

gave an impetus to research which has been productive of results that will stand the test of time. Though some of Naunyn's hypotheses have since been proven wrong, he was correct in the fundamental principles, which prior to this time had been in a great measure overlooked. Until now the same principles were thought applicable to these, as to concretions in general.

Von Recklinghausen, for instance, in referring to concretions in general, draws the following conclusions: (1) concretions develop from substances dissolved with difficulty by the tissue juices, secretions and excretions—the gall-stones from cholesterin, and bilirubin salts, etc., etc.; (2) these substances are contained in their vehicles in abnormally large quantities; (3) the presence of a foreign body plays an important rôle, presenting a nucleus around which the precipitated crystals may form layers.

Gall-stones are composed largely of cholesterin and bilirubin-calcium salts, both of which are substances very difficult of solution. Based upon this fact, it was formerly thought that gall-stones resulted from an increase of cholesterin in the blood, due to disturbance in metabolism or the nature of the food ingested, and its consequent excretion by the liver and precipitation in the bile. This explanation, for a time accepted, was finally disproven by a demonstration of the fact that cholesterin was not increased in the blood of those individuals; in fact, that the injection of cholesterin into the blood and its introduction into the intestines did not materially increase the quantity in the bile.

These investigations of Jankau and Thomas, together with his own observations, led Naunyn to the conclusion that cholesterin in the bile is in no way dependent upon the general metabolism and the food ingested, but that the whole has its origin in degenerative processes of the desquamated cells from the gall-bladder and ducts. Inasmuch as cholesterin is found in pus, sputum, serous exudates and transudates—in fact, wherever there is a desquamation and degeneration of the lining cells of the mucous and serous surfaces—Naunyn assumes that the same occurs in the gall-bladder and ducts. Since the quantity of cholesterin in the blood is very small compared with the quantity found in the bile and stones of these cases, he concludes that the entire amount has its origin in these degenerative processes. This theory, however, is scarcely tenable now. The great discrepancy between the quantity of cholesterin in the blood and that in the bile is to be explained by the length of time required for the development of biliary calculi and the concentration there of certain substances through the stagnation