lower resistance of the mouse to infection. The same holds true for the action of mucin (9). No evidence could be found indicating a direct influence of the antibiotics on the fungus either *in vitro* or *in vivo*, pointing to a modification of the host's cell.

Summary. 1. Terramycin has the same virulence enhancing effect on *Candida albicans* as aureomycin. Other antibiotics failed to show this effect. 2. Terramycin due to its stability acts after standing or boiling while aureomycin, which is not stable on standing and is heat labile, does not. This parallels their antibiotic activities. 3. Only the intraperitoneal injection of either drug and fungus is effective in producing a fatal infection. All other routes of administration and combination were negative. 4. Intravenous injection of drug and fungus indicates a protective effect. 5. Cortisone administered shortly before and after infection with *Candida albicans* produces a generalized fatal infection. 6. Lowered resistance of the animal to infection is considered as the cause of "virulence enhancement."

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Effect of Anterior Pituitary Growth Hormone on Certain Liver Enzymes. (20489)

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(Introduced by R. C. Parker.)

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It has been reported(1) that growth hormone decreases the catabolism and excretion of amino acids rather than directly affecting the synthesis of body protein. In contrast, Russell(2) using nephrectomized rats given casein hydrolysate, found that the principal action of growth hormone is to increase amino acid uptake into tissues. This agrees with the results of Friedberg and Greenberg(3) who found an increased incorporation of isotopic methionine into skeletal muscle following growth hormone administration. Bartlett and Glynn(4) observed no effect of growth hormone on liver or renal aspartic-glutamic transaminase in the normal adult female rat though the hormone increased liver aspartic-glutamic transaminase in immature hypophysectomized rats. Fraenkel-Conrat *et al.*(5) have shown that the administration of growth hormone to plateaued female rats for 8 days at a level of 3 mg per day resulted in decreased fasting arginase activity in pooled liver samples. It seemed advisable to study the effect of growth hormone, given in acute dosage to normal rats, on the activities of certain liver enzymes involved in nitrogen metabolism.

Methods and results. Eighteen adult male rats of the Wistar strain which had been maintained on a stock chow diet and water *ad libitum* were divided into 2 groups of comparable average body weight (380 g; range 322 to 429 g). Following a fast of 22 hours, one group was injected intraperitoneally with an anterior pituitary growth hormone preparation (Connaught Medical Research Laboratories, Lot 200) in saline (made slightly alkaline) at a level of 3 mg per 100 g body

TABLE I. Effects of Anterior Pituitary Growth Hormone on Liver Enzyme Activities in Adult Male Rats.

		Saline group	Growth hormone group	t
Q_{urea}	Range	3.98–5.86 (9)	2.27–5.60 (9)	3.24*
	Mean	4.99	3.77	
	S.D.	.60	.96	
Arginase	Range	78–98 (9)	67–81 (9)	3.14*
	Mean	83	74	
	S.D.	7	5	
Aspartic-glutamic transaminase	Range	133–184 (8)	115–181 (9)	
	Mean	157	157	
	S.D.	16	23	
Alanine-glutamic transaminase	Range	96–146 (8)	70–124 (9)	2.83†
	Mean	120	101	
	S.D.	16	12	
Blood urea, mg %	Range	25.6–38.0 (9)	25.0–36.8 (8)	
	Mean	30.0	31.0	
	S.D.	3.9	3.9	

* Significant at the 1% level. † Significant at the 5% level.
( ) signifies No. of animals used.

weight, the average volume injected being 2.0 ml. The remaining group was similarly injected with saline (made slightly alkaline) on a body weight basis. Three hours following injections, the animals were sacrificed by stunning and decapitation. Blood was collected from each animal and heparinized for the determination of blood urea by the method of Archibald(6). Livers were quickly removed and aliquots taken for liver enzyme measurement. Liver urea formation was determined as the Q_{urea} of Krebs and Henseleit (7), defined as the number of μl of urea-CO_2 formed per mg dry tissue per hour. The procedure of Gornall and Hunter(8) was employed, modified in that the liver slices were agitated in Warburg flasks mounted on manometers instead of in small Erlenmeyer flasks. Liver arginase activity of homogenates was estimated by the method of Van Slyke and Archibald(9) as adapted to liver tissue by Liener and Schultze(10). Arginase activities were expressed as μmol urea formed per 100 mg wet tissue per hour. Activity of the aspartic-glutamic transaminase in liver homogenates was measured by the method of Tonhazy *et al.*(11). Activity of the alanine-glutamic transaminase in liver homogenates was estimated by substituting dl-alanine for dl-aspartate and omitting the aniline citrate step thus allowing direct measurement of the pyruvate formed(12). Transaminase activities are expressed as Q_T^{10}, defined as the μl pyruvate-CO_2 formed per mg wet tissue per hour. The results of these analyses are shown in Table I. A "t" test was used to ascertain statistical significance.

A further study was carried out in the same manner employing young male rats (107-135 g) with 5 animals in each group. The results of this study are shown in Table II and a "t" test was applied to ascertain statistical significance.

Discussion. The significant depression in liver arginase activity and in the rate of urea formation by liver slices, as a consequence of growth hormone administration, agree with a hypothesis that the hormone acts in part at least in suppressing amino acid catabolism. These findings offer direct evidence of the mechanism involved in the decreased appearance of blood urea following casein hydrolysate administration in growth hormone-treated, nephrectomized rats(2). The lowered alanine-glutamic transaminase activity observed in the growth hormone-treated rats suggests that this transaminase may be directly related to amino acid catabolism though further studies are necessary to verify such a hypothesis. Caldwell and McHenry(12) have reported that the aspartic-glutamic transaminase is less sensitive to basal diet changes than is the alanine-glutamic transaminase. This lowered sensitivity may explain the absence of an

TABLE II. Effects of Anterior Pituitary Growth Hormone on Liver Enzyme Activities in Young Male Rats.

		Saline group	Growth hormone group	t
Q_{urea}	Range	1.84–4.46 (5)	2.30–3.16 (5)	
	Mean	2.99	2.83	
	S.D.	1.04	.36	
Arginase	Range	64–80 (5)	65–76 (5)	
	Mean	71	71	
	S.D.	8	4	
Aspartic-glutamic transaminase	Range	120–158 (5)	113–162 (5)	
	Mean	138	131	
	S.D.	16	19	
Alanine-glutamic transaminase	Range	47–77 (5)	69–117 (5)	3.20*
	Mean	60	90	
	S.D.	14	20	
Blood urea, mg %	Range	22.0–36.4 (5)	18.2–32.6 (5)	
	Mean	27.2	25.2	
	S.D.	6.2	5.3	

* Significant at the 5% level.
( ) signifies No. of animals used.

effect of growth hormone on aspartic-glutamic transaminase.

Adult male rats were employed in the study reported and a second similar study, in which liver arginase activity was measured, confirmed the observation that growth hormone significantly depresses the liver arginase activity in adult male rats when determined on an individual basis. In a third study employing young male rats (107-135 g), treatment with growth hormone in the same manner as described caused no significant alteration in the rate of urea formation by liver slices, in aspartic-glutamic transaminase activity, or in liver arginase activity but caused a significant increase in alanine-glutamic transaminase activity. These findings support the view that effects of growth hormone are difficult to produce in the rapidly growing rat(13) and the effect of the hormone on liver alanine-glutamic transaminase may be dependent on the age of the animal. Comparison of values obtained for untreated young and adult animals reveals that the blood urea level and the liver enzyme activities measured were lower in young male rats than in adult male rats. This might be a consequence of the state of rapid growth, and hence higher rate of protein anabolism, of the young rats. The lack of response to growth hormone administration of liver enzyme activities in the young rats could conceivably be due to the fact that the livers of these animals were already responding maximally to a relative excess of endogenous growth hormone. In none of the experiments did growth hormone significantly alter the level of blood urea.

Summary. In the adult male rat, an acute dosage of anterior pituitary growth hormone caused significant depressions in the rate of urea formation by liver slices, in liver arginase activity, and in liver alanine-glutamic transaminase activity but did not alter liver aspartic-glutamic transaminase activity. None of these effects were observed in young male rats, and in such animals, a significant elevation in liver alanine-glutamic transaminase activity was noted.

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Inactivation of Antidiuretic Hormone by Blood Serum of the Pregnant Woman.* (20490)

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It is assumed that the secretion of minimum amounts of antidiuretic hormone (vasopressin) by the hypophysis is sufficient to insure a normal reabsorption of water by the kidney. This amount corresponds to 1 to 5 mU per hour in the dog(1-3) and a similar amount in man(4,5). Furthermore, blood plasma and tissues contain enzymes that inactivate vasopressin and oxytocin(6-10). The oxytocin-inactivating ability increases considerably in the blood serum during pregnancy (11). An increase of 1000 times was observed by Page(12) from the time of conception to the ninth month of pregnancy. Similar observations were recorded by Croxatto(13) for the pressor effects of vasopressin.

No systematic study of the inactivation of the antidiuretic properties of vasopressin in pregnancy has been undertaken. Aside from the physiological importance of such study, it is of interest because of the difference in stability of the antidiuretic and pressor effects of vasopressin *in vitro*. The antidiuretic activity appears to be more resistant to changes in pH (Heller(14)). Ralli(15) using sodium thioglycollate, and Almeyda(16) and Croxatto(17) with thiosorbitol have shown that the pressor activity disappears completely or almost completely, whereas the antidiuretic activity is not affected. The present communication deals with the determination of the ability of blood serum from non-pregnant, pregnant and postpartum women to inactivate the antidiuretic effects of vasopressin.

Methods. Recently obtained blood serum, kept at a temperature of −5° was used throughout. A vasopressin preparation† containing 10 U per ml was added to the serum and the conveniently diluted mixture adjusted to pH 7.3 and incubated at 37°. The time of incubation varied from 30 to 300 minutes for the serum of pregnant women and from 1 to 24 hours for the non-pregnant. At the end of incubation, 1 ml of the solution per 100 g of body weight was injected intraperitoneally into 4 hyperhydrated rats following the technique of Burn(18). The inactivation of the antidiuretic hormone by the serum was measured by the effect on diuresis of the incubated material. Controls were run on the hormonal preparation and the sera *per se*. With injections of 0.1 to 0.2 ml of serum per 100 g body weight of the rat, the effect on diuresis was negligible and could be disregarded. A higher dose of serum produced antidiuretic effects (Croxatto and coworkers) (19,20). The same solutions assayed in rats were tested on the blood pressure of anesthetized cats, by injection into the femoral vein in small doses and at relatively long intervals, to determine whether or not the loss of pressor activity of the substrate paralleled the loss of antidiuretic activity.

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