bromide were obtained, showing the presence of xylose as one of the products of hydrolysis of the substance isolated from the soil. Tests made for the presence of other pentose sugars gave negative results.

The quantitative method of determining pentosan depends as has been noted on the formation of a pentose from the pentosan and the formation of furfural from the sugar on further heating with acid. In the cell wall material which makes up such a large portion of the organic matter of plants no doubt there is a pentosan compound present, either as such, or as part of the complicated molecule of lignocellulose, for a crude pentosan can be prepared from such material. In the case of the Marshall loam such a crude pentosan was obtained and was probably present as such in the soil as a plant residue. In the case of soil organic matter in general, however, it cannot be assumed that the formation of a pentose sugar and from it furfural, necessarily indicates the presence of a pentosan as such. Pentose sugars are part of the complicated molecule of nucleoproteins and phosphatides and are split off from these on heating with acids. The nucleoproteins are characteristic of tissues in which nucleated cells are abundant and those of animal origin have been especially studied. The investigation of those of plant origin is not so thorough, but there is every evidence that the parts of plants rich in cells are also rich in nucleoproteins and this compound and its decomposition products must contribute to the organic matter of the soil.

With this in mind it is evident that a determination of pentosan in soil by the method in general use is simply the determination of the furfural that may arise from a pentosan, a pentose, or a pentose-yielding material other than a pentosan.

In the light of our present knowledge of pentosans and pentose-yielding material, their presence in a soil must be regarded either as a plant residue, such as a portion of the lignocellulose, which has resisted decomposition, or as products of decomposition of complicated compounds such as nucleoproteins.

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[FROM THE LABORATORY OF PHYSIOLOGICAL CHEMISTRY OF THE DEPARTMENT OF ANIMAL HUSBANDRY OF THE UNIVERSITY OF ILLINOIS.]

ON THE PRESERVATION OF FECES.

BY PAUL E. HOWE. T. A. RUTHERFORD AND P. B. HAWK.

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Fresh feces lose nitrogen when subjected to a drying process, even when such process is carried out under the most carefully controlled conditions. Of late years this fact has come to be generally recognized and consequently various schemes have been adopted in the attempt to determin the amount of this lost nitrogen in order that a correcting factor might

be applied. None of these forms of manipulation, so far as we are aware, has proved entirely satisfactory. As a result of a series of tests Zaitschek[1] concluded that the loss of nitrogen in drying feces was greater for the feces of carnivora than for those of the herbivora. He further found that drying feces with added acid did not always wholly prevent a loss of nitrogen and that entirely accurate results could only be obtained by determining the nitrogen content in several samples of fresh feces. The extent of the nitrogen loss, according to this investigator, depends on the quantity of non-protein nitrogen present, as well as upon the moisture content of the feces.

In our experiments the feces were collected in the ordinary friction-top paint pail which had previously been rinsed with a 10 per cent. alcoholic solution of thymol and subsequently dried. During the preservation period these pails were kept in a refrigerating room. The feces were analyzed for nitrogen and moisture. In some of the tests, the data from which are given below in tabular form, the stools were analyzed immediately after defecation and at short intervals thereafter. In other tests the stools were collected from a subject through a period of eight days and this carefully mixed eight-day sample was then subjected to analysis, the initial analysis being followed by others at long intervals. In some instances the tests covered a period of two hundred and forty-eight days after the dropping of the stool.

In Table I we have data from two samples collected from two different individuals living on similar diets, the feces being collected through an eight-day period as just indicated. An examination of the data from stool No. 1 shows that there was practically no change in the nitrogen value of the sample even after 158 days in the refrigerating room. From this time to the end of the experimental period of 248 days there was a slight lowering of the nitrogen content. In the case of the moisture content of this stool the data indicate that there was practically no change in the moisture value for a period of twenty-one days. On the one hundred and fifty-eighth day the moisture had increased about 3 per cent. Unfortunately no analyses were made during the period intervening from the 21st to the 158th day. Stool No. 2 analyzed at the same intervals as stool No. 1 yielded similar data.

Data from the analyses of three individual stools dropped by three men living on different diets are given in Table II. The initial analysis was in each instance made seven hours after the stool was passed, this first analysis being followed by other analyses at intervals of 2, 4 and 8 days. In one instance (stool No. 4) the final analysis was made on the 83rd day. Each stool yielded a very uniform series of values for both

[1] *Arch. ges. Physiol.*, 98, 595 (1903).

nitrogen and moisture throughout the experimental period of eight days. At the 83rd day stool No. 4 was found to have gained moisture (5–6 per cent.) and to possess a lower nitrogen content. In Table III are given data from 3 other individual stools which were collected under similar conditions as those mentioned in Table II and dropped by the same individuals. The procedure in the case of the stools differed from that adopted in the case of the stools mentioned above in that the first analysis was made upon the fresh stool. The stools were passed, immediately mixed, sampled and portions weighed out for analysis. The analysis of the fresh feces was followed by the further examination of the stool at intervals of 2, 5 and 7 days. An examination of the table will show a most satisfactory uniformity in the values obtained from the different analyses.

Data from composit stools are again given in the Table IV. This table includes data from 6 composit stools analyzed at intervals of 8, 43 and 92 days. These samples were from 6 different men living upon a similar diet, the individuals being different from those previously mentioned. At the end of the forty-third day the nitrogen and moisture values (with the exception of those of stool No. 10) were found to be rather uniform with those obtained at the initial analysis.

Conclusions.

I. The method of feces collection and preservation which involves the use of friction-top pails is very satisfactory for the following reasons:

1. It permits of the analysis of the *fresh* feces.

2. It prevents loss of moisture.

3. It maintains the nitrogen content practically unaltered for at least *twenty days* and frequently for a much longer period.

4. It eliminates all loss of material since the feces are not transferred to any other receptacle before they are thoroughly mixed for analysis.

II. It is preferable to make the analysis on the *fresh* feces, since this procedure does away with all drying processes and hence eliminates the loss of nitrogen which invariably accompanies such drying.

TABLE I.—COMPOSIT STOOLS.

	8 days.	16 days.	19 days.	21 days.	158 days.	248 days.
	Stool No. 1.					
Nitrogen (moisture-free), per cent.....	2.396	2.374	2.403	2.362	2.340	2.269
Moisture, per cent.....	70.40	70.87	70.11	70.60	73.47	74.03
	Stool No. 2.					
Nitrogen (moisture-free), per cent.....	1.954	2.036	2.049	2.033	1.892	1.823
Moisture, per cent.....	76.87	76.19	76.64	76.64	79.86	80.58

TABLE II.—INDIVIDUAL STOOLS.

	7 hours.	2 days.	4 days.	8 days.	83 days.
		Stool No. 3.			
Nitrogen (moisture-free), per cent	2.179	2.275		2.263	
Moisture, per cent	75.36	75.24		74.66	
		Stool No. 4.			
Nitrogen (moisture-free), per cent	2.312	2.387	2.343		1.641
Moisture, per cent	73.28	73.14	73.44		79.18
		Stool No. 5.			
Nitrogen (moisture-free), per cent	1.582	1.597	1.622	1.618	
Moisture, per cent	74.85	74.62	74.40	74.93	

TABLE III.—INDIVIDUAL STOOLS.

	Fresh.	2 days.	5 days.	7 days.
		Stool No. 6.		
Nitrogen (moisture-free), per cent		1.854	1.816	1.843
Moisture, per cent	77.62	76.61	77.26	76.44
		Stool No. 7.		
Nitrogen (moisture-free), per cent	1.491	1.471	1.470	1.473
Moisture, per cent	80.06	80.48	80.16	80.18
		Stool N. 8.		
Nitrogen (moisture-free), per cent	1.319	1.347	1.295	1.335
Moisture, per cent	76.49	76.16	76.04	75.95

TABLE IV.—COMPOSIT STOOLS.

	Per cent. nitrogen (moisture-free basis).		
Stool No.	8 days.	43 days.	92 days.
9	1.913	1.901	1.788
10	1.863	1.740	1.848
11	2.179	2.270	...
12	2.127	2.194	2.068
13	1.730	1.736	1.663
14	1.629	1.631	1.743

[FROM THE LABORATORIES OF PHYSIOLOGICAL CHEMISTRY OF THE UNIVERSITY OF ILLINOIS AND THE UNIVERSITY OF PENNSYLVANIA.]

STUDIES ON WATER DRINKING.[1] III. ON THE URIC ACID ELIMINATION FOLLOWING COPIOUS WATER DRINKING BETWEEN MEALS.

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The present paper embraces a report of two metabolism studies made

[1] For I and II of this series of studies see Hawk, *University of Penn. Med. Bull.*, 18, 7 (1905); and Fowler and Hawk, *J. Exp. Med.*, 12, 388 (1910), respectively.