

work lies outside the scope of my work, its character being chemistry proper. Therefore, without intending to diminish its importance I shall characterise it only with a few words.

Well-known are his investigations on the elementary chemical processes, which he investigated under favourable conditions, for example in the state of rarefied gases. He made some important researches on the structure of fibrous matter with X-rays and elaborated suitable methods for the study of monocrystalline metals. We have mentioned above his investigations on the quantum-theoretical treatment of chemical processes published together with Wigner.

Well-known scientists are the two Farkas brothers: A. Farkas and L. Farkas; the first lives in England, the second in Jerusalem. His researches on *ortho*- and *para*-hydrogen, on heavy water, etc. are well known, also the English monograph of A. Farkas on hydrogen.

L. Szilárd, former "Privatdozent" at the University of Berlin, excited the interest of scientists with some important remarks. He thoroughly discussed the second law of thermodynamics from the standpoint of the statistical theory, and showed that the fluctuation phenomena are not in contradiction with the phenomenological theory. Szilárd was the first to observe the disintegration of the Be^9 nucleus by ν radiation. Apart from He, this was the first example of photo-disintegration in nuclei. He was the forerunner of Fermi, observing that different nuclei respond to different groups of slow neutrons, and he already

estimated the energy of the neutron groups by the same method which is now generally adopted. In a way, he thus laid the experimental foundation to Bohr's famous ideas on nuclei, expanded last winter.

Before finishing, I wish to enumerate a few scientists, who lived in Hungary, but whose work falls outside the proper range of physics, but touches parts of this science, *e.g.* :

Baron H. Harkányi, Astronomer, first determined the effective temperature of stars with the aid of the law of Planck.

R. Kövesligethy, Astronomer and geophysicist, reached some fine results in seismology.

E. Chohnoky, Professor of Geography, first called attention to monsoon-like phenomena observed in Europe.

I have mentioned at the beginning, that one of the most important technical devices, the dynamo-principle, was discovered by A. Jedlik long before W. Siemens, but he could not perceive its practical importance. This was not the case with electrical transmission of force. Both, the idea and the full execution were due to Hungarians resulting in the transformer of Déri-Bláthy-Zipernowsky.

The Jendrassik-Ganz heavy oil motor worked out by G. Jendrassik is one of the best of its kind and is well known all over the world.

I hope this short summary will produce the impression that Hungary, notwithstanding her bad conditions, works hard and successfully in some parts of science.

RESEARCH ITEMS.

Contribution to the Theory of Schlicht Functions.—Pesch ("Zur Theorie der Schlichten Funktion" *Crelle's Jour.*, (B), 176, 61-94) has made interesting contributions towards the solution of the coefficient-problem of schlicht functions. He has obtained some general theorems about the variability of the coefficients a_2, a_3, \dots, a_n of a function $f(z) = z + a_2 z^2 + \dots + a_n z^n + \dots$ schlicht in the unit circle; *i.e.*, he has obtained some results concerning the region $B_s^{(n)}$ in a $(2n-2)$ -dimensional space where $B_s^{(n)}$ comprises all points (a_2, a_3, \dots, a_n) for all schlicht functions. Even with the intricate analysis that the author uses only very little knowledge can be gathered about $B_s^{(n)}$. He has also considered the regions $E_s^{(n)}$ formed by the a 's when they are all real and the corresponding regions in the case of functions which transform the unit circle into star regions. (A region is said to form a star region about the origin when every line through the origin intersects the boundary of the region only once.)

At the outset he proves a theorem about the approximation of schlicht functions by means of the iteration of functions which transform the unit circle into the same with a radial slit issuing from a boundary point. (He makes the proof dependent on a difficult theorem of Lowner.) He shows that by means of this theorem some fundamental results such as $|a_2| \leq 2, |a_3 - a_2^2| \leq 1$ follow immediately; at the same time he shows that all results can-

not follow (*i.e.*, such results are not iteration-invariant), *viz.*, $|a_3| \leq 3$. After proving some general results concerning the coefficient-regions he also proves some results concerning the coefficients of functions corresponding to star regions. One such result is the following:

If $S(z) = z + s_2 z^2 + \dots$ transforms the unit circle into a star region and if

$$\frac{S}{S_1} = z + 2 \sum_2^{\infty} \sigma_v z^v$$

then

$$\begin{vmatrix} 1 & \sigma_2 & \dots & \sigma_n \\ \bar{\sigma}_2 & 1 & \dots & \sigma_{n-1} \\ \dots & \dots & \dots & \dots \\ \bar{\sigma}_n & \dots & \dots & 1 \end{vmatrix} \geq 0.$$

He has also obtained a partial differential equation satisfied by all functions transforming the unit circle into regions with multiple slits (the result in the case of a single slit is due to Lowner). He has studied in detail the region $B_s^{(3)}$. An interesting result he obtains in this connection is the following:—For every Schlicht $f(z) = z + b_2 z^2 + b_3 z^3 + \dots$ we have

$$1 \geq R \beta_3 \geq 2 \phi(R \beta_2) - 1 \text{ where } \beta_2 = -\frac{b_2}{2},$$

$$\beta_3 = b_2^2 - b_3 \text{ and } \phi(x) = \frac{x^2}{\lambda^2(x)} [2\lambda(x) - 1],$$

$$x = \lambda e^{1-\lambda}.$$

K. V. I.

The Structure of Boron Hydrides.—In surveying the present position of our knowledge regarding the structure of Boron hydrocarbons E. Wiberg (*Ber.*, 1936, 69, 2816) points out that the electron distribution in these hydrocarbons is difficult to understand as there are, *e.g.*, in the simplest hydrocarbon B_2H_6 , 12 valency electrons although apparently there must be here as many bonds as in ethane C_2H_6 with its 14 electrons. The formula proposed by the author in 1928 with an ethylenic double bond between the two Boron atoms, 4 co-valently bound and 2 electrovalently bound hydrogen atoms as in $\overset{-}{B} \overset{+}{H} \overset{+}{H} \overset{-}{B} = \overset{-}{B} \overset{+}{H} \overset{+}{H} \overset{-}{B}$ fits in best with several physical and chemical properties. The stable position of the two protons seems to be inside the orbits of the double-bond electrons and as only protons can occupy such a position when it is attempted to substitute them by other atoms or radicals, the molecule splits as into BCl_3 , $(CH_3)_3$, etc. The constitution of the corresponding B_4H_{10} is given by $\overset{-}{B} \overset{+}{H} \overset{+}{H} \overset{-}{B} = \overset{-}{B} \overset{+}{H} \overset{+}{H} \overset{-}{B} - \overset{-}{B} \overset{+}{H} \overset{+}{H} \overset{-}{B} = \overset{-}{B} \overset{+}{H} \overset{+}{H} \overset{-}{B}$. The acid character of these compounds, as exhibited by the formation of ammonium salts, can also be represented by the simpler formula $(B_2H_4H_2)$ and $(B_4H_6)H_4$. Their unsaturation is shown by the formation of addition compounds with alkali metals. Other evidences in support of the unsaturated poly-basic acid character are provided by dipole moment, ultraviolet absorption, and magnetic measurements.

M. A. G.

The Potash-Soda Felspars.—The results of investigations of the optical properties and chemical composition of 26 potash-soda felspars, have been reported in a paper by Dr. Edmondson Spencer, read at a recent meeting of the Mineralogical Society, London. In the orthoclase-microperthites there is almost linear relation between specific gravity and optical properties and Ab-content. Specimens were heated (a) to near melting for a short period, and (b) for several days at $1075^\circ C$. Refractive indices decrease on heating between 400° and $850^\circ C$, and d also decreases. Heating to 1120° produces little further change. Very slow cooling from 800° to 350° restores the schiller and the lost refractive index and sp. gr. It appears that perthite can be dissolved and re-precipitated more readily than has been thought possible.

A structural explanation of the formation of perthite lamellæ is offered.

A new equilibrium diagram for temperatures down to $800^\circ C$ is given. It is argued therefrom that residual granite magma at about 800° in presence of much water and free silica splits gradually into a soda-rich and a potash-rich fraction. The occurrence of potash-felspar crystals in xenoliths, the origin of the microcline of pegmatites, of 'vein' perthite, and of quartz-microcline intergrowths are other points discussed.

The Nitrogen Supply of Rice Soils.—In the *Indian Journal of Agricultural Science* (6, Part VI) P. K. De draws attention to the fact that in Bengal and in Burma rice is being grown for centuries year after year on the same

land without the addition of any fertiliser and attempts to answer the question as to where the crop gets its supply of nitrogen from. Two possibilities are suggested, *viz.*, that rice may be capable of assimilating elementary nitrogen like the legumes or that nitrogen fixation may take place in the water-logged soil sufficient to make up for the quantity removed by the crop and lost otherwise. The second possibility has been studied by him and the conclusion is reached that such fixation does take place in water-logged condition and under sunlight. Increases of nitrogen from less than 1 per cent. up to as much as 33 per cent. over the initial quantities were observed. Soils with a high pH value were found to be more active than others and even these latter became active with the addition of lime. The agency for such fixation is tentatively put down as algal growth, either by itself or with the help of bacteria.

The Arrowing of Sugarcane.—The subject of the arrowing or flowering sugarcane in its important agricultural aspects has been comprehensively studied and the results of several years' work brought together by K. Krishnamurthi Rao and K. V. Gopala Iyer (*Agric. and Livestock in India*, 6, Part V). The conclusions may be summarised as follows:—Arrowing is no indication of maturity; on the other hand, the juice of arrowed canes continues to improve for a long period after the arrowing; increase in sucrose content and purity is noticed till two to three months after full arrowing and to an extent of three to four per cent. in sucrose and five to eight per cent. in purity. Arrowing stops further growth of the cane almost entirely, and greatly takes away therefore from the tonnage that may be expected from canes which continue to grow without arrowing, two or three months after arrowing the weight of the arrowed canes to the weight of non-arrowed cane is as 1 : $1\frac{1}{2}$ or 2. By this time the sucrose content of the non-arrowed cane becomes equal to that of arrowed canes. Calculated in total sugar values, the maximum available sugar in one hundred lbs. of arrowed and non-arrowed canes of P. O. J. 2878 variety was 22.88 lbs. and 34.10 lbs. respectively; other varieties also showed similar differences. If these figures are calculated on the acre basis, the magnitude of the loss due to arrowing will be found to be astonishingly large.

Seedling Canes in Bihar.—The possibility of breeding sugarcane varieties in Upper India which has for long been doubted has now been demonstrated by the successful work in this direction carried out in Bihar by K. L. Khanna, of which an account appears in *Agriculture and Livestock in India* (7, Part I). Although the fertility of the flowers and seed-setting have been erratic under field conditions uniformly good results have been obtained under conditions of controlled temperature and humidity; and a large number of seedlings from different selfs and crosses have been raised to maturity during the past three seasons. The following observations made in the course of the work will be found interesting:—Sugarcane seed, thoroughly dried and kept without any preservative, remained viable for over seven months and they lost viability

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only during the rains. Instances of sugarcane seed keeping viable for over two months after being sown in the open were also observed. Seeds from different varieties and combinations differed in their vitality and viability, the stronger pollinating parents being found to produce seeds which kept viable over longer periods. For germination of sugarcane seeds in Petrie dishes acidified distilled water was found to afford protection against fungus attacks and also to produce better germination. The flowering of canes has been both induced and hastened by growing them in special soils and by injecting into the canes at different stages of growth certain chemicals such as mercuric chloride and ferrous sulphate in doses of varying concentrations. Several useful cultural hints as well as data regarding the flowering, pollination and fertilisation in cane are described in detail.

Deep-focus Earthquakes and their Geological Significance.—Such of the geologists who suspected the existence of deep-focus earthquakes will read with interest the contribution of Leith and Sharp (*Journal of Geology*, 44, No. 8) on this subject, and would probably like to revise some of the old and untenable dictums of seismology. The authors have given numerous examples of deep-focus earthquakes, referred to by Wadati near Japan, where some of the earthquakes are believed to have taken their origin from 700 km. and downwards. From these and other examples, Leith and Sharp estimate that nearly 10 per cent. of the earthquakes originate at great depths. They have further examined the conditions of temperature, viscosity, rigidity and strength in relation to the behaviour of the materials at such

great depths. Incidentally, discussing the geological significance of such earthquakes, they have questioned the very existence of the asthenosphere or the zone of flow. Their conclusions are of great importance, and are likely to modify the present views on crustal mechanics in general and isostasy in particular. The paper is well illustrated with numerous figures, maps and charts.

Sexual Periodicity.—In an admirable Croonian lecture, F. H. A. Marshall (*Phil. Trans. Roy. Soc. Lond.*, (B), 1936, 539) describes the sexual periodicity and the causes which determine it. An alternation of active and quiescent periods induces an internal rhythm of reproduction. The secretion of hormones which act upon the accessory organs and sexual characters is correlated with this rhythm. In the absence of pregnancy, the successive repetition of the follicular (œstrous) and luteal phases is controlled by the mutual interaction of the pituitary and the ovary. Generally it may be said that in all higher animals sexual periodicity, while conditioned by environment, is regulated in its successive phases by the combined integrative action of the nervous and endocrine systems. "The primary periodicity is a function of the gonad the anterior pituitary acting as a regulator, and the internal rhythm is adjusted to the environment by the latter acting on the pituitary, partly or entirely, through the intermediation of the nervous system. The further fact, however, must not be overlooked, namely, that in the absence of the anterior pituitary the functions of the gonad fail, so that the pituitary in common with the other endocrine organs, conditions the metabolic processes which are essential for reproduction".

SCIENCE NOTES.

Recent Geological Changes in Northern India.—In the course of an extension lecture recently delivered under the auspices of the Faculty of Sciences, Lucknow University, Mr. D. N. Wadia dealt with the recent geological changes in Northern India and their effect upon the drainage of the Indo-Gangetic basin. At the very outset, he pointed out that the earth has no claim to be called a *terra-firma* as the earth's crust possesses no real stability. The surface features of this crust, the distribution of sea and land, continents, mountains, rivers, lakes are subject to constant and ceaseless change and every geological age comes to possess its own geographical features. The changes that have taken place in India since the last geological age the Pleistocene, have been of great magnitude and importance. He then gave a brief account of the changes in each of the three great natural physical divisions of India, the Peninsula of Deccan, the Indo-Gangetic plains and the Himalayas. In the latter part of his address, he referred to the recent drainage changes in Northern India. During a very late geological epoch a great river flowed from Assam to the Punjab and Kohat, thence turning southward flowed towards the Arabian Sea. The course of this ancient river—the Indo-Brahm

of Sir Edwin Pascoe—is revealed to us to-day by the alluvial deposits it laid down along its valley. A differential elevation taking place near the Potwar Region of east Punjab at the end of the middle Pleistocene, severed this Indo-Brahm River into two portions—the upper half taking an easterly course into the Bay of Bengal forming the present Ganges and the lower half which continued to follow the north-westerly and then southerly course towards the Arabian Sea, forming the present Indus. The River Jumna was at first an affluent of the Indus with a westerly course; and later, a tributary of the Ganges captured this stream and drained it eastward. In conclusion, he detailed the various evidences of recent geological changes in the Himalayas indicating that these mountains have been elevated several thousand feet since the Pleistocene.

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Royal Asiatic Society of Bengal.—The Annual Meeting of the Society was held on the 15th February.

The Rt. Hon'ble Sir John Anderson, P.C., G.C.B., G.C.I.F., M.A., B.Sc., LL.D., presided.

The following were elected Fellows:—Dr. K. N. Bahl, Mr. K. N. Dikshit, Dr. N. N. Law, and Dr. J. N. Mukherjee.