WINTER CULTURE OF MIGNONETTE.

MIGNONETTE is of easy cultivation when once its requirements are understood. Some potfuls are useful and acceptable for decoration at all times, but especially in the spring and early summer; it can then be obtained in greatest perfection. During hot weather mignonette has a tendency to produce seed so fast, that its beauty is soon lost. It is grown largely and well in the London market gardens, and it is but reasonable to suppose that equally good results should be obtained by winter cultivation away in the country where the atmosphere is much clearer. The earlier the seed is sown in September the better, as the plants then get tolerably strong and are better enabled to withstand the winter. It is best to sow in the pots in which the plants are intended to flower. These should be 5 inches or 6 inches in diameter, and be used clean and well drained. A good proportion of old mortar mixed with rather heavy loam and some dried cow manure I find to be an excellent compost. This can scarcely be rammed too hard in the pots if used somewhat dry, as the roots when once started will penetrate the hardest of soils. In filling the pots care must be taken that the whole of the soil forms one mass, for if it be rammed in separate layers, neither the roots nor water pass through it so freely. A little of the same soil should be sifted for covering the seed after it has been sown. The latter, if good, will only require sowing thinly, and the pots may be placed in any cold frame until the end of October. Abundance of air should be admitted after the plants appear, and these should be gradually thinned out to six or eight, according to the size of the pot. It is not advisable to thin too much in the autumn, as some of the plants are liable to die away in the winter. Those selected should be the strongest and most evenly placed over the surface. Mignonette is best kept through the winter in a cool place where all available light can be obtained and air admitted on favorable occasions. It should not be encouraged to grow in mid-winter, as it then becomes so weak, neither should it be exposed to dry fire heat. A position near the glass in a house where carnations, bouvardias, and such like plants flower in winter suits it admirably, as the circulation of air admitted by the laps of the glass prevents injury to the mignonette by the necessary fire heat in severe weather.

Frames, such as are used for bedding plants and where heat is only applied to expel damp and keep out frost, may also be employed, but as these have often to be covered up during a spell of frost, the house has a material advantage. Some advise keeping mignonette dry in winter, but I consider this quite a mistake. The plants do not require so much water at this season, but some should be given whenever necessary. If this is not done, in all probability they will die when it is given after allowing them to get quite dry. As the days lengthen in spring and the flowers show, plenty of water should be applied. A little artificial manure mixed at first with an equal portion of dry loam and spread with a label over the surface of the soil will prove beneficial, and the strength may be increased with safety as the plants progress. A small stick placed to each plant when young will keep them from falling about, and a much better shaped plant can be obtained than if it be tied later on. Batches to succeed these may be sown at intervals during the summer, and, with the exception of selecting a cool position, the same treatment may be adopted.

The best variety we have found for pot culture is a selected form of Miles' Spiral. It is not easy to obtain it true from seedsmen or to keep it true if other sorts are grown. The best plan is to weed out any plants that are not true so soon as the first flowers open and save seed from the best and most vigorous growing forms; a select strain can thus be obtained even in one season, and it can only be kept true by growing the one variety and saving seed annually, from the spring flowering plants preferred. The true variety above mentioned is a vigorous grower with broad foliage, and the spikes attain a length of 9 inches or more under good cultivation. It would be a great advantage to private gardeners to save seed themselves of any good annual plant they may possess, and such as cannot be obtained true with certainty from other sources. Where numerous varieties have of necessity to be grown near each other for seed production, the inferior forms will seed most freely, and, worse still, the pollen from these becomes distributed to the better ones, and causes their deterioration. Mignonette is a case in point. Let the above advice regarding it be put into practice, and the results will well repay the extra trouble incurred.—*J. G. K., in The Garden.*

COMETS.*

By Prof R. S. BALL.

FOR several months past I have anxiously considered how I could best discharge the honorable duty which has been intrusted to me this evening. I have to deliver an astronomical discourse, and to do my very utmost to make that discourse adequate to the subject, adequate to this large and cultivated audience, and adequate to the memorable occasion on which the British Association has first crossed the Atlantic Ocean.

I propose to address you this evening on the subject of comets, but it will be readily understood that, of a subject so vast and so elaborate, only a slender proportion can be comprised within a single lecture. The first question to be decided was how to select from the vast mass of materials those which would be most suitable for our discussion this evening. To describe the natural history of comets with any approach to completeness would be a very tedious, indeed almost an endless, task. We must rather select those episodes in the history which have especially added to our knowledge and enabled us to obtain a rational view of the whole subject. Does not Longfellow tell us how impossible it would have been for him to portray the fortunes of Evangeline throughout every detail? He has only disclosed to use the picturesque and eventful phases of that history. May I be permitted to say that I desire to treat my subject in a similar manner, and while concentrating my attention on the really important matters I shall yet follow the wanderer's footsteps, "not through each devious path, each changeful year of existence."

In pursuance of this scheme I shall at a single blow lop off all the earlier parts of the history. The great primitive discoveries of the character of comets and of their movements must be entirely omitted. The splendid researches of Sir Isaac Newton, and the classical achievement of Halley, are among this class. They are no doubt familiar to every cultivated mind, for they belong to that wondrous alliance between mathematics and astronomy which imparts a thrill of pleasure to the generous intellect. They are not for our discussion to-night.

* Lecture by Prof. R. S. Ball, Astronomer Royal for Ireland, at the Montreal meeting of the British Association.

I shall only address you upon the more recent acquisitions to our knowledge of comets; and in order to give definiteness to our programme, I shall select a certain epoch not yet twenty years old, which is to bound our retrospect into time past. There is a special appropriateness in the choice of the year 1866 as a starting point for the modern history of comets. A very memorable occurrence in that year attracted universal attention, and threw much and quite unexpected light on the nature of comets. The review of the subject given in this lecture will extend from the year 1866 to the present time. But even in this restricted interval it will not be practicable for me to give anything like an exhaustive account of the different researches that have been made. Every astronomical journal teems with observations of comets. Every year brings us one, or two, or three, or more comets; organized efforts are made to observe these comets to the utmost, and each season has its own harvest of discoveries. Amid this host of claimants for our attention we must wend our way this evening, glancing at some discoveries, according to others such notice as their importance may merit, but reserving special attention for the three monumental achievements in the modern history of comets. These are, first the determination of the connection between comets and shooting stars; secondly, the spectroscopic researches on comets; and thirdly, the investigations of the tails of comets. The first of these subjects must be for ever associated with the name of Professor Schiaparelli, the second with the name of Dr. Huggins, the third with the name of Professor Brdichin.

It was long ago remarked by Kepler, in language of splendid exaggeration, that there were as many comets in the heavens as there were fishes in the ocean. There are comets large and comets small, comets with one tail, comets with two tails, and comets without any tail at all. Comets appear at uncertain and irregular intervals; they are not confined to any special part of the heavens. A comet may be first discovered in one constellation, and after a journey across the heavens it may sink to invisibility in any other constellation. A comet is sometimes only seen for days or even for weeks, but sometimes it remains visible for months or even for years. The features of the comet itself are also in a course of incessant transformation during its visit. Its size and its shape are not constant. The interval of a few days, or sometimes of even a few hours, suffices to work wondrous changes in a body almost spiritual in its texture.

Amid all these elements of confusion, where are we to seek for the law and the order which really underlie the phenomena? There is law and there is order. Each one of the myriad comets pursues a definite high road through space. It is in the province of the mathematician and the astronomer to ascertain by their joint labors what the path is for each comet. The astronomer directs his telescope to the comet, and he reads from the graduated circles attached to his telescope the precise point in the heavens where the comet is located. He repeats this observation a few nights later, he does it a third time, and his work is done. All the mathematician absolutely requires is to know the place of the comet accurately on three nights. He will no doubt be glad to accept further observations; they will help to eliminate the errors inseparable from such labors; they will enable him to obtain three places of the comet purged from all sources of uncertainty. The comet is then within his toils. He can determine the route which the comet is pursuing. He can by his calculations follow the comet in its movements through the profundity of space far beyond the penetration of the telescope. The telescope only watches the comet during a brief portion of its career, but the subtle eye of the mathematician seldom loses sight of a comet once detected. He watches it recede to its greatest distance; he knows when the comet begins to return; he sees how it gradually approaches the sun. He assigns the spot on the heavens where the comet is first to appear, and he tells the day and sometimes even the hour when the telescope will welcome the wanderer's return.

It has long been known that the highway of each comet is one of those graceful curves known to geometers as conic sections. The comets which appear only once sweep through our system in a curve which cannot be distinguished from a perfect parabola. The small but exceedingly interesting class of comets which return periodically revolve in the most beautiful of all curves—the ellipse. The supreme law of gravitation has ordained that the comets must follow a conic section whereof the sun lies at one of the foci. But subject to this imperative restriction the orbit of a comet may have every degree of variety. A comet may revolve in a path so small that it only requires three years to complete a revolution. Another comet moving in a much longer ellipse will require seventy-five years. There may be every intermediate gradation, and there are some cometary orbits so vast that the mighty journey cannot be accomplished in less than thousands of years, while there are others whose orbits stretch out to a distance so stupendous that we fail to follow them in their wanderings. The ellipses seem to be utterly interminable, and in language of mathematics we say that the orbit is parabolic.

In order to enunciate the first of the great modern discoveries which we are to consider to-night, it is necessary to associate with each comet a certain particular elliptic path lying in a particular plane with a particular position in that plane and with a particular magnitude. The comet is, in fact, to be identified by its path as its only permanent characteristic, for, though the comets may exist in myriads, yet no two comets follow the same course through space, such a contingency is too remote to be worthy of serious contemplation; it is, in fact, infinitely improbable.

There is not, I believe, a greater surprise in the whole of modern astronomy than the discovery of a myriad of small bodies stealthily accompanying a comet in its mighty journey, and the surprise is all the greater when we consider that in another aspect we have been long familiar with these small bodies, and we have called them shooting stars or luminous meteors. It was Schiaparelli who first demonstrated, in 1866, the wholly unlooked for connection between the showers of shooting stars and the movements of comets.

Every one is familiar with the very beautiful spectacle of a shooting star, which is seen to flash into the air and vanish in a streak of splendor. These little bodies were long an enigma in astronomy, but they have gradually been subordinated to law and order. It has been found that the sun which controls the mighty Jupiter does not disdain to guide with equal care the tiny shooting stars, and their movements are now tolerably well known. The received doctrine about the shooting stars has stood the severest test known to science, that is, the test of fulfilled prediction. The first great prediction in this refined branch of astronomy was made about twenty years ago. It was foretold that a splendid shower of shooting stars would occur on the night of November 12, 1866. All the world knows how triumphantly this prediction was fulfilled.

If I may be permitted, I would wish to narrate in a few words my own experience of that ever memorable night. The details of that majestic spectacle have been engraved on my memory. I have had the good fortune to see other striking astronomical phenomena. The first was the glorious comet of 1858, the last was the transit of Venus in 1882; but I have no hesitation in saying that no phenomenon I have ever seen in the heavens, and no spectacle that I have ever witnessed on the earth, has impressed me so deeply and so profoundly as the great shower of shooting stars in 1866.

I was at that time astronomer to the late Earl of Rosse, at Parsonstown, and in the autumn of the year I attended my first meeting of the British Association at Nottingham. From the lips of my esteemed friend, Mr. James Glaisher, I learned that a great shooting star shower was to be anticipated on the 12th of November. The prediction could not be put forward with all the confidence that we have when the almanac foretells an eclipse. It was rather a venture, by which an important theory was to be put to a severe test.

On the ever-memorable night I was occupied as usual in observing nebulae with the present Earl of Rosse at the great reflecting telescope. In the early part of the evening the sky was clear, and the night was dark; but no unusual phenomenon occurred until about ten o'clock. I was at that moment watching a nebula at the eye-piece, when I was startled by an exclamation from the assistant by my side. I looked up just in time to see a superb shooting star stream across the heavens. Soon came another star, and then another, and then in twos and in threes. We saw at once that the prediction was about to be verified. We ceased the observations with the telescope and ascended to the top of the wall, which forms one of the supports of the great telescope. This position commanded an extensive view of the heavens, and from it Lord Rosse and myself, on a beautiful starlight night, witnessed that gorgeous display of celestial fireworks which has given fresh impetus to astronomy.

It was not merely the incredible number of the shooting stars that was remarkable. They came no doubt in thousands which no man could number, but what was especially to be noticed was the intrinsic brilliancy of each individual star. There were innumerable meteors that night, any one of which would have elicited a note of admiration on any ordinary occasion. As the night wore on and the constellation of Leo climbed up from the east, then the display exhibited a very interesting and characteristic feature, for, as each shooting star was projected across the sky, the track which it followed was invariably directed from the constellation of Leo, nay, even from a particular point in that constellation. So marked a property of the shower suggests an appropriate name, and accordingly this particular group of shooting stars bears the not unpleasant name of the "Leonids."

It is easy to demonstrate that the apparent radiation of the meteors from a point is only the effect of a perspective. They are really moving in parallel lines. Those parallel lines have a vanishing point, and that point is the radiant in the constellation of Leo. As we stood on the walls of the great telescope, we saw the true character of the radiant most beautifully demonstrated. Those meteors which appeared close to the radiant pursued a track which was greatly foreshortened. A few that were actually at the radiant, or very close to it, had no visible track at all; they merely shone like a very rapidly variable star, which rose from invisibility to brilliancy, and then again declined to evanescence, all within the space of a very few seconds. In these exceptional cases we viewed the track of the stars "end on." They were, in fact, coming straight at us, but fortunately there was a kindly screen which shielded the earth that night from the awful meteoric tempest. Each one of those meteors hurries along with a velocity truly appalling; it is more than a hundred times swifter than the swiftest bullet that was ever fired from a rifle. It is really the demoniacal impetuosity of this velocity which is the source of the earth's safety. The meteor moving freely through space suddenly plunges into our atmosphere. Instantly a gigantic resisting force is aroused. The velocity of the meteor is checked, and the energy stored in that velocity is transformed into heat. That heat is enough to raise the body red hot, to raise it white hot, nay, even to drive the solid mass into a streak of harmless vapor. Of all the countless myriads of shooting stars which went to their destruction on that night, not one single particle has ever been recovered. These facts, when placed in the crucible of the mathematician, conduct him to a solution of the problem as to the nature of the great shooting star shower. It is to be remembered that the law of gravitation determines the movements of these bodies. The meteor, ere its disastrous collision with our atmosphere, must have been traversing the solitudes of space in an elliptic path with the sun in one of the foci. This is as true of a meteor the size of a grain of sand as it is of the earth or the planet Jupiter. The astronomer then approaches the question with the knowledge that the orbit of the meteors is an ellipse (or at all events one of the conic sections), but what the particular ellipse is must be decided by an appeal to the actual observations. The facts are simple enough: We note in the first place that the shower took place on the 12th of November, but on the 12th of November in each year, or on any other fixed date, the earth is always at a particular point of its annual journey round the sun. The stream of meteors must therefore pass through that particular point of space, and hence the search for the orbit is narrowed, for only ellipses which pass through this particular point can fulfill the conditions of the question. Another clue is afforded by the position of that point in Leo from which all the meteors seemed to radiate. The mathematician sees how to fit the ellipse so that it shall give the proper radiant. And now the question has been narrowed almost to the last point. One more appeal to observation, and the ellipse will be absolutely known. All we must now learn is how long the swarm of meteors takes to complete the circuit of its mighty path. To answer this question, profound historical research has been made by Professor Newton, and a mathematical research has been made which has given additional luster even to the name of Adams. The great showers of meteors have been shown to have occurred at intervals for the last thousand years. The earliest record was in the year 902, on the occasion of the death of the Moorish king Ibrahim-bin-Ahmad. An old chronicler describes how the event was solemnized in the heavens no less than on the earth; he tells us how "that night there were seen as it were lances, an infinite number of stars which scattered themselves like rain to right and left, and that year was called the year of the stars." We now know that this exhibition was not, as the old chronicler thought, a miraculous compliment to the memory of the deceased prince; it was really only a shower of the Leonids, such a shower as appears every thirty-three years, such a shower as appeared in 1866, such a shower as may be anticipated in the year 1899.

By these researches the path followed by the Leonids has been completely determined. The plane of the ellipse, and every circumstance of its position, and its proportions have been reduced to numerical accuracy. The shoal of meteors pursue their path unseen by any astronomer, but the mathematician knows precisely where they are at this moment, and at every moment.

This point being gained, a great discovery was made by Schiaparelli in 1866. About that time a comet was seen, this comet was duly observed, and the path which it followed was computed. There was nothing very remarkable about the comet, and it would not now be much remembered save for one most extraordinary circumstance, which Schiaparelli was the first to proclaim. Like the shoal of meteors, this comet also revolves in an elliptic path around the sun. This is a mere consequence of the law of gravitation, and calls for no remark, but the fact that the two ellipses lie in the same plane is a very remarkable coincidence which could not be overlooked. When we further come to see that the two ellipses are of the same size and shape, when we see that they are placed in the same position, when we see, in fact, that the ellipse which is the orbit of the shooting stars is identical with the orbit of the comet, then we have obtained a result which ranks as one of the most striking astronomical discoveries that this century has witnessed.

The Leonids therefore travel through space precisely in the track of the comet of 1866. The question at once arises of the relation of the shoal of meteors to the comet. Is the shoal of meteors one thing and the comet another thing, and do both these things happen to be traveling in the same orbit without any necessary connection, or are we to suppose that the two objects, if not actually identical, are at all events very intimately connected? These are problems which, in the present state of our knowledge, it seems difficult to solve. I shall only lay down one or two principles which may help us to form a conclusion.

Whatever be the nature of comets, or the materials of which they are composed, whether they be faint or bright, large or small, periodic or parabolic, one fact is certain, their masses are all extremely small in comparison with their great dimensions. I shall indeed, at a later part of this lecture, show that comets seem to be almost imponderable when compared with the great masses of the sun and of the planets. The great bulk of a comet necessarily implies that many parts of it are at a considerable distance from its center of mass. Hence for a double reason the coherence of the parts of a comet arising from their mutual gravitation is an extremely feeble force. Each particle of the comet is directly solicited by the sun to pursue a path of its own, and if the forces of coherence be not adequate to overcome this tendency, the comet must undergo a gradual degradation into separate parts. As the periodic time of the orbit of each part will vary, it will follow that the comet will be spread out in fragments along its path. It would seem that these small fragments constitute the meteors.

It is often supposed that meteorites, or solid bodies which actually tumble down on the earth, are connected with shooting stars, and hence it has been asserted, and even by very good authority, that meteorites are connected with comets, if not actually parts of comets. I merely mention this view for the purpose of saying that to me it seems quite unsupported by the facts. There is no reliable evidence, or indeed no evidence at all, that meteorites are connected with the periodic showers of shooting stars which alone are connected with the comets. This would not be the occasion to discuss the interesting question as to the origin of meteorites, but all the available facts seem to me to point to an origin on some body far more closely resembling a planet than a comet. It is now about sixteen years since Dr. Huggins first turned his spectroscopic upon these bodies, and showed that certain lines in the spectra of the comet of 1866 were identical with certain of the lines of carbon. Since then many comets have been observed and much valuable spectroscopic work has been done. This has been so often and so fully discussed that I do not now propose to dwell on the subject at length. It is, however, quite impossible to avoid a brief reference to one of the latest efforts of Dr. Huggins' marvelous skill. He has succeeded in inducing a comet to depict with absolute fidelity its spectrum on the photographic plate. That photograph has not only shown the lines which could be seen with the spectroscopic, but it has also exhibited many other lines in the invisible part of the spectrum. The discussion of this photograph and of the bright lines and the dark lines it contains is full of interest, though here I shall only remark that it contains convincing evidence of the presence of carbon in this comet.

That a comet's tail should be directed away from the sun is a very remarkable and characteristic feature of this group of bodies. At the first glance it seems at variance with every received doctrine of astronomy. The great law of nature which regulates the movements of the heavenly bodies is the law of attraction. The very movement of a comet in an elliptic path around the sun is in itself a demonstration that the comet is attracted by the sun.

While the comet as a whole is amenable to the law of gravitation, it is obvious that the materials, whatever they may be, which constitute the tail of the comet must be repelled by some force of an exceptional character. This force must sometimes be of very great intensity. Cases are not wanting where a comet, after darting in close to the sun, has actually whirled round the sun, with the stupendous velocity of 300 miles a second, and in a few hours has commenced its outward journey. During this appalling swoop what has been the conduct of the tail of the comet? It seems necessary to believe that at the commencement the tail was streaming away for millions of miles on one side of the sun, while in a few hours the tail has gone completely round, so as to be extending for millions of miles in the opposite direction. No known laws of mechanics allow us to believe that the same tail is seen under circumstances so diverse. We are compelled to believe that the tail is constantly dissipated and constantly renewed. It would, in fact, seem that the tail of a comet was in some respects like the column of smoke ascending from a chimney—the column remains, but the particles of which that column consists are in perpetual transition.

In the study of this subject we have to make use of the interesting labors of Prof. Bredichin of Moscow. This accomplished astronomer has devoted himself for many years to the collection and to the discussion of all the known phenomena of comets' tails, and he has succeeded, I believe, in taking a considerable step in the solution of the problems involved. In the first place, he has shown that there are different types of comets, and he has proceeded to classify them. There are, first of all, the comets with very long and very straight tails, such, for instance, as the comet of 1874, and many others. The next class included the tails of a scimitar shape. These are often of very great splendor, though not so long or so straight as those of the first type. The great

comet of 1858 may be cited as an illustration of this class. The third and last class of comets' tails are very short and curved. It is to be observed that these tails sometimes exist in combination, so that a comet is often decorated with two tails of different type.

Once the form of the tail has been laid down, and the perihelion distance of the comet given, then the investigation of the forces adequate to the production of that tail is a problem admitting of numerical solution. It can be demonstrated that the straightest tail that ever streamed from a comet could be produced by a repulsive force not more than twelve times as great as the intensity of gravitation at the same distance. This number twelve will be the characteristic of tails of the first type. The tails of the second type vary within certain limits, but speaking generally, the repulsive force adequate to their production need not be more than about equal to the force of gravitation itself. The tails of the third type would be explained if the repulsive force were only the fifth part of gravity.

The next question that arises is as to the physical explanation of the repulsive force which produces these tails. We have to find this force of three different intensities, one about twelve times as great as gravity, one about equal to gravity, and one about a fifth of gravity. Before we postulate the existence of a new force of some unknown character, it is surely our duty to inquire whether there may not be some force already known which is competent to produce the phenomena. The best known repulsive force is of course that with which every one is familiar in connection with electricity. Electricity attracts electricity of an opposite type, while it repels that of the same type. We are also aware that in some mysterious manner the sun is connected with electricity. We know that the phenomena of terrestrial magnetism are connected with solar phenomena, and hence we are tempted to inquire whether the electricity of the sun may not offer an adequate explanation of the phenomenon of the comet's tail.

Let us suppose that the sun is attracting a distant body by virtue of gravitation, and at the same time repelling that body in virtue of the fact that the sun and the body are both charged with electricity of the same name. When the attracted body is one of large dimensions, the attraction will vastly exceed the repulsion, and indeed the latter may be entirely neglected in most cases. There is, however, a radical difference between the nature of the electrical forces and the nature of the gravitational forces. The latter are proportional to the masses of the attracting bodies, while the electrical forces are proportional to their surfaces. The mass varies as the cube of the linear measurements, while the surface only varies as the square. The relative efficiency of the electric repulsion in comparison with the gravitational attraction increases as the radius of the particle decreases. It must thus necessarily follow that no matter how great may be the preponderance of the power of gravitation on masses of finite dimensions, yet it must always be possible, other things being equal, to have a particle so small that the electrical repulsion shall exceed in any required ratio the intensity of the attraction of gravitation.

As the comet draws near the sun, the heat it experiences increases, so that the materials of the comet begin to dilate, and to be driven off into a vaporous condition. The matter is thus resolved into a state of extreme subdivision. These separate particles are charged with an electricity similar to that of the sun, and in virtue of their minuteness the intensity of that repulsion has become sufficient to sweep off the particles in a stream, and thus generate the tail.

Such is the modern view of the formation of comets' tails. Professor Bredichin has given good reasons for thinking that we can even discover the special ingredients which enter into the formation of each of the three types of tail. It seems, from the molecular nature of hydrogen, that this element is especially suitable for the tails of the first type. The tails of the second type seem to arise from some substances possessing the properties of hydrocarbons, while the tails of the third type contain some elements which seem to have a high atomic weight. The theory of Professor Bredichin is well illustrated by the comet of 1858. This comet, besides the majestic curved tail, the object of so much admiration, had a pair of long, faint, slender tails, streaming straight from the head. These two objects were doubtless the edges of a conical tail of the first type, too faint to be visible throughout its entire extent. The great tail was one of the second type.

We have many reasons for believing that the masses of comets are very much less than the masses of the planets. We might indeed almost conclude that the masses of the comets are inappreciable. Let us briefly indicate the grounds for this important conclusion.

The sun and the planets form a system characterized by perfect order and symmetry. We have the sun in the center. We have all the great planets moving round the sun in the same direction. They all move nearly in circles, and all these circles lie nearly in the same plane. This organization is a necessary *modus vivendi* among the bodies of our system. Each planet acts and reacts upon all the other planets, but, owing to the circumstances of their movements, their irregularities are but small, and the permanence of the system is insured. Alter that system to any extent, merely reverse for example the direction in which one of the planets is moving, and the whole compromise is destroyed. The actions and reactions, instead of being quickly balanced, will go on accumulating, and the seeds of confusion and ultimate dissolution have been sown. But we have in our system thousands of comets which repudiate all the regulations by which the planetary convention is restrained. Comets come in what direction they please, they move in every plane but the right one, and their orbits are not in the least like circles. The very fact that our earth continues to revolve around the sun so as to be a fit abode for life is a proof that comets cannot have any considerable mass. If comets had mass, then organic disease would be introduced into the solar system, which must ultimately prove fatal.

Science has gradually dissipated the fears which once invested comets; they are interesting and beautiful visitors which come to please and instruct, never to threaten or to destroy.

HOT WATER FOR SPRAINS.

FOR sprains, Prof. Brinton teaches that the limb is to be put into a vessel of very hot water immediately, boiling water being added as it can be borne, and kept immersed for twenty minutes or until the pain ceases. Then put on a pretty tight bandage, and order rest. Sometimes the joint can be used in twelve hours. If the trouble is more chronic, apply a silicate of sodium dressing, and let the patient walk with a cane, if the ankle be the joint affected.—*Col. and Clin. Record.*

SLEEPLESSNESS.

OF the new hypnotic the *Medical Press* says: Paraldehyde is claiming the attention of the profession, as in some respects it is superior to chloral, as it is very safe to give in simple sleeplessness, and leaves no unpleasant after-effects. However, it is of no use where insomnia is the result of pain. It is given in the following formula:

Paraldehyde..... 3 j.
Syrup of orange..... 3 j.
Water..... 3 j.
To be taken at bedtime.

—*Louv. Med. News.*

BEER CAUSES BRIGHT'S DISEASE.

MOST physicians of fifty years ago, or more, are familiar with the fact that a generation ago Bright's disease was rare; now it is one of the most familiar causes of death. Every day's paper contains the names of its victims. The reason for this is manifest; it is the pernicious and foolish habit of daily indulging in beer drinking.—*Gaillard's Med. Jour.*

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