complexes of stone fruits, and possibly may aid in arriving at a more rational virus nomenclature based upon chemical properties.

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Formation of 2,3-Butylene Glycol in Bacterial Fermentation of D-Glucosamine[1]

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There have been a few reports made with respect to the products of bacterial fermentation of D-glucosamine. According to these papers, acetic and butyric acids (*1*), propionic and D-lactic acids (*2*), D-lactic, L-lactic, and succinic acids (*3*), etc., have been shown to be produced by action of bacteria on D-glucosamine.

In our laboratory extensive investigations were recently carried out on the ability of microorganisms in the soil to make use of D-glucosamine; those that were observed to utilize it were isolated into pure cultures. From among them, a number of active strains of bacteria and of fungi were selected for studies on the fermentation of D-glucosamine. The bacteria of the coli-aerogenes group were found to utilize it vigorously.

A report is made here on the products of the fermentation of D-glucosamine by *Aerobacter cloacae* (Jordan) Bergey *et al.,* isolated from soil. A liquid culture medium containing D-glucosamine alone as the source of both carbon and nitrogen was employed; composition of the medium was as follows:

(*A*)	D-glucosamine hydrochloride			40.0 g	in 1 liter of water
(*B*)	NaCl	10.0 g,	KH_2PO_4	4.0 g	in 1 liter of water
	$MgSO_4 \cdot 7H_2O$	0.2 g,	$CaCO_3$	10.0 g	

where (*A*) and (*B*) were prepared apart, sterilized separately, and then combined aseptically.

A strain of *A. cloacae* was inoculated into the medium and incubated at 37° C for about 10 days. In the early stages of incubation, a vigorous generation of gas was observed.

After the incubation period, the liquid culture was filtered, concentrated *in vacuo* to about 300 ml, and extracted continuously with ether for 50 hr. The ether extract was dried, concentrated to a viscous liquid, and the residual liquid was distilled under diminished pressure to give 6.9 g (approx 20% of the D-glucosamine) of the main fraction at 89°–92° C/16–17 mm Hg after a small quantity of the foregoing fraction (0.5 g). The substance obtained was a colorless, clear, viscous liquid ($[\alpha]_D^{24°\,C} = +1.3°$ [1 = 1dm]), somewhat like glycerol, which crystallized in the cold. We confirmed it to be 2,3-butylene glycol by distilling it with 25% sulfuric acid, followed by separating the methylethyl ketone, which is to be derived from 2,3-butylene glycol, from the distillate, converting the ketone into the *p*-nitro-phenylhydrazone (yellow; mp, 126.5°–127.5° C), adopted under the Akabori method (*4*).

After the extraction of the glycol, the aqueous mother liquor was strongly acidified with sulfuric acid and extracted again with ether continuously for 40 hr. On concentration of the extract, there remained a considerable amount of colorless, clear, viscous liquid containing the crystals of succinic acid (1.1 g; approx 3% of the D-glucosamine) and giving out an acetic acid smell. The volatile acids contained were separated from it by steam distillation as usual; the total amount was estimated at 0.64 g as acetic acid. Lactic acid was also found in this acidic extract.

In addition, small amounts of ethyl alcohol and acids fixed in the precipitate, such as oxalic acid, were also observed to be produced in this fermentation.

Study as to when and how the amino group is split off in the process of the fermentation of D-glucosamine is in progress.

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The Influence of Skin Temperature upon the Pain Threshold as Evoked by Thermal Radiation—A Confirmation

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In a recent paper Hardy, Goodell, and Wolff (*1*) reported experiments on the effect of skin temperature on pain threshold evoked by thermal radiation. By a graphical extrapolation from their data, they were able to infer that "the skin in the areas tested must be raised [to a temperature of 44.9° C] to be noxiously stimulated, regardless of the initial level of skin temperature."

[1] This research was carried out while the author was at the Psycho-Acoustic Laboratory, Harvard University, Cambridge, Mass.

[1] Previously reported at the meeting of the Chemical Society of Japan in April 1947.

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