revolution than any of the other planets. You have forgot the moon, said the Marchioness. We shall quickly find her again, replied I: the moon turns round the earth, and does not leave her,
but as the earth advances in the circle which she describes about the sun; and if the moon turns round the sun, it is because she will not quit the earth. I understand you, said she; and I love the moon for staying with us when all the other planets abandon us: nay, I fear your German would have willingly taken her away too if he could; for in all his proceedings, I find he had a great spite to the earth. It was well done of him, said I, to abate the vanity of mankind, who had taken up the best place in the universe; and it pleases me to see the earth in the crowd of planets. Sure, answered she, you do not think their vanity extends itself so far as astronomy! Do you believe you have humbled me, in telling me the earth goes round the sun? For my part, I do not think myself the worse for it. I confess, Madam, said I, it is my belief that a fair lady would be much more concerned for her place at a ball, than for her rank in the universe; and the precedence of two planets will not make half such a noise in the world
as that of two ambassadors; however, the same inclination which reigns at a ceremony governs in a system; and if you love the uppermost place in the one, the philosopher desires the centre in the other; he flatters himself that all things were made for him, and insensibly believes a matter of pure speculation to be a point of interest. This is a calumny, said she, you have invented against mankind; why did they receive this system if it was so erroneous? I know not, answered I, but I am sure Copernicus himself distrusted the success of his opinion; it was a long time before he would venture to publish it; nor had he done it then without the importunity of his friends. But do you know what became of him? the very day they brought him the first printed sheet of his book, he died; foreseeing that he should never be able to reconcile all the contradictions, and therefore very wisely stept out of the way. I would be just to all the world, said the lady, but it is hard to fancy we move, and yet find we do not change our
place; we perceive ourselves in the morning where we lay down at night: perhaps you will tell me the whole earth moves. Yes, certainly, added I; it is the same case as if you fell asleep in a boat upon the river; when you awake you find yourself in the same place, and the same situation, in respect to all the parts of the boat. It is true, said she, but there is a great difference; when I awake I find another shore, and that shews me my boat has changed its place. But it is not the same with the earth. I find all things as I left them. No, no, said I, there is another shore too; you know, that beyond the circles of the planets are fixed stars; there is our shore. I am upon the earth, and the earth makes a great circle round the sun; I look for the centre of the circle, and see the sun there; then I direct my sight beyond the sun in a right line, and should certainly discover the fixed stars, which answer to the sun, but that the light of the sun effaces them: but at night I easily perceive the stars that correspond with him in the day,
which is exactly the same thing; if the earth did not change its place in the circle where it is, I should see the sun always against the same fixed stars; but when the earth changes its place, the sun must answer to other stars; and there again is your shore, which is always changing. And seeing the earth makes her circle in a year, I see the sun likewise in the space of a year answer successively to the whole circle of the fixed stars, which circle is called the zodiac. I will draw you the figure of it, if you please on the sand. It is no matter, said the lady, I can do well enough without it; besides, it will give an air of learning to my park, which I would not have in it: for I have heard of a certain philosopher, who being shipwrecked upon an unknown island, seeing several mathematical figures traced on the sea-shore, cried out to those who followed him, courage, my companions, the isle is inhabited, behold the footsteps of men. But you may spare your figures, such footsteps are not decent here.
I confess, Madam, added I, the footsteps of lovers would better become this place; that is, your name and cypher carved on the trees by your adorers. Tell me not, said she, of lovers and adorers. I am for my beloved sun and planets: but how comes it to pass, that the sun, as to the fixed stars, completes his course but in a year, and yet goes over our heads every day? Did you never, said I, observe a bowl on the green? It runs towards the jack, and at the same time turns very often round itself: so that the parts which were above are below, and those which were below are above. Just so it is with the earth: at the same time that she advances in the circle, which in a year's space she makes round the sun, in twenty four hours she turns round herself; so that in twenty-four hours every part of the earth loses the sun, and recovers him again; and as it turns towards the sun, it seems to rise, and as it turns from him, it seems to fall. It is very pleasant, said she, that the earth must take all upon herself, and the sun do no-
thing; and when the moon, the other planets, and the fixed stars, seem to go over our heads every twenty-four hours, you will say, that too is only fancy. Mere fancy, Madam, which proceeds from the same cause: for the planets complete their courses round the sun, at unequal times, according to their unequal distances; and that which to day we see answer to a certain point in the zodiac, or circle of the fixed stars, to-morrow will answer to another point; because it is advanced on its own circle, as well as we are advanced upon ours; we move, and the planets move too, but with more or less rapidity than we do; this puts us in different points of sight in respect to them, and makes us think their courses irregular. But there is no occasion of discoursing to you on that head; it is sufficient to inform you, that what seems irregular in the planets proceeds only from our motion, when in truth they are all very regular. I will suppose them so, said the lady: but I would not have their regularity put the earth to so great trou-
ble; methinks, you exact too much activity from so ponderous a mass. But, said I, had you rather that the sun and all the stars, which are vast great bodies, should in twenty-four hours make a prodigious tour round the earth, and that the fixed stars, which are in a circle of infinite extent, whose movement is always extreme, should run in a day 300,000,000 of leagues, and go farther than from hence to China, in the time that you would say, “away, quick to China,” as they needs must, if the earth did not turn round itself every twenty-four hours? To say the truth, it is much more reasonable to think that she should make the tour, which at most is not above 9000 leagues; you perceive plainly, that to set 9000 leagues against 300,000,000, is no trifling difference. Oh, said she, the sun and stars are all fire, their motion is not very slow, but the earth, I fancy, is a little unwieldy. That, replied I, signifies nothing; for what think you of a first rate ship, which carries 150 guns,
bove 3,000 men, besides great quantities of merchandize? one puff of wind, you see, sets her a-sailing, because the water is liquid, and being easily separated, very little resists the motion of the ship: or if she lie in the middle of a river, she will without difficulty drive with the stream, because there is nothing to oppose her course; so the earth, though never so weighty, is as easily born up by the celestial matter, which is a thousand times more fluid than the water, and fills all that great space where the planets float; for how else would you have the earth fastened to resist the motion of the celestial matter, and not be driven by it? You may as well fancy a little block of wood can withstand the current of a river. But pray, said she, how can the earth, with all its weight, be borne up by your celestial matter, which must be very light, because it is so fluid? It does not argue, answered I, that what is most fluid is most light: for what think you of the great ship I just now mentioned, which, with all its burden, is yet lighter than the water it
floats on? I will have nothing to do with the great ship, said she, with some warmth; and I begin to apprehend myself in some danger upon such a whirligig as you have made of the earth. There is no danger, said I; but, Madam, if your fears increase, we will have the earth supported by your elephants, as the Indians believe it. — Hey day, cried she, here is another system; however, I love those people for taking care of themselves; they have a good foundation to trust to, while we Copernicians are a little too ventrous with the celestial matter; and yet I fancy, if the Indians thought the earth in the least danger of sinking they would double their number of elephants.

They do well, said I, laughing at her fancy, who would sleep in fear. And if you have occasion for them to night, we will put as many as you please in our system: we can take them away again by degrees, as you grow better confirmed. I do not think them very necessary, said she. I have courage enough to turn.— You shall turn with pleasure, Madam, said
I, and shall find delightful ideas in your system. For example, sometimes I fancy, myself suspended in the air, without any motion, while the earth turns round me in twenty-four hours; I see, I know not how many different faces pass under me, some white, some black, and some tawny; sometimes I see hats, and sometimes turbans; now heads of hair, and then bald pates; here I see cities with steeples, some with spires and crescents, others with towers of porcelain; and, anon, great countries with nothing but huts; here I see vast oceans and there most horrible deserts; in short, I discover the infinite variety which is upon the surface of the earth.

I confess, said she, twenty-four hours would thus be very well bestowed, so we were in the same place where we are now; I do not mean in the park, but we will suppose ourselves in the air, other people continually passing by, who take up our place, and at the end of twenty-four hours we return to it again.

Copernicus himself, answered I, could
not have comprehended it better; first then we might see the English passing by us, up to the ears in politics, yet settling the nation no better than we do the world in the moon; then follows a great sea, and there perhaps some vessel, not near in that tranquillity as we are; then come some of the Iroquois going to eat a prisoner for their breakfast, who seems as little concerned as his devourers.

After appear the women of the land of Jessop, who spend all their time in dressing provisions for their husbands, and painting their lips and eye brows blue, only to please the greatest brutes in the world: then the Tartars going devoutly on pilgrimage to the great Prester John, who never comes out of a gloomy apartment, all hung with lamps, by the light of which they pay their adoration to him: the fair Circassians, who make no scruple of granting every thing to the first com'er, except what they think essentially belongs to their husbands: then the inhabitants of Little Tartary, going to steal concubines for the Turks and Persians; and at
last, our own dear countrymen, it may be, in some points, as ridiculous as the best of them.

This, said the Marchioness, is very pleasant; but, to imagine what you tell me, though I were above, and saw all this, I would have the liberty to hasten or retard the motion of the earth, according as the objects pleased me more or less; and I assure you I should quickly send packing the politicians and men-eaters, but should have a great curiosity for the fair Circassians; for methinks they have a custom very particular. But I have a great difficulty to solve, and you must be serious. As the earth moves, the air changes every moment, so we breathe the air of another country. Not at all, replied I; for the air which encompasses the earth does not extend above a certain height, perhaps twenty leagues; it follows us, and turns with us: have you not seen the labour of the silk-worm, the shells which those little insects imprison themselves in; and weave with so much art and closeness;
but yet their covering is of a down, very loose and soft; so the earth, which is solid, is covered from the surface twenty leagues upwards with a kind of down, which is the air, and like the shell of the silk-worm turns at the same time. Beyond the air is the celestial matter, incomparably more pure and subtle, and much more agitated than the air.

Your comparison, said she, is somewhat low, and yet what wonders are wrought, what wars, what changes, in this little shell! It is true, replied I; but nature takes no notice of such minute particular motions, but drives us along with the general motions, as if she were at bowls.

Methinks, said she, it is very ridiculous to be upon a thing that turns, and be in all this perplexity, and yet not be well assured that it does turn; and to tell you the truth, I begin to distrust the reasons you give why we should not be sensible of the motion of the earth; for is it possible there should not be some little mark left by which we might perceive it?
All motions, replied I, the more common and natural they are, are the less perceptible; and this holds true even in morality: the motion of self-love is so natural to us, that for the most part we are not sensible of it, and we believe we act by other principles. Ah! said the Marchioness, now are you moralizing to a question of natural philosophy, which is running wide of the argument: but enough, this lecture is sufficient for the first time; let us now depart, and meet here again to-morrow, you with your systems, and I with my ignorance.

In returning back to the castle, that I might say all I could on the subject, I told her of a third system invented by Tycho-Brache, who had fixed the earth in the centre of the universe, turned the sun round the earth, and the rest of the planets round the sun; for since the new discoveries, there was no way left to have the planets turn round the earth. But the lady, with the quickest apprehension, replied, she thought that too affected a system, that among so many great bodies,
the earth only should be exempted from turning round the sun; that it was improper to make the sun turn round the earth, when all the planets turn round the sun; and that though this system was to prove the immobility of the earth, yet she thought it very improbable; so we resolved to stick to Copernicus, whose opinion we thought most uniform, probable, and diverting. In a word, the simplicity of his system convinces us, and the boldness of it surprises with pleasure.
SECOND EVENING.

The Moon is an Habitable World.

The next morning, as soon as the Marchioness was awake, I sent to enquire how she did, and whether she had been able to sleep while the globe was turning? I received for answer, that she already felt quite accustomed to the motion; and had slept as undisturbedly as Copernicus himself. Soon afterwards, some company came to spend the whole day with her; a tiresome custom which is always observed in the country; yet long as the visit was, we considered it a great kindness in the guests, not to prolong it to the next day; which I find is a common practice in this part of the world: however, as they had the civility
to leave us, the Marchioness and I had the evening to ourselves. We immediately went to the park and resumed our astronomical conversation. She understood so perfectly all I had said on the former evening, that she disdained to hear any repetition of the subject, and desired me to enter on a new one.—Well then, said I, since the sun, which we conclude is immovable, can no longer be considered a planet, and the earth is proved to be one, and to move round the sun, you will be the less surprised to hear, that the moon is a world like ours; and to all appearance, inhabited. I never heard speak of peopling the moon, she replied, but as a ridiculous, visionary hypothesis. It may be so, answered I; I only adopt the interest of any party, in these cases, as people do in civil wars; in which the uncertainty of the event, induces them to hold a correspondence with opposite sides, and even, when possible, with their enemies. For my part, though I believe the moon is inhabited, I can be very civil to any one
that disbelieves it; and I always retain the power of going over to their side without disgracing myself, if I found they had the advantage: but in the present state of the question I have the following reasons for thinking the moon is inhabited.

Let us suppose that no communication had ever been carried on between Paris and St. Denis; and that a Parisian who had never gone out of his own city should stand on one of the towers of Notre-Dame, and at that distance view St. Denis: were he asked if he believed that St. Denis was inhabited like Paris, he would, without hesitation answer, No; I see inhabitants in Paris but I can discover none at St. Denis, nor did I ever hear of any being there. Somebody standing by, might answer, that we certainly cannot see them from the tower of Notre-Dame, but that is, because we are at too great a distance; that from all we can discern of St. Denis it is very much like Paris; that it has steeples, houses, walls; and therefore is very probably inhabited.—
All this makes no impression on our citizen; he insists upon it that St. Denis is uninhabited because he does not see any body in it. The moon is our St. Denis, and each of us is this Parisian who has never left the city in which he resides.

Oh! you wrong us, interrupted the Marchioness; we are not so stupid as your citizen; when he sees that St. Denis is constructed exactly on the same plan as Paris, he must be out of his senses not to believe it inhabited: but the moon is very different from the earth. Be cautious, Madam, said I; if the moon's resemblance to the earth prove it habitable, I shall force you to believe that it is inhabited. I confess, answered she, that if you can shew me the similarity, I cannot pretend to deny its being inhabited, and I see so much confidence in your looks that I am afraid you will be triumphant. The two different motions of the earth, which I never before knew any thing about, make me fearful of hastily rejecting any other opinion; but still, can it be
possible that the earth is luminous like the moon?—that you know is essential to their similarity. Indeed, Madam, I replied, the luminous quality of planets depends on less than you imagine. The sun alone is, in his nature, luminous; but the planets only reflect the light they receive from him. He enlightens the moon, the moon reflects his rays on the earth, and the earth is undoubtedly in the same manner a source of light to the moon; it is not farther from us to the moon, than from the moon to us.

But, enquired the Marchioness, is the earth equally capable of reflecting the sun’s light? I see, answered I, you have an invincible partiality for the moon. Light is composed of globules which rebound from a solid substance, but pass through any thing in which they find interstices, such as air or glass; the moon, therefore, gives us light in consequence of being a hard solid body, which sends back these globules. I suppose you will not dispute the hardness and solidity of the earth. See then the effects of an ad-
vantageous situation—because the moon is at a distance we only view her as a luminous body instead of a large mass of matter similar to the earth. Our globe, on the contrary, from having the ill luck to be more closely inspected, appears only a mass of dark soil, fit for nothing but to produce food for animals; we do not perceive the splendour of her light, because we cannot remove to a distance from her. So it is, answered the Marchioness, with the different ranks of society: we are dazzled with the grandeur of situation superior to our own, without considering how much every condition of human life resembles all the rest.

'Tis precisely the same thing, I replied; we take upon us to decide on every thing, but we are never in a proper place for making our observations. We would form an opinion of ourselves, and we are too near; we would judge of others, they are too distant from our view. We should be placed between the earth and the moon to form a just comparison, a spectator, not an inhabitant of the world. I
shall be inconsolable for the injustice we do our world, said she, and the partial regard we have for the moon, unless you can assure me that the inhabitants of that planet, are as ignorant of their advantages, and consider our globe a luminous body, without knowing that from their own we derive so much light. I can make you easy on that head, answered I; we are certainly a luminary to them: they do not, it is true, see us describe a circle round them,* but that does not signify. The reason of our appearing to remain in the same place is this;—the side of the moon which was turned towards us at the creation, has always continued so, we always observe the same eyes, mouth, and other features of the face which, by the help of imagination, we have contrived out of the spots on her

* This is an error, for if they consider the earth's situation relatively to the firmament, they must see that she performs a revolution in twenty-seven days: they certainly always find her answer to their zenith, or at the same distance from the zenith, but at the same time this zenith is continually answering to some new point in the heavens.
surface.* If the other half were presented to us, we should see spots arranged in a different form; this does not arise from the moon's not turning on her axis, she turns in the same time that is employed in going round the earth, that is, a month; but whilst she is performing part of her revolution on her axis, she at the same time performs an equal part of her circle round the earth, and thus, by putting herself in a new situation, continues to shew the same side; therefore although with regard to the sun and the rest of the heavenly bodies the moon evidently turns on her axis, yet when viewed from the earth she does not appear to do so. All the other luminaries seem to the moon to rise and set in the space of a fortnight, but she constantly sees our globe in the same part of the

* When the moon is viewed through a telescope, its spots bear no resemblance to the human face; but on contemplating it with the naked eye, it is easy to imagine that form; and it has become so common to talk of the face on the moon, that even an astronomer can hardly divest himself of the idea.
heavens.* This apparent immobility, were it invariable, would be thought inconsistent with the nature of a planet; but the moon has a sort of vibratory motion which sometimes conceals a small part of the face, and exhibits a part of the other side. Now, I can venture to say that the inhabitants attribute this motion to us, and imagine that we vibrate in the heavens like a pendulum.

All the planets, said the Marchioness, are like us human beings, who always attribute to others what belongs to ourselves. The earth says, It is not I who turn, it is the sun. The moon says, It is not I who vibrate, but the earth; there is error throughout. I would not advise you to attempt making any reform, answered I; you had better consider the remaining proofs of the resemblance which the earth and moon bear to each other. Figure to yourself those two globes suspended in the heavens. You know the sun always enlightens one

* The earth always answers to one side of the moon, but not the same point in the sky.
halt of a circular body, whilst the other half remains in the shade. There is then one half of both the earth and the moon, which is enlightened by the sun, or in other words, in which it is day, and the other half in which it is night. Observe likewise that as a ball moves with less force and celerity after it has struck against a wall from which it flies off to an opposite place, so the light is weaker when reflected to us from a body that only receives it. The pale light of the moon is in reality the brilliancy of the sun, but as we receive it merely by reflection, in coming to us, it is deprived of its strength. Of course it shines with much greater splendour on the moon, and for the same reason the dazzling light received by our globe from the sun, must appear faint when reflected back to the moon. That part of the moon which to us appears luminous during the night is the side which has daylight; and the part of the earth which is illuminated by the day, when turned toward the dark side of the moon, affords
equal light to her. All this depends on the mutual position of the earth and moon. During the first days of the month when the moon is not discernible, she is placed between the sun and us, and proceeding in the day time with the sun; the luminous side is therefore necessarily turned to the sun, whilst the dark part is towards the earth. We are unable to see the unenlightened side of the moon, but this dark half viewing the part of our globe in which it is day, is assisted by our light, and though invisible to us, has the advantage of seeing the earth as a full moon: it is then to the lunar inhabitants *full earth*, if I may so express myself.* After this, the moon advancing in her monthly round, and no longer between the sun and earth, turns towards us a part of her enlightened half, and that we call the crescent. At the same time that part of the moon which is in-

* We have a convincing proof of the light reflected from the earth at this time, in the dusky light perceived on a part of the moon that is not enlightened by the sun. *Astron. Art. 1412.*
volved in the obscurity of night, ceases to see all the luminous side of the earth, and finds it continue to decrease.

Enough, said the Marchioness, in her lively manner, I shall easily learn the rest when I like; let me stop a moment, and trace the moon through her monthly circle. I see that in general that planet and the earth have very different degrees of light, and I imagine that when we have the full-moon all the luminous side of the moon is turned towards all the part of our globe which is obscure; and that, at that time, the inhabitants cannot discern us at all, but say they have new-earth. I should not choose to be obnoxious to reproach for obliging you to enter into a long explanation of any thing so easily understood, but the eclipses, how are they effected? You could guess it without difficulty, I replied. When we have a new moon, and she, being between us and the sun presents her dark side to our luminous half, the shadow of this obscure part falls on the earth; so that wherever the moon is in a direct line under the sun
she hides that luminary from our sight, and darkens a part of the enlightened side of our globe; this, then, forms an eclipse of the sun to us during the daytime, and an eclipse of the earth to the moon during her night. When the moon is at the full, the earth is between her and the sun, the shaded side of the earth towards the light side of the moon. If the earth's shadow fall directly on the moon, it darkens the luminous half that we see; 'tis then we have an eclipse of the moon in our night, and the moon an eclipse of the sun in her day. What prevents an eclipse every time the moon is between the sun and us, or the earth between the sun and moon, is this; it often happens that these three bodies are not placed exactly in a line, in which case the one that would occasion the eclipse throws its shadow on one side of the other, and consequently does not obstruct its light.

I am very much astonished, said the Marchioness, that there is so little mystery in eclipses, and that being produc-
ed by such simple means, every body does not discover the cause of them. In truth, answered I, there are many people, who from the emotions they feel at any phenomena, appear to have little chance of finding out the occasion of them at present. Throughout the East-Indies, when the sun and moon are eclipsed, the inhabitants believe that a great dragon, with his black claws, is going to seize these luminaries; and all the time the eclipse lasts, you may see whole rivers covered with the heads of these Indians, who have put themselves up to the throat in water, because, according to their notions, this is a very religious act, and will induce the sun or moon to defend itself bravely against the dragon. In America, it was thought that the sun and moon were angry when they were eclipsed, and every kind of absurdity was practised to regain their favour. The Grecians too, who had arrived at such a height of refinement—did they not, for a long time, believe that the moon was eclipsed by the power of sorcery, and that the magicians
caused her to descend from the skies, and cast a baneful influence on the herbs? And were not we, likewise, in great alarm but two-and-thirty years ago, at a total eclipse of the sun? Did not an immense number of people shut themselves up in caves and cellars; and were they easily persuaded to leave them by the philosophers who wrote so much to reassure them?

Really, replied she, all that is too ridiculous. There ought to be a decree passed to prevent any body from ever talking of eclipses, lest the memory of these follies should be perpetuated. The decree, said I, should extend so far as to obliterate the memory of every subject, for I can think of nothing in the world which is not the monument of some human folly.

Answer me this question, said the Marchioness: Are the inhabitants of the moon as much afraid of eclipses as those of the earth? How ridiculous it is if the Indians of that world put them-

*1654. There have been others in Europe, in 1724, 1715, and 1716.
selves up to the chin in water; if the Americans believe the earth is angry with them; if the Greeks imagine we are enchanted, and suppose we shall injure their herbs; and, in short, if we are inflicting on them all the terror they have caused us? I have no doubt but that is the case, answered I; for why should the good folks in the moon have more sense than we? What right have they to frighten us, unless we can frighten them? I dare say, added I, laughing, that, as a prodigious number of men have been, and still are silly enough to worship the moon; so there are some in the moon that pay their adorations to the earth, and that they are kneeling to one another. If it be so, she replied, we may pretend to have an influence on the moon, and to produce the crisis in the diseases of her sick people; but as a little common sense in the dwellers on that globe would be sufficient to destroy all these honours, I must confess I am afraid they will have the advantage over us.

Don't alarm yourself, said I, 'tis not
probable that we are the only fools in the universe. There is something in ignorance that is calculated for general reception, and though I can only guess the character of the people in question, yet I have no more doubt, that, could we form the comparison, we should find ourselves equal to them, than I have that the accounts are true that we receive of their globe.

What accounts do you receive? enquired she. Those, I replied, that are given us by the learned, who travel there every day by the assistance of telescopes. They tell us that they have discovered in the moon, earth, seas, lakes, elevated mountains, and profound abysses.

You astonish me, cried the Marchioness; I cannot imagine the possibility of discovering mountains and abysses, from the great irregularity they cause on the surface of the globe; but how do they distinguish earth from sea? Because, answered I, the water,* by suffering part of

*It is proved that there is no water in the moon, but there are volcanoes; they may be seen without a tele-
the light to pass through it, and consequently reflecting less than the earth, has at a distance the appearance of dark spots; whilst solid parts, by reflecting all the light, look much more brilliant. The illustrious M. Cassini, who has acquired a greater knowledge of the celestial bodies than any man in the world, discovered in the moon something which separates, then re-unites, and afterwards loses itself in a cavity. We have reason to believe, from its appearance, that this is a river. In short, all these different parts are now so well known to us, that they have been named after our great men. One place is called Copernicus, another Archimedes, another Gabileus. Other parts have fancy names; there is a promontory of décams, a sea of nectar, and so on; in fact our description of the moon is so particular, that if a learned man was to take a journey there, he would be in no more danger of losing himself than I should in Paris.

scope, which was the case on the 7th of March, 1794. Philos. Trans.
But, said she, I should like to have a more detailed account of the interior of the country. The gentlemen of the observatory are not able to give it you, I replied; you must make enquiry of Astolfo, who was taken to the moon by St. John. That is one of the plesantest follies of Ariosto, I'm sure you will be amused with it. I confess it would have been better if he had not introduced in it so respectable a name as that of St. John; poets, however, will take licenses, and we may venture to excuse this, for the whole poem is dedicated to a cardinal, and one of our popes has honoured it with a particular eulogium, which in some editions is placed before the work. This is the subject of the piece: Orlando, nephew to Charlemagne, had lost his senses, because the beautiful Angelica preferred Medore to him. Astolfo, a valourous knight-errant, was one day carried by his hippograffe to the terrestrial paradise, which was at the top of a very high mountain: there he met with St. John; who informed him that it was necessary, in order to
cure Orlando of his madness, for them to take a journey together to the moon. Astolfo, delighted with the opportunity of seeing a new country, needed no entreaty, and in a moment the apostle and knight took their course in a chariot of fire. As Astolfo was no philosopher, he was surprised to find the moon much larger than it appeared while he was on the earth; his astonishment, however, increased when he saw in it rivers, lakes, mountains, towns, forests, and what I should have been equally surprised at, nymphs hunting in the forests. But the most curious thing of all he saw, was a valley, in which was to be found everything that was lost on the earth: crowns, riches, the rewards of ambition, hopes without number, all the time that had been devoted to gaming, all the alms that men had ordered to be distributed after their death, verses dedicated to monarchs, and the sighs of lovers.

As to lover's sighs, rejoined the Marchioness, I don't know what became of them in Ariosto's time, but at present I
fancy there are none that go to the moon. We should find a great many, said, I were they only those that you have occasioned. In short, the moon is so careful in collecting all that is lost here, that not a single thing is wanting of the number: Ariosto has even whispered that Constantine's donation is there: the popes have assumed the government of Rome and Italy, by virtue of a donation from that emperor, but the truth is, we can't tell what is become of it. There is but one sort of thing that has not escaped to the moon, and that is—folly: the people on earth have taken care not to part with that; but to make the moon amends, an incredible quantity of wit has taken its flight thither, which is there preserved in phials; it is a very subtle fluid, and easily evaporates, unless carefully corked up: on each of these phials is written the name of the owner. I think Ariosto puts them together without any order, but I like better to imagine them placed neatly in long rows. Astolfo was astonished to find full phials belonging to
many wise people of his acquaintance. I am sure, continued I, mine has been considerably augmented since I began to indulge myself with you in philosophic and poetic reveries; but I console myself by supposing that, after listening to all my fancies, your wits must inevitably become so volatile, that, at least, a little phial full will evaporate, and make its way to the moon.

Our knight-errant found his own among the rest, and by St. John’s permission, took possession of it, and snuffed up all the bottleful, like Hungary water; but, according to Ariosto, he did not carry it away with him; for it soon returned to the moon, in consequence of an extravagance he was guilty of some time after. He did not forget Orlando’s phial, which had occasioned his journey; he had a good deal of trouble in carrying it, for the hero’s wit was naturally weighty, and not a drop was wanting. At the end, Ariosto, according to his general custom of saying whatever he pleases, addresses in beautiful language, the following apos-
trophe to his mistress: "Who, my fair one, will ascend to the heavens, to re-store the senses of which your charms has robbed me? Hitherto I have not com-}plained, but I know not what may be the extent of my loss; should I continue the victim of your beauty, I shall in the end become what I have represented Orlando to be. However, I do not believe it is necessary for me to traverse the airy regions for the recovery of my senses; all the faculties of my soul, instead of mounting to such unattainable height, are solacing themselves in the beam of your eyes, and hovering round your lovely mouth. Ah! have compassion on me, and suffer me to take them back with my lips." Is not the thought pretty? For my part, in adopting Ariosto's way of thinking, I should dissuade people from ever letting their wits escape, unless it were from the influence of love; for you see how near they then continue, and how easily they may be regained; but when they are lost in any other way, as we, for instance, are losing ours in philo-
sophising, they fly directly to the moon, and are not caught again at pleasure. Never mind, said the Marchioness, ours will have an honourable station among the philosophic vials; whereas, had we lost them in the poet's way, they might, perhaps, hover around some unworthy object. But, continued she, to deprive me completely of mine, tell me seriously whether you believe there are men living in the moon, for you have not yet given me a decided opinion. Do I believe it? replied I; Oh no, I don't believe there are men in the moon. We see how much all nature is changed even when we have travelled from here to China; different faces, different figures, different manners; and almost a different sort of understandings; from here to the moon the alteration must be considerably greater. When adventurers explain unknown countries, the inhabitants they find are scarcely human; they are animals in the shape of men, even in that respect sometimes imperfect, but almost devoid of human reason; could any of these travellers reach
the moon, they surely would not find it inhabited by men.

Then what sort of creatures are they? asked the Marchioness impatiently. Upon my word, Madam, said I, I can't tell. Were it possible for us to be endowed with reason, and at the same time not of the human species; were we, I say, such beings, and inhabitants of the moon, should we ever imagine that this world contained so fantastical a creature as man? Could we form in our minds the image of a being composed of such extravagant passions, and such wise reflections; an existence so short, and plans so extensive; so much knowledge of trifles, and so much ignorance of the most important things; such ardent love of liberty, yet such proneness to slavery; so strong a desire for happiness, with so little power of being happy? The people in the moon must be very clever to imagine such a motley character. We are incessantly contemplating our own nature, yet we are still unacquainted with it. Some have found it so difficult to
comprehend, that they have said the gods had taken too much nectar when they created men; and when they had recovered their calm reason, they could not help laughing at their own work. Well, we are not in danger of being laughed at by the inhabitants of the moon, answered the Marchioness, as they would find it so impossible to imagine our characters: but I should be very glad if we could find out theirs; for, really, one feels a painful degree of curiosity in knowing that there are beings in the moon we see yonder, and not having the means of discovering what they are. How is it, I replied, that you have no anxiety to be acquainted with all the southern parts of the world, which is yet unknown to us? we and the inhabitants of that part of the globe are voyaging in the same vessel, of which they occupy the head, and we the stern. You see that the head and the stern have no communication with each other; that the people at one end know nothing of the nature or occupations of those at the other, and yet
you want to be acquainted with all that is going forward in the moon, that separate vessel, which is sailing in a distant part of the heavens.

Oh! replied she, I consider myself already acquainted with the inhabitants of the southern world, for they certainly must be very much like us; and in short we may know them better whenever we choose to give ourselves the trouble of going to see them; we cannot miss them, for they will remain in the same place; but these folks in the moon—I am in despair about them. Were I, I replied, gravely to answer you, we know not what may happen, you would laugh at me, and I should undoubtedly deserve it; nevertheless, I think I could defend myself, in some measure, from your ridicule. A thought has come into my head, which is whimsical enough, and yet there is a wonderful deal of probability in it; I don't know how it has acquired the power of imposing that on my understanding, being in itself so extravagant. I dare say I shall likewise bring you to confess,
contrary to reason, that there may some day be a communication opened between the earth and the moon. Recollect the situation of America before it was discovered by Christopher Columbus. The minds of its inhabitants were involved in the most profound ignorance; far from having any knowledge of the sciences, they were not even acquainted with the most simple and necessary arts; they went without clothes; they had no weapon but the bow; they had no notion that men might be carried by animals; they supposed the ocean an immense space, impassable by man, and bounded only by the sky, to which it was joined. It is true, that after they had been several years in contriving to scoop out the trunk of a great tree, they ventured to commit themselves to the water in this rude sort of vessel, and went from one country to another, borne along by the winds and waves; but as their bark was very liable to be overset, they were frequently under the necessity of swimming to overtake it, so that, properly speak-
ing, they were oftener in the water than in their ship. You must suppose they would not have yielded a very implicit credence to a person who had told them that a navigation was carried on, incomparably superior to theirs; that by its means, every part of the liquid expanse could be resorted to; that the vessels might be detained at one spot, whilst the billows were foaming around; that even the speed with which they moved might be regulated; in short, that the ocean, whatever its extent might be, was no obstacle to the commerce of the different people. In a course of time, however, notwithstanding their incredulity, a spectacle new and astonishing presents itself to the eyes of these savages. Enormous bodies, extending their white wings to the blast, come sailing on the ocean with fearful rapidity, and discharging fire on every side: these tremendous machines cast on their shore men covered with iron;引导 with facility the monsters that carry them, and darting thunderbolts from their hands, to destroy all who at-
tempt to resist them.—"Whence come these awful beings? Who hath given them power to ride on the waters, and to wield the thunder of heaven? Are they children of the sun? assuredly they are not men!" I cannot tell, Madam, whether you feel as strongly as I do, the surprise of the Americans; surely no event could ever have excited an astonishment equal to theirs. After thinking of that I will not assert that no communication can be established between our world and the moon. Did the Americans ever conceive the idea that there would be any between their country and Europe, of which they had never heard? There is, I acknowledge, an immense space of air to travel through before we could reach the moon; but did those seas appear to the Americans more capable of being crossed? Really, exclaimed the Marchioness, looking earnestly at me, you are quite mad! Who denies it? answered I. It is impossible you should deny it, said she. The Americans were so ignorant, that they could not imagine the
practicability of crossing such an extent of water; but we have science enough to know that the air is possible, although we have no machine which can transport us through it. We do more than conjecture the possibility of rising in the air, I replied, we have actually began to fly. Several persons have discovered a method of fixing on wings which supported them in the air, of moving these wings, and by their assistance, flying over rivers; these new-fashioned birds did not, to be sure, soar like the eagles, and their flight has sometimes cost them an arm or a leg; but, however, these attempts answer to the first pieces of wood that were launched into the water, and which served for the commencement of navigation: there was a vast difference between these mere planks and great ships, capable of going round the world; nevertheless, by gradual improvements we have learned to construct such vessels. The art of flying is but in its infancy; in due time it will be brought to perfection,* and some day or

* Montgolfier's balloons, invented in 1783, have gone
other we shall get to the moon. Can we pretend to know every thing? to have made every possible discovery? Pray let us give posterity leave to make some improvements as well as ourselves. I won't give them leave, answered she, to break their necks by attempting to fly. Well, I replied, though flying be not perfected here, the inhabitants of the moon may, perhaps, excel us; and it will be the same thing, whether we go to them or they come to us. We shall then be like the Americans, who knew so little of navigation, while it was so thoroughly understood at the other side of the globe. Pugh! cried the Marchioness; if the people of the moon were so expert, they would have been here before this time. The Europeans, answered I, did not find their way to America till six thousand years had elapsed; they were all that time learning the art of navigation so a great way in fulfilling of this prediction; but it is evidently impossible for it to be accomplished; these globes can only carry us to a certain height, beyond that we could not breathe.
completely as to pass over the ocean. Probably the people in the moon are able to take little excursions in the air, very likely they are now practising: after they have acquired more experience they will pay us a visit, and heaven knows what surprise it will occasion us! You are insupportable, exclaimed she, to combat me with such chimerical arguments. Take care, said I, if you provoke me, I shall corroborate them. Remember the earth has been made known to us by little and little. The ancients positively asserted that the torrid and frozen zones were uninhabitable, from the excessive heat of the one, and the cold of the other; and in the time of the Romans the general chart of the world was made little larger than that of their own empire, this at once shewed the grand idea they had of themselves, and their extreme ignorance of the earth. Men were, however, discovered in these extremely hot and intensely cold climates, which discovery has greatly augmented the number of inhabitants on our globe. At one time
it was believed that the ocean covered every part of the earth except what was then known. Antipodes had never been heard of, and who could imagine that men would be able to walk with their heads downwards? Yet after all, the antipodes were found out. Now the map must be altered; a new half added to the earth! You understand, Madam, what I am aiming at; these antipodes so unexpectedly discovered, should teach us to think modestly of our attainments; we may yet know much more of our own world, and then become acquainted with the moon; till that time we must not expect, because our knowledge is progressive: when we understand our own habitation, we may be permitted to study that of our neighbours. In truth, said she, viewing me attentively, you enter into the subject so deeply that one cannot but imagine you in earnest. Indeed I am not, answered I; I only wished to shew you the possibility of maintaining an extravagant opinion, so as to embarrass, though not to convince a person of sense.
Truth alone makes her way to the understanding; she can even convince without exhibiting every proof; she is so adapted to our capacities, that when first discovered, we seem only to have met with an old acquaintance.

Ah! this restores my tranquillity, said she. Your sophistry disturbed my imagination. Let us retire; I am now composed, and inclined to go to rest.
THIRD EVENING.

THE Marchioness wished to pursue our astronomical researches during the day; but I told her that as the moon and stars were the subject of our whimsical conversations, they ought to be our only confidants; we therefore waited till evening, and then took our ramble in the park, which thus became sacred to learning.

I have a vast deal of news to tell you, said I; I yesterday told you the moon, according to all appearances, was inhabited, but I have recollected a circumstance which would expose its inhabitants to so much danger, that I don't know whether I shall not retract my former opinion. Indeed I will not suffer you to retract it, answered she. Yester-
day you prepared me to receive a visit from the inhabitants of the moon in a few days; now you are going to refuse them a place in the creation. You shall not trifle with me in this way. You told me the moon was inhabited; I surmounted the difficulty of believing it, and now I will continue to believe it. Softly! said I, we should give but half an assent to an opinion of this nature, and reserve the other half in case we should find the opposite idea better supported. I am not contented with words, she replied, give me facts; remember your comparison of the moon with St. Denis. But, answered I, the moon is not so similar to the earth, as St. Denis is to Paris. The sun draws out of the earth watery exhalations, which rise to a certain height in the air, collect together, and form themselves into clouds. These clouds hover about the earth in irregular shapes, sometimes shadowing one part, and sometimes another. In viewing the earth from a distance, the appearance of its surface would continually vary, because a
large space of country darkened by a cloud would appear less luminous than the other parts, and as the clouds dispersed would resume its brightness; from this cause the spots on the earth would be seen to change their places, assume different forms, and sometimes be entirely dissipated. If, then, the moon had clouds in its atmosphere, we should observe this variety of spots; but we find them always confined to the same place, which proves that the sun raises no vapours from the moon. It is then a body incomparably more solid than the earth, and its subtile particles easily dissipated as soon as they are put in motion by the heat. The moon, therefore, must be a mass of rock and marble, from which no evaporation proceeds; for exhalations so naturally arise where there is water, that we cannot admit the existence of water where they are not to be found. What sort of beings do you think could inhabit these barren rocks; this country without water? Ah! cried she, you forget that you have assured me the seas in
the moon were distinguishable. It was a mere conjecture,* I replied; I am sorry to have led you astray. These dark places which have been taken for seas are probably only deep cavities: at so great a distance it is excusable if we don't always guess aright. But, said she, will your objections oblige us to conclude that the moon has no inhabitants? By no means, answered I, we will neither decide one way or another. I must own my weakness, she replied; I cannot bear to remain in suspense. I must believe something; enable me to determine; let us ascertain the existence of these people, or let us annihilate them at once, and think no more about them. But preserve them if possible; I have formed an attachment for them, of which I shall not easily divest myself. I will not leave the moon without inhabitants, then, said I; for your pleasure it shall be repeopled.

As the spots in the moon never vary,†

* This is not, now, even conjectured, for with a telescope we may see irregularities at the bottom of what were supposed to be seas.
† M. Herschel has observed variations in them;
we certainly cannot believe that there are any surrounding clouds which successively obscure the surrounding parts; this however is not a proof that there are no exhalations; our clouds are formed of vapours, which at their first rising out of the earth, were in separate particles, too small to be visible to us; in ascending they meet with a degree of cold that condenses and unites them into conspicuous forms; after which they float in the air till they dissolve in rain. But these exhalations frequently remain dispersed and imperceptible, and fall back on the ground in gentle dews. I suppose then that vapours of this kind are exhaled from the moon, for it is incredible that the moon should be a large mass, composed of parts all equally solid, all in a state of equal tranquillity, all incapable of being influenced by the action of the sun. We know of no body which has these properties, not even marble. The most dense bodies are subject to change, which he, with certainty, attributes to the industry of the inhabitants.
either from some secret and interior motion, or from the action of external matter. As the exhalations from the moon, do not form themselves into clouds, and return in showers, they can only become dew: for that purpose it is not necessary that the atmosphere, which apparently adheres to the moon as ours does to the earth, should be exactly similar to our air, nor the vapours exactly like ours; and that I think is probably the case: the matter must have a different disposition in the moon, from that in the earth; consequently the effects be different; however, all that is of no importance; since we find that there is motion in the parts of the moon, either internal, or produced by foreign causes, we may again people it, as we have the means of affording them subsistence: of producing fruit, corn, water, and every thing that is needful. I mean fruit, corn, &c. such as the moon can produce, the nature of which I

* The atmosphere of the moon, if there be any, is quite invisible to us.
am unacquainted with; and all these in proportion to the wants of its inhabitants, of which I am likewise ignorant.

That is to say, answered the Marchioness, you are sure every thing is right, without knowing how it is; here is a little knowledge placed against a great deal of ignorance, but we must be content with it: I am very happy to have inhabitants restored to the moon; I am glad also that you give them a surrounding atmosphere, for it seems to me that a planet would be too naked without one.

These two different airs, said I, one belonging to the earth, the other to the moon, tend to prevent a communication between the two planets. If it merely depended on the power of flying, who knows, as I yesterday said, but we may, at some future time, be sufficiently expert? All things considered, I think we must not expect this communication; the amazing distance at which they are placed, would be a considerable difficulty; and were this obstacle removed, were the two planets nearer together, it would be
impossible to pass from one atmosphere to the other. Water is the atmosphere of the fishes; they never pass into that of the birds, nor the birds into theirs: they are not prevented by the distance, but the existence of both depends on their proper element. Our air, we find, is mixed with more dense and gross vapours than that of the moon; therefore an inhabitant of that world would be drowned if he entered our atmosphere, and fall lifeless on the earth.

Oh! how glad I should be, exclaimed the Marchioness, for a shipwreck to cast a good number of them on the earth, we might then examine them at our leisure. But, I replied, if they were clever enough to navigate the surface of our atmosphere, and from a curiosity to examine us, should be tempted to draw us up like fishes, would that please you? Why not? answered she, laughing. I would voluntarily put myself in their nets just for the pleasure of seeing the fishers.

Remember, said I, you would be very ill by the time you reached the top of our
We see then there are many things to prevent us from leaving our own world, and going to the moon. To console ourselves let us guess all we can about it. In the first place, I conjecture that the inhabitants must see the heavens, the sun, and the stars, of a very different colour from what they appear to us. We view those objects through a sort of glass which alters their appearance; this glass is our atmosphere, pervaded with exhalations.

* Respiration is difficult at the height of a league. Half a league higher it must be impossible.
tions. Some moderns assert that it is blue, as well as the sea, but we can only distinguish the colour in the parts of those elements that are most remote from the eye. The firmament, say they, in which are the fixed stars, has no light in itself; and consequently ought to appear black,* but as we see it through our blue air, it seems to us to be blue. If that is true, the rays of the sun and stars cannot pass through the air without receiving a slight tinge from its colour, and losing a degree of that which is natural to them. But supposing the air is not coloured, it is certain that through a thick fog the light of a flambeau, seen at some distance, appears of a deep red, which is not its real colour; if therefore our air be considered only a mist, it must necessarily alter the colour of the sky, sun and stars. The celestial fluid alone could give us light and colours in their original state. Therefore as the atmosphere of the moon differs

* Desaussuers tells us it appears black when viewed at a league's distance from the earth.
from ours, it is either of a different colour, or else it is another sort of mist, which varies the appearance of the celestial bodies. In a word, the glass through which the people in the moon view these objects is of a different nature to ours.

On that account, replied the Marchioness, I prefer our world to the moon; I think it impossible for the assortment of colours presented to our sight by the heavenly bodies to be so beautiful as that they form when viewed through the medium of our air. Let us suppose a red sky and green stars; the effect is not so agreeable as golden stars and a blue sky. One would think, said I, you were choosing clothes or furniture; but believe me nature has a good taste; let us trust to her for providing a set of colours for the moon, there is no fear but it will be a pleasing one. She has undoubtedly varied the appearance of the universe at each different point of view, and in all these varieties there is great beauty.

I acknowledge her talents, answered she, at each point of view she has placed
a different sort of glass, by which means she has given the appearance of variety to objects which remain always the same. With a blue atmosphere, we have a blue sky, and perhaps with a red atmosphere, the inhabitants of the moon have a red sky; yet this sky is absolutely the same. In like manner she seems to have placed various sorts of glasses before the eyes of our imagination, through which the same object presents to each of us a different appearance. To Alexander, the earth appeared a proper place to convert into an empire, for his sway; Celadon viewed it only as a fit residence for Astrea; a philosopher considers it a large planet travelling through the heavens, and inhabited by a number of madmen. I think the spectacle of nature cannot be more varied than the prospects of different imaginations.

The varied appearance of objects viewed by the imagination, I replied, is the most surprising, for they are exactly the same things though apparently so dissimilar; whereas there may be other natu-
ral objects visible to the moon, and some that are visible to us may not be seen there; perhaps for instance, there is neither dawn nor twilight. The air that surrounds us, rises to some height, receives the rays of light that would not reach the earth, and by its density, detains and conveys to us a part of this light which was apparently not destined for us; thus you see the dawn and twilight are particular favours conferred on us by nature; they are degrees of light to which we are not regularly entitled, and which are bestowed on us in addition to our share. But the atmosphere of the moon, being purer than ours, is probably not so well calculated to reflect the rays which it receives before the sun is risen, or after it is set. The poor inhabitants have not then this light, which by its gradual increase prepares us so agreeably for the brilliancy of the sun, and in the evening reconciles us to its loss, by a progressive diminution. The moon, after the profound gloom of night, receives the ardent blaze of the sun, as if by the instan-
taneous drawing up of a curtain; on the contrary, whilst still enjoying the dazzling light of day, it is again plunged into extreme darkness; day and night are not connected by an agreeable medium partaking of both. The people in the moon never see the rainbow; for as the dawn is produced by the thickness of our air and vapours, so the rainbow is formed in the clouds which are dispersed in rain; thus we are indebted for the most beautiful appearances in nature, to things in themselves far from agreeable. Since the moon has neither dense vapours nor rainy clouds, farewel to Aurora, and the Rainbow! Alas! to what can they liken the beauties of that country; what a source of comparison are they deprived of!

I should not much regret those comparisons, answered the Marchioness; and I think the inhabitants of the moon have ample amends made them for the loss of rainbows and twilight by being exempted from thunder and lightning; for these likewise are formed in the clouds. They have constant serenity of weather;
never losing sight of the sun. They have no gloomy nights in which the stars are concealed. They are unacquainted with those storms and tempests; those elemental wars which seem to indicate the wrath of heaven. Are they then to be pitied? You speak of the moon as an enchanting spot, said I; yet I don't know whether it is very delightful to be exposed throughout a day that is as long as our fortnight* to a blazing sun, without a cloud to temper the intensity of its heat. It is perhaps owing to this that nature has formed cavities in the moon large enough to be seen by our telescopes; they are not valleys situated between mountains, but hollow places, in the midst of large plains. How do we know whether the inhabitants, oppressed by the perpetual radiance of the sun, may not take refuge in these caverns? Perhaps they even build towns, and constantly reside in these parts. We see that here our subterranean Rome.

* During this time the sun rises and sets as it does in our day.
is larger than the Rome which is built on the surface: we have only to remove the latter, and the other would be a city such as we should find in the moon. A large number of the people dwell in each cavern, and from one cavern to another is a subterraneous passage for the communication of the inhabitants. You laugh at this idea; I have no objection; but seriously I think you are more likely to be mistaken than I. You believe the people in the moon must dwell on the surface, because we are on the surface of our globe; you should form quite a different opinion, and think that because we reside on the surface they dwell in the interior parts; every thing must be very differently conducted here and in the moon.

It does not signify, replied the Marchioness, I can't bear the idea of these people living in perpetual darkness. You would find it still more difficult to admit the opinion, said I, if you knew that a great philosopher of ancient times had informed us that the moon was the dwel-
ling of souls who had on earth rendered themselves worthy of very exalted happiness. He supposes that their felicity consists in listening to the music of the spheres, but that when the moon comes under the shadow of the earth, they are no longer able to hear the celestial harmony, at which time they utter the most piercing cries, and the moon hastens on as fast as possible to relieve them from this agonizing situation. We may expect then, answered she, to have the virtuous spirits sent here from the moon, for I suppose they likewise honour our world by making it an abode of the blessed; so in these two planets it is thought a sufficient reward to superior goodness for the soul to be transported from one world to the other. Really, I replied, it would not be a trifling enjoyment to take a survey of different worlds; I often receive a great deal of pleasure from such a journey, although but in imagination; what must it be then to perform it in reality? It would be much more delightful than going from here to Japan; in
other words, than crawling from one end of the earth to the other with great labour, merely for the sake of seeing men. Well, said she, let us make this tour to the planets as we can; what should prevent us? We will place ourselves at all those different points of view, and at each of them survey the universe. Have we any thing else to see in the moon? You are not yet thoroughly acquainted with that world, I replied. You recollect that the two motions of the moon, by one of which she turns on her axis, and by the other round us, being equal, the latter always prevents the former from withdrawing any part from our sight, and consequently we always view the same side. That half therefore is the only part that can see our world, and as the moon, with regard to us, must be considered not to turn on her centre, the half to which we are visible sees us always fixed in the same part of the sky.*

* That is to say only at the same distance from the zenith and the horizon.
When it is night, and the nights there are as long as our fortnight, she sees at first only a small part of the earth enlightened; then a larger portion; and at length the light seems hourly to spread over the earth, till it becomes entirely luminous. On the contrary these changes in the moon are visible to us only from one night to another, because we are a long time without seeing her. I should like to hear the mistakes which the philosophers of that world fall into from the apparent immobility of our earth, whilst all the other heavenly bodies rise and set in the space of a fortnight. Probably they consider the earth immovable in consequence of her enormous size, being sixty times larger than the moon; and when the poets are disposed to flatter indolent princes, I have no doubt but they compare them to this orb in her state of majestic repose. It does not however appear an entire immobility. From the moon they must see the earth turn on her axis. Our Europe, Asia, America, present themselves one after another, in different
shapes, nearly as they are represented on our maps. Only imagine what a novel sight this must be to travellers coming from the other side of the moon to that which is always facing us! How incredulously they must have heard the accounts of the first that spoke of it, who lived at the opposite side. It is come into my head, said the Marchioness, that from that half of the moon to the other they make pilgrimages to come and examine us, and that particular honours and privileges are destined for those who have seen the great planet. At least, answered I, they who constantly see us have the privilege of being better illuminated during their nights; the inhabitants of the other side must be much less agreeably situated in that respect.

Now, madam, let us pursue our journey to the different planets; we have been long enough at the moon. Next, in the road from the moon to the sun, we find Venus. In talking of Venus, I shall resume my argument concerning St. Dennis. Venus, as well as the moon,
turns on her axis and goes round the sun: with telescopes it is seen that this planet, like the moon, is sometimes a crescent, sometimes on the decrease, sometimes full, according to her different situations relatively to the earth. The moon, according to all appearances, is inhabited; why then should Venus be destitute of inhabitants? But, interrupted the Marchioness, with your why nots you will put inhabitants in all the planets. Certainly, I replied, this why not has the power of peopling them all. We find that they are of the same nature, all opaque bodies, illuminated only by the sun, and the reflections of his rays on each other; and having all the same motions. So far then they are alike, and yet we are to suppose that these great planets were formed to remain uninhabited, and that such being the natural condition of them all, an exception should be made in favour of the earth—let who will believe it; I cannot. A few minutes, answered she, have wonderfully confirmed your opinion. Just now the moon was on the point of being
quite deserted, and you cared very little about the matter, and now, if one were to presume to deny that all the planets are as full of inhabitants as the earth, I see you would be quite in a passion. It is true, said I, that in the positive fit I had just now, if you had contradicted me on the subject of these said inhabitants, I should not only have maintained their existence, but in all probability have described their formation. There are certain moments when we feel assured of a thing, and I never felt so fully persuaded of my opinion as I was then; however, though my ardour is now a little abated, I still think it would be very strange for the earth to be so well inhabited, and the other planets perfectly solitary; and numerous as we know the inhabitants of the earth to be, we do not see them all, our world contains as many species of animals that are invisible to us, as of those that we discern. From the elephant to the hand-worm we can examine them; there our sight is bounded; but after the hand-worm is an infinitude of little animals not...
discernable by the naked eye, and to which, in point of size, he is an elephant. With magnifying glasses, we may see a drop of water, vinegar, or any other liquor, filled with little fishes or serpents; which we should never have thought of finding there; and some philosophers suppose the taste of these liquors is produced by punctures which the little animal make in the tongue. Mix these liquors with certain things, expose them to the sun, or leave it to corrupt, and you will find new sorts of animals.

Many masses, apparently solid, contain scarcely any thing but a heap of these small animals, which in so confined a situation find room enough for their little movements. The leaf of a tree is a world, inhabited by worms imperceptibly small, to which it appears an amazing extent, having mountains and caverns, and so large that from one side of the leaf to the other the little worms have no more communication with each other than we have with the antipodes. From such considerations I cannot doubt of a great
planet being inhabited. There have been found even in very hard stones an endless number of worms lodged in every interstice, feeding on parts of the stone. Consider the countless numbers of these little beings, and how many years they could subsist on a quantity of food as big as a grain of sand; and then though the moon should be but a mass of rock, we may let it be eaten by its inhabitants rather than not assign any to it. In short every thing is animated; every thing is full of life. Associate in your calculation all the species that have been lately discovered, and that those we may suppose are yet undiscovered, with all that we are in the habit of seeing, and you will surely confess that the earth is amply stocked with living creatures; that nature must delight in bestowing life since she has created such infinite variety of beings so small as to elude our sight. Can you believe that after the earth has been thus made to abound with life, the rest of the planets have not a living creature in them.
My reason is convinced, answered the Marchioness; but my imagination is overwhelmed with such an infinite variety and number of inhabitants existing in each of the planets; for as there is no dull uniformity in nature, the difference of species must be in proportion to the number of beings—how can imagination grasp such a vast idea? Imagination, I replied, is not required to represent all this to us; we can penetrate no farther than we are assisted by our sight; we can only perceive, from a general glance, that nature has established an inconceivable diversity in her works. The human face is formed every where on the same plan, but still how great is the difference between the visages of Europeans and of Africans or Tartars: not only in separate nations do we find a distinguishing character of countenance, even among the same people every family seems formed from a distinct model. How astonishing is the power of nature in giving such variety to so simple an object? In the universe we are but as a little family
whose faces resemble each other; the next planet contains another family who have a different style of countenance.—Probably the variations are greater in proportion to the distance, and could we compare the inhabitants of the earth and moon, we should easily see that they were nearer neighbours than those of the earth and of Saturn. Here, for instance, our thoughts are made vocal; the people in another planet only express themselves by gestures; farther off, they may dispense with any sort of conversation.—Here our reason is matured by experience; elsewhere experience may add little to the understanding; at a greater distance, children may know as much as old men. In this world we give ourselves more uneasiness about the future than the past; on another globe, the past afflicts more than the future: on a third, the people are neither distressed by one nor the other, and they perhaps are not the most unhappy. It is said that we are possibly in want of a sixth sense belonging to our nature, by means of which
our knowledge would be greatly augmented. This sense is most likely in some other world, where one of our five is wanting. There may even be a great number of natural senses, but in the distribution of them among the planets, only five have fallen to our share, and with these five we remain satisfied because we don’t know of any more. Our sciences have certain limits which no human understanding has exceeded: at a particular point we stop, the rest is reserved for other worlds, when they are ignorant of many things that we know. This planet is blest with the delightful emotions of love, but at the same time desolated by the fury of war. Another enjoys perpetual tranquillity, but with this uninterrupted peace, love is unknown, and calmness degenerates into ennui. In short whatever nature has done on a small scale, for the distribution of happiness and talents among us, she has undoubtedly performed on a more extensive plan for the benefit of the universe; at once diversifying and equalizing all.
Are you satisfied, Madam, said I? Have I given your imagination room to exert itself? Do you not already see the people of different planets? No, answered she, with a sigh: All you have been saying is so vague and unsatisfactory, there is nothing in it for the mind to fix on. I want something more determined; more marked. Well then, I replied, I will not conceal any particulars I am acquainted with: I can give you some information that you will acknowledge to be undoubted, when I tell you my authorities. Prepare to listen patiently if you please, for it is a long story.

In one of the planets, I shall not at present tell you which, there is a people that are very active, laborious, and skilful. Like some of our Arabs, they live by pillage, and that is their only fault. They live together in the most harmonious manner, labouring incessantly, and in concert, for the common good: above all their chastity is unexampled: it is true they have no great merit in it; they are all sterile; there is no difference of
sex among them. But, interrupted the Marchioness, were you not aware that the author of this marvellous story wanted to make a fool of you? How could such a nation be perpetuated? No, I replied, very coolly, they did not intend to make a fool of me; all that I have told you is fact, yet the nation is perpetuated.—They have a queen whose royalty consists, not in directing the business of the state, not in leading her subjects to the field of battle, but in her surprizing fecundity, she has millions of children; in short the production of them occupies the whole of her time. She has a large palace, divided into a vast number of chambers, in each of which a cradle is prepared for a little prince, and she is confined successively in all these chambers, always surrounded by her courtiers, who congratulate her on the noble privilege she enjoys exclusively of her subjects.

I see, Madam, that you wish to enquire who are her lovers, or, to give them a more respectable appellation, her hus-
bands. Some of the eastern queens have seraglios of men; she apparently does the same, but she keeps it a greater secret than they; this may arise from modesty, but it is acting with little dignity. Among these Arabs who are always in action, are found a few strangers, in person very much resembling the natives of the country, though extremely different in disposition, for they are remarkably indolent; they never stir out nor engage in any business; and were not these persons kept for the pleasure of the queen, they would hardly be suffered to remain amongst so industrious a people. If, in reality, notwithstanding the smallness of their number, they are the fathers of many thousands of children, they deserve to be excused from any other employment; and it is a striking proof that this is their only function, that as soon as the queen has brought forth her ten thousand children, the Arabs kill, without mercy, the unhappy foreigners, then become useless to the state.

Have you done? enquired the Marchioness. Thank heavens! Let us now
resume a little common sense, if we can. Where have you picked up this romance? What poet is the inventor of it? I again tell you, I replied, that it is no romance. All this takes place on our globe, even under our eyes. If I must explain the mystery—these Arabs are no other than bees.

After this I gave her the natural history of bees, of which she had before scarcely ever heard more than the name. In concluding, you see, said I, that in attributing to other planets what is daily passing here, we should be accused of telling the most extravagant falsehoods. The history of insects in particular is a collection of wonders. I have no doubt of it, she replied: the silk-worm alone, with which I am better acquainted than the bees, would afford abundant materials for your descriptions. A people undergoing such wonderful changes as to be totally unlike what they formerly were; at one part of their lives crawling, at another, flying: in short a thousand incredible things might be told of the character and manners of this nation.
My imagination, continued the Marchioness, is beginning to work on the subject you have given me—the inhabitants of all the planets: I am conjecturing their figures; I can discern some of them very distinctly, but I don't know how to describe them to you. As to their figures, said I, I advise you to leave the formation of them to your dreams, we shall hear to-morrow what they have suggested, and whether they have been able to represent the inhabitants of any of the planets.
FOURTH EVENING.

Particulars concerning the Planets Venus, Mercury, Mars, Jupiter, and Saturn.

The dreams of the Marchioness did not assist her; they represented nothing that did not bear a resemblance to what we see here. I had the same complaints to make as certain people, whose paintings are always fanciful and grotesque, do at the sight of our pictures. Phsaw, say they, these are all men—here are no objects of imagination. We therefore resolved to content ourselves with the conjectures we should be able to make concerning the inhabitants of the planets as we continued our journey: we had last night got as far as Venus. We are assured, said I, that Venus turns on her axis, but it is not ascertained in how long a time, consequently we cannot tell the length of her days. Her year lasts but about eight months, as she
is not longer than that in performing her revolution round the sun. She is of the same size as the earth, therefore the earth and Venus appear equally large to each other. I am glad of that, said the Marchioness; then I hope the earth is to Venus the shepherd's star, and the parent of love, as Venus is to us. These appellations can be proper only for a pretty little, brilliant, gay looking planet. True, answered I; but do you know what makes Venus look so beautiful at a distance? it is the effect of her being very frightful when near. With good telescopes it has been seen that she is covered with mountains, much higher than ours, sharp pointed, and apparently very dry.* This kind of surface is the best calculated to reflect the light with great brilliancy. Our earth, whose surface is very smooth, compared with that of Venus, and partly covered with water, pro-

* M. Herschel's observations contradict this idea.—Venus has a very dense atmosphere, which prevents us from distinguishing any thing on her surface; the brilliant appearance of this planet arises from her proximity to the earth.
bably looks less beautiful at a distance. So much the worse, said the Marchioness, I should like her to preside over the loves of the inhabitants of Venus; they must certainly understand what love is. Oh! undoubtedly, I replied; the people in that planet are all Celadons and Sylvanders, and their every-day conversations are finer than the most admired in Clelia. Their climate is very favourable to the tender passion. Venus is nearer to the sun than we; from whence she receives a more vigorous and active influence.

I can see, interrupted the Marchioness, what sort of people the inhabitants are. They are much like the Moors of Grenada; a little, dark, sun-burnt people, scorched by the sun; full of wit and animation, always in love, always making love, listening to music, having galas, dances, and tournaments. Give me leave to tell you, Madam, answered I, that you know but little of the inhabitants of Venus. Our Moors of Grenada when compared with them would appear as cold and stupid as Greenlanders.

But what must the inhabitants of Mer-
cury be? We are above twice the distance from the sun that they are. They must be almost mad with vivacity. Like most of the negroes they are without memory, never reflecting; acting by starts and at random: in short, Mercury is the bedlam of the universe. The sun appears there nine times larger than it does to us: the light they receive is so brilliant, that our finest days would be but twilight in comparison; perhaps they would find them so dark, as not to be able to distinguish one thing from another. The heat to which they are accustomed is so intense, that they would be almost frozen in our Africa. In all probability, our iron, silver, and gold, would be melted in their world, and only be seen in a liquid state, as we in general have water, which in some degrees of cold becomes a solid body. The inhabitants of Mercury would not imagine that in another world those liquors, which, perhaps, form their rivers, are the hardest of all bodies. Their year lasts but three months. The length of their day is not known to us, because Mercury is so small, and so near
the sun, that it exceeds the art of all our astronomers to observe him with sufficient accuracy to determine what sort of motion he has on his centre: the inhabitants, I think, must wish it to be performed in a short time, for scorched as they are with the fierceness of the sun, the coolness of night is undoubtedly very desirable to them. The part which by rotation is deprived of the sun’s light, is illuminated by Venus and the earth, which must appear very large. As to the other planets, being farther off than the earth, they, seen from Mercury, appear much smaller than to us, and afford very little light to that planet.

I don’t feel so much for its inhabitants on that account, replied the Marchioness, as from the inconvenience they must suffer from such excessive heat. Let us try if we can’t relieve them in some way. Is it not probable they have long and plentiful showers, such as we are told fall continually for four months together, in our hot countries, at the seasons when the heat is most intense?

It may be the case, answered I; and
we may have another way of giving them relief. There are some parts of China which, from their situation, ought to be very hot, and yet, even in the months of July and August, the weather is so cold that their rivers freeze. This coldness arises from the quantities of saltpetre with which the countries abound; the exhalations, drawn up in great abundance by the heat, are of a cold nature. Mercury, if you please, shall be a little planet made of saltpetre, and the sun, by attracting the cooling exhalations, will thus prevent the evil it would otherwise be the cause of. However, we may rest assured that nature would not place beings where it was impossible for them to exist; and that habit, and ignorance of a better climate, render this situation agreeable: Mercury therefore may perhaps do very well without saltpetre, or abundant rains.

After Mercury, you know, we find the sun. We cannot possibly place inhabitants there: the why not fails in this case. We conclude from the earth being inhabited, that other bodies of the same na-
ture must be so too: but the sun does not resemble the earth, and the rest of the planets. He is the source of all that light which the planets only reflect to each other after they have received it from him. They may exchange, if I may so express myself, with one another, but none of them can bestow an original light. The sun is the sole proprietor of that treasure; which he distributes freely on every side. The light, thus issuing from the centre, is reflected from every solid body it meets, and from one planet to another, it proceeds in bright streams that intermix, and cross each other in a thousand directions, forming a splendid tissue of the richest materials. The grand luminary, by being placed in the centre, is in the most advantageous situation for animating each planet with his heat and radiance. The sun, then, is of a peculiar nature, but what that nature is, we find it difficult to imagine. Formerly it was believed to be a pure fire, but lately we have been undeceived by observing spots on the surface. As certain new planets had just before been dis-
covered; (I shall give you an account of these planets hereafter;) which entirely engrossed the attention of the philosophers, a sort of mania for new planets seized their minds, and they immediately concluded these spots were some; that they performed a circle round the sun, and necessarily concealed some part of his light, by turning their dark side towards the earth. The learned already, through these planets, complimented the different princes of Europe. Some gave them the name of one prince, some of another, and perhaps in time there would have been a great contest to know who had the best right to name these spots.

I don't like their plan, said the Marchioness. You told me, the other day, that the different parts of the moon were named after learned men; I thought that very proper; as princes monopolize the earth, it is but fair that astronomers should have the sky for their share, and not suffer princes to intrude on their domain. Allow them, however, I replied, if territory should be wanting, to consign to them some planet, or some part of the
moon. As to these spots on the sun, they can make no use of them; for instead of planets, we find they are only clouds of smoke or dross arising from the sun. Sometimes these clouds are greatly accumulated, sometimes we see little of them, and at other times they totally disappear. Sometimes a number of them are combined together, then they are separated into small parts; at one time they are very dark, at another they grow pale. It appears as if the sun were some kind of liquid: many people think it is melted gold, in a continual state of ebullition, producing impurities, which the rapidity of its motion casts up from the surface; they are afterwards consumed, and others produced. Only think what amazing bodies these are. Some of them are seventeen hundred times* larger than the earth, for you must know, the earth is more than a million times smaller† than

* The largest of the sun's spots are scarcely three times larger than the diameter of the earth, or twenty-seven times its bulk.
† The earth is only a hundred, or to speak with more exactness, a hundred and eleven times, smaller.
Imagine, therefore, what must be the quantity of this liquid gold, or the extent of this ocean of light and fire.

Other philosophers say, and with great plausibility, that the spots, or at least the greatest part of them, are not newly produced, and then destroyed after a certain time; but large, solid masses, of irregular forms, always subsisting; sometimes floating on the surface of the sun, sometimes partly, or entirely buried in the liquid substance, and presenting to our view different projections according to the size of the part that remains uncovered. Perhaps they may be parts of some great mass of matter which serves as aliment to the fire of the sun. However, let the sun be what it will, it does not by any means appear habitable.* It is a pity; the situation would be advantageous: placed at the centre, its inhabitants would see the pla-

* Some natural philosophers have, however, thought that the sun might be the cause of heat without being itself hot: and that there was a possibility of its being inhabited. M. Herschel believes its population very abundant. Trans. Philos. 1795. Decade Philosophique.
nets going round them in regular orbits, whilst to us their motions seem to have perplexing varieties, which are merely the effect of our not observing them from the best place: that is, the centre of their circles. What a sad thing it is: there is but one spot where the study of the celestial bodies would be extremely easy, and at that spot there is nobody to pursue the study. You forget yourself, answered the Marchioness. Were any one placed on the sun, he would neither see the planets nor the fixed stars; would not the light of the sun efface every other object? The inhabitants would doubtless think themselves the only people in existence.

I acknowledge my error, I replied: I was thinking of the situation of the sun without considering the effect of such an excessive light; but although you have so properly corrected my mistake, yet you must allow me to tell you that you have fallen into one yourself. The inhabitants of the sun would not see any: they would be either incapable of enduring so immoderate a light, or, were their
eyes sufficiently strong, of receiving it, unless they were at some distance; therefore the sun could only be a habitation for people without sight. In short, we have abundant proofs that this luminary was not intended to be a dwelling-place; and therefore we may as well continue our planetary journey. We are now stopping at the central point, which is always the lowest part in any thing that is round; and, by the way, I should tell you that in going from our world to this centre, we have travelled thirty-three millions of leagues. We must now return the way we came. We pass by Mercury, Venus, the Earth, and the Moon; all which we have visited. Then we arrive at Mars. I don't know that there is any thing remarkable of this planet. The days there are about half an hour longer than ours; and the year twice the length of ours, except a month and a half. Mars is four times less than the earth,* and the sun appears rather smaller and less brilliant than it does to us. In short,

* Its volume, or bulk, is five times smaller.
Mars contains nothing calculated to arrest our attention.

But what a beautiful object is Jupiter, surrounded by his four moons, or satellites! These moons are four little planets which, whilst Jupiter revolves in twelve years round the sun, constantly go round him, as the moon does round the earth. But, interrupted the Marchioness, how is it that there are planets which go round other planets, no better than themselves? It seems to me, that there would be much more regularity and uniformity in assigning to all the planets but one sort of orbit, in which they should move round the sun.

Ah! Madam, I replied, were you but acquainted with the vortices of Descartes; those vortices, so terrible in name, and so charming in the ideas they give rise to, you would not talk in this way. My wits must all go, said she, laughing. I must know what these vortices are.—Make me quite mad at once: now I have dipped into philosophy, I can’t trouble myself about the care of my senses; spite of the world’s laughter, we will talk of
the vortices. I did not know you had so much enthusiasm, said I; 'tis pity it has no other object than vortices.

What we call a vortex is a quantity of matter, whose detached parts move all in the same direction, but allowed at the same time to have some little movements peculiar to themselves, provided they still pursue the general course. A vortex of wind, for instance, is a vast number of little particles of air, turning all together in a circular direction, and involving whatever comes in their way.—The planets, you know, are borne along by the celestial fluid, which is prodigiously subtle and active. All the celestial matter, from the sun to the fixed stars, constantly turns round, carries the planets along with it, and makes them proceed round the sun in the same direction, but in longer or shorter periods, according to their distance from the centre. Even the sun is made to turn on its axis by being exactly in the midst of this moving matter; you will therefore observe, that if the earth were in the cen-
tral situation she could not be exempted from this rotation.

Such is the great vortex of which the sun is master; but the planets, at the same time, form little vortices in imitation of the sun. Each of them, while turning round the sun, turns likewise on itself, and carries in its motion a certain portion of the celestial matter, which is ready to receive any impulse that would not prevent it from following the general course: this is a vortex of any particular planet, and it extends as far as the motion of this planet has any influence. If a smaller planet comes within the vortex of a larger one, it is irresistibly carried round that larger one, and altogether, the large and small planet, and the vortex that encloses them, performs their revolution round the sun. Thus at the commencement of creation we obliged the moon to follow us, because she came within the influence of our vortex, and was by that means subjugated to our will. Jupiter, the planet we were speaking of, was more fortunate or more powerful than
the earth. Four little planets were in his neighbourhood, and he became master of them all; and we, who are a planet of some importance, would probably have felt his power, if we had been near him. He is a thousand times larger than the earth;* and would easily have drawn us into his vortex, and made us one of his moons; instead of this we have a planet to attend on us; so true is it, that the situation into which we are thrown decides the fate of our lives.

And how do we know, answered the Marchioness, that we shall always remain where we are? I begin to tremble lest we should be foolish enough to approach such an enterprising planet as Jupiter, or that he should come to us, for the sake of drawing us into his vortex; for I can't help thinking, from your description of the agitated state of this celestial fluid, that it must move the planets irregularly, sometimes urging them nearer together, sometimes sending them to a greater distance. We may as well expect to gain

* We may even say thirteen hundred times.
as to lose by such an eccentric motion, said I; perhaps we may make a conquest of Mercury or Mars, which are smaller planets, and incapable of resisting us. However we have no occasion for either hope or fear; the planets will remain in their places; and, like the former kings of China, they are forbidden to aim at conquest. You have observed that when oil is mixed with water, the oil swims at the top. Put any substance that is extremely light on both these, and the oil will support it, so that it will not touch the water: but put a heavier body, or a certain weight, it will pass through the oil, which is too weak to stop it, and keep falling till it meets the water, which has sufficient force to bear it up. Thus two liquors put together, being of unequal weight, will not mix, but place themselves in different situations, and neither will one rise, nor the other descend; pour on these other liquors which are of a nature to remain separate, and the same effect is still produced. In like manner the celestial matter which fills this grand vortex, is in separate strata, encircling
each other, of unequal weights, like oil and water, and some other liquors. Some planets are likewise heavier than others,* each therefore stops in the layer which has the degree of force necessary for supporting it, and keeping it in a state of equilibrium; and you must be convinced that it can never go beyond this stratum.

I understand, replied the Marchioness, that the different degrees of weight are sufficient to keep them in their proper ranks. I wish with all my heart there was some such regulating power among us, that would serve to fix people in the situation most suitable to them! You have quite removed my uneasiness with regard to Jupiter. I am very glad he will let us remain quietly with our little vortex, and single moon. I feel very well contented with one attendant, and do not envy him his four.

You would do wrong if you did, said I; he has no more than are necessary.

* The Cartesians carried their illusion so far as to believe that so solid a mass as a planet could be steadily supported by the ethereal fluid, the most subtle of all fluids.
He is five times farther from the sun than we, that is, a hundred and sixty-five * millions of leagues distant from it, consequently his moons receive and reflect but a feeble light: the number, therefore, compensates for the little effect produced by each: were they not separately so inefficient, four moons would appear unnecessary, as Jupiter turns on his axis in ten hours, and, of course, the nights are very short. The satellite which is nearest to Jupiter performs its circle round him in two and forty hours; the next in three days and a half; the third, in seven; the fourth, in seventeen; and by the inequality of their progress, they form a most pleasing spectacle for this planet. At one time they rise all four together; then, almost immediately separate; sometimes they are all at the fall, placed in a line, one above another; afterwards they are seen at equal distances in the sky; then, when two are rising, the other two will set. Above all, I should like to see the perpetual variety of eclipses among

* Calculated with more exactness, 179.
them, for there is not a day passes in which they do not eclipse each other, or the sun.* Surely as eclipses are so familiar to the inhabitants of that world, they must be considered a subject of amusement rather than terror, as they are here.

You will not fail, I suppose, said the Marchioness, to people these four moons, though they are only little subaltern planets, intended merely to give light to another during the night. Undoubtedly not, I replied. These little planets are not unworthy of inhabitants, because they are unfortunate enough to be subjected to a larger planet.

I think, then, answered she, these satellites ought to be like colonies to Jupiter; that their inhabitants should, if possible, receive from him their laws and customs, and in return, render him some degree of homage, and always consider the great planet with respect. Would it not be needful, said I, for the moons oc-

* Or, we may add, in which they are not eclipsed by the shadow of Jupiter, which happens the most frequently.
casionally to send deputies to Jupiter, who should take an oath of fidelity to him? I must own the little superiority we possess over the people in our moon makes me doubt whether Jupiter has much influence over the inhabitants of his satellites, and I think the only superiority he can aspire to is that of impressing them with awe. For of what a terrific size he must appear! To the planets nearest to him he looks sixteen hundred times larger than our moon appears to us.* Truly if the Gauls in ancient times were afraid the heavens would fall and crush them to death, the inhabitants of this moon may with greater propriety apprehend the fall of Jupiter. Perhaps, she replied, that is the subject of alarm to them instead of the eclipses, which you assure me they see without fear; † for as they are exempt from one folly, they must be subject to some other.—

* Thirty-six times larger than we see the moon: and they receive from him one thousand two hundred and ninety times more light.
† Their solar eclipses are of much longer duration than others.
Undoubtedly, answered I. The inventor of a third system, which I mentioned the other day, the celebrated Tycho Brahe, one of the greatest astronomers that ever lived, felt none of the vulgar terror at an eclipse; he was too much accustomed to study the nature of such a phenomenon: but what do you think he was afraid of instead? If when he first went out of doors the first person he saw was an old woman; or if a hare crossed the path he had taken, Tycho Brahe thought the day would be unfortunate, and returning in haste to his apartment, he shut himself up without venturing to engage in any occupation whatever.

It would be unjust, said she, if such a man as he could not with impunity overcome the fear of an eclipse, for the inhabitants of the satellite we were speaking of, to be exempted from it on easier terms. We will not spare them: they shall submit to the general doom; and if they escape one error, they shall be liable to another.

A difficulty has just occurred to me,
continued she, you must remove it if you can: if the earth is so small in comparison of Jupiter, are we visible to the inhabitants of that planet? I am afraid we are unknown to them.

Really I think so, answered I; the earth is certainly too small to be distinguished by them.*

We can only hope that in Jupiter there may be some astronomers who, after taking great pains to compose very excellent telescopes, and availing themselves of the finest nights for making their observations, may at length discover a very little planet, which they had never seen before. At first the learned give an account of it in their journal; the rest of the people either hear nothing about it, or laugh at it when they do; the philosophers are discouraged, and resolve not to mention it again, and but a few of the inhabitants, who are more reasonable than the others will admit the idea. By

* The earth at that distance must appear only three seconds and a half in diameter, as the planet Herschel does to us; but our nearness to the sun necessarily prevents them from seeing us at all.
and by they examine again; they see the little planet a second time; they are then assured of its reality, and even begin to think it has a motion round the sun. After observing it a thousand times, they find out that this revolution is performed in a year: and at last, when the learned have been at great pains to investigate the subject, the inhabitants of Jupiter know that our world is in the universe. The curious eagerly look through their telescopes, and, with all their looking, can scarcely discern it.

Were it not disagreeable, said she, to know that from Jupiter we can only be seen through telescopes; I should amuse myself with the idea of all the glasses being pointed towards the earth, as ours are towards him, and the mutual curiosity with which the two planets examine each other, and enquire, "What world is that? What sort of people inhabit it?"

Your imagination is too rapid, I replied; when the astronomers of Jupiter become acquainted with our earth, they do not become acquainted with us: they will not suspect the possibility of its be-
ing inhabited; if any one should venture to express such an idea, how would they laugh at him! Perhaps they would even persecute any philosopher who should maintain the opinion. After all, I think the inhabitants of Jupiter are too much occupied in making discoveries on their own globe, to concern themselves about us. Jupiter is of such extent, that if they are adepts in navigation, their Christopher Columbus must be fully employed. The inhabitants cannot know, even by reputation, a hundredth part of the other inhabitants. In Mercury on the contrary, they are all neighbours, living familiarly together, and hardly considering the tour of their world more than a pleasant walk. If we are not visible to Jupiter, much less can Venus be so, who is at a still greater distance;* and Mercury must be most out of its reach of all, being the smallest, and the most distant. However, the inhabitants can see Mars, their own four satellites, and Saturn with all his moons. Surely then they have

* Venus is not farther from Jupiter, but more concealed by the rays of the sun.
planets enough to perplex their astronomers: nature, in kindness, has hid from them the rest.

What! cried the Marchioness; do you consider it a kindness? Without doubt, answered I. This great vortex contains sixteen planets; nature, to spare us the trouble of studying the motions of so many of them, let us see but seven: is not that a favour? But not feeling the value of this mark of consideration, we have with great pains discovered the other nine which had been concealed from us: our curiosity brings its own punishment, in the laborious study which astronomy now requires.

I see, she replied, by the number of planets you mention, that Saturn must have five moons.* You are right, said I; and it is but just that he should have so many, as he is thirty years in going round the sun; and in some parts the night lasts fifteen years, for the same reason that on our globe, which turns in a

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* He has seven, and Herschel six. In all there are twenty-five planets, without reckoning ninety-one comets known in 1800.
year, there are nights beneath the poles of six months’ duration. But Saturn, being at twice the distance that Jupiter is from the sun, consequently ten times farther than the earth, his five moons faintly as they are illumined, would not give sufficient light during his nights; he has therefore a wonderful resource, the only one of the kind we have discovered in the universe: ’tis a large circle or ring which environsthe planet,* and which, being sufficiently elevated to escape almost entirely the shadow of Saturn, reflects the sun’s light on the darkened parts, and reflects it more strongly than all the five moons, because it is not so high as the lowest of them.

Really, said the Marchioness, with an air of deep reflection and astonishment, all this is managed with wonderful order; nature had certainly in these instances a view to the wants of living beings; this admirable disposition of light was not the effect of chance. Only the planets which are distant from the sun have

* Its exterior diameter is sixty-seven thousand seven hundred leagues.
been provided with moons—the earth, Jupiter, and Saturn; for Venus did not require any; nor Mercury, who already has too much light; whose nights are extremely short, and probably considered a greater blessing than even the days. But stop—I think Mars, who is farther from the sun than we, is without a moon. We cannot conceal the fact, I replied; he has none; but he doubtless has resources for the night which we are ignorant of. You have seen phosphorus; matters of that kind, whether liquid or dry, receive and imbibe the light from the sun, which they emit with some force when in the dark. Mars perhaps has high rocks of phosphorus that absorb, in the day time, light enough to irradiate the night. You must own it would be an agreeable sight for the rocks to light up as soon as the sun was set, and without art produce the most beautiful illuminations, that with all their radiance would not have the inconvenience of casting any heat. In America, you know, there are birds which in the dark will afford light enough to read by; how can we tell whether Mars has
not a great number of such birds, who as soon as the night is come disperse themselves on every side, and give an artificial day.

I am not satisfied, answered she, either with your rocks or birds. They would be pretty enough to be sure; but as nature has bestowed so many moons on Saturn and Jupiter, it shews that moons are necessary. I should have been very much pleased to find that all the worlds at a great distance from the sun had some, if Mars had not formed a disagreeable exception. Ah! replied I, if you were more deeply versed in philosophy you must accustom yourself to see exceptions to the best systems. We clearly see that some things are adapted in the most perfect manner to their end; others we accommodate as well as we can, or perhaps are obliged to content ourselves with knowing nothing about them. Let us do so with respect to Mars, since our researches are fruitless, and resolve to say no more about him.

We should be very much surprised, were we on Saturn, to see during the
night a great ring, extending over our heads in a semi-circular form from one end of the horizon to the other; and by reflecting the light of the sun, would have the effect of a moon at every part of the circle. And are we not to have inhabitants in this great ring? said she, laughing. Though I am disposed to place them wherever I can, answered I, I confess I dare not tell you there are any there; this ring appears too irregular a dwelling. As for the five moons, we can't dispense with inhabitants for them. If the ring, however, were what some suppose, only a circle of moons, following each other very closely, with an equal motion, and the satellites, five of these moons escaped out of the ring, what numbers of worlds would the vortex of Saturn contain! Be that as it may, the people in Saturn are uncomfortable enough, even with the help of their ring. It gives them light, it is true; but what sort of light, at that immense distance from the sun? The sun himself, which appears to them a hundred times smaller* than to

* Ten times less in diameter.
us, seems but a little pale star, emitting but a feeble light or heat. And could they be transported to our coldest countries, such as Greenland and Lapland, you would see them ready to expire with the heat. If water were conveyed to their planet it would no longer be water, but a polished stone, and spirits of wine which never freeze here, would become hard as diamond.

Your description of Saturn petrifies me, said the Marchioness; though just now you almost threw me into a fever in talking of Mercury. The worlds, answered I, which are at the different extremities of an immense vortex, must be totally unlike.

Then, replied she, the people are very wise in Saturn, for you told me they were all mad in Mercury. If they are not very wise, answered I, they are at least, I suppose, very phlegmatic. Their features could not accommodate themselves to a smile, they require a day's consideration before they answer any question, and they would think Cato of Atica unmanly and frivolous.
I am thinking, said she, that all the inhabitants of Saturn are slow; all those of Mercury are quick; amongst us some belong to the former class, some to the latter; may not that be in consequence of the earth's being placed just in the middle situation and participating of both extremes? The men of our world have no determined character; some are like the inhabitants of Mercury, others resemble those of Saturn, in short we are a compound of all the other planets. That's a good idea, replied I; we form such a ludicrous assemblage that it might easily be imagined we had been brought together from a variety of worlds. We are therefore very well situated for studying character, for this is an abstract of all the planets.

At any rate, rejoined the Marchioness, the situation of our world has one great convenience: the heat is not oppressive as at Mercury or Venus, nor the cold so benumbing as at Jupiter or Saturn. And we are in a part of the earth that is not subject to the greatest degrees of heat and cold experienced even on our own
globe. If a certain philosopher returned thanks to his Creator for having formed him a man, and not a beast; a Greek and not a Barbarian; I think we ought to be grateful for being born on the most temperate planet in the universe, and in one of the most temperate parts of that planet. You ought, likewise, Madam, said I, to be thankful for being young, and not old; young and handsome, not young and ugly; a young and handsome French woman, not a young and handsome Italian: there are many things to excite your gratitude besides the temperature of your climate.

Ah! replied she, let us be grateful for every thing, even the vortex in which we are placed. The happiness we enjoy is but little, we must not lose any of it; it is well to cultivate an interest in the most common things. If we are only alive to strong emotions our pleasures will be few, seldom attainable, and dearly purchased. Promise me then, said I, that when such animated pleasures are within your reach you will think of the vortices and me, and not neglect us en-
tirely. Very well, said she: but will philosophy always afford me new enjoy-
ments? For to-morrow, at least, answere-
ed I: I have the fixed stars in reserve for you, which surpass all that you have yet examined.
FIFTH EVENING.

Every Fixed Star is a Sun, which diffuses Light to its surrounding Worlds.

The Marchioness was very impatient to know what the fixed stars were. Are they inhabited, like the planets? said she, or are they not peopled? What can we make of them? Perhaps you would find out what they are, answered I, if you were to try. The fixed stars cannot be at less distance from the earth, than twenty seven thousand, six hundred and sixty times the earth's distance from the sun, which is thirty-thee millions of leagues; perhaps some astronomers would tell you they are farther still. The space between the sun and Saturn, the most distant planet, is only three hundred and thirty millions of leagues; that is but a trifle in comparison of the distance be-
tween the sun, or earth, and the fixed stars, in fact, we don't take the trouble to compute it. Their light, as you perceive, is brilliant: if they receive it from the sun, it must be very faint after travelling such an immense journey, and by reflecting it to us it would be still more weakened. It would be impossible for light, which had twice gone such a long space, to appear so bright as that of the fixed stars. They are therefore luminous in their nature, or in other words, they are so many suns.

Do I mistake, cried the Marchioness, or do I see your drift? Are you not going to say "the fixed stars are all suns: our sun is the centre of a vortex which turns around him; why should not each fixed star be also the centre of a vortex, turning round it? Our sun enlightens planets; why should not every fixed star likewise enlighten planets?" I need make no other answer, replied I, than Phœdrus made to Enone: thou hast named it.

But, rejoined she, you are making the universe so unbounded that I feel lost in
it: I don't know where I am, nor what I'm about. What! are they all vortices heaped in confusion on one another?—Is every fixed star the centre of a vortex, as large perhaps as ours?* The amazing space comprehending our sun and planets is but a little portion of the universe! An equal space, occupied by each of these vortices? The thought is fearful: overwhelming! For my part, said I, I think it very pleasing. Were the sky only a blue arch to which the stars were fixed, the universe would seem narrow and confined; there would not be room to breathe: now that we attribute an infinitely greater extent and depth to this blue firmament, by dividing it into thousands of vortices, I seem to be more at liberty; to live in a freer air; and nature appears with astonishingly increased magnificence. Creation is boundless in treasures; lavish in endowments. How grand the idea of this immense number of vortices, the middle of each occupied by a sun, encompassed with planets

* That may be the case, but we have no proof that there are planets turning round these stars.
which turn round him! The inhabitants of one of these numberless vortices, on every side behold the suns of surrounding vortices, although the planets belonging to them are invisible, as the light they receive from their suns cannot penetrate beyond their own vortex.

You are directing my eye, answered she, to an interminable perspective. I see plainly enough the inhabitants of the earth; then you enable me to discover, with somewhat less clearness, those of the moon and other planets contained in our vortex. After all that you require me to view the people that dwell in planets belonging to other vortices. I must confess they are so much in the background that with all my efforts they are scarcely perceptible to me. In short do they not seem almost annihilated by the very expression you are obliged to make use of in describing them? You must call them the inhabitants of one of the planets, contained in one, cut of the infinity of vortices. Surely the very idea of ourselves is as nothing when such a description is applied to us, when we are thus lost a-
amongst millions of worlds. For my part I find the earth begins to diminish into such a speck, that in future I shall hardly consider any object worthy of eager pursuit. Surely people, who form unnumbered schemes of aggrandizement, who are wearying themselves out in following up projects of ambition, are ignorant of the vortices. I think my augmentation of knowledge will increase my idleness, and when I am reproached for being indolent I shall reply, *Ah, if you knew the history of the fixed stars!* Alexander could not have been acquainted with it, answered I; for a certain author, who believes that the moon is inhabited, tells us very seriously that it was impossible for Aristotle to avoid receiving so rational an opinion (could Aristotle be ignorant of any truth) but that he never disclosed it for fear of displeasing Alexander, who would have been miserable to hear of a world that he could not subjugate. There would have been a still greater reason for keeping the vortices of the fixed stars a secret; if any body in those days had known them, they would not have thought
of ingratiating themselves with the monarch by talking of them. It is unfortunate that I who am acquainted with the system should not be able to reap any benefit from it. According to your reasoning it will only be an antidote to the disquietudes of ambition; that is not my malady. The weakness I am most addicted to is an excessive admiration of beauty, and I fear the vortices will have no power to assist me in overcoming it. The immense number of worlds destroys the grandeur of this, but it does not lessen the charms of a fine pair of eyes or a beautiful mouth, they retain their power in spite of all the worlds that can be created.

Love is a strange thing, said she, laughing; it escapes every corrective; there is no system that can abate its influence. But answer me seriously; have you sufficient reason for believing this system? To me it appears to rest on an uncertain foundation. A fixed star is of a luminous nature like the sun, therefore you say it must, like the sun, be a centre to a vortex containing planets which travel
round the sun. Now, is that a necessary consequence?

Listen, Madam, I replied; we are so naturally disposed to mingle the follies of gallantry with our gravest discussions, that mathematical reasoning partakes of the nature of love. Grant ever so little to a lover, and presently you are forced to grant him a great deal more, and so on till you don't know how to stop. In like manner admit any principle a mathematician proposes, he then draws a consequence which you are obliged to admit, and from that consequence another, and thus before you are aware he carries you so far, that on a sudden you wonder where you have got to: these two characters always take more than you mean to give them. You must own that when two things are similar in all that I know of them, I may reasonably think them similar in what I am unacquainted with in respect to them. From that principle I draw the conclusion of the moon being inhabited because she resembles the earth; and the other planets, because they resemble the moon. And because
the fixed stars bear a resemblance to our sun, I attribute to them all that he possesses. You have already made too many concessions to draw back, you must go on; do it therefore with a good grace. But, said she, in admitting this resemblance between the fixed stars and our sun, we must suppose that the inhabitants of another great vortex see it as a little fixed star, visible only during their nights.

That is indisputable, I replied. Our sun is so near to us in comparison of the suns belonging to other vortices that his light must be incomparably stronger to us than to them. When he is risen we can discern no other heavenly body: so, in another vortex, another sun eclipses ours, and permits it to appear only at night, with all the other suns, then visible. With them, fixed to the blue firmament, our sun forms a part of some imaginary figure. As to the planets which go round him, as they are not seen at so great a distance, they are not so much as thought of. Thus all the suns are daily luminaries to their own vortex, and nightly
ones to all the other vortices. Each reigns alone in his own system; elsewhere, is but one of a great number. Nevertheless, do not these worlds differ from each other in a thousand instances, notwithstanding this equality? for a general resemblance does not exclude a vast number of dissimilarities.

Surely, answered I: but the difficulty is to find them out. For aught we know one vortex may have more planets revolving round its sun, another fewer. In one there are subaltern planets, turning round the principal planets; in another they may be all alike. Here they all collect round their sun in a circle, beyond which is an empty space which extends to the neighbouring vortices; in other parts of the universe they may have their orbits at extremities of their vortex whilst the centre is left empty. And very likely there are some vortices without any planets; others, whose suns, not being in the centre, have a circular revolution, carrying their planets along with them; others, again, whose planets may rise and set with regard to their sun according to
the change of that equilibrium which keeps them suspended—What would you have more? Surely here is enough for a person who has never gone beyond one vortex.

All that is nothing, she replied, for the number of worlds. What you have been imagining would suffice with five or six, instead of millions.

If you talk of millions, now, said I, how will you count them when I tell you there are many more fixed stars than you discover; that with telescopes an endless number are seen which are invisible to the naked eye; and that in a single constellation, where we might before have counted a dozen or fifteen, there have been found as many as we were accustomed to observe throughout the heavens?*

Have pity on me, cried she; I yield; you have overwhelmed me with worlds.

*I conclude, from a pretty accurate calculation, that we may perceive a hundred millions with a telescope that has an opening of four feet; I have clearly distinguished fifty thousand, and my glass is but two inches and a half in diameter.
and vortices. Ah! said I, but I must add something more still; you see that white part of the sky, called the milky-way. Can you guess what it is?—An infinity of little stars, invisible to our eyes on account of their smallness, and placed so close to each other that they seem but a stream of light. I wish I had a telescope here to shew you this cluster of worlds. In some measure, they resemble the Maldavia Isles, those twelve thousand little islands or banks of sand, separated only by narrow canals of the sea, which one might almost leap over. The little vortices of the milky-way must be so close, that from one world to another the people might converse or shake hands. The birds, at least, I think, can go from one world to another; and pigeons may be taught to carry letters as they do in our Levant from one town to another. These little worlds must deviate from the general rule by which the sun of any vortex effaces at its rising all the other suns. In one of the little vortices contained in the milky-way the sun of that particular vortex can hardly appear closer to its pla-
nets, or more brilliant, than a hundred thousand other suns, in the neighbouring vortices. The sky, then, is filled with a countless quantity of fires almost close to each other. When they lose sight of their own sun, they have thousands still remaining; and the night is not less enlightened than the day; at least the difference is so trifling that we may say there is no night. The inhabitants of those worlds, accustomed as they are to perpetual light, would be very much astonished to hear of miserable creatures who spend half their time in profound darkness; and who, even during the light of day, see but one sun. They would think we had fallen under the displeasure of nature, and shudder at our condition.

I don't ask you, said the Marchioness, whether they have any moons in the milky-way; they could be of no use to the principal planets, since they have no nights, and besides that, move in so small a space that they could not be encumbered with subaltern planets. But, continued she, by multiplying worlds so
liberally, you give rise to a great difficulty. The vortices, of which we see the suns, touch our vortex: the vortices you say are round; can so many circles touch this single one? I can't understand how it is.

It shews a great deal of sense, answered I, to discover this difficulty, and even to be unable to solve it, for it is in itself well founded, and in the way you conceive it, unanswerable; therefore there would be but little proof of wisdom in finding an answer to what was incapable of any. If our vortex were in the figure of a die, it would have six flat sides, which is very far from a circle; on each of these sides might then be placed a vortex of the same shape. If instead of six it had twenty, fifty, or a thousand, flat sides, an equal number of vortices might come in contact with it, each resting against one of these sides. You know the greater number of flat sides a body has, the nearer it approaches in form to a circle; so that a diamond cut into a great number of facets, if they were extremely small, would be nearly as round as a pearl
of the same size. The vortices are only circular in this manner. They have an amazing number of flat sides, each of which is close to another vortex. These sides are very unequal; some larger, some smaller. The smallest correspond to those of the milky-way. If two vortices leave any space between, which must often be the case, nature, to make the most of the extent, fills up the vacancy by one or two, or perhaps a thousand, little vortices, which without inconveniencing any of the others, form one, two, or a thousand more systems of worlds; so there may be many more worlds than our vortex has sides; and I dare say, though these little vortices are formed merely to fill up spare corners of the universe that would otherwise have been useless; though they may be overlooked by the neighbouring vortices, yet they are quite satisfied with themselves. It is probably such little vortices whose suns we cannot discover without telescopes, of which there is a prodigious number. In short all these vortices are adjusted in the best order imaginable; and as each of them
must turn round its sun without changing place, it is formed to move in the most easy and commodious manner for that purpose. They, as it were, catch hold of each other, like the wheels of a watch, and mutually assist the motion. It is likewise true that in a sense they counteract one another: each vortex if it had no external pressure would extend itself; but when it attempts to swell, it is repelled by the surrounding vortices, which forces it to shrink back; then it extends again, and so on;* some philosophers think that the fixed stars give such a sparkling intermittent light in consequence of this alternate expansion and contraction of the vortices.

There is something agreeable, said the Marchioness, in the idea of such a combat among the worlds, and the reciprocal emission of light produced by it, which apparently is the only communication carried on between them.

No, no, I replied, that is not the only

* The preservation of the starry system is more satisfactorily explained by attraction; they are all kept in equilibrium by their mutual attraction.
one. The neighbouring worlds sometimes send us visitors, who come in a very magnificent style. These visitors are comets, ornamented with brilliant flowing hair, a venerable beard, or a majestic train.

Ah! what ambassadors! said she, laughing. We could dispense with their company, for they only frighten us. They only frighten children, answered I, because their appearance is extraordinary; but there are many children among us. The comets are merely planets, belonging to another system. Their orbit was toward the extremity of their vortex, which was perhaps differently compressed by those that surrounded it: the lower side was flatter and was next to us. These planets, beginning at the upper part to form their circle, did not foresee that it would not extend beyond the limit of their vortex, at the lower part; in order, therefore, to continue their circular journey, they were obliged to enter the extremities of the next vortex, which

† It is indisputably proved that the comets belong to our solar system.
we will suppose is ours. They always appear to us extremely elevated, moving on the other side of Saturn. Considering the prodigious distance of the fixed stars, there must be between Saturn and the extremities of our vortex a great space void of planets. Our enemies reproach us with the inutility of this space, but we find there is a use for it, as it is devoted to the service of foreign planets, that occasionally enter our system.

I understand, said she, we don't allow them to penetrate into the heart of our vortex, and mix with our planets; we receive them as the Grand Seignior receives the ambassadors that are sent to him. He does not honour them with a lodging in Constantinople, but assigns them one in the environs. There is another resemblance, I replied, between us and the Ottomans; they receive ambassadors without sending any in return; and we receive the comets without sending any of our planets to return their visits.

From all these circumstances, answered she, we seem to be very proud; yet we should not hastily form that conclusion;
these strange planets have a very menacing air with their beards and trains; perhaps they are only sent to insult us; ours not having so imposing an appearance would not be so well calculated to inspire those worlds with awe. The tails and beards, I replied, are merely extraneous: the planets themselves do not differ from ours; but in entering our vortex they assume the beard or train from a certain illumination derived from our sun. This, by the bye, has not been very well explained by our astronomers; however, they are sure it is only some sort of illumination, and they must tell us more of it when they can. Then I wish, rejoined she, that our Saturn would take a beard or a tail, and frighten the other vortices; then laying aside his terrific appendages, return to us, and perform his ordinary functions. He would do better to stay where he is, answered I. You recollect I explained to you the shock produced by the repulsive power of each vortex: I think a poor planet must be violently shaken in such a situation, and the inhabitants cannot feel
much the better for passing through it. We think ourselves vastly unfortunate when a comet makes its appearance, whereas we ought to consider the comet most unfortunate. I am not inclined to pity it, said the Marchioness; I dare say all its inhabitants arrive here in good health, and it must be extremely entertaining to them to enter into a new vortex. We who always remain in our own have but a dull life. If the people in a comet have the sense to know the time at which they shall pass into our vortex, those who have already been the journey, are just before busily employed in describing to the rest what they will see. Speaking of Saturn, they say: "You will presently see a planet with a great ring round it. Then, you will discover one followed by four small planets." Some of these people, perhaps, are set to watch the moment of entering our system: when it is arrived, they cry, new sun, new sun, as our sailors exclaim, land, land.

I find then, said I, it is useless to attempt raising your compassion for the comets: I hope, however, you will not
refuse it to the inhabitants of a vortex whose sun has been extinguished, and who are thus condemned to perpetual darkness. Suns extinguished! cried she. Yes, undoubtedly, I replied. The ancients saw certain fixed stars which are no longer visible.* These suns have been deprived of their light; ruin must have ensued throughout the vortex; a general mortality on all the planets; for how could existence be maintained without the sun? The thought is too dreadful, said she; is it not possible to evade it? I'll tell you, answered I, what some intelligent people have imagined. They think that the fixed stars that have disappeared are not extinct, but partly darkened; that is to say, that they have one side obscure, the other luminous; that as they turn on themselves, they first present the light part to us, and then the dark; when that is the case, we cease to see them. Apparently the fifth moon belonging to Saturn is in this condition, for during part of its revolution we entirely

* In 1572 and 1604, some beautiful stars appeared to burst into light, and afterwards became extinct.
lose sight of it; at which time it is not most remote from the earth; on the contrary, it is then sometimes nearer than when visible. Though the moon is a planet, and therefore cannot exactly guide our opinion with respect to suns, yet we may suppose that a sun can be partly covered with fixed spots. To spare you the pain of believing the other opinion, we will adopt this, which is more agreeable: but I can only receive it when applied to such fixed stars as have a regular time for appearing and disappearing, as some have lately been observed to do, otherwise we cannot suppose them half suns. What must we say to the stars that disappear, and do not become visible after a time that would certainly have been sufficient for turning on their axis? You are too just to require me to believe that they are half suns: however I will do all in my power to serve you; we will conclude that these stars are not extinguished, but plunged in the unfathomable depth of the sky, and thus become invisible; in this case the vortex would accompany its sun, and all go on as usual. It is true
that the greatest part of the fixed stars have not any motion which removes them farther from us, for if they were not equally distant, they would sometimes appear larger, sometimes smaller; but that is not the case. We will therefore suppose that some of the small vortices, being light and active, slip between the others, and return after they have made their tour, whilst the larger systems remain immovable. But there is one inevitable misfortune: there are some fixed stars, which for a long time are alternately visible and invisible, and at length totally disappear. Half suns would reappear at a regular time; others that had retreated to an immense distance, would at once disappear, and be concealed for a very long time: exert therefore all your resolution, Madam; these stars are certainly suns which grow so dark as to be invisible to us, then resume their brightness, and afterwards are entirely extinguished. How, exclaimed the Marchioness, can a sun, a source of light become darkened? With the greatest ease, answered I, if Descartes be in the right.
He imagines that the spots on our sun, being impurities, or vapours, may grow thick, collect together, form themselves into a mass, and continue to encrust the sun till it is quite hid. If the sun is a fire connected with solid matter, serving as its aliment, we are not in a better condition: the solid matter may be consumed. 'Tis said we have already had a fortunate escape: the sun during several years, (the year, for instance, after the death of Caesar,) appeared very pale; owing to the incrustation which was beginning to form. The sun had sufficient force to break and disperse it; had it continued, we should have been lost. You make me tremble, said the Marchioness. Now I know the consequences of paleness in the sun, instead of going to my glass every morning to see if I am pale, I think I shall go and look whether the sun is so. Take courage, Madam, I replied, it requires a good deal of time to ruin a system of worlds. But, answered she, it seems as if time would inevitably effect it. I cannot take upon me to deny it, said I. The immense mass of
matter which composes the universe is in continual motion, even the smallest particles of it, and since there is this motion we are in danger, for changes must happen, either slowly or rapidly, but always in a time proportioned to the effect. The ancients were so vastly wise as to imagine the heavenly bodies were of such a nature as never to alter, because they had not observed any alteration in them. Had they leisure to assure themselves of this by experience? Compared with us the ancients were young: if flowers that last but a day were to transmit their histories to each other, the first would draw the resemblance of their gardener in a certain way: after fifteen thousand ages of these flowers had elapsed, others would still describe him in the same manner. They would say, "We have always had the same gardener, the memoirs composed by our ancestors prove this to be the case; all their representations exactly apply to him; surely he is not mortal like us; no change will ever take place in him." Would the reasoning of these flowers be conclusive?—it would have
a better foundation than that of the ancients respecting the celestial bodies; and had there never to this day been observed any change in the heavens, though they should appear likely to remain much longer without alteration, I would not decide on them; I should think more experience necessary. Should the term of our existence, which is but a moment, be the measure of other durations? Ought we to assert that what has lasted a hundred thousand times longer than we, must last for ever? No, ages on ages of our duration would scarcely be any indication of immortality. Truly, said the Marchioness, I think these worlds can have no pretensions to it. I shall not do them the honor to compare them with the gardener who outlives so many transient flowers; they are but as those flowers themselves, springing up and fading away, one after another: for I suppose if old stars disappear, new ones become visible; the species cannot otherwise be continued. Yes, answered I, we need not fear the extinction of the species. Some will tell you these new stars are only suns
which re-approach us after having been for a long time at a distant part of the heavens. Others think they are suns that have broken through the crust that began to cover them. I easily conceive the possibility of all this; but I think it equally possible for new suns to be created. Why should not the matter that is fit to compose a sun, after having been dispersed in various places, be at length gathered together in one spot, and then become the foundation of a new system of worlds? I am the more inclined to this opinion because it answers better to the grand idea I entertain of the works of nature. Has she now no way of producing and destroying plants and animals but by a continual revolution? I am persuaded, and I doubt not that by this time you are so too, that she exerts the same power with respect to worlds. But on such subjects we can only form conjectures. The fact is that for nearly a century past, in which, by the help of telescopes, almost a new heaven has been discovered, unknown to the ancients, there have been few of the constellations in which some
sensible alteration has not taken place;* the greatest number of changes is observed in the milky-way, as if more motion and bustle existed among this heap of worlds. Really, said the Marchioness, I find the worlds, in short all the heavenly bodies, so liable to change that I have quite overcome the horror I felt at the idea of the sun's being extinguished. Well, replied I, to prevent your relapsing, we will say no more about them, we are arrived at the uppermost part of the heavens, and to inform you whether there are any stars beyond that, exceeds my skill. You may place more worlds or not, just as you are disposed. These invisible countries should, in propriety, be left to the philosophers: they may imagine them to exist, or not exist, or to exist in any way they choose. I shall content myself with having directed your mind to all that is discernable by your sight.

Ah! she exclaimed, then I am acquainted with the whole system of the

* This is not proved.
universe! how learned I am! Yes, said I, you are learned enough in all reason, and your knowledge is attended with this convenience,—you may retract your belief of all that I have told you wherever you think proper. I only ask as a reward for my trouble, that whenever you see the sun, the sky, and the stars, you will think on me.*

* As I have given these conversations to the public, I think it would not be right to conceal any thing which passed on the subject. I shall publish another dialogue of the same kind that we had a long time after these. It shall be entitled the "Sixth Evening," as the rest were evening scenes.
SIXTH EVENING.

Additional Thoughts in Confirmation of those in the preceding Conversations. Discoveries that have lately been made in the Heavens.

FOR a long time the Marchioness and I said nothing about the plurality of worlds, we had apparently forgotten that we had ever talked on the subject. I went one day to her house, and just as I entered, two men of talents and celebrity were going out. You see, said she, what visitors I have had; I assure you they are gone away with a suspicion that you have turned my brain. I should be very proud of such an achievement, answered I, it would show my power, for I think one could not devise a more difficult undertaking. Well, replied she, I am afraid you have accomplished it. I don't
know how it happened, but whilst my two friends, whom you met at the door, were here, the conversation turned on the plurality of worlds; perhaps they had an invidious design in directing it to that subject. I immediately told them all the planets were inhabited. One of them said he was certain I could not be of that opinion: in the most unaffected manner, I maintained my sincerity; he continued to think I was only feigning, and I believe he had too great a regard for me to admit the possibility of my having really adopted so extravagant an opinion. The other, from esteeming me less, did not doubt my veracity. Why have you made me obstinately adhere to sentiments which people who have the greatest friendship for me will not suffer themselves to believe me possessed with?—But, Madam, answered I, why did you maintain these opinions seriously, when talking with persons that I am sure would not gravely argue on any subject?—Should we thus trifle with the inhabitants of the planets? Let us, who believe their existence, be content to remain a
little select band, and not disclose our mysteries to the vulgar. Vulgar! exclaimed she; do you reckon these two men among the vulgar? They have good understandings, said I; but they never reason. Grave reasoners, who are austerer people, would not hesitate to place them in that class. They however take their revenge by ridiculing the reasoners. We should if possible accommodate ourselves to persons of both characters; it would have been better to speak jestingly of the planetary inhabitants to such men as your two friends, since they are accustomed to pleasantry, than to enter on an argument, for which they have no talents. You would have retained their good opinion without depriving the planets of a single inhabitant. Would you have meanly sacrificed the truth? answered she. Where is your conscience? I must own, I replied, I have not much zeal for truths of this nature; I would readily forbear to maintain them if it suited my convenience.

The cause which prevents people from believing the planets to be inhabited is,
that they appear to them only bodies placed in the heavens to give light, instead of globes consisting of meadows and fruitful countries. We readily believe that meadows and fields are inhabited, but it is thought ridiculous to assert that mere luminous bodies are. 'Tis in vain that reason informs us of fields in the planets; reason comes too late, the first coup-d'œil has impressed our minds before-hand, and this impression is not willingly parted with. The planets, 'tis said, are only luminous bodies; what sort of inhabitants then can they have? Our imaginations do not enable us to distinguish their figures, therefore it is the shortest way to deny their existence. Would you require me, for the sake of establishing the idea of these inhabitants, whose interest cannot be very dear to me, to attack all the powers of the senses and the imagination? Such an enterprise would demand a vast deal of courage. Men are not easily persuaded to see through their reason, rather than their eyes. Some few persons are rational enough to believe, after a thousand proofs
have been given them, that the planets are worlds like ours, but they do not believe it in the same way they would do, if they had not seen them apparently so different; they always recur to the first idea they had formed, and can never wholly divest themselves of it. These people seem to *condescend* to our opinion, and only patronize it from a love of singularity.

Is not that enough, said she; for an opinion that is merely probable? You would be astonished, answered I, if I told you the word probable was too modest for the occasion. Is it merely probable that Alexander has been in existence? No, you consider it certain; and what is the ground of your certainty? Is it not that you have had every proof that such a subject requires, and that no circumstance leads you to doubt the fact? You have never seen Alexander, nor have you any mathematical demonstration of his existence. What would you say if this were the case with respect to the inhabitants of the planets? We cannot show them to you, nor can you require us to
demonstrate their being, in a mathematical way; but you have all the evidence that can be desired: the entire resemblance between the planets and the inhabited earth; the impossibility of imagining any other use for which they could be created; the fruitfulness and magnificence of nature; the attention she seems to have paid to the wants of their inhabitants, such as giving moons to those planets that were very remote from the sun, and the greatest number of moons to the most distant: and it is an important consideration that every thing is on that side of the question, without any objections to counterbalance it; you cannot for a moment doubt unless you resume the vulgar mode of seeing and thinking. In fact it is impossible to have more evidence, and evidence of a more determinate kind; how then can you treat this opinion as a mere probability?

But do you think, said she, I can feel as certain that the planets are inhabited, as that Alexander has been in existence? By no means, I replied; for although, on the subject we are speaking of we have
as many proofs as in our situation we can receive, yet these proofs are not numerous. I protest, exclaimed she, I'll renounce these planetary inhabitants, for I don't know whether to believe there are any or not—it is not certain, yet it is more than possible—I am quite perplexed. Do not be discouraged, Madam, I replied. Clocks that are made in the most common manner show the hour; those only that are made with more exquisite art, indicate the minutes; in like manner common minds see a great difference between probability and absolute certainty; but it is only superior understandings that ascertain the degrees of certainty or of probability, and who, if I may use the expression, can tell the minutes as well as the hours. Place the inhabitants of the planets a little below Alexander in point of certainty, but above a vast number of historical relations which are not entirely proved; I think that is their proper place. I love order, said she, you do me a kindness in giving arrangement to my ideas: why did you not do this before? Because, answered
I, whether you attribute to this idea a little more or a little less certainty than it possesses is of little consequence. I am certain you don’t feel so assured as you ought to do of the earth’s motion: are you the less happy on that account? Oh! as to that opinion, I am sure I do my duty; you have no right to complain of me, for I firmly believe that the earth turns. Yet I have not given you the most convincing proof of it, answered I. You use me very ill, said she, to make one believe things without sufficient reason; am I unworthy to hear the best arguments? I wished to prove my opinions, I replied, by easy, entertaining arguments; would you have had me make use of such solid, sturdy ones as I should have attacked a doctor with? Certainly, said she; now fancy me a doctor, and let me have this new proof of the earth’s motion.

With all my heart, answered I; it is this, and I am vastly pleased with it, because I think I found it out myself: but it is so good and so natural that I can hardly hope to have been the inventor. I am sure an obstinate learned man who
wished to oppose it, would be forced to
talk a great deal on the occasion; and
that is the only way in which a scholar can
be overcome. It is evident either that all
the heavenly bodies go round the earth
in four-and-twenty hours, or the earth,
turning on her axis, only imagines the
motion in them. It is the most impro-
vable thing in the world that they should
in reality go round the earth in that short
space of time, though we are not at first
aware of the absurdity of such an opin-
ion. All the planets certainly revolve
round the sun: but these revolutions are
unequal from the unequal distances at
which they are placed from the sun: the
most remote, as we might naturally sup-
pose, take a longer time than the rest.
This order is observed even in the satel-
lites that go round a large planet. Ju-
piter's four moons, and the five belong-
ing to Saturn, require a longer or short-
er time to move round their planets ac-
cording to their distance from it. It is
further ascertained that the planets have
a rotation on their axis; the time of this
is likewise unequal; we cannot tell the
cause of such inequality, whether it depends on the different size, or the degree of solidity of the planets, or on the different degrees of rapidity of the vortices in which they are enclosed, and the liquid matter by which they are carried along; this inequality however is certain, and in general we find that the order of nature is such as to admit of particular variations in things that are regulated by the same rules.

I understand, said the Marchioness; I am quite of your opinion; if the planets moved round the earth, the time employed by each would be different, according to their various distances, as is the case in their revolutions round the sun: is not that what you mean? Precisely so, Madam, answered I; their unequal distances from the earth would produce an inequality in their revolutions round her; and the fixed stars, being so extremely remote from us, so far beyond all that could have a general movement round us, at least situated in a place where such a motion must be very feeble; is there any probability of their revolving round us in...
four-and-twenty hours, like the moon which is so near to us? Ought not the comets likewise which do not belong to our vortex, which have such irregular courses, and such different degrees of swiftness, to be exempt from performing this daily circle round our world? No, planets, fixed stars, and comets too, must all turn round the earth! Were there but a few minutes difference in the time of their revolutions we might be satisfied with it; but they are all exactly equal, never varying in the slightest degree; surely this is a conspicuous circumstance.

Oh! replied the Marchioness, I could venture to say this exactitude existed only in our imaginations. I am glad that any thing inconsistent with the genius of nature, which this equality in so many moving bodies would be, should depend on our motion, and she, even at our expense, be free from the charge of inconsistency. For my part, said I, I dislike a perfect regularity, and I don’t approve of the earth’s turning every day on her axis in exactly twenty-four hours; I am disposed to think the time varies. Varies!
she exclaimed; do not our clocks show that it is always equal? Oh, replied I, I don't depend on clocks, they cannot always be perfectly right; and should they be so, and sometimes show that the earth has made a longer or shorter tour in four-and-twenty hours than usual, it would be thought that we ought rather to suspect them of being wrong than attribute any irregularity to the revolutions of the earth. That is paying an extravagant respect to her, I should depend no more on the earth than on a clock: the one might be put out of sorts almost by the same causes as the other, only I think it would take longer time to produce a sensible irregularity in the earth; that is the only advantage I should allow her to have over a clock. Might not the earth by degrees get nearer to the sun, where the matter being agitated with greater violence, she might perform her motion on her axis, and her revolution round the sun, in a shorter time? In that case the years would be shorter, and the days too, but we should not perceive the difference, for we should still divide the
year into three hundred and sixty-five days, and the day into twenty-four hours. So that without living longer than we do now, we should live a greater number of years: and on the contrary, if the earth were to remove farther from the sun, we should live fewer years; although our lives would be as long. In all probability, said she, if that were possible, a long succession of ages would make but a trifling difference. True, I replied; nature does nothing abruptly, her method is to effect every alteration by such gentle gradations that it is scarcely perceptible to us. We hardly observe even the changes of seasons; others that are produced much more slowly must in general escape our notice. Nevertheless every thing is subject to mutability; even a certain lady who has been seen, through telescopes, in the moon for about forty years appears considerably older. She used to be rather handsome: now her cheeks are fallen away, her nose and chin are beginning to meet; in short all her charms are fled, and it is even feared that her life is near its close.
What are you talking of? cried the Marchioness. I am not jesting, I replied, they have perceived in the moon a particular figure, which had the air of a woman's head, jutting out of rocks, and it is owing to some changes that have happened there. Some pieces of mountains have mouldered away, and left us to discover three points, which can only serve to make up the forehead, nose, and chin, of an old woman. Well, said she, but do you not think it is some destiny that had a particular spite to beauty, since the young lady's head is the only spot in the moon that has undergone a change. Perhaps in recompence, replied I, the changes which happen upon our earth dress out some face which the people in the moon see; I mean some face formed like those of the people in that planet, for we always try to discover in distant objects the resemblance of what we continually think of. Our astronomers discern young ladies' faces in the moon; probably if women were to examine it they would find handsome male faces. If I were to look, I
don't know whether I should not see your likeness, Madam. I must undoubtedly, said she, feel myself obliged to any body who could find me there; but let us return to what we were talking of just now: are there any considerable alterations on the earth? In all probability there are, answered I. Many high mountains, at a great distance from the sea, have on them beds of shells, which show that they were formerly covered with water. Sometimes likewise, at a distance from the sea, are found stones containing petrified fishes. How could they have got to that place unless the water had been there? Fables tell us, that Hercules separated with his hands two mountains called Calpe and Abila, which being situated between Africa and Spain obstructed the ocean; and the sea immediately rushed in violently, and formed the great gulph that we call the Mediterranean. Fables are not altogether fabulous; they are histories of remote periods, disguised by two very ancient and common defects; ignorance, and a love of the marvellous. It is not credible that Hercules (for there have
been fifty), but the ocean may have torn asunder, perhaps with the assistance of an earthquake, two mountains more feeble than the rest, and have by that means rushed in between Europe and Africa. Then a new spot was discovered on our globe by the people in the moon, for you recollect, Madam, that the water forms a dark spot. It is the general opinion that Sicily has been separated from Italy, and Cyprus from Syria: new islands have sometimes been formed in the sea; earthquakes have ingulfed some mountains, and produced others, as well as changed the course of rivers. Philosophers give us reason to fear that the kingdom of Naples and Sicily, being over great subterranean vaults filled with sulphur, will some time or other fall in, when the vaults are no longer strong enough to resist the fires contained in them, which have now vent at such openings as Vesuvius and Ætna. All this will be sufficient to diversify a little the appearance we make to the inhabitants of the moon.

I had much rather, said the Marchioness, that we had tired them with the
same object always, than divert them with the swallowing up of provinces.

I do not know, replied I, if within this little time there have not been several burnt up in Jupiter. What, provinces burnt up in Jupiter! cried she; upon my word that would be considerable news. Very considerable, said I, Madam: we have remarked these twenty years in Jupiter a long train of light, more glaring than the rest of that planet's body. We have here had deluges, perhaps they may have suffered great conflagrations in Jupiter; how do we know to the contrary? Jupiter is ninety times bigger than the earth, and turns on his centre in ten hours, whereas we do not turn in less than twenty-four, which implies that his motion is 216 times stronger than ours.—May it not be possible, that in so rapid a circulation, its most dry and combustible parts should take fire, as we see the axle-trees in wheels from the rapidity of their motion will break out into flames! But however it is, this light of Jupiter is by no means comparable to another which in all probability is as ancient as the world,
and yet we have never seen it. How can a light order it to be concealed? said she; there must be some singular address to compass that point.

This light, I replied, is only visible at twilight, which is most frequently of sufficient power to conceal it; and when it is not hid by the twilight, either the vapours of the horizon prevent us from seeing it, or without great attention we may even mistake it for twilight. However, about thirty years since it was discovered with certainty, and for some time gave great light to the astronomers, whose curiosity wanted stimulating by something new. They might find as many new subaltem planets as they chose without feeling any interest in them. The two last moons of Saturn, for instance, did not enrapture them as Jupiter's satellites had done; custom destroys the power of every thing.

We see, during a month before and after the equinox of March, when the sun is set and the twilight disappeared, a sort of whitish light resembling the tail of a comet. It is seen before the dawn
and sun-rise; towards the equinox of September, and morning and night towards the winter solstice. At other times, as I have before said, the twilight conceals it; for we have reason to believe it always exists. It has lately been conjectured that it is produced by a large mass of matter, somewhat dense, which environs the sun for a certain extent. The greatest part of his rays penetrate this covering, and come to us in a straight line, but some of these rays by striking against the internal surface are reflected back to us, either before the direct rays can reach us in the morning, or after they have ceased to enlighten us in the evening. As these reflected rays come from a higher region than the direct ones, it is therefore earlier when we receive them, and later before we lose them.

On this ground I must retract what I said on the probability of the moon having no twilight, for want of a surrounding atmosphere as dense as that of the earth. She is no loser by it, if she can receive a twilight through this thick air which surrounds the sun, and reflects his
light to places which could not have his
direct rays. Then, enquired the Marchioness, will not this be a source of twi-
light to all the planets, without the ne-
cessity of a dense atmosphere to environ
each, since that which surrounds the sun
may produce the same effect for all the
planets in the vortex? From the frugal-
ity of nature, I am disposed to believe she
has effected the purpose by this mean
only. Yet, said I, in spite of this frugal-
ity, the earth would have two causes of
twilight, one of which (the dense air be-
fore the sun), would be useless, and could
only serve as an object of curiosity to the
frequenters of the observatory: but it
may be that the earth alone sends out
exhalations sufficiently gross to produce
twilight; and therefore a general re-
source has been provided for the other
planets; if their evaporations are more
pure and subtle. We perhaps, of the in-
habitants of all the worlds in our vortex,
breathe the grossest air; did the people
of the other planets know that, with what
contempt would they survey us!

That would be wrong, answered the
Marchioness; we are not contemptible for being surrounded by a thick atmosphere since the sun himself is in the same situation. Tell me, is not this air produced by certain vapours that you formerly told me issued from the sun; and may it not be to moderate the power of the first rays which perhaps would otherwise be excessive? I think it probable that the sun may be thus veiled, to accommodate it to our use. That is a happy idea, Madam, said I; you have found ed a pretty little system. We may add that this vapour possibly falls back in a sort of rain to refresh the sun, in the same manner as we sometimes throw water into a forge when the fire becomes too fierce. We cannot attribute too much to the power of nature; but all her operations are not made visible to us, therefore we cannot feel assured of having discovered her designs, or her manner of acting. We should not consider any new discovery a certain foundation for reasoning on, though we are very much inclined to do it: philosophers are like elephants, that in walking never put one
foot to the ground till they feel the o-
ther firmly supported. That comparison,
said she, is the most just, because the me-
rit either of elephants or philosophers does
not consist in external charms; we shall
however do well to imitate the superior
judgement of both: inform me more of
the new discoveries, and I promise not to
be in a hurry again to form systems.

I have told you, I replied, all the news
I have heard from the sky, and I believe
no later intelligence has been received.
I am sorry it is not so entertaining and
wonderful as some observations I read
the other day in an abridgement of the
Annals of China, written in Latin. They
there see a thousand stars at a time fall
from the sky into the ocean with an amaz-
ing noise; or dissolve and disperse in rain.
This has not merely been seen once in
China; I have met with the same account
given at two remote periods of time, be-
sides that of a star which goes towards
the east, and bursts with the noise of a
gun. It is a pity such sights should be
confined to China, while this part of the
world is never favoured with them. But,
said she, I never heard that the Chinese were great astronomers. No, answered I, but the Chinese are gainers by being at so great a distance from us, as the Greeks and Romans were by being separated for a long space of time; whatever is remote assumes the right of imposing on us.

Really I am more and more of opinion that Europe is in possession of a degree of genius which has never extended to any other part of the globe, at least not to any distant part. It is not perhaps able to diffuse itself over a great proportion of the earth at once, and some invincible fatality prescribes to it very narrow bounds. Let us then make use of it while it is in our possession: and let us rejoice that it is not confined to science and dry speculations, but equally extended to objects of taste, in which I doubt whether any people can equal us. Such, Madam, are the things that should engage your attention and constitute your philosophy.

THE END.

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