sugar and salt solution required to produce contraction of the filaments agrees with De Vries' results. He remarks[1] that about 25 per cent. of sugar solution is required to produce the same amount of shrinking as is caused by 4 per cent. solution of chlorides of sodium or potassium.

If we compare the effects of dilute acetic acid and of salt solution on the wall-protoplasm of the glands we find that both cause shrinking, but that the results of the two reagents are clearly distinguishable by subsequently irrigating with water. If salt solution has caused the shrinking the cells rapidly recover, but the shrinking caused by a poison is permanent. In the case of the cell-protoplasm we clearly distinguish therefore between the action of a poison and the mechanical withdrawal of water. But in the case of the filaments precisely the same difference is found to exist between the action of salt solution and acid—when tested by subsequent irrigation with water.[2] Therefore the effects of salt solution being certainly mechanical, the effect of the acid seems to be probably poisonous, using poisoning to mean a specific injurious action on living matter.

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## Note *on* Atmospheric Bacteria. By G. F. Dowdeswell, B.A. Cantab.

It has been observed both by Dr. Burdon Sanderson, in this country, and by Prof. F. Cohn, in Breslau, that when atmospheric air is drawn through a nutrient fluid in wash bottles, no Bacteria are developed. To elucidate the cause of this, a series of experiments has been made, in which the method adopted was to put about 100 c. c. of Cohn's normal cultivating solution[3] in each of several wide-mouthed bottles, previously superheated, then boiling the solutions, covering the bottles with watch glasses, and placing them in the incubator at 35° C. for some days, to ascertain if they were free from organisms, as tested by their contents remaining pellucid; they were then fitted with caoutchouc stoppers, through which glass tubes were inserted, to draw air through the solution, each tube being bent once at a right angle, excepting the egress tube of the last bottle, which was straight, plugged with cotton wool at both ends, and connected

[1] Loc. cit., p. 11.

[2] It not only cannot recover its normal extended condition, but swells up and forms a "soap-bubble" mass which can be made to contract and swell out again by alternations of salt solution and water. This effect, which is, of course, mechanical, is quite different from the extension and contraction of a filament which has not been treated (killed) with acid, quinine, &c.

[3] Pot. Phosp., 1·0, Mag. Sulph., 1·0, Ca. Cl., 0·1, Amm. Tart., 2·0, and Aq., 200.

with two large water jars by a caoutchouc tube. The wash bottles were then connected by tubing which was previously subjected to prolonged boiling, as were the stoppers; the glass tubing and the cotton wool was heated in an oven to over 100° C. for a considerable time. The aspirator formed by the water jars was then set in motion, and upwards of 100 Lts. of air drawn through the wash bottles, at the rate of about 2 Lts. an hour. The aspirator being only worked mornings and evenings, this occupied between two and three days. The experiments were made in an ordinary sitting-room, the temperature of which varied between about 50° F. and 70° F. An uncovered bottle of the solution was placed near the wash bottles for comparison. When the requisite quantity of air had passed through, the bottles were removed, the entrance tube of the first wash bottle was rinsed out into a fresh bottle of the solution by a stream of water from an ordinary wash bottle, previously boiled, and cooled with precautions against contamination; the cotton wool at the bottom of the exit tube of the last wash bottle was pushed into the fluid of its own bottle by a thin rod previously heated. All the bottles were then covered with watch-glasses, and placed in the incubator at 35° C. The result was that in twenty-four hours the fluid in the uncovered bottle was found to be slightly turbid, containing bacterioid growth, the same with the bottle into which the entrance tube of the first wash bottle had been rinsed, while that of the last bottle, into which the cotton wool had been dropped, was distinctly more turbid; but the solution in the first wash bottle remained free from Bacteria, and continued so for several days, as long as observed. A microscopical examination showed that the numbers of Bacteria present in the different bottles corresponded to the macroscopical appearances mentioned above.

From these observations it is concluded, that when atmospheric air is drawn through wash bottles containing cultivation fluids, part of the Bacteria present are entangled in the tube by which the air enters, as might have been anticipated from the well-known experiments of M. Pastern and others; and that part of them are "washed out" by the current of air, as conjectured by Cohn;[1] which latter, in these experiments, were caught by the plug of cotton wool.

The above observations refer only to Bacteria; no mention is made of other organisms or bodies, of which, and of the different species of Bacteria present, with their relative numbers, an account will be given in a subsequent communication; and further details of the experiments, with the results of observations on other points which have suggested themselves.

[1] 'Beit. z. Biol. d. Pflanzen,' 3 H., 146 S., 1875.