XXII. *An Account of a new and cheap Method of preparing Pot-aſh, with Obſervations.* *By* Thomas Percival, *M. D. F. R. and A. S. Member of the Royal Society of Phyſicians at* Paris, *&c.*

Read April 6, 1780.

THE agriculture ſociety at Mancheſter has long recommended the making of reſervoirs for the water which flows from dung-hills in farm yards. This water is ſtrongly impregnated with the ſalts and putrid matter of the dung-hill, and by ſtagnation it acquires a much higher degree of putreſcence, and probably becomes proportionably more replete with ſalts. When thus collected and improved, it is pumped into an hogſhead, which being drawn upon a ſledge, or ſmall cart, is conveyed into the meadows, for the purpoſe of ſprinkling them with this rich manure. This important improvement in rural oeconomy, I apprehend, has not been extended much beyond the diſtrict of our ſociety; and it ſeems to be unknown to one of the lateſt and moſt intelligent writers on huſbandry: for Lord KAIMS, in a recent

cent work on this ſubject, of which he has favoured me with a copy, has not even mentioned it.

But theſe reſervoirs may be applied to a purpoſe ſtill more ſubſervient to public utility than that above deſcribed. JOSIAH BIRCH, Eſq. a gentleman who carries on an extenſive manufactory, and bleaches his own yarn, about ſix months ago, was induced, by a happy turn of thought, to try whether the dung-hill water might not be converted into pot-aſhes. He accordingly evaporated a large quantity of it, and burnt the *reſiduum* in an oven; the product of which ſo perfectly anſwered his expectations, that he has ever ſince continued to prepare theſe aſhes, and to employ them in the operations of bucking. A ſtranger to that narrowneſs of ſpirit which ſeeks the concealment of a lucrative diſcovery, he is deſirous that it ſhould be communicated to the Royal Society, and has furniſhed me with the following account, together with the plan annexed.

" The quantity of muck water uſed was twenty-four " wine pipes full, which employed a man and two " horſes two days, to cart it from the pump to the pan " wherein it was boiled; but this expence I ſhall now " ſave, as I ſhall lay a ſough of brick, which will convey " it from the pump to the boiler. The coals uſed to " boil and burn it were one hundred and twenty baſkets,

" and I ſuppoſe each baſket weighs ſix ſcore pounds or " upwards. One man was occupied three weeks in boil- " ing and burning. The quantity of aſhes made was " 9 cwt. 1 qr. 12 lbs. well worth, at the preſent price of " aſhes here, two guineas *per* hundred.

		L.	s.	d.
" 9 cwt. 1 q. 12 lb. at 42 s. *per* cwt.		19	13	0
" A man and two horſes, two days, at 6 *s.* *per* day, -	0 12 0			
" 120 baſkets of coals, at 5 d. *per* baſket, - -	2 10 0			
" A man's wages for three weeks,	1 7 0			
		4	9	0
		15	4	0

" The profit, therefore, amounts to 15 l. 4 s. deduct- " ing only a trifle for the wear of the pan and oven."

The profits ariſing from this preparation of pot-aſh are ſufficiently evinced by the foregoing eſtimate; and they may, perhaps, admit of increaſe by future improvements. In the ſpring and ſummer ſeaſons, I ſhould apprehend, the evaporation might be carried on without the aid of fire, by conveying the dung-hill water from the reſervoir through proper ſluices into ſhallow troughs or ponds, of ſuch extent as to afford a ſufficient

ſurface for the action of the ſun and wind[a]. Theſe might be covered in rainy weather with awnings of canvas, painted on the outſide black, and white on the inſide; the former with a view to abſorb, the latter to reflect, the rays of light.

(a) The following abridged view of a meteorological regiſter, which I kept with great exactneſs during the years 1774 and 1775, may throw ſome light on the practicability of this plan in the climate of Lancaſhire, which, I believe, is nearly the ſame as that of moſt of the other Weſtern counties of England.

1774	Thermometer		Days	
	2 o'clock.	P.M.	Rainy	Fair.
	°	°		
Jan. Feb. March,	56	28	25	65
April, May, June,	72	45	55	36
July, Auguſt, Sept.	75	53	66	26
Oct. Nov. Dec.	60	30	43	49
1775				
Jan. Feb. March,	54	30	61	29
April, May, June,	78	51	42	49
July, Auguſt, Sept.	74	48	62	30
Oct. Nov. Dec.	64	32	50*	28*

* Fourteen days omitted, no account being taken.

The thermometer, uſed in making the preceding obſervations, was graduated according to the ſcale of FAHRENHEIT. It was placed in the open air, and in a Northern expoſure. The column of rainy days expreſſes the leaſt as well as the greateſt quantity of rain. The column of fair days includes only thoſe days in which not a ſingle ſhower was noticed. The day comprehends twenty-four hours.

The mean quantity of rain which annually falls here is about 33 inches.

This

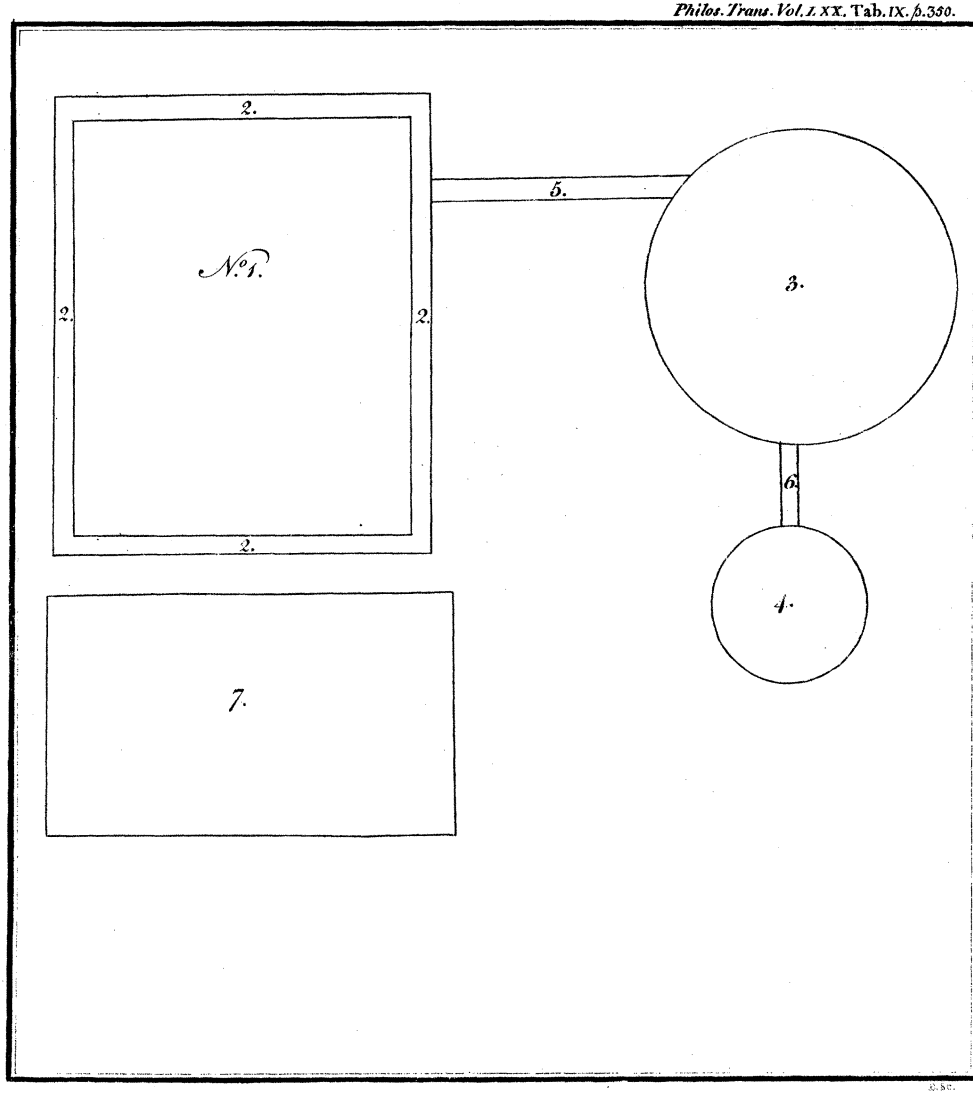
This pot-aſh is of a greyiſh white appearance, deliqueſces a little in moiſt air; but if kept in a dry room, near the fire, acquires a powdery ſurface. It is hard, and of a ſpongy texture when broken, with many ſmall cryſtals in its ſubſtance. The colour of its internal parts is duſky and variegated. To the taſte it is acrid, ſaline, and ſulphureous. It emits no ſmell of volatile alkali, either in a ſolid form, diſſolved, or when added to lime-water; neither does it communicate the ſapphire colour to a ſolution of blue vitriol. Silver is quickly tinged black by it, a proof that it contains much phlogiſton. Ten grains of this pot-aſh required eleven drops of the weak ſpirit of vitriol to ſaturate them. The like quantity of ſalt of tartar required, of the ſame acid, twenty-four drops: a ſtrong effervеſcence occurred in both mixtures; from the former a ſulphureous vapour was exhaled. A tea ſpoonful of the ſyrup of violets, diluted with an ounce of water, was changed into a bright green colour by five grains of the ſalt of tartar; but ten grains of this pot-aſh were neceſſary to produce the ſame hue, in a ſimilar mixture. Half an ounce of the pot-aſh diſſolved intirely in half a pint of hot water; but when the liquor was cold, a large purple ſediment ſubſided to the bottom: and it was found, that this ſediment amounted to about two-thirds of the whole quantity of aſhes uſed.

I have not leiſure, at preſent, to proſecute theſe expements farther, and ſhall therefore content myſelf with making a few general obſervations on the facts that have been advanced.

1. This pot-aſh is a true fixed vegetable alkali, and a product of putrefaction which has not, that I recollect, been noticed by the chymiſts. A very celebrated writer has even in expreſs terms aſſerted, that "all vegetables, "not excepting thoſe which in their natural ſtate fur- "niſh aſhes containing much fixed alkali, when burnt, "after their acid has been altered by a complete putre- "faction, leave aſhes intirely free from alkali [b].

2. The quantity of alkali contained in this pot-aſh may, with ſome probability, be eſtimated at one-third of its weight; whereas the white Muſcovy aſhes are ſaid to yield only one-eigth part [c]. Of its impurities ſulphur is the moſt injurious to its bleaching powers, and ſhould in the preparation of it be carefully ſeparated. A longer continued and more gentle calcination in a furnace ſupplied with a ſufficient current of air might, perhaps, anſwer this end. But the moſt effectual method would be to lixiviate the ſalts with pure water, after a moderate fuſion, and then to evaporate them ſlowly to dryneſs.

(b) MACQUER's Dictionary of Chemiſtry, article Alkali.
(c) HOME on Bleaching, p. 157.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It muſt, however, be remarked, that in thus freeing the pot-aſh from phlogiſtic matter, another impurity is generated: for both the action of fire, and the ſolution in water, convert into earth a portion of the alkaline ſalt.

3. No quick-lime appears to be contained in this pot-aſh: for a ſolution of it, poured from its ſediment, remained clear, though long expoſed to the air. Nor did it acquire any milkineſs by being blown into from the lungs; but perhaps the addition of this cauſtic ſubſtance would increaſe its activity and value, when employed in ſoap-boiling and other arts: for the Ruſſian pot-aſh is more pungent to the taſte, ſaturates a larger proportion of acid, and diſſolves oils more powerfully than the pure alkaline ſalts. And Dr. HOME has proved [d], that theſe qualities depend on a large admixture of quick-lime.

4. It would be worthy of trial, to aſcertain whether the large purple ſediment, which ſubſides when this pot-aſh is lixiviated, might not be applied to the manufacture of Pruſſian blue; or uſed in the manner recommended by Mr. MACQUER for dying wool and ſilk. See the Memoirs of the French Academy for the year 1749 [e].

5. The farmer, though he live at a diſtance from the manufactures in which pot-aſh is employed, may yet

(d) Eſſay on Bleaching. NEUMANN's Chemiſtry, by LEWIS.
(e) See alſo NEUMAN's Chemiſtry, by LEWIS, p. 73.

find

find his account in preparing it from dung-hill water: for it will furniſh him with a top dreſſing for his garden and land, of great fertilizing powers. But if fuel be dear where he reſides, and conveniences for combuſtion be wanting, the ſimple evaporation of the water may ſuffice, and the putrid lye, thus reduced to a ſolid form, will prove to be a rich manure. At Hart Hill, my ſummer abode, about three miles from Mancheſter, I have lately practiſed a method of making a compoſt of the dung-hill water. The weeds and rakings of the garden, the dreſſings of the fields, the leaves blown from the trees, and other refuſe matters, are put together near the reſervoir, out of which the water is occaſioally pumped and ſcattered over the heap: ſo ſtrong a ferment almoſt inſtantly excites putrefaction. And theſe vegetable ſubſtances are ſoon converted into a fertile mould, which retaining the ſalts and oils of the dung-hill water, ſuffers the ſuperfluous moiſture to exhale into the air, or to percolate through it. And I have found, by experience, that the compoſt thus prepared is laid on the meadows at leſs expence, and that it is more efficacious and durable in its operation than the ſprinklings, which, at ſtated times, they formerly received: for my land, though good and in fine condition, is light and

ſandy, and the dung-hill water quickly paſſed below the roots of the vegetables which grow upon its ſurface.

Mancheſter, March 3, 1780.

EXPLANATION OF THE FIGURE.

1. The dung-hill.

2. A ſough or drain round the dung-hill.

3. A reſervoir for the dung-hill water.

4. A well, communicating with the reſervoir, in which a pump is fixed, to convey it to N° 7.

7. A pan in which the water is boiled to the conſiſtence of treacle, and afterwards burnt in an oven. The pan is made of iron plates, turned up a little at the edges. To theſe are ſcrewed planks of wood, to make it about twenty inches deep.