

as has been already said ; and in consequence of this property, the coldest portions of the fluid generally occupy the lower parts. The continued progress of cold produces congelation. If, therefore, the law just mentioned had been strictly true, the lower parts of water would have been first frozen ; and being once frozen, hardly any heat applied at the surface could have melted them, for the warm fluid could not have descended through the colder parts. This is so far the case, that in a vessel containing ice at the bottom and water at the top, Rumford made the upper fluid boil without thawing the congealed cake below.

Now, a law of water with respect to heat operating in this manner, would have been very inconvenient if it had obtained in our lakes and seas. They would all have had a bed of ice, increasing with every occasion, till the whole was frozen. We could have had no bodies of water, except such pools on the surfaces of these icy reservoirs as the summer sun could thaw, to be again frozen to the bottom with the first frosty night. The law of the regular contraction of water by cold till it became ice, would, therefore, be destructive of all the utility of our seas and lakes. How is this inconvenience obviated ?

It is obviated by a modification of the law which takes place when the temperature approaches this limit. Water contracts by the increase of cold, till we come *near* the freezing temperature ; but then, by a further increase of cold, it contracts no more, but expands till the point at which it becomes ice. It contracts in cooling down to 40 degrees of Fahrenheit's thermometer ; in cooling further it expands, and when cooled to 32 degrees, it freezes. Hence, the greatest density of the fluid is at 40 degrees, and water of this temperature, or near it, will lie at the bottom with cooler water or with ice floating above it. However much the surface be cooled, water colder than 40 cannot descend to displace water warmer than itself. Hence we can never have ice formed at the bottom of deep water. In approaching