None of the animals receiving 0.1 cc of the culture died during the 10-day period of observation. Thirteen human strains (65%) killed mice when 0.5 cc of culture was injected intraperitoneally.

Of these 13 strains 3 also killed when 0.1 cc was inoculated. All the animals died in from 24 to 48 hours after inoculation.

Summary and conclusions. The biological properties and mouse virulence of 70 Lancefield's group B cultures (50 bovine and 20 human) have been studied and compared. The fermentation reactions show that, aside from the inability to ferment lactose by 8 of the human strains and some difference in the fermentation of glycerol, dextrin and salicin, the reactions are very similar for both groups. In some instances the biological properties studied were identical for strains of bovine and human origin. It has been observed with the majority of strains that the differences between single bovine and human cultures were not greater than those between individual strains from the same source.

There is an indication that human strains are more likely to reduce methylene blue.

It is known that the mouse virulence of group B streptococci is low. Inoculation of the 70 cultures studied into mice gave results which indicated that the strains from human sources possessed a higher mouse virulence than the bovine strains.

In spite of minor differences between cultures from bovine and human origin, their similarity in other respects points to a close relationship between these organisms.

15811

Latex Rubber Capsule for Producing Hypertension in Rats by Perinephritis.

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In studies of dietary choices by hypertensive rats[1] it was necessary to produce large numbers of animals with graded and persistent hypertension. Constricting perinephritis was the method of choice for several reasons but the use of cellophane,[3,4] collodion[5] or silk[5,6] in young rats is technically difficult, the mortality is high, and the results are variable. Partial nephrectomy[2] could not be used because of the accompanying trauma and renal insufficiency. Simple compression of the renal artery had the disadvantage of technical difficulty coupled with later development of collateral circulation.

Enveloping the kidneys of young rats in molded pure gum latex capsules had previously been used to produce hypertension in a few animals in this laboratory.[7] This paper describes more complete experiments, indicating that this method can produce persistent hypertension ranging from 165 to 240 mm Hg at the end of 2 or 3 weeks in at least 70% of the total operated rats and in

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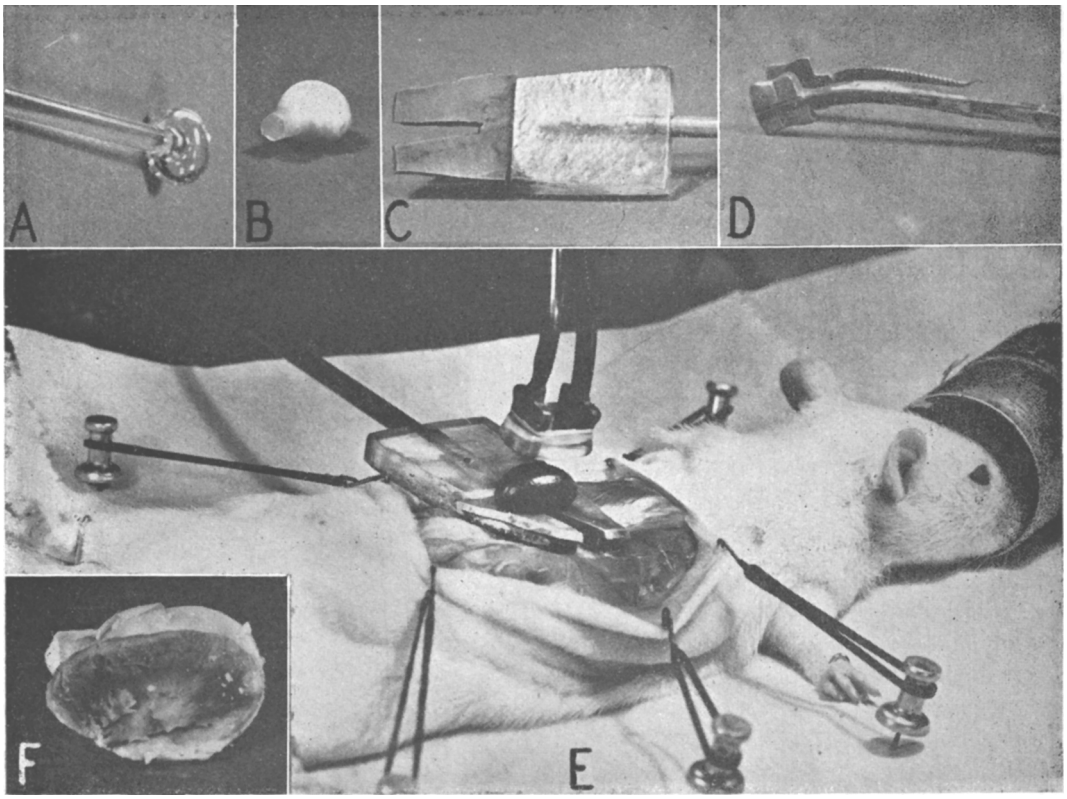

FIG. 1.

A. Glass mold.
B. Completed latex rubber capsule removed from mold.
C. V-shaped platform for stabilizing the delivered kidney while the capsule is being applied.
D. Kelly hemostat with ends broadened by means of solder to stretch and hold the everted capsule during application to kidney.
E. Operative field showing kidney in place on platform with stretched latex capsule held over the kidney prior to application.
F. Sagittal section of kidney showing thick, tough capsule 57 days after latex rubber capsule was applied. Rubber capsule itself has been removed completely.

about 90% of 60-day survivors. The convenience and dependability of the method, particularly when large numbers of rats with stable hypertension are needed, makes it worthy of brief description.

Method. A series of glass molds, resembling rats' kidneys in size and shape, were made by fusing and shaping solid glass rods or tubes (Fig. 1A). The molds were then dipped into liquid latex and placed in a rack, stem downward, to dry. Three dippings, producing a thickness of approximately 0.003 inch, plus a heavier reinforcing coat applied with camel's hair brush in the angle between the capsule and its neck made the rubber membrane suitably rugged and elastic. The completed capsules, still on the molds, were soaked in running hot tap water (45-50°C) for several hours to toughen the rubber, dissolve residual protein, and assist "peeling-off" the finished capsules (Fig. 1B). Assorted sizes of completed capsules were stored in 75% alcohol until used.

Male rats, weighing 190 to 200 g, were anesthetized with ether and fastened in the prone position (Fig. 1E). The hair over the lumbar region was removed and the skin scrubbed with 75% alcohol. Through a single dorsal mid-line incision, 5 to 6 cm long, either kidney could be delivered by the usual approach, *i.e.* by cutting the subcutaneous fascia longitudinally and splitting the under-

TABLE I.
Systolic Blood Pressures (Indirect) 60 Days After Applying Latex Rubber Capsules Bilaterally.

	First series	Second series	Totals, both series	%, both series together
Total No. operated	37	10	47	100
Deaths—1 to 30 days				
1 to 5 days post-op.	7	0	7	
6 to 30 days post-op.	4*	1	5	25.5
Survivors—30 days or more				
Systolic blood pressures†				
185 to 240 mm Hg	13‡	7	20	42.5
165 to 185 mm Hg	10§	2	12	25.5
135 to 165 (failures)	3	0	3	6.5

* Sacrificed 30 days after operation because of infected wounds and/or emaciation.
† Concurrent control rats, 11 in all, had systolic blood pressures ranging from 100 to 130 mm Hg.
‡ One died 57 days after operation in severe cardiac failure.
§ One died 42 days after operation with gross hematuria and acute urinary retention.

lying dorsal muscle mass by blunt dissection. In addition, splitting the muscles close to the vertebral column avoided undue stretching of the renal vessels during further manipulation of the kidney.

The upper and lower poles of the kidney were freed gently from the adrenal glands and perirenal fat by blunt dissection. Decapsulating the kidneys decreased the immediate postoperative mortality from renal insufficiency and was accomplished by nicking the capsule and peeling it toward the hilus with tissue forceps. Any oozing of blood was readily controlled by gentle pressure with a moist sponge.

The liberated and decapsulated kidney was then placed on the platform (Fig. 1C and E) with its pedicle in the V-shaped cleft. The soft rubber covering of this platform reduced trauma and prevented slippage. A rubber capsule of a size which would snugly enclose, but not compress, the kidney was rinsed free of all alcohol in warm Ringer's solution and placed in the everted position over the widened end of the hemostat used as an applicator (Fig. 1D and E). With the handles of the hemostat spread, the widely expanded rubber capsule was brought down over the kidney and the ends of the applicator pushed firmly against the kidney platform.

The lower free border of the everted capsule was drawn over the lower pole of the kidney by means of forceps, after which the other end of the capsule applicator was quickly turned inward, causing the upper end of the capsule, guided by forceps, to snap in place over the upper pole of the kidney. The loose neck of the capsule did not compress the renal vessels or ureter. The first kidney having been replaced, the other was treated similarly at the same operation and the rats were placed in individual metabolism cages for recovery. If oliguria or gross hematuria appeared during the night, 5 cc of Ringer's solution were given intraperitoneally and repeated again in 12 hours.

Sham operations, including all steps except the final snapping on of the latex capsule were performed in 5 animals. Systolic blood pressures in control, sham-operated and experimental rats were measured indirectly twice weekly by the plethysmographic technic described by Sobin.[7] All rats received Purina laboratory chow and water *ad lib.*

Results. Table I summarizes results obtained 60 days after bilateral application of latex rubber capsules in (a) an exploratory series of 37 male rats and (b) a more completely studied and technically superior series of 10 male rats. The highest normal systolic blood pressure in a parallel control series of 11 male rats was 130 mm Hg, the lowest 100 mm Hg. Because small changes in blood pressure are apt to be misleading, a rise of systolic blood pressure to

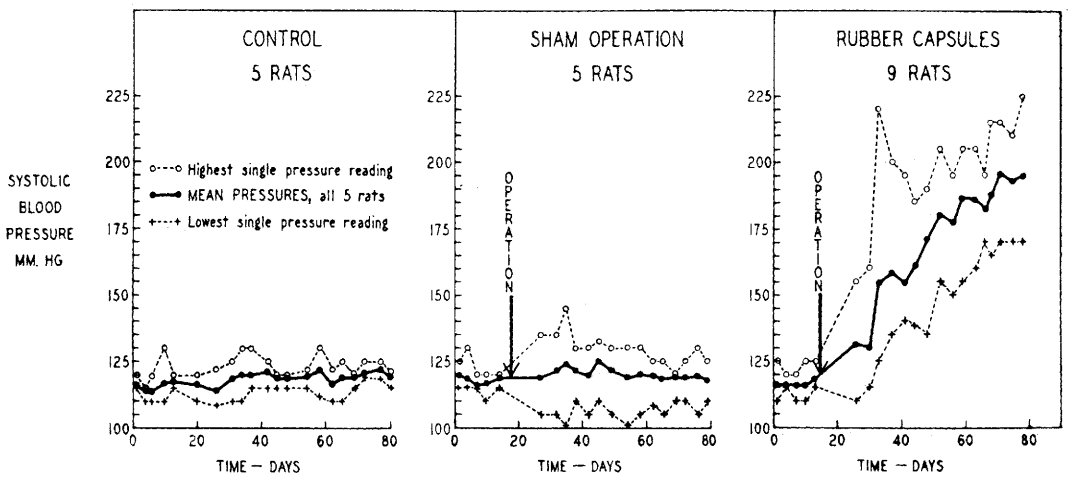

FIG. 2.

Charts showing systolic blood pressures of control rats, of sham-operated rats, and of rats with perinephritic hypertension due to bilateral application of rubber capsules.

TABLE II.

Comparison of Blood Pressures Measured (a) plethysmographically and (b) by Hamilton manometer.

	Indirect readings (plethysmograph on tail) Systolic mm Hg	Direct readings (Hamilton manometer, femoral artery) Systolic mm Hg	Diastolic mm Hg
Control rats	125-130	130-140	80- 85
	125-130	125-140	85- 90
	115-120	115-125	80- 90
Sham-operated rats (60+ days post-op.)	122-127	120-130	90- 95
	105-110	100-115	60- 70
	125-130	130-140	80- 90
Rats with bilateral latex rubber capsules (60+ days post-op.)	185-190	190-210	100-120
	205-210	190-220	110-130
	200-205	200-210	140-150

165 mm Hg or more was regarded as significant, *i.e.* any animal showing a rise less than 35 mm Hg above the highest single reading ever observed in parallel control animals was recorded as a failure.

The results for a total of 47 operated rats have been combined in Table I. As might be expected, experience led to improved results in the second series. In the first group mortality was 30%, in the second 10%. Similarly the incidence of significant hypertension was greater in the second and technically superior series. Severe hypertension (systolic blood pressures between 185 and 240 mm Hg) developed in 70% of the second series; moderate hypertension (165 to 185 mm Hg) in 20%.

Fig. 2 compares, for the second series, the highest single blood pressure, the lowest single blood pressure, and mean pressures for (a) 5 control rats, (b) 5 sham-operated rats, and (c) the 9 successfully operated rats all of which developed significant hypertension. The sham operation produced only a transitory increase in the systolic pressure of a few animals, while mean pressure for the group was not modified. Applying the latex capsules led to a clear increase in mean pressure by 2 to 3 weeks after operation and all of the animals were clearly developing hy-

pertension by 3 weeks after operation.

Systolic blood pressures having been followed by repeated indirect measurements for 60 days, these conclusions as to the severity of the hypertension were verified by direct determinations using the Hamilton manometer. Three rats of each group were lightly anesthetized by injecting intraperitoneally 3 mg sodium pentobarbital per 100 g body weight. Their pressures were measured (a) plethysmographically and (b) immediately afterward directly from the femoral artery. Table II summarizes this comparison and, within the usual respiratory variations of blood pressure when a tracheal cannula is not used, shows the quantitative accuracy of conclusions drawn from previous indirect measurements.

Comment. The pathogenesis of hypertension in these animals appears to be similar to that produced by other chronically irritative materials such as silk or cellophane. Within a few days after the application of the rubber capsule the superficial tissues of the renal cortex reacted by forming first a fibrinous, then a definitely fibrous, envelope. The latter can become very thick and tough as shown in Fig. 1F. In this specimen the latex capsule has been applied to the kidney 57 days before. The microscopic changes were also similar to those produced by other types of irritative capsule. Similar results have also been observed in a few rabbits.

Summary. Enclosing both kidneys in molded latex rubber capsules to produce perinephritis can be recommended for its simplicity and effectiveness, particularly when large numbers of hypertensive rats are required.

15812

On Use of Urea- and Phenol-Treated Skin Test Antigens for Diagnosis of *Lymphogranuloma venereum.*

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It has been shown in an earlier report from this laboratory[1] that urea in concentrations of 1 to 2% inactivated the virus of *Lymphogranuloma venereum* in 10% yolk sac suspensions prepared from infected chick embryos. Suspensions so inactivated with urea were satisfactory both as complement-fixing and skin test antigens. Urea-inactivated skin test antigens (containing 0.25% phenol and 1-20,000 merthiolate as preservatives) have been prepared in these laboratories for clinical testing for over 4 years.[2-5]

When later studies[6,7] revealed that the addition of phenol to yolk sac suspensions enhanced their complement-fixing activity from a titer of approximately 1-200 to 1-3200, and in some instances to 1-6400, the question of the possible enhancement with phenol of the skin test activity naturally presented itself.

Methods. To investigate the effect of phenol on the reactivity of skin test antigens, saline suspensions were prepared as previously described[7] from yolk sac membranes heavi-

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