The diagnosis is very easy to determine. The condition could be confused only with that of othæmatoma in its later stage, when sometimes the bluish-red color of the skin, which is dependent upon the presence of a bloody serous exudate, is succeeded by a paler hue, owing to the conversion of the latter into a transparent, syrup-like fluid. The previous history, the course of the disease, and the fact that the lobule is not affected in perichondritis confirm the diagnosis.

The prognosis is favorable, in that healing always occurs even if a deformity results.

The treatment consists first in energetic, local, antiphlogistic measures (ice-bags). If these fail to help, we may resort, in the early stage of the inflammation, to warm, wet compresses, and, if necessary, to incision. It is also a good plan, after making the incision, to scrape out the necrosed cartilage and the fungous granulations, to irrigate the cavity thoroughly with antiseptic fluids, to inject a mixture of iodoform and glycerin into the substance of the cartilage itself, and then to drain the wound with iodoform gauze. When there is a suspicion of tuberculosis, the infiltrated lymph glands must be extirpated.

Tophi.—Tophi are deposits of uric acid salts in the auricle; they are regarded as one of the earliest symptoms of gout. They appear here more frequently than in any other part of the body. They vary in number and in size. Sometimes they are white and contain a milky or creamy fluid; at other times they are as hard as little stones and are firmly attached to the cartilage by an inflammatory exudate. The patient afflicted with these deposits experiences, both before and during an attack of gout, a sensation of smarting and pricking in these nodules. In some cases these deposits will appear shortly after an attack.

Tuberculosis.—Tuberculosis has been observed in the auricle in the form of tuberculous ulceration and in that of a miliary skin tuberculosis (tuberculosis cutis).

Tuberculous perichondritis of the auricle has been described by Haug. It affects the concha, which is red and doughy to the touch. The neighboring lymph glands are also swollen and are sensitive to pressure. The skin over the swelling is somewhat red or bluish in color, but it may be pale; it cannot be indented. It must be borne in mind that these tuberculous nodules resemble fibromata, which are common in this region, and consequently a differentiation must be made between the two diseases. In general, these tuberculous nodules grow very slowly and only rarely show an inclination to soften and break through on the outside. According to Haug, nodular tuberculosis arises from an infection with tubercle bacilli in piercing the ears or by wearing earrings which were previously worn by tuberculous patients.

The disease, as in the ordinary perichondritis, is of slow development. If it is not operated upon, an abscess develops, after the lapse of a certain length of time, and tuberculous ulcers of the skin make their appearance. Then follow fistulæ through which necrosed cartilage can be felt with a probe. If the swelling is incised at an early stage and widely opened up, discolored pus and granulations containing tubercle bacilli will be disclosed, and the affected cartilage—sometimes in the form of a disconnected sequestrum—will also be seen. In cases that are not operated upon early the disease lasts for a period of many months and deformities of the ear often result.

The prognosis of nodular tuberculosis is relatively good, and if the nodules and affected glands are operated upon and removed early, a complete cure may be looked for.

Ossification of the Cartilage of the Auricle.—A few instances of this affection have come under observation. In these the cartilage was always found to be partially but never wholly affected; the upper part of the cartilage, the helix, the scaphoid fossa, the antihelix, and the fossa triangularis were the localities affected, while the tragus, antitragus, and lobule remained perfectly free.

Ossification does not seem to occur with special frequency at any particular period of life; it has been observed in persons as young as fifteen and in others as old as seventy-five. In a large proportion of the cases the change represents the termination of an othæmatoma; in still other cases a simple perichondritis has been observed to give rise to the deposit of bone. In many instances the cause is to be sought in trophic changes. These newly deposited bone masses possess all the anatomical features of true bone; the Haversian canals being surrounded by well-formed bone corpuscles, marrow, etc. The process goes on without visible appearance of inflammation and without the subjective symptoms of pain. Treatment is scarcely required. Knapp has in one case extirpated the bony cartilage.

New Growths.—The following benign new growths of the ear have been observed: angioma, atheroma, chondroma, chondro-myxoma, cysts (both serous and dermoid), fibroma, lipoma, nævi, and papillomata (warts).

Among malignant tumors the more important are the sarcomata in their different forms. The relatively benign fibro-sarcoma is found in the lobule as well as on the other parts of the ear. It is only by the aid of the microscope that a distinction can be made between such varieties of new growths as the angio-sarcoma, the chondroma, the cylindroma, etc.

The etiology of these growths is obscure. Scars, erosions, moles, a chronic eczema, a nævus, etc., may be the starting-point. Sarcoma of the auricle affects, as a rule, individuals under fifty years of age. The different forms vary as to the rapidity with which they grow. The canal is generally first affected, then the auricle. The round-celled sarcomata affect the auricle very seldom, while the fibro-sarcomata are the most common among the new growths of the ear. The primary nodule often remains for quite a long time relatively stationary until it receives some traumatism—the usual cause of a renewed activity of growth. This lighting up of the disease may manifest itself either in the form of superficial erosions, which bleed easily, secrete a thin serum, and have their edges markedly infiltrated, or in that of the rodent ulcer, which is of slow development and is situated in the skin and perichondrium. Lupus is often mistaken for sarcoma, especially when the characteristic lupus eruptions are wanting, and when, in the neighborhood of the ulcer, neither macular nor papular infiltrations are to be found. In both cases the neighboring lymph glands are swollen.

The sarcomata are therapeutically accessible only in the early stage, and they yield only to extensive excision; the use of caustics and all other means of treatment tend rather to accelerate their growth.

Another variety of ulcerative new growth is the carcinoma. In this variety the ulcer has sharp, bitten-out edges, beset with papillary excrescences, and its floor is covered with discolored, cheesy detritus. The viscid secretion that is given off has a most disagreeable and characteristic odor, and the destruction takes place very rapidly, so that not only the auricle but also the meatus, the neighborhood of the parotid gland, and the deep parts of the temporal bone are eaten away. The glands, even those far removed from the seat of the disease, show evidences of being involved.

In the benign, slowly developing carcinomas there is an abundant formation of connective-tissue stroma which gives a thick, tough structure. On the other hand, in the malignant type we have a stroma rich in vessels and in embryonic connective-tissue cells. In this variety there is developed a rich, thick layer of typical strings of cells which grow through the whole substance of the cartilage, and, after destroying the capsule of the cartilage, they take its place.

While the rodent ulcers can be removed by operation, even relatively late, with good results, in the case of the deep-seated cancers, unless taken at the very earliest stage, the involvement of tissue is so great that excision is not always practicable. In both cases the infiltrated lymph glands should be removed.

Noma.—Noma is a very infrequent affection and observed, up to the present time, only in ill-nourished, young

children, especially after typhoid fever, the acute exanthemata, or diphtheria, and mostly in association with otorrhœa.

The diagnosis and prognosis are the same as for noma of the cheek. The disease is to be treated locally by daily applications of nitrate of silver, or by means of the Paquelin or galvano-cautery; the gangrenous parts are also to be removed with a curette. Constitutionally the treatment should be of a stimulating character, with a liberal diet.

Nervous Affections.—*Anæsthesia of the Auricle*, in association with a similar condition of one side of the head, is one of the symptoms observed in cerebro-spinal meningitis, as well as in hysteria. It is generally associated with anæsthesia of the external auditory meatus. In the various affections of the middle ear the loss of the tactile and temperature senses in the auricle and its immediate vicinity is relatively frequent.

Hyperæsthesia.—This condition is observed much more frequently than is usually supposed. It is chiefly found in hysteria. At times it is noticeable in one spot and remains stationary, while at other times it spreads over the entire lobule and auricle.

J. Orne Green describes a case of hyperæsthesia which remained after an attack of herpes zoster.

Hubert-Valleroux observed a case which developed subsequently to an attack of tertian intermittent fever which had not been influenced by quinine. In this case it was found possible to ward off or control the attacks by compression of the carotid on the corresponding side shortly before the attack was expected.

Hyperæsthesia ought not to be confused with neuralgia of the auricle, nor with the pain which is a concomitant symptom of affections of the meatus, the middle ear, and the auricle.

Neuralgia.—Neuralgia of the auricle is an affection of rare occurrence. It is observed most often in connection with an herpetic eruption and is caused by some affection of the twigs of the trigeminus on the anterior surface and of the cervical plexus on the posterior. It is often attended with congestion and swelling. Pain is caused by slight pressure, while strong compression will sometimes cause the pain to cease.

Cramp of the Outer Ear.—Spastic contractions of the auricle occur very seldom. Romberg states as a reason that these muscles, in man, are only rarely voluntary. This condition has been observed after syringing the ear (Voltolini); on the introduction of a speculum and on the application of friction (Blau); as one of the symptoms of brain lesions (Romberg); as an aura preceding epileptic attacks without visible cause (Wolff); in cases of deafness, in strained attention (Schwartze); and, finally, as a symptom of habit spasms (Politzer). The branches of the facial nerve are always involved. Romberg cites a case of an old woman, forty-nine years of age, who, twenty-seven years previously, had suffered from an apoplectic attack with paralysis of the right arm, and in whom, after emotional disturbances, convulsions of both ears occurred, causing them to be rapidly wagged up and down. Tinnitus aurium and headache followed the attack. The case reported by Wolff concerned the retractors and the transverse muscles; the ear was dragged far backward and the muscles were felt to be hard and contracted, their contraction causing a pain which extended from the ears to the back of the head. Subcutaneous section of the muscles cured this case. Schwartze often noticed a quivering motion of the ears in the deaf when their attention was strained, and he noticed an instance of this in a boy of fourteen. In this case no other visible cause than that of intense attention could be discovered. The case observed by Blau concerned a boy of ten years, in whom every rubbing of the ear and every introduction of the speculum caused pain and a quick up-and-down motion of the ears, lasting for some minutes. The external application of the acetate of morphine (from two to ten per cent. with olive oil), stuffing the meatus with cotton, and the use of general constitutional treatment relieved this case.

The treatment must depend upon the cause. When such is not discovered, the treatment can only be symptomatic. Electricity, massage, and narcotics are to be used in such cases, but where they fail subcutaneous section of the muscles is indicated.

Burns and Scalds.—Owing to their very exposed position the auricles often suffer from burns or scalds. This happens either through hot liquids being thrown at or falling upon the head, or, as is often the case, by the patient's falling accidentally, or being pushed, against a hot substance—a stove, steam-pipe, etc. All grades of burning are observed as in the case of other parts of the body. While these burns of the auricle are generally of a superficial character, Hartmann of Berlin has reported a case in which the damage inflicted was sufficiently severe to cause a perichondritis. (For further information in regard to this subject consult the article on *Burns.*)

Injuries.—Superficial injuries affecting the auricle are to be treated in the same manner as those which affect other parts of the body. Neglect here, as elsewhere, is likely to lead to infection, and this in turn may cause a perichondritis. Parts of the ear which are severed must be very carefully sewed together. Cases have been reported in which the ear, after being entirely severed, has been sutured in its proper place, has taken a firm hold, and has healed without deformity. When this operation is performed, the surgeon must see that the meatus is kept open and not allowed to become closed by the formation of new tissue.

The artificial opening for earrings is apt to be torn through and a resulting inflammation may arise. A very simple plastic operation will correct the resulting deformity; for its performance, local anæsthesia will be found sufficient.

While othæmatoma may in certain cases, as before stated, arise without previous injury, it is dependent in most cases upon trauma of the ear. It is a noteworthy fact that othæmatoma is seldom seen in the army. In lunatic asylums, furthermore, it has become less frequent since the patients have received more humane treatment. The capacity for hearing is not very much lessened by injuries inflicted upon the auricle, even when the loss of substance is considerable.

Congenital Malformations.—Congenital malformations may be due either to an arrested or to an excessive development; they may be unilateral or bilateral.

Malformations due to arrested development include (*a*) absence of the whole or parts of the organ; (*b*) microtia (diminutive ear); and (*c*) congenital fistula. The cases belonging to the latter class are by far the most important, as a lack of development in other portions of the auditory apparatus is often found associated with this condition.

The external auditory canal, the membrana tympani, the ossicular chain,—one or all of these may be rudimentary or wanting, or the labyrinth may be only partially developed; and even the lack of development may include the maxillary, sphenoid, and palatal bones, and the structures of the throat. In some cases a lack of cranial development is found.

Gruber describes a case in which the right auricle was very rudimentary and the external auditory canal was entirely wanting. In addition, the following abnormal conditions were observed: The right half of the forehead was more prominent than the left; the left zygoma was smaller than the right; the right naso-labial fold was obliterated; the right eyeball remained partially exposed when the patient attempted to close the eye, and he was not able to wrinkle the skin of the forehead on the same side; the right side of the soft palate was lower than the left, and the uvula was drawn over to the left side; when the patient made an attempt at whistling, the mouth was drawn to the left; the sense of taste was normal; air entered the Eustachian tubes on catheterization; the watch was heard on contact; and the tuning forks placed on the vertex were best heard on the defective side. This case showed defective development of the peripheral

portion of the facial nerve as well as a lack of development of the auditory apparatus and the zygoma.

Virchow, cited by Gruber, considers that deformities of the auricle are to be regarded as connected with faulty morphological development in the region of the first branchial cleft.

Congenital absence of the entire auricle is very rare, as some portion of the auricular cartilage covered with integument is generally to be found. Defects of particular portions of the auricle are more common and possess, except from a cosmetic point of view, but little pathological importance. In this category belong those cases in which the normal inrolling of the helix may fail to take place, and as a result we then have the ape-like auricle, or Darwinian pointed auricle; those in which the antihelix is larger than, and overrides, the helix—the "Wildermuth auricle"; and, finally, those cases in which the auricle is lapped over on itself ("cat's auricle"), with or without the growing together of the helix and tragus (see article in Vol. I., on *Auricle, Anatomy and Physiology of*).

Microtia is comparatively rare and the ear, though diminutive, may be well developed, or it may be malformed. When this latter condition is present it is often found that the malformation occupies some abnormal position, as in front of or below its usual location—a possibility which should always be remembered if an operation to form an external auditory canal is attempted.

Congenital aural fistulæ are to be found in front of the tragus or in the ascending portion of the helix; they are short blind canals lined with an epithelium which produces a white creamy secretion. They are liable to mild inflammatory attacks from closure of the entrance.

Malformations due to an excessive development include: (*a*) supernumerary appendages; (*b*) abnormal development of a part or of the entire auricle (macrotia partialis vel totalis); and (*c*) supernumerary auricles (polyotia).

Supernumerary appendages are most often seen in front of the tragus and are composed of reticulated cartilage with its coverings of perichondrium, subcutaneous areolar tissue and skin; such a structure must therefore be considered to be a true auricular appendage.

Macrotia partialis is not rare and is often found among the women of those races which wear heavy earrings. In such women the lobes are often to be found to be of an enormous size. *Macrotia totalis* is rare. *Polyotia* is extremely rare. Lauger relates the cases of two double-bodied monsters each of which had four auricles. The most frequent and most readily corrected of the malformations of the auricle are those in which the cephalo-auricular angle measures 55° or over. This latter condition is not always congenital, but is frequently caused by a faulty style of dressing the hair or of using strings in adjusting the headgear; for this reason it is more frequently to be found among women.

Prognosis.—In cases of malformed auricles, when there is an absence of an external auditory canal and the tuning fork is not heard by bone conduction, it is best not to attempt any operative interference unless it be for cosmetic reasons. In cases of unilateral deformity in infants it is almost impossible to state whether they hear or not, and it is therefore best to give an unfavorable prognosis.

Treatment.—In the correction of some of the above-mentioned defects otoplasty is of service, but its range is limited. It is often best, in a case of marked auricular deformity, to remove the entire auricle, with the exception of a stump to which an artificially devised auricle may be fastened. Supernumerary appendages may be removed. Congenital aural fistulæ must be opened and thoroughly exposed to view; the lining membrane must then be carefully exsected; and, finally, the whole cavity must be thoroughly curetted and the wound then allowed to granulate. Excessively large ears may be reduced in size by an operation of which the following are the two fundamental features: the removal of an elliptical-shaped piece of cartilage from the fossa of the helix, and the excision of a triangular section from the posterior border of the helix. The apex of this triangle should be located in the posterior portion of the concha. After the removal of these two portions of the auricle, the edges of the wound are to be united with fine interrupted silk sutures. For the correction of the handle-shaped ears, if the patient be young enough, pressure bandages applied for some time may suffice. If this does not accomplish the end desired, an elliptical piece of the posterior auricular fold should be removed and the edges of the wound united by sutures. In very marked cases it may be necessary to remove a small portion of the cartilaginous framework as well. In operating, care must be taken to have the cephalo-auricular angle the same on both sides.

In the so-called "cat's auricle" the holding of the auricle in a correct position by means of adhesive strips or bandages may remedy the deformity. At the same time, if adhesions are found to exist between the helix and the tragus, they will have to be cut through, and if the cartilage is not sufficiently flexible it may also have to be cut through along the line marking the folding. In some cases it may be necessary, in addition, to hold the auricle upright by denuding a small area on its posterior surface and a similar area on the side of the head, and then causing these two denuded surfaces to adhere together. Every case will call forth a certain amount of ingenuity on the part of the operator.

Robert Lewis, Jr.

EAR DISEASES: AFFECTIONS OF THE EUSTACHIAN TUBE.—The diseases of the Eustachian canal may be classed in two general divisions, viz., one in which there is more or less obstruction, and one in which there is more or less dilatation.

The obstructive class comprises by far the greater number of cases and constitutes practically all in which treatment is of use.

The obstructions are of two kinds: one in which the occluding element lies without the tube, and the other in which it lies within the tube.

The most common of the extra-tubal causes is the naso-pharyngeal tonsil (Luschka's tonsil, post-nasal adenoid, third tonsil, etc.), which is fully described elsewhere in this work. Let it suffice to say here that this tonsil, growing from the roof and sides of the naso-pharynx, may entirely cover the pharyngeal orifices of the tubes and absolutely prevent any aeration of the middle ear. From this extreme condition, found only in young children, there are gradations to so small an amount of adenoid tissue as to be harmless. Whether the occlusion be complete or partial, there is originally no attachment between the tubal prominences and the adenoid, but usually some attachment is soon formed by reason of continued contact or plastic inflammation. With the approach of adult life the glandular tissue of the adenoid, if not removed by operation, gradually gives place to connective tissue; and this, in turn, as it contracts, will, through the attachments just mentioned, draw the lip of the tubal orifice backward. Some degree of flexion is caused in this way and as a further result there is produced a degree of internal occlusion which may be even more serious than that due to the earlier pressure of the hypertrophied gland. In addition to its interfering with the functions of the Eustachian tube the enlarged Luschka's tonsil may retard its development.

There are still other external conditions which indirectly favor obstruction of the lumen of the Eustachian tube. The various pathological conditions located in the nasal cavities belong in this category. The tubal orifices lie in the track of the inlet through which air is supplied to the lungs. Anything tending to retard this supply of air causes a partial vacuum in the naso-pharyngeal vault; in other words, it establishes a condition in which suction is exerted on the mucous membrane lining this canal. Chronic hyperæmia and some measure of hyperplasia of the mucous membrane ultimately follow, and the calibre of the tube undergoes a corresponding degree of reduction.

All the acute febrile diseases of childhood affect the middle ear through the Eustachian canal, and, as a matter of course, involve the canal walls themselves. Of these diseases scarlet fever, diphtheria, and measles are the most troublesome. It is doubtful whether a direct spread of specific infection takes place, particularly in diphtheria; but there is intense congestion affecting the whole tract of the middle ear, as a result of which the Eustachian tube is occluded and all drainage from the tympanum ceases. The previous existence of a certain degree of tubal stenosis, due to hypertrophy of the adenoid tissue in the vault, serves only to aggravate the conditions produced by the febrile disease. The partial paralysis of the throat muscles, that so often follows diphtheria, sometimes also involves the tubal muscles. When deafness develops as a sequel of diphtheria, the possibility of its association with faucial paralysis—*i.e.*, with paralysis of the tubal muscles—should be carefully borne in mind. While it will scarcely be possible to establish a positive diagnosis, the probable dependence of the impaired hearing upon the cause in question may be inferred from the absence of tubal narrowing dependent upon a swollen condition of the lining mucous membrane. For example, gentle catheterization and inflation reveal the absence of any narrowing such as would be produced by a swollen mucous membrane, and yet the inflation improves the hearing to a noticeable degree. In the presence of this evidence we are warranted in drawing the conclusion that the habitual and frequent opening of the tube that results from the normal activity of the muscular fibres attached to it has been absent for a certain length of time, and that consequently the atmospheric pressure upon the outer surface of the drum membrane has during this period been in excess. Then again, the mere fact that the tubal prominences in the pharynx are covered with mucus does not warrant the inference that an exudative inflammation is present, for oftentimes the mucus, which is secreted at some other part of the naso-pharyngeal tract, flows down over the tubal orifices and so gives the appearance as if it were being secreted from parts situated higher up in the tubes themselves.

The other diseases which produce local lesions in the Eustachian tubes are syphilis, tuberculosis, smallpox, carcinoma and other varieties of new growths. Syphilis and smallpox may cause almost any degree of distortion, according to the location of the ulcer. The other diseases, on the other hand, may completely destroy the tubes and the surrounding tissues.

Foreign bodies are rarely encountered in the Eustachian tube. Bougies have been broken while in use and the distal fragment has been left in the tube. I have twice removed a pin from the tubal prominence of a patient who habitually carried several pins in her mouth in spite of repeated accidents. A man who amused himself by passing curved wires through his nostril and letting them slip past his palate into his mouth, came to my office in great distress because a wire had engaged in one of his Eustachian tubes. Particles of food are sometimes forced a little way into the tubes by vomiting. (See also the case mentioned by Dr. Sprague, on p. 591 of the present volume.)

The obstructions lying within the tubes are usually stenoses that have resulted from inflammations. These consist chiefly in hypertrophies of the mucous membrane and secondarily in hyperplasias of the submucous connective tissue. The lower ends of the tubes are most frequently affected, the upper ends rarely, and the central portions almost never. The stenosis at the lower end of the tube is caused by hyperæmia. This is induced in some of the ways already mentioned, and leads to a chronic thickening of the membrane. This may be said to be the intermediate link in the series of pathological changes which underlie chronic inflammation of the middle ear with its annoying subjective noises and associated deafness. It is often the condition that causes the patient to come for treatment. It must be relieved if deafness and a wide range of nervous disturbances dependent upon defective or perverted hearing are to be prevented. The degree of hypertrophy should be ascertained as accurately as possible by learning as fully as we can from the patient the past history of the trouble, and by making a thorough investigation—by digital exploration, by direct inspection through the anterior nares, and by aid of the rhinoscopic mirror—into the condition of the vault and nasal passages. Indirectly, inspection of the membrana tympani is, of course, valuable.

TREATMENT.—So far as hypertrophy of Luschka's tonsil is concerned, there is only one plan of treatment which is likely to be of much service, viz., the removal of all the redundant tissue by suitable surgical measures. These are described in detail in another part of this work, and it will therefore not be necessary for me to discuss the matter any further in this place. The same remark applies equally well to all the various procedures which are employed for the relief of hypertrophied conditions in different parts of the nasal passages, to the methods adopted for the removal of spurs of bone or cartilage from the septum narium, to the proper manner of introducing the Eustachian catheter, and to the plan of forcing air through the Eustachian tube into the middle ear by means of what is known as Politzer's method. There are a few matters, however, in regard to which I may speak without incurring much risk of repeating what will be stated elsewhere.

Electrolysis for the reduction of long-standing hypertrophies has many advocates. It is accomplished by introducing an insulated metal catheter, thoroughly polished and slightly oiled on the inside, and passing through this a gold probe with a smooth nodular end. The probe is connected with the negative pole of the battery, and the positive pole may be held against the side of the neck. When the stricture is reached, the probe is allowed to rest against it, and then an electric current of from two to five milliamperes is passed for five minutes. No pressure whatsoever is to be used on the probe. It is claimed that, after a varying number of sittings, there will be no stricture for the probe to rest against.

Such diseased conditions of the middle ear as are accompanied by an irritating discharge may cause inflammation of the tube by the drainage which takes place through it. As the drum membrane is perforated in these cases, the tube may be washed with antiseptic and styptic solutions by filling the external canal with the desired fluid and forcing it through by pressing on the tragus as it is bent backward over the meatus. Pure alcohol and weak solutions of nitrate of silver may be thus used. They cause pain at the time, but much relief almost immediately follows. Polypi in the middle ear sometimes close the upper end of the tube. These or any accretions should be removed.

Dilatation of the tube is sometimes observed in connection with atrophic conditions.

Richard R. Daly.

EAR DISEASES: AFFECTIONS OF THE EXTERNAL AUDITORY CANAL.—MALFORMATIONS.—Malformations of the auditory meatus are usually combined with congenital defects of the auricle and middle ear, sometimes with arrest of development of the bones of the head (Mich. Jaeger, Moos, Zuckerkandl, Steinbrügge, and others). Contractions of the canal, complete closure, osseous or membranous (congenital atresia), and entire absence of the auditory meatus, represent the three different degrees of congenital defect.

In place of the external orifice of the ear there may be a shallow depression, or a short blind canal, or a very fine canal extending inward for some distance beyond the narrow, funnel-shaped cartilaginous portion. The canal may be uniformly narrowed throughout its extent, or constricted near its middle like an hour-glass, or the principal contraction may be near the membrana tympani. Congenital bridge-like bands of connective tissue crossing the meatus have been described by Moos ("Klinik der Ohrenkrankheiten," p. 85). Abnormal width of the meatus, amounting to deformity, is sometimes a congenital condition.

Some instances of *double meatus* are known; these are to be referred to an arrest in the closure of the first