The meteor was evidently a Perseid, and had a radiant at 36° + 57°. It was first seen when at a height of 95 miles above Oxford, and disappeared when 61 miles above Devizes. Its real length of path was 53 miles, and the earth point is indicated in the English Channel about 10 miles south of Lyme Regis, Dorsetshire.

On August 11, 11h. 43m., Prof. Herschel mapped a small bolide, rivalling Jupiter in brightness, and traversing with moderate speed a course of 15° from 229° + 59° to 225° + 44°, or from near ι Draconis to the head of Boötes. Duration of flight 1·5 sec.; the nucleus was evenly bright all the way, and it left a streak for 3 secs. Mr. Corder registered the same meteor, and gives the time as 11h. 42m., magnitude equal to Jupiter, and path as 60° + 62½° to 70° + 64° in Camelopardus.

This object was also a Perseid, the radiant being at 32° + 52° near the cluster at χ Persei. The meteor at its first appearance was 75 miles high above a point 5 miles N. of Stratford-on-Avon, and at its disappearance 52 miles high over a place 5 miles W.N.W. of Great Malvern. Its real length of path was 34 miles, and earth point 6 miles S.E. of Aberdare.

*Red Spot on Jupiter.*—When twilight became too strong for comet-seeking on the morning of August 25 last, I turned my 10-inch reflector on Jupiter and saw the red spot, indefinitely, near its central transit. The planet had only just risen above the tops of some houses in this locality, and the telescopic image was by no means good, but I estimated the transit of the spot occurred at 4h. 24m. A.M. (August 24, 16h. 24m.), or about 9·4m. after Mr. Marth's zero meridian, System II., so that the longitude of the spot was 5°·7. The shouldering of the great south equatorial belt, east of the spot, was very conspicuous, and afforded an excellent guide to the position of the latter. A few minutes after the transit of the red spot I noticed a large white spot on the north side of the north equatorial belt, passing the central meridian. A power of 312 was used in these observations. W. F. DENNING.

Bristol, September 7.

## Curious Optical Phenomenon.

THE following description of an optical phenomenon, and its probable explanation, may be of interest. It will be observed that a similar experience occurring to one not accustomed to making optical experiments would very probably have caused him to believe that he had seen a ghost. It is therefore of importance psychologically.

The facts observed were as follows:—At about 1 A.M., August 26, I went to my bedroom; to get to it I had to pass through a small room which I used as a study. On entering it, though it was dark, and I had no lamp, the small room seemed brightly illuminated, about as bright as an 8 c.p. lamp would make it, apparently. To one side of a window in the room I saw a man standing, whom I recognised to be myself. The whole impression was very vivid and clear.

So far nothing was observed beyond what is described in the ordinary ghost story. I was much occupied with the consideration of a problem at which I had been working, and did not at first grasp the full signification of what I saw. On turning my head, the figure disappeared, but on looking towards the window, through which a very faint line came, the image reappeared. I then noticed that it was apparently standing in a position occupied, as I knew, by a large table. On more close examination, without, however, moving from the spot where I was standing, I saw that it had changed, and that it did not appear to have features; then it appeared to be flat against the wall, and I finally recognised it as an after-image of a shadow. On my first seeing it, however, it did not have this appearance to me, and I had evidently mentally supplied the features as one often does to the face of a friend who is seen at a distance which is really too great to admit of actual recognition.

I then got the impression of having seen the shadow before, and on considering the matter a few seconds, remembered that it was just before I had started for my room. I had been working in another room, endeavouring to solve a physical problem for four or five hours, and for about half an hour, or possibly more, had been steadily looking at a lamp (a habit of mine when abstracted); I then got up, leaving the lamp lit, and went out on my way to my bed-room as mentioned above. On going out of the door my shadow was thrown by the lamp on the wall just to the right of the door. The passages were entirely dark, and it was not until I entered the room used as a study, that the faint light coming through the window and falling on the same spot of the retina that was previously occupied by the image of the dark doorway, stimulated the after-image.

I may say that my health was of the best, but that I had been smoking heavily for a few days previously, and the fact had begun to force itself upon me.

I would especially remark upon the apparent brightness of the apparition. I had never seen an after-image so bright. On going back to the room where the lamp was, I proved that the appearance of the shadow thrown as I went out of the room corresponded with that of the image seen, minus of course the features and colour, which had been supplied by the imagination.

In speaking of optical phenomena, I would say that an easy way of showing that the colours seen in the colour-top are due to lack of accommodation, is by taking a piece of red paper or cloth, and turning the top till the inner or outer line matches it exactly. Then, without moving or changing the speed of the top, place before the eye a convex glass. The colour on the top will disappear, but that of the cloth will of course remain. Similar experiments to those observed with the top can be observed by drawing dark lines on a piece of glass, and waving dark and white paper behind them. R. A. F.

## A Remarkable Flight of Birds.

THE forms of birds flying at a great height and crossing the solar disc, as described by Mr. Bray in your issue of August 29, have been rather frequently seen here during the spring and autumn months, and the writer has always attributed such flights to migrating birds on passage. They have usually been noticed while observing the image of the sun projected on a card screen from the eyepiece of a small equatorial telescope; occasionally, however, they have attracted attention at night also, crossing the disc of the moon, upon which their forms are very clearly defined, and with careful focussing (which is very nearly the same as for parallel rays) it has almost been possible to identify the species from the shape of the wings and manner of flight; birds of the swallow tribe, in particular, have been clearly distinguished, and others resembling the thrush, possibly redwings or fieldfares, have been noticed. The direction of flight, according to the writer's experience, is nearly always towards the south in August and September, and the reverse in April.

On August 31, a continuous watch was kept on the moon from 8.50 to 9.35 P.M., using a power of 80 diameters on a reflector of 10 feet focus. Only eight birds were seen, however, four of them slowly crossing from north to south, the other two from west to east (nearly). They were evidently very distant. An estimate of the change of focus required for the apparently nearest bird gave ·15 inch. This would imply a distance of 7900 feet from the telescope, and the moon's altitude being about 14° the vertical height of this bird would be 7900 × sine 14° = 1900 feet (about). Some of the birds, judging from their apparent size, must have been two or three times more distant, and therefore higher in the same proportion.

It would be very interesting to obtain systematic observations of such flights of birds from various localities during the migrating seasons. Possessors of telescopes would find these observations a good exercise in that kind of patience or endurance which is so necessary in observing, for instance, a so-called meteor shower at its maximum!

The writer would be glad to receive notes on the subject from those of your readers who may care to watch for birds during the autumn. Estimates of the angle subtended by the spread wings would perhaps give the most reliable means of ascertaining the height of the birds, and their direction of flight can easily be obtained by reference to the diurnal motion of the sun or moon. It is hoped that by collecting data of this kind some new facts may be learned regarding the mysterious habits of our bird visitors. J. EVERSHED.

Kenley, Surrey.

## *THE WOBURN EXPERIMENTAL FRUIT FARM.*

ON June 12 last a small party of those interested in agriculture and horticulture, including Mr. Herbert Gardner, Sir John Thorold, Prof. Armstrong, Prof. Warington, Dr. Voelcker, Mr. Charles Howard, Mr.

Carruthers, Mr. George Murray, and others, visited Woburn to make the first formal inspection of an institution which, under the above somewhat unpretentious title, has been established by the joint action of the Duke of Bedford and Mr. Spencer Pickering, F.R.S., in order to supply what has hitherto been a great national want.

The object of this institution is to provide an experimental station where all matters connected with horticulture, and especially with the culture of hardy fruits, may be investigated both from the scientific and practical point of view.

The origin of such an enterprise is always a matter of some interest, and it becomes all the more so in after years, when, too often, the details of its conception and evolution are irretrievably lost. In the present instance we may trace the origin to an accident in a chemical laboratory. It was owing to such an accident some years ago that Mr. Pickering, whose work in physical chemistry is well known, was driven to seek health in a partial existence in the country. Not having the means, however, to procure this in the orthodox manner without abandoning his scientific work, he resorted to the somewhat unusual means of getting air and exercise by becoming an agricultural labourer at Rothamsted. From an agricultural labourer to a small farmer and landowner the steps were not so tedious as is generally the case, and for some few years past Mr. Pickering has turned his attention, after the manner of many landowners, to horticulture and practical fructiculture. To any one of a scientific turn of mind the unsatisfactory basis on which the culture of fruit depends cannot fail to be apparent. Its present condition is little better than that of horticulture some fifty years ago. It rests mainly on the hard-earned and often one-sided experience of practical men, gardeners, for the most part, or nurserymen.

But the pressure of business will rarely allow a nurseryman to indulge in anything approaching to systematic research, and even when he does obtain any important results, they are liable to be looked on askance, as being possibly tinctured by mercenary considerations. Moreover, even amongst the highest practical authorities there is hardly a single point in the cultivation of fruit on which unanimity of opinion prevails; indeed, on some of even the most elementary processes there seem to be as many opinions as there are so-called authorities.

The desirability of having some station where such matters might be patiently investigated, and from which results might issue free from any taint of commercial expediency, was evident to Mr. Pickering, and not having himself the capital or land necessary for such an undertaking, he applied for assistance to a former college friend, the Duke of Bedford. The Dukes of Bedford have during generations past identified themselves with the progress of agriculture and horticulture, the present holder of the title showing no tendency to be eclipsed by his predecessors in these matters. As was probable, such a scheme met with the hearty approval of the Duke, and the result was the establishment of the present institution, conducted jointly by himself and Mr. Pickering.

The fruit farm is on the Duke's land near Ridgmount Station, and almost adjoins the land which is given up to the use of the Royal Agricultural Society as an experimental agricultural station. About twenty acres have been devoted to the purpose, and of this some fifteen have already been planted.

Everything at present justifies the anticipation that this station will be conducted in the liberal and thoroughgoing manner which alone can produce results capable of commanding the confidence of horticulturists, and the energy with which the work has been commenced indicates that no time will be lost in obtaining trustworthy results. It is but twelve months since the field was bearing a crop of roots and weeds (especially the latter), yet in spite of the adverse season, the ground has been thoroughly cleaned, roads, hedges, and fences have been made, a house built on it, and over 500 experimental plots have been planted; also an extensive nursery has been planted, as well as collections of various ornamental and useful trees and shrubs. A fine crop of eighty different varieties of strawberries has been already gathered. With such work accomplished, it is scarcely necessary to say that an able manager is resident on the farm. The present manager, Mr. L. Castle, is a man whose experience and knowledge will command the confidence of practical horticulturists.

It is only possible here to indicate briefly the character of some of the experiments instituted. Besides strawberries—the investigation of which will embrace not only the respective merits of different varieties, but also the comparative values of the varieties at different ages, and the effects of certain manures on the crop—apples have been selected for the majority of the experiments already begun. Sixty different experiments are arranged to test different methods of planting, of root and branch treatment, and different manurial treatment, each experiment being made on eighteen trees, six of each of three varieties, all of the same age, and all raised on the same stock. These trees are all dwarf trees, and certain of the experiments are repeated with standard trees on the free-growing stock, and also with other dwarf trees of a fourth variety. Thirty-eight plots have been devoted to ascertaining the influence of different methods of training on the quantity and quality of the crop, and a collection of about 120 good varieties of apples has been made, each variety being grown on different stocks, and subjected in each case to different methods of treatment. This collection of apples is also so arranged that it may be utilised for the investigation of insecticides, without destroying the value of the results as regards the comparison of the different varieties. A smaller but interesting collection of apples of Scotch, Irish, and foreign origin has also been made. The numerous shelter hedges which have been planted are also of considerable interest, since, from an economical point of view, they also are experimental. They are composed of different varieties of nuts, plums, damsons, crabs, quince, medlars, and berberries.

Other experiments of greater scientific interest than the above are, we understand, either in progress or in contemplation; amongst these may be mentioned the influence of different stocks on the scion, and the great question of the effects of self- or cross-fertilisation. Such experiments, however, necessitate the lapse of a considerable amount of time before they can be said even to have been started, if they are to be started on a really satisfactory basis.

Those who are familiar with Mr. Pickering's chemical work will not fear that sufficient attention to minute details will be absent from the present undertaking. As instances of the thoroughness with which small questions are being examined, we may mention experiments on the relative merits of different arrangements of the same number of trees in a given area, and of the different direction in which the rows run as regards the points of the compass. Or, again, experiments on the influence of the nature, position, and inclination of the cut given in pruning a branch, and also the improvements which are being devised in methods of measuring the evaporating power of the air.

But it is very noteworthy that the strictly practical and economical aspects of horticulture will receive more attention than is usually the case at experimental stations. Six demonstration plots of a quarter of an acre each have been planted to illustrate how land may be most advantageously cropped by farmers, growers, and cottagers respectively. The initial cost of each of these plots is known, and an accurate account of the incoming and outgoing connected with each will be kept. In the nursery,

to which allusion has already been made, trees and bushes are being raised for distribution amongst the Duke's tenantry. We are pleased, however, to find that these practical steps for the promotion of fructiculture do not originate in any extravagant notions of the all-saving powers of fruit-growing to remedy the present agricultural distress. Much harm has been done in this country by the special pleading of those who are faddists on the subject, and who advocate their fad by holding up to view all the notable cases of success, and all the possible advantages to be gained, while they keep in the background all the difficulties and dangers, minimise the costs of planting, and hide the numerous cases of failure. No one can question the fact that fruit-growing in England is a profitable occupation when properly conducted under favourable conditions of soil, climate, and distance from market; nor can it be doubted that a certain proportion (perhaps 5 or 10 per cent.) of those who are now ordinary farmers could become fruit farmers with great advantage to themselves, and it must also be admitted that the distribution of some knowledge of fruit-growing over the country generally would render the thousands of orchards attached to homesteads a source of small, or often substantial, profit to the holders, instead of being, as they are at present, a mere waste of land and money; but to imagine that every farmer can become a fruit grower is as absurd as imagining that every farmer could become a horse breeder. Even if such a metamorphosis were possible it would be suicidal; yet it should be pointed out that the fruit market in England is an exceptionally expansible one, and that prices of hard fruits would probably be but little affected even if the supply were doubled; the rapidly increasing importation of apples, which has now reached 5,000,000 bushels a year, has had no effect whatever on the market price of the fruit. These might have been grown in England just as well as abroad, for with a proper selection of varieties England need never fear a competition with foreign-grown apples.

It is certainly a fallacy to suppose that it is only in a few exceptionally favoured districts that fruit can be profitably grown: the appearance of the trees and the abundant crop of strawberries at the Woburn Experimental Fruit Farm are sufficient to demonstrate that a field of ordinary arable land of average fertility, with nothing to recommend it for fruit-growing beyond having a gentle slope to the south-west, and with a reputation amongst farmers of being the most unmanageable in the district, may be rendered highly suited for the production of fruit. To produce such results, however, right methods of procedure are, of course, essential, and nothing could be more striking than the difference between the bulk of the apple-trees at the farm, and those growing on two plots where the planting and subsequent treatment were such as is usually adopted by farmers: the ground where these trees were had, indeed, been properly trenched and cleaned once, but the trees had been carelessly planted, the branches had not been cut back, and the weeds had been subsequently allowed to grow; the result was that along the branches there were only a few half-dead leaves of not more than one-fifth of the proper size, and it would have required a trained horticulturist to have recognised that these trees were of the same variety as those which had been properly tended.

Visitors were also much struck by the evidence which the results at the farm afforded of the hardiness of English fruit trees. No season could have been more trying for recently-planted trees than that just experienced. A very wet autumn, during which the heavy soil of the farm was unworkable, was followed by a winter of almost unprecedented severity, and this, in its turn, by a still more trying period of drought. Yet, with the exception of the young stocks and a few strawberry plants, the mortality amongst the thousands of trees and bushes brought on to the ground in the autumn, was confined to about six individuals and half of these were killed through the improper method purposely adopted in planting them.

All readers of NATURE will wish success to an enterprise so well begun and so liberally conducted, which is clearly destined to afford results of high economic and scientific value.

## *THE REVISION OF THE "BRITISH PHARMACOPŒIA."*

THE last edition of the "British Pharmacopœia" was issued in 1885, and though a thin volume of "Additions" was published by the General Medical Council in 1890, the progress of science and the requirements of medical practice have rendered necessary a complete revision of the official handbook. The work has accordingly been entrusted to a Committee of the Council, consisting of Sir Richard Quain, F.R.S., Chairman, the only remaining member of the Committee of 1885; Sir Dyce Duckworth and Mr. Carter, of London; Dr. Leech, of Manchester; Dr. Batty Tuke, of Edinburgh; Dr. Donald MacAlister, of Cambridge; Dr. McVail, of Glasgow; and Dr. Atthill and Dr. Moore, of Dublin. Dr. Nestor Tirard, of King's College, London, has been appointed secretary to the Committee, and Prof. Attfield, F.R.S., of the Pharmaceutical Society of Great Britain, general editor. On questions of chemistry, Dr. T. E. Thorpe, F.R.S., Principal of the Government Laboratory at Somerset House, with Prof. Emerson Reynolds, F.R.S., of Dublin, and Prof. Tilden, F.R.S., of the Royal College of Science, have been invited to act as scientific referees. Mr. W. T. Thiselton-Dyer, F.R.S., Director of the Royal Botanic Gardens, Kew, and Mr. Holmes, Curator of the Pharmaceutical Society's Museum, have received a similar invitation as regards botanical questions. The rapid growth of experimental pharmacology has, moreover, rendered it desirable to enlist expert assistance in regard to the physiological properties and actions of new remedies, and accordingly difficult questions of this nature will be referred to Dr. Lauder Brunton, of London, Prof. Fraser, of Edinburgh, and Prof. W. G. Smith, of Dublin. Lastly, on matters of pharmacy, the Pharmaceutical Society have been asked to give their valuable aid, and have promptly formed a strong committee of practical experts. To this committee many questions as to the compounding and preparation of drugs will doubtless have to be referred.

A circular inviting suggestions for the improvement of the "Pharmacopœia" has been addressed to the several universities and medical licensing corporations of the United Kingdom, and from the majority of these careful and elaborate replies have been received. They contain numerous proposals for the omission of doubtful or obsolete preparations, for the incorporation of new drugs that have come into practical use since 1885, and for the simplification and correction of the text in general.

In response to requests transmitted through the Privy Council to the medical authorities of the colonies and India, a very large body of materials, submitted with the object of adapting the "Pharmacopœia" to the requirements of the empire at large, have reached the editing committee. These open up a multitude of somewhat difficult questions; for though the "Pharmacopœia" is by law recognised as the official standard of reference at home, it has not the same legal sanction outside the British Isles. While therefore it is possible that something may be done as regards the recognition of important natural drugs used in Indian or colonial practice, it is highly probable that these may have to be relegated to a special appendix. The desire to go as far as may legally be practicable in making the "Pharmacopœia" an im-