

probability of an analogy between the colours of a thin plate and the sounds of a series of organ-pipes; and observes that the same colour recurs whenever the thickness of the plate answers to the terms of an arithmetical progression, in the same manner as the same sound is produced by means of an uniform blast from organ-pipes which are different multiples of the same length.

11. *Of the Coalescence of Musical Sounds.*—In this section Dr. Smith's assertion that the vibrations constituting different sounds are able to cross each other in all directions, without affecting the same individual particles of air by their joint forces, is minutely investigated and controverted.

12. *Of the Frequency of Vibrations constituting a given Note.*

13. *Of the Vibrations of Chords.*

14. *Of the Vibrations of Rods and Plates.*

Of the contents of these three sections no account will be here attempted, as they consist chiefly of experiments and demonstrations illustrated by diagrams.

15. *Of the Human Voice.*—A technical description is here given of the formation of sounds by the configuration and inflexions of the different parts of the vocal organ. And it is intimated that by a close attention to the harmonics entering into the constitution of various sounds, much more may be done in their analysis than could otherwise be expected.

16. *Of the Temperament of Musical Intervals.*—After pointing out some imperfections in most of those who have treated this subject before him, the author suggests his own method of distributing the imperfection of the scale, so as to produce a modulation that shall be found the least defective. And here he observes, as upon an average of all music ever composed some particular keys occur at least twice as often as others, there seems to be a very strong reason for making the harmony the most perfect in those keys which are the most frequently used; since the aggregate sum of all the imperfections which occur in playing, must by this means be diminished the most possible, and the diversity of the character at the same time accurately preserved.

*Observations on the Effects which take place from the Destruction of the Membrana Tympani of the Ear.* By Mr. Astley Cooper. In a Letter to Everard Home, Esq. F.R.S., by whom some Remarks are added. Read Feb. 6, 1800. [*Phil. Trans.* 1800, p. 151.]

The case to which we owe the observations contained in this paper, is that of a youth, who at the age of ten was attacked with an inflammation and suppuration in the left ear, which continued discharging matter for several weeks; and who after the space of about a twelvemonth had the same symptoms in his right ear, the discharge in both cases being thin and fetid, and conveying many small bones and particles of bones. On probing the ears when the youth was about twenty years of age, it was found that the membrana tympani

of the left ear was totally destroyed, and that but a small part of it remained in the right ear. So free was the passage through both the ears, that the patient, by closing his nostrils and contracting his cheeks, could with ease force the air from the mouth through the meatus auditorius; and yet what is most remarkable, the sense of hearing was by no means materially impaired by this imperfection; especially in the left ear, where the whole of the membrane was dissolved. The organ even retained a nice musical discrimination.

From this, and another similar instance here described, it is inferred that the loss of the membrana tympani, though it somewhat diminishes the power of hearing, does not absolutely destroy it; and that probably where this membrane is wanting, its functions are supplied by the membranes of the fenestræ ovalis and rotunda, which being placed over the water of the labyrinth, will, when agitated by the impressions of sound, convey their vibrations to that fluid, in a similar manner as is done by the membrana tympani in its healthy state. It is also intimated that the principal use of this membrane is probably to moderate the impressions of sound, and to proportion them to the powers and modifications of the organ.

Mr. Home, by whom this paper was communicated, has been pleased to add some additional remarks on the mode of hearing in cases where the membrana tympani has been destroyed; from which we collect that this membrane appears to him to be chiefly intended to give an extended surface capable of communicating to the small bones the impressions made upon it, which a membrane would be incapable of doing unless it had a power of varying its tension to adapt it to different vibrations: and that this membrane being destroyed, there can be little doubt that the impressions of the vibrating air are produced on the stapes, from whence they are communicated to the cavity of the tympanum, and thence to the internal organ. These remarks are added in order to reconcile the present case with the doctrine laid down by Mr. Home in his late paper on the organ of hearing.

*Experiments and Observations on the Light which is spontaneously emitted, with some degree of Permanency, from various Bodies. By Nathaniel Hulme, M.D. F.R.S. and A.S. Read Feb. 13, 1800. [Phil. Trans. 1800, p. 161.]*

The light which is the object of the present inquiry must be distinguished not only from that which we derive from the sun, but also from the brightness exhibited by artificial phosphori, electricity, meteors, and other lucid emanations. The principal bodies which afford the light here treated of, are, 1) Some vegetable and earthy substances, such as *rotten wood*, and *peat earth*. 2) Marine animals, some in a living state, viz. the *Medusa phosphorea*, the *Pholas*, the *Pennatula phosphorea*, and the *Cancer fulgens*; and most of the marine fishes soon after they are deprived of life. 3) *Animal flesh* in general, some time after the extinction of life. And, 4) Among