conjugated with sulphuric acid and none with glycuronic acid, the 0.5 gm. thymol would be excreted as 0.766 gm. of thymol sulphuric acid. This would cause a marked increase in the percentage of ethereal sulphates in the urine. If the detoxicating power of the liver were below par, the thymol would not be conjugated, and the percentage of ethereal sulphates would be only slightly different from what it had been on the first two days—before the thymol administration.

We have found that this detoxicating function of the liver usually runs parallel with the other functional derangements of this organ. In some cases, however, the conjugating power of the gland is markedly reduced, whereas the other functions do not show any disturbances as determined by the methods at our disposal. In still other cases the sulpho-conjugation is entirely normal (as determined by the test here described), while the other tests show a reduction of hepatic functional capacity.

It is possible that each individual cell of the liver tissue takes part in all of the liver functions; it is also possible that different portions of the liver lobule, and different conglomerations of liver lobules may have specific functions. In the former case, it is most likely that a reduction in the ability of the liver to perform one function will be accompanied by a proportional reduction in all the liver functions; in the latter case one or more functions of the liver may be disturbed without affecting the other hepatic functions.

It is essential, in studying hepatic disease to examine all the functions of the liver by the various methods at our disposal, and it is important to examine the detoxicating power of the liver before drawing any conclusions as to the type and extent of hepatic involvement.

154 (1332)

The relation of the intestinal flora to the scurvy of guinea pigs and of infants.

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The question recently has been raised as to whether scurvy in guinea pigs and in human beings is due to constipation and to the putrefactive activity of the bacteria in the intestinal tract. In order to determine this point a study of the intestinal flora was made in guinea pigs on a normal diet, on a diet which produced scurvy, and again on a diet which cured this disorder. For this purpose cultures and grain stained films were made from the feces, as well as from the different levels of the small and large intestine immediately after chloroforming the animals. This study on guinea pigs is portrayed in Table I.

It will be seen that proteolytic bacteria other than subtloid types were not found in the intestinal tract; that the bacteria which were cultivated were merely those found in the outer world, for example, on dried foodstuffs. Similar organisms, indeed, were cultivated from the hay and oats which were fed these animals. Attention may be called to the fact that with none of the diets did *B. coli* develop, and that it was isolated from only one animal. The number of viable bacteria will also be noted as remarkably few, generally less than 1,000 per milligram of material. Among these there were hardly any that were actively proteolytic. Furthermore, a point of prime importance, there was no change in the flora on adding orange juice to the diet, although the scorbutic symptoms disappeared. It is our opinion, therefore, that most of the bacteria entering the intestinal tract are destroyed, and that the pabulum is not such as to encourage the growth of native intestinal bacteria.

A similar study was carried out on the stools of three infants suffering from scurvy. Table II gives a summary of these results. It will be seen that the infants were all on a high carbohydrate diet, and that in two instances we were able to compare the flora, not only during the active scorbutic process, but after orange juice had been given for a week or more. This investigation shows that the bacteria were merely such as we should expect with a diet rich in carbohydrates. Putrefactive organisms were present only in small numbers; in the case where they were found to be most numerous (*S*) they had disappeared upon the subsequent examination, although the scurvy had become more marked.

We therefore conclude from this study that the scurvy, both of guinea pigs and of infants, is not associated with an overgrowth of putrefactive bacteria in the intestinal tract. The amount of putrefaction present, however, can be determined only by a chemical study.

TABLE I.

INTESTINAL FLORA OF NORMAL AND OF SCORBUTIC GUINEA PIGS.

Guinea Pig.	Diet.	Period of Feeding.	Scorbutic Condition.	Source of Material Cultured.	Types of Bacteria.	Remarks.
No. 1664	Straw, oatmeal, water			Cecum	Staph. alb. and aur. Subtiloid Gram—bac. Yeasts	No B. coli Very few viable bacteria
		20 days	Scurvy	Colon	Subtiloid Gram +diploc. B. acidoph. Yeasts	No B. coli Material almost sterile
				Ileum	Staphyloc. Gram + diploc. Yeasts	No B. coli No putrefactive types About 1 viable organism per mg.
H. 63	Straw, oats, water	19 days	Scurvy	Cecum	Subtiloid bac. Gram + cocci B. acidoph. Yeasts	About 1 viable organism per mg.
				Colon	Like cecum	Like cecum
No. 414	*Carrots*, hay, water	Several weeks	Normal	Feces	Subtiloid bac. B. acidoph. Gram + diploc. Yeasts	No B. coli (or other gas-producing bact.) 20,000 viable organisms per mg.
	Oats, hay, water	8 days	Normal	do.	Flora unchanged	No B. coli 1,000 viable organisms per mg.
	do.	15 days	Scurvy	do.	Gram—bac. (saprophytic) Staph. alb.	No B. coli 16,000 viable organisms per mg.

TABLE I.—*Continued.*

Guinea Pig.	Diet.	Period of Feeding.	Scorbutic Condition.	Source of Material Cultured.	Types of Bacteria.	Remarks.
	Oats, hay, *orange juice*, water	3 days	Normal	do.	Subtiloid bac. (spore bearing) Gram + diploc. Yeasts	No B. coli 56 viable organisms per mg.
	Do.	8 days	Normal	Ileum	Streptoc. Gram + cocci B. acidoph. Yeasts	No B. coli 1,700 viable organsims per mg.
				Cecum	Moulds Yeasts Sporebearing bac. (numerous) M. ovalis	No B. coli 640 viable organisms per mg. putrefactive tendency
				Rectum	Yeasts Streptoc. B. acidoph.	No B. coli 840 viable organisms per mg.
No. 1776	Raw goat's milk, hay	87 days	Scurvy	Ileum	Yeasts B. acidoph. Saprophytic bact.	No B. coli No proteolytic bact. 264 viable organisms
				Cecum	Yeasts B. acidoph. Gram—twisted bac. M. ovalis	No B. coli No proteolytic bact. 560 viable organisms
				Rectum	Yeasts B. acidoph. Saprophytic bact.	No B. coli No proteolytic bact. 4,380 viable organisms

TABLE II.

FECAL FLORA OF SCORBUTIC INFANTS.

Infant.	Diet.	Date.	Scorbutic Condition.	Source of Material.	Types of Bacteria.	Remarks.
M.	Malt soup and cereal	Dec. 1	Subacute	Rectum	B. acidoph. B. bifidus M. ovalis B. coli	Normal infants' flora. Gram + bac. predominant No spore-bearing or putrefactive types B. acidoph. about 40% viable bact.
	Do.	Dec. 4	Do.	Do.	Do.	Do.
	Same also, 20 c.c. liquid petrolatum, one week	Dec. 11	Subperiosteal hemorrhage	Do.	Do.	Relatively more B. coli Many B. bifidus No putrefactive bact.
	Same diet, oil stopped, *orange juice*, 10 days	Dec. 21	Markedly improved	Do.	Do.	Normal infant's flora Bacteria as above
K.	Malt soup and cereal	Dec. 11	Subperiosteal hemorrhage	Rectum	Streptococci B. coli M. ovalis	Gram—bacteria predominant B. coli gram + diploc. numerous B. acidoph. few B. bifidus few
	Do. + *orange juice* (60 c.c.), 8 days	Dec. 21	Markedly improved	Do.	B. bifidus B. coli Streptococci	Gram + bact. predominant Many B. bifidus Streptoc. unchanged
S.	Formula: Cream, water, flour, sugar, also cereal	Dec. 21	Mild scurvy	Rectum	B. lact. aerog. B. coli M. ovalis B. bifidus B. welchii	Gram + and—bact. about equal Many lact. aerog. Putrefactive bact. in minority
	Malt soup and cereal	Feb. 11	More marked	Do.	B. lact. aerog. M. ovalis B. bifidus Dipheroids	Gram + bact. in great majority (B. bifidus) Spore bearers very few Flora not at all putrefactive