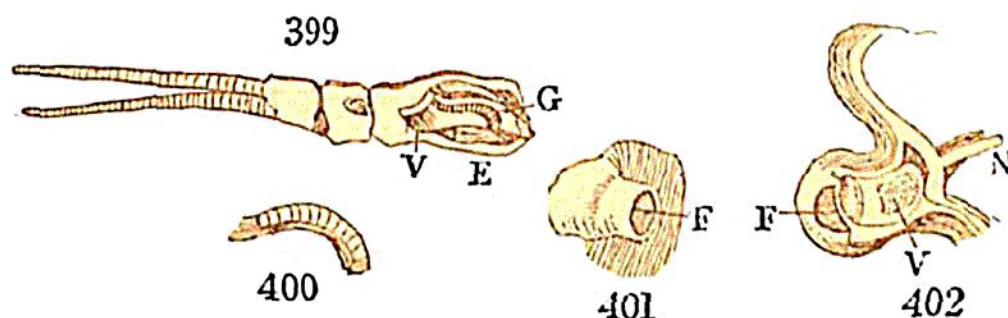


§ 3. Comparative Physiology of Hearing.

THE structure of the organs of hearing in the lower animals presents a regular gradation from the simple vestibule, with its membranous sac, supplied with nervous filaments, which may be regarded as the only essential part of this organ, through the successive additions of semicircular canals, fenestra ovalis, tympanic cavity, ossicula, ear-drum, meatus auditorius, cochlea, and concha, till we arrive at the combination of all these parts in the higher orders of the Mammalia. The simpler forms are generally met with in aquatic animals, probably because the sonorous undulations of water are communicated more readily, and with greater force, than those of air, and require no accessory apparatus for their concentration. The lobster, for instance, has a vestibular cavity (seen at v, in Fig. 399,) containing a membranous sac, with a striated groove (g,)* and receiving the filaments of the auditory nerve. This vestibule is protected by the shell on all sides, except at one part, where it is closed only by a membrane (e,) which may therefore be considered as corresponding to the fenestra ovalis. The outer side of this membrane in the *Astacus fluviatilis*, or cray-fish, is seen at f in Fig. 401; while Fig. 402, shows an



ear-drum be destroyed, and the ossicula lost, an almost total deafness generally ensues. After a time, however, the hearing may be in a great measure recovered, with an undiminished power of distinguishing musical tones. See two papers by Sir Astley Cooper, in the Phil. Trans. for 1800, p. 151; and for 1801, p. 437.

* This groove is represented magnified in Fig. 400.