present only 2 vibrios, the dissociant Rangoon Rough (2) and Basrah II.

Group VI (Protein I and Specific Carbohydrate III). Of this combination no examples have as yet been found, but their existence among dissociants of the other groups is not improbable.

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Pantothenic Acid Content of Animal Tissues.

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Evidence has been presented[1] for the existence in all types of living tissue of a substance which has been named "pantothenic acid". A quantitative biological test based upon yeast growth which is specific for this substance has been developed.

While marked progress has been made in this laboratory in concentrating and purifying the acid it is unlikely that any chemical method for its determination can be devised for some time to come. In order to learn something of its functions, however, it seemed desirable to obtain approximate information as to the content of various animal tissues.

Each of the tissues indicated below was thoroughly ground and extracted with a large volume of hot water, usually 100 times its weight. The pantothenic acid which is not "bound" in the tissues is thus extracted, and that which in some cases, at least, is "bound" is not determined. The numerical values are based upon the pantothenic acid extracted from a unit weight of moist tissue, in comparison with that in a unit weight of an arbitrary standard preparation. This "standard" was prepared by extracting rice bran with 60% methanol and evaporating to dryness. Our most potent concentrate is approximately 8,000 times as effective on a weight basis as this standard.

Duplicate or triplicate determinations were made in every case. These usually agreed within about 10%. In order to save space, only averages are given: Skeletal muscle dog No. 1, 0.032, dog No. 2, 0.037, rat, fresh, 0.034, rat autolyzed at 37°, 0.147; smooth

[1] Williams, R. J., Lyman, C. M., Goodyear, G. H., Truesdail, J. H., and Holaday, D., *J. Am. Chem. Soc.*, 1933, **55**, 2912.

muscle, dog, 0.033; heart muscle, dog No. 1, 0.032, dog No. 2, 0.020, sheep 0.053; skin, dog, 0.007; blood vessel, dog, 0.0012; duodenum, dog, 0.020 stomach, antrum, dog, 0.008 fundus, dog, 0.008; lymph gland, dog, 0.011; blood, dog, 0.0021; human, 0.005; spleen, dog, 0.01, ovary, dog, 0.004, testis, dog 0.014, cockerel, 0.09; liver, dog No. 1, not taken at once, 0.153 dog No. 2 (placed in methanol immediately), 0.008, sheep (few hours after butchering), 0.09, same allowed to autolyze at 37°, 0.30, rat taken immediately, 0.036, same in ice box 3 days, 0.20, same autolyzed at 37°, 0.45; human (autopsy), 0.07, cancerous portion, 0.0045, cockerel, not taken at once, 0.19; adrenal, dog, 0.046, beef, 0.058, cortex, beef, 0.063; kidney, dog, 0.036, lung, dog, 0.007; pituitary, whole, dog, 0.027, post. beef, 0.026, ant. beef, 0.025; brain, whole, dog No. 1, 0.081, rat, taken immediately, 0.036, same in ice box 3 days 0.062, sheep, few hours after butchering, 0.054, grey matter, dog No. 2, 0.08, white matter, 0.067; umbilical cord, human, 0.005; thyroid, dog No. 1, 0.013, dog No. 2, 0.008; pancreas dog No. 1, 0.040, dog No. 2, 0.027; fatty tissue, dog, 0.0014.

The following conclusions may be drawn: The acid is present in determinable amounts in all animal tissues. Where tissues from several animals have been examined there are roughly parallel values for these tissues. The richest tissue is liver. If taken very fresh, however, the liver has a relatively low value which may increase by more than 12 times by autolysis. This indicated that the acid is stored in the liver in a non-extractable form. Some storage is likewise indicated in muscles.

It appears that pantothenic acid is not peculiarly concerned in the fabrication of any specialized hormone but is a common constituent of all types of cells. Experimental work to be published elsewhere is in line with the conclusion that this substance is a *sine qua non* of respiration in general and that the universal presence is explained on this basis.