It is noteworthy that the structures of compounds containing more than one alkaline-earth ion, barium and calcium, or strontium and magnesium, for example, conform more closely to the ideal cubic symmetry than do the structures of compounds containing a single alkaline-earth ion. It appears that when the alkaline-earth atomic positions are occupied by two kinds of atoms of appreciably different ionic size, this allows packing of the other ions without much distortion, and the lattice as a whole can assume an undeformed cubic symmetry.

It is hoped to publish these observations in greater detail at a later date.

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[1] Bragg, W. L., "Atomic Structure of Minerals".
[2] Rooksby, H. P., Nature, 155, 484 (1945).

Artificial Condensation Nuclei and Relative Humidity

WORKING at Heidelberg, during 1942–44, I have investigated the change in size of artificially produced condensation nuclei with variation of relative humidity, by measuring the diminution of conductivity of air through ion-adsorbing suspensoids in a chamber ionized by gamma rays. A differential compensation method was used, the principle of which was first indicated by Greinacher in Switzerland in 1922. The results enabled a new examination to be made of the theory of the growth of solution nuclei with relative humidity, commonly associated with the name of the Norwegian scientific worker Koehler. I have been able to show that, contrary to the accepted view, substances of different hygroscopic power, namely, strongly hygroscopic, less hygroscopic and non-hygroscopic particles, show very different behaviour. Compared with the extreme importance of the individual chemosorptional hygroscopicity, other characteristics do not seem to influence considerably the growth of the nuclei with relative humidity. Salt nuclei generally showed no tendency to crystallize even at low humidities.

Details of this work will be published as soon as possible.

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Neutron and Negative Proton

ABOUT a year ago, I proposed a method of detecting the decay of the neutron[1]. Recently, it has been reported that Kapitza has, in the course of the analysis of cosmic ray spectra, discovered the negative proton. Whether this news is true or not, it is quite reasonable to suppose that a free neutron may also have the probability of being $\beta+$ radioactive*, thus producing a negative proton. This process would, of course, occur only if the mass of the negative proton is smaller than that of the neutron. To detect the existence of this negative proton, one may apply the method similar to that proposed in my previous note[1] and then search for the $\beta+$ rays. If the negative proton is the anti-particle of the ordinary proton, the annihilation process might be expected to occur with the emission of one or two photons of energy about 10^9 eV. These photons will, on encountering the wall of the containing vessel, produce electron showers of a considerable number of particles which may easily be detected by using a counter-controlled cloud chamber arranged in usual ways. These showers can very easily be distinguished from the showers of cosmic rays since we know that the latter are mostly in downward directions.

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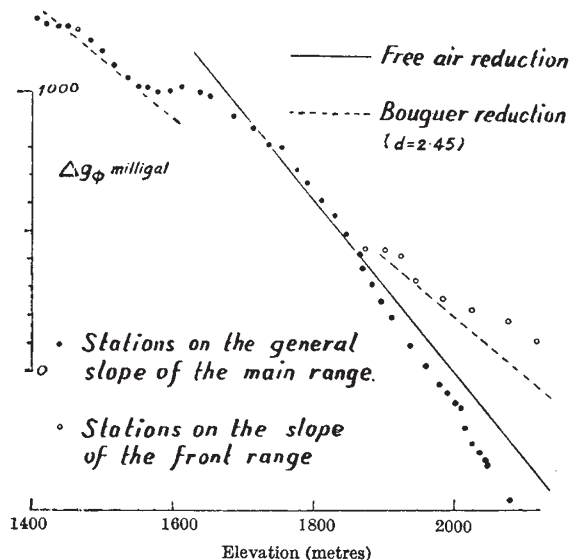Meitan, Kweichow.
Dec. 3.

[1] Wang, K. C., Nature, 155, 574 (1945).

* The suggestion that possibly a free neutron might be $\beta+$ radioactive was made in a speculative paper by Gamow (Phys. Rev., 45, 728; 1934).—EDITORS.

Gravitational Data from the Nan Shan Range

STUDYING the gravitational data obtained in the front of the Nan Shan Range, China, interesting facts pertaining to the crustal structure of the earth are revealed. The gravimetric survey was not primarily carried out for this academic purpose. The geodetic results are nevertheless interesting. The variation of the gravitational acceleration was measured by static gravity meters with a sensitivity of 0·1 milligal, and the elevation of the stations was determined by a transit to within a few feet.

The gravity variation of long linear traverses, after reduction to one common latitude (Δg_φ), is plotted separately against the elevation of the stations. Then we find that the isostatic compensation and the free air reduction of the elevation fit well in front of the main range. Beyond a sharp boundary, however, the picture changes. Usually the Bouguer reduction becomes the controlling factor.

In the accompanying figure is shown a typical example. The gravity anomaly and the elevation along a traverse across the fanning slope of the mountain down to the extensive expanse of the desert below are plotted in solid dots. In this particular case the sharp transition occurs at thirty miles from the thrust zone of the main range. Therefore the crust of the earth seems here to be blocky in nature.

Free air reduction

------ Bouguer reduction
(d = 2·45)

Δg_φ milligal

• Stations on the general slope of the main range.

○ Stations on the slope of the front range

Elevation (metres)

Our data also confirm the current conception that minor land features like the front range, which may be thirty to seventy miles in base and more than 1,500 ft. above the surrounding country, is not even slightly compensated in isostasy. In the same figure, the circles represent the data of a side traverse up the slope of such a front range. It appears that this kind of sensitive criterion can be usefully employed in geographical and physiographical classifications.

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Action of Tyrocidin and Detergents in Liberating Amino-Acids from Bacterial Cells

THE estimation of amino-acids by the amino-acid decarboxylase technique[1] provides a means for the investigation of the amino-acid content of the internal environment of bacterial cells. If 1 ml. of a thick washed suspension of S. fœcalis cells grown in casein digest medium is placed along with 1·5 ml. phosphate buffer pH 6·0 in the main cup of a Warburg manometer and 0·5 ml. lysine decarboxylase preparation tipped in from a side-bulb in the usual way, there is a small output of carbon dioxide of magnitude depending upon the degree of washing of the cells and corresponding to the amount of lysine carried down with and adsorbed on the surface of the cells (see curve labelled 'intact cells'). If a further aliquot of cell suspension is treated in such a way as to disintegrate the cells, either by mechanical shaking with glass beads[2] or by immersion in a boiling water bath for 10 min., before the addition of the enzyme, the amount of lysine assayed increases markedly (curve labelled 'boiled cells'). The difference in the quantities of lysine measured with the intact cells and with the disintegrated cells corresponds to the lysine liberated from the internal environment by disruption of the cell-wall, through which the enzyme cannot pass. Investigation of the amount of such lysine contained in the internal environment of the cells shows that its concentration depends upon that existing in the external environment, the ratio of the internal to external concentration varying from 2–3 for external concentrations of the order 0·02 M to approximately 20 for external concentrations of the order 0·001 M.

In this way it can be shown that lysine and glutamic acid exist in a free state in the internal environment of S. fœcalis cells and that the internal concentration is markedly greater than the external. It can be shown that lysine diffuses freely into the cell from the external environment, but that the passage of glutamic acid across the cell-membrane requires energy which can be supplied by the simultaneous fermentation of glucose, etc. When cells containing a high internal concentration of lysine and glutamic acid are suspended in distilled water or an isotonic salt solution, there is no loss by diffusion of this internal amino-acid over 48 hr. at 4° C. Full details of these investigations will be published shortly[3].

Hotchkiss[4] has shown that treatment of bacterial cells with tyrocidin or certain detergents results in a leakage into the suspending fluid of nitrogenous and phosphorus-containing substances. It seemed probable that the nitrogenous substances included amino-acids. Accordingly, suspensions of S. fœcalis cells grown in a casein-digest medium and consequently containing an internal concentration of 0·05–0·06 M free lysine and a similar concentration of free glutamic acid, were suspended in distilled water in the presence and absence of tyrocidin prepared from tyrothricin by the method of Hotchkiss and Dubos[5]. After 2 hr. at 37° C. the cells were centrifuged down, washed and the internal concentrations of lysine and glutamic acid assayed as described : no loss had occurred in cells suspended in water alone, but cells suspended in suitable concentrations of tyrocidin contained no free lysine or glutamic acid in the internal environment.