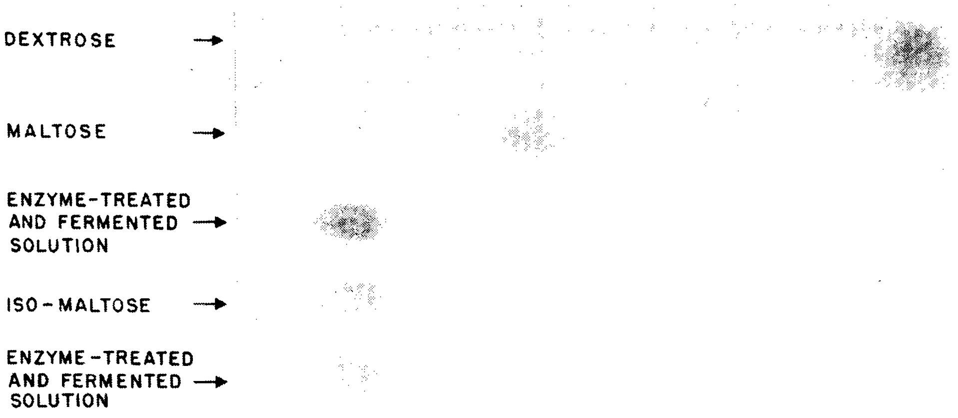

FIG. 1

We have observed the enzymatic synthesis of higher carbohydrates directly from dextrose, on which we wish to make a preliminary report.

A 47.5% dextrose solution, buffered to pH 4.6 with an acetate buffer (acetic acid–sodium acetate), and containing 4.07% of a purified precipitated enzyme preparation derived from *A. oryzae,* was kept under aseptic conditions for 238 hr at 53°–54° C. The enzyme preparation, which was assayed for α-amylase by the Sandstedt, Kneen, and Blish (*4*) procedure, contained 400 α-amylase u/g. Its Lintner value was 180 at 20° C. In addition, the enzyme preparation contained a relatively large amount of limit dextrinase.

The reducing value of the incubated mixture was determined by Lane-Eynon (*5*) titration at intervals in order to follow the progress of enzymatic synthesis. These values in terms of initial reducing value (100%) are shown in Table 1.

After 238 hr the fermentable carbohydrates were removed by fermentation with yeast; 66.6% of the dextrose originally present was fermentable. The fermented solution was decolorized with Darco, filtered with Celite, and evaporated to a syrupy consistency. No crystals have been obtained as yet.

The syrupy material was then chromatographed by the procedure of Jeanes, Wise, and Dimmler (*6*), using two descents to obtain the chromatogram shown in Fig. 1. In this chromatogram the mobility of duplicate spots of the sample was compared with dextrose, maltose, and isomaltose control spots. The chromatogram clearly shows that the unfermentable carbohydrates synthesized directly from dextrose by *A. oryzae* consist mainly of isomaltose. In addition, there is a smaller quantity of an oligosaccharide containing more than 2 dextrose units per molecule, since its mobility is less than that of isomaltose.

Preliminary experiments with an enzyme preparation derived from *A. niger* (NRRL 330)[1] also showed a synthesizing action on dextrose under identical conditions. The investigations will be continued.

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[1] We are indebted to H. M. Tsuchiya, of the Northern Regional Research Laboratory, Peoria, Ill., for generously providing us with the *A. niger* (NRRL 330) culture filtrate.

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Analcime in the Popo Agie Member of the Chugwater Formation[1]

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Analcime (analcite, $NaSi_2AlO_6 \cdot H_2O$) has been reported as a sedimentary mineral in only a few occurrences, and in no large quantity except in the Green River (*1*) formation. Special interest attaches, therefore, to the recognition of analcime as the prominent mineral in a section of sedimentary rock ranging in thickness up to about 60 ft, and extending over thousands of square miles. This analcime rock is the ocherous Popo Agie member (*2*) (originally called the Popo Agie Beds [*3*]) of the Triassic Chugwater formation of western Wyoming.

In previous field work which has been done on the Popo Agie its uncommon and distinctive lithology has been characterized variously as "ochre clay" (*2*), "sandy shale" (*4*), "oolitic claystone" (*5*), "mudstone" (*6*), and "siltstone and claystone" (*7*), without mention of analcime. Laboratory examination by the writer, of the ocherous and oolitic mudstone, shows the dominant mineral constituent to be analcime, which is accompanied by fine angular quartz silt,

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[1] University of Missouri Research Grants Nos. 410 and 415 are aiding in the field and laboratory work of this problem. J. D. Love kindly furnished locations of Popo Agie exposures unknown to the writer.

some carbonate, and pigmenting iron oxide. The accessory minerals are estimated to occur as less than 10% of some specimens and usually as less than 80% of most of the typical ocherous Popo Agie.

Recognition of the analcime is based on x-ray powder diffraction patterns, and its optical properties —namely, isotropic character and index of refraction which ranges slightly above 1.487. Loss of weight on ignition of the bulk specimen falls between 9 and 10% by weight.

White to slightly colored oolites represent the purest analcime in the Popo Agie, but it occurs also in the ochre-colored portions. The tiny spheres are definitely oolites (*4*), and are not euhedral to subhedral crystals, as were observed by Bradley (*1*) in the Green River, or by Ross (*8*) in the occurrence from Yavapai Co., Ariz. Ordinary bedding is absent in the analcime rock, but rectangular nodules up to 18 in. on an edge, which weather to well-rounded corners, and massiveness characterize its structure.

The origin of the Popo Agie analcime is tentatively postulated as representing an alteration or reaction product of colloidal clays with strongly saline water, whereby the sodium came from the water and the aluminum and silicon from the clay. In other words, analcime is believed to represent a stable hydrous sodium aluminum silicate in a saline environment, whereas illite might be the stable hydrous potassic aluminum silicate in a less saline marine environment. This origin is similar to the one proposed by Ross (*8*). Microscopic study of the Popo Agie so far has not shown the presence of significant feldspar, mica, shards, or other tuffaceous materials, which occur in the Green River and which are cited (*1*) as the most probable source of aluminum and silicon. It is possible that volcanic dust might still have contributed to the analcime, and that all nonquartz material has been entirely altered in the Popo Agie, leaving behind only fine-grained quartz silt, but there is no positive evidence for that.

The analcime-containing Popo Agie is quite widespread. It crops out in continuous exposure along the northeast flank of the Wind River Mountains. Five localities sampled between Derby Dome (15 miles southeast of Lander) to near Dubois, an airline distance on the northwest of about 70 miles, all show well-developed analcime. The analcime-bearing section on Middle Fork (Sinks Canyon) southwest of Lander is approximately 60 ft thick. Analcime is abundantly present also in the Popo Agie across the Wind River basin in Circle Ridge and Maverick Springs domes on the south flank of the Owl Creek Mountains. It was observed to the west in the faulted Popo Agie high on Red Rocks Cliff along the Gros Ventre River about 20 miles east of Moose, Wyo. Analcime was determined in oolitic ocherous Popo Agie well cuttings[2] at a depth of 4700 ft from Unit #1 Well, South Baxter basin, sec 21, T 16 N, R 104 W, south of Rock Springs, Wyo. Airline distance between the South Baxter basin and Circle Ridge Dome is approximately 150 miles across the Wind River range.

Presumably the analcime rocks extended continuously across this area, or at least were formed throughout at about the same geologic time. They are unique mineralogically and should constitute a good stratigraphic marker. The base of the Popo Agie has not been defined previously (*2, 6*), but the lowest occurrence of analcime may be utilized as a reference surface for the base. The sediments overlying the analcime vary from conglomerate through sandstone to gypsum. The Triassic-Jurassic rocks of Wyoming are scant in index fossils, and the stratigraphy of the section has been controversial. The analcime rocks appear to be a single, definitely, and uniquely recognizable zone which may serve as a datum on which further stratigraphic conclusions may be based. The abundance and availability of the analcime make it worthy of consideration for possible technological use.

More detailed petrographic, chemical, and stratigraphic studies that are in progress will be published later.

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The Activation by Vitamin D of the Phosphorylation of Thiamin

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It appears that vitamin D is intimately linked with the metabolism of phosphorus in the living organism. There are several findings suggesting that the symptoms of rickets depend on changes in the metabolism of phosphorus. Zetterström (*1*) has demonstrated by *in vitro* experiments that phosphorylated vitamin D activates phosphatase obtained from various organs.

The amount of thiamin in food affects the blood and tissue concentration of cocarboxylase (*2*). If this vitamin is given intravenously or intramuscularly, the phosphorylation of thiamin to cocarboxylase proceeds rapidly. In 1951 we tried to determine whether vitamin D affects this synthesis. For the determination of the concentration of cocarboxylase in blood, the writers used the manometric method of Westenbrink (*3*). Alkali-washed yeast was prepared from dried yeast (obtained from Oranjeboom, Rotterdam). The analyses were made in duplicate. First a normal value for the cocarboxylase concentration in the blood of the experimental subjects was determined during 4 days.

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[2] Courtesy M. M. Fidlar, Mountain Fuel Supply Co., Rock Springs, Wyo.