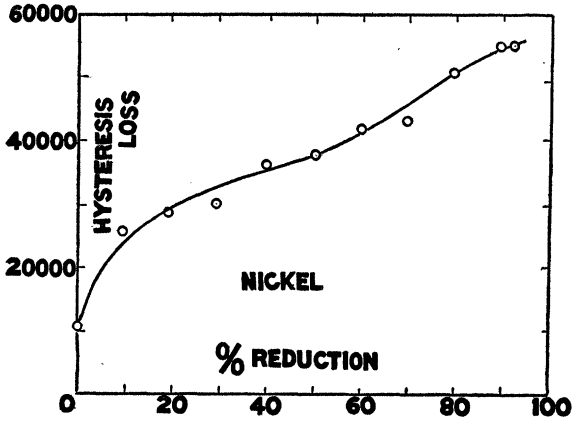
The photomicrographs[3] of these strips show a much finer grain structure for the specimens having the greater reduction in thickness and thus we assume that the per cent. of cold reduction is some measure of the number of crystal grains per unit volume even though with random orientation. We may, therefore, plot the relation between per cent. of cold reduction



and hysteresis loss. This is shown in Fig. 1 and confirms the relation found by others that large grain size is conducive to small hysteresis loss. Honda and Kaya[4] in a recent study of the magnetic properties of single crystals of iron find a similar law holding in their work. The same conclusion may be drawn from Gerlach's[5] curves for the magnetization of single iron crystals and electrolytic specimens. Sorensen[6] ascribed the high coercive force in thin films of iron, cobalt and nickel as due to the minute size of the crystals. Edwards[7] had a similar experience. The recent work of Ishagaki[8] on the effect of grain-size on the hardness of pure iron fits into the same picture.

It is interesting to note, on the other hand, that Welo and Baudisch[9] found for precipitated magnetite that "lean hysteresis loops, low coercitivities and low remanences are associated with oxides composed of small crystals."

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[3] Williams, *Proc. A. S. S. T.*, 1926.

[4] Honda and Kaya, *Sci. Reps.* Tohoku Imp. Univ., 15, p. 729, Nov., 1926.

[5] Gerlach, *Ztschr. f. Phys.*, 38, p. 832, 1926.

[6] Sorensen, Amer. Phys. Soc. Program, Abstract, Nov. 28–29, 1924, *Phys. Rev.*, 24, p. 658, 1924.

[7] Edwards, Amer. Phys. Soc. Program Abstract, Dec. 28–30, 1925.

[8] Ishagaki, *Sci. Reps.*, Tohoku Imp. Univ., 16, p. 285, 1927.

[9] Welo and Baudisch, Amer. Phys. Program, Abstract, Feb. 26–27, 1926.

A DYSENTERY-LIKE BACILLUS FROM A PHLEGMONOUS INFLAMMATION

THE bacilli belonging to the dysentery group have with few exceptions been isolated from the intestinal and urinary tracts. The writer has found but one reference to the isolation of one of this group from an extremity. Magnusson, 1919,[1] isolated a dysentery bacillus, which he named *Bacterium viscosum equi,* from "joint ill" in foals. Since the bacillus to be described was isolated from a phlegmonous inflammation of the lower leg and foot of a man, it will, perhaps, be of interest.

The isolated bacillus has the following characteristics:

Non-motile, Gram-negative, non-spore-forming, short rods.

Aerobic and facultative anaerobic.

Gelatin colonies: grayish-white, raised, entire.

Gelatin stab: no liquefaction.

Agar colonies: gray, smooth, entire.

Agar slant: gray, smooth, glistening.

Broth: turbid.

Milk: acid. Slow coagulation.

Indol is formed.

Acetyl-methyl-carbinol not formed.

Nitrates not reduced.

H_2S not formed.

Acid, but not gas, in lactose, saccharose, mannite, dextrose, maltose, raffinose, arabinose, adonite, sorbite, galactose, levulose, salicin, glycerin, xylose and trehalose.

No acid or gas in dulcite, dextrin, inulin, inosite, amygdalin or rhamnose.

Andrewes, 1918,[2] proposed the name *Bacillus dispar* for all lactose-fermenting members of the dysentery group, but *Bacillus madampensis* Castellani, 1912, and *Bacillus ceylonensis* Castellani, 1909, were evidently included in the group as shown by the reaction of the strains of *B. dispar* to dulcite.

The bacillus herein described differs from *B. madampensis* in that it ferments adonite and salicin, and does not ferment dextrin nor rhamnose. The non-fermentation of dulcite differentiates the bacillus from *B. ceylonensis.*

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THE SELECTIVE EFFECT OF POLARIZED RADIATIONS ON CERTAIN PHOTOCHEMICAL REACTIONS

THE selective effects of polarized light as compared with ordinary light on biochemical reactions

[1] *Jour. Comp. Path. and Therap.*, 32, 143.

[2] *Lancet*, 1918, 1, 560.

were first brought into prominence by Elizabeth Sidney Semmens (*Journ. Soc. Chem. Ind.*, 42, 954, 1923, also Brit. Assoc. Report, 1923).

In two previous notes by Bhatnagar and Lall and Bhatnagar, Lall and Mathur (*Nature;* February 27, 1926, and July 3, 1926) the effect of polarized light with the electric vector in the light-wave vibrating in the plane of incidence was shown to be selective on animal metabolism and on growth of *V. cholerae* and *B. typhosis*. Further work on the subject has been published from this laboratory in the *Indian Journal of Medical Research* (Vol. XIV, No. 2, October, 1926).

No positive results seem to have been so far recorded in favor of a selective effect on purely photochemical reaction, though there are some unsuccessful attempts described in literature (Ghosh, *Journ. Ind. Chem. Soc.*, 1925, Vol. 2, p. 269). Investigations were therefore undertaken to find whether polarized light would accelerate purely chemical reactions as it does some of the biochemical reactions studied by Baly and Semmens, Hill and Macht and Bhatnagar, Lall and Mathur. Positive results have now been obtained in the case of the interactions of liquid amalgam of sodium or potassium and water. This reaction was shown to be photo-sensitive by Bhatnagar, Mata Prasad and D. M. Mukherjee (*Journ. Ind. Chem. Soc.*, 1925, Vol. 1, 263).

The apparatus employed to obtain two fairly large patches of the polarized light and ordinary light of the same intensity was the same as described in a previous note (*Nature,* July 3, 1926). Spectra of the two beams of light taken in the visible region by means of an Adam Hilgers Spectrograph were found to be identical. The heat-rays were cut off from the reaction vessels by interposing in each arm of the apparatus a rectangular glass cell containing a strong solution of alum. The equality of intensities was measured by means of a Hilger Thermopile and Broca Galvanometer as described in the note referred to above. The polarized beam indicated a polarization of 90.5 per cent. as measured by means of a Savart's polariscope.

The reaction between the amalgams of the alkali-metals and water takes place in the dark, but is considerably accelerated by light even in the visible region. As a result of this reaction hydrogen and sodium hydroxide are produced.

The rate of the reaction was studied in two ways: (1) By measuring in a capillary tube the movements of a column of mercury due to the generation of hydrogen, (2) by titrating the alkali produced against a standard solution of an acid.

Both sets of experiments showed a remarkable acceleration of reaction when the reaction vessels were exposed to polarized radiations with the electric vector vibrating parallel to the plane of incidence. These results have been verified in hundreds of experiments. The differences in accelerations produced are not small and with suitable surfaces of the alloys exposed to the two kinds of radiations, they are as large as thirty-three per cent., and a complete account of the work is being communicated to one of the chemical journals.

As far as the author knows, this is the first purely chemical reaction as distinguished from the biochemical reactions studied by previous investigators which has definitely been shown to be selectively affected by polarized radiations. When the radiations polarized with the electric vector vibrating perpendicular to the plane of incidence, fall on the reaction vessels, minimum accelerations are produced in the reaction. Work on this subject, however, is in progress and definite results will be communicated later on.

A large number of other photochemical reactions such as the photo-decomposition of hydrogen peroxide, the reaction between mercuric chloride and ammonium oxalate in presence of iron chloride have been tried with negative results. From a large number of the photochemical reactions studied from this standpoint, it appears so far that the photochemical reaction in heterogeneous system only show this selective action and that the surface plays some part in this reaction.

In this connection it is interesting to recall the remarkable discovery which Elster and Geitel made in 1894 that in certain cases the photoelectric effect is influenced by the orientation of the plane of polarization of the incident light. Using also the liquid alloy of sodium and potassium and allowing polarized white light to fall upon surface, at an angle of 45°, they found a maximum current when the electric vector in the light wave was vibrating in the plane of incidence and a minimum current when the electric-vector was perpendicular to the plane of incidence. These experiments have been confirmed by Kunz and a number of other workers and have received a satisfactory explanation through the work of Pohl and Pringshein (*Deutsch. Phys. Gesell,* Veb., 12, p. 215–228, 349, 360, 1910).

It is proposed to apply and extend the view of Pohl and Pringsheim regarding this selective effect of polarized radiations to the case of photo-chemical reactions described in this note.

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