glycerol, and predicted the existence of the diatomic alcohols, which he established by the discovery of glycol, glycollic acid, and a number of other derivatives. The theoretical deductions to which these researches gave rise led to a memorable controversy between the French and German schools, which greatly influenced the development of the conception of basicity, and the spread of Gerhardt's teaching of the true principles on which the formulation of organic compounds should be based.

In 1854 Wurtz isolated butyl alcohol (*isopropyl carbinol*) from the fusel oil of potato-spirit, and ten years later he added another term to this series of homologues by the preparation of his methylene hydrate, an isomeride of amyl alcohol discovered by Cahours. The mode of its resolution by heat into water and amylene led Wurtz to the study of abnormal vapour densities, as manifested by the thermal decomposition of phosphorus pentachloride, the hydrate and alcoholate of chloral, ammonium sulphhydrate and chloride, etc.—an inquiry which brought him into conflict with Berthelot and Sainte-Claire Deville. His study of the action of hydrochloric acid on aldehyde led to the discovery of aldol, its polymerides, and other derivatives, which occupied much of his attention for several years.

The foregoing is a very incomplete summary of Wurtz's contributions to experimental chemistry contained within some 150 memoirs. His relation to his epoch has already been set forth in the admirable obituary notice by Friedel—himself an Alsatian—which appears in the Bulletin of the Chemical Society of France—a society of which Wurtz was one of the original founders, and which he consistently supported so long as he lived. A charming sketch of his life, work, and personality by his pupil and life-long friend, Prof. Armand Gautier, appeared in the *Revue Scientifique* of December 22–29, 1917, written on the occasion of the celebration of his centenary. It affords a delightful picture of Wurtz as he appeared in his laboratory—the directing and dominant agency, *primus inter pares*, of a galaxy of collaborators such as Friedel, Caventou, Crafts, Louguine, De Clermont, Salet, Naquet, Willm, Oppenheim, Lauth, Girard, Le Bel, Grimaux, Cleve, Chydenius, Tollens, Sell, Silva, Henninger, Maxwell Simpson, Hanriot, Franchimont, Echsner de Coninck, Richet, and van't Hoff, with Gautier himself—all men who, stimulated by the example of their leader and influenced by his teaching, have contributed to fashion the edifice of modern chemistry.

Wurtz was a fine character—a man with a broad mind in a large and manly frame. He had all the qualities which attract men and fascinate youth—charm of manner, transparent integrity, generous impulses and a ready sympathy, an enthusiastic and loyal devotion to science, and a quick and whole-hearted appreciation of merit in those who sought to enlarge its boundaries. He was idolised by his students. As a lecturer he had much of the force and fire of his master, Dumas, the same

gift of happy and graceful diction, the same clarity of thought, the same power of logical and lucid exposition. He had also, in no small measure, Dumas's facility of literary expression. No nobler tribute was ever penned than that paid by Wurtz, in the opening pages of his well-known *Dictionnaire*, to the genius and labours of Gerhardt and Laurent. M. Armand Gautier well applies to him the words which he himself used at the graveside of Dumas: "Votre grande figure n'est pas de celles qui puissent disparaître dans l'oubli. Votre souvenir se perpétuera, votre nom passera d'âge en âge. Vous vivrez par vos œuvres, par l'exemple que vous avez donné, par les productions immortelles et les qualités de votre esprit."

T. E. THORPE.

ICE AND FLOWER EXPLORATION IN HIGH ASIA.¹

(1) THE indefatigable explorers of the glaciers of the Karakoram Himalayas, Dr. and Mrs. Workman, who have done more than any others to visit and map out the details of those vast ice-fields, give in the volume before us still another account of their travels and explorations in a new sector of these regions. As usual, in order to cover as much new ground as possible within the narrow summer limits in which travel was practicable, they formed separate and independent expeditions, although they combine their results in a single volume. At the present time, when so much is being written about the extension of women's sphere on account of the war, it is interesting to find abundant evidence here of the *pre-war* exploits of a woman-pioneer in these Indian Alps, in fields usually regarded as the especial preserve of men, and of men of unusual nerve because of the physical perils to be encountered and overcome.

Mrs. Workman independently instituted and led the pioneer expedition to the hitherto unvisited Rose Glacier of Sia Chen, which is the longest non-polar glacier in the world; Dr. Workman explored the Sher-pi-Gang and other glaciers and basins; and between them they achieved the feat during two summers of mapping out nearly two thousand square miles of ice-field details for the first time. Although the journeys were performed in 1911 and 1912, the exigencies of the war have prevented the publication before now; but as no one else has visited those regions since then, this delay in no way detracts from the interest and solid scientific value of the work accomplished and now given to the public.

A striking feature of the moraines in those remote regions was the great preponderance in them of sedimentary rocks at such an extreme altitude. The "black" moraines on the north, which must have been intensified in the snowy surroundings, were found to consist of hardened black shale and mixed with slabs of "a pure white

¹ (1) "Two Summers in the Ice-wilds of Eastern Karakoram: The Exploration of Nineteen Hundred Square Miles of Mountain and Glacier." By F. B. Workman and W. H. Workman. Pp. 296. (London: T. Fisher Unwin, Ltd., 1917.) Price 17s. 5s. net.

(2) "On the Eaves of the World." By Reginald Farrer. Vol. i., pp. xii + 311; Vol. ii., pp. viii + 328. (London: Edward Arnold 1917. Price, 2 vols. 30s. net.)

marble"; and on the south the black slaty sedimentary rocks contained some veins of iron pyrites with quartz and other igneous rocks.

As in their previous joint books, the text is enriched by a profusion of excellent photographs, all taken by the writers themselves, and quite up to the high standard set in their earlier journals. Altogether, it is an attractive record of solid geographical achievement.

(2) This is one of the travel-books which owe their existence to the enterprise of horticulturists ransacking the world for new species of flowering plants for decorative garden purposes. The recesses of south-western China have already proved a happy hunting-ground for such botanical expeditions, especially in the more southern borders, but our author traversed the unfrequented northern

on the Tibetan border called the White Wolves. He prefers his own system of phonetics for Chinese names: thus Archueh becomes "Arjeri," and the familiar Yamen appears as "Yamun."

With Mr. Purdom, formerly of Kew, and three Chinese lads, Mr. Farrer started from Peking in the spring of 1914 and spent that year on the hill ranges of South Kansu on the border of Tibet, and thereafter wintered in the north, moving farther north in 1915 into the alpine tracts above Sining. Those tracts had previously been in part traversed rapidly by the scientific expeditions of Prezewalsky and Potanin, but these brought back only dried specimens, and did not gather seeds or living plants, which defect our author has now remedied for cultural purposes in regard to several rare species. A list of the new species is given

FIG. 1.—*Isopyrum Farreri*, sp.n. From "On the Eaves of the World"

portion in the hope of securing new specimens which would be more hardy and thus more suitable for the British climate than the softer productions of Yunnan and Szechuan, which have now been freely explored by Forrest and other collectors. The narrative, in detailing the author's experiences, reflects his abounding enthusiasm; and though he has his eyes mainly on the business of collecting, he also gives incidentally a good deal of description of the people and of the country through which he passes. As it makes no pretence of being a scientific book, and is thoroughly colloquial in style, relatively free from technicalities except the names of plants, and somewhat facetious, it is easy reading for the general reader. The author had some excitement at times in evading the roving bands of brigands

in the appendix, and includes amongst others several new poppies, primulas, and asters, a new gentian, and two new rhododendrons, besides the *Isopyrum* named after the author, which is here illustrated. Several others of the new species are also decidedly decorative, as seen in good photographic reproductions, whilst other photographs illustrate some of the country traversed and its semi-Tibetan people.

L. A. WADDELL.

THE SUN AND THE WEATHER.

PROF. C. G. ABBOT has contributed to the *Scientific Monthly* (November, 1917) a reasoned discussion, in the light of recent investigations, of the extent and probable sequence of the effect of solar variation on world weather.