

“Discovery II” and The Exploration of the Whale’s Habitat.

THE Royal Research ship “*Discovery II*” returned from Antarctic on June 3rd after completing her third commission. The expedition was of 20 months’ duration and covered 2 arctic summers. The scientific work was in charge of Dr. N. A. Mackintosh with Mr. H. F. P. Herdman as Chief Hydrologist and Lieutenant A. L. Nelson, R.N.R. in executive command.

The ship left Thames on October 21st, 1933, and 5 weeks later (Nov. 21st) was on the whaling grounds of South Georgia. After a few days’ stop there, she left Georgia and a line of stations was then made across the Scotia sea to the South Shetlands and from there due north to the western opening of the Straits of Magellan. A number of observations was made with the primary object of following the seasonal changes in the water movements and so trace the circulation of the marine animals and plants, on which the whales and all other antarctic life are ultimately dependent. Thirty full stations were made during the cruise and in addition 19 subsidiary “towing” stations. A full station takes 3 to 4 hours; it includes a sounding and noting of meteorological data; of chief importance are the observations of sea temperatures taken at, at least 20 points between the surface and the bottom—here from $2\frac{1}{2}$ to 3 miles deep—and of the collection of water for chemical analysis from the same points. Concurrently, a series of hauls are made, both vertically and horizontally with nets of varying mesh; those

of the finest—200 meshes to the linear inch—are designed to collect the microscopic vegetation, which constitutes the “pastures” of the ocean, and is as important at sea as on land; those of the medium mesh are for the smaller forms of animal life, including young stages of whale food; and the largest, for the adult whale food, a prawn some $2\frac{1}{2}$ in. in length—the so called “krill” which forms the only food of the porpoises. A “towing” station is confined to using certain of the nets to keep a check on the intervals between stations, as the distribution of animal and plant life is sometimes “patchy”.

“*Discovery II*” returned to South Georgia on April 10th and on her way back repeated the series of stations already gone through. The second season was begun under winter conditions and after traversing the East Pacific Sector and making some important observations, was back at South Georgia on January 27th, 1935. On her return journey, she communicated with a whale marker “*William Scoresly*” which was also working towards the same objective as “*Discovery II*”. While the latter was exploring the whales’ habitat and the life-history of its food supply, “*William Scoresly*” is interested in marking the whales in order to know whence and where they travel, at what speed and in what numbers.

“*Discovery II*” is to leave London again in the course of the next autumn on her fourth and probably final commission.—(From an article in “*Statesman*”, June 18th.)

Research Notes.

Can Quantum-Mechanical Description of Physical Reality be considered Complete?

ON the basis of the uncertainty principle arising from Quantum Mechanics, the philosophical outlook of modern science has been asserted to be one of indeterminism and the principle of causality has been repudiated by such scientists as Bohr, Heisenberg, Weyl, Eddington and Jeans. On the other hand Einstein, Planck, Rutherford and Silberstein are staunch adherents to the view that the principle of causality still rules Physical Science. In view of this divergence of opinion, a paper with the above title by Einstein, Podolsky and Rosen (*Phys. Rev.*, 1935, 47, 777) requires careful consideration. In this paper the authors observe that any physical theory which attempts to explain the objective world must satisfy two conditions, *viz.*, that it must be true and that the description given by the theory should be complete. They formulate the condition of completeness in the following terms: “Every element of the physical reality must have a counterpart in the physical theory.”

They define a physical reality by postulating that “if, without in any way disturbing a system, we can predict with certainty (*i.e.*, with probability equal to unity) the value of a physical quantity, then there exists an element of physical reality corresponding to this physical quantity.” This they consider not as a necessary but only a sufficient criterion of reality. Translating this condition into the language of quantum mechanics they show that in the case of particle with a single degree of freedom its momentum satisfies the condition of reality while its co-ordinate of position does not satisfy that condition. There are now two alternatives: (1) either the description of reality given by quantum mechanics is not complete, or (2) when the operators corresponding to two physical quantities do not commute the two quantities cannot have simultaneous reality. The assumption so far has been that the description given by quantum mechanics is complete so that the second alternative was chosen. The authors now show, however, that this assumption leads

to a contradiction when considered along with the criterion of reality, by proving that two physical quantities with non-commuting operators can have reality. Hence they conclude that the description provided by quantum mechanics is not complete, but express their conviction that some other complete theory is possible.

T. S. S.

The Nuclear Spins and Magnetic Moments of the Principal Isotopes of Potassium.

IN the *Physical Review*, 1935, 47, 739, S. Millman reports the result of his experiments in which the spins and magnetic moments of K_{39} and K_{41} were investigated by the method of magnetic deflection of molecular beams developed by Breit and Rabi. An analysis of the curves led to the value $I=3/2$ for K_{39} and the value of the separation $\Delta\nu$ of the $^2S_{1/2}$ state was thence calculated to be 0.0152 ± 0.0006 cm.⁻¹. This result is interesting because it is only recently that the experimental difficulties involved in the measurement of this small separation have been ingeniously overcome by Jackson and Kuhn (*Proc. Roy. Soc., A*, 1935, 148, 335), who also obtain a value $\Delta\nu=0.0152$ cm.⁻¹. They observed the absorption due to a molecular beam moving perpendicular to the direction of observation so that the Doppler broadening was prevented and were thus able to resolve the line. They were unable, however, to fix the value of the nuclear spin definitely, but the work of Millman solves the problem without ambiguity and the magnetic moment of the K_{39} nucleus is then calculated to be 0.39 nuclear magnetons. In the case of K_{41} , it is only concluded that $I > \frac{1}{2}$ and that the ratio of the magnetic moments of K_{41} and K_{39} is such that $0.42 < \frac{\mu_{K41}}{\mu_{K39}} < 0.88$.

T. S. S.

The Structure of Hydrogen Peroxide.

ON the basis of the value for the dipole moment of the molecule, Theilacker [*Zeit. Physikal Chem., (B)* 1933, 20, 142] suggested that in hydrogen peroxide there is a free rotation of the two OH groups about the O—O bond as the axis. Penney and Sutherland (*J. Chem. Physics*, 1934, 2, 492) however concluded from wave-mechanical considerations that the two OH groups are not in free rotation, but fixed at an azimuth of 90°.

This structure will also agree with the observed moment value. A. Simon and F. Fehér (*Zeit. Electrochem.*, 1935, 41, 2291) have now studied the Raman spectrum of 99.5 per cent. hydrogen peroxide and find strong evidence for the structure proposed by Penney and Sutherland. Besides a strong line at 877 cm.⁻¹(15) due to O—O oscillation, there are two bands at 1462-1345 (1) and 3410-3200 (3). The latter is the well-known water band due to O—H oscillations. The band at 1462-1345 is a deformation band corresponding to the 1648 band of water, and shows two clear maxima corresponding to the two kinds of closely allied deformation oscillations to be expected from the wave-mechanical structure. The absence of free rotation is supported by the fact that there is no doubling of the frequencies O—O and O—H.

The Interaction of Atoms and Molecules with Solid Surfaces.

THE activity of atoms and molecules on solid surfaces is an important problem connected with chemical reactions taking place on solid surfaces. The atoms and molecules may vibrate about a mean position or may migrate from one part of the surface to the other, or may be ejected from the surface altogether, by the thermal agitation of the solid surface beneath them. The problem has been investigated by J. E. Lennard-Jones and C. Strachan [*Proc. Roy. Soc., (A)*, Vol. 150, p. 442] who have worked out formulæ for the mean interval between successive excitations from the lowest vibrational state to higher states and also for the mean time during which the atom remains in an excited state. In the following paper, C. Strachan has examined the process of evaporation of absorbed atoms or molecules on a surface.

A Relation between Molecular Spectra and Constituent Electrons.

H. DESLANDRES has traced a very interesting relation between the vibration spectrum of a molecule and its constituent electrons by means of an empirical formula. The formula is given by $\nu = qd_1/r's'$, where ν is the frequency of vibration in wave-numbers, d_1 is an universal constant having the value 1062.5, s' is the number of electrons in the outer ring or rings of the constituent atoms of the molecule, q is an integer and r' is

another integer usually small. His papers in the *Comptes Rendus* (Paris, 1934-35) contain many experimental proofs of his formula.

Adsorption and Catalysis.

THE mechanism of the adsorption of reacting molecules on a surface in relation to catalytic activity is of considerable interest and has been tackled by a number of workers. It is well known that contact catalysis proceeds from strong adsorption which in turn is due to ionisation of atoms or molecules caused by the surface. A hot filament of Tungsten, Iron, Molybdenum or Platinum placed in vapours of Potassium captures the valence electrons and adsorbs the Potassium ions so formed. Nyrop has developed recently (*J. Phy. Chem.*, 1935, **39**, 643) the ionisation mechanism for the catalytic activity of surfaces. He has formulated two postulates for the same: (a) The catalytic surface is at the temperature in question, able to ionise such of the molecules among the reactants as are most difficult to ionise; and the surface will cause a strong adsorption, as the ions formed are attracted by the surface. (b) Other conditions remaining the same, a molecule with a lower ionisation potential is adsorbed in preference to one with a higher ionisation potential. The ability to cause ionisation can be represented by an electric field at the surface, the potential barrier hindering the free electrons of the metal from escaping. The energies of activation for the adsorption of a given molecule on surfaces will determine the relative catalytic efficiencies of the different substances. The type of ionic adsorption pictured by Nyrop does not involve assumptions regarding "Peaks" on surfaces, formulated by Taylor. When ionic adsorption takes place, the positive ions formed by ionisation weakens the field due to the surface electrons. Catalytic poisons would, according to this theory, consist of those substances whose ionisation potential is low. Catalysts with high ionising power are more easily poisoned than others with lower ionising power. A too narrow potential barrier in relation to the dimensions of the adsorbed molecule may weaken the power of ionisation. When molecules coming into contact with the surface are highly unsaturated, they are adsorbed at two or more points. The preferential adsorption of highly unsaturated molecules is the cause of prefer-

ential hydrogenation of unsaturated organic compounds. The above theory developed by Nyrop may be of use in the elucidation of the numerous problems that arise in contact catalysis.

M. P. V.

The "Transition State" Concept in the Interpretation of Reaction Velocities.

ACCORDING to the kinetic theory chemical reactions ought to proceed at extremely high speed, if every collision between the reactants is effective in bringing about a chemical change. The occurrence of numerous chemical reactions which proceed at measurable rates can only be explained by postulating an energy barrier between the initial and final states. The condition of the reacting system at the top of the barrier is designated the transition state. It is well known that the *energy* of the transition state for any reaction can be calculated from the temperature coefficient of the velocity constant. Similarly it should be possible to estimate the *density* of the transition state from the pressure dependence of the specific reaction rate. M. G. Evans and M. Polanyi (*Trans. Far. Soc.*, 1935, **169**, 877) have outlined a general theoretical treatment of the reaction velocities by the transition state method and have applied it to interpret the variations in velocity constants of reactions at high pressures. They are thereby able to account for the exponential dependence of reaction velocity on pressure. They also explain the strong acceleration brought about by pressure in the case of many of the so-called "slow" reactions. It is often surmised that reactions accompanied by a diminution in volume should be accelerated by pressure. The theory detailed in this paper, however, shows that this can only be true if the density of the transition state is intermediate between that of the initial and the final states. The *cis-trans* isomerisation of fumaric acid is not accelerated by pressure though the reaction is accompanied by a diminution in volume. The transition state appears in this case to be one having a lower density than either the initial or the final state. The ideas set forth in this paper, besides their theoretical interest, seem to be of value in the investigation of high pressure reactions of technological importance.

K. S. G. D.

Effect of Cathode Rays on Hydrophobic Sols.

THE literature on the effect of ionizing radiations on colloids is one of conflicting results due to large effects of impurities, sensitiveness to hydrogen-ion concentration and other unknown factors such as internal photo-electric action. May Annets (*J. Phys. Chem.*, 1935, 509, 39) has investigated the effect of cathode rays on sols of copper, gold, silver, lead, bismuth, platinum, ferric hydroxide and arsenious sulphide. The stability of both positively and negatively charged sols is found to decrease. This is to be expected; the cathode rays on collision with the sols give up their kinetic energy and their charge. With the gain of the charge the stability of the sol will increase or decrease as the sol is negatively or positively charged. The kinetic energy produces ionisation of the dispersion medium and thereby the increase of electrolytic concentration, which in general decreases sol stability irrespective of the sign of the charge. In the absence of a permanent chemical reaction the positive and negative ions recombine with production of heat.

Under cathode ray bombardment the rate of heating of the sol was found to be definitely greater than the rate of heating of water, a phenomenon which is yet to receive an adequate explanation. The accepted heats of flocculation, the energy due to the charge on the surface of the colloid particles and the energy due to the compression of the water around the colloid particles being too small by 10^3 , 10^6 , 10^{13} times respectively, to account for the observed difference, it is not clear what additional source of energy in the colloid state could account for this phenomenon.

K. S. R.

Starches from Old and New Rice.

THE difference in the physical properties and in the behaviour under various treatments of starch from old and new rice forms the subject of a study by D. L. Sahasrabudde and M. M. Kibe and is reported in the *Indian Journal of Agricultural Science*, Vol. V, Part I. Coarse rices, reported to be fit only for bread making as distinguished from the finer ones fit for use as boiled rice, are composed of larger grains, but all are alike in general appearance with the usual characteristic polygonal shape. In one and the same variety, old and new grains show no difference in size. In their behaviour

towards methylene blue and iodine, no difference in the starch of different varieties or of different ages was noticeable. Older rices and those of the finer cooking varieties soften more than do new rices and those of the coarser bread varieties, when treated with boiling water and with dilute caustic soda. Likewise as an indication of the extent of digestibility, it is brought out that the hydrolysing action of hydrochloric acid, diastase and pancreatin was more on old rices than on new rices, the same behaviour differentiating also the finer rices from the coarser ones, except in regard to pancreatin. The rices also show significant difference in the amount of liquefaction of the starches on boiling with water, the older liquefying much more than the newer ones and hence being more readily digested. The presence of an amylo-hydrolytic enzyme in the rice grain is established, the prolonged action of which on rice in storage may account for the greater susceptibility of older rices to the various treatments described.

A. K. Y.

Treatment of Opium Habit with Lecithin.

A VERY important contribution towards treatment of opium addiction has been made by Wen-chao-Ma and co-workers at the suggestion of Dr. J. Heng Liu, Chairman of the National Opium Suppression Commission, China. (*F. E. A. T. M.*, Nanking, 1934, Vol. II, 381-387.)

The authors observed that opium smokers can secure comfortable and spontaneous cure by means of lecithin diet. A daily dose of 60-90 gm. of lecithin from Soya bean took from 3 to 6 weeks and sometimes more to break the habit. Soya bean lecithin was found to have advantage over egg yolk preparation in that it is less expensive and is said to be more easily assimilated.

Lecithin does not have the property of directly suppressing the symptom. It has been observed that in serious cases of opium addiction, the amount of lipid material in the body cell is reduced to nil, while in moderate cases there exists a fair amount and in light cases a relatively big amount. When lecithin is administered orally, the lipid material is gradually increased with the external manifestation of corresponding subsidence of the craving symptom and an amelioration of the opium habit. The patients treated with lecithin diet had no

disturbance in bowel movement, their appetite was good and they increased in body weight. They enjoyed a sound sleep and felt happy throughout the treatment.

According to the authors, lecithin treatment affords a means of suppressing opium habit without the use of military force or elaborate hospital equipment.

N. C. D.

Transmissibility of Tobacco Mosaic Virus by Aphids.

IT being fairly well established that heavy infections with tobacco mosaic in tobacco fields are not attributable to the dissemination of the virus by aphids from tobacco to tobacco, the possibility of transmission by aphid agency of the virus from other host plants is investigated by Isme A. Hoggan (*J. of Agr. Research*, Vol. 49, No. 12). Out of the eighteen hosts tested, transmission was obtained only from the tomato, occasional infections developed in eight and no infection at all from the others. The positive results were however rather insignificant, as only one aphid out of 129 caused infection even in the best of the three species of aphids used as carriers. It is concluded that it is unlikely that any appreciable amount of dissemination of tobacco mosaic is brought about by aphids, except perhaps from the tomato.

The Relation of Plant Characters to Yield in Sorghum.

CORRELATION studies of eight different plant characters as related to yield of grain per plant in respect of two irrigated and three rain-fed varieties of sorghum, carried out over a series of two seasons in Coimbatore by G. N. Rangaswamy Ayyangar and his assistants, bring out certain characters as reliable indices in selecting for high yield (*The Indian Journal of Agricultural Science*, Vol. V, Part I). The diameter of peduncle, weight, length and thickness of earhead and straw weight have given high positive correlation values. The weight of 100 grains has given high correlation values in the case of the irrigated varieties and low values in the case of the rain-fed varieties. The length of peduncle is either not correlated or is negatively correlated with yield. In the two irrigated varieties, the duration of the crop was also studied and was found to be negatively correlated with yield. A review

of the previous work on the subject both in India and outside is also given, the conclusions of the authors being in general agreement with those of the workers in Bombay for all the characters common to both the studies.

A. K. Y.

A Further Note on the Feeding Mechanism of *Chirocephalus diaphanus*.

H. G. CANNON in the above paper (*Proc. Roy. Soc. Lond.*, B, 1935, 806, 455) describes the feeding mechanism of *Chirocephalus* and largely agrees with the description given for *Anostraca* by Eriksson (*Zool. Bidr. Uppsala*, 1934, Vol. 15, p. 23). There are, however, two important points in which Cannon differs from the latter author and they are (1) the method of production of the oral food current, and (2) the function of the labral gland. According to Eriksson, the current is a continuous stream while Cannon maintains that it is an intermittent one. As regards the labral gland, Eriksson believes that the secretion of the gland agglutinates the extra food matter to be thrown away, while Cannon is of opinion that the glandular secretion is helpful in aiding *Chirocephalus* in binding the food to be eaten. Moreover, the author has been able to show by suitable staining, the existence of an anteriorly-directed food current. With regard to the labral gland secretion he notes that "a part of it oozes round the sides of the labrum and forms a mass underneath the head region and mouth, while a part of the secretion passes backwards beyond the tip of the labrum where it is sucked against the inner surface of the anterior trunk limbs." Here it converts the anteriorly-directed food current into a groove.

Origin and Nature of Nucleolus.

MARY S. GARDINER (*Quart. J. Micro. Sci.*, 1935, 77, 308) has examined the structure and behaviour of the nucleolus in a number of plants and animals. Using Feulgen's technique, the author has come to the conclusion that the nucleolus is not chromatinic and that it is albuminoid in chemical composition, probably closely allied to "formed yolk". Its significance in regard to secretory activity of the cell is considerable and is by no means an accumulation of waste matter. Its absence in cells where there is

no secretory activity like the oogonia and spermatogonia and spermatocytes of *Limulus* and *Tenebrio* points to a definite correlation between the nucleolus and secretory activity of the cell. And the transformation it undergoes during the process of vitellogenesis when it becomes vacuolated and finally disappears also points to the same conclusion. Cells of most plant tissues are to be considered secretory and the universal presence of a nucleolus in these cells emphasises this idea.

The Autonomic Nervous System of *Amphioxus*.

PROF. J. BOEK'S paper (*Quart. J. Micro. Sci.*, 1935, **77**, 308) describes the enteric nervous system of *Amphioxus lanceolatus*. *Amphioxus* has been often denied a sympathetic nervous system comparable with that of higher vertebrates. The author has, however, found in the walls of the intestine a nerve plexus comparable with the plexus of Auerbach of higher vertebrates and a more delicate nerve plexus analogous to that of Meissner is also reported. The ganglion cells and their synaptic connections with pre- and post-ganglionic nerve fibres all recall the sympathetic system of higher vertebrates. The entire plexus is connected with the central nervous system by visceral nerves and dorsal roots.

Relations of Anorthosite to Granite.

IN connection with the sixteenth International Geological Congress, a very instructive excursion was conducted to the well-known anorthosite areas of Adirondacks and Duluth. A comparison of the rock types from the above areas has been made by F. F. Grout and W. W. Langley (*Journal of Geology*, Vol. XLIII, No. 2). The difference between the two is due to the intense deformation of the Adirondack rocks, during or after crystallisation developing granulation and showing minerals and structures characteristic of metamorphic rocks. At Duluth the rocks have suffered little or no deformation and therefore in common with other anorthosite areas, the granitic phase of the magma seems to have evolved from gabbro

magma sometime after the anorthosite was formed. After a very careful study of these rocks both in the field and in the laboratory they have suggested that both the granite and the anorthosite are related to gabbro, but not differentiated directly from each other.

The Vitamin A Content of Certain Sweet Potato Varieties.

VERY marked differences in the Vitamin A content of different varieties of the sweet potato (*Ipomoea batatas*) are disclosed as the result of a study of five varieties commonly grown in Tennessee (*J. of Agr. Research*, Vol. 50, No. 2) by F. L. MacLeod and his students. The differences were of the following order, *viz.*, 13,500 units, 900 units, 1,800 units, 9,000 units and 4,500 units per pound respectively by the varieties Nancy, Hall, Triumph, Southern Queen, Porto Rico and Yellow Jersey. It is also brought out that the Vitamin A content materially increases by the storage of the potatoes for two months or more, the Porto Rico increasing from 9,000 to 29,000 units and the Yellow Jersey from 4,500 to 18,000 units by this process. The observation made in previous work that the Vitamin A content increases with the depth of pigmentation of the varieties is also confirmed.

A. K. Y.

Crystalline Insulin.

BY their new method of crystallisation of insulin hydrochloride from buffer solution, Scott and Fisher (*Biochem. J.* 1935, **29**, 1048) have shown that different samples of insulin hydrochloride having an ash content of 0.02 per cent., crystallised from an ammonium acetate buffer solution by means of zinc, cobalt or cadmium, showed constant values for the respective metals. The average ash content of each insulin salt was proportional to the atomic weight of the metal, and these facts indicate that crystalline insulin contains the metals as chemically combined constituents and not as impurities.

Science Notes.

Two Charophytes from Kolhapur (S. M. C.).—Mr. S. A. Parandekar, Rajaram College, Kolhapur, writes:—Among the flora of Kolhapur two species of Chara have been recently observed and identified as *Chara brachypus* A. Br. and *Chara corallina* with the help of the key published by Allen (Charophyte Notes from Gonda, U.P., *J. Bombay Nat. Hist. Soc.*, 30, 589). The Charophytes from Kolhapur have not been so far recorded and studied, although about twenty species have been reported from Deccan. The report of the occurrence of the two charophytes might therefore prove of interest.

Chara brachypus A. Br. has been already reported from Bombay (Salsette island) by Dixit (*J. Ind. Bot. Soc.*, 19, 205) and by Allen from Gonda, U.P.

Chara corallina (which is not so abundant here as the other species) has been also recorded from Gonda by Allen, but not by Dixit from Bombay.

I am thankful to Mr. G. O. Allen, and Prof. S. C. Dixit, who have worked on Indian Charophyta, for informing me that Charophytes from Kolhapur have not been so far reported.

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Awards of Silver Jubilee Medals.—We have great pleasure in felicitating scientists of India who have been decorated with Silver Jubilee Medals on the occasion of the recent Jubilee Celebration of H. M. the King-Emperor. The list given below is, however, incomplete.

Dr. P. K. Acharya, M.A., Ph.D., D.Litt.; S. P. Agharkar, Esq., M.A., Ph.D., F.L.S.; Rai Sahib Arthaballah Mahant; S. N. Bal, Esq., M.Sc., Ph.D.; Dr. Bains Prashad, D.Sc., F.R.S.E., F.L.S., etc.; D. V. Bal, Esq., L.A.G. (Hons.), A.I.C., F.C.S.; A. C. Banerji, Esq., M.A. (Cantab.), M.Sc.; S. B. Belekar, Esq., M.Sc.; D. Bhattacharji, Esq.; C. C. Calder, Esq., B.Sc., B.Sc. (Agric.), F.L.S.; H. Crookshank, Esq., B.A., B.A.I. (Dub.); J. F. Dastur, Esq., M.Sc., I.A.S.; M. L. De, Esq., M.A., I.E.S.; Deoras, Esq., M.Sc.; Dr. H. B. Dunningcliff, M.A., D.Sc., F.I.C.; Sir L. L. Fermor, O.B.E., A.R.S.M., D.Sc., F.R.S., etc.; Dr. C. S. Fox, D.Sc. (Birm.), M.I.Min.E., F.G.S., etc.; Babu S. K. Ganguli; Rao Sahib S. N. Godbole, M.Sc.; Dr. F. H. Gravely, D.Sc.; Dr. A. M. Heron, D.Sc. (Edin.), F.G.S., F.R.G.S., etc.; Dr. S. L. Hora, D.Sc., F.R.S.E., etc.; Jamaluddin, Esq.; Gurudatta Karwal, Esq.; R. P. Khosla, Esq.; Dr. K. Krishnamurthi, D.Sc.; D. N. Mehta, Esq., B.A. (Oxon.); Dr. E. P. Metcalfe, D.Sc., F.Inst.P.; M. A. Moghe, Esq., M.Sc.; Dr. A. L. Narayan, D.Sc., F.Inst.P.; Dr. B. K. Narayana Rao, B.A., M.B.C.M., M.R.C.S., D.P.H., D.O.; M. Owen, Esq., M.Sc., F.I.P., I.E.S.; G. R. Paranjpe, Esq.; M. W. Sayer, Esq., B.A., Dip. Agri. (Cantab.); D. R. Sethi, Esq., M.A., F.Sc.; Dr. F. J. F. Shaw, D.Sc. (Lond.), A.R.C.S., F.L.S.; Dr. B. K. Singh, M.A. (Cantab.), D.Sc., F.I.C.; Rao Bahadur B. Viswanath, F.I.C.; D. N. Wadia, Esq., M.A., B.Sc., F.G.S., etc.; Dr. T. S. Wheeler, Ph.D., F.I.C., F.Inst.P., M. I.Chem.E.

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Origin, Scope and the Present Position of Potato Research at the Agricultural Research Station, Nanjanad.—The potato was introduced into the Nilgiris in the beginning of the nineteenth century. As the climate was quite suitable for its cultivation, it gradually extended and the local ryots

(Badagas) finding the crop most remunerative took to its cultivation readily.

The crop now occupies nearly 11,000 acres. The potato is a very delicate crop and the ryots out of ignorance handled the crop carelessly and consequently deterioration set in rapidly.

As the crop is of very appreciable economic importance in the Nilgiris where it forms the main crop raised by the indigenous hill population and as its cultivation was threatened to extinction, the Government of Madras opened a Station in 1917 for the improvement of potatoes and supply of good seeds to the potato growers on the Nilgiris.

The Station is situated in the Nanjanad village and is 10½ miles from Ootacamund on the Governor Shola Road. The soil in the Station is a poor clayey loam and is typical of that to be found on the Nilgiris. It is all dry land. The Station is exposed to the South-West monsoon, the violent winds of which usually damage the potato haulms. The area of the Station is 161 acres and that under cultivation is nearly 45 acres.

The chief crop is potato, but koral and samai are grown in rotation and lupin, a leguminous crop, is grown as a green manure crop. Two crops of potatoes are grown annually the first being planted in March-April and harvested in August-September and the second sown in August-September and harvested in December-January. The bulk of the area is planted to first or main crop in the month of March-April.

Up to 1933, the work on potatoes was carried on in a restricted scale and was confined to the testing of improved varieties of potatoes, method of cultivation and manuring for the purpose.

The Government of Madras approached the Imperial Council of Agricultural Research for a grant for expansion of research work on potatoes chiefly with the object of breeding new varieties. The Imperial Council of Agricultural Research accepted the scheme and sanctioned a grant of Rs. 19,995 spread over a period of 5 years for research work on potatoes.

The work commenced from June 1933. A detailed study of the Botanical characters of all the varieties grown at this Station was made and a list of varieties that produce and retain flowers and those that bear visible pollen have been worked out.

Inter-varietal crosses have been carried out successfully and as many as 7 crosses have been obtained. The seedlings have been raised and are awaiting further study and selection of suitable types for cultivation. It is hoped that some of them may prove better than the existing varieties and a few may be fit for cultivation in the plains as well.

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Combining of Good Quality Indian Cottons.—The Publicity Officer, Indian Central Cotton Committee, writes:—There is enough evidence to show that the present-day tendency in the cotton textile industry lies in the increased production of yarns of finer counts. This can be achieved either by using superior quality cottons or by subjecting cotton of a given quality to some such mechanical treatment as will appreciably raise its spinning performance.