

elastin from the keratins. As to the physical properties shown by micromanipulative studies the walls show flexibility as well as resilience or toughness.

Our studies of both the chemical and the physical properties of the cyst wall show that this structure has the properties of the group of keratins more nearly than those of any other group of scleroproteins. A positive test for unoxidized sulfur or for a high cystine content would convincingly demonstrate that the cyst wall is keratin; however, due to the small quantity of material present in the cyst wall, it is at present impossible to apply such tests for cystine.

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Digestible Constituents in Tubercle Bacillus.

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In 3 investigations, Loeffler,¹ Robinovitch,² and Day and Gibbs³ found that living tubercle bacilli were killed in about 48 hours when mixed with pancreatic enzymes. According to Loeffler, the live bacilli were digested, according to Day and Gibbs they were not. None of the foregoing papers records the use of quantitative biochemical methods for detecting tubercle bacillus digestion. Nor was consideration given to the possibility that this might take place without complete dissolution of the bacterial cell.

One of the objects of the present work was to determine by quantitative methods, the extent to which tubercle bacilli undergo digestion by pancreatic enzymes acting together. In all the experiments, human and bovine strains grown on Long's synthetic agar medium were used. The nearly dry masses of bacilli were easily lifted off the agar, weighed and mixed at once with commercial pancreatic enzyme preparations.

Digestible Carbohydrate. Series of June, 1928-May, 1929. Suspensions of tubercle bacilli in chloroform Ringer solution were incubated with and without the addition of pancreatic enzyme powder. In most of the experiments sufficient chloroform and toluol was added to promptly kill the bacilli. At convenient intervals of a few

¹ Loeffler, F., *Deutsche Med. Wochenschr.*, 1913, **39**, 1025.

² Robinovitch, L. G., *Endocrinology*, 1926, **10**, 602.

³ Day, A. A., and Gibbs, W. M., *J. Infect. Dis.*, 1930, **46**, 26.

days, reducing sugar was determined in the filtrates by adaptations of Folin's⁴ methods. In 30 experiments the added enzyme preparations caused an increase in reducing sugars followed by their gradual disappearance. An occasional failure to digest occurred. Calculated as dextrose, the digestible carbohydrate in 1 gm. tubercle bacilli varied up to 3 mg., depending upon the digestion period and other factors.

Digestible Fat. Series of May, 1930-June, 1931. Acid liberated from 1 gm. portions of tubercle bacilli by autolytic and by pancreatic enzymes was titrated with N/20 sodium hydroxide, with phenol red indicator. The rapid acid liberation during the first week slowed down in a month, almost to a standstill. A gram of tubercle bacilli undergoing autolysis for one month in the presence of excess of chloroform and toluol, liberated, on the average, 3.8 cc. N/20 acid. The corresponding figure is 6.5 cc., when 50 mg. of pancreatic enzyme had been added. Part of the acid liberated probably was due to protein digestion.⁵ To calculate the weight of fat digested is difficult in the absence of figures for molecular weights of true glycerides in tubercle bacillus. If the above figure, 6.5 cc. N/20 acid is calculated as oleic acid, which involves many assumptions, the result indicates that all or nearly all of the fat was digested.

Physical Changes. In tubes containing the added pancreatic enzymes the bacilli seemed to swell to 2 or sometimes 3 times their original volume. When hand centrifuged for 5 minutes the flocculent bacillary masses were sedimented to their original volume. The bacilli became buttery, and sampling the mixture was impossible. In control tubes the bacilli remained the same in gross appearance although autolysis was going on. Such mixtures could be sampled.

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Aciduric Organisms in Dental Caries.*

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With the recent interest in dietary factors in dental decay the rôle

⁴ Folin, O., *J. Biol. Chem.*, 1926, **70**, 410.

⁵ Sherman, H. C., and Neun, D. E., *J. Am. Chem. Soc.*, 1916, **38**, 2210.

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