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

radio-opaque solution into the duct of Wirsung was demonstrated in 21 cases (23%). This finding was not constant in the same individual since in 79 cholangiograms made in these 21 cases the reflux was seen 36 times. However, in one patient filling of the duct of Wirsung occurred reglarly in 6 cholangiograms made over a 7-months period. That it may be difficult to demonstrate in an individual case is indicated by its occurrence in but 1 of 10 cholangiograms made over a period of 2 years in one case and 4 years in another case.

In 3 cases in which a reflux occurred, stones in the common bile duct were present and in 2 other cases a high grade stricture was noted. The remaining 16 cases presented varying degrees of spasm at the ampulla. It is obvious that a stone impacted at the ampulla of Vater is not a necessary or even common factor in conversion of the ducts into a continuous channel to allow reflux of bile into the duct of Wirsung.

Doubilet[1] found the occurrence of reflux into the pancreatic duct from the common bile duct in about one-fifth of his cases and considered spasm at the sphincter ampullæ as the causative agent.

In a personal communication, Kreilkamp and Boyden[2] record the presence of well developed sphincter ampullæ in 2 out of 12 maceration specimens of the major papilla. This incidence agrees with the frequency of reflux into the major pancreatic duct and suggests a spasm of the sphincter ampullæ as the etiologic factor.

Studies by McGowan, Butsch, and Walters[3] and Doubilet and Colp[4] have shown that morphine in the usual therapeutic dosage frequently will produce spasm of the sphincter of Oddi, thus increasing the intraductal biliary pressure. In one case in this series the major pancreatic duct was visualized on cholangiography following the injection of morphine whereas no reflux was demonstrable on 3 previous examinations.

Conclusions. 1. Reflux of contents of the common bile duct into the duct of Wirsung occurred in 21 of 91 cases (23%). 2. Such reflux is not dependent on obstruction at the ampulla due to stone or stricture but is probably more often due to spasm at the ampulla.

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1 Doubilet, H., personal communication.

2 Kreilkamp and Boyden, personal communication.

3 McGowan, Butsch, J. M., and Volterse, W., *J. A. M. A.*, 1936, **106**, 2227.

4 Doubilet, H., and Colp, R., *Surg., Gynecol. and Obstetrics*, 1937, **64**, 622.