ministered in a solution containing 20.36% total solids and 2.42% nitrogen at a rate of 1 cc per sq dcm body surface per day. Nitrogen determinations were made by the macro Kjeldahl method and ketone bodies were determined by Van Slyke's method. Liver "fat" was determined by saponification, acidification, and extraction with petroleum ether.

The data presented in Table I show that the development of a significant ketonuria is uniformly accompanied by a deposition of fat in the liver which ensues when the anterior pituitary extract is administered to a fasting rat. Although both choline and the pancreas extract may have caused a slight diminution in the liver fat content of the control rats neither of these agents had a significant influence upon the increase in liver fat produced by the anterior pituitary extract (Exps. 2, 3, and 5). The ketonuria of both the choline and pancreas extract treated control rats (Exps. 4 and 6) was very slightly but definitely less than that of the controls (Exp. 1). The pancreas extract had no effect whatsoever upon the ketonuria due to the anterior pituitary extract although it was measurably reduced by the choline. This is in contrast to the ineffectiveness of choline in influencing the ketonuria which occurs during fasting after the production of a fatty liver by dietary means.[5]

Summary. The deposition of fat in the liver of fasting rats due to certain anterior pituitary extracts is not influenced by the administration of choline or a pancreas extract called lipocaic. The ketonuria which accompanies these fatty livers is not affected by the administration of the pancreas extract but is slighly reduced by feeding choline.

10023

Classification of Streptococci from Cases of Endocarditis.

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Sherman[1] recently offered a method of classifying the streptococci based mainly on physiological* tests which include growth at

[5] Deuel, H. J., Jr., Murray, S., Hallman, L. F., and Tyler, D. B., *J. Biol. Chem.*, 1937, **120**, 277.

[1] Sherman, James M., *Bact. Rev.*, 1937, **1**, 1.

* The term physiological includes all tests other than fermentative tests.

10°C and at 45°C, growth in the presence of 6.5% NaCl or in the presence of 0.1% methylene blue, liquefaction of gelatin, and reaction in litmus milk.

It was the purpose of the study here reported to investigate the biochemical behavior of streptococci isolated from cases of endocarditis and to attempt to correlate their reactions in Sherman's tests with the reactions of the salivary streptococci or of the enterococci. The organisms investigated consisted of 20 strains isolated from the blood of cases which were clinically diagnosed as cases of endocarditis. These strains were submitted to us through the kindness of various hospitals throughout St. Louis and other cities of the United States. All organisms were found to be bile-insoluble.

Table I shows the reactions of the endocarditis-organisms in the physiological tests which Sherman considers to be of primary differential value. Twelve of the organisms tested are similar to *Streptococcus salivarius* according to Sherman's tests, 3 correspond to *Streptococcus fecalis* and 2 to *Streptococcus zymogenes*. Only in the case of the strain labeled Coffman is there any variation from the rule. This strain resembled *Streptococcus fecalis* in other ways but did not reduce the litmus of litmus milk until after the milk had been clotted. However, the other strains which resembled *Streptococcus fecalis* gave the typical reaction in milk, *i. e.*, reduction of the litmus before coagulation. The strains which resembled *Streptococcus zymogenes* showed the strong reduction which is typical for these organisms. Peptonization also occurred, additional evidence of their property of proteolysis.

Three strains, which have been designated as the R endocarditis-strains, produced an alkaline reaction in milk and thus failed to correspond to any of the hemolytic and non-hemolytic streptococci thus far known. These organisms were peculiar in other characteristics. In morphology, they tended to become quite rodlike and to form very short chains upon cultivation in the laboratory, although on first isolation, they appeared to be typical streptococci.

Many workers, previous to Sherman, based their classifications on fermentative reactions. Sherman considers these reactions to be too variable to use as a basis for the classification of the streptococci and considers the fermentative tests among those of secondary differential value.

The streptococci from endocarditis were tested fermentatively. In Table II is shown the number of strains fermenting the various sugars, arranged by groups as defined by physiological reactions shown in Table I. It was observed that the organisms that resem-

TABLE I.
Physiological Reactions of Endocarditis-Streptococci.

Strains	Hemolysis	Growth at 10°C	Growth at 45°C	Growth in presence of 6.5% NaCl	Growth in presence of 0.1% M.B.	Gelatin Liquefied	Litmus Milk
Salivary Type							
B 9898	—	—	—	—	—	—	A (8)
2867	—	—	+	—	—	—	ACl + R (4)
2868	—	—	+	—	—	—	ACl (8)
2869	—	—	+	—	—	—	ACl + R (2)
Landt	—	—	—	—	—	—	A or — (8)
Levy	—	—	—	—	—	—	A (8)
2834	—	—	+	—	—	—	ACl + R (3)
Cushing	—	—	+	—	—	—	A (8)
Lilly	—	—	—	—	—	—	A (8)
Beahle	—	—	+	—	—	—	ACl + R (3)
Poole	—	—	+	—	—	—	ACl + R (4)
Barrett	—	—	—	—	—	—	A (8)
Fecalis Type							
Coffman	—	+	+	+	+	—	R (2) ACl (2)
8911	—	+	+	+	+	—	R (1) ACl (2)
V_1	—	+	+	+	+	—	R (1) ACl (2)
Zymogenes Type							
Dog 4	+	+	+	+	+	+	ACl, R, P (1)
V_2	+	+	+	+	+	+	ACl, R, P (1)
R Type							
2047	—	—	+	—	—	—	Alkaline (8)
Falkner	—	—	+	—	—	—	" (8)
Cl 4395	—	—	+	—	—	—	" (8)

A = Acid. ACl = Acid Clot. R = Reduction. P = Peptonization. Nos. in parentheses = No. of days.

TABLE II.
Number of Strains Fermenting Various Carbohydrates Arranged According to Groups.

	Maltose	Sucrose	Lactose	Mannite	Salicin	Raffinose	Inulin	Sorbitol	Trehalose	Esculin
Salivarius Type, 12 strains	12	12	12	0	7	3	2	0	7	3
Fecalis Type, 2 strains	3	3	3	2	3	0	0	2	3	3
Zymogenes Type, 3 strains	2	2	2	2	2	0	0	2	2	2
R Type, 3 strains	3	3	3	3	0	0	0	0	0	0

bled the *Streptococcus salivarius* in their physiological reactions, closely resembled the salivary streptococci in their fermentative reactions. The percentage of these which fermented salicin, raffinose, and inulin was somewhat lower than that given by Sherman. The 5 streptococci from endocarditis, which resembled the enterococci in their physiological reactions, also gave fermentative reactions typical of the enterococci. The Coffman strain again varied somewhat by its inability to ferment mannite or sorbitol.

The R strains gave peculiar reactions in the sugars. They produced acid very slowly in maltose, sucrose and lactose, and failed to ferment any of the other sugars. In this way, they resembled a possible fermentative type of *Streptococcus salivarius*.

These results indicate that, in their physiological and fermentative reactions, the streptococci of endocarditis resemble one of two groups, the salivary streptococci or the enterococci. These results suggest that the streptococci concerned in endocarditis may be of endogenous source and that the source may be either the upper respiratory or the gastro-intestinal tract.

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Reflux into the Major Pancreatic Duct During Cholangiography.

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During the past ten years at the University Hospital, studies have been made of the biliary tract by means of cholangiography. The first cholangiogram of this series made in November, 1928, drew attention to the interesting phenomenon of reflux of contents of the common bile duct into the major pancreatic duct. In a patient having a persistent biliary fistula due to a stricture at the ampulla the major pancreatic duct was visualized on X-ray examination.

The cholangiograms were made by injecting radio-opaque solution into biliary fistulæ or more often into T-tubes placed in the common bile duct at the time of operation. One X-ray picture was taken immediately, followed by others at intervals to determine the emptying of the duct system.

In 91 patients 203 cholangiograms were made. A reflux of the