of ebony sinks in water, while a *flat slip* of the same material lies on the surface; and it required considerable sagacity to separate such cases from the general rule. Galileo's opinions were attacked by various writers, as Nozzolini, Vincenzio di Grazia, Ludovico delle Colombe; and defended by his pupil Castelli, who published a reply in 1615. These opinions were generally adopted and diffused; but somewhat later, Pascal pursued the subject more systematically, and wrote his *Treatise of the Equilibrium of Fluids*, in 1653; in which he shows that a fluid, inclosed in a vessel, necessarily presses equally in all directions, by imagining two *pistons*, or sliding plugs, applied at different parts, the surface of one being centuple that of the other: it is clear, as he observes, that the force of one man acting at the first piston, will balance the force of one hundred men acting at the other. "And thus," says he, "it appears that a vessel full of water is a new Principle of Mechanics, and a new Machine which will multiply force to any degree we choose." Pascal also referred the equilibrium of fluids to the "principle of virtual velocities," which regulates the equilibrium of other machines. This, indeed, Galileo had done before him. It followed from this doctrine, that the pressure which is exercised by the lower parts of a fluid arises from the weight of the upper parts.

In all this there was nothing which was not easily assented to; but the extension of these doctrines to the air required an additional effort of mechanical conception. The pressure of the air on all sides of us, and its weight above us, were two truths which had never yet been apprehended with any kind of clearness. Seneca, indeed,[1] talks of the "gravity of the air," and of its power of diffusing itself when condensed, as the causes of wind; but we can hardly consider such propriety of phraseology in him as more than a chance; for we see the value of his philosophy by what he immediately adds: "Do you think that we have forces by which we move ourselves, and that the air is left without any power of moving? when even water has a motion of its own, as we see in the growth of plants." We can hardly attach much value to such a recognition of the gravity and elasticity of the air.

Yet the effects of these causes were so numerous and obvious, that the Aristotelians had been obliged to invent a principle to account for them; namely, "Nature's Horror of a Vacuum." To this principle were referred many familiar phenomena, as suction, breathing, the

[1] *Quæst. Nat.* v. 5.