posited; the greatest quantity of iron being collected together at that part.

2ndly, That this point is endued with the same kind of attraction as the pole of the hemisphere where the ship is: consequently, in New Holland, the south end of the needle would be attracted by it, and the north end repelled.

3rdly, That the attractive power of this point, in a ship of war, is sufficiently strong to interfere with the action of the magnetic poles, upon a compass placed upon or in the binacle.

The above suppositions, Capt. Flinders thinks, will account for all the observed differences; and, admitting this opinion to be well founded, it ought, he says, to follow, that when the ship is on the north side of the magnetic equator, the differences in the variation of the magnetic needle, arising from a change in the ship's head, must be directly contrary to those above described. A few observations are given, which tend to confirm this opinion, and which also seem to show that the variation is more westerly when taken upon the binacle of a ship whose head is westward in north latitude, than when observed in the centre of the ship.

Capt. Cook having observed a considerable variation in the compass while taking some observations upon Pier Head, on the coast of New Holland, Capt. Flinders thought it right to make some fresh observations at that place. He found, as Capt. Cook had done, that the stones which lay on the surface of the ground did not produce any sensible effect upon the needle, but that a considerable variation took place, by a change of situation of a few yards only, at the top of the hill. Whether this arises from a particular magnetic substance lodged in the heart of the hill, or from the attractive powers of all the substances of which Pier Head is composed being centered in a point, similar to what Capt. Flinders has supposed to happen in a ship, is, he says, a question he shall not attempt to decide.

The Physiology of the Stapes, one of the Bones of the Organ of Hearing; deduced from a comparative View of its Structure and Uses in different Animals. By Anthony Carlisle, Esq. F.R.S. Read April 4, 1805. [Phil. Trans. 1805, p. 198.]

The bones of the organ of hearing, or ossicula auditūs, in man and in the mammalia, form, Mr. Carlisle says, a series of conductors, whose office seems limited to the conveyance of sounds received through the medium of air; no parts corresponding to such bones being found in fishes. In two of the classes of animals, however, namely, birds, and the amphibia of Linnaeus, there is only one ossicle of the tympanum, which is in the situation of the stapes.

Mr. Carlisle then proceeds to give a minute description of the human ossicula auditūs, especially of the stapes. This description we shall pass over, that we may be the more particular in our account of the varieties observed in the last-mentioned bone in other animals.

The configuration of the stapes, or indeed of the other ossicles, is
not governed, Mr. Carlisle says, by the form, habits, or voice of the animal, except in those mammalia which inhabit the waters, such as the seal, the walrus, and the whale tribe: in these the stapes is more massive; but in the otter, which only dives occasionally, the stapes does not differ from that of the fox. In the tiger, the dog, and other ferae, the crura are straight, and meet in an acute angle; but the same figure occurs in the horse, in the beaver, in the goat, and in many other herbivorous quadrupeds. In the cete, the muscle of the stapes pulls the capitulum at such an angle, as very much to depress its subjacent end into the fenestra vestibuli; and the joint appears capable of considerable motion. In the walrus, this ossicle is entirely solid: in the seal, and in the cete, the bone has only a small perforation instead of the crural arch.

Mr. Carlisle has discovered a very remarkable singularity in the stapes of the marmot, and in that of the guinea-pig. In those animals, the bone is formed of slender crura, constituting a rounded arch: through this arch an osseous bolt passes, so as to rivet it to its situation. This bolt, to which Mr. Carlisle has given the name of Pessulus, is placed near the top of the arch, so that, by the action of the stapedeus muscle, the upper part of the straight crus is brought into contact with the pessulus. The use of this mechanism is not obvious, there being nothing in these animals, excepting their shrill whistle, peculiarly different from others which are destitute of such mechanism. In the kangaroo, the stapes is like the corresponding ossicle in birds, called Columella. In the two species of Ornithorhynchus (paradoxus and hystrix), this resemblance to the columella is still more striking, and forms an additional point of similarity between these singular quadrupeds and birds. These columellae are articulated to a small bone, which performs the office of the manubrium of the malleus; whereas, in birds, the capitulum of the columella is slightly expanded, and is joined to a triangular plate of cartilage attached to the membrana tympani. In some birds, a small foramen occurs in the middle of this plate.

The amphibia are provided with columellae similar to those of birds; but the cartilage is united to the under surface of the true skin, without any apparent application of muscles to alter its tension.

From the preceding circumstances, Mr. Carlisle is led, he says, to the following conclusions:—In man, and in most of the mammalia, the figure of the stapes is an accommodation to that degree of lightness which seems a requisite condition; and that bone is especially designed to press on the fluid contained in the labyrinth; the ultimate effect of which pressure is, an increase of the tension of the membrane closing the fenestra cochleæ.

There does not, in Mr. Carlisle’s opinion, appear to exist any motion between the ossicula auditus that bears any relation to the peculiar vibration of sounds. He rather conceives, that the different motions of these bones only affect the membrana tympani, so as to lessen the intensity of violent impulses. Sounds of less impetus, not
requiring such modulation, are transmitted by the vibrations of the integrant parts of these bones, unaccompanied by muscular action.

This reasoning, Mr. Carlisle says, is suggested by the columnæ in the aves and amphibia; for, since many birds accurately imitate a variety of sounds, it may be inferred that they hear as acutely and as distinctly as mankind.

The muscles of the ossicula auditūs appear to be of the involuntary kind; their peculiar stimulus is sound, and the chorda tympani is a gangliated nerve. If the above supposition is true, the muscles may be considered as all acting together; especially as it is well known that some persons who hear imperfectly are more sensible to sounds when in a noisy place; as if the muscles were then excited to action.

It cannot, Mr. Carlisle thinks, be allowed, that the pressure of the watery fluid in the labyrinth is necessary to produce the sensation of hearing, since birds hear without any such mechanism: such pressure, however, would give increased tension to the fenestra cochleæ; and, as the membrane of that fenestra is exposed to the air contained within the cavity of the tympanum, it appears adapted to receive such sounds as pass through the membrana tympani, without exciting consonant motions in the ossicula auditūs.

In order to investigate the truth of the above opinions, Mr. Carlisle had water, at the temperature of his body, dropped from a small vial into the meatus externus, the tragus being previously pulled towards the cheek. The first drop produced a sensation like the report of distant cannon; and the same effect succeeded each drop until the cavity was filled.

In this experiment the vibrations of the membrana tympani must, he says, have been impaired, if not destroyed; yet the motions of the membrane produced by each drop of water affected the air contained in the tympanum, sufficiently to produce a sensible impression.

That something like this occurs in many kinds of sounds, is, Mr. Carlisle thinks, more than probable; and as the cochlea consists of two hollow half cones, winding spirally, and uniting at their apices, it follows that the sounds affecting either of the cones must pass from the wide to the narrow end; and the tension of the parts, in either case, will necessarily aid the impression.

On an artificial Substance which possesses the principal characteristic Properties of Tannin. By Charles Hatchett, Esq. F.R.S. Read April 25, 1805. [Phil. Trans. 1805, p. 211.]

Mr. Hatchett, after mentioning the experiments made by several eminent chemists on the substance generally called Tannin (but which he thinks would be better expressed by the word Tan), observes, that the results of those experiments have established, that tan is a peculiar substance, naturally formed, and existing in many vegetable bodies, such as oak bark, &c.; but that no one has ever