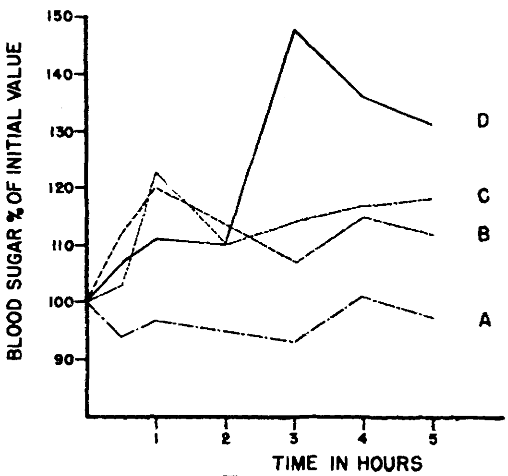

FIG. 3

Effect on blood sugar levels of rabbits receiving 10 ml injections of heparinized blood. Each curve represents average of 3 animals except C (2 animals). Curves A, B, and C were obtained by injecting pooled heparinized blood taken from several donor rabbits: A—blood injected immediately (within 10 min) after collection, B—after incubation at room temp for 1 hr, and C—after incubation 37°C for 1 hr. Curve D by reinjecting the animals' own heparinized blood after incubation 37°C for 1 hr.

does not protect mice against insulin-induced shock was confirmed by thoroughly controlled experiments with groups of 30 and 40 mice receiving 100 mg/kg (single and multiple doses) of the hyperglycemic factor at various intervals before and/or after the injection of insulin (0.016 unit/mouse). Failure of relatively large doses to protect mice against insulin-induced convulsions seems to be at variance with the results obtained in rabbits, in which the subcutaneous injection of the hyperglycemic factor in large doses successfully reversed the hypoglycemic effect of the insulin. The absence of data on the actual blood sugar levels in the mice makes interpretation of the results difficult.

Summary. The hyperglycemic activity of certain fractions derived from the 15% sodium chloride supernatant, a by-product of insulin manufacture, was determined before and after alkaline inactivation of the insulin present in these preparations. Hyperglycemic activity was studied in the rabbits but the results were interpreted only qualitatively, since a satisfactory log dose-response was not obtained. The factor was active whether intravenously or subcutaneously administered. Repeated subcutaneous administration produced hypoglycemia and convulsions in some animals. The factor appeared to be stable in heparinized blood at 37°C for 1 hour; incubated blood itself produced a delayed hyperglycemic effect when injected intravenously. The factor did not protect mice against insulin-induced convulsions, but did reverse the hypoglycemic effect of insulin in the rabbit.

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Stimulatory Effect of Aureomycin on the Growth of Chicks. (17793)

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(Introduced by Ben King Harned.)

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Several reports in the literature suggest that the growth-promoting activity of "animal protein factor" concentrates for chicks is not due solely to the vitamin B_{12} content of such supplements(1-3). Stokstad *et al.*(4) in studying the distribution of this additional factor(s) found that fermentation liquors of *Streptomyces aureofaciens* were capable of producing growth increments in chicks greater

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TABLE I.
Comparison of Aureomycin HCl to Various Supplements with APF Deficient Chicks.

Supplements to Diet I kilo of diet	Exp. 1 3 wk, g	Exp. 1 4 wk, g	Exp. 2 3 wk, g	Exp. 2 4 wk, g	P
None	235	320(10)	207	301(8)	
25 cc. *S. aureofaciens* mash	257	390(10)			.01
50 " " " "	243	373(10)			.01
100 " " " "	235	348(10)			.02
10 mg aureomycin HCl	264	367(10)			.01
25 " " "	273	407(10)			.01
50 " " "	262	377(10)			.01
100 " " "	279	385(9)	241	358(10)	.01
200 " " "	269	380(10)			
100 " streptomycin			240	351(9)	.01
100 " chloromycetin			214	319(8)	.05
100 " penicillin			249	361(10)	.01
100 " sulfasuxadine			222	321(9)	.05

P value calculated by the simple rank test using unpaired replicates.
No. of chicks in parentheses.

than those obtained with vitamin B_{12} alone. Cunha *et al.*(5) obtained the same results with swine fed this fermentation APF supplement. As aureomycin is a known constituent of *S. aureofaciens* liquors, this compound was tested and found to possess a marked ability to stimulate the growth of the chicks. Other antibiotics elicited a response under similar conditions.

Experimental. The APF deficient chicks used were Barred Rock New Hampshire Red crosses from a laying flock which was maintained on the APF deficient diet and under the conditions described by Stokstad *et al.*(4). The hens had been fed the deficient diet for approximately 3 months before the progeny were used in these experiments. The normal chicks were New Hampshire Reds purchased from a commercial hatchery. The day old chicks were housed on raised screens in heated brooders and were fed the experimental diets and water *ad libitum.* Since all diets were supplemented with excess vitamin B_{12}, survival of chicks fed these diets was usually 100%. Growth was used as a measure of activity. All supplements were incorporated in the basal diets. Diet I is the corn-soybean diet for chicks reported by Stokstad *et al.*(4). Diet II is the synthetic diet of Oleson *et al.*(6). supplemented with 2 mg of pteroylglutamic acid per kilo. Diet III differs from diet II in that the casein and gelatin are replaced by 22% α protein and 0.3% methionine. All diets were supplemented with 90 γ of vitamin B_{12} per kilo.

Results. The comparative growth-promoting activity of whole *S. aureofaciens* mash, aureomycin hydrochloride and certain other antibiotics is shown in Table I. The data indicate that aureomycin at a level of 25 mg per kilo gives the same stimulatory effect as whole *S. aureofaciens* mash. Certain other antibiotics were tested at levels of 100 mg per kilo. Of these only penicillin gave a response equivalent to that produced by aureomycin.

The growth-promoting effect of aureomycin is not limited to APF deficient chicks or to chicks fed the corn-soybean diet. The results presented in Table II indicate that the growth of normal hatchery run chicks fed several different diets, including a commercial chick starter mash, is significantly increased by the inclusion of aureomycin in the feed.

In two experiments, when graded levels of aureomycin or penicillin were injected intravenously or intramuscularly, no significant growth responses over the control group were obtained.

Discussion. The data presented indicate that the inclusion in the diet of aureomycin

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TABLE II.
Effect of Aureomycin on Growth of Normal Chicks on Various Diets.

	Wt at 3 wk							
Supplement	Diet I, g	P	Diet II, g	P	Diet III, g	P	Commercial chick starter, g	P
None	242(10)		223(9)		211(10)		195(10)	
50 mg aureomycin	273(10)	.05	263(10)	.05	240(10)	.05	226(10)	.02

P value calculated by the simple rank test using unpaired replicates.
No. of chicks in parentheses.

or certain other antibiotics will produce a growth stimulation greater than that obtained by vitamin B_{12} alone. The activity of these compounds is presumably related in some way to their antibiotic activity. The lack of activity of intravenously administered aureomycin or penicillin is consistent with this hypothesis. However, the mode of action of these antibiotics on the intestinal flora remains to be determined. Moore *et al.*(7) have previously reported the stimulatory effect of streptomycin on the growth of the chick.

A number of source materials have been reported to possess growth-promoting activity greater than could be accounted for on the basis of their vitamin B_{12} content(8-11). Since these natural materials are not known to contain any antibiotics, the relation of the effect of these materials to the growth stimulation induced by aureomycin is difficult to assess at this time. It may be possible that the factor present in the natural supplements and the factor presumably produced by the action of aureomycin in the intestinal flora of the chick are similar.

Summary. Aureomycin hydrochloride stimulates the growth of chicks when fed in the diet at levels as low as 25 mg per kilo. This effect is presumed to be an indirect one since certain other antibiotics manifest this same property. The relationship of this phenomenon to proposed new APF factors in certain natural materials is discussed.

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Alveolar Ventilation Studies Using the Mass Spectrometer.* (17794)

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In recent investigations the rate of intrapulmonary mixing of gases has been used as a measure of respiratory function. Cournand *et al.* examined the intra-alveolar mixing of tidal air by determining the concentration of nitrogen in an alveolar sample after the subject respired 100% oxygen for 7 minutes. Alveolar ventilatory insufficiency was as-

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