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| Heat of the Air. | Correction. |
| 42⁰ | ,00087 |
| 52 | ,00174 |
| 62 | ,00261 |
| 72 | ,00348 |
| 82 | ,00435 |

The correction in this table is expreſſed in 1000th parts of the diſtance between the freezing point and the surface of the ice : *e. g.* if the freezing point ſtands ſeven inches above the ſurface of the ice, and the heat of the room is 62, the point of 32⁰ ſhould be placed 7 × 00261, or ,018 of an inch lower than the obſerved point. A diagonal ſcale will facilitate this correction.

The committee obſerve, that in trying the heat of liquors, care ſhould be taken that the quickſilver in the tube of the thermometer be heated to the ſame degree as that in the ball ; or if this cannot be done conveniently, the obſerved heat ſhould be corrected on that account ; for the manner of doing which, and a table calculated tor this purpose, we muſt refer to their excellent report in the Phil. Tranſ. vol. lxvii. part ii. art. 37.

With regard to the choice of tubes, they ought to be ex­actly cylindrical. But though the diameter ſhould vary a little, it is eaſy to manage that matter in the manner propoſed by the Abbé Nollet@@\*, by making a small portion of the quickſilver, *e. g.* as much as fills up an inch or half an inch, slide backward and forward in the tube ; and thus to find the proportions of all its inequalities, and from thence to adjuſt the diviſions to a ſcale of the moſt perfect equality. The capillary tubes are preferable to others, be­cauſe they require ſmaller bulbs, and they are also more ſenſible, and leſs brittle. The moſt convenient ſize for com­mon experiments has the internal diameter about the 40th or 50th of an inch, about 9 inches long, and made of thin glaſs, that the rise and fall of the mercury may be better ſeen.

The next thing to be conſidered, is of what number of degrees or diviſions the ſcale ought to conſiſt, and from what point it ought to commence. As the number of the diviſions of the ſcale is an arbitrary matter, the ſcales which have been employed differ much from one another in this circumſtance. Fahrenheit has made 180 degrees between the freezing and boiling water point. Amonton’s made 73, and Sir Isaac Newton only 34. There is, however, one general maxim, which ought to be obierved : *That ſuch an arithmetical number ſhould be chosen as can easily be divided and subdivided, and that the number of diviſions ſhould be ſo great that these shall seldom be occasion for fractions.* The number 8 choſen by Reaumur anſwers extremely well in this respect becauſe it can be divided by ſeveral figures without leaving a remainder ; but it is too ſmall a number : the conſequence of which is, that the degrees are placed at too great a diſtance from one another, and Fractions muſt therefore be often employed. We think, therefore, that 160 would have been a more convenient number Fahrenheit’s number 80 is large enough, but when divided its quotient soon becomes an odd number.

As to the point at which the ſcale ought to commence, various opinions have been entertained. If we knew the beginning or loweſt degree of heat, all philosophers would agree, that the loweſt point of the thermometer ought to be fixed there ; but we know neither the lowest nor the higheſt degrees of heat ; we obſerve only the intermediate parts. All that we can do, then, is to begin it at ſome invariable point, to which thermometers made in different places may easily be adjuſted. If poſſible too, it ought to be a point at which a natural well-known body receives ſome remarkable change from the effects of heat or cold. Fahrenheit be­gan his ſcale at the point at which ſnow and ſalt congeal. Kirwan propoſes the freezing point of mercury. Sir Iſaac Newton, Hales, and Reaumur adopted the freezing point of water. The objection to Fahrenheit’s loweſt point is, that it commences at an artificial cold never known in na­ture, and to which we cannot refer our feelings, for it is what few can ever experience. There would be ſeveral great advantages gained, we allow, by adopting the freezing point of mercury. It is the loweſt degree of cold to which mercury can be applied as a meaſure ; and it would render unnecessary the use of the ſigns plus and minus, and the extenſion of the ſcale below 0. But we object to it, that it is not a point well known; for few, comparatively ſpeaking, who use thermometers, can have an opportunity of ſeeing mercury concealed. As to the other advantage to be gained by adopting the freezing point of mercury, namely, the abolition of negative numbers, we do not think it would counterbalance the advantage to be enjoyed by uſing a well- known point. Besides, it may be aſked, Is there not a pro­priety in uſing negative numbers to expreſs the degree of cold, which is a negative thing ? Heat and cold we can only judge of by our feelings: the point then at which the ſcale ſhould commence, ought to be a point which can form to us a ſtandard of heat and cold ; a point familiar to us from be­ing one of the moſt remarkable that occurs in nature, and therefore a point to which we can with moſt clearness and preciſion refer to in our minds on all occaſions. This is the freezing point of water choſen by Sir Iſaac Newton, which of all the general changes produced in nature by cold is the moſt remarkable. It is therefore the moſt convenient point for the thermometers to be uſed in the temperate and frigid zones ; we may ſay over the globe, for even in the hotteſt countries of the torrid zone many of the moun­tains are perpetually covered with ſnow.

Having now explained the principles of the thermometer as fully as appears neceſſary, in order to make it properly underſtood, we will now ſubjoin an account of thoſe thermometers which are at preſent in moſt general uſe. Theſe are Fahrenheit’s, De l’lſle’s, Reaumur’s, and Celſius’s. Fahren­heit’s is uſed in Britain, Del’Iſle's in Ruſſia, Reaumur’s in France, and Celſius’s in Sweden. They are all mercurial thermometers.

Fahrenheit’s thermometer conſiſts of a ſlender cylindrical tube and a ſinall longitudinal bulb. To the side of the tube is annexed a ſcale which Fahrenheit divided into 600 parts, beginning with that of the ſevere cold which he had obſer­ved in Iceland in 1709, or that produced by ſurrounding the bulb of the thermometer with a mixture of ſnow or beaten ice and ſal ammoniac or ſea salt. This he apprehended to be the greateſt degree of cold, and accordingly he marked it, as the beginning of his ſcale, with 0 ; the point at which mercury begins to boil, he conceived to ſhow the greateſt degree of heat, and this he made the limit of his ſcale. The diſtance between theſe two points he divided into 600 equal parts or degrees ; and by trials, he found that the mercury ſtood at 32 of theſe diviſions, when wa­ter juſt begins to freeze, or ſnow or ice juſt begins to thaw ; it was therefore called the degree of the freez­ing point. When the tube was immerſed in boiling wa­ter, the mercury roſe to 212, which therefore is the boiling point, and is juſt 180 degrees above the former or freezing point. But the preſent method of making the ſcale of theſe thermometers, which is the sort in most common uſe, is first to immerge the bulb of the thermometer in ice or

@@@[m]\* Lecons de Phys. Exp. tom. iv. p. 376.