THE TREATMENT OF SEWAGE

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649724833

The Treatment of Sewage by Dr. C. Meymott Tidy

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

www.triestepublishing.com

DR. C. MEYMOTT TIDY

THE TREATMENT OF SEWAGE

Trieste

THE

TREATMENT

OF

SEWAGE.

BY

Dr. C. MEYMOTT TIDY.

[*Abridged from the "Journal of the Society of Arts."*

NEW YORK:
D. VAN NOSTRAND, PUBLISHER,
23 MURRAY AND 27 WARREN STREETS.
1887.

THE

TREATMENT OF SEWAGE.

Liquid Excreta.

Every adult male person voids on an average 60 ozs. (= three pints) of urine daily. The 60 ozs. contains an average of 2.53 ozs. of dry solid matter, consisting of—

Urea	512.4	grains.
Extractives (pigment, mucus, uric acid)	169.5	"
Salts (chiefly chlorides of sodium and potassium)	425.0	"
	1106.9	"
	=2.53	ozs.

The urine, therefore, of a population of 10,000 adults may be taken as 600,000 fluid ozs., or 3,750 gallons per day.

Urine rapidly decomposes, the urea becoming the volatile body carbonate of ammonia, and the urine thereby losing a valuable manurial constituent. After a

time, but at a later stage, certain foul smelling gaseous products of decomposition are evolved. To collect and preserve urine, therefore, presents practical difficulties. The ammonia from stale urine was formerly distilled and converted into a sulphate, at Courbeville, near Paris.

Solid Excreta.

Every adult male person voids about 1,750 grains (or 4 ozs.) of fæces daily, of which 75 per cent. is moisture. The dry fæcal matter passed daily is therefore about 1 oz. per adult head of the population. Of this *dry* fæcal matter, about 88 per cent. is organic matter (of which 6 parts are nitrogen) and 12 per cent. inorganic, of which 4 parts are phosphoric acid. Of this dry fæcal matter 11 per cent. is soluble in water.

Taking a population of 10,000 adults, it follows that the moist fæcal matter passed daily is equal to 2,500 lbs. (= 1 ton, 2 cwt., 8 lbs.) or 1.116 ton, whilst the dry fæcal matter is equal to 625 lbs. (5 cwt., 2 qrs., 9 lbs.).

The facts, therefore, respecting the excreta of a population of 10,000 adults may be thus tabulated:

TABLE I.—FÆCAL MATTER PASSED PER 10,000 OF ADULT POPULATION PER DIEM.

	Pounds.
Moist fæcal matter excreted.....	2,500
Dry " " " (calculating 75 per cent. as moisture).....	625
Soluble in water=68.55 lbs..... Insoluble in water=556.45 lbs....)	= 625

TABLE II.—URINE AND FÆCES PASSED PER DAY BY 10,000 ADULTS.

	Total solids.	Water.	Solids dry.	Solids soluble.	Solids insoluble.
	Moist lbs.	Gallons.	lbs.	lbs.	lbs.
Fæces	2500	187.5	625.0	68.55	556.45
Urine.	—	3750.0	1581.21	1581.21	—
		3937.5	2206.21	1649.76	556.45

The following table has been adapted from Letheby. The quantities given are somewhat below the normal. The facts

Constituents.	Weight in ounces avoirdupois of chief constituents of urine and feces passed by children and adults in 24 hours.					Weight in lbs. of urine and feces contributed by a mixed population of 10,000 persons (1,644 boys, 3,020 men, 1,662 girls, 3,674 women) in 24 hours.				
	Males.		Females.		Average all ages.	Males.		Females.		Total at all ages.
	Boys.	Men.	Girls	Wom.		Boys.	Men.	Gir s.	Wom.	
Urine.	oz.	oz.	oz.	oz.		lbs.	lbs.	lbs.	lbs.	lbs.
Fresh urine	19.875	48.490	16.881	42.157	[illegible]	2078.2	9152.5	1753.6	9680.7	22859.6
Dry constituents	0.969	2.197	0.750	1.584	[illegible]	99.6	414.7	77.9	364.6	966.8
(a.) *Organic matter*	0.677	1.720	0.574	1.216	[illegible]	69.5	324.6	59.6	279.2	732.9
Containing nitrogen	0.166	0.481	0.161	0.320	[illegible]	17.1	90.8	16.7	74.9	199.5
(b.) *Mineral matter*	0.292	0.477	0.176	0.372	[illegible]	30 0	90.0	18.3	85.3	223.9
Containing phosphoric acid	0.085	0.069	0.024	0.049	[illegible]	8.6	13.0	2.5	10.6	29.7
" potash	0.040	0.078	0.027	0.055	[illegible]	4.1	14.7	.8	12.7	34.3
Feces.										
Fresh feces	3.421	5.340	1.061	1.414	2.784	351.5	969.9	110.2	324.7	1775.5
Dry constituents	0.879	1.112	0.282	0.376	0.662	90.3	209.9	29.3	86.3	415.8
(a.) *Organic matter*	0.762	0.939	0.244	0.325	0.567	78.3	177.2	25.3	74.6	355.4
Containing nitrogen	0.049	0.062	0.016	0.022	0.037	5.0	11.7	1.6	5.0	23.2
(b.) *Mineral matter*	0.117	0.173	0.038	0.051	0.095	12.0	32.6	3.9	11.7	60.2
Containing phosphoric acid	0.039	0.062	0.018	0.018	0.033	4.0	11.7	1.8	4.1	21.1
" potash	0.014	0.023	0.004	0.006	0.012	1.4	4.3	0.4	1.4	7.5

were collected from a number of sources, the ratio of children to adults being that adopted by Röderer and Eichhorn.

My own experiments would lead me to give one pint as an average quantity of urine passed by children daily up to the age of ten years, the quantity gradually increasing up to three pints in the adult. The solid constituents of the urine which, at the age of ten, are on an average 0.8 oz. daily, increase, according to my observation, up to 2.5 ozs. in the adult. The quantity passed by girls and women is rather less than that passed by boys and men.

The fæces passed by girls and women are considerably less than that passed by boys and men. The calculations in the table state the amount as less than one-third. My own observations, however, scarcely support these numbers. It would, I think, be more accurate to regard the fæcal matters passed by female children and adults as about one-half that passed by male children and adults.

VALUE OF NIGHT SOIL (HUMAN EXCRETA).

Urine, in its natural condition, has a theoretical value of between 15s. and 16s. per ton. The dry solid matters of the urine have a theoretical value of about £18 16s. per ton.

The quantity of ammonia per year voided by the average individual in the urine has been stated as from 10 lbs. to 11.32 lbs., having a value on the lower quantity of 6s. 8d., and on the higher of 7s. 3d.

Fæcal matter, in its moist and natural condition, has a theoretical value of £1 7s. 6d. per ton. The dry solid matters of fæces have a theoretical value of £5 17s. 7d. per ton.

The quantity of ammonia voided per year in the fæces, by an average individual, is estimated at 1.64 lbs., having a value of about 1s. 3d.

The estimates given above are based on the agricultural values of the nitrogen calculated as ammonia, together with the phosphoric acid and potassium salts, these being materials of sparing occurrence in