sisting of NaCl—1.2 per cent., CaCl—0.025 per cent., KCl—0.042 per cent., $NaHCO_3$—0.02 per cent. To 1,000 parts of this solution was added 1 part of commercial (3 per cent.) H_2O_2 in order to allow the tissue a sufficient amount of oxygen and at the same time obviate the appearance of free bubbles in the specimen. An increase of size of the tissue was obtained in nearly 85 per cent. of the specimens. Tissues used for the present study were the spinal cord and intestines of a chick embryo of 4 to 10 and 14 to 17 days respectively. The increase in size was pretty regularly about 0.5 mm. during the first twenty-four hours, which corresponds very nearly to the results obtained by M. R. Lewis.

The newly grown part of the tissue has often the same thickness as the rest of the piece, the whole piece becomes usually more uniform. On the other hand in about 36 specimens in which there was no growth the thickness of the tissue was not uniform. Apparently then a successful growth of tissue is not due to any chemical or physical phenomenon.

Experiments are undertaken with tissue cultures in serum and on influencing the growth with physico-chemical agents.

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Uridin and cytidin phosphoric acid.

By P. A. LEVENE.

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In a series of articles published in course of the last few years, Walter Jones and his co-workers advanced a theory on the mode of linkage of the four nucleotides taking part in the molecular structure of yeast nucleic acid. According to these authors, the nucleus of yeast nucleic acid is a tetra ribose of the following structure $[(C_5H_{10}O_5)_4—3H_2O]$. The assumption was based on the isolation of three substances which the authors viewed as dinucleotides, having the properties of a tetrabasic acid. In a previous publication the present author expressed the view that the experimental evidence adduced by Jones and co-workers was not sufficient to establish their theory. It also seemed to the present author that the experimental evidence presented was insufficient to establish the individuality of the guanosin

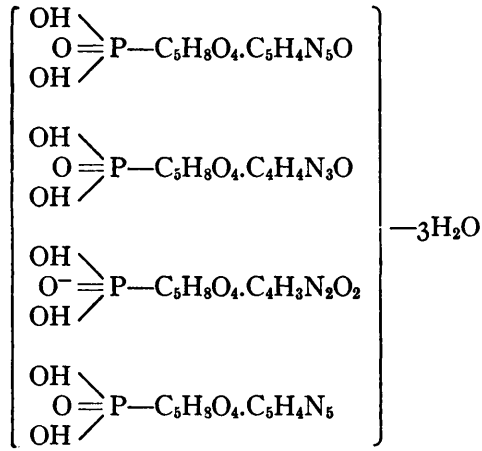
cytidine and adenosin-uracil dinucleotides. On the other hand, it seemed to the present author that a cytosin-uracil dinucleotide could actually be isolated from the mixture of pyrimidine nucleotides previously described by Levene and Jacobs.

The latter conclusion is now proven erroneous. Employing a different process for the fractionation of the brucine salts of the pyrimidine nucleotides it was possible to separate them into two brucine salts. One of these was converted into a crystalline barium salt of uridin-phosphoric acid, the other into an amorphous barium salt having the composition of the barium salt of cytidin-phosphoric acid.

The barium salt of uridin-phosphoric acid had a specific rotation of $[\alpha]^{20}_D = + 3.5°$. The barium salt as well as the products of hydrolysis with 10 per cent. sulphuric acid were tested for amino-nitrogen with a negative result. The base isolated on hydrolysis was pure uracil and the attempt to isolate cytosine-picrate from the mother liquor was unsuccessful.

The second brucine salt when converted into the barium salt gave a product which differed in composition and in physical properties from that of uridin-phosphoric acid. It deposited from a concentrated aqueous solution as a precipitate consisting of microscopic globules. It apparently had greater solubility and a higher optical rotation than the first salt $[\alpha]^{20}_D = + 14.0°$.

It is possible that this salt was not as yet obtained in the same degree of purity as the first. No dinucleotide was for the present isolated from the mixed brucine salts of the pyrimidine nucleotides. Of course, it is realized that eventually such conditions of hydrolysis may be found, that will yield dinucleotides. Efforts in this direction are now being made in this laboratory. However, for the present one must admit that the structural formulæ advanced by Jones and co-workers are merely a matter of speculation, and that the mode of linkage of the four nucleotides of the yeast nucleic acid still remains to be established. Omitting all arbitrary elements the structure of yeast nucleic acid should be represented as follows:



The barium salt of uridin-phosphoric acid had the following composition:

Calculated. For $C_9H_{11}N_2O_9PBa$.		Found.	
		I.	II.
C	23.50	23.65	——
H	2.41	2.64	——
N	6.10	6.17	6.17
P	6.75	——	6.82
Ba	29.90	——	29.47
$Ba_2P_2O_7$	48.97	49.02	——

The specific rotation in 2.5 per cent. HCl was

$$[\alpha]^{20}_D \frac{0.14 \times 100}{1 \times 4} = +3.5°.$$

On hydrolysis of the nucleotide the base uracil was obtained. It had the following composition:

Calculated. For $C_4H_4N_2O_2$.	Found.
N = 25.05	24.88

The barium salt of cytidin-phosphoric acid had the following composition:

Calculated. For $C_9H_{12}N_3O_8PBa$.	Found.
C 23.56	23.71
H 2.64	2.55
N 9.16	9.39
P 6.77	6.43
Ba 29.96	29.36
$Ba_2P_2O_7$ 48.97	48.79

The optical rotation of the substance was the following:

$$[\alpha]^{20}_{D}\frac{0.56 \times 100}{1 \times 4} = + 14.0°.$$

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The influence of X-rays on the development of the crown gall.

By ISAAC LEVIN and M. LEVINE.

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Crown gall is an infectious disease of plants which may be induced artificially by inoculating with the aid of a needle prick of a drop from an agar culture of *Bacterium tumefaciens*. Erwin F. Smith, of Washington, who investigated the condition continually for the last 10 years, is of the opinion that the disease is identical with human cancer. Irrespective of the stand one takes in regard to the identity of the two conditions, it must be conceded that there is a great deal of analogy between them. Crown gall as well as cancer is a new growth caused by a continuous, limitless proliferation of a group of cells within a tissue which normally do not proliferate at all. As a result of the rapid proliferation the new cells remain young and undifferentiated.

Clinical and experimental evidence indicates that the main biological and therapeutic action of X-rays consists in inhibition of the proliferating power of young undifferentiated cells. In man and vertebrates the mechanism of the action of X-rays on tumor cells is obscured by the changes in the cellular elements of the blood, lymph and the fixed connective tissue cells of the surrounding regions which is always encountered side by side with the changes in the tumor cells themselves. The crown gall, on the other hand, is an ideal subject for the study of the direct biological action of the X-rays on the tumor cells, since there is no other tissue present which may be changed by the rays.

For the present study ricinus plants and agar subcultures of *Bacterium tumefaciens* were used. The seeds for the former and the primary culture for the latter were obtained through the