

Current Topics and Events.

THE President and Council of the Royal Society decided at a meeting on February 19 to recommend for election into the Society the following fifteen candidates: Dr. W. R. G. Atkins, Prof. C. A. Lovatt Evans, Mr. R. H. Fowler, Dr. F. A. Freeth, Dr. Walcot Gibson, Dr. Harold Jeffreys, Prof. F. Wood Jones, Prof. J. Kenner, Prof. E. Mellanby, Mr. J. A. Murray, Prof. J. Proudman, Mr. R. V. Southwell, Dr. L. J. Spencer, Dr. R. J. Tillyard, Prof. R. Whiddington.

THERE has been so much adverse criticism of the Wireless Telegraphy and Signalling Bill recently introduced by the Postmaster-General that we are beginning to wonder whether after all something cannot be said in favour of it. Every one must admit that some control of "etheric" waves is absolutely necessary, even if the terms in which the Postmaster-General asks for authority are open to question. Scientific men, although they know perfectly well what the framers of the Bill mean by "etheric waves," have taken a Puckish pleasure in destructive criticism of the nomenclature. When asked to give a scientific definition they have to confess their inability. A proposal has recently been made for a large and powerful radio station which will control the time-keeping of clocks. Railway engineers want to use radio signalling to control their trains. It is obvious that if some one were not put in authority, the ether—if there is an ether—would soon be in a chaotic condition. If anything affects telegraphy or telephony, the Postmaster-General has been given in the past, and still possesses, the most absolute powers to prevent this interference taking place. During the War, the public welcomed the autocratic powers given to the Post Office. If there were another war these powers would be at once resuscitated for the public benefit. The Bill has been in preparation for two or three years, and most of those affected by it have been consulted. If suitable amendments be introduced so that the regulations do not affect amateur research injuriously, and section 7, which perhaps goes too far in putting the methods of radio power transmission under the control of the Post Office, be suitably amended, we see little to criticise in the Bill. Regulations are always grievous at the start, but they may nevertheless be for the public good.

It is of interest, just now, to recall the connexion of the Royal Society with various experiments made in 1664 from the steeple of old St. Paul's, under the guidance of Robert Hooke. Oldenburg, the Society's secretary, writing to Boyle, on August 25, 1664, reports that having found the top of Paul's steeple a convenient place for experiments, order was given at the previous day's meeting of the Royal Society (held at Gresham College) to try there the descent of falling bodies, the Torricellian experiment, and the vibrations of a pendulum suspended so as to reach to the floor of the church, a perpendicular height of about 200 ft. Hooke began at once to make trials, enlisting, as helpers, "some other company," which, we gather, included Lord Brouncker, Dr. Wilkins, Sir Robert Moray and Dr. Goddard. Hooke

comments on sundry difficulties in a letter to Boyle, dated Sept. 8, 1664. He says: "the steeple being without any kind of lofts, but having here and there some rotten pieces of timber lying across it, I caused a rope to be stretched quite cross the top, and fastened; in the midst of which I fixed a pulley, through which I let down the string and weight to the bottom, for only in the very middle of the steeple was there a broad clear passage from top to bottom." The vicissitudes of issue of the "Philosophical Transactions" have curious connexion, too, with old St. Paul's and the Great Fire of London in 1666. The Royal Society's printers (Mr. Martyn and Mr. Allestry) and the booksellers in St. Paul's Churchyard lost their stock of books in the conflagration, after carrying them from their own houses into St. Faith's Church, under St. Paul's. Among the losses were all the copies then printed and unsold of the "Philosophical Transactions." It is small wonder that early copies of this scientific journal are rare.

WE have recently had occasion to consider in these columns the recommendations of the Departmental Committee on the Use of Preservatives and Colouring Matters in Food. The Minister of Health has now published draft regulations based on these recommendations, and in framing them he has apparently adhered closely to the latter. The preservatives formaldehyde and boric and salicylic acids are completely prohibited: benzoic acid and sulphur dioxide are allowed in certain cases only and in strictly limited amounts. The following may contain sulphur dioxide: sausages, jam, fruits, beer, cider, wine and cordials and fruit juices: benzoic acid is only permitted in coffee extract, fruit juices and cordials and sweetened mineral waters, including brewed ginger beer; but no article is permitted to contain both sulphur dioxide and benzoic acid. As regards colouring matters, all colours which are compounds of the following metals are prohibited: antimony, arsenic, cadmium, chromium, copper, lead, mercury, zinc. In addition, gamboge and half-a-dozen coal-tar dyes, including picric acid, are also forbidden. Further to protect the consumer, it is laid down that sausages, jam, and coffee extract must be labelled if they contain preservative, whilst articles sold as preservatives must be labelled with the percentage of sulphur dioxide or benzoic acid present. The regulations will apply to imported as well as to home products. Full powers are taken to carry out inspections and take samples. The regulations, when put in force—no date is as yet mentioned—should do much to improve the quality of Great Britain's foodstuffs.

THE American Association for the Advancement of Science has about 13,000 members, and in his address as retiring president (*Science*, January 2), Dr. Charles D. Walcott considers how this great body can render science of service to mankind. It should, he says, "act as a liaison agency between professional science and the public, as well as between the various sciences." Whether it be in the traffic and social problems of modern life, or in the conservation of

natural resources, the great need is the education of all citizens in the scientific method of approach. "All scientific men and women may do their bit—first, by training themselves to observe accurately, to think straight, and then to record clearly and honestly, and to draw warranted conclusions based on the facts presented . . . ; second, by reviewing the mass of technical information with which they are familiar and telling the story they have learned in simple, clear language, free from obscure, complicated, technical and verbose wording." They should engage in co-operative public work, applying the scientific spirit in all branches of social endeavour, and notably in all agencies concerned with the education of the people from the university to the cinema. Could not, Dr. Walcott concludes, the Association organise a committee to deal with the popularising of scientific knowledge, bringing its lessons and its principles home to all—and particularly to children, to women, and to business men? This is admirable counsel, and just as applicable to those on the eastern side of the Atlantic as to Dr. Walcott's fellow-citizens.

At the sale of the Crisp Collection of antique microscopes on February 17, high prices were realised for some of the instruments. The silver "universal" by G. Adams was obtained by Mr. Webster for 36*l.* This instrument, on account of its highly ornamental construction, its scientific interest, and the fact that it is made throughout of silver, was easily the most valuable item from the auction point of view. The original modification of the Hooke microscope, dating from about the year 1675, realised 16*l.* The name of the maker of this very fine early example of English opticians' work is unknown. An original compound microscope made by Guiseppe Campani, the great Italian optical instrument maker, was obtained by the Science Museum, South Kensington, for 45*l.* Other instruments of historical and scientific value secured for this museum included the improved "universal" microscope by G. Adams, the Cuno form of hand microscope made by Depovilly of Paris, and a modified form of John Marshall's microscope. For the new Museum at Oxford, several instruments were obtained, including a replica of Hooke's original compound microscope, as figured and described in his "Micrographia," 1665. This item realised 20*l.* Mr. T. H. Court, whose valuable collection in the Science Museum is well known, secured a large number of the instruments. Of these, the elaborately decorated microscope made for Pope Benedict XIV. (31*l.*), the very fine microscope made in 1752 by D. Joannes de Guevave (33*l.*), and an early Italian microscope inscribed "Elaboratum a Blasis Burlini Venetiss Optico" (31*l.*), may be mentioned. Three fine examples of the Marshall microscope, made in the early part of the eighteenth century, were sold at prices ranging from 13*l.* to 22*l.*

PROF. T. H. PEAR, in a discourse at the Royal Institution on Friday, February 20, on "Acquiring Muscular Skill," stated that his purpose was, first, to examine an urgent practical aspect of the problem; the desirability of describing and recording skill in a

universally acceptable language and notation. The photographic, stereoscopic, cinematographic, and ultra-rapid cinematographic study of the ideal postures and movements desirable in certain skills, and the result of describing and discussing such records in words, have occasionally led to a degree of "intellectualisation" which is not generally recognised. The accidental fact that some skills have been more fortunate in their exponents partly, but only partly, accounts for this. By the aid of these various devices and of certain utilisations of "picture-diagrams" and films it is possible not only to record actual performances, but also to criticise them analytically. The study of modern figure-skating in the international style is a good illustration of this point. Suitably prepared diagrams should help the learner, before he attempts to execute a complicated series of movements, to grasp them visually, both in parts and as a whole. This method of transmitting skill is probably in its infancy. Its progress in the hands of suitable instructors should be rapid. Whether such visual means of approach to the mind are specially suitable only to the person who "thinks in pictures" is an important and unsettled problem. By these means it should be possible to compose new skilled movements and new combinations of them. Before the days of musical notation and of writing, musical composers and poets had to be performers. Nowadays they may inspire other more gifted executants. This may be possible for skilled movements when a combination of workers, players, anatomists, physiologists and psychologists produce a grammar, a syntax, a harmony and a recorded poetry of movement.

In his presidential address to the Optical Society on Thursday, February 12, Prof. Archibald Barr referred to the optical instrument maker as the tool-maker for all branches of scientific investigation including his own. He stated that scientific investigators depend to a great extent on the knowledge and skill of the optician for the provision of their tools. Every improvement made in the optician's products enables the user of these tools to go farther and deeper in his researches. It is the duty of the optician to keep himself familiar with the latest advances in science, so as to be ready to forestall the needs of the investigator, or to be able fully to understand the requirements that arise, and to bring to bear on the production of the new tools an intimate knowledge of the means by which, and the extent to which, the requirements can be fulfilled in a practicable device. Opticians are primarily concerned with less than one octave out of the sixty or more of known radiation, though for some purposes they have to take account of one or two octaves on each side of that of visibility, into the infra-red and the ultra-violet. Narrow as it may be on the scale of radiology, the one octave of the visible spectrum has and always will have a very special significance in the scheme of things as they are, and that octave includes a wide range of problems of all degrees of complexity. Within the limits of optics properly so called, there is still scope for development to which no limits can be set.

PROF. WILLY WIEN, of Würzburg, has been elected an honorary fellow of the Physical Society of London.

MR. E. HILTON YOUNG, M.P., has been appointed chairman of the Departmental Committee on the University of London, in succession to Lord Ernle, who has resigned.

DR. LOUIS A. BAUER, director of the department of terrestrial magnetism of the Carnegie Institution of Washington, has been elected a corresponding member of the Russian Academy of Sciences.

WE learn from *Science* that Mr. John F. Stevens, of New York City, has been awarded the John Fritz Gold Medal of the Engineering Foundation, New York, "for great achievements as a civil engineer, particularly in planning and organising for the construction of the Panama Canal, as a builder of railroads and as administrator of the Chinese Eastern Railway."

A TEMPORARY assistant and a temporary junior assistant are required in the metallurgical research department of the Royal Arsenal, Woolwich. Candidates should be graduates with university training in metallurgy. Applications for the posts should be sent, with copies of not more than three testimonials, to the Chief Superintendent, Research Department, Royal Arsenal, Woolwich, S.E.18.

A TECHNICAL assistant is required at the Royal Aircraft Establishment, South Farnborough, Hants, for experimental and development work in connexion with aerial beacons and aerodrome illumination generally. Candidates should possess an honours degree in electrical engineering, design experience in the application of optical and illuminating engineering, and, if possible, experience in lighthouse work. Applications, marked A.47, should be sent to the superintendent of the establishment.

APPLICATIONS are invited for the position of organising secretary to the standing committee on special libraries and bureaux of information. His duties will consist of attending meetings of the standing committee and its executive, the compilation of a directory of special libraries and intelligence bureaux in the United Kingdom, and preparation for the second conference to be held in September 1925. Applications giving full particulars, and endorsed "Special Libraries," should be sent to reach Mr. J. G. Pearce, Central House, 75 New Street, Birmingham, not later than March 10.

THE annual general meeting of the Institute of Metals will be held at the Institution of Mechanical Engineers, Storey's Gate, Westminster, S.W.1, on Wednesday and Thursday, March 11 and 12, commencing each day at 10 A.M. Twelve communications are due for presentation at the meeting. The annual dinner will be held at the Trocadero Restaurant on Wednesday, March 11, at 7 P.M. Amongst those who have accepted the Council's invitation to be present at the dinner are the Right Hon. Neville Chamberlain (Minister of Health), the Right Hon. the Lord Morris (vice-chairman, Imperial Mineral Resources Bureau), and the presidents of many kindred societies.

DR. H. C. WILLIAMSON has been appointed to investigate the salmon of British Columbia at Prince Rupert. Dr. Williamson was a distinguished student and graduate of St. Andrews as well as holder of a research studentship of the Exhibition of 1851. Trained in fisheries work at St. Andrews, then for nearly two years at Naples, and afterwards in Germany, he entered on the scientific work of the Fishery Board for Scotland equipped as few have been with special knowledge and experience. For twenty-eight years he has carried on a continuous series of researches, illustrated by his own skilful pencil, on food-fishes, edible and other crustaceans, and has made careful experiments on the eggs of salmon and herring in connexion with their transmission to the antipodes, besides other fisheries' subjects, and has at present a work on fishes in the press. The loss of a highly trained scientific investigator in Scottish fisheries, following so soon after the retirement of his able senior Dr. Fulton, is unfortunate for the Department, yet Canada will be the gainer. Dr. Williamson's publications in the Reports of the Fishery Board extend from 1893 to the present year.

THE council of the Institute of Chemistry announces that the Meldola Medal for 1924, awarded for meritorious work in chemistry during the year, has been awarded to Dr. Leslie J. Harris, of the School of Biochemistry and Emmanuel College, Cambridge. Dr. Harris's investigations have been concerned largely with the theoretical basis of acid-base titrations and in special relation to amphoteric electrolytes. His results have been published mainly in a series of papers appearing in the Proceedings of the Royal Society, B, during the past few years. He has shown that the protein constituents, amino-acids, may be estimated from a consideration of their individual acid and basic constants, by titrating within definite P_H limits. The same principle has been utilised also by Dr. Harris for estimating proteins and other ampholytes. Recently he has shown that such methods are of general application in chemistry, and serve to estimate substances containing the feeblest basic or acidic groups, it having previously been supposed that acids or bases of less than a certain strength were incapable of estimation by acidimetry. Incidentally he has disproved for many cases the theory of acid-base binding at peptide linkages, and he has brought forward fresh data upon the ionic nature of the protein molecule. Denaturation of proteins he has shown to involve a chemical change which occurs at a hitherto undescribed sulphur grouping in the protein molecule. Dr. Harris has also carried out investigations upon milk and infant nutrition.

IN the notice of the second edition of "An Introduction to the Study of Cytology," by the late Dr. L. Doncaster (*NATURE*, February 14, p. 224), the reviewer regretted that the scope of the book was not enlarged. We understand from Mr. J. Gray that the omissions mentioned are entirely due to the fact that their inclusion would have involved a considerable increase in the cost of the book. It seemed desirable to keep the book within the means of the average

student, and this would not have been possible in a new edition including even a brief account of recent knowledge of cell inclusions and somatic cells. The new edition has recently been translated into Italian by Prof. L. Cognetti de Martiis, of the University of Turin, and can be purchased for seven shillings.

As a result of the amalgamation of the Ipswich Scientific Society and the Ipswich and District Field Club, there has been formed, under the presidency of Mr. J. Reid Moir, the Ipswich and District Natural History Society. The honorary secretary is Mr. F. W. Brinkley, 31 Oxford Road, Ipswich. Fortnightly meetings are held, taking the form of lectures in winter and spring and excursions in the summer, and various sections, each under the guidance of a "leader," deal with different aspects of the Society's activities. The Society claims a membership of about 250, and it is hoped to issue shortly the first volume of Proceedings. According to the programme for the 1925 session, Sir Charles Sherrington, president of the Royal Society, who is himself associated with Ipswich, has consented to become patron of the Society, and there is little doubt that the sympathy and encouragement expressed by his interest in the Society will do much to promote appreciation of the value of science in the neighbourhood.

IN addition to the Monthly Bulletin of the Hawaiian Volcano Observatory, a weekly *Volcano Letter* is now issued. Each letter contains the Kilauea report for the previous week on the volcanic phenomena and on the earthquakes recorded at the Observatory, in addition to miscellaneous news. On its reorganisation a short time ago, the Volcano Research Association was placed under the U.S. Weather Bureau. It has now (since last July) been transferred to the U.S. Geological Survey. Since 1920, it has established earthquake stations at Kone, Hilea, and Hilo, all in Hawaii, in addition to the central observatory at Kilauea; it has conducted boring experiments at Kilauea, equipped a chemical laboratory at the Observatory, and maintained a research fellowship at the station for one year. It is now engaged in preparing for publication the scientific results of its fifteen years' work on the volcano.

WE have received No. 2 of *Brighter Biochemistry*, the illustrated journal of the Biochemical Laboratory, Cambridge. As its title implies, it is a product in a lighter vein than is usual in biochemical journals: it contains short articles in prose and rhyme, contributed by various members of the staff of the Laboratory, whose identity is revealed by the initials at the foot of each contribution. As might be expected, a local colour is reflected from most of the articles, and some of the allusions will probably only be fully appreciated by those who have an intimate acquaintance with the members of this school and their works. Perhaps the most amusing contribution is a short one in verse, entitled "The Great Push: another version," giving a brief, though doubtless accurate, account of recent experiments conducted by one of the staff of the Laboratory. A series of

cautionary tales for biochemists, and the story of John Montgomery Wardley, are other good things in the number, whilst, as might be expected, blood sugar methods and their authors—we had almost said perpetrators—have not escaped satire at the hands of those who have to use them.

THE German Scientific and Medical Association (Gesellschaft deutscher Naturforscher und Aerzte) has been greatly encouraged by the success of the Innsbruck meeting in September last. No general meeting will be held in 1925. Severe economy is still necessary. A meeting at Düsseldorf is planned for 1926. *Die Naturwissenschaften* has been made the organ of the Association, and monthly communications are distributed with this journal. The issue of November 21 was devoted to the proceedings of the Innsbruck meeting and included the lectures delivered at the joint meetings of the Society, together with the more important of those delivered to the medical and natural science sections. Men of science of all shades will find something of interest in one or other of these lectures, for the range of subjects covers a wide field. A thousand members have accepted the offer of a reduced subscription rate to this journal. The membership subscription is 5 marks in Germany, 50,000 kroner in Austria. Foreigners may send notes or cheques in registered envelopes to the G.D.N.A. at Chemietreuhandgesellschaft, Berlin W.10, Sigismundstr. 3. For all other business the Secretariat is at Leipzig, Nürnberger Strasse 48¹. Publications are issued through the Hirschwaldsche Buchhandlung, Berlin, N.W., Unter den Linden 68.

WE have received Nos. 9-10 of vol. i. of the *Bulletin d'Histologie Appliquée*, edited by Prof. A. Policard, of Lyons. It contains original papers on physiological and pathological histology, a section on methods, a critical review, and a bibliographic index. It is well printed, but the illustrations could be improved considerably. A somewhat original feature is a quotation from some author after each paper: the excerpts cover a variety of subjects, from the use of a theory (Gide) to a diet for white rats (Steenbock). The number contains four original papers: A. Lumière and R. Noël describe the lesions produced in guinea-pigs by the actual method of killing, and conclude that simple bleeding by cutting the carotids, or removal of the heart and lungs after opening the thorax, produce the least alteration in the tissues; all asphyxial methods cause congestion and hæmorrhages. E. Grynfeltt describes the erectile tissue in the fimbriæ of the Fallopian tube, by means of which the abdominal ostium of the latter can be brought close to the ovary. Mlle. A. Van Herwerden gives a short account of a reversible gelation produced in the protoplasm of the living tadpole by means of weak acetic acid. H. E. V. Voss describes the ossification and calcification sometimes observed in portions of ovary grafted into the testicle or kidney of a male guinea-pig, and concludes that connective tissue cells are responsible, typical osteoblasts not being observed. In the section on methods, A. Ch. Hollande discusses the oxidase reaction, and finds, as the result of his experiments, that the formation of indophenol blue

in cell-granules is not diagnostic of the presence of an oxidase in them, since the granules take up the blue colour when the dye itself is presented to them. The actual formation of the blue colour, however, shows that oxidases must be present in the cells or their surroundings. M. Bernheim reviews the functions of the germ centres of Flemming in the lymph-glands, and concludes that they play an important part in the defence mechanism of the body. The bibliographic index is under headings such as embryology, tissue culture, etc., sections v. to ix. appearing in this number.

THE Medical Supply Association, Ltd., 167-185 Gray's Inn Road, London, has recently placed on the market a compact X-ray outfit of unusual design. It is described by them as the "Radiosearch" Complete X-ray Apparatus and is intended for general laboratory work. Electricity at 70,000 volts is supplied by a small oil-immersed transformer, enclosed in a rectangular wooden box with ebonite top, which stands in front of a hard-wood panel about three feet high. From the upper part of this panel two well-separated stout porcelain insulators project horizontally and forwards. To the end of one of these a practical type of milliamperemeter with open scale is attached, while the other column carries a variable resistance by which the

heating current for the Coolidge tube may be adjusted while the apparatus is in action, a dial enabling the setting to be noted. The high tension leads from the secondary of the transformer are suitably connected to these instruments and pass on over spring pulleys to the X-ray tube itself. The tube is the self-rectifying radiator "Coolidge" with current-carrying capacity of 10 milliamperes at 70,000 volts. It is held axially within a cylindrical box with only the electrode sleeves projecting on either side. The arrangement, adequately protected with lead rubber, is mounted upon a separate and portable table stand so as to enable a beam of X-rays to be projected in any desired direction. The outfit is well and strongly constructed. Its simplicity and solidity are distinct features, and there seems little to get out of order with reasonable care. It should be noted that no means is provided for the variation of the potential difference at the tube terminals. An attachment can, however, be supplied for this purpose at an additional cost. It would also make the outfit more complete for experimental work if a sphere-gap with resistance were fitted so that the potential difference across the tube could be directly measured. Most physicists using the set, however, would probably prefer to make this measurement by means of an X-ray spectrograph.

Our Astronomical Column.

ENCKE'S COMET.—*Astr. Nach.* No. 5345 contains some observations by G. A. Tikhov of Pulkovo on the spectrum of Encke's comet made on Oct. 20, 1914 (46 days before perihelion), and Oct. 4, 1924 (27 days before perihelion). An objective prism was employed. The following are the intensities of the principal bands, on a scale from 1 to 10.

Wave-length.	Intensity.		Source.
	1914.	1924.	
388	10	10	Cyanogen
405	8	4	
473	1	6	Carbon
516	...	1	"
563	...	1	"

The 1924 spectrum is of a type often found in comets. That of 1914 is unusual in the feebleness of the carbon bands, which is perhaps due to the longer interval before perihelion. The continuous spectrum is weak, especially in 1914.

THE NATURE OF SPECTROSCOPIC BINARIES.—According to the theory of binary stars, there is a simple relation between the period and the semi-amplitude, K , of velocity variation. This relation involves the masses of the stars; but by assuming an average mass, and treating the stars in groups, it becomes possible to investigate this relation without introducing serious errors. This has been done by Dr. O. Struve in the *Astrophysical Journal*, vol. 60, p. 167, who has found that for spectroscopic binaries with periods greater than 2.5 days, the relation between P and K agrees satisfactorily with theory. The Cepheid variables have comparatively small values of K which show no relation to the periods—thus incidentally affording evidence in favour of the pulsation theory, which assumes that Cepheids are not true binaries. In addition, the author has discovered an interesting group of stars (to which he has applied the rather unfortunate name of "Pseudo-

Cepheids") which closely resemble the Cepheids in the behaviour of K . These are all spectroscopic binaries of short period (less than 2.5 days), and if they are to be regarded as true binaries, the peculiar behaviour of K would seem to imply either that the total masses are very much smaller than the average, or that the mass-ratios are very large—neither of which assumptions is supported by evidence from the long-period binaries.

The evidence brought forward by Dr. Struve thus seems to show that short-period spectroscopic binaries may be classed in two groups; some, characterised by large values of K , are true binaries, while others (the more numerous group) are probably not binary stars at all, and bear a close analogy to the Cepheid variables.

THE DIAMETER OF VENUS.—*Astr. Nach.* No. 5348 contains three articles on this subject by members of the staff of the Berlin-Babelsberg Observatory. It is a matter of considerable interest, owing to Venus being the only known orb that closely resembles the earth in size. The measures are difficult, owing to the extreme brightness of the disc, which produces irradiation, the amount of which is difficult to determine; it has generally been assumed that the amount of irradiation in arc is constant at all distances of the planet, but the researches here described (by G. Struve, J. Dick, and A. Kühl) show that this assumption is untenable. They used the large Babelsberg refractor with various powers up to 1000. G. Struve's final diameter is 17.523" at unit distance; comparing this with the usually adopted value for the earth, 17.61", we see that the planet's diameter is less than that of the earth by some 40 miles only. That, however, may be modified if the visible disc of Venus is bounded by a cloud surface, as this is likely to be some miles higher than the solid ball of the planet.