of the orange peel are rich in the fat soluble vitamine. On this diet young rats have matured, mated, and raised young. Control experiments showed the diet, without the preparation of orange peel, to be free from fat soluble A.

Experiments now in progress indicate that similar preparations made from lemon and grape fruit peel likewise contain the fat soluble vitamine.

A detailed account of the experiments will appear in the course of the year.

123 (1705)

Effects of age and of the inclusion of salts on the heterotropic action of colloidal bodies of cytological interest.

By D. T. MACDOUGAL.

[*From the Desert Laboratory, Tucson, Arizona.*]

Auxographic measurements of the swelling of sections of dried plates of agar and of gelatine previously described show that the relative enlargement of a colloidal body in its different axes will be determined largely by the unequal stresses which may be set up, as for example when liquid agar or gelatine is poured on glass and dried without shrinking in area. It was pointed out that sections from such plates of agar increased only 3 or 4 per cent in length while swelling 3,000 or even 4,000 per cent in thickness, and that sections of gelatine increased 8 to 40 per cent in length while swelling from 500 to 2,000 per cent under the auxograph.[1]

Tests of sections of plates of pure agar freshly made and a year old have recently been made. Plates which swelled 2,000 per cent in water when freshly made August 1, 1919, increased but 1,600 per cent July 1, 1920. Plates swelling 3,200 per cent when young increased but 2,000 per cent when nine months old. This total decrease was accompanied by lessened swelling in thickness and increased swelling parallel to the broad surfaces of the plates. The relative increase in length and width of sections of old plates was double that in the same plates when newly made

[1] MacDougal and Spoehr, "Hydration of Amino Compounds," PROC. SOC. EXPER. BIOL. AND MED., 1919, xvii, 33–36.

and swelled in water. Similar increases occurred when old plates were hydrated in chlorides of K, Na, Mg and Ca at 0.0001 *M*.

The effects of age on gelatine plates are not so marked but the areal swelling increases with age. The differential effects of the various solutions on such areal or linear increases were very marked and noticeable. Thus strips 30 to 50 mm. in length cut from a single plate when placed in the solutions gave increases in thickness and length as below:

	.01 M.		0.001 M.		0.0001 M.	
	Th.	L.	Th.	L.	Th.	L.
KCl.....	1090 p. ct.	38 p. ct.	800 p. ct.	33 p. ct.	640 p. ct.	35 p. ct.
CaCl.....	600 "	6 "	1350 "	8 "	830 "	10 "
HCl.....	1620 "	70 "	1600 "	20 "	925 "	8 "
Water.....					780 "	8 "

The areal increase in the potassium solution varied but little in the different concentrations being much greater than in calcium, which was near that in water. The greatest disproportion however between increase in thickness and in length was in the acid.

Agar was made into plates with an inclusion of minute proportions of chlorides of calcium, potassium and magnesium, which would represent possibilities in the plant cell. When such salted plates were hydrated in solutions of KCl, NaCl and HCl at 0.0001 *M* the swelling in length amounted to 12 to 14 per cent. as compared with increases of 3 to 4 per cent. which might be shown by pure agar.

The increase in length of the sections of salted gelatine cut from plates cast to harden heterotropically are as below:

	0.01	0.001 M.	0.0001 M.
KCl.....	14 per cent.	14 per cent.	12 per cent.
CaCl.....	12 " "	8 " "	12 " "
HCl.....	80 " "	15 " "	8 " "

Among the more important effects it is to be seen that the increase in length of heterotropic plates is lessened by the incorporation of salts when swelled in KCl. The presence of incorporated salts accelerates increases in length in $CaCl_2$ in an uncertain manner, but exercises such an effect rising with the concentration in acid. The presence of incorporated salts lessens the increase in length in KCl, does not modify it greatly in HCl, but exaggerates the increase in $CaCl_2$ at 0.01 *M*.

The alterations in dimensional relations resultant from age, from the incorporation of salts in concentrations within the range of occurrence in the cell, and from hydration in various solutions are to be included in the possibilities of conditions affecting growth and cytological procedure.

124 (1706)

Is glycogen the source of acids developed in autolysis?

By WITHROW MORSE.

[*From the School of Medicine, West Virginia University, Morgantown.*]

In the following communication, an attempt is made to answer the question whether glycogen contributes to the rise in acidity in an autolyzing digest.

Method.—Beef liver from the butcher was ground in sand, diluted with Ringer's Solution to make a 20 per cent. digest by weight and divided into two portions, I (control) and II, to which one gram of glycogen obtained from liver was added for every 250 c.c. digest. In order to follow the rate and extent of digestion, the following procedure was used: Fifty c.c. of the well-mixed digest were transferred to a 100 c.c. volumetric flask and made up to the mark with 5 per cent. trichloracetic acid. The mixture was left until precipitation was completed (4 to 12 hrs.) and then filtered. The nitrogen in 20 c.c. of the filtrate was then determined by Sorensen formol-titration. The reaction of medium was studied by the following method: Fifty c.c. of the digest were placed in fish-bladder dialyzing sacs and dialysis was made against Ringer's Solution for 10 hrs. Hydrogen ion concentration was then determined by the gas chain method, a Leeds and Northrup Type "K" potentiometer, Weston standard cell and platinum needle contact electrode being used. For the privilege of using the Government apparatus in the West Virginia Experiment Station, the writer thanks Professors McIlvane and Morgan.

In the following protocol, the averages of triplicate experiments are given. The rate is given in cubic centimeters of decinormal nitrogen, the hydrogen ion concentration in the Sorensen nomenclature (P_H):