branes. Tumors grown in this manner grew readily when transplanted back into mice. As long as care was taken to obtain clean tissue free of yolk and other extraneous materials the takes and growths in the mouse appeared unchanged from its original behavior in these respects.

It appeared, however, that cancer cells were also diffused through the yolk substance, since subdermal injection into a mouse of untreated yolk from cancer-inoculated eggs was sufficient to produce a tumor of the same type as the donor tissue for the egg.

Histological sections revealed healthy-appearing cancer cells with numerous mitoses in progress. The supporting stroma was supplied by the yolk sac membrane.

For many problems in cancer research this new method of growing cancer tissue should be of value. The tumors so produced are contained in a relatively stable biological system which at the same time is open to some manipulation.[3] Further, since the stroma is furnished by the chick tissue, different types of tumors can be studied against a common background.

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THE EFFECT OF 11-DESOXY-17-HYDROXY-CORTICOSTERONE ON RENAL EXCRETION OF ELECTROLYTES[1]

IN an earlier report[2] data were presented which indicated that adrenal steroid compounds possessing a hydroxyl group on C_{17} in the presence of an oxygen atom on C_{11} stimulated the renal excretion of sodium and chloride in normal dogs in contrast to the well-known "sodium and chloride-retaining" effect of 11-desoxycorticosterone, corticosterone and dehydrocorticosterone. At that time it was not possible to determine the physiological effect of the addition of the hydroxyl group on C_{17} in the absence of an oxygen atom on C_{11} because of inability to obtain crystalline 11-desoxy-17-hydroxycorticosterone (Substance "S", Reichstein). Recently Professor T. Reichstein, of Basel, succeeded in providing us with a sample of this compound which, when tested in a normal dog, indicated that it belonged to the group of compounds possessing "sodium and chloride-retaining" property (Table 1). The addition of a hydroxyl group on C_{17}, however, definitely reduced the "sodium and chloride-retaining" potency of desoxycorticosterone.

TABLE 1

EFFECT OF THE INJECTION OF 25 MG OF 11-DESOXY-17-HYDROXYCORTICOSTERONE. (SUBSTANCE "S," REICHSTEIN)

24-hour period	Urine volume	Sodium	Chloride	Potassium	Inorganic phosphorus	Total nitrogen	Body weight
	cc.	*m.eq.*	*m.eq.*	*m.eq.*	*mg*	*gm*	*kg*
Control .	490	63	54	20	570	10.3	12.8
Treated .	390	34	38	14	480	10.1	12.9
Control .	470	55	50	16	520	11.1	12.9
Control .	420	58	54	18	450	10.6	12.8

It is of interest to note that whereas the addition of a hydroxyl group on C_{17} to a compound which possessed a very striking "sodium and chloride-retain-

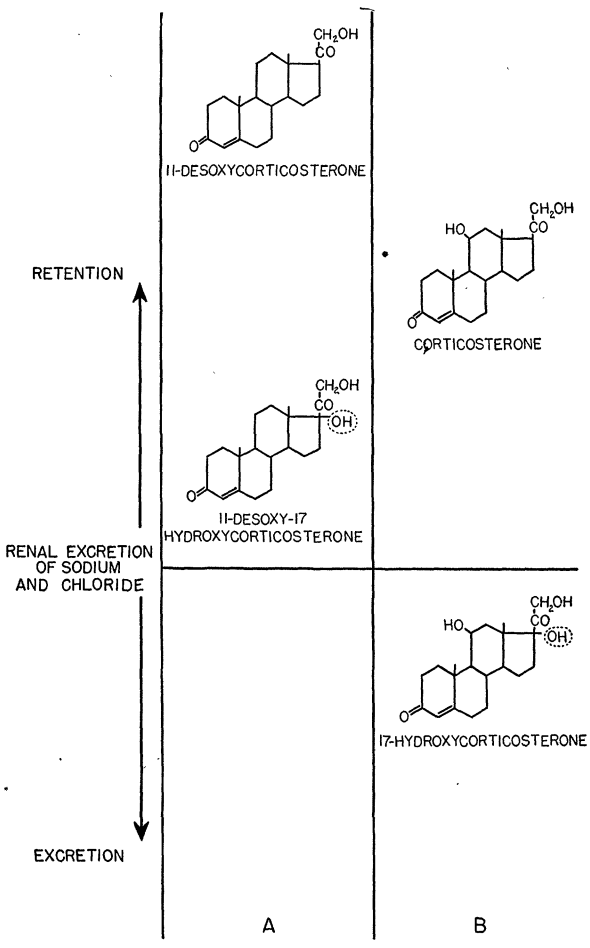

FIG. 1. Adrenal steroids: The relation of changes in chemical structure to the renal excretion of sodium and chloride. Compounds in column "A" do not possess carbohydrate-regulating-activity whereas compounds in column "B" do.

[3] A. Taylor, J. Thacker and D. Pennington, SCIENCE, 94: 542, 1941.

[1] This study was aided by a grant from the Committee on Research in Endocrinology, National Research Council.

[2] G. W. Thorn, L. L. Engel and R. A. Lewis, SCIENCE, 94: 348, 1941.

ing" property, *i.e.*, desoxycorticosterone, resulted in the formation of a compound with relatively low "sodium and chloride-retaining" potency, the addition of a hydroxyl group on C_{17} to a compound which initially possessed moderate "sodium and chloride-retaining" potency, *i.e.*, corticosterone, resulted in the formation of a compound in which all "sodium and chloride-retaining" effect had disappeared. In this latter instance, the new compound actually facilitated sodium and chloride excretion (Fig. 1).

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CHILDREN'S SPEECH

IN a recent note about my studies (SCIENCE, December 26, 1941) John B. Carroll stated that he had tried without success to study mathematically the distribution of words in children's speech. The readers of SCIENCE may therefore be interested in the nature of the results of a fairly extensive mathematical investigation that I have been conducting on this subject.[1]

In Fig. 1 is presented the Rank-Frequency distribution of the different ranked words (X) with their respective frequencies (Y), with straight lines connecting successive points, of an aggregate of approximately 24,000 words dictated into an Ediphone by a girl during the six weeks preceding her fifth birthday, as reported by R. S. Uhrbrock.[2]

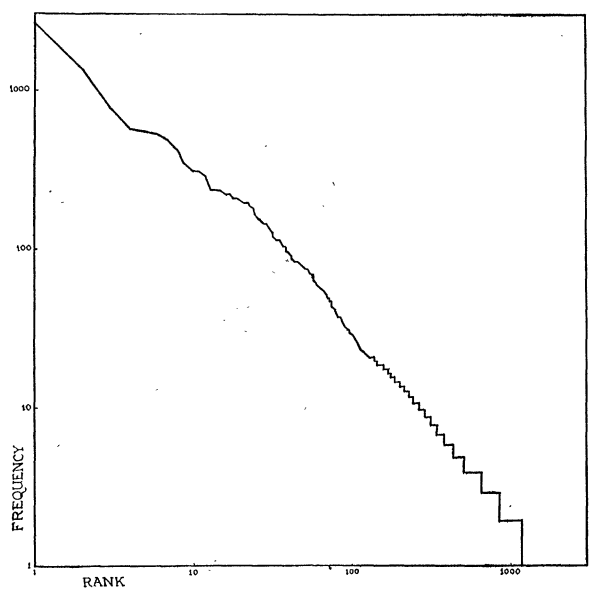

FIG. 1. The rank-frequency distribution of *ca.* 24,000 running words of a five-year-old girl recorded by R. S. Uhrbrock.

Dr. Uhrbrock put at my disposal the manuscript not only of the above material, but also of the dictations of the same girl made on or about her 6th, 6½th and 7th birthdays. The results of five samples of 2,000 words each from the 5-, 6½- and 7-year material, and of two samples of the same length from the less extensive 6-year material are presented in Table I, where the closeness of the calculated values to the theoretical slope, −1, is apparent. The best lines of X's and of Y's were calculated by least squares, and the error is the root-mean-square error of the deviations from the best line of Y's.

TABLE I

RANK-FREQUENCY DISTRIBUTION OF THE UHRBROCK RECORDINGS OF THE SPEECH OF A GIRL

Sample number	Age	Length of sample (words)	No. ranks (X)	Best X-slope (negative)	Best Y-slope (negative)	Error (Y)
5 yrs.	1	2,002	513	.97	.92	.086
	2	2,000	501	.95	.93	.055
	3	2,003	496	.96	.92	.077
	4	2,000	484	.97	.94	.078
	5	2,000	475	1.00	.95	.091
6 yrs.	1	2,000	466	1.00	.96	.080
	2	2,000	459	.99	.96	.081
6½ yrs.	1	2,000	467	.99	.95	.082
	2	2,000	500	.97	.93	.077
	3	2,000	413	1.02	.99	.074
	4	2,000	404	1.02	.99	.074
	5	2,000	476	.96	.93	.069
7 yrs.	1	2,000	437	1.02	.99	.074
	2	2,000	440	1.01	.98	.074
	3	2,000	398	1.04	1.01	.076
	4	2,000	457	.98	.95	.070
	5	2,000	487	.95	.92	.073

In addition to the above Uhrbrock material I have similarly analyzed the words of the extensive speech-material ranging from 22 through 59 months as collected and reported by M. S. Fisher[3] and as generously made available to me for the above purposes by Dr. L. H. Meek, director of the Child Development Institute of Teachers College, Columbia University. Though the 72 samples examined vary considerably in size and in best Y-slope, nevertheless the median slope is −1.02. In discussing the above material in greater detail in a future publication,[4] I shall present quantitative information on the general relationship between the size of sample and slope[5] and also the positive correlation

[3] John D. Archbold fellow in medicine.

[1] This investigation was made possible by grants from the Milton fund and from the Committee on Research in the Social Sciences at Harvard University. I here acknowledge the help of my wife and of my research assistants, Miss Inez Randall and Dr. Sydney Fairbanks.

[2] R. S. Uhrbrock, *Ed. Research Bull.*, 14: 85–97; also *Jour. Ed. Psychol.*, 27: 155–158.

[3] M. S. Fisher, *Child Development Monograph* No. 15, New York, 1934.

[4] Chap. III of "The Principle of Least Effort" now in preparation.

[5] G. K. Zipf, "The Psycho-Biology of Language," p. 44, Boston, 1935; *Jour. Psychol.*, 4: 239–244; *Psychol. Record*, 2: 347–367.