the very hypothesis on which ours has now been formed. They thus add greatly to the probability of its truth.

We do not, however, mean to assert, that the zero of the mercurial thermometer is absolutely at 175° or 121°below the present 0. or that the progression of the temperatures has been fixed accurately for mercury or for vapour. On the contrary, we have seen that the discrepancies of the results obtained by different physical experimenters are great, and do not admit of obtaining un­

changeable numerical indices of progression, either of the temperatures or the corresponding elastic force. The existence of these two progressions, and their character, has, we think, been established, and our research has the effect of confirming, the profound views of Dr Dalton, which have, we think, been ill understood and insufficiently appreciated.

56. The following table exhibits some formulæ and experiments collated :

*Table of the force of Steam at different temperatures from* 0° *to* 500°.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| I.  Tempera­  ture.  Fahrenheit. | IL  Dalton. | III  Ure. | IV.  Young. | V.  Ivory. | VI.  Tred  gold. | VII.  South­  ern | VIII  Robison. | IX.  Watt. | X.  Frank.  Inst. | XI.  New  For­  mula. | XII.  Diff. Dolt. so Ure'sExpts. | XIII.  Diff  Acad.  Inst. | XIV. Diff. Tred. & Dalton | | XV.  Diff. New Formula ⅜ Dalton. | | XVI.  Tempera­  ture.  Fahrenheit |
| 0º | 0.08 |  | , |  |  |  | ∙∙∙ | ... |  | 0.07 | ∙∙∙ | ∙∙∙ |  |  |  | — .01 | 0° |
| 10 | 0.12 | ... | ... | ... |  | ... | ... | ... |  | 0.10 | ... | ∙∙∙ |  | .. |  | — .02 | 10 |
| 20 | 0.17 | ... | 0.11 | ... | ... | ... | ... | ... |  | 0.15 | ... |  |  | .09 |  | .02 | 20 |
| »2 | 0.26 | 0.20 | 0.18 | ... | 0.17 | 0.16 | 0.00 | ... | ... | 0.24 | — .06 |  |  | .10 |  | .02 | 32 |
| 40 | 0.34 | 0.25 | 0.20 | ... | 0.24 | 0.22 | 0.10 | ... | ... | 0.32 | — .09 |  |  | .11 |  | — .02 | 40 |
| 50 | 0.49 | 0.36 | 0.36 | 0.36 | 0.37 | 0.33 | 0.20 | ∙∙∙ |  | 0.45 | — .13 | ... |  | .10 |  | — .04 | 50 |
| 60 | 0.65 | 0.52 | 0.53 | ... | 0.55 | 0.48 | 0.35 | ∙∙∙ | ... | 0.64 | — .13 |  |  | .09 |  | — .01 | 60 |
| 70 | 0.87 | 0.73 | 0.75 | 0.73 | 0.78 | 0.68 | 0.55 | 0.77 | ... | 0.88 | — .14 |  |  | .05 |  | .01 | 70 |
| 80 | 1.19 | 1.01 | 1.05 | ... | 1.11 | 0.95 | 0.82 | ∙∙∙ | ... | 1.20 | — .16 |  |  | .06 |  | .04 | 80 |
| 90 | 1.59 | 1.36 | 1.44 | 1.36 | 1.53 | 0.34 | 1.18 | ... |  | 1.61 | — .23 | ... |  | .04 |  | .02 | 90 |
| 100 | 2.12 | 1.86 | 1.95 | ... | 2.08 | 1.84 | 1.60 | 1.55 | ∙∙∙ | 2.15 | — .24 | ∙∙∙ |  | .00 |  | .03 | 100 |
| 110 | 2.79 | 2.45 | 2.62 | 2.46 | 2.79 | 2.56 | 2.25 | ... | ... | 2.83 | — .34 |  |  | .05 |  | .04 | 110 |
| 120 | 3.63 | 3.30 | 3.46 | ... | 3.68 | 3.46 | 3.00 | ... | ... | 3.69 | — .33 |  |  | .10 |  | .06 | 120 |
| 130 | 4.71 | 4.37 | 4.54 | 4.41 | 4.81 | 4.43 | 3.95 | .∙∙ | ∙∙∙ | 4.78 | — .34 | ... |  | ...16 |  | .07 | 130 |
| 140 | 6.05 | 5.78 | 5.88 | ... | 6.21 | 5.75 | 5.15 | 5.14 | ... | 6.15 | — .27 |  |  |  |  | .08 | 140 |
| 150 | 7.73 | 7.53 | 7.55 | 7.42 | 7.94 | 7.46 | 0.72 | ... | ... | 7.80 | — .20 |  |  | .21 |  | .07 | 150 |
| 160 | 9.79 | 9.60 | 9.62 | ... | 10.05 | 9.52 | 8.65 | 8.92 | ... | 9.85 | — .19 | ... |  | .26 |  | .08 | 100 |
| 170 | 12.31 | 12.05 | 12.14 | 12.05 | 12.60 | 12.14 | 11.05 | 11.37 | ... | 12.38 | — .26 |  |  | .29 |  | .t∣7 | 170 |
| 180 | 15.38 | 15.16 | 15.23 | ... | 15.67 | 15.20 | 14.05 | 14.73 | ... | 15.41 | — .28 | ... |  | .29 |  | .03 | 180 |
| 190 | 18.98 | 19.00 | 18.96 | 18.93 | 19.00 | ... | 17.85 | 19.00 | ∙∙∙ | 18.90 | + .12 |  |  | .02 |  | .02 | 190 |
| 200 | 23.51 | 23.60 | 23.44 | ... | 23.71 | ... | 22.62 | ... | ... | 23.52 | + .09 | ∙∙∙ |  | .20 |  | .01 | 200 |
| 210 | 28.82 | 2.8.88 | 28.81 | 28.81 | 28.86 | ... | 28.65 | ... | ... | 28.82 | 4.07 | ... |  | .04 |  | .00 | 210 |
| 212 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | .30.00 | 30.00 | 29.40 | ... | 30.00 | 0.00 |  |  | .00 |  | 0.00 | 212 |
| 220 | 35.18 | 35.54 | 35.19 | ... | 34.92 | ... | 35.8 | 33.65 | ∙∙∙ | 35.10 | — 0.36 |  |  | — .26 |  | — .15 | 220 |
| 230 | 44.60 | 43.10 | 42.47 | 42.63 | 42.00 | ... | 44.5 | 40.+ | ... | 42.60 | — 1.50 |  |  | 2.13 |  | 2.00 | 230 |
| 240 | 53.45 | 51.70 | 51.66 | ... | 50.24 | ... | 54.9 | 49.0 | ... | 51.42 | — 1.75 |  |  | 3.21 |  | 2.03 | 240 |

***Table of the Force of Steam at different Temperatures (continued).***

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| I. | II. | III. | IV. | V. | VI | | VII. | VIII. | IX. | X. | XI | XII | XIII. | XIV. | | XV. | | XVI |
| Pressure in | French  Acad. |  |  |  |  |  |  |  |  | Franklin Institut. | New  Form. | Din; Dr | Diff |  | Diff. | Diff New | | Pressure in |
| Atmos­  pheres. | Dr Ure. | Young. | Ivory. | Tredg∙. | | South. | Robinson. | Watt. | Ure's Ex­pedient. | Arad.  Inst. | Tred. &Dalton | | Form & Ac. Inst. | | Atmos­pheres. |
| 1st At. | 212.0° | 212° | 212" | 212» | 212° |  | ... | 212° | 212° | 212° | 212° | 0.00 | 000.2 |  | 0.00° |  | 0.00o | 1st At. |
| 2d At. | 250.5 | 2000 | 240.3 | 249 | 250 |  | 250.3+ |  | 2525 | 250.0 | 249.7  274.1 |  | — 0.5 |  | 0.+ |  |  | 2d At. 3<l At. |
| 3d At. | 27δ.2 | 2750 | 271 | 274 |  | 267 | 275.2 |  | — 0.2 |  | 1.+ |  | 1.0 |
| 4th At. | 293.7 | 201.5 | 288 | 290 | 294 |  | 293.4+ |  |  | 201.5 | 201.9 | ... | — 2.2 |  | 1.4 |  | 0.7 | 4th At. |
| 5th At. | 308.8 | 304.5 | 302 | ... | 309 |  |  | ... | 304.5 | 306.8 | ... | — 4.3 |  | 3.7 |  | 0.1 | 5th At. |
| 6th At. | 320.4 | 315.5 | ... | ... | 322. |  | ... |  |  | 315.5 | 319.2 | ... | — 4.9 |  | —4.0 |  | 1.2 | 6th At. |
| 7th At. | .331.7 | 325.5 |  |  | ... |  | ... | ∙∙∙ |  | 326.5 | 329.9 |  | — 6.7 |  | ... |  | 1.1 | 7th Λt. |
| 8th At. | 362.0 | 336.0 |  | 337 | 342.+ | | 343.6+ |  |  | 336.0 | 339.3 | ... | — 6.0 | +3.3 | |  | 0.3 | 8th At. |
| 9tb At. | 374.8 | 345 |  |  |  |  |  |  |  | .345.0 | 348.8 |  | — 5.0 |  |  |  | 0.9 | 9th At. |
| 10th At. | 358.9 |  |  |  |  |  |  |  |  | 352.5 | 355.6  363.0 |  | — 6.4 |  |  |  | 0.1 | loth At. 11th At. |
| 11th At. | 366.8 | ∙∙∙ |  | ... | ∙∙∙ |  | ... |  |  |  | ∙∙∙ |  |  | ... |  |  |
| 12th At. | 374.0 | ... |  | ... | 372. |  | ... | ... |  | ... | 309.4 | ... | ... | —3.0 | |  | ... | 12th At. |
| 13th At. | 380.6 | ... |  | ... | ... |  | ... | ... | .. | ... | 375.5 | ... | ∙∙∙ |  | ... |  | ... | 13th At. |
| 14th At. | 38S.9 | ... |  | ... | ... |  | ... |  |  | ... | 381.3 | ... | ... |  | ... |  | ... | l4th At. |
| 15th At. | 392.8 | ... |  | ... | ... |  | ... |  |  | 383.8 | 387.0 | ∙∙∙ | — 9.0 |  | ∙∙∙ |  | 0.3 | 15th At. |
| 16th At. | 398.5 | ... |  | ... | ... |  | ... |  |  | ... | 391.9 | ... | ... |  | ... |  | ∙∙∙ | 16th At. |
| l7th At. | 403.8 | ... |  | ... | ... |  | ... |  |  | ... | 396.7 | ... | ... |  | «·· |  | ... | 17th At. |
| 18th At. | 408.9 | ... |  | ... | ... |  | ... |  |  | ... | 401.3 | ... | ... |  | ... |  | ... | 18th At. |
| 19th At. | 413.9 | ... | ... | ... | ... |  | ... |  |  | ... | 405.8 | ... | ... |  | ∙∙∙ |  | ... | 19th At. |
| 20th At. | 418.5 | ... | ... | ·■· | 414 |  | ... |  |  | 405 | 410. | ... | — 13.5 | +2.3 | |  | 1.7 | 20th At. |
| 30th At. | 457.2 | ... |  | ∙∙∙ | ... |  | ... |  |  | ... | 444.0 | ... | ∙∙∙ |  | ... |  |  | 30th At. |
| 40th At. | 466.0 | ... | ... | ... | ∙∙∙ |  | ... |  |  | ... | 470.5 | ... | ... |  | ... |  |  | 40th At. |
| 50th At. | 510.6 | ... | ... | ... | ... |  | ... | ... |  | ... | 491.4 | ... | ... |  | ... |  | ... | 50th At. |

The first and last columns contain the successive temperatures, as far as 240°, and after that the number of atmospheres of pressure ; and their reference ex­tends wholly across the table.

Col. II. contains the later experiments of Dr Dalton, interpolated, where necessary, down to 240° ; the remainder of that column is from the experiments of the French Academy.

Col. III. contains the experiments of Dr Ure.

Cols. IV. V. and VI. contain the formulæ of Dr Young,

Mr Ivory, and Mr Tredgold.

Cols. VIL VIII. IX. and X. contain the experiments of

Southern, Robison, Watt, and the Franklin Institute. Col. XI contains the numbers given by our formulæ. Col. XII. exhibits the differences between the experi­

ments of Drs Dalton and Ure.