thoſe bilious colics that ſo frequently affect our mari­ners.

*Preſervation of SEA-Water from Putrefaction.* As it is ſometimes neceſſary to preſerve ſea-water in caſks for bathing and other purpoſes, it is of importance to know how to keep it from putrefaction. Many experiments were made to determine this point by Mr Henry, and are recorded in the firſt volume of the Memoirs of the Literary and Philoſophical Society of Mancheſter. His firſt experiment we ſhall here preſent to our readers. "To one quart of ſea-water were added two ſcruples of freſh quicklime; to another, half an ounce of com­mon culinary ſalt; and a third was kept as a ſtandard without any addition. The mouths of the bottles be­ing looſely covered with paper, they were expoſed to the action of the ſun in ſome of the hotteſt weather in ſummer. In about a week the ſtandard became very offenſive; and the water, with the additional quantity of ſalt, did not continue ſweet many hours longer; whereas that with lime continued many months without ever exhibiting the leaſt marks of putridity.” When he added a dram more of quicklime, the whole of the magneſia contained in the water was ſeparated; and when a further addition was made, a lime-water was immediately formed. He therefore concluded, that two ſcruples of quicklime are ſufficient to preserve a quart of ſea-water. The proportions, however, may vary a little, according to the ſtrength of the quick­lime employed.

*Freſhening of SEA-Water.* The method of making ſea-water freſh was long a deſideratum in navigation. Many methods have been propoſed for this purpoſe, Mr Appleby publiſhed an account of a proceſs which he had inſtituted in the year 1734. He diſtilled ſea-water Wſth a quantity of *lapis infernalis* and calcined bones; but this proceſs was ſoon laid aſide, as it was not only difficult in itſelf, but rendered the water unpalatable. Dr Butler propoſed ſoapleys in place of Mr Appleby’s ingredients; but the water was ſtill liable to the ſame objection. Dr Stephen Hales recommended powdered chalk; but his method was expenſive, and did not improve the taſte of the water. Dr Lind of Portſmouth diſtilled ſea-water without any ingre­dients; but as the experiment he made was per­formed in a veſſel containing only two quarts, with a glaſs receiver in his ſtudy, nothing concluſive can be drawn from it for the uſe of ſailors. At length Dr Irving brought the proceſs to a very high degree of ſimplicity and perfection, by which the water is obtained pure, without much expence of fuel or a complicated apparatus. For this valuable diſcovery he received a reward of L.5000. The advantages of his method re­main to be ſtated, which may be reduced to the follow­ing: 1.The aboliſhing all ſtills, ſtill-heads, worm-pipes, and their tubes, which occupy ſo much ſpace as to ren­der them totally incompatible with the neceſſary buſineſs of the ſhip; and uſing in the room of theſe the ſhip’s kettle or boiler, to the top whereof may occaſionally be applied a ſimple tube, which can be eaſily made on board a veſſel at ſea, of iron plate, ſtove funnel, or tin ſheet; ſo that no ſituation can prevent a ſhip from being com­pletely ſupplied with the means of diſtilling ſea-water. 2. In conſequence of the principles of diſtillation being fully aſcertained, the contrivanee of the ſimpleſt means

of obtaining the greateſt quantity of diſtilled water, by making the tube ſufficiently large to receive the whole column of vapour, and placing it nearly in a horizontal direction, to prevent any compreſſion of the fluid, which takes place ſo much with the common worm. 3. The adopting of the ſimpleſt and moſt efficacious means of condenſing vapour; for nothing more is required in the diſtillation but keeping the ſurface of the tube always wet, which is done by having ſome ſea-water at hand, and **a** perſon to dip a mop or ſwab into this water, and paſs it along the upper ſurface of the tube. By this operation the vapour contained in the tube will be entirely condenſed with the greateſt rapidity imaginable; for by the application of the wet mop thin ſheets of water are uni­formly ſpread, and mechanically preſſed upon the ſurface of the hot tube; which being converted into va­pour make way for a ſucceſſion of freſh ſheets; and thus, both by the evaporation and cloſe contact of the cold water conſtantly repeated, the heat is carried off more effectually than by any other method yet known. 4. The carrying on the diſtillation without any addi­tion, a correct chemical analyſis of ſea-water having evinced the futility of mixing ingredients with it, either to prevent an acid from riſing with the vapour, or to deſtroy any bituminous oil ſuppoſed to exiſt in ſea-water, and to contaminate the diſtilled water, giving it that fiery unpalatable taſte inſeparable from the former proceſſes. 5. The aſcertaining the proper quantity of ſea water that ought to be diſtilled, whereby the freſh wa­ter is prevented from contracting a noxious impregna­tion of metallic ſalts, and the veſſel from being corroded and otherwiſe damaged by the ſalts caking on the bot­tom of it. 6. The producing a quantity of ſweet and wholeſome water, perfectly agreeable to the taſte, and ſufficient for all the purpoſes of ſhipping. 7. The ta­king advantage of the dreſſing the ſhip’s proviſions, ſo as to diſtil a very conſiderable quantity of water from the vapour, which would otherwiſe be loſt, without any ad­dition of fuel. To ſum up the merits of this method in a few words: The uſe of a ſimple tube, of the moſt eaſy conſtruction, applicable to any ſhip’s kettle. The rejecting all ingredients; aſcertaining the proportion of water to be diſtilled, with every advantage of quality, ſaving of fuel, and preſervation of boilers. The ob­taining freſh water, wholeſome, palatable, and in ſuffi­cient quantities. Taking advantage of the vapour which aſcends in the kettle while the ſhip’s proviſions are boiling. All theſe advantages are obtained by the above-mentioned ſimple addition to the common ſhip’s kettles. But Dr Irving propoſes to introduce two ſurther improvements. The firſt is a hearth, or ſtove, ſo conſtructed that the fire which is kept up the whole day for the common buſineſs, of the ſhip ſerves likewiſe for diſtillation; whereby a ſufficient quantity of water for all the economical purpoſes of the ſhip may be obtained, with a very inconſiderable addition to the expence of fuel. The other improvement is that of ſubſtituting, even in the largeſt ſhips, caſt-iron boilers, of a new conſtruction, in the place of coppers.

As ſoon as ſea-water is put into the boiler, the tube is to be fitted either into the top or lid, round which, if neceſſary, a bit of wet linen may be applied, to make it fit cloſe to the mouth of the veſſel; there will be no oceaſion for luting, as the tube acts like a funnel in car-