

in 10,000 of air were developed in the chamber before the flame was extinguished by the decrease of oxygen; and 8-10 or more parts of carbon monoxide in 10,000 of air, if inhaled for more than an hour, can induce a dangerous degree of saturation.

The reasons for the elaborate arrangement of the three vessels and a cover over all, as first adopted by Nansen, were economy and efficiency in the use of fuel. In our hands when well pumped up and burning strongly, the Primus (silent type, large size, capacity 1,100 c.c.) consumes 4-5 grams of kerosene (liquid paraffin) per minute. Taking into account the heat of combustion, the volume of water and the increase of temperature in the contents of the vessels, we have found that when only one vessel is used the efficiency is only 50-60 per cent. When all three vessels are used, but without the cover, the efficiency and economy rise to 70-80 per cent; and with the cover over all, it reaches 80 or even 90 per cent, as Nansen, Shackleton, and others have reported.

With these facts before us, it appears that in Nansen's arrangement (Fig. 1), safety has been too far sacrificed to economy. We suggest, therefore, that the metal cover be omitted, and one of asbestos, or felt, or blanket substituted, with a vent sufficiently wide to offer no obstruction to the escape of the products of combustion; and in addition that some such arrangement of the vessels as that shown in Fig. 2 be adopted: an arrangement suggested to us by Mr. Anthony Fiala.

Even with this arrangement, in which there is a full supply of air and a good draught, some carbon monoxide is produced when the distance between the inner, or cooking, pot and the top of the Primus is so small that some of the flame impinges upon the cold surface of the pot. We find, however,

that if this distance is increased so that it is 2 cm. more than the distance now provided between the top of the burner of the Primus and the bottom of the vessel when the vessel is set directly upon the frame of the Primus—or 3-4 cm. in all between burner and pot—no carbon monoxide whatever is produced. With this arrangement, the efficiency of the stove is, however, decreased; and only about 70 per cent of the heat produced by the burning of the fuel is caught in the contents of the three vessels of the cooker.

Whatever arrangement of the cooking and melting vessels may be adopted by future explorers, it would be well, before the expedition starts, to test it by filling the vessels of the cooker with ice and placing it with the lighted Primus in a small room, together with an electric fan to mix the air, and a canary, white mouse, or rat. To be safe, the depletion of oxygen in the chamber should extinguish the flame before the test animal is noticeably affected. With the modified cooker this test may be performed by conducting some of the air from the cooker into a box in which the animal is placed.

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NEWS AND VIEWS

Gold Medal of the Royal Astronomical Society

THE Gold Medal of the Royal Astronomical Society has been awarded to Dr. Edwin Hubble, Mount Wilson Observatory, California. Edwin Hubble joined the staff of the Mount Wilson Observatory in 1919. His first work was an investigation of the spectra and luminosity distributions of galactic nebulae, and he established the now accepted connexion between the light from such nebulae and the spectra of the stars involved. He proceeded to a general classification of what are now known as extra-galactic nebulae, and then turned to intensive studies of M31 and M33, which considerably extended the list of novae observed in them, and he identified Cepheid

variables of galactic type as occurring in them. By means of the period-magnitude law for Cepheids he evaluated the distances of these nebulae, which led in turn to estimates of their dimensions and masses and definitely established not only their extra-galactic nature but also their general similarity to our own galaxy. From this fundamental work followed the recognition of the nebulae in general as extra-galactic but comparable with our own galaxy in structure. The 'island universe' controversy was thus settled.

Combination of nebular distances with measures of red-shifts (discovered by Slipher but enormously extended by Hubble and Humason) led to the enuncia-

tion of the 'velocity-distance proportionality', often called Hubble's Law. This law underlies all modern theoretical cosmology and the concept of the expanding universe. Recent refinements due to Hubble himself have called in question the interpretation of the red-shifts as velocities; but, in whatever form, the apparent increase of velocity at the rate of about 500 km. sec.⁻¹ per 10⁶ parsecs is a fundamental world-datum. Hubble's more recent researches have been concerned with the distribution of the nebulae in space and the discovery of their average homogeneity, modified by a tendency to form groups and clusters; with the determination of the mean density of matter in space, another fundamental constant; with space absorption and obscuration in the galactic plane; with the effects of red-shifts on apparent magnitudes; and with the character of the 'local' group of nebulae. It may fairly be claimed that the modern picture of the universe of extra-galactic nebulae is largely due to Hubble's researches. He has recently collected them in a book, "The Realm of the Nebulae", a work of epic quality. His contributions are characterized by the power and originality of his methods, by his observational skill, by the objective character of his deductions and by the general brilliancy of his results.

The Earthquake in Turkey

THE first official estimate of the earthquake losses was given to the Kamutay on January 11 by the Health Minister, who said that there were 23,131 dead and 7,994 injured and that 29,131 houses had been ruined. Further news of the disaster comes from the affected areas as communications are restored. The Susheri district north-east of Erzinjan had been completely cut off for a fortnight except for the dropping of food and medicaments by a squadron of aeroplanes. There were 3,950 dead and 590 injured. It appears that the Malatia Erzinjan railway was not so greatly affected by the earthquake as the Sivas Erzinjan line, though the blizzards and snow affected this line tremendously. According to eye-witness accounts from Rechadiye, there were crevices 400 yards long and several yards wide in different directions. Streams and rivulets have changed their courses. At a place 12 kilometres from Rechadiye a mountain had its shape completely altered, giant precipices being formed and roads being blocked. The Yeshil-Irmak overflowed and further threatened Amasya.

Sailors report that between Kerasun and Shebin-Karihisar an entire mountain has subsided. Photographs from Erzinjan show that movement there took place in all directions, as there appears to have been no predominant direction of fall of the columns and other debris. The town of Erbaa near Tokat has apparently suffered almost as much as Erzinjan, and in many places the bursting of drains due to the earthquake and floods has added new terror. It is reported that typhoid has broken out at Fatsa. After-shocks of decreasing intensity have been felt at intervals in the widely separated areas of Samsun, Amasya, Bursa, Kersund, Yozgad, Inebolu, Bolu,

Burdur, Isparta, Karahisar, Erbaa, Akhissar, Odemish, Duzic, Sivas, Tokat, Bergama, Smyrna and Kikili, that is from northern to south-western Anatolia, according to a *Times* report.

The entire body of survivors from Erzinjan, numbering 3,200, have been removed to Alexandretta, Mersin, Adana and other towns of Southern Anatolia, except about 130 injured, who have been placed in hospitals in Istanbul, and the surviving military cadets who have been sent to Konia. It is reported that the Government is discussing a proposal to rebuild Erzinjan on its present site, and temporary wooden cottages are to be erected. Dr. G. Van Dyk states that the first pulse to arrive at De Bilt (Holland) after the earthquake was dilatational, and that possible after-shocks were registered there on December 27 at 22h. 44m. 3s. G.M.T. and on December 28 at 3h. 30m. 45s. and 3h. 35m. 15s. G.M.T. We are indebted to Rev. J. P. Rowland, S.J., of the Stonyhurst College Observatory, for a copy of the seismogram of the principal earthquake. This seems to indicate the possibility of three distinct shocks having occurred within the first minute. They appear to have been of increasing intensity and from very nearly the same epicentre.

Drug Standardization

THE Harrison Memorial Lecture was delivered by Mr. A. D. Powell, chief analyst of Boots Pure Drug Co., Ltd., at the evening meeting of the Pharmaceutical Society on January 9. His subject, "Drug Standardization", was chosen, he said, in token of the work done in that connexion by the late Colonel E. F. Harrison prior to his undertaking the responsibilities of his post as chief of the Defensive Gas Warfare Department during the War of 1914-18. Mr. Powell surveyed the progress of standardization from the time when, as a result of the disclosures of the *Lancet* Analytical Sanitary Commission, the Adulteration Act 1860 was passed, and concluded by outlining his own ideas of the desirable features of a satisfactory drug standard.

Mr. Powell put forward five points: (1) The description and principal requirements of strength should be free from ambiguity, and the descriptive paragraph, if it referred to a drug of definite chemical composition, should not be so restrictive as to insist on a particular method of preparation. (2) The degree of purity in terms of the substance, or of an active principle, should be defined wherever possible, unless, as with many organic chemicals, the melting point gave a sufficient indication of a high degree of purity. (3) The tests for purity should be diagnostic, and preferably capable of application under conditions varying within reasonable limits. (4) The number of tests for purity should cover all the impurities likely to be present in significant proportion, but should be limited by this consideration. (5) Tests to detect traces of unlikely impurities, or a redundancy of tests for the same impurity, may weaken rather than strengthen a standard. In general, standardization should be definite and free from ambiguous interpretation; this should not