

into a teschenite by the incoming of purple titanite and basic soda-lime feldspars, but the latter rock is penetrated by irregular veins of the analcite-syenite.

This occurrence is interesting, inasmuch as there is only one other occurrence of alkali-syenites in the British area, namely, the borolanite and associated syenites of Sutherlandshire. These, however, are probably of Cambrian age. The Ayrshire occurrences are being investigated by the writer with the aid of a Royal Society grant, and it is hoped that an account of these alkalic rocks will be published in a short time.

G. W. TYRRELL.

University of Glasgow, December 9.

Collected Works of Sir William Herschel

I BEG to direct attention to a pressing need, namely, the publication of the collected works of Sir William Herschel. The investigations of this great man are practically inaccessible to the vast majority of modern astronomers, and the result is that few have any acquaintance with his writings, or know them only second-hand. In my relations with American astronomers I have met no one who has made a close study of Herschel's papers, and in going over them myself have been obliged to obtain them from distant libraries and abstract the contents by laborious processes. I have been equally impressed with the deep insight into the laws of nature which Herschel shows, and the slight extent to which his conclusions and methods are known to modern workers. Surely you will be willing to lend your voice to the praiseworthy task of awakening the British public to a national duty. When writing the life of Herschel for the "Encyclopædia Britannica" thirty years ago, the late Prof. Pritchard directed attention to the necessity of the publication of Herschel's collected works; but meanwhile nothing has been done. Italy has published the collected works of Galileo, Holland the collected works of Huyghens, while France has published the collected works of several of her great mathematicians and astronomers, &c., as those of Lagrange, Laplace, Fourier, Fermat, &c., and now the Swiss, with commendable effort, are trying to publish the vast collected works of Euler.

Herschel's writings are not very voluminous, and probably could be comprised in one large or two moderate sized volumes; and it seems certain that a thousand copies of them could be sold within reasonable time, so that a good publishing house might safely undertake the risk; but in order to give the work a national stamp it would need supervision by an official committee of the Royal Society, or the Royal Astronomical Society, of which Herschel was the first president.

T. J. J. SEE.

U.S. Naval Observatory, Mare Island, California,
November 20.

An International Map of the World.

I HAVE read with much interest, in NATURE of December 2, the communication by Sir Duncan Johnston. I must, however, confess that two of his propositions tend to damage the very principle of uniformity aimed at by the original idea.

For if, in the preparation of the map of closely populated districts, another scale (in the details) is to be adopted, the general idea conveyed by the map will be misleading.

The same is the case with altitudes. It is necessary to take into consideration the fact that, in all probability, the metre-unit will be adopted throughout the world in the time necessary for the preparation and issuing of the proposed maps. In the meantime, it should be noted on the sheets for foot-countries: 1m.=3 feet.

E. BÁTHORI.

Nagybecskerek, Hungary, December 6.

WITH reference to Dr. Báthori's letter on the article which appeared in NATURE of December 2, on the 1/1,000,000 scale international map, I agree with him to the extent that I am fully impressed with the importance of uniformity so far as it can be attained without detriment to the value of the map, but I consider that in some cases uniformity can only be obtained at too great a price.

Dr. Báthori demurs to my suggestion that the detail

shown should not be absolutely uniform throughout the world. I can best illustrate my view that too hard and fast a uniformity should not be insisted on by stating a concrete case. The committee proposes, and I think rightly, to show on the map lines of telegraph and post offices. In sparsely settled countries, for example Rhodesia, such information would be useful, and could easily be shown on the map. In the populous London district such information would be of no value, even if it could be shown, and I think that the practical utility of the map would be increased in this case by some departure from strict uniformity. Other similar cases might be given.

With regard to the other point mentioned by Dr. Báthori I am afraid I cannot agree with him that the metre will be adopted throughout the world, and I certainly hope that the completion of the international map will not be postponed until the metre is generally used. In the past and the present the foot has been and is used as the unit of measurement in the United States of America, in Great Britain and Ireland and its colonies and dependencies; practically all records are in terms of that unit, and it must be many years before this unit can be changed, if it ever is. If the countries named do not exceed in area and population those which have adopted metrical measurements, they are, at any rate, large enough to merit consideration. I see no reason why the altitudes in this very large and populous area should be shown on the map in terms of a unit not generally used by their people, nor, on the other hand, do I see any cause why the large and populous countries which have adopted the metrical system should have their altitudes expressed in feet.

It seems to me that, provided the unit adopted is legibly marked on the map and subject to some give and take where the two systems meet, countries using the foot should have their altitudes expressed in feet, and those using the metre in metres. I do not think this would cause material difficulty. The practical advantages of this course seem to me to justify some departure from rigid uniformity.

DUNCAN A. JOHNSTON.

Eastbourne, December 10.

Positions of Birds' Nests in Hedges.

DURING the autumn and winter of the past three years I have been observing the distribution of birds' nests as regards position in the hedges. In the fields around this village the following facts are noticed. In hedges running north and south (facing east and west), by far the greater number of nests are found to the east of a line through the length of the hedge. In hedges running east and west (facing north and south), very few are on the north side, some in the centre, but most to the south of the line through the length of the hedge. There seems to be a very good reason why this should be the case, but it would not do to state reasons without more evidence. I have not seen this matter noticed in any book or "paper," and it would be interesting to know how the majority of the nests in other parts of the country are placed. The present is a good time for such observations.

J. H. TULL WALSH.

St. Faith's, Norfolk, December 2.

Uranium Ore as a Remedy.

WITH reference to Mr. H. Warth's letter in NATURE of November 11 (p. 38), it may be of interest to record a fact which has come under my notice while engaged in the development of a uraninite mine in Turkestan. The ore is oxidised and calcareous, and contains uranium, vanadium, and copper, radium being present in accordance with Prof. Rutherford's formula, which gives the quantity of it in relation to the uranium. The uranium is on the average 3.8 per cent., but in some places reaches the ratio of 30 per cent. and more. Until now the work in the mine has proceeded only in the summer time, and in the winter season the workmen have migrated to the neighbouring coal and copper mines. As I know from the literature of the subject that vanadium and uranium are toxic substances, I instruct the workmen to wash their hands well before going to their dinner and after their work. "We

do this," they say, "but at the same time we know that in actual practice a cut on a hand, which lasts for a long time in a coal mine, here, when powdered by the ore, gets well very quickly."

CHR. ANTOONOVICH.

St. Petersburg, Russia, M. Possadskaya 21,
December 4.

Lunar Rainbow of December 1.

ON Wednesday, December 1, about 11 p.m., we saw here a very fine lunar rainbow. It was a perfect bow in the west, showing on a black sky. At the two ends the colours of the rainbow were to be seen quite plainly, though there was only about half a moon. Had there been a full moon, the sight would have been very fine. The rainbow was visible for about twenty minutes.

RICHENDA CHRISTY.

Orchards, Broomfield, Chelmsford.

THE TERCENTENARY OF THE TELESCOPE.

THE year 1609 is one of the most remarkable epochs in the history of astronomy. In the summer of that year Kepler's book on the motion of Mars was published, in which for the first time the actual orbit of a planet in space was determined, while astronomers had hitherto only been able, with more or less success, to investigate the projection of that orbit on the celestial sphere. In the same year the newly-invented telescope was directed to the heavenly bodies, and enabled mankind to form an idea of their constitution, instead of being, as hitherto, reduced to making wild guesses on this subject. But while many years had to pass before Kepler's work became generally recognised (even Galileo never accepted it), the telescope at once became an indispensable tool to astronomers.

Though many attempts have been made to prove that some of the ancient or mediæval philosophers made use of telescopes, it is now generally acknowledged that the telescope was not known to anyone before the year 1608.¹ On October 2 of that year Johan Lipperhey, a spectacle-maker of Middelburg, submitted to the States General an instrument for seeing at a distance, which he had invented, "as was known to the members of the States," and demanded either a patent for thirty years or an annual pension. The States General desired the inventor to produce a binocular telescope, and when he did that they eventually paid him 900 florins for three instruments of this kind, while the patent was refused on the plea that the invention had already become known to many people. These facts are certain enough, but it is quite possible that Lipperhey may not have been the first to construct telescopes, but that the claims of Zacharias Janssen, another spectacle-maker of Middelburg, may be well founded. It appears that this man had invented a compound microscope in 1590. A story was current early in the seventeenth century that some children, when playing with lenses, had found that a weathercock viewed through two of them appeared much enlarged and turned upside down, and that this led to the invention of the telescope. But a telescope which produces an inverted image must have been the so-called astronomical telescope soon afterwards invented by Kepler, which has a convex eye-lens, and not the Dutch or Galilean telescope with a concave eye-lens of which the modern opera-glass may serve as a specimen. A man who had invented a compound microscope would not be unlikely to possess lenses good enough to produce a fair image of a weathercock, and to have been capable of modifying this acci-

dental discovery by substituting a concave eye-lens to make the image upright. Some person is said to have gone to Middelburg to procure a telescope from the spectacle-maker there, but to have applied, by a mistake, to Lipperhey, who thus first heard of the invention.

Whether Lipperhey or Zacharias Janssen was the first to make telescopes will probably never be settled with absolute certainty, but in any case the first telescopes were undoubtedly made in Middelburg. In the introduction to the catalogue of his library (p. xviii), Libri describes a small tract printed at Lyons and dated November 12, 1608, in which mention is made of "nouvelles lunettes" made by a poor, pious and God-fearing man of "Mildebourg"; and the writer states that "even the stars which ordinarily do not appear to our view and our eyes on account of their smallness and the weakness of our vision may be seen by this instrument." From several other contemporary sources we know that knowledge of the new invention spread very rapidly, so that telescopes were not difficult to procure in the spring of 1609, both in the Netherlands and elsewhere. In December, 1608, the States General sent two telescopes made by Lipperhey to King Henry IV. of France; others were publicly offered for sale in Paris about the end of April, 1609, while the news of the invention had reached Venice in December, 1608, and a specimen of the new instrument was brought to Milan in the following May. The wonderful new toy was so very simple that it is not strange that "there was nobody who did not say he had invented it," as a contemporary writer tells us. Among these was Galileo, who in August, 1609, on the Campanile of San Marco at Venice, exhibited a telescope made with lenses purchased in that city. He claimed to have merely heard that a certain Belgian had presented to Prince Maurice of Nassau a glass by means of which distant objects were seen as clearly as if they were quite near, and that this meagre information sufficed to enable him in a single night to design a telescope. If the information received by Galileo was really as scanty as he says, it is very strange that the man who from it constructed a telescope should shortly afterwards, in his "Sidereus Nuncius," show that he hardly had grasped the most rudimentary notions as to the passage of rays of light through lenses and the formation of images. He would have done better if he had followed the explanation of the effect of convex and concave lenses given by Kepler in his book on optics, published in 1604.¹

But even if we cannot give Galileo the credit which he demanded of having re-invented the telescope, and though, as we have seen, others before him had pointed a telescope to the stars, he deserves full credit for having at once grasped the great possibilities offered by the instrument, and for having made the first serious attempt to explore the heavens with it. He did not grind the lenses himself, but made use of such as he could purchase. Judging by the very rough sketches of the lunar surface given in his little book "Sidereus Nuncius" (published in March, 1610), his small telescopes, magnifying from three to thirty diameters, cannot have been very good; still, they were sufficient to show that the moon was a body like our earth, having mountains and plains, that the Milky Way really was composed of innumerable stars; and, above all, they enabled him to discover the four satellites of Jupiter in January, 1610. Continuing his work, he detected in the following autumn the phases of Venus and Mars, and about the same time he became greatly puzzled by the peculiar appearance of Saturn, which planet, instead of showing a round

¹ See in particular Thomas Henri Ma tin's paper "Sur des Instruments d'Optique faussement attribués aux anciens par quelques Savants modernes" in Boncompagni's *Bulletino*, iv., 1871.

¹ "Opera ed. Frisch," i., p. 56.