ry perſon who pretends to explain other phenomena in a ſimilar manner. Then, and not till then, he is able to ſay what classes of phenomena will admit of the expla­nation : and, when all this is done, his explanation is ſtill an *hypothesis,* till he is able to prove, from other indisputable ſources, the exiſtence and agency of the ſame thing analogous to the elaſtic fluid, from which all is borrowed.

Such conſiderations would juſtify us for conſidering with great attention the nature of sound. But a work like this will not give room for a full diſcuſſion ; and we muſt refer our readers to the writers who treat it more at large. Much curious information may be got from the pains-taking authors of the laſt century ; ſuch as Lord Bacon; Kircher; Merſennus ; Caſſerius in his great work *De Voce et Auditu ;* Perrault in his *Diſ­ſertation du Bruit* ; Muſſenbroek in his great Syſtem of Natural Philosophy, in 3 vols 4t0 ; and in his *Essais de Physique* ; and the writings of the celebrated phyſiolo­giſts of the preſent age. We alſo refer to what has been ſaid by us in the article Acoustics.

At preſent therefore we muſt content ourſelves with giving a ſhort hiſtory of the ſpeculations of philosophers on this ſubject, tracing out the ſteps by which we have arrived at the knowledge which we have of it. We ap­prehend this to be or great importance ; becauſe it ſhows us what kind of evidence we have for its truth, and the paths which we muſt ſhun if we wiſh to pro­ceed farther: and we truſt that the progreſs which we have made will appear to be so real, and the object to be attained so alluring to a truly philoſophical mind, that men of genius will be incited to exert their utmoſt efforts to paſs the preſent boundaries of our real pro­gress.

In the infancy oſ philoſophy, sound was held to be a ſeparate exiſtence, ſomething which would be, although no hearing animal exiſted. This was conceived as waft­ed through the air to our organ of hearing, which it was ſuppoſed to affect in a manner reſembling that in which our noſtrils are affected when they give us the ſenſation of ſmell. It was one of the Platonic species, fitted for exciting the intellectual ſpecies, which is the immediate object of the soul’s contemplation.

Yet, even in thoſe early years of ſcience, there were ſome, and, in particular, the celebrated founder oſ the ſtoic ſchool, who held that sound, that is, the cauſe of sound, was only the particular motion of external groſs matter, propagated to the ear, and there producing that agitation of the organ by which the soul is immediate­ly affected with the ſenſation of sound. Zeno, as quo­ted by Diogenes Laertius@@\*, ſays, “ Hearing is produced by the air which intervenes between the thing sounding and the ear. The air is agitated in a ſpherical form, and moves off in waves, and falls on the ear, in the ſame manner as the water in a ciſtern undulates in circles when a ſtone has been thrown into it.” The ancients were not remarkable for preciſion, either of conception or argu­ment in their diſcuſſions, and they were contented with a general and vague view of things. Some followed the Platonic notions, and many the opinion of Zeno, but without any farther attempts to give a diſtinct conception of the explanation, or to compare it with experiment.

But in later times, during the ardent reſearches in the laſt century into the phenomena of nature, this be­

came an intereſting ſubject of inquiry, the invention of the air-pump gave the firſt opportunity of deciding by experiment whether the elastic undulations of air were the cauſes of sound: and the trial fully eſtabliſhed this point ; for a bell rung *in vacua* gave no sound, and one rung in condenſed air gave a very loud one. It was therefore received as a doctrine in general phyſics that air was the vehicle of sound.

The celebrated Galileo, the parent of mathematical philoſophy, diſcovered the nature of that connection be­tween the lengths of muſical cords and the notes which they produced, which had been obſerved by Pythago­ras, or learned by him in his travels in the eaſt, and which he made the foundation of a refined and beauti­ful ſcience, the theory of muſic. Galileo ſhowed, that the real connection subſiſted between the tones and the vibrations of theſe cords, and that their different degrees of acuteneſs corresponded to the different frequency of their vibrations The very elementary and familiar demonſtration which he gave of this connection did not ſatisfy the curious mathematicians of that inquiſitive age, and the mechanical theory of muſical cords was proſecuted to a great degree of refinement. In the courſe of this inveſtigation, it appeared that the cord vibrated in a manner preciſely ſimilar to a pendulum vi­brating in a cycloid. It muſt therefore agitate the air contiguous to it in the ſame manner ; and thus there is a particular kind of agitation which the air *can* receive and maintain, which is very intereſting.

Sir Iſaac Newton took up this queſtion as worthy of his notice ; and endeavoured to aſcertain with mathe­matical preciſion the mechaniſm of this particular claſs of undulations, and gave us the fundamental theorems concerning the undulations of elaſtic fluids, which make the 47, &c. propositions of Book II. of his Principles of Natural Philoſophy. They have been (perhaps haſ­tily) conſidered as giving the fundamental doctrines con­cerning the propagation of sound. They are therefore given in this work in the article Acoustics ; and a variety of facts are narrated in the article Pneumatics, to ſhow that ſuch undulations *actually obtain* in the air of our atmoſphere, and are accompanied by a ſet of phenomena of sound which preciſely tally or correſpond to all the mechanical circumſtances of theſe undulations. In the mean time, the anatomiſts and phyſiologiſts were buſily employed in examining the ſtructure of our or­gans of hearing. Impreſſed with the validity of this doctrine of aerial undulations being the cauſes of sound, their reſearches were always directed with a view to diſcover thoſe circumſtances in the ſtructure of the ear which rendered it an organ ſuſceptible of agitations from this cauſe ; and they diſcovered many which ap­peared as contrivances for making it, a drum, on which the aerial undulations from without muſt make very for­cible impulſes, so as to produce very sonorous undula­tions in the air contained in it. Theſe therefore they conſidered as the *immediate* objects of ſenſation, or the immediate cauſes of sound.

But ſome anatomiſts ſaw that this would not be a full account of the matter : for after a drum is agitated, it has done all that it can do ; it has produced a noiſe. But a farther proceſs goes on in our tar : here is behind the membrane, which is the head of this drum a curious mechanism, which communicates the agitations

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