sectioned. When jaundice was pronounced, a test was made as follows: Coagulation time was observed and 30 cc of cod liver oil (Lilly) were given in 300–400 cc of water by stomach tube. Blood coagulation was determined at two, four and twenty-four hour intervals.

The normal coagulation time varied from three to five minutes in nine dogs. The length of the coagulation time following the appearance of jaundice in the animals varied in the extremes from six and one half to fourteen minutes. The degree of jaundice was judged as slight, moderate and marked, depending on the intensity of sclerae pigmentation.

There was no marked change in serum calcium following common duct ligation, but the calcium did tend to decrease as jaundice increased. After the cod liver oil was given, the coagulation time returned to normal within four hours and was practically the same after twenty-four hours. In forty-eight to seventy-two hours, it was again delayed, but not to the extent that it had previously been. Snell *et al.* [13] observed that in some animals a spontaneous reduction in the coagulation time might occur late in the progress of the jaundice. Because this was noticed in a few animals, the tests here reported were made early after the onset of deep icterus.

While calcium and parathormone are both considered effective measures in the reduction of coagulation time in jaundice, it would seem from these results that cod liver oil might be just as effective and more practical than the others.

Repeated intravenous injections of calcium chloride or calcium lactate will produce an albuminuria and eventually nephritis. Parathyroid extract, if continued over a period of time, may deplete the bones of calcium. Cod liver oil has been shown here to consistently change a delayed coagulation time in obstructive jaundice to normal. The efficacy of cod liver oil in causing this change is probably based on its ability to increase the ionizable calcium.

In patients thus far observed having a delayed coagulation time from other causes than hemophilia, cod liver oil was efficacious in restoring normal coagulation time in four to six hours.

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CITRIC ACID INVERSION OF SUCROSE IN PLANT TISSUES

THE conventional method used for hydrolyzing sucrose in extracts of plant tissues has been that one using hydrochloric acid. More recently the use of invertase has found favor with many analysts, and directions for its use are found in the revised methods of the A. O. A. C. For reasons pointed out in an article[1] published in *Plant Physiology*, the use of hydrochloric acid with plant extracts is often of questionable value, and our experience here and some unpublished work of the senior author have taught us that it is very hard to secure satisfactory and consistent results using invertase. For these reasons we decided to try citric acid as a hydrolyzing agent for sucrose in plant extracts. Davis and Daish[2] had previously reported good results using citric acid and lately Harvey[3] has suggested its use with extracts from woody tissues containing a considerable quantity of glucosides. Since we could not find any results by comparing the three mentioned methods used on the same samples of plant extract, we decided to make such a study, and the brief results published below are typical of the ones we secured in this work. In the interest of briefness only a few typical examples, such as will illustrate the conclusions drawn, will be given.

The hydrochloric acid and invertase inversions were made according to the methods published in the A. O. A. C.[4] The citric acid inversion was carried out by adding 10 per cent. of C. P. citric acid to the sample, placing in a boiling water-bath for five minutes and then allowing it to stand over night, after which the sample was treated as in the hydrochloric acid procedure. The Shaffer-Hartman method[5] was used in estimating the reduced copper.

TABLE I
Percentage of Sucrose Present in Samples of Commercial Sucrose

Method of hydrolysis	Percentage of theoretical found
Citric acid	98.69
Hydrochloric acid	97.83
Invertase	97.05

[13] Snell, A. M., Greene, C. H., and Rowntree, L. G., *Arch. Int. Med.*, 36: 273, 1925.

[1] Report of committee on methods of chemical analyses, "The Determination of Soluble Carbohydrates," *Plant Physiology*, II, 195–204, 1927.

[2] Davis, W. A., and Daish, A. J., "A Study of the Methods of Estimating Carbohydrates, Especially in Plant Products," *J. Agr. Sci.*, 5: 437–468, 1913.

[3] Harvey, E. M., "Phloridzin." Ore. Agr. Exp. Sta. Bull., 215, page 23, 1925.

[4] Association of Official Agricultural Chemists. "Official and Tentative Methods of Analysis," Second Edition, 1925.

[5] Shaffer, P. A., and Hartman, A. F., "The Iodometric Determination of Copper and Its Use in Sugar Analysis," *J. Biol. Chem.*, 45: 365–390. 1921.

In Table I, each figure represents the average of more than twenty-five determinations; in Table II a half dozen or more.

TABLE II

Analysis of Plant Extract. Results Expressed in Mgs. of Copper Corresponding to Invert Sugar in Aliquots

Plant	Hydrochloric acid	Citric acid	Invertase
Grape:			
Stems B	4.58	3.21	0.79
Stems C	3.39	2.01	2.66
Leaves 1	6.34	5.68	5.22
Coleus:			
Yellow	2.16	4.96	0.24
Mixed[6]	.99	2.04	−2.31

Summarizing these results the following facts seem evident. First, hydrochloric acid used with solutions containing glucosides (grape stems) gives too high results, and with those containing little and only a trace of sucrose low results. Second, invertase results are variable and the conditions for accurate use are not yet sufficiently defined to give consistent results. Third, citric acid is easy to use, consistent in results, apparently does not hydrolyze the glucosides and does not seem to destroy any of the invert sugar.

On the basis of these results it seems well worth while to thoroughly investigate the use of citric acid as an inverting agent for use with plant solutions, and it is hoped at a future date to investigate its action much more completely, especially on phloridzin and maltose.

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THE MUTANT PARAMECIUM AURELIA

IN February, 1924, the writer isolated from a laboratory stock culture of *Paramecium aurelia* a number of invaginated forms. Progeny of these forms were bred in pedigree isolation culture and a race of mutant paramecia was established. The distinguishing character of this mutant is an apical notch and an aboral longitudinal groove which extends almost to the posterior end of the animal. It has been found that the notch, which is sufficiently well marked as to be clearly discernible with the 16 mm objective of the compound microscope, varies slightly but is inherited equally by both daughter cells at fission.[1] As this mutant form has been bred continuously in isolation pedigree cultures from February, 1924, to the present time, May 30, 1928,[2,3] and has retained the "notched" character both in the original parent series and in ex-conjugant series derived from the parent series, the writer wishes to record the appearance of the animals at the time of discontinuance of the pedigree isolation cultures.

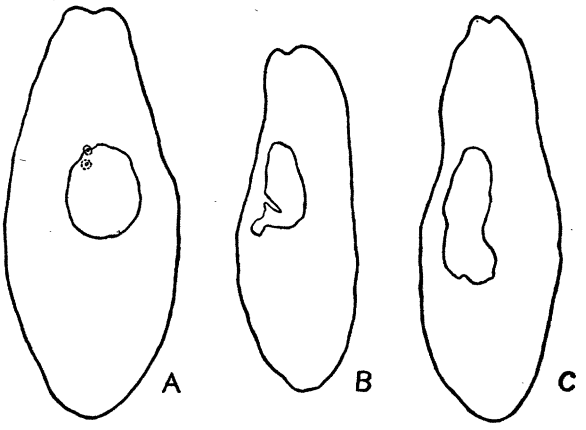

FIG. 1. Outline drawings of fixed specimens of mutant paramecia showing notched condition. X - - - . A. From Series A (original series) in 840th generation. B. From exconjugant series in 750th generation. C. From exconjugant series in 754th generation.

It is to be remarked that in all respects, except for the notch and the groove, this species shows the characters of *Paramecium aurelia* and it is not proposed to designate it other than a mutant of *Paramecium aurelia*. The micronuclei are two in number and of the characteristic "aurelia" type, as in Fig. 1, A. The three individuals shown in outline drawing (Fig. 1) made with a camera lucida from fixed and stained specimens are from the two pedigreed series of this race of paramecium. Comparison of the notched condition figured here of individuals in the 750th and 840th generations with the similar condition shown by the microphotographs in a previous report,[1] at which time the animals were in the 60th and the 300th generations, will make clear that the notched condition has been retained during the entire course of the pedigree culture. This precise inheritance of a new morphological character is, it is believed, unique in the annals of the protozoa.

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[6] Many samples have only a trace or no sucrose.

[1] Dawson, J. A., 1926, "A Mutation in *Paramecium aurelia*," *Jour. Exp. Zool.*, 44, 133.

[2] Richards, Oscar W., and Dawson, J. A., 1927, "The Analysis of the Division Rates of Ciliates," *Jour. Gen. Physiol.*, 10, 853.

[3] Dawson, J. A., 1928, "A Comparison of the Life-'cycles' of Certain Ciliates," *Jour. Exp. Zoöl.*, 51, 199.