putrified, or in powder; and yet ſome part will remain, which it is very difficult to take out from the twiſted canals, eſpecially in thoſe ſponges of the *tragos* kind, ſo hard to cleanſe. In a word, the blood or humours, which the ancients have obſerved, is no other than the mucilage or juice of the ſubſtance of theſe worms.

Dated at Guadaloupe,
1 March, 1757.

LXXIX. *Account of an Experiment, by which it appears, that Salt of Steel does not enter the Lacteal Veſſels; with Remarks. In a Letter to the Rev.* Tho. Birch, *D.D. Secr. R. S. By* Edward Wright, *M. D.*

SIR,

Read Mar. 2, 1758. THO' iron is univerſally allowed to be one of the moſt powerful medicines now in uſe, yet many phyſicians obſerving, that the *fæces* of patients, who uſed it either in a metallic or ſaline form, were tinged of a black colour, have been led to think, that, in a metallic ſtate, it could not be reduced into particles fine enough to be received by the lacteal veſſels; and if taken in a ſaline form, that it underwent a precipitation in the inteſtines, by which, being reduced to an earth or calx, it was in like manner rendered incapable of making its way into the blood. But the accurate experiments, with which Signor Menghini has favoured

the public in the Memoirs of the Bononian Academy *, ſufficiently prove, that the ore and filings of iron, finely levigated, enter the blood in conſiderable quantity; as does alſo the *crocus*, *calx*, or earthy part of the metal, tho' in leſs proportion than the two former, which were found to act with a violent *ſtimulus* on the veſſels, and to have diſſolved and broke the *craſis* of the blood of different animals, that had uſed them for ſome weeks in large doſes mixed with their ordinary food. Tho' it muſt be allowed, that theſe experiments are very curious, yet the ſubject ſeems to require a further inquiry, viz. *Whether iron is capable of entering the blood in a ſtate of ſolution, or under a ſaline form:* for, from the violent *ſtimulus*, as well as from the diſſolution of the blood, and other ſymptoms brought on by the uſe of the ore and filings, theſe ſubſtances (not being properly diſſolved) appear to have acted in a manner ſo groſsly mechanical, that, whatever Signor Menghini may think, very little is to be concluded from them, with regard to the action of iron on the human body, in ſuch caſes, as indicate its uſe, and where a rational phyſician would think proper to preſcribe it as a medicine.

Having read Signor Menghini's memoir, I recollected, that in the year 1753 I had, with the aſſiſtance of two friends, made the following experiment, in order to diſcover, whether iron, in a ſaline form, is capable of entering the lacteals.

An ounce and a half of ſalt of ſteel diſſolved in a ſufficient quantity of water, filtrated and mixed with

* Vincentius Menghinus *de Ferrearum particularum progreſſu in Sanguinem. Comment. Acad. Bonon.* T. 11. P. 2. pag. 475.

about a pound of bread and milk, were forced down the throat of a dog, that had been kept faſting for 36 hours. An hour after he had ſwallowed this mixture, having ſecured him in a ſupine poſture, as is uſual in ſuch experiments, we opened the abdomen, and obſerved the lacteal veſſels, like white threads, running along the meſentery in a very beautiful manner. Upon ſlitting open part of the ſmall guts, we there found a good deal of the mixture, which appeared frothy, but without any black colour, or the leaſt ſign of the ſalt being precipitated; and ſtruck a deep inky colour with infuſion of galls. Tho' the white colour of the lacteals convinced us, that they were full of chyle, yet, as it would have been impoſſible to have collected a ſufficient quantity of it from them, we found it neceſſary to open the thorax, and tie the thoracic duct a little above the receptacle, which, from the ligature, ſoon became turgid, the animal being alive and warm, and the chyle ſtill continuing its courſe towards the thoracic duct. Having cut open the receptacle, we eaſily collected a ſufficient quantity of chyle, and immediately mixed therewith, drop by drop, infuſion of galls; a very ſimple and eaſy method, by which an incredibly ſmall quantity of ſalt of ſteel may be diſcovered in moſt liquors: but not the ſmalleſt change of colour was obſerved, tho' they were rubbed together for ſome time, and allowed to ſtand ſeveral hours. Now had there been a ſingle atom (ſo to ſpeak) of the ſalt in ſo ſmall a portion of chyle, as that uſed in this experiment, which was, as near as I could gueſs, ſomewhat leſs than half an ounce, it is not to be imagined, that it could have failed to diſcover

diſcover itſelf by this method of trial; for upon adding one fourth of a grain of the ſalt, this mixture inſtantly became of a bright purple: and I have found, by other experiments, that the ſmalleſt quantity of ſalt of ſteel ſhews itſelf as readily in the chyle by galls, as in any other liquor of the ſame conſiſtence.

This experiment (which was as fair as could have been deſired), together with another obſervation I have made, *viz.* that neither the blood nor urine of patients, during the uſe of ſalt of ſteel, in the leaſt change colour with galls, renders it more than probable, that this ſalt *does not enter the blood.*

As the ſalt was found to have undergone no change in the ſmall guts, it appears, that it is not prevented from entering the lacteals by its being decompoſed or precipitated, as has been imagined; but, on the contrary, that what renders it incapable of being received by theſe veſſels, is its *aſtringency:* for the lacteals ſeem to be endowed with that admirable faculty of admitting ſuch particles of pure chyle as they happen to be in contact with, and of accommodating their diameters to them, at the ſame time that by their natural irritability, and power of conſtriction they obſtinately exclude ſuch as are aſtringent; which, were they to enter the lacteals, would either produce dangerous obſtructions in theſe veſſels, or, if they got into the blood, would occaſion polypous concretions in the larger veſſels, or coagulations incapable of being tranſmitted thro' the minute veſſels of the lungs; the effects of which would be either ſudden death, or at leaſt inflammations and ſuppurations from obſtructions in the pulmonary veſſels; inconveniences, which

which nature, by precluding aſtringents from entering the lacteals, has carefully and wiſely avoided.

Salt of ſteel, taken internally, muſt retain its aſtringency until it be precipitated; which can ſcarce ever fail to happen in the great guts, from the putrid *fæces* they contain, which are always obſerved to be tinged of a black colour from the metallic baſis of the ſalt, part of which, as it has little or no aſtringency, may, no doubt, enter the blood, as Signor Menghini obſerved of the *crocus*, which is the ſame ſubſtance; and we know, from the experiments of Liſter and Muſgrave †, that particles much groſſer than thoſe of the white chyle, provided they be not aſtringent, or very acrid, are conveyed by the lacteals. But the metallic baſis being ſeparated from its acid, and thus reduced to a mere calx or earth, can ſcarce be ſuppoſed to have any medicinal quality whatſoever, or at leaſt to have any ſhare in the virtues juſtly attributed to ſalt of ſteel.

As this ſalt is not only aſtringent, and conſequently a ſtrengthener, but at the ſame time acts with a gentle *ſtimulus*, all its virtues (which are known to be very great in diſeaſes, where the fluids are either viſcid, cold, and phlegmatic, or diſſolved and watery, from a laxity of the ſolids) may be accounted for from its immediate effects on the ſtomach and *primæ viæ*, and on the ſyſtem of the ſolids in general by conſent; which it would be needleſs to illuſtrate by ſimilar examples, becauſe well known to every one the leaſt verſed in medical ſtudies. I ſhall therefore only beg

† Phil. Tranſact. by Lowthorpe, vol. iii. p. 102. edit. 1749. the ſame by Jones, vol. v. p. 259.

leave,

leave, from the obvious qualities of this medicine, and from what has been obſerved above, to deduce the following corollaries.

1. That ſalt of ſteel has no deobſtruent or aperient virtue by any immediate action, that it can poſſibly have on the blood, or other animal fluids, as ſome have imagined; but that, on the contrary, it owes this quality to its *not entering the blood*, which it would otherwiſe coagulate, and to *its action on the ſolids alone.*

2. That in diſeaſes proceeding from a laxity of the ſolids, great care ought to be taken to reſtore and invigorate the *primæ viæ*; ſince a medicine (and this we may preſume not the only one) whoſe immediate action is confined to thoſe parts, is yet found by experience to produce ſo ſalutary effects in ſuch diſeaſes.

3. That as this ſalt does not enter the blood, and conſequently cannot be in danger of too much ſtimulating or conſtricting the veſſels, on which it only acts by conſent, it may, in ſmall doſes, be ſucceſsfully uſed in many caſes, where it has been imagined to be hurtful, particularly in conſumptions of the lungs, ſo frequent and fatal in this iſland; which are commonly attended with too great a laxity of the *primæ viæ*, and of the ſolids in general, tho' they ſeem more immediately to proceed from a laxity and weakneſs of the pulmonary veſſels; in which circumſtances it muſt be of the utmoſt conſequence to reſtore the tone of thoſe principal organs of chylification, the *primæ viæ*; as good chyle not only corrects the acrimony of the blood, which in the advanced ſtages of conſumptions ſo much prevails, but likewiſe ſaves a great

a great deal of labour, which the lungs (already too much oppreſſed) muſt otherwiſe undergo from a crude and ill-concocted chyle. Agreeably to this we find, in the *Eſſays Phyſical and Literary* of Edinburgh *, two well-vouched hiſtories of patients far gone in conſumptions, with the uſual ſymptoms of pain in the breaſt, cough, groſs ſpitting of fetid matter, difficulty of breathing, hectic fits, and morning ſweats, perfectly cured in a few weeks, by the uſe of the Hartfell-Spaw near Moffat; which, contrary to what is obſerved in moſt natural chalybeat waters, contains a fixed vitriol of iron.

Theſe, Sir, are the few obſervations I had to make at preſent on this ſubject. I have taken the liberty to addreſs them to you, in order, if you ſhall think proper, to be communicated to your illuſtrious Society; which, I hope, will continue to lateſt poſterity thoſe intereſting reſearches for the advancement of every branch of natural knowlege, by which it has already acquired ſo much and ſo deſerved honour; and am, with the greateſt reſpect,

SIR,

Your moſt obedient humble Servant,

Strand, Feb. 28. 1758. Edward Wright.

---

* Vol. I. art. xii. p. 364.