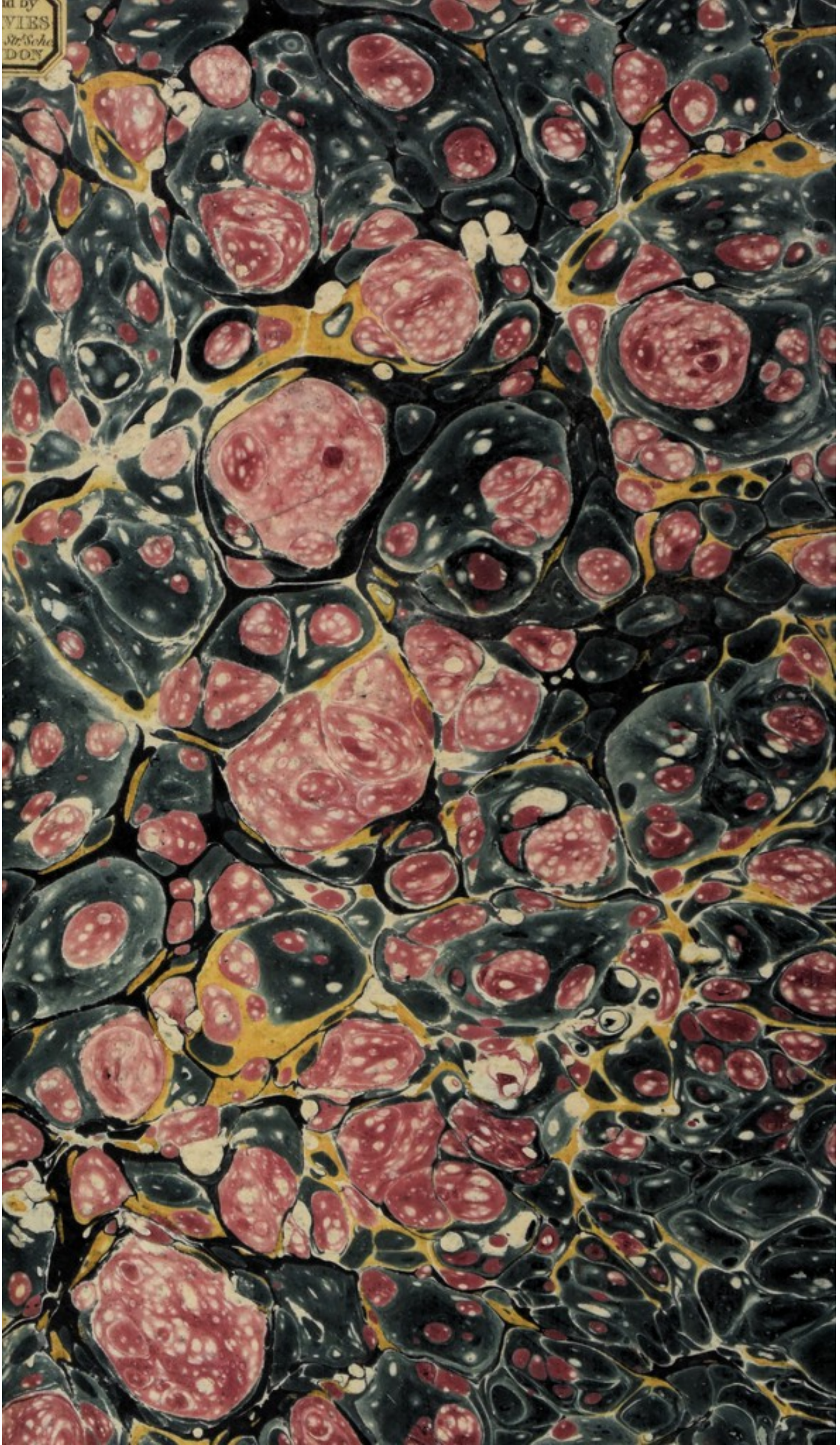
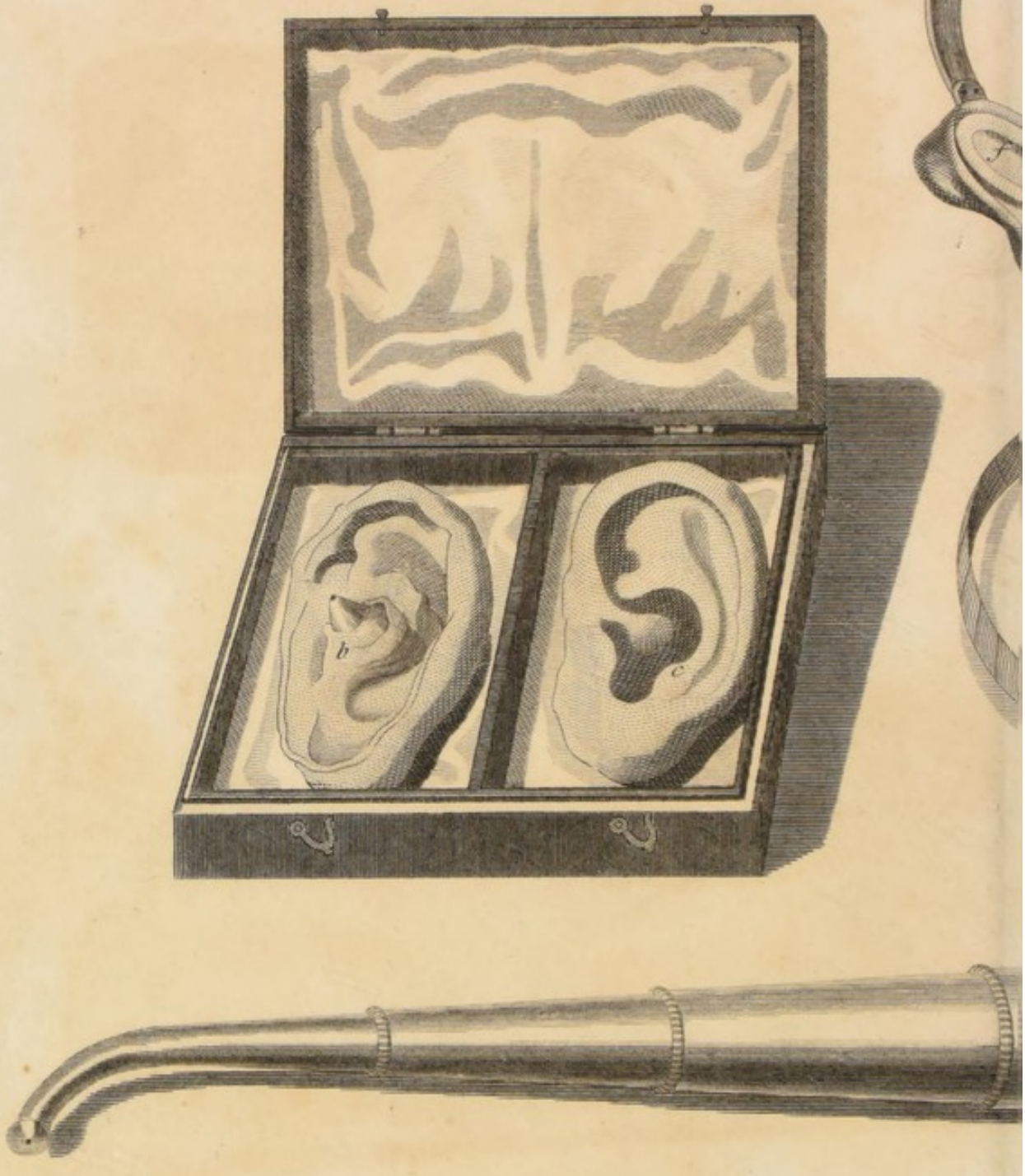
A treatise on the physiology and diseases of the ear ; containing a comparative view of its structure and functions, and of its various diseases, arranged according to the anatomy of the organ, or as they affect the external, the intermediate and the internal ear / By John Harrison Curtis.





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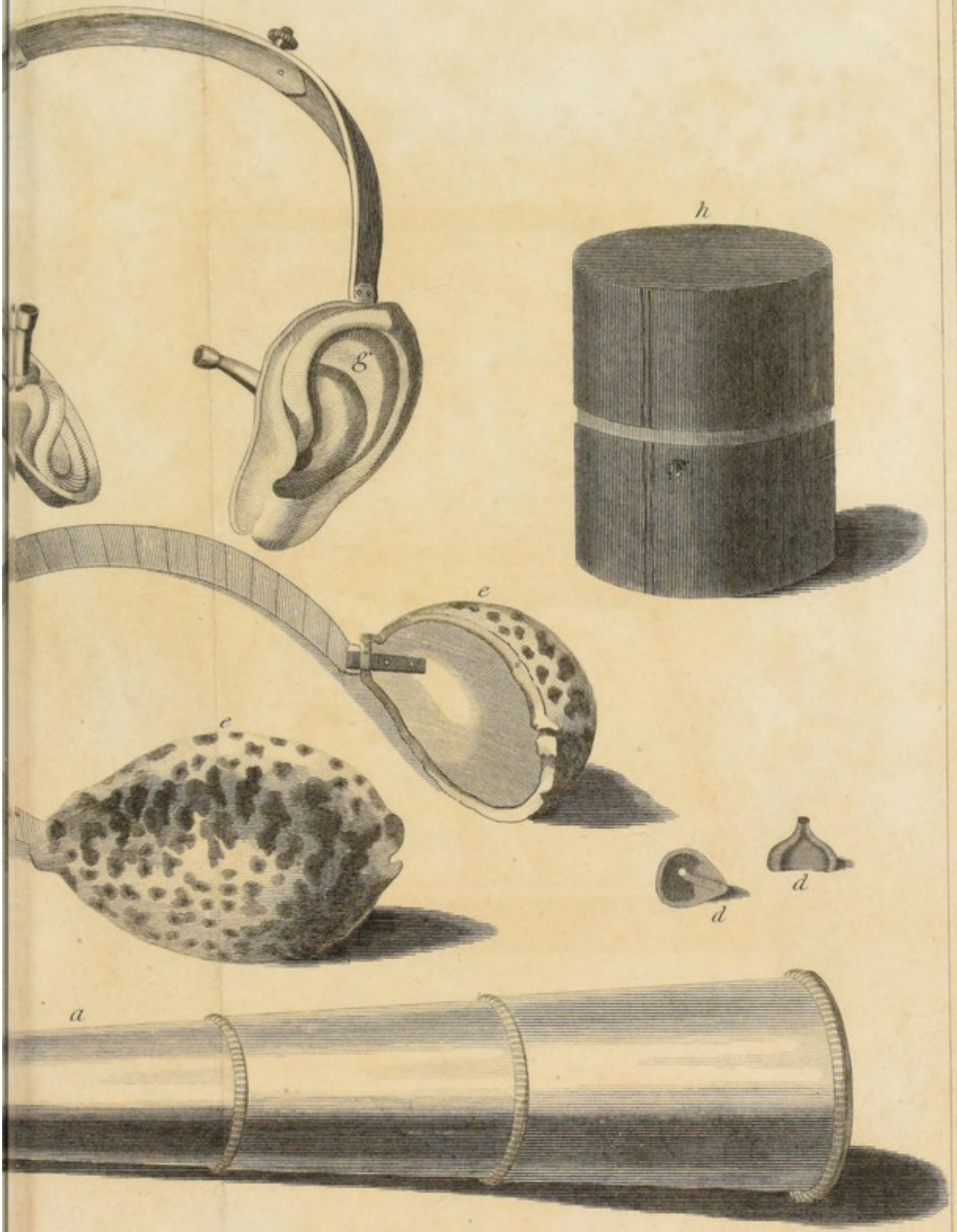

Neele Sculp. Strand.

Instruments.

A

TREATISE

ON THE

Physiology and Diseases

OF THE

EAR;

CONTAINING

A COMPARATIVE VIEW OF ITS STRUCTURE AND FUNCTIONS,

AND OF ITS

VARIOUS DISEASES,

ARRANGED ACCORDING TO THE

ANATOMY OF THE ORGAN, OR AS THEY AFFECT THE EXTERNAL, THE INTERMEDIATE, AND THE INTERNAL EAR.

BY

JOHN HARRISON CURTIS, Esq.

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1817.

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TO HIS

ROYAL HIGHNESS

THE PRINCE REGENT,

IN TOKEN OF THE

AUTHOR'S GRATEFUL SENSE

OF HIS

ROYAL HIGHNESS'S GRACIOUS CONDESCENSION,

IN BECOMING THE PATRON OF THE

Royal Dispensary for the Diseases of the Ear,

AND IN

APPOINTING HIM

AURIST TO HIS ROYAL PERSON,

THIS WORK

Is most respectfully dedicated, by

His Royal Highness's

Most obedient and most

Devoted Servant,

John Harrison Curtis.

Soho Square,
April 14th, 1817.

EXPLANATION OF THE PLATE.

a. Hearing Trumpet.

b. French Artificial Ear, with gold tube; internal side.

c. French Artificial Ear, with gold tube; external side.

d. The Tubes.

e. Spanish Ears.

f. Internal part of the German Silver Ear.

g. External part of the German Silver Ear.

h. Trumpet Case.

INTRODUCTION.

THE improvements in Medicine and Surgery of late years have been great and important, but more particularly in the latter. In proportion as civilization advances in every state, the number of diseases is augmented, and the profession acquires greater respect and estimation from its more extensive utility.

In former times, Surgery, the most ancient branch, (for external accidents in savage life, always precede internal disease,) was

simple, and of limited extent. As improvement took place, this department became gradually enlarged; and in point of science and principle, as it is now cultivated, it stands on a firmer basis than Medicine. For the benefit of society, it has been subdivided, by its professors, into various departments, which, by calling for a more minute attention to particular subjects, has enlarged our views of them, and made us more capable of affording effectual relief, under circumstances formerly considered as beyond the reach of the Healing Art.

The benefit which has resulted to mankind from the exercise of the Oculist's profession as a distinct branch, is incalculable: the operations on that delicate organ, the eye, are now conducted with a nicety and success unknown in former times: the formation of an artificial pupil, as first invented

by Mr. Gibson of Manchester, and subsequently improved by the late Mr. Saunders, Sir William Adams, and others, has saved the sight of numbers, on whom former operations had failed, and who, without this discovery, must have continued in total darkness for life.

The same happy result to society has been the consequence of the profession of the Dentist. The teeth are essential to the appearance and symmetry of the visage; without them that contour and harmony of features, which the face ought to possess, is wanting: but the teeth are parts of the body which nature has intended should more quickly decay than the other parts, from their greater exposure to external causes, acting upon, and destroying their enamel, and osseous structure. When lost to the constitution, not only is the beauty

of the countenance impaired, but the process of digestion becomes imperfectly carried on, the food is no longer comminuted as it ought to be, and stomach complaints, with a decay of general health, are too often the consequence.

The hand of the artist has here been the assistant of Nature; the artificial substitutes are equal in their effect to the real organized productions originally implanted; nay, to such perfection has the art of man been carried, that in cases of syphilitic complaints, where the palate or bony arch of the mouth has been destroyed, and the unhappy sufferer has been incapable of uttering and articulating, so nicely has mechanism, in the hands of a Faleur, a Ruspini, and others, supplied the defect, that no trace of it can be perceived, either in the articulation, or in the reception of food.

These facts demonstrate clearly the advantage of subdividing the objects of professional pursuit or study, and bending a close attention to one point: it is applying to Science, that which experience has proved to be so successful in the mechanical arts.

In the construction of one small machine, a watch, there are no less than twelve different branches employed in order to perfect it, and to each branch is assigned the making of one separate part; hence the perfection and cheapness to which it is brought.

The same system is conspicuous in all the leading manufactures of this country: and the advantage of the principle has been admirably enforced by the late Dr. Adam Smith, in his Wealth of Nations, as well as by other celebrated characters.

The mind of man, it is clear, though capacious, and possessed of very extensive powers, cannot embrace the whole circle of science, or retain it with that exactness which is necessary to excel; he must select a part of the circle, if he wishes to shine, and must bend his attention to that subject alone, in scientific pursuits. However, it is not intended, by this observation, to convey an idea, that the student should alone endeavour to get acquainted with the department he selects, as a mechanical art, or that he should not travel beyond its bounds: on the contrary, a professional education should be so conducted, as to make every one first acquainted with the general principles and scope of every part of the profession; and this being once attained, and the general studies completed, then, and not till then, he should limit his pursuit to one subject; this subject, in consequence of

his previous acquirements, he will then better understand; he will be able to improve by a comparison and illustration of it with the other branches he has studied, and make them all bear on this favourite, or leading topic: his previous acquirements may be considered in the light of scattered rays, which will be all brought home to this centre point or focus.

It is on this principle, and with an anxious wish to extend the knowledge of this department of surgery, which has hitherto been undervalued from various causes, that the Author begs leave to call the attention of the Public to the present Work.

In estimating the different senses, none will be found of more importance than that of hearing. The ear is the grand medium

which connects man with society; which facilitates all social intercourse, by an unlimited interchange of ideas; and which extends information and intelligence far beyond the power of the eye, or any other sense. Through this medium man is enabled to conduct the great and complicated business of life; by it, his harangue is heard in the senate, and his commands in the field. It forms the mutual and unembarrassed communication of all sentiment and expression.

Without this sense, how comparatively useless are the organs of speech! and where hearing is defective in early life, dumbness is too often a consequence. Count de Buffon's case of the savage boy found in the woods of Ardennes, in France, is a strong proof that the powers of the mind

could not be developed without this important sense, and the interchange of ideas to which it gives rise.

But the ear, though the most important of all the senses, has hitherto claimed but little attention from the Profession. The diseases of every other organ are well understood, together with the modes of repairing their defects; but the imperfections of this sense having been little attended to by the regular Profession, the treatment has been, for the most part, confined to the hands of empirics: hence, obscurity and prejudice have prevailed in this branch of practice, and an apathy has taken place on the subject, highly injurious to the interests of society.

It has been unfortunately laid down as a maxim, that the diseases of this organ are incurable. But this opinion has no just

foundation; and, in fact, might have been applied with equal propriety to the other organs, on which we daily see such admirable cures performed. Indeed, there can be no doubt but experience, joined with an ardent desire to improve, will be attended with the same success in this as in every other branch of the Medical Science.

But to such a length has prejudice been carried, on this subject, that in cases of deafness in early childhood, where much might have been done, and the misfortune of settled disease in great measure averted, no attempt has even been made to ascertain the defect, or try the smallest means of relief; while it is well known, that, at the birth, and a considerable time after, a viscid mucus often fills up the passage of the ear, in like manner as the meconium does the intestines; and when this ori-

ginal layer, or deposition, is removed, the hearing soon becomes perfect, as at any other period of life.

It has been already stated that *dumbness* is often the consequence of imperfect hearing. An institution has been most laudably established for those labouring under this complicated misfortune. And I have suggested to the Committee of that charitable Institution, the Deaf and Dumb Asylum, that every child introduced into it should be first carefully examined, the precise defect, as far as possible, ascertained, and the point settled, whether the imperfection be confined to the organ of speech alone, or be owing to a complicated disease of both organs. By such examination, relief might often be afforded, and the child placed in a situation of recovery.

In the following Treatise it is meant to inquire fully into the functions and diseases of the Ear.

The published works on this subject are few in number, and are very incomplete. Duverney, among the French, is the only author who has treated the subject scientifically, until our own time, when Dr. Monro, of Edinburgh, first published his very accurate treatise on the anatomy of the Ear; and then followed the work of the late Mr. Saunders, which, besides the anatomy, elucidated the diseases of the ear, and introduced into this department of surgery considerable improvement. His work, however, is more adapted for the Profession, than for general reading; and as it is of importance that those who unfortunately labour under a defect of hearing,

should have some knowledge of the particular causes of the disease, the Author flatters himself that the present Work will be found an acquisition of no small value to those for whom it is more especially intended.

The Work is necessarily concise; but any gentleman desirous of farther investigating this interesting subject, may have an opportunity of so doing, by attending the Lectures of the Author, and the practice of the Royal Dispensary.*

* Vide page 93.

A TREATISE, &c.

CHAP. I.

Of the Structure and Uses of the different Parts of the Ear.

The Ear, though differently modified in some of its parts, possesses the same general structure in all animals. It is divided into an external and internal part, and in the several classes of animals the difference is greater in the external than in the internal division of it.

In quadrupeds this difference of structure is more conspicuous than in the rest, and this difference or variety seems intended to adapt the

animal the better for its particular circumstances or mode of life.

On examining the external ear in quadrupeds, it is found to resemble the oblique section of a cone, from near the apex to the base. Hares, and other animals exposed to danger, and liable to be attacked by man or beasts of prey, have large ears, and they are particularly directed backwards; while their eyes at the same time, full and prominent, warn them of any danger in front. Rapacious animals, on the contrary, have their ears directly forwards, as is observable in the lion, the tiger, the cat, and others. Where the peculiar nature of animals is such as to require that sound be distinctly heard from a low situation, as, for instance, slow hounds and others, they will be found to have either large hanging-down ears, or have them flexible, since they move their heads with more difficulty than man. Fowls, again, differ from quadrupeds in having no external ear; but in place of it there is a tuft of very fine feathers, which covers the passage to the ear: this covering allows the

sound to pass easily through; and it also prevents any insects, or external matters which might prove a source of injury, from getting into it.

To them an external ear would have been inconvenient, as causing an obstruction in the course of their flight, in passing through thickets, and other nearly impervious places. In the external ear of the fowl, there is situated a liquor to lubricate it, and, from its disagreeable quality, to prevent the entrance of insects.

On examining farther the different tribes of animals, we find that fish have a complete organ of hearing, and equally perfect as that of the other classes. The element, also, in which they exist, is proved to be one of the best mediums for the transmission of sound: thus, in the skate, on dissecting the head, we find placed, at some distance behind the eyes, a bag which contains a fluid, and a soft cretaceous substance; these are the vestibule and cochlea of this creature, corresponding to similar parts of the internal ear in man. There is, also,

distributed upon this bag, a part of the auditory nerve, resembling what is termed the *portio mollis*, or branch of the seventh pair of nerves, in the human subject: they have likewise semicircular canals, a leading part of the internal ear, filled with a fluid which communicates with this bag; and they have also an external passage, which communicates with this internal part.

In the cod species, instead of this soft cretaceous substance, I have noticed, there is found a hard crustaceous stone; but there seems no appearance of an external passage, as in the skate.

In prosecuting our inquiries farther, the ear has been discovered in insects; it lies at the root of their antennæ, or feelers, and can be distinctly seen in the lobster, and some others of the larger kind.

On the whole, this organ of *hearing* is so constructed, in every class, as to be peculiarly

adapted to the mode of life, and other circumstances connected with the situation of the animal.

Man has the most perfect external ear of all animals: as he must hear sounds equally from all quarters, and especially such sounds as are transmitted from his own height, so his external ear is both large, and placed in a vertical manner, turned somewhat forward. But to compensate the animal when compared with man, the former in general possesses, in this respect, a greater power of motion, and is furnished with a greater number of muscles. Thus animals can direct or apply the cone of the ear to the sonorous body without moving the head.

When the motion of the external ear takes place in man, which has been known in some rare instances, it does not seem to add any thing to the perfection of the sense, as it does in them.

In describing the human ear, it is divided by

anatomists into three parts, the external ear, the intermediate, and the internal.

The outward ear is designed by nature to stand prominent, and to bear its proportion in the symmetry of the head; but in Europe it is greatly flattened by the pressure of the dress. It consists of elastic cartilage, formed with different hollows, or sinuosities, all leading into each other, and finally terminating in the concha, or immediate opening into the tube of the ear. This form is admirably adapted for the reception of sound, for collecting and retaining it, that it may not pass off, or be sent too rapidly to the seat of the impression. The intermediate ear displays an irregular cavity, having a membrane stretched across its bottom; and this cavity has a communication with the external air, through the tube which leads into the fauces. The tympanum, or drum, which stretches across it, is intended to carry the vibrations of the atmosphere, collected by the outer ear, to the chain of bones which form a peculiar mechanism in the tympanum.

The internal ear may be considered as the actual seat of the organ: it consists of a nervous expansion of high sensibility, the sentient extremities of which are spread in every direction, and in the most minute manner, in osculating with each other, and forming plexus, all for the purpose of increasing sensation.

Here also the sound is collected and detained, which the mastoid cells and cochlea present. To this apparatus is added the presence of a fluid, contained in sacs and membranes; and as this fluid is in large quantity in some animals, there is no doubt it is intended as an additional means for forcing the impression; and the known influence of water, as a powerful medium, or conductor of sound, strengthens the idea. The internal ear of man, therefore, has all the variety of apparatus which is only partially present in the other classes of creation; and its perfection is best judged of, by considering the variety which the internal ear of other animals exhibits. The internal ear of some animals, we find, consists of little more than a sac of fluid, on which

is expanded a small pulp of nerve; according to the situation of this cavity, as it lives in water alone, or is partly exposed to the air, so in the latter it has an external opening with the ear or otherwise.

All terrestrial animals possess an external opening leading to the internal ear. In fowls, the ear is more of a cartilaginous consistence than real bone. Hence any tremulous motion impressed on the air is communicated merely by the spring and elasticity of these cartilaginous parts, which do not require, in order to render the membrane of the ear tight, the same power or action of the muscles. In the internal ear the semicircular canals appear also very distinct, the same as in man. In all animals the internal ear is composed of a nervous expansion, contained in a hollow or cavity, and assisted in its impression by a sac and fluid also present there.

Such being the structure necessary to the collection and reception of sound, the latter, it is observed, reaches the ear at equal distances,

and in an equal time. The common velocity of sound is estimated to be 1142 cubic feet in a second of time. The knowledge of the velocity of sound is of great use in determining the distance of ships, or other objects, at sea; for if a ship fires a gun, the sound of which is heard five seconds after the flash is seen, then 1142 multiplied by five, gives the distance 5710 feet, or one English mile and 430 feet.

All sound is conveyed in waves or vibrations; and where these meet with an obstruction in their course, which is hard and of a regular surface, on striking against it, they become reflected. If the ear be placed in the course of these reflected vibrations, it will perceive a sound similar to the original one, which will appear to proceed from a body situated in the same position and distance as the reflecting medium or obstacle, and exactly as the original sounding body was before.

This sound is properly termed an echo, or a

reflecting one, thrown upon the ear by the obstructing body.

Reflected sounds, like reflected rays of light, may be deflected, that is, magnified or turned off, by contrivances similar in principle to those made to increase the powers and extent of vision. Thus, where there is an elliptical cavity, or sound uttered in one focus or point, it will be heard much magnified in the other focus; of this a striking example is given by the effect of sound in domes or vaults, as instanced in the Whispering Gallery of St. Paul's Cathedral. It is on this principle the speaking-trumpet is constructed, so useful at sea; which in its form is a hollow parabolic conoid, having a perforation at the top, to which the ear is applied in hearing, or the mouth in speaking. This principle of reflected sounds applies to the ear itself. From the hard bodies situated in the internal ear the sound is evidently reflected back to the other parts, so that the organ may be said to combine both principles of receiving the impres-

sions directly, and again indirectly, by the reflection of the sounds which strike on its harder or bony parts, which are thus applied a second time, as it were, to the auditory nerve. This idea is strengthened by the circular shape of the canals, where the sound striking on one focus will be magnified as it extends to the other.

The same may be said in respect to the cochlea, and all the internal parts of the organ, which are certainly formed for this reflection and reverberation of sound. Indeed, it is only by comparing the structure with the parts we know, that a just idea can be formed of the peculiar and intricate structure we observe, as we cannot suppose any part of the fabric is made in vain.

Besides the effect of the hard and bony parts of the ear in increasing the power of sound, the tension of the different membranes seems also an essential requisite. Thus various muscles are so situated as to put the parts on the stretch,

that the sound striking upon them, like the parchment of a drum, may, from this tension, have its influence augmented.

The knowledge of reflected sounds has never yet been taken advantage of by the aurist in applying the principle to the construction of artificial means for assisting the faculty of hearing; the only principle attended to has been, to increase the collection of sounds by extending the canal of the auricle or external ear, in the form of trumpets and cones: but if the farther power of reflected sound were admitted into these instruments, as I have now attempted to do, on the plan of the speaking-trumpet, a two-fold advantage would arise, both in a greater collection of the vibrations, and in the more powerful and repeated application to the organ.

Besides the perfection attached to the structure of the human ear beyond that of other animals, its nervous texture internally is of a more delicate and sensible nature. Thus the

nerves are even more acute or sentient than in the other parts of the body. All the nerves of the internal ear display a soft pulpy substance, but are never seen in the form of a firm cord.

The auditory nerve also as it enters the internal passage of the ear, is accompanied by a larger artery than most of the other nerves, to heighten the sensibility; for increased circulation has every where this effect; and it also forms into plexus, or combinations, for the same purpose.

From this view, then, the parts essential to hearing are,—

First. An external ear;* for in man, whenever this part is completely removed, deafness is a consequence.

* The external ear can only be considered as accessary in its functions to the internal; and it was conceived by the Count de Buffon, that hearing could take place without it. This he considered proved by the instances ofdogs, and other animals,

Secondly. The membrane of the tympanum, which may be partially injured, but never can be completely removed, without producing deafness.

Thirdly. The stapes; for all the small bones of the ear may be removed without causing deafness; but the stapes is the only one that prevents the escape of sound from the internal ear.

Fourthly. The aperture of the Eustachian tube, as preserving the access of air through the throat to the tympanum, and its renewal and change in the organ.

from the whim of their owners, being occasionally deprived of the external ear, and suffering no defect by the operation. But though this fact may be true in young animals, and while the expansion of the auditory nerve on the internal ear possesses its full powers and influence to receive the impression of sound, yet it is clear that in the human subject, such a loss would be severely felt; which is confirmed by the advantage of artificial means, in collecting the sound, and strengthening the power of the impression.

Fifthly. The presence of a fluid in the internal ear, which is necessary to heighten the acuteness of impression, and to render it effectual.

Such, then, as I have endeavoured to describe it, is the complex and minute structure of this important sense; and when we attend to the intricacy of its parts, the delicacy of its texture, the numerous windings and sinuosities it every where displays, we are struck with wonder, and admiration at the nicety of its mechanism, and cannot be surprised that the least change should produce on it a deviation from the healthy state.

To conclude: when we contemplate the varied organization of the ear in the different tribes of animals, we shall in all of them find it admirably fitted for their different situations and characters. It is the work of infinite power, and modified by a Supreme Being, who has adapted every creature, whether animate or inanimate, for its place. All our researches

in Anatomy serve to point out this fact, but none more strongly than the investigation of the different organs of sense. A nervous expansion we find the universal medium, on which the impressions are made, and through which they are conveyed. This being the case, all the senses may be considered in a manner as resembling each other, and only differing in their peculiar modification, and what may be termed the auxiliary organization of the parts that transmit the effect to the mind.

CHAP. II.

Of the Diseases of the Ear.

HAVING in the Introductory Part pointed out the necessity of an exclusive attention to the diseases of the Ear as a particular profession, and of the parts of the organ essential to the exercise of its peculiar functions; I now proceed to examine its leading diseases, or those imperfections which occasion deafness, or a loss of hearing. For more clearly understanding their nature, they require to be arranged according to the particular parts of the organ in which they are seated; and they accordingly come to be divided into the diseases of the auricle, or

external ear; diseases of the tympanum, or drum; and diseases of the labyrinth, or internal ear.

Diseases of the External Ear.

The diseases of the external ear are the most simple of any, and have the particular advantage of being open to our inspection, and also to the touch. This being completely within the reach of the eye and the finger, we cannot fail in detecting their nature.

I. *Inflammation.*

From the exposure of the external ear to cold and other causes, it is liable to inflammation. Where this inflammation is confined to the soft parts, the complaint is not very violent; but when it passes beyond these bounds, and extends to the bony passage and cartilaginous substance of which it is composed, it is then attended with the most acute pain and general fever, producing great excitement and uneasiness.

In attempting a cure, resolution, or subduing inflammation in its first stage, is the primary object; and for this purpose, a cooling regimen, the use of saline purgatives, and even bleeding, will be at times indispensable; while cold applications are made to the part to lessen the action of its increased circulation.

The success of resolution is known by the gradual abatement of pain: but should the preceding means fail in their influence, then suppuration must be promoted, and the former plan laid aside, substituting in its stead, warm applications and poultices to the ear; but in some constitutions, it may be observed, so rapid is the process of inflammation in this part, that suppuration is unavoidable.

The matter when formed is generally evacuated between the auricle and mastoid process, or into the meatus, or passage, and not externally. The discharge is mostly by a small opening, and, on healing, the granulations are often pressed out through the opening, and appear

somewhat like a polypus. If the granulations entirely stop the opening, then the discharge is prevented from escaping, and accumulates behind. The patient then suffers a new accession of pain and uneasiness, as if another collection or suppuration were forming; and to give relief in this case, an incision into the sinus must indispensably be made to admit its evacuation.

The proper place for this opening is between the auricle and mastoid process, or where the collection exists; the bone is often destroyed, as a consequence of the inflammatory process. The external opening of the temporal bone, and the external layer of the mastoid process, are the parts destroyed.

The time of teething in young children, is the period when this disease is most apt to occur; and hence its acuteness may be accounted for, requiring often the palliative powers of opium to lull the intense pain it occasions. It is a disease more frequent in scrophulous subjects than others, and thus the propriety of early resolution is pointed out.

II. *Herpes.*

ANOTHER disease of the external ear, more frequent than the former, is Herpes, or an herpetic eruption, affecting it either in the form of an ulcerous sore, or a thickening of the integuments; and in the worst cases, these two states are combined, when the passage becomes nearly closed, and temporary deafness is the consequence; the ichorous discharge issuing from the sore, and collected in the passage, hardens and becomes solid, thus obstructing the entrance of sound, and is accompanied also with a disagreeable smell, or fetor. This disease is at times a consequence of typhus. The whole ear is often excoriated by it, and covered with a layer of ichorous matter.

In the treatment, though the correcting of constitutional acrimony be the principle, the state of the part at the same time requires a primary attention. The inspissated matter is to be removed by properly syringing the pas-

sage with soap and water, and, to do it completely, the choice of a syringe is a matter of consequence. A syringe of a moderate size will answer the purpose best, the power of which is not too great; and the operation should never be trusted to any but a skilful hand. On properly cleansing the ear, an alterative injection is to be employed instead of the soap and water, and the constitution corrected by alterative medicines in small doses, until the cure is completed.

The period for a cure may extend from two or three weeks to the same number of months, according to the circumstances of the case, in respect to its severity and constitutional nature; and this treatment should be continued in a regular and steady manner in order to be successful.

III. *Morbid Septum of the Passage.*

An unnatural septum sometimes obstructs the passage of the ear, proceeding from an elongation of the common skin. As the sound is

hereby communicated no farther than the external ear, and cannot reach the labyrinth or internal cavity, deafness must be the consequence. But this defect more frequently arises from a diseased tympanum, than from any other cause, where the suppuration is considerable, and much matter has been forced out into the passage.

The following is the usual progress of the disease:—The patient, after a puriform discharge from the ear, feels a sudden and considerable increase of deafness, to which he has been in a certain degree subject in consequence of the original complaint. During this original state of deafness, he has been also sensible, on blowing his nose, of air passing at times through the meatus; but the puriform discharge having now ceased, and the patient being also no longer able, on blowing the nose, to feel air escape through the passage, the existence of a septum becomes undoubted. To this may be added the sensation of a particular fulness of the tympanum.

If, under these circumstances, the patient be placed in a clear light, and the ear examined, a septum will be perceived. To remove this impediment, the septum is to be pierced and lacerated; when the hearing will be restored to the same degree in which it prevailed under the diseased tympanum, and before the septum was formed.

So quick is the hearing restored, that, immediately after the operation, the ticking of a watch has been heard at a considerable distance, which could not have been perceived before, even when close to the ear.

After the operation, much attention is necessary to prevent the closing of the sides of the aperture, and the septum being re-produced.

IV. *Excrescences of the Ear.*

The lining of the external passage, like all secreting surfaces, is liable to produce excrescences, termed polypi, which, in appearance,

resemble the common venereal warts; like them they are also the consequence of irritation, being generally conspicuous where a discharge takes place from a diseased state of the tympanum.

A disease of the tympanum is always complicated with this appearance, although this appearance is a secondary symptom; yet at times it appears without any affection of the tympanum, but it is rare.

The treatment here is the same as that employed for excrescences elsewhere. When small, they are best extracted with a pair of forceps, and the root or part to which they adhered afterwards touched with the Argentum Nitratum, or Lunar Caustic. In introducing the caustic, care should be taken not to carry it so far as to injure the tympanum; and with this caution the treatment will be generally successful.

V. *Inspissated Cerumen.*

The most frequent cause of deafness, connected with the state of the external passage, is that arising from collected cerumen or wax; a due secretion of the passage is absolutely necessary to keep it in a healthy condition, as well as to preserve it from external injury. A defective, or too profuse, secretion is equally the cause of deafness, and the cerumen frequently becomes indurated and inspissated to such a degree as to cause obstinate dullness of hearing. The actual quantity to produce this effect cannot be determined; in many persons the secretion is very copious, compared with what it is in others; but unless it be considerably altered by stagnation, it does not seem materially to affect the functions of the part. When accumulated on the membrane of the tympanum, it frequently obstructs the sense of hearing.

The symptoms that particularly mark this

complaint are the following. With the general sense of deafness, there is combined the impression of noises in the ear, consisting either of a particular clash or confused sound, or a heavy sensation like the noise of a hammer: these sounds prevail most while eating.

On ascertaining the presence of these symptoms, and following it up by an examination of the ear, the cause of deafness will be easily detected.

The best means of relief is simply washing out the passage with warm water, by means of a syringe, which Dr. Haygarth found the best solvent of ear-wax, and the only means necessary.

On its removal, the complaint is instantaneously relieved, and the hearing restored. When there is no defect or imperfection of the organ, its removal generally produces a slight irritation of the ear, in consequence of the strong excitement occasioned by forcing the fluid into

the passage; but this soon ceases, without any unpleasant effect. This disease, however simple, has been often mistaken or overlooked, and the cause supposed to lie deep in the structure of the organ, whilst, in fact, it arose merely from the source above pointed out; which shows the necessity, in all cases of deafness, of ascertaining, by an accurate examination, that such a mechanical cause does not exist.

VI. *Accidents.*

From its situation the external passage is subject to occasional accidents, or other mechanical causes acting upon it, than inspissated cerumen.

Thus, in cases of children, small bodies, as peas, cherry-stones, pins, &c. have got into the ear, where, exciting inflammation, they often cause considerable pain before they are removed. A number of remarkable cases of such accidents will be found related by authors.

The great art in extracting them, is to be cautious not to push them deeper; they are best taken out by a pair of small forceps: a little oil may be dropped into the ear before making the attempt.

In the same way, insects at times get into the ear, which produce the most unpleasant feelings in the part, as well as great noise, and often actual pain: the best way of removing them is to drown them, by filling the passage with mild fluids, as water or oil, by means of a syringe, and thus washing them out. Acrid liquors are improper; for, in the endeavour to avoid them, the insect gets deeper. The motion is often so severely felt by children, as to produce a state little short of delirium; after the removal, a little oil of sweet almonds is the best application, to soothe the irritated part.

Even a little oil, in the first instance, will destroy the insect.

VII. *Congenital Inspissation of Cerumen.*

This is a disease more frequent than is generally supposed. All the secreting passages in children, at birth, are lined with a tenacious layer of this natural secretion; it is seen in the bowels, in the state of meconium; and no less in the ears, in the state of viscid wax: the reason of this is, that the parts of the concha and passage are narrow, and such an accumulation is essential to defend the tympanum from the waters of the amnios.

In all apparent deafness of children, the ears should be examined in order to trace whether it is connected with this cause.

CHAP. III.

Diseases of the Tympanum.

I. *Puriform Discharge of the Tympanum.*

The first disease of the tympanum is that named, from its leading symptom, its "Puriform Discharge," which has been accurately and minutely described by Mr. Saunders. The appearance of this discharge is ichorous, and it is sometimes tinged with blood;—if a silver instrument is stained with it, it will turn of a yellow colour. A loss of hearing naturally attends this disease; and the degree of this loss is proportioned to the injury the machinery of

the part suffers—in some cases amounting to total deafness.

The leading criterion that marks the existence of this disease, is the passage of air, on blowing the nose, by the meatus externus: wherever this circumstance can be made to take place, it is obvious the discharge is from the tympanum, and connected with an injury or destruction of its membrane. But though no air pass by the tympanum, still the latter may be diseased; for the inflammation, first beginning in the Eustachian tube, may obliterate it previous to its reaching the tympanum, and bring on its suppuration: this fact is confirmed by dissection.

Although, therefore, air cannot be made to pass at the meatus externus, we are not to consider the tympanum sound without farther demonstration; and this we have in our power by a proper examination.

For this purpose, the ear must be placed in a

strong light, or in such a position, that the rays of the sun may fall into the meatus, and so illuminate it as to render the bottom visible; or, instead of this inspection, the ear may be sounded with a blunt probe, when a person acquainted with the particular feel of the membrane of the tympanum will be able to ascertain it by the touch: but it requires the *tactus eruditus*, or the touch of experience.

The membrane, if defective, will allow the instrument to pass into the tympanum, the bony passage of which is readily distinguishable. Perhaps both modes of ascertaining the disease should be employed.

Such a proper examination and minute inquiry as I have here recommended, will prevent it from being confounded with the Herpes, or ulcerated state of the external passage.

The cure of the Herpes is certain; and as soon as the ulceration heals, hearing is restored.

But in the present complaint, though the discharge cease under the use of medicine, its issue, in regard to the preservation of hearing, is doubtful. A point on which a practitioner should be cautious in offering his opinion to a patient.

This affection of the tympanum is produced by various causes; diseases of the throat are the most frequent. Thus the Scarlatina Maligna, or Scarlet Fever, combined with an affection of the throat, frequently occasion the tympanum to suffer, in consequence of the gangrene, or sloughing, which takes place: even the bones of the tympanum are at times thrown off; and the patient, if he survive the fever, is left completely deaf.

The disease, also, often succeeds the ear-ache, or inflammation of the passage extending to the tympanum; and if the inflammation is not subdued by resolution, then the tympanum and mastoid cells become filled with pus, or matter.

The pus comes to be discharged by ulceration, in large quantity, after the patient has suffered most intense pain. During its progress, the discharge of matter produces, for a time, a relief of symptoms; but, as the disease goes on, fresh matter is formed, and continues to ooze from the passage.

The symptoms that peculiarly mark this disease are, an intense throbbing pain in the ear and head, accompanied with symptomatic fever; and sometimes slight delirium supervenes.

The pain is not always equally intense, but fluctuates in degree; and its paroxysms, or fits, are somewhat like those of the tooth-ache.

It is this resemblance to the latter that has caused it too often to be neglected, or improperly treated. It is a disease that evidently requires the most active antiphlogistic treatment; and nothing stimulant, either in the way of general or topical means, should be employed. Hence acrid substances, and stimulating fluids,

used under the idea of curing the tooth-ache, aggravate, to a certainty, this disease; and suppuration, the very circumstance to be avoided, is hereby hastened.

The treatment to be observed here is obvious: to arrest inflammation in the first instance, if early applied to; and if this be done with energy at the first, all the symptoms will be found to subside. The deafness, which is always great during the inflammation, will gradually lessen, and the deposited lymph, instead of forming pus, will soon be absorbed. But if the inflammation has continued for some time, even though resolution may be accomplished, the patient does not always recover his perfect hearing; and the question is,—how far a proper secondary treatment may obviate this imperfect state, which the previous inflammation has left? The defect here chiefly arises from a deposition of lymph, and perhaps, also, from some thickening of the parts.

We know that, in other parts of the body, a

large quantity of lymph can be absorbed by using the proper means for giving activity to the vessels. As the deafness, after inflammation of the tympanum, arises from this cause, the object is to prevent the lymph from becoming organized, and any thickening of the membrane from becoming permanent, which must continue the defect. The point, therefore, should be, even if suppuration is formed, to make an early opening to evacuate the matter, and thus prevent the membrane from acquiring that state which renders it unfit for receiving acutely the impression of sound. An opening being once made, and the matter discharged, every precaution must be next taken to prevent it from again forming.

But in a vast number of cases of this disease, the attack is slow and insidious, so that at first we are not aware of its commencement :—slight fits of pain are felt, and relieved by a trifling discharge; these fits recur at intervals, and it is not till after a long time that the puriform discharge is fully confirmed.

This disease has divided the opinions of practitioners: by some it is considered as only trivial; by others, as certainly dangerous; and, indeed, any one who regards its consequences on the organ of hearing, must be of the latter opinion. Its progress is rarely stopped, if left to itself, till the organization of the tympanum is destroyed, as well as its contents, or the small bones; when total deafness ensues.

Hence the most judicious treatment is required to arrest its progress; and this treatment is, at the same time, attended with no danger: those, therefore, who think that no interference should take place, I conceive, are highly to be blamed.

They consider it rather as a salutary discharge, which ought not to be interrupted; but the same argument applies to the healing of every sore, and is a relic of the obsolete pathology of former days.

This doctrine, however, is still held out by

many respectable practitioners; but it rests on no solid or just foundation: and in all cases of this disease we are called upon to interfere as early as possible, if we wish to preserve the functions of the organ. Of this prejudice Mr. Saunders, to whom we are indebted for the first clear and judicious account of this disease, gives us some strong instances.

Even the late Dr. Heberden, in his Commentaries, had taken up this popular but mistaken opinion, that it ought not to be healed.

Some of the first surgeons and anatomists, also, have adopted the same idea, on the supposition that the discharge being suppressed, inflammation of the brain might be the consequence. That, however, is more likely to happen from the progress of the disease passing on to ulcerate the parts, and destroy the bone; which ulceration may thus spread to the dura mater, one of the membranes of the brain. But Nature has so provided, that as ulceration proceeds, the membranes generally thicken, as a

safeguard in some measure to check its progress.

In order to convey an accurate idea of this disease, it may properly be divided into three stages.

The first consists of a simple puriform discharge. The second, is when it is complicated with fungus and polypus. And the third, is when a caries of the tympanum attends the discharge.

The progress of the disease is uncertain: at one time it advances rapidly through its different stages; at another, it requires years to make any considerable progress. It is evidently not a constitutional disease, but merely an affection of the part, and as such, is only to be attacked by local means; for general remedies are of no avail. Where the constitution is weakly and infirm, it may be put into a more vigorous state, by the use of tonic medicines, such as bark and other astringents, which

will certainly tend to quicken the healing of the parts. But, at the same time, direct applications to the seat of the disease are to be considered as the true means of cure.

Blisters and setons are here, with many surgeons, favourite remedies: they may, indeed, act as auxiliaries, on the principle of derivation; but they ought to be judiciously used, and confined to habits that can bear such a drain; for if employed indiscriminately, and without attention to this circumstance, the patient may be subjected, for a length of time, to pain and inconvenience, without in any degree promoting the cure.

This disease, I have already stated, is attended with various degrees of deafness, and thus, in like manner, will the degree of recovery be found to vary. The extent of deafness, during the disease, is not always according to the apparent injury which the tympanum seems to have suffered: for in some cases the deafness is trivial, where the injury of structure is appa-

rently great; and in others, the deafness is complete where injury appears to be but small.

In the first stage the inflammation and thickening of parts, will evidently obstruct the passage of sound between the external and internal ear.

In the second stage the mechanical obstruction of a fungus or polypus must still more oppose the entrance of sound, and increase the degree of deafness.

On the suppression of the discharge, in the first or second stage, there is often a remarkable increase of deafness.

Of the real state of the parts it is impossible *à priori* to decide, as from their situation they are invisible; and it would be rash to determine how far the power of hearing is to be restored, or to flatter the patient with delusive expectations; but, whatever the state of the case may be, for the strong reasons already laid down, I

conceive it always proper to make an attempt at a cure; the patient cannot be injured by it, and there is always a chance of doing something in the way of relief, if the disease be not advanced to its last and ultimate stage.

Where the discharge has continued, it forms in part a medium for the transmission of sound; and therefore though offensive in the last stage, the hearing will be still more diminished if it be partially suppressed: thus patients in this state, after syringing their ears, hear better for a time, in consequence of the fluid acting as a temporary medium for the transmission of sound.

Though in very old cases cures may be performed, yet it is to recent ones chiefly that the Aurist is to look for success; but, owing to popular prejudice, the malady is too often slighted or temporised with; and hence it is generally in confirmed cases only that he is consulted: for in the early period of the disease, when relief may be obtained, it is commonly

neglected, till, tired out with the fruitless expectation of nature curing herself, the patient has at last recourse to advice.

No complaint, perhaps, requires greater attention in training it through its different stages, and in varying the treatment of the disease according to these stages. No one remedy is to be trusted to; but the circumstances of each individual case should be studied before any particular method is adopted.

The first stage of the disease will often yield to an injection of the zinci sulphas, or sulphate of zinc, used night and morning, which will often effect a cure in the space of three weeks or a month. It is apt, however, to leave a morbid sensibility of the ear, which occasions pain on the entrance of loud sounds.

The plumbi superacetas, or sugar of lead, is equally useful as an injection.

In some cases the continuance of these injec-

tions has been necessary for a considerable time; which it may be proper to state, in order, first, that the patient may not look for a speedy cure, and, secondly, that he may be induced to persevere a reasonable length of time.

In the second stage of the disease, the point is to extract the fungus or polypus with a pair of small forceps; and, if these excrescences do not come entirely away, to endeavour to pinch the roots till the whole is removed. The roots may then be touched with the argentum nitratum, as before mentioned.

On the removal of the fungus or polypus, the injection of zinc is to be used; and in a great number of cases the hearing will be restored, and the discharge suppressed.

When the fungus or polypus is removed, the morbid state is then reduced to the same as I mentioned in the first stage.

In all cases of this disease where a cure is

completed, the healing process seems to be effected by the extension of the cutis, or skin of the meatus, into the tympanum, and its becoming continuous with the membraneous lining.

This fact is confirmed by dissection in several cases of the disease, where such a continuation clearly appeared.

After a cure, as a free passage of the air takes place, it occasions a drying of the thinner or watery parts of the discharge; the remainder accordingly becomes inspissated, and is the cause of occasional increase of deafness: but though this be the case, if a practitioner, when consulted, ascertains that there has been a previous discharge, he should be extremely cautious of employing any forcible means to remove it, lest he should endanger the re-production of the former disease.

II. *Obstruction of the Eustachian Tube, requiring perforation of the Tympanum.*

From its puriform discharge, the next affection of the tympanum I have to consider, is, the influence produced on it by the obstruction of the Eustachian tube.

By this obstruction a very great degree of deafness is produced, and air can no longer be admitted into the cavity of the tympanum, while the included portion of air is either absorbed or else it remains.

If it remain, it becomes condensed, and counterbalances the pulses of air excited by sounding bodies; if it be absorbed, the membrane of the tympanum is carried by the pressure of the atmosphere as far as its limits can go, and in this case cannot vibrate, as it ought, to any considerable degree. That this last opinion is the most just, is confirmed by dissection, which has

shown the tympanum in a number of cases filled entirely with mucus, and, consequently, that the air had been absorbed.

The cause of the obstruction of the Eustachian tube, as before stated, is either syphilitic ulcers, or sloughing from the cynanche maligna, or putrid sore-throat.

It is on the healing of the ulcers that deafness ensues; for then the obstruction becomes complete, and the opening into the throat is as it were sealed up: besides these causes, a polypus, or one depending from the pharynx, has occasionally produced the same obstruction; and an enlargement of the tonsils, where it continues, as in some cases, permanent, has been attended with the same effect.

This species of deafness is attended with no peculiar or diagnostic symptom to mark it, except the actual loss of hearing. There are neither distressing noises in the ear, nor any of

those other sensations which indicate a diseased state of the auditory nerve, or certain morbid causes acting upon it.

The true criterion to distinguish this is, that some conspicuous disease of the throat always precedes it; and therefore the previous history from the patient is of great consequence in ascertaining it.

On examining the parts in this case by dissection, I have found that the obstruction lies in the cartilaginous extremity of the tube. There are instances, however, where the obstruction depends on an increasing or superabundant ossification, filling up the substance of the bone.

In such cases the disease is slow in its progress, different from the former, and at the same time shows no obvious cause.

Though this species of deafness is highly

formidable, yet the cure of it has been in many instances accomplished, by means of an operation first suggested, and successfully performed by Mr. Astley Cooper: to this he was naturally led by the important observation, that the sense of hearing, though imperfect, is not destroyed in cases of suppuration of the tympanum, or its partial injury from other causes; hence, as deafness is complete from obstruction of the tube, from no entrance being given to the air, he very rationally supposed that, by making a small puncture in the membrane, in order to allow the air to get access, the machinery of the ear would thus be set in motion.

The experiment confirmed the justice of the idea; and hearing has been preserved in a number of instances in this way, not only by Mr. Cooper, but also by myself and others.

The operation is performed by simply passing the instrument into the meatus, and pushing it through the anterior and inferior part of the

membrane of the tympanum, for in this position the manubrium of the malleus will be avoided; a circumstance particularly to be attended to, in order that no part of the machinery may be injured.

Immediately on making the perforation a little crack will be heard by the patient, like the tearing of parchment, from the rapid entrance of air through this narrow aperture. In directing the instrument, care should be taken that it does not penetrate the vascular part of the membrane so as to occasion an effusion of blood; otherwise the success of the operation may be defeated.

When the operation is properly performed, hearing is instantaneously restored: by the perforation a new substitute is made in the small aperture for the Eustachian tube, and the air being thus admitted into the tympanum, the action of the membrane, and of all the connecting machinery, is in a certain degree re-established.

An eminent surgeon * informed me, that he has performed the operation with success, merely with a common probe.

In such cases the only danger of a relapse is from a closing of the puncture: to avoid this, a larger perforation may be made; but then in proportion is the membrane of the tympanum diminished, and consequently the acuteness of the sense of hearing lessened.

The small opening, therefore, is to be preferred, even should a re-union take place. When this happens, it is generally three or four days after the operation, though sometimes I have seen it later.

The most favourable circumstance is when the sides become fistulous, for then the sense of hearing is certainly saved.

When re-union takes place, the operation

* Mr. Astley Cooper.

requires to be repeated, and there is no danger attending it. In one patient, Mr. Saunders performed it three successive times in a very short period; and then, not wishing to have occasion to repeat it, he made a sort of laceration which was successful in preserving the opening; but the degree of hearing, he acknowledged, was lessened by this great enlargement.

CHAP. IV.

Diseases of the Internal Ear.

The diseases of the Labyrinth, or Internal Ear, may be divided into the constitutional or local, or such as influence it from a morbid condition of the brain, and such as arise from a change in its whole structure.

I. *Constitutional.*

Of all the causes of deafness, that which proceeds from an organic affection of the brain is of course the most dangerous. In apoplectic cases, with faultering of speech and blindness, we find deafness also produced by the general

affection of the head. But worst of all is the case where a tumour of the brain compresses the origin of the nerves; for here the deafness is complete, and no impression can be conveyed through the organ to the mind.

A tumour, however, in the vicinity of the organ of hearing, though it runs its course, and proves fatal in the end, has rather a contrary effect; and even while the pupils are dilated, and there is every appearance of pressure on the brain, a morbid acuteness takes place, in consequence of the surrounding inflammation. Indeed, the auditory nerve often becomes acutely sensible in disease, or the patient suffers from acuteness of perception, or has a *tinnitus aurium*, or singing of the ears, analogous to the flashes of light which sometimes affect the eyes in total blindness, and which those experience who are blind of cataract.

So morbidly acute does sensation become in some persons under disease, that the least motion

of the head will excite a feeling like the ringing of a great bell close to the ear.

In delirium also, in vertigo, in apoplexy, and in hysteria, the increased sensibility of the organ becomes a painful sensation. In paralytic affections of the face, we find there is deafness in the corresponding ear, if the affection of the nerve be near the brain; which is explained by the intimate connexion between the auditory nerve and the communicating one of the face. From observing the course of the latter nerve through the temporal bone, and its connexion in the tympanum, we know why, in violent tooth-ache, and in *tic douloureux*, we find the Eustachian tube and root of the tongue affected.

The ear is also sometimes affected by sympathy, from foulness of stomach and bowels; and the same reason may be assigned for the symptom of hypochondriasis—that they are affected with strange sounds, and in the case

of intestinal worms, we find murmuring and ringing of the ears a symptom. Of the organic diseases of the ear there is little to be found on record. It would seem, at times, that the fluids become so altered in their consistence as to prove an absolute destruction of the organ.

Mr. Cline found in a person deaf from birth, that the whole internal ear was filled with a substance like cheese.

A disease also of the auditory nerve, like that of the retina, or optic nerve, in the gutta serena, is no unfrequent complaint; and in several cases lately, I have treated it as amarosis, with considerable success.

Deafness in acute fever is considered a favourable sign; as it argues, according to the old theory, a metastasis, or translation of the morbific matter; or rather, according to modern opinion, it shews a diminution of morbid sensibility of the brain. The accumulation of the vessels of the brain, or of the auditory nerve,

will also produce deafness, and unusual sensations of the ear. This we find instanced in suppression of the menses, and in hæmorrhoids, surfeits, &c: in which cases it is found preceded by vertigo and head-ache.

In comparing the diseases of the ear and the eye, we find a considerable analogy subsisting between them; but in those of the eye there is one advantage, that the transparency of its humours is a leading mark to direct us, which we do not possess in the case of the ear: but in judging of the diseases of the internal ear, we should always endeavour to determine, whether it is in the seat of sense or in the brain that the real affection lies; otherwise our attempts to relieve will be ineffectual.

II. *Local.*

From the constitutional diseases of the internal ear I proceed next to examine the local; and, however varied the change of structure on which they may depend, they have all been

comprehended and treated under the vague, and, perhaps, too general term of nervous deafness.

The general symptoms by which this species of deafness is distinguished are, various kinds of noises affecting the head, and communicated from the seat of the organ.

At times, these noises seem somewhat to resemble the murmuring of water; at other times, they may be compared to the hissing of a tea-kettle as it boils over; on other occasions, they are represented by the patient as like the rustling of leaves, the blowing of wind, &c.: all these noises are to be considered as false perceptions in the organ, not arising in the nerve itself, but in the condition of the parts about it.

There is a particular species of this deafness, which represents a beating noise, like a pulse; this noise is much increased by any bodily exertion occasioning an increased action of the

heart. The cause of this species clearly depends on an irritation of the arterial system; but whether depending on the small arteries of the labyrinth, or on the internal carotid artery, which passes close beneath the cochlea, is uncertain; but whichever of these may be the cause, it gives rise to the same false perceptions as in the other species.

In all cases of this nervous deafness, when it affects one ear, I may observe, it is in general rendered worse by the conduct of the patient himself; for when the organ of one side is injured, we hear so much better with the other, that we attend only to the sensation conveyed by it, and neglect the duller sensation. The effect of this is, that the diseased ear becomes worse, and the same consequence arises as that which takes place in the eyes by squinting.

In attending to the treatment of nervous deafness, if the practitioner is early applied to, and the disease is still in its first stage, it may be considered in general as curable.

But where this species has continued long, and the organ has been habituated to this state of false perception, any attempt at a cure may be considered as a hopeless undertaking. The mechanical contrivances, however, are here very useful.

In entering upon the treatment of nervous deafness, it is essential to observe, that a great similarity exists between it and that species which arises from a venereal cause. In nervous deafness, therefore, it is proper to inquire minutely into the history of the case, and to ascertain from what source the disease originates.

Two cases of nervous deafness, proceeding from a syphilitic cause, came lately under my care, both of which yielded to a regular course of mercury, and the function of the organ was in each completely restored.

Again, where the connexion of the disease with venereal causes is not so clear, instead of

the above treatment, a strict antiphlogistic course, if the patient be able to bear it, will often prove successful, namely, powerful saline cathartics, of which the best is the vitriolated magnesia; the doses should be repeated as often as the strength of the patient will admit, and in the intermediate time small doses of the submuriate of mercury are to be administered, to promote absorption, by taking off any thickening of the parts, which is apt to impede the due performance of the functions of the organ.

This practice will in most incipient cases succeed; and, if not completely, will at least considerably palliate the predominant symptom; and in all cases it ought to have a fair trial, for deafness should never *à priori* be considered as incurable.

At the same time, it must be confessed that the diseases of the internal ear are involved in much obscurity. Dissections have proved that a total deafness may exist without any apparent

defect in the mechanism, either of the external or internal ear.

This Mr. Saunders, and others, have shown by the dissection of several cases of persons who had been deaf during life. On examination of these cases, every part appeared perfect; even the nerve and its expansion showed no trace of morbid change; and the alteration, whatever it was, was too minute for either the knife or the eye to detect: it consisted, perhaps, in an original want of power in the nerve to receive impressions.

But though I have stated that nervous deafness in its first stage is generally curable, much will depend on the time the treatment is continued, and on the perseverance of the patient and the practitioner.

In some instances a cure has been accomplished in a very short period; in others I have found it necessary to persevere for a con-

siderable time, and recovery at last has taken place.

With respect to the application of topical remedies to the ear, gentle stimulants, in form of liniment, as a portion of the essential oils mixed with the oil of almonds, may be beneficially introduced into the ear, where being retained they will serve as a substitute for the natural secretion, and at the same time to increase the sensibility of the passage.

All the advertised nostrums are preparations of this kind; and, so far as they supply the secretion, and gently stimulate the passage, in some cases they may be useful: but as to the notion that they are to remove an organic affection of the part, the various species of which I have described, it only shows the complete ignorance of those who expect success from such inadequate means of relief.

As I have stated, that there is so little to be

done by medicine in confirmed cases of nervous deafness of long standing, I have with much pains collected a variety of contrivances to assist hearing, many of which I have obtained from the Continent, in order to give all possible relief in such distressing cases.

The newest inventions of this kind, are the artificial ears lately introduced into this country from France, where they were originally manufactured.

By being closely adapted to the ear, they increase the collection of sound; but besides that, there is an additional force wanted to transmit it through the passage. In this respect, the French invention is deficient: to remedy its defect, I have added a small tube, which, by contracting the passage, will occasion the sound to enter with greater impetus. This invention is found very convenient, in consequence of the substitutes being applied over the natural ear, which they are made to resemble.

The Spanish ears also, made of shells, answer

very well: but, at the same time, I must remark, that these mechanical contrivances, although found to be more serviceable than any thing of the kind in general use, yet do not apply with equal success in all cases; and there are, in fact, cases in which no mechanical contrivance can be of use.

With some patients the German silver ears answer better than any others; but are objected to by many, on account of their weight, and being more conspicuous than the French ears; it also being necessary that they should be fixed by a spring, which goes over the head.

The French ears, being made of a light substance, where they answer the purpose, are generally preferred.

I have also invented a hearing-trumpet, forming a parabolic conoid, on the same principle as the speaking-trumpet used at sea, which is so well known to answer the purpose in extending the impression of sound. It has this convenience, that it shuts up in a small case for the pocket.

CONCLUSION.

I HAVE thus traced, in the preceding pages, the various diseases of the Ear, and laid down the general principles of cure, best adapted to each: but it is to be observed, with regret, that few attempts have yet been made by anatomists to trace the morbid change or affection to which the ear is liable. On this subject we are almost destitute of information, while the diseased appearances of all the other organs of the body have been traced with great minuteness and attention, have been accurately examined and ascertained, and the symptoms which accompany them recorded with precision and care.

But here, it must be confessed, there are

many and great difficulties to obstruct our inquiries; indeed, some of them would appear at first sight almost insurmountable. Nature, as we have seen, has placed the chief and most important part of the ear, in the living subject, beyond the reach of our examination; while, its diseases being rarely mortal, the ears are seldom dissected in ascertaining the causes of death.

The few, therefore, who have applied themselves to the subject of the elucidation of the morbid structure of the ear, have been obliged to dissect such ears as came by chance in their way, without knowing any thing of the previous history of the person to whom they belonged, or the symptoms under which he laboured.

Thus, even though dissection may show the various morbid changes of the structure, the assistance of anatomy is still highly imperfect, in so far as these changes are not accompanied with a knowledge of the symptoms

which distinguished them during the life of the patient.

To the above difficulty, a further one may be added, peculiar to this class of diseases, namely, that a clear and distinct account of the feelings can scarcely be expected from a deaf person, and is seldom obtained.

Though conscious of their imperfection, such persons are not aware of the numerous causes from which it may arise. The approach of deafness, also, is often slow and imperceptible, and unattended with pain, or other strong sensation, to mark its commencement.

Hence few strong impressions are made by it on the mind of the patient for a time, to awaken him to the approaching infirmity; and he loses the faculty of the organ so imperceptibly, that his friends often perceive it before he does himself.

It is from these difficulties, which have been

met with by surgeons and anatomists in their attempts, that the subject of the ear has been so much neglected. But I am inclined to think, that the constant dissection of diseased ears, accompanied by due zeal and attentive research, will lead to much useful information; and comparing the symptoms observable during the patient's life, as often as that can be done, with the appearances of the ear on dissection, will enable us to trace cause and effect; and by so doing, adequate means of relief will often come to be discovered.

But though our knowledge may be thus enlarged in respect to the history and appearances of the diseases of the ear, we shall, perhaps, be often disappointed of success in attempting a cure. This cannot be otherwise, when we reflect that of the diseases of the ear, one-third is confined to the labyrinth, or internal ear; and as this part is totally inaccessible, no manual assistance can be rendered.

But though the aid of surgery is thus pre-

cluded, other secondary means may still be resorted to. Internal remedies are capable of producing changes of a salutary nature, in a great number of local diseases, particularly in those organic affections, whose nature is known and discriminated.

The diseases of the ear, as I before observed, are often constitutional; and the general treatment of the constitution will therefore influence the malady of the particular part. Thus syphilis, in its constitutional form and ultimate stage, attacks the ear, and deafness is produced by this specific cause.

The same course of medicines that removes the other constitutional symptoms, has an equal effect on this organ; and if there are no other constitutional symptoms but deafness, then employing internal medicines, according to the regular method observed in the treatment of this disease, will remove the complaint.

Deafness is often the attendant of a cold, or

inflammatory state of habit; in this state, purging, or aperient remedies, properly administered, will be successful.

Various other instances might be adduced, all tending to show that there are different morbid changes of this organ, as well as of the others, which are curable by a general treatment acting upon the constitution, and thus indirectly affecting the part.

Nay, even the most difficult of the whole of this class of diseases, that which is termed *nervous deafness*, may, as we find in its first stage, be arrested in its progress, and thus rendered curable.

And it may be considered, that while, on the one hand, there are many and great difficulties, which present themselves in the prosecution of our subject, on the other hand, there are some advantages to counterbalance these, and to prompt us forward in our exertions.

In concluding the present Work, therefore, I must again be allowed to urge, that though much may be done to give relief in diseases of the ear, much still remains to be learned in this branch of practice.

As a leading step to this, and that theory and practice may go hand in hand, I have succeeded, with the assistance and patronage of some of the first persons in rank, science, and professional celebrity, in instituting a Public Dispensary for the Diseases of the Ear; where considerable numbers have already been cured, and where pupils have the fullest opportunities of examining the different diseases of the organ, of marking the success of their treatment, and of judging of the issue of any new plans that may be proposed, either by myself, or from the suggestion of others; several eminent professional characters having kindly offered their assistance at the Dispensary.

With regard to the present Work, from my time having been more devoted to objects of

professional practice, than to refinements in literary style, I must bespeak the candid allowance of the Public to its imperfections; I trust, however, that these will be found inessential to the grand objects I am endeavouring to promote; and that, whatever they may be, an attentive revisal, and the kind suggestions of friends, will enable me to correct in a future edition.

CASES.

CASE I.

Mrs. W. applied to me, under a violent inflammation of both ears, attended with much pain and fever.

After taking a few ounces of blood from the vicinity of the parts, and applying warm fomentations, the symptoms gradually subsided. It may be remarked, that her hearing was not much affected, although she could not hear sounds distinctly. By the use of laxative medicines, at the same time adopting an antiphlogistic plan, she is now perfectly recovered.

CASE II.

Miss B. applied to me with an herpetic eruption of both ears, which she had been subject to at different times for the last five years. By taking the Compound Calomel Pill regularly every night, for about a month, and anointing the external part of the ear with an ointment made of equal parts of the Nitrated Mercurial Ointment and Hog's Lard, she is now perfectly well. It was, however, necessary to order her an astringent injection, which was continued for the space of ten days.

CASE III.

Miss L. complained of an ulcer which covered the whole of her left ear. It was not attended with a puriform discharge from the tympanum; but merely the external part was diseased. As

the ulcer had been of long standing, I was fearful that she would lose her ear, as she appeared to be of a scrofulous habit. After continuing the use of an alterative medicine for near a month, and applying the Ointment of Zinc to the parts affected night and morning, they began to put on a better appearance. But in order to hasten the cure, I found it necessary to substitute the Nitrated Mercurial Ointment, mixed with Hog's Lard; which, in the course of a month from her first application, completely restored her.

The ulcer, however, left a slight scar; but was not very observable.

CASE IV.

Mr. C. applied to me with a puriform discharge from the tympanum, which had continued for some time. As it was in its first stage, it yielded to a single astringent injection of the Sulphate of Zinc.

CASE V.

Col. W. applied to me in consequence of a puriform discharge from the tympanum. On inspecting the tympanum, I found it injured; as air could be blown out of the meatus. By observing a strict antiphlogistic regimen, using an injection of the Sulphate of Zinc, and taking an alterative for six weeks, the discharge was suppressed, and the hearing restored.

CASE VI.

Mrs. N. applied to me in consequence of a large polypus which came out of the meatus. It appeared after a puriform discharge from the tympanum. For some time air had passed out of the meatus, on blowing the nose: this symptom had ceased about the time the excrescence was first observed. I succeeded in extracting

the polypus, which came out entire. After dressing for a short time with the Red Nitrated Mercurial Ointment, the parts to which the polypus adhered healed. I conceived it necessary to adopt the alterative and purgative plan, which was carried on for about a month; at the expiration of which time she was quite well.

CASE VII.

Miss W. was sent to me with a polypus in her left ear, attended with a puriform discharge from the tympanum; which had impeded her hearing so much, that her friends took her from school. On inquiry, I learned, that she had had the discharge for some time. I extracted the polypus with a pair of small forceps; but was not able to bring it away entire. I afterwards pinched the roots, and applied the Argentum Nitratum, as recommended by Mr. Saunders.

I found it necessary to order an astringent injection, which, being used for some little time, succeeded in suppressing the discharge. As she was a girl of a delicate constitution, I administered the Bark, joined with a chalybeate. Her hearing is not only restored, but her general health also considerably improved.

CASE VIII.

Mr. L. had been subject to a puriform discharge from both ears, which had troubled him, more or less, for several years. The discharge, when he first applied to me, was very considerable, and was extremely offensive; it was occasionally mixed with blood; and such was its acrimony, that the ear and neck were excoriated by it.

Observing my usual plan of not stopping the discharge hastily by the use of astringent injec-

tions, for fear of producing an inflammation of the brain; a caution necessary to be attended to in the treatment of diseases of this nature.—I prescribed, for some few weeks, small doses of the Submuriate of Mercury, and twice a week some purgative medicine. After following this plan for about ten days, and having blisters applied behind the ears, I ordered him an injection of the Nitrated Silver, which he used night and morning for a month; at the expiration of which time the discharge was suppressed, and the hearing restored.

CASE IX.

Mr. D., aged thirty-two, had been deaf of the left ear from his childhood. On inspection, I found it perfectly sound. The fault evidently lay in a deficiency of the natural secretion: by restoring this, by means of proper applications, and by observing for some little time a strict anti-

phlogistic regimen, so perfectly has his hearing been restored, that he can hear the tick of a watch at the distance of four yards; which before he could not do unless held in direct contact with the ear.

CASE X.

Peter Oliver was recommended as a patient to the Royal Dispensary. He had been deaf nearly four years when he was admitted. As I found it was a nervous affection, I applied blisters behind both ears, put him on an antiphlogistic plan, gave him small doses of Submuriate of Mercury, and occasionally a brisk dose of the Vitriolated Magnesia. In the space of five weeks he was perfectly well.

CASE XI.

DAVID VOIR, a lad nine years of age, was admitted a patient of the Royal Dispensary on the 21st of March. He was a very delicate boy, and laboured under great difficulty of hearing. I treated this case in a similar manner to the former. The blisters behind his ears were kept open for a fortnight, and it was ten days before he found any considerable relief. He continued the use of the alterative and cathartic medicines for some time; which, although they relieved his hearing, reduced him more than I wished. I put him on a strengthening diet, and administered the Bark in small doses; and he has now perfectly recovered his strength, together with his hearing, and is altogether much better in his health than formerly.

CASE XII.

GEORGE DAWSON, aged twenty-two years, was admitted a patient for an obstinate nervous deafness, at the Royal Dispensary, on the 28th of March. On inquiry, I found he had been deaf several years; and upon inspection, I found his ears quite dry, wanting the natural secretion: he complained of the noises in his head, frequently attending nervous deafness, which at times prevented him from following his employment. As he was a robust man, and of a plethoric habit, and was very desirous of obtaining his hearing, I took twelve ounces of blood from his arm, put a seton in the nape of his neck, and applied a blister behind each ear, which were kept open for a fortnight: he took five grains of the Submuriate of Mercury every night, and an ounce and a half of the Sulphate of Magnesia, twice a week; at the same time adopting a strict antiphlogistic regimen. He persevered in the use of his medicines for a short time. As he was reduced, I ordered him the

Bark. He was discharged on the 6th of May. I have seen him since the seton has healed, which it had not when he was discharged. He continues quite well, having his perfect hearing, and is not troubled with any noise whatever in his head.

CASE XIII.

Mr. ——applied to me; his case was similar to the preceding one. I pursued the same plan, only in a milder degree. The blisters were applied; and not having the desired effect, I had recourse to the seton, which was kept open a month. The parts are now healed, and his hearing is perfectly restored.

CASE XIV.

Mr. N., a gentleman resident in Ireland, wrote to me respecting his case; which, from

what I could learn, appeared to be a nervous affection; as, besides being very deaf, his head was much affected with strange noises, which at times made him melancholy.

I prescribed nearly the same mode of treatment as in the preceding case; at the same time ordering him to lose six ounces of blood from the nape of the neck, in case the medicine and antiphlogistic plan did not relieve him. I heard from him a short time since, to the purport that his hearing is much improved, and the noise in his head considerably abated.

His brother has since called on me, to acquaint me he is now quite well.

N. B. In this case the seton was not applied.

The number of cases of incipient deafness, which I have successfully treated, only convinces me, that if early attended to, they are more easy of cure than is generally imagined.

CASE XV.

Mr. Y., a young man twenty-seven years of age, applied to me with an obstruction of the Eustachian tube, which, from what he informed me, I was induced to think, proceeded from a syphilitic cause. After using a stimulating gargle for some time, without effect, I was induced to perform the operation of puncturing the tympanum; which succeeded instantly in restoring his hearing; but I had some difficulty in preventing the aperture from again uniting. The edges of the wound became fistulous, and in a few weeks the membrane recovered its usual tension; and his hearing is now restored.

It may be proper to remark here, that in slight cases of obstruction of the Eustachian tube, I found a slight stimulating gargle of the greatest service, and in my opinion it deserves a trial in cases that are supposed to proceed from this cause; as the remedy is simple, its applica-

tion cannot be attended with any unpleasant effect. It may, indeed, make the throat a little sore; but that soon goes off.

An obstruction may proceed from various causes, as I mentioned in a former part of the Work; but the most frequent cause is a cold, when the orifice of the tube becomes swollen: in that case, a gargle is of great service.

CASE XVI.

Mr. W. came to me with an unusual sensation of both ears, which he had laboured under for some years. On inspection, I perceived there was a quantity of cerumen in a very hard state, collected at the bottom of the meatus. By continuing to syringe the ears, the whole was removed. On the first application of the syringe, which brought away a considerable quantity, he was able to hear the church clock strike, which he had not done for several years

before. What makes this case rather singular, is, that this gentleman conceived he laboured under a violent nervous affection, and came to me for the purpose of obtaining a trumpet; which not answering his expectations, I prevailed on him to let me examine the state of his ears. I need not mention that he was much pleased at being relieved by such simple means.

MANY other cases of a similar nature have come under my observation; all which point out the necessity of minute examination, in order to ascertain the cause of the defect, before offering any decided opinion.

In the dissection of the ears of those who have been deaf for many years, whatever other derangement of structure may exist, there is always a quantity of inspissated wax in the passage, in a very hard state; which shows, that a morbid condition of the organ necessarily affects the secretion of this part, and that

the secretion itself accumulated in this way may act as an additional mechanical cause in increasing the obstruction of hearing.

CASE XVII.

Thomas Hamilton, a boy seven years of age, was brought by his mother to the Royal Dispensary. She informed me he had been both deaf and dumb from his birth. Although I did not give her any considerable hopes of cure, I was desirous of attempting relief. I accordingly employed the same mode of treatment as I have recommended in cases of nervous deafness; having, however, previously ordered the ears to be well syringed. He was admitted on the 22d of April; and since that time his hearing has been improving; and the last time I saw him at the Dispensary, he was enabled to speak a few words. His mother informs me, he is more playful than formerly. The boy looks quite cheerful to what he did, and his hearing is considerably improved within these few days.

Another case also occurred at the Dispensary, of a child brought there who was very backward in acquiring his speech; which I supposed might proceed from deafness. I syringed the child's ears, applied a small blister behind each, and ordered them to be kept open for ten days. At the expiration of that time, the mother found a visible alteration for the better, as the child is now learning to talk very fast.

Several instances might be mentioned, which have come under the observation of others as well as myself, which, in my opinion, claim particular attention: and I am inclined to think, if every child who is supposed to be born deaf, were to have his ears properly examined and syringed, it would be frequently attended with very good effect.

I have no doubt that frequently in childhood, for want of something being done by way of relief, the deafness becomes confirmed, and dumbness follows. The plan I have proposed

in such cases is simple, and is not attended with any danger: I therefore hope it will be followed by all who have deaf children.

I shall not tire the reader with a recital of any more cases: the few I have inserted will be sufficient to show, that diseases of the ear, like diseases of other parts of the body, are often curable, and that, in a great number of cases, the hearing is only impaired, not lost; hence the necessity of attending to them. Although, it must be confessed, many are involved in great obscurity, yet that number is small, when compared with those in which, with attention, the cause of disease may be discovered, and a cure effected.

THE END.

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Anatomy, Physiology, and Pathology,

OF THE EAR,

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