

namely, in pointing to local conditions within the bile passages and gall bladder as the immediate cause of gall stone formation.

The general result is to show that in cholelithiasis we have to do with a local disease affecting the bile passages or gall bladder, or both, and not with any general constitutional disturbance affecting nutrition or metabolism.

The result of the observations to which I refer has thus been to confirm in the amplest way the view held by Budd (1857). The relation of events in the formation of gall stones Budd held to be, diseased condition of mucous membrane, increase of cholesterin in solid form, deposit of this around any small particle of inspissated bile that may be present. A similar view was held by Bristowe. But the observer, to whom more than any other we are indebted for establishing this on a basis of facts, is Professor Naunyn of Strassburg, whose elaborate and valuable monograph on *Cholelithiasis*, published in 1892, gives the fullest and clearest account of the subject we possess.

PHYSIOLOGICAL CONSIDERATIONS.

Before passing to consider what these local conditions are, let me preface with a few remarks as to the bile itself and the conditions which in health determine its quantity, quality, and secretion.

We have to do with a watery secretion of low specific gravity, excreted in quantity of about two to three pints daily, containing some 1 to 2 per cent. of solids; these consisting of certain specific constituents—the bile pigments and bile acids—formed by the liver cell itself; certain inorganic salts, the most important of which in the present relation is calcium; a constant percentage of the insoluble body, cholesterin, held in solution by the salts of the bile acids and by the traces of fats and fatty acids present; and, lastly, a considerable amount of mucoid material formerly regarded as mucin, now shown to be of more complex character—a mucoid nucleo-albumin—which is added to the bile during its passage along the bile passages, and especially during its sojourn in the gall bladder.

This fluid is secreted constantly, more abundantly four or five hours after food under the direct stimulus of the food products conveyed to the liver during digestion, less actively and more concentrated during the night when digestion is in abeyance. During active digestion and secretion it flows into the duodenum, expelled in a series of jerks by peristaltic action of the muscular fibres in the walls of the larger bile ducts. In the intervals between digestion its passage is temporarily arrested by the sphincter-like contraction of the wall of the duodenum through which the common bile duct obliquely passes, and