If my ſtay here had been longer, I had continued my obſervations; and perhaps ſhould have made ſome diſcoveries. It belongs to the academicians of Bourdeaux to puſh theſe obſervations further, if they think proper.

From the Entrance of the river of Bourdeaux, the 4th of Auguſt, 1756.

Peyſſonel.

LXXXVII. *An Account of the diſtilling Water freſh from Sea-water by Wood-aſhes. By Capt.* William Chapman: *In a Letter to* John Fothergill, *M. D.*

Whitby, 10th 2d mo. Feb. 1758.

Read April 13. 1758.

THY kind acceptance of my laſt emboldens me to inform thee, how, on my return from a voyage to the north part of Ruſſia, I procured a ſufficient quantity of freſh water from ſea-water, without taking with me either inſtruments or ingredients expreſsly for the purpoſe.

Some time in September laſt, when I had been ten days at ſea, by an accident (off the north cape of Finland) we loſt the greateſt part of our water. We had a hard gale of wind at ſouth-weſt, which continued three weeks, and drove us into 73° lat. During this time I was very uneaſy, as knowing, if our paſſage ſhould hold out long, we muſt be reduced to great ſtraits; for we had no rains, but frequent fogs, which yielded water in very ſmall quantities. I now

blamed myſelf for not having a ſtill along with me (as I had often thought no ſhip ſhould be without one). But it was now too late; and there was a neceſſity to contrive ſome means for our preſervation.

I was not a ſtranger to Appleby's method: I had alſo a pamphlet wrote by Dr. Butler, intituled, *An eaſy Method of procuring of freſh Water at Sea.* And I imagined, that ſoap might ſupply the place of capital lees, mentioned by him. I now ſet myſelf at work, to contrive a ſtill; and ordered an old pitch-pot, that held about ten quarts, to be made clean: my carpenter, by my direction, fitted to it a cover of fir deal, about two inches thick, very cloſe; ſo that it was eaſily made tight by luting it with paſte. We had a hole thro' the cover, in which was fixed a wooden pipe nearly perpendicular. This I call the ſtill-head: it was bored with an augre of 1 ½ inch diameter, to within three inches of the top or extremity, where it was left ſolid. We made a hole in this, towards the upper part of its cavity (with a proper angle) to receive a long wooden pipe, which we fixed therein, to deſcend to the tub in which the worm ſhould be placed. Here again I was at a loſs; for we had no lead pipe, nor any ſheet-lead, on board. I thought, if I could contrive a ſtrait pipe to go thro' a large caſk of cold water, it might anſwer the end of a worm. We then cut a pewter diſh, and made a pipe two feet long; and at three or four trials (for we did not let a little diſcourage us) we made it quite tight. We bored a hole thro' a caſk, with a proper deſcent, in which we fixed the pewter pipe, and made both holes in the caſk tight, and filled it with ſea-water: the pipe ſtuck without the caſk

caſk three inches on each ſide. Having now got my apparatus in readineſs, I put ſeven quarts of ſea-water, and an ounce of ſoap, into my pot, and ſet it on the fire. The cover was kept from riſing by a prop of wood to the bow. We fixed on the head, and into it the long wooden pipe above-mentioned, which was wide enough to receive the end of the pewter one into its cavity. We eaſily made the joint tight.

I need not tell thee with what anxiety I waited for ſucceſs: but I was ſoon relieved; for, as ſoon as the pot boiled, the water began to run; and in twenty-eight minutes I got a quart of freſh water. I tried it with an hydrometer I had on board, and found it as light as river-water; but it had a rank oily taſte, which I imagine was given it by the ſoap. This taſte diminiſhed conſiderably in two or three days, but not ſo much as to make it quite palateable. Our ſheep and fowls drank this water very greedily without any ill effects. We conſtantly kept our ſtill at work, and got a gallon of water every two hours; which, if there had been a neceſſity to drink it, would have been ſufficient for our ſhip's crew.

I now thought of trying to get water more palateable; and often peruſed the pamphlet above-mentioned, eſpecially the quotation from Sir R. Hawkins's voyage, who "with four billets diſtilled a hogſhead "of water wholſome and nouriſhing." I concluded he had delivered this account under a veil, leſt his method ſhould be diſcovered: for it is plain, that by four billets he could not mean the fuel, as they would ſcarce *warm* a hogſhead of water. When, ruminating on this, it came into my head, that he burnt

burnt his four billets to aſhes, and with the mixture of thoſe aſhes with ſea-water he diſtilled a hogſhead of freſh water wholſome and nouriſhing. Pleaſed with this diſcovery, I cut a billet ſmall, and burnt it to aſhes; and after cleaning my pot, I put into it a ſpoonful of thoſe aſhes, with the uſual quantity of ſea-water. The reſult anſwered my expectations: the water came off bright and tranſparent, with an agreeable pungent taſte, which at firſt I thought was occaſioned by the aſhes, but afterwards was convinced it received it from the reſin or turpentine in the pot, or pipes annexed to it. I was now relieved from my fears of being diſtreſſed thro' want of water; yet thought it neceſſary to adviſe my people not to be too free in the uſe of this, whilſt we had any of our old ſtock remaining; and told them, I would make the experiment firſt myſelf; which I did, by drinking a few glaſſes every day without any ill effect whatever. This water was equally light with the other, and lathered very well with ſoap. We had expended our old ſtock of water before we reached England; but had reſerved a good quantity of that which we diſtilled. After my arrival at Shields, I invited ſeveral of my acquaintance on board to taſte the water: they drank ſeveral glaſſes, and thought it nothing inferior to ſpring-water. I made them a bowl of punch of it, which was highly commended.

I have not the convenience of a ſtill here, or ſhould have repeated the experiment for the conviction of ſome of my friends: for as to myſelf, I am firmly perſuaded, that wood-aſhes mixed with ſea-water will yield, when diſtilled, as good freſh water as can be wiſhed for. And I think, if every ſhip bound a long

long voyage was to take a ſmall ſtill with Dr. Hales's improvements, they need never want freſh water. Wood-aſhes may eaſily be made, whilſt there is any wood in the ſhip; and the extraordinary expence of fuel will be trifling, if they contrive ſo that the ſtill may ſtand on the fire along with the ſhip's boiler.

I ſhall think myſelf ſufficiently recompenſed, if any hints here may tend to the relief of my brother ſailors from the diſmal extremity of want of water; an extremity too little regarded by thoſe, who have never experienced it.

P. S. During my paſſage from Ruſſia we very rarely had any *aurora borealis*; and thoſe few we ſaw were faint, and of ſhort continuance: at which I was much ſurpriſed; for about ten years ago, being in a high north latitude, we had very beautiful ones almoſt every night in the month of September; which exceeded any I have ſeen deſcribed in the *Philoſophical Tranſactions*, or *Memoires de l'Academie Royale.*

Wm. Chapman.