such material is very small and pseudopodia may form on either side thus tending to mask its presence. Exceptionally the posterior end may be made to liquefy but usually the inert posterior end compels an *Amœba*, in order to retrace its path, to turn about.

31 (1613)

Concerning the antiseptic action of some aromatic fumes.

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The recent World War was instrumental, in connection with the impetus given to the search for antiseptics and parasiticides, in calling attention to the powerful antiseptics and germicidal properties of various essential oils; as for instance so well described by Cavel[1] and Fränkel[2]. This antiseptic action of volatile oils is undoubtedly responsible for the remarkable medicinal virtues of ancient balsams, especially in relation to the treatment and healing of wounds. An ethnological study of the habits and customs of ancient peoples, especially in the Orient, cannot fail to call attention to the extensive employment of incense, perfumes and fumigations among these people. Incense was burned in connection with the religious and sacrificial offerings on the one hand, and for esthetic purposes in private homes on the other. Again, powerfully odoriferous substances are in great vogue in the Orient as perfumes and not only are such drugs applied to clothing but very frequently the orientals fumigate their naked bodies directly with the smoke of aromatic herbs and spices, burned over glowing coals. These circumstances suggested to the authors the possibility that such perfumes and fumes may serve a hygienic as well as esthetic purpose by exerting an inhibitory effect on the growth and spread of microörganisms. Accordingly some experiments were undertaken in order to ascertain the value of such an hypothesis.

The authors subjected a number of gums, spices and other

[1] *Comp. rend.*, 1918, clxvi, 827.

[2] Theropmonatofte, June, 1915.

odoriferous substances to destructive dry distillation by heat and studied the effects of the fumes produced thereby on bacterial cultures. The following substances were investigated; gum olibanum, gum glabanum, storax, myrrh, saffron, cinnamon, benzoinum and various samples of domestic and Japanese incense. The various substances were heated in glass test tubes over a flame and the fumes were allowed to come in contact with various microörganisms, care being taken to exclude the germicidal effects of steam. The bacteria studied were: *B. coli*, and *B. pyocyaneus aureus*. In one series of experiments smears were made with live organisms on agar slants; then a given fume was poured into or over the test tube and the culture incubated. In another series of experiments agar or gelatin plates were inoculated with the bacteria and allowed to remain open under a glass bell jar, in which incense was burned. In still another series of experiments the various spices in powdered form, individually or in combination with each other, were incorporated in culture media and then an attempt was made to grow bacteria on those media. Control experiments were made by burning filter paper (cellulose), raw cotton and various woods.

The results of the experiments showed that the fumes of most of the gum and spices studied, notably gum galbanum, gum olibanum, cinnamon and saffron prevented the growth of freshly transplanted bacteria, in other words, exerted a distinct *antiseptic* action. When however such fumes were poured over or brought in contact with fully grown or luxuriously developed cultures of *B. pyocyaneus* and especially of *B. coli* the *germicidal* effect was not so marked. This was possibly due to the poor penetration of the fumes and the volatile oils, etc., carried over by them, into the deeper layers of the cultures.

It was not surprising to note that fumes produced by destruction of various woods and also of cotton gave similar results. Pure cellulose however was not antiseptic in this respect.

Inoculation of bacteria into culture media impregnated with the various aromatics produced a distinct inhibitory effect on their growth.

The burning of various forms of incense, especially of Japanese origin produced a distinct antiseptic effect, that is, inhibited the

growth of organisms freshly inoculated on plates, which were exposed to such fumes in partially closed chambers, for periods varying from ten to thirty minutes.

While the experiments above reported were of a crude character the results obtained were of so uniform a nature, that the authors are inclined to conclude that the fumes produced by the burning or destructive dry distillation of various gums, spices and other aromatic substances of a similar nature, certainly tend to exert an antiseptic action on the bacteria studied. This is of course of interest not only from the scientific point of view, but also to the historian, as offering a possible explanation for the extensive employment of incense in connection with sacrificial rites, etc.

32 (1614)

The vitamine content of honey and honeycomb.

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Dutcher[1] concluded from experiments on pigeons that honey contained a small but negligible amount of antineuritic vitamine. Faber[2] did not find honey to protect against scurvy in guinea pigs.

The present authors carried out feeding experiments on albino rats, to determine whether the growth promoting accessories fat-soluble A and water-soluble B were present in white clover honey or in a mixed strained honey, and whether these honeys protected guinea pigs against scurvy.

Rats fed a diet lacking water-soluble B when compared with rats fed the same diet except that half of the carbohydrate was replaced by an isodynamic equivalent of either of these honeys, showed in five weeks an average gain in weight of only five grams in favor of the honey-fed rats.

Similar experiments on the addition of the strained honey to diets deficient in fat-soluble A showed almost similar failure of

[1] Dutcher, R. A., *J. Biol. Chem.*, 1918, xxxvi, 551.

[2] Faber, H. K., *J. Biol. Chem.*, 1920, xliii, 113.