

"it is less consistent with reason to imagine something unintelligible, in order to appear to explain rarefaction by a merely verbal device, than it is to conclude, from the fact that bodies become rarefied, that they contain pores or interstices which grow larger and that some new body approaches to fill these pores; even though we may not perceive this new body through any of our senses" [II, 7]

## Descartes on Weight and Gravity

23. How all parts of the Earth are driven downward by this heavenly matter, and thus become heavy.

Next, it must be noted that the force which the individual parts of the heavenly matter have to recede from {the center of} the Earth cannot produce its effect unless, while those parts are ascending, they press down and drive below themselves some terrestrial parts into whose places they rise. For, seeing that all the spaces which are around the Earth are occupied either by particles of terrestrial bodies or by the heavenly matter; and seeing that all the globules of this heavenly matter have an equal propensity to move away from the Earth: individually they have no force to drive other similar globules from their place. However, since such a propensity is not as great in the particles of terrestrial bodies; whenever the heavenly globules have some of these terrestrial particles above them, the former must bring this force of theirs to bear upon the latter in every way. Thus, the weight of each terrestrial body is not, strictly speaking, produced by all the heavenly matter flowing around it, but rather only by that portion of the heavenly matter which immediately ascends into the place of the descending body, and which, therefore, is exactly equal to it in size. For example, if B<sup>12</sup> is a terrestrial body suspended in mid-air which is united with more particles of the third element than a quantity of air equal to it, and which therefore has fewer or narrower pores in which the heavenly matter is contained; it is evident that if this body B descends toward I, a quantity of air equal to it must ascend into its place. And because this quantity of air contains more of the heavenly matter {which is striving to recede from the Earth's center} than there is in B, it is also evident that there must be, in this quantity of air, the force to drive B down {and thus to give it the quality which we call weight}.

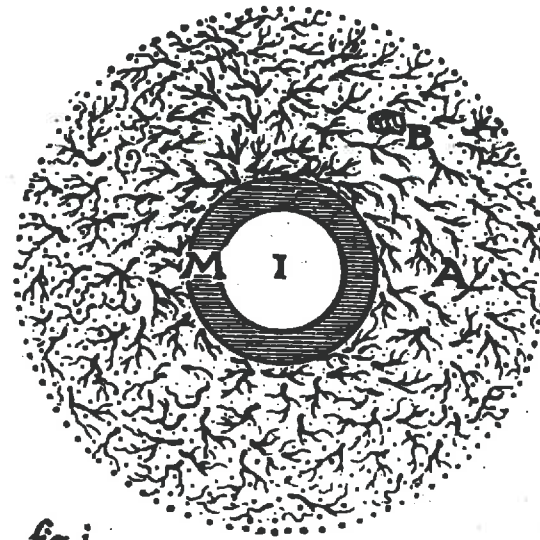


fig i



25. That weight does not correspond to the quantity of matter in each body.

And, in order that nothing may be omitted, it must also be noticed that, by 'heavenly matter', I mean here not only the globules of the second element, but also the matter of the first mingled with them. And those terrestrial particles which are following the course of the heavenly matter (and thus are more rapidly moved than the rest) are also to be placed in this category; such are those which form the air. Besides, the matter of the first element, other things being equal, has greater force to drive terrestrial bodies downward than do the globules of the second, because it has more agitation; and for a similar reason, these globules have greater force than {a similar quantity of} the terrestrial particles of air which they move with them. As a result, it cannot easily be estimated from weight alone how much terrestrial matter is contained in each body. And it may be that although a piece of gold may weigh twenty times as much as a quantity of water equal to it [in volume], yet it may not contain four or five times as much terrestrial matter: not only because an equal amount must be subtracted from both because of the air in which they are being weighed,<sup>13</sup>