quarter' of the gneissic uplands of Sutherland (N. Scotland).

MOUNTAINS AND VALLEYS.

Richter of Graz writes on 'Gebirgshebung und Thalbildung' (*Zeitschr. deut. u. österr. Alpenverein*, xxx, 1899, 18–27), re-affirming the modern view that the bold forms of the Alpine summits result from the carving of valleys between them. He calls attention to the rough equality of height among the peaks of the Alps, and discusses the relation of peak height to valley spacing. He points out that in lofty ranges, the valleys must be relatively far apart, in order to allow the intervening mountain to rise to a great height. Before the greater uplift of the Alps, when the relief of the surface was less, streams and valleys were probably more numerous and closer together. As elevation progressed, some streams deepened their valleys faster than others and the side branches of the more active streams tapped the less active streams at many points and practically destroyed them; thus only the stronger streams survived in the deeper valleys. The rapid erosion of cliffs has reduced the mountain sides to a relatively uniform declivity, and the peaks are defined by the intersection of slopes propagated upward from the stream lines. Glacial action is briefly referred to as having produced trough-like channels whose side walls are steeper than the preglacial valley slopes which rise above them.

THE MEUSE IN BELGIUM.

After the Meuse trenches the Ardennes, it turns eastward along the strike of the Carboniferous rocks, receiving the Sambre from the western extension of the same geological belt. On this longitudinal course, streams of considerable length are received from the valleys of the Ardennes on the south, but the divide on the north lies close to the Sambre-Meuse, except at a few points where it locally loops northward. The streams that drain these loops receive a number of barbed headwaters which flow away from the Meuse valley before turning around towards it. The barbed headwaters are explained by Cornet as having once belonged to streams that flowed continuously northward. They have been captured by side streams of the Meuse in consequence of the depth to which its longitudinal valley has been cut (*Ann. Soc. géol. de Belgique*, xxvii, 1899). The beheaded streams, northward of their diverted headwaters, and their special relations to the valleys that they occupy are not described.

W. M. Davis.

NOTES ON INORGANIC CHEMISTRY.

A paper was read by Dr. Orme Masson before the recent Melbourne meeting of the Australasian Association on the use of Iceland spar as a standard in volumetric analysis, and is reprinted in the *Chemical News*. In Masson's method the pure spar in cleavage crystals is weighed in a beaker and then treated with 20 cc. of the acid to be standardized; after the first effervescence is over the whole is heated to boiling for an hour. The now perfectly neutral calcium chlorid is decanted off, the undissolved spar carefully rinsed in the beaker, dried at 110° and weighed. The loss in weight represents exactly the strength of the acid compared with normal, as 20 cc. of normal acid dissolves exactly 1 gramme of calcium carbonate. The method presents the advantages over the usual Iceland spar method, that there is no indicator used and no titrating of excess of acid with alkali—furthermore the crystals are less hygroscopic than the powder. The method has a further advantage over other methods in that few compounds can easily be obtained in so pure a state or of so definite composition as Iceland spar.

In a recent number of the *Bulletin* of the French Chemical Society Professor Moissan has described a definite phosphid of calcium with the formula Ca_3P_2. It may be formed by the reduction of calcium phosphate with carbon in the electrical furnace, or by the direct action of phosphorus vapors on calcium. In the former case it is crystalline, in the latter amorphous; in both a dark red solid. It is decomposed by water with the formation of phosphin, PH_3, in this respect resembling a number of binary compounds of calcium, such as calcium hydrid with evolution of hydrogen, calcium carbid with evolution of acetylene, calcium nitrid with evolution of ammonia. Lebeau has also

described recently arsenids and antimonids of calcium which on treatment with water yield respectively arsin AsH_3 and stibin SbH_3.

ANOTHER new compound of considerable interest, N_3I, has been prepared by Professor Hantzsch, of the University of Würzburg, and is described in the last *Berichte*. This is prepared by the action of iodin on the silver salt of hydrazoic acid, AgN_3. Unlike the other iodids of nitrogen which are dark brown, this is almost colorless. It seems to rather resemble the iodid of cyanogen CNI, which is formed in an analogous way, being soluble in water and of an almost intolerable odor. It is, however, very explosive, being even more unstable than the other iodids of nitrogen.

IN a recent number of *Nature*, R. A. Hadfield describes a contribution which his firm has made to the contest of armor plate *vs.* projectile. The latest improvement in the armor plate is that of Krupp, the composition of the steel used affording exceeding toughness and great tensile strength combined with high elastic limit. The surface is hardened by carburization by gas cementation instead of by charcoal, as in Harveyized plates. Against these plates ordinary projectiles are broken to pieces, their striking energy being wasted in breaking themselves instead of in perforating the plate. Hadfield's projectiles however, when used with a slightly higher velocity than the average usually employed, perforate these plates readily. These projectiles are fitted with a soft metal cap, which takes up a part of the energy which would otherwise be used in shattering the projectile.

IN this connection it may be added that the daily press has published a statement from T. A. Edison, Jr., that he has now devised a new armor plate which has a resistance much greater than the Krupp plate, so that for equal strength, the thickness of the plate can be reduced nearly one-half. At the same time the cost of the plate is very materially less than that of the Krupp or even of the Harvey plate.

THE preparation of some nickel bronze alloys is given by Sergius Kern of St. Petersburg, in the *Chemical News*. These alloys are especially prepared for fittings in high pressure marine boilers, and contain 70 per cent. copper, 17½ to 20 per cent. nickel, and the balance zinc. The alloys rust very slightly, have a tensile strength of 26 to 36 tons per square inch, and elongation of 14 to 17 per cent. in 2 inches.

THE discovery of a series of magnesium-aluminum alloys is reported in *Engineering*. When containing 10 per cent. magnesium the alloy resembles zinc, with 15 per cent. brass, and with 20 per cent. bronze. They give good castings and are resistant to the atmosphere, are fairly hard and work as well as brass. The alloys are lighter than aluminum and while possessing no great strength, are of value for many purposes where a light metal like aluminum would be used, if it could be cast and worked successfully. The inventor, Dr. Ludwig Mach has named the alloys magnalium.

J. L. H.

SCIENTIFIC NOTES AND NEWS.

THE French Association for the Advancement of Science meet at Paris from the 2d to the 9th of August, under the presidency of General Sebert.

THE Ways and Means committee of the New York legislature has reported an item of $60,000 for the purchase of the scientific collections and library of the late Professor James Hall, State geologist and paleontologist for over sixty years. Should this report be sanctioned by the Senate and the Governor, the State Museum will acquire an immense collection in invertebrate paleontology, comprised principally of material from the New York formations. The library is the sum total of all the books brought together by Professor Hall during his remarkably long and active career and will make a unique addition to the State Library. It is hoped that no opposition will be manifested to the completion of this purchase.

PROFESSOR DAVID EDWARD HUGHES, the eminent physicist, has left the greater part of his large estate to four London hospitals, which will receive ultimately between $1,500,000 and $2,000,000. As these hospitals have medical schools attached to them, the money will doubtless be used in large measure for educational and scientific work. Professor Hughes also bequeathed $20,000 each to the Royal So-