

# **SUMMER COMPLAINT AND INFANT FEEDING**

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Summer Complaint and Infant Feeding by W. S. Christopher

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**W. S. CHRISTOPHER**

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BY

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## PREFACE.

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Chapter I. is an essay which appeared in the *New York Medical Journal* November 9, 1889. The subject of which it treats, "SUPERDIGESTION," is closely related to the chemical processes occurring in the intestines in summer complaint, if indeed it does not entirely comprehend them. It is included here to assist in explaining these processes. The last paragraph of this chapter was not in the original essay.

Chapters II., III., and IV., are lectures delivered in the Fourth Special Course of the Chicago Polyclinic during the spring of 1892. They were published in the *Journal of the American Medical Association* of April 30, May 7 and May 21, 1892. Having been prepared for publication from a stenographer's report they still retain the didactic style.

Chapter V. was read before the Section of Diseases of Children, of the American Medical Association, at Detroit, June 7, 1892. It is to appear in the August number of the *Archives of Pediatrics*. Acknowledgment is hereby made to the publishers of these several journals for permission to reprint.

This arrangement necessarily involves some repetition.

W. S. C.

408 Center Street,  
July 25, 1892.

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fermentation in the glucoses. In the fermentation of cane-sugar by the yeast-plant, the sugar is first inverted—that is, transformed into dextrose and levulose, two glucoses—before the alcoholic fermentation occurs. The inverting of the cane-sugar is accomplished by a soluble ferment which accompanies and is probably produced by the yeast-plant itself. At all events, its action precedes the alcoholic fermentation induced by the plant. Similarly, according to Schützenberger,\* the butyric fermentation is usually, perhaps invariably, preceded by the lactic fermentation. It seems that certain changes in the albuminous constituents of milk are produced by the lactic ferment, which fit these albumins to nourish the butyric ferment, and thus enable it to grow.

Another illustration of this peculiarity of ferments is found in the different organisms which prevail at different times during the progress of a putrefaction.

In the gastric digestion of proteids the process ends with the formation of peptones, but in pancreatic (tryptic) digestion of proteids the decomposition of the albuminoid molecule is more profound, and we find in addition to the peptones, leucin, tyrosin, hypoxanthin, aspartic acid, and glyocol. With these products the fermenting action of the pancreatic juice probably ends, but this action has paved the way for the growth of microorganisms, which flourish among the products of the tryptic digestion, and, as the result of their action upon these products, there are produced such bodies as indol, scatol, phenol, fatty acids, ammonia, hydrogen, sulphuretted hydrogen, carbonic acid, and ptomaines (Ewald, Charles, and Landois).

\* On Fermentation. New York, 1887.

In making artificial digestion experiments, the readiness with which putrefaction sets up in the pancreatic digestion of proteids is very striking, particularly when compared with gastric processes.

Now, since this putrefactive process is impressed upon the products of the digestion, and is not a change produced directly in the original food-stuff itself, but rather a continuation of the decomposition processes set up in the albumin molecule by the digestive ferment proper, it seems to me that the term superdigestion fitly characterizes it. Certainly the term indigestion is eminently improper and misleading.

In general terms, superdigestion may be defined as pathological fermentation of the products of normal digestion. It is always induced by micro-organisms, and varies according to the food.

We may therefore have --

a. Superdigestion of proteids.

b. Superdigestion of fats.

c. Superdigestion of carbohydrates.

a. *Superdigestion of Proteids.*—Proteids are digested both by the gastric and by the pancreatic juices, but superdigestion of the products of gastric digestion is infrequent, at least in the stomach, while further change of the pancreatic products is exceedingly common. This difference is probably due less to any doubtful antiseptic action on the part of the gastric juice than to the difference in extent of the digestion or decomposition of the albumin molecule produced by the two juices. We may dismiss stomachic superdigestion of proteids and confine ourselves to that which occurs in the intestine. The most interesting of the intestinal decomposition products of proteids, for our present purpose, are the

fatty acids, the ptomaines, and the gases, which latter comprise carbonic-acid gas, ammonia, nitrogen, hydrogen, marsh gas, and sulphuretted hydrogen. Certain of the gases unite with each other and form non-volatile salts, and others are formed in relatively small amount, so that in this form of superdigestion flatulence is not a marked symptom, excepting in certain cases of diarrhoea-producing putrefactions, and then the origin of the gas is by no means certain.

The fatty acids thus formed do not accumulate in sufficient quantity to produce a strong acid reaction in the intestine, and probably, therefore do not cause pain. In their further decomposition the fatty acids give rise to gases. The ptomaines are the important products of the superdigestion of proteids. These bodies are alkaloids, and, like the vegetable alkaloids, produce their effects through the agency of the central nervous system. They are partly excreted with the fæces, and in part absorbed. After absorption they have another gauntlet to run in the liver, one of whose functions, as Schiff has shown, is to destroy these bodies. Consequently, it is only when they are formed in excess, or the liver fails to destroy them, that they gain entrance to the general circulation and produce general effects. The nature of the symptoms produced by the ptomaines varies according to the physiological properties of the ptomaine produced. A not uncommon group of symptoms produced in this way comprises constipation, headache, drowsiness, and listlessness, or even a marked depression—the so-called biliousness. Here there seems to be at work, a ptomaine or ptomaines possessing the properties of morphine and curare.