land is returned by the rivers into the sea from whence it came. Another part falls into the sea before it reaches the land ; and this is the reason why the rivers do not return so much water into the Mediterranean as is raised in vapour. A third part falls on the low lands, where it affords nourishment to plants ; yet it does not rest there, but is again ex haled in vapour by the action of the sun, and is either car ried by the winds to the sea to fall in rain or dew there, or else to the mountains to become the sources of springs.

It is not however to be supposed that all fountains can be referred to one and the same cause. Some proceed from rain and melted snow, which, subsiding through the surface of the earth, makes its way into certain cavities, and thence issues out in the form of springs ; because the waters of several are found to increase and diminish in proportion to the rain which falls. Others, again, especially such as are salt, and spring near the seashore, owe their origin to sea water percolated through the earth ; and some to both these causes ; though without doubt most of them, and especially such as spring near the tops of high mountains, receive then waters from vapours, as before explained.

This reasoning of Dr. Halley’s is confirmed by more recent observations and discoveries. It is now found, that though water is a tolerable conductor of the electric fluid, dry earth is an electric *per se,* consequently the dry land must always be in an electrified state, compared with the ocean. It is also well known, that such bodies as are in an electrified state, whether *plus* or *minus,* will attract va pour, or other light substances that come near them. Hence the vapours that are raised from the ocean must necessarily have a tendency to approach the land in great quantity, even without the assistance of the wind, though this last must undoubtedly contribute gτeat[y towards the same purpose, as Dr. Halley justly observes. In like manncr, the higher grounds are always in a more electrified state than the lower ones ; and hence the vapours having once left the ocean and approached the shore, are attracted by the high mountains ; of which Mr. Pennant gives an in stance in Snowdon. Hence we may see the reason why springs are so common in the neighbourhood of mountains, they being so advantageously formed in every respect for collecting and condensing the vapours into water.

The heat of springs is generaIly the same with the mean temperature of the atmosphere. The mean temperature of the south of England is 48° ; in Scotland, near Edinburgh, it is 45° ; in the north of Ireland it is 48°, and on the south coast about 51°. At Upsala, in Sweden, it is 43°, and in Paris 53°. According to accurate experiments made by eminent philosophers, the heat of the springs in these dif­ferent countries corresponds with the medium temperature. We have not heard that similar experiments have been made in other countries, or we should have been careful to collect them. We do not however doubt but they have been made in most countries of Europe; yet we suspect little attention has been paid to this subject within the tropical regions.

Though this coincidence of the heat of springs with the mean temperature of the climate where they ffow, seems to be a general fact, yet it admits of many exceptions. In various parts of the world there are springs which not only exceed the mean temperature, but even the strongest meridian heat ever known in the torrid regions. The following table will give a distinct notion of the degrees of heat which different springs have been found to possess, according to the experiments of philosophers. It is necessary to remark that experiments made upon the same springs, by different persons, vary a little from one another, which may be owing to many accidents easily accounted for. Where this is the case, we shall mention both the lowest and highest degree of heat which has been ascribed to the same spring, according to Fahrenheit’s thermometer.

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| --- | --- | --- | --- |
| **Places.** | **Springs.** | **Highest degree of heat.** | **Lowest degree of heat.** |
| **Bristol,** | St. Vincent’s or | 84 | 76 |
| Buxton, | the hot well, Gentleman’s bath | 82 |  |
| Matlock, | 69 |  |
| Bath, | King’s bath, | 119 | 113 |
| Aix-la-Chapelle,  Barege, |  | 146  122 | 136 |
| **Pisa,** |  | 104 |  |
| Caroline baths in Bohemia,  Iceland, | Prudel or furious,.... **Geyser,.....** | 165  212 | ... |
|  |  |  |

In cold countries where congelation takes place, the heat of the earth is considerably above the freezing point, and continues so through the whole year. From experiments that have been made in mines and deep pits, it appears that this heat is uniform and stationary at a certain depth. But as the heat of these springs far exceeds the common heat of the internal parts of the earth, it must be occasioned by causes peculiar to certain places ; but what these causes are, it is no easy matter to determine. We are indeed certain that hot springs receive their heat from some subterranean cause ; but it is a matter of difficulty to investigate how this heat is produced and preserved. Theories have however been formed on this subject. The subterranean heat has been ascribed to the electrical fluid, and to a great body of fire in the centre of the earth ; but we suspect that the nature of the electrical fluid and its effects are not sufficiently understood. As to the supposition that the heat of springe is owing to a central fire, it is too hypothetical to require any refutation. From what then does this heat originate, and whence is the fuel which has produced it for so many ages ? To enable us to answer these questions with preci sion, more information is necessary than we have hitherto obtained respecting the structure of the internal parts of the earth. It is peculiarly requisite that we should be made acquainted with the fossils which are most common in those places where hot springs abound. We should then perhaps discover that hot springs always pass through bodies of a combustible nature. It is well known to chemists, that when water is mixed with vitriolic acid, a degree of heat is produced superior to that of boiling water. It is also an established fact, that when water meets with pyrites, that is, a mixture of sulphur and iron, a violent inflammation takes place. If therefore we could prove that these materials exist in the strata from which hot springs are derived, we should be enabled to give a satisfactory account of this curious phenomenon. As some apology for this supposition, we may add, that most of the hot springe mentioned above, have been found by analysis to be impregnated with sul phur, and some of them with iron. It must however be acknowledged, that the hot springs of Iceland, which are 212°, the heat of boiling water, according to an accurate analysis of their contents by the ingenious Dr. Black, were neither found to contain iron nor sulphur. It will benecessary that we should wait with patience, and continue to collect facts, till the sciences of chemistry and mineralogy shall be so far advanced as to enable us to form a permanent theory on this subject.

Springs are of different kinds. Some are perennial, or continue to flow during the whole year ; others flow only during the rainy season ; some ebb and flow. At Torbay there is one of this kind, which ebbs and flows five or six inches every hour. There is another near Coriso in Italy, which ebbed and flowed three times a day in the time of Pliny, and continues to do so still. A spring near Henley