LETTERS TO THE EDITOR.

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Impending Developments in Chemical Enterprises.

ATTENTION has already been directed in the columns of NATURE to the sporadic manner in which capital is being diverted into certain branches of industrial chemistry. The shortage of dyes, drugs, and other fine chemicals has rendered this form of manufacturing enterprise very lucrative even to comparatively small capitalists. The commercial success attending these undertakings is a proof in itself that these manufacturers are supplying the essential needs of the community, and to this extent their efforts are entirely praiseworthy. It must, however, be conceded that the multiplication of small businesses engaged in producing the same article will sooner or later lead to competition of a particularly wasteful and disastrous kind, and this clash of internecine interests will become most pronounced at the cessation of hostilities, precisely when all productive energies should be nationalised against external competitors. This danger is not absent even in the larger chemical enterprises, and it is evident that there are great difficulties ahead in the most fundamental of all chemical manufactures, namely, the production of sulphuric acid. At present the explosives factories cannot have too much of this essential chemical reagent, and large plants for producing it have been erected all over the country. Sulphuric acid producers have been circularised recently by the managing director of a firm of acid-makers, who insists on the urgent need for co-operation among this group of industrialists in order to prevent the absolute chaos which must arise in the sulphuric acid trade at the conclusion of peace if manufacturers are not more closely associated. Certain of the remedies proposed are somewhat drastic. It is proposed that Parliament should consent to legislation "whereby the entirely wasteful introduction of capital by superfluous and speculative parties without experience in the trade would be prohibited until the merits of the proposition had been examined by a committee of expert manufacturers in conjunction with expert Government representatives." So far as this inhibition is directed against new capital unaccompanied by new ideas something may be said in favour of legal restrictions. But, on the other hand, the history of human invention has always manifested the self-sacrificing obstinacy of the inventor, a characteristic which has mainly benefited, not the individual himself, but the community. One can foresee the short shrift which an inventor, inexperienced in the trade, but with a revolutionary process, would receive at the hands of a committee consisting of manufacturers interested in maintaining the *status quo*, and Government officials looking forward to an honoured age of pensionable retirement received as the guerdon of a policy of masterly inactivity. Such agencies might possibly prevent some waste of capital; they would, however, be much more likely to expatriate inventive genius.

KRYPTON.

Science in Public Schools.

PERHAPS you will kindly allow me once more to correct your correspondent. Clifton College was not in advance of Rugby, either in the date, or in the extent, of the teaching of science, but closely followed Rugby in both. Your correspondent gave 1867 as the date for the general introduction of science for the whole school at Clifton. I have before me the lists of the Rugby classes in 1866. Out of 48 Sixth Form boys 24 learned science; of 133 Fifth Form, 60; of 155 Upper Middles, 155; of 135 Lower Middles, 135; of 30 Lower School, none. Clifton College never exceeded this proportion.

It is the fact that under Dr. Temple Rugby took the lead.

JAMES M. WILSON.

Formerly science master at Rugby, and headmaster of Clifton College.

The Nature of Growths in Colloidal Silica Solutions.

DR. BASTIAN has described certain experiments in this journal[1] in which he claimed to have synthesised from sterile colloidal solutions living bodies which were capable of reproducing themselves. Considerable weight is lent to Dr. Bastian's demand for independent investigation by the undeniable fact, that since the earth cooled, life has already once been synthesised from its inorganic constituents. In spite, therefore, of the inherent improbability of Dr. Bastian's results, I decided to repeat his experiments. Since the best criterion of life is the ability of organisms to reproduce themselves in sterile media, this test was employed throughout; and it is hoped that the resulting experiments, taken in conjunction with recent work in the same field,[2] may help to decide whether these "organisms" are in reality alive or merely colloidal simulacra.

Because of the great importance attached to the particular sample of sodium silicate employed, I procured two of the samples used by Dr. Bastian himself, as well as a third preparation—a 0·01 per cent. colloidal solution—specially made for me by Grübler. More than a hundred of the same tubes as used by Dr. Bastian were filled with his two solutions, and were sterilised at various temperatures from 100° C. to 130° C., and for various periods of time.

After they had been kept in the incubator for about two months they were exposed to a northern light for from two to three years. In order to examine the tubes the necks were cut with a white-hot glass point, and elaborate precautions taken to ensure sterility while transferring some of the centrifugalised deposit to the subcultivating media. At the same time films were made from each deposit and examined microscopically. The precautions mentioned consisted in carrying out all operations under cloths steeped in disinfectant and in an atmosphere that had been sprayed with a steam atomiser containing 4 per cent. lysol.

Three fluids were employed for the subcultures: (*a*) ordinary nutrient broth, (*b*) Dr. Bastian's ammonium tartrate and sodium phosphate solution, and (*c*) "tryptic broth," a special medium recently described by S. W. Cole and the writer. This medium contains a considerable amount of tyrosine, as well as other amino-acids, and was adopted after Dr. Bastian had stated that the presence of tyrosine very greatly increased the growth of his "organisms."

The subcultures were incubated for two periods of ten days, first at room temperature, and then in the incubator, but only one tube out of the hundred showed a visible growth, even under the microscope. I have no doubt that this growth was due to an accidental infection during the process of subcultivation, because the tube was one of a few that were opened soon after they had first been sealed, and without the elaborate precautions afterwards used. I am, more-

[1] NATURE, January 22, 1914, p. 579.
[2] Benjamin Moore and J. A. Webster, Proc. Roy. Soc., B. 693, p. 163, October, 1913; and Benjamin Moore, Proc. Roy. Soc., B. 609, p. 27, July, 1915.
[3] *Lancet*, July 1, 1916, p. 9.