

Its inactivity towards dulcite is particularly interesting, and furnishes another instance of the selective power of micro-organisms towards the most closely allied isomeric bodies. Remembering the relationship of dulcite to galactose and of galactose to milk-sugar (galactose is converted into dulcite by nascent hydrogen, and milk-sugar is converted into galactose and dextrose by the action of dilute acids), it is to be anticipated that in the fermentation which this bacillus induces in milk-sugar, the decomposition is limited to the dextrose portion of the milk-sugar molecule. In the action of this bacillus on starch, the latter is in the first instance dissolved, doubtless through the agency of a diastatic ferment, to which the organism gives rise, as well as to the peptonising one which brings about the liquefaction of the gelatine already referred to. A tube containing starch-liquid, which had been fermented by the bacillus, gave no blue coloration with iodine, clearly showing that the whole of the starch had undergone transformation into other products.

(8.) In view of the characteristic products—ethyl alcohol and acetic acid—to which this organism gives rise, we propose for it the name of *Bacillus ethaceticus*.

XI. “On the Effect of Temperature on the Specific Inductive Capacity of a Dielectric.” By W. CASSIE, M.A. Communicated by Professor J. J. THOMSON, F.R.S. Received May 24, 1889.

(Abstract.)

The variation with temperature of specific inductive capacity was measured in different ways for solids and liquids.

In the case of solids a condenser was made with thin sheets of the dielectric in question, and the capacity measured at different temperatures. The condenser was suspended in an air-bath by wires passing through the top to an insulated support outside. This support was several feet above the bath, so that it was never heated, and its insulation was independent of the temperature of the condenser. The capacity was measured by Professor J. J. Thomson's method,\* and conduction or absorption in the condenser allowed for by varying the time of charge and discharge. The rate of increase per degree centigrade of the specific inductive capacity was found to be for—

Mica	between 11° and 110°	....	0·0003
Ebonite	„ 13 „ 63	....	0·0004
Glass	„ 17 „ 60	....	0·0012
Another specimen of	„ „ 13 „ 60	....	0·002

\* ‘Phil. Trans.,’ 1883.

In the case of liquids a quadrant electrometer was immersed in the liquid in question, and the deflection observed at different temperatures. The liquid was heated in a water-bath, and the needle and quadrants were attached to insulating supports above the bath. The electromotive force was obtained from a Ruhmkorff coil without the condenser, and with a high resistance between the terminals by which to control the E.M.F. The poles of a second electrometer in air were connected to the poles of the liquid electrometer, and the ratio of the readings of these two gave a measure of the specific inductive capacity independent of variations of E.M.F. The results are shown in the following table; and in the last column are inserted for comparison the rate of change of refractive index for the four of the liquids for which Messrs. Dale and Gladstone have determined it. Mean values are given except for these four. For glycerine there is no similarity between the two effects; but for the other three the effects are of the same order of magnitude, although not exactly in the ratio 1 : 2 indicated by the electromagnetic theory of light.

	Rate of decrease of specific inductive capacity per degree.		Rate of decrease of refrac- tive index per degree for A line in solar spectrum.
Turpentine. ....	between 20° and 36°	0·0012	between 10° and 47° 0·00035
" .....	" " 49	0·0011	
" .....	" " 62	0·0009	
Carbon bisulphide.	" 15 and 43	0·004	between 20° and 48° 0·00018
Glycerine .....	" 18 and 41	0·006	
" .....	" " 61	0·0053	between 25° and 39° 0·00037
Benzoline .....	" 19 and 41	0·0006	
" .....	" " 52	0·0011	
" .....	" " 63	0·0015	between 10° and 39° 0·0004
Benzine .....	" 15 and 39	0·0014	
" .....	" " 58·5	0·0012	
Olive oil .....	" 17 and 68	0·0024	
Paraffin oil. ....	" 18 and 54	increase 0·0023	

XII. "On the Interchange of the Variables in certain Linear Differential Operators." By E. B. ELLIOTT, M.A., Fellow of Queen's College, Oxford. Communicated by Professor SYLVESTER, F.R.S. Received June 5, 1889.

(Abstract.)

Recent theories of functional differential invariants, reciprocants, cyclicants, &c., have brought into notice a considerable number of