of the bile. Though a very small portion of the stone-forming elements may orginate in the manner described by Naunyn, it is now pretty generally maintained by leading authorities on physiologic chemistry that cholesterin, found in various tissues and in the blood, is the result of metabolism, and must be considered an excretion. They consider the bile as a whole an excretory product, having secondary digestive functions to perform; in it are excreted those substances not soluble in water, and which cannot therefore be excreted by the kidneys, skin or lungs. Chief among these substances are cholesterin and bilirubin salts. Inasmuch as bilirubin is found in combination with calcium salts in the bile and biliary calculi, it was at one time thought probable that an increase of calcium salts in the blood, their excretion and precipitation with bilirubin in the bile, played an important role in the development of cholelithiasis. But neither the intravenous injection of calcium salts nor their ingestion with the food increased them as constituents of the bile. In fact, it was not even possible to precipitate the bilirubin salts and cholesterin through concentration of the bile by evaporization or direct addition of calcium to the bile itself. Their solubility is not affected by or dependent upon their concentration.

These substances, otherwise insoluble in water, are held in solution by the cholates and fats. Perhaps a breaking up or dissociation of the cholates would result in the precipitation of these substances that they aid in holding in solution. This theory, too, was doomed to disappointment. Minkowski demonstrated that in the entire absence of the cholates the fats and soaps present are still capable of maintaining the solution.

It has been frequently demonstrated that the presence of foreign bodies in the gall-bladder does not suffice to produce cholelithiasis. Gall-stones themselves have been introduced into the normal gall-bladders of animals only to disappear entirely or in part within a short time afterwards. Other foreign bodies have been introduced and left to remain in the bladder for three to eight months with a like result. Though there are cases recorded in which gall-stones have been found with silk threads, etc., as nuclei, there were in all probability other factors at work in these cases. The truth remains, however, that perfectly sterile foreign bodies introduced into the normal gall-bladder will not result in the formation of biliary calculi.

The foregoing, while proving nothing in a positive way, does show that the cause of the development of gall-stones is dependent upon principles not governing concretions in