THE RELATIONSHIP OF OSTEOMATA OF THE EXTERNAL AUDITORY MEATUS TO SWIMMING

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by

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OF ALL THE osseous tumours occurring in the temporal bone, those of the external auditory meatus are undoubtedly the most commonly seen by the otologist.

The majority of these growths are situated close to the tympanic membrane and arise from the tympanic annulus. They occur as single or multiple swellings and not infrequently are bilateral and symmetrical. Large solitary bony tumours, often occluding the lumen of the meatus, are unusual. In most cases they are found at the junction of the bony and cartilaginous meatus and may grow both medially and laterally along the lumen of the meatus. They are invariably immobile, being firmly attached to the bony wall of the canal by a pedicle which varies considerably in size and shape. Rarely the osteoma has no bony pedicle, being attached to the canal wall by fibrous tissue.

Histologically, osteomata vary from dense sclerotic bone (ivory or eburnated) to soft spongy bone (cancellous). Milligan and Wingrave (1911) say: " The cancellous type, whether occurring as a prominent exostosis or as a flattened hyperostosis, is formed by a process of osseous hyperplasia from the periosteum of developed bone due to long continued inflammation or other forms of irritation. They are invariably associated, at some period of their growth, with disease and discharge from adjacent structures. Ivory exostosis are formed by eccentric ossification in developing bone. It is restricted in its origin to the tympanic element and is thus formed in membrane."

Unfortunately, there is no uniformity in the literature regarding the differentiation between the terms " exostosis " and " osteoma ". Many pathologists feel that the term osteoma should be used only for true bony tumours, i.e. those arising without cause and continuing to grow until their blood supply is restricted. Exostosis would then be reserved for cases of bony hyperplasia resulting from known stimuli and where growth ceases with the withdrawal of the stimulus.

However, Sissons (1958) uses the term " osteoma " to describe circumscribed masses of compact bone, often occurring in the skull, and reserves the term " exostosis " (or more properly cartilage capped exostosis) for the swellings consisting of cartilage and bone which occur in the metaphyseal regions of long bones. This is the definition adopted in this paper, and the osteomata which are considered are those occurring in the deep part

of the bony external auditory meatus in close proximity to the tympanic membrane.

The associationship between swimming and meatal osteomata has been commented on by many people, one of the most important papers being that of Van Gilse and Belgrave in 1938. They commented on the high incidence of such osteomata in the Dutch people, who swim in the cold waters of the North Sea, and the low incidence in Italians, who swim in the warm water of the Adriatic.

The purpose of the investigations upon which this paper is based was to obtain answers to the following questions:

(*a*) Does swimming play a vital aetiological role in the production of meatal osteomata?

(*b*) What are the factors which determine whether or not any particular individual is likely to develop an osteoma, and why is there such a marked variation in racial incidence?

(*c*) How does regular swimming produce osteomata?

(*d*) What happens to the bony external auditory meati of the aquatic mammals who spend the greater part—if not all—of their lives swimming in cold water?

SPECIMEN QUESTIONNAIRE

Name..... Age.....years

1. Do you swim regularly?
2. For how long have you been swimming regularly?
3. In fresh water, sea water or indoor swimming baths?
4. Do you dive?
5. Do you wear ear plugs or a bathing cap when swimming?
6. Do you immerse your head when taking a bath?
7. Are any of your family deaf?

CLINICAL RECORD

	Right ear	Left ear
Hearing		
Aural abnormalities		
Meatal osteomata		

Fig. 1. Specimen questionnaire.

A survey was carried out in 1949 on a large number of National Service recruits to determine the relationship between swimming and the production of meatal osteomata. After completing a questionnaire (Fig. 1) all the recruits had a detailed examination of their ears, nose and throat. Great care was taken with the questionnaire to ensure that all parts were understood and each form was scrutinized after completion to ensure that it had been filled in properly and legibly. These precautions reduced the number of spoilt forms to a minimum. Eight thousand two hundred forms were available for analysis. The individual questions in the questionnaire were, of necessity, simple in design and, as each group of recruits received a short explanatory talk prior to their completing the forms, any difficulties were dealt with at once.

Clinical findings were recorded personally and the hearing noted only if abnormal. The presence of a meatal osteoma received special attention and was recorded either as Grade (+), seedling, Grade (++), intermediate, or Grade (+++), total occlusion of the lumen of the meatus (Fig. 2).

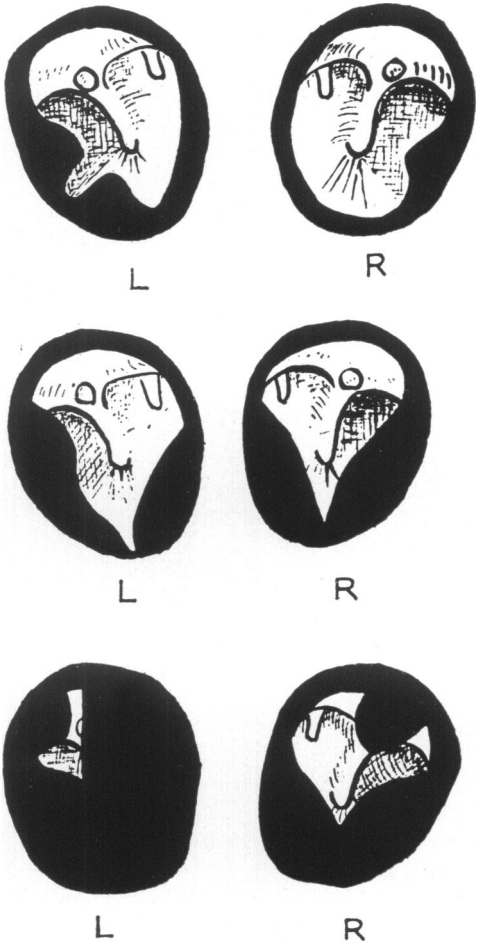


Fig. 2. Meatal osteomata graded by size.

The group of people upon whom this investigation was carried out were, to some extent, specialized in that they consisted entirely of healthy young males between the ages of 17 and 35 years. However, this restriction did possess certain advantages:

1. Men tend to swim more frequently than women and invariably without protection for their ears.

2. This group was as close to a true cross-section of the " young man " population as it would be possible to examine in large numbers.

3. All were unscreened as far as their having or not having meatal osteomata was concerned.

4. It could be assumed that the earlier years of the majority of the boys would have been passed in much the same surroundings. It was hoped that any variation in their individual environment would be minimized by the size of the sample.

5. If an older group had been chosen many additional and complex variants would have arisen, e.g. occupation, marital state.

Results

Analysis of the completed questionnaires showed that 60 per cent. of the recruits swam regularly and that, provided they continued to swim regularly then there was a greater chance of their learning to dive as they grew older. However, it was also likely that as they became older they would be less likely to continue swimming.

TABLE I

	Total	*Swimmers*	*Non-swimmers*
No. immersing head when taking a bath ..	3,322 (41% total)	2,352 (48.3% swimmers)	970 (30.5% non-swimmers)
No. with family history of deafness	298 (3.8% total)	182 (3.8% swimmers)	116 (3.7% non-swimmers)
No. wearing ear protection when swimming	98	(1.8% swimmers)	

As it was not expected that any of the swimmers would bathe on every day throughout the year, one year of regular swimming was arbitrarily defined as one in which the individual had spent at least four months bathing on at least four days a week! Not unexpectedly, many doubtful cases occurred and each was evaluated individually.

Table I shows that a considerably higher percentage of swimmers than non-swimmers gave a history of immersing their heads when taking a bath. It is extremely doubtful if this habit, probably only carried out weekly—and in warm water—is of any real significance as an aetiological factor in the production of meatal osteomata. Only a very small proportion of swimmers used any form of ear protection when bathing, and no cases of osteomata were found in this group.

Although far more swimmers use indoor baths, rather than the sea or river (the latter are termed "cold water swimmers"), Table II shows that a much higher percentage of the cold water swimmers developed osteomata—the average time spent swimming being the same in each group.

This suggests that the temperature of the water used for swimming may play an important role in the formation of osteomata.

A total of 60 people with meatal osteomata were seen: this was 0.7 per cent. of the total examined, and 1.2 per cent. of the regular swimmers. No case of osteomata was seen in a non-swimmer or in anybody who at some time had not been a regular swimmer. The majority of osteomata were found in people who had swum regularly for 6—14 years, but the range varied from 1 to 16 years. A separate enquiry was carried out on a larger group of recruits to determine the actual site in the bony meatus where the osteomata arose. Seventy-six cases of Grade (+) osteomata were reviewed and all were found to arise from the deep bony meatus just lateral to the tympanic membrane. Seventy per cent. were found anterior to a hypothetical line along the axis of the handle of the malleus, the remainder from the posterior segment.

TABLE II

	No. of swimmers	*No. osteomata*
Fresh water	600 (49.4%)	30 (5%)
Sea water	674 (54.6%)	38 (5.6%)
Swimming baths	3,342 (68.6%)	30 (0.9%)

In those meati where two separate osteomata occurred, it was usually found that they appeared to be growing from the anterior and posterior aspects of the meatal floor. Occasionally an osteoma was seen arising from the meatal roof and covering the membrana flaccida—these grow from the squama of the temporal bone and rarely occur alone.

It was concluded from this survey that in young males the formation of deep meatal osteomata is invariably associated with a history of regular swimming. This relationship is especially true when bathing is carried out in cold water rather than the comparatively warm water of indoor swimming baths. However, only a small proportion of regular swimmers develop osteomata and experiments were carried out to find an explanation for this individual susceptibility.

Clinical investigation

The figures obtained in the survey which has been described indicate conclusively that one of the aetiological factors in the production of meatal osteomata is the presence of water in the external auditory meatus–as in swimming. It would also appear that the colder the water the more likely are osteomata to develop.

In order to investigate the effect of water of varying temperatures on the epithelial lining of the external auditory meatus, a series of experiments was carried out on human volunteers. These were of both sexes and their ages varied from 17 to 60 years. No person was accepted who gave a history suggestive of previous middle or external ear disease or in whom

evidence of aural disease was found on clinical examination. A total of 82 persons were available for study.

With the subject lying horizontally, water was gently pumped at a constant rate from a thermostatically controlled tank into the right ear—the left was untouched, thus serving as a control. A flow rate of 800 c.c. a minute was used for a period of 30 seconds. At the end of this time the head was tipped to remove any retained fluid. The meatus was then inspected and a record made of the time elapsing between the end of the irrigation and the return of the meatal lining to a normal colour.

The irrigations were carried out with water at body temperature, 45° C., 30° C., 20° C., and 10° C., one week elapsing between each test. All the experiments were then repeated using a 3 per cent. sodium chloride solution, this being the average concentration of salt in the sea.

Results

With water at body temperature no change was seen in the appearance of the deep meatus or tympanic membrane.

Water at 40° C. produced an immediate mild erythema of both the tympanic membrane and lining of the deep portion of the bony external auditory meatus. Using water below body temperature produced an immediate pallor of the deep meatal lining, but after a short time this was replaced by a marked erythema.

The time elapsing from the cessation of irrigation to the return of the meatal lining to a normal appearance is called the " erythema time ". Figure 3 shows average erythema times plotted against appropriate water temperatures. The line " maximal erythema time " is drawn from the readings obtained from five people whose times were so in excess of the average to merit special attention. In these cases the meatal blood vessels appeared to be unusually susceptible to the effects of cold and the consequent reflex vasodilatation more prolonged.

No difference in times was obtained when 3 per cent. sodium chloride solution was used as the irrigating fluid.

In order that the possible significance of these unusually long erythema times might be investigated, the irrigations were repeated on 10 cases with small bilateral Grade (+) osteomata. In half, the right ear was used, the left in the remainder. These erythema times are also shown in Figure 3 and it is obvious how closely they resemble the times recorded for the five " odd " cases previously mentioned.

It appears reasonable to conclude from these findings that the colder the swimming water the greater the duration of the reflex meatal erythema. In addition there appears to be a certain number of people whose meatal blood vessels are unusually sensitive to cold and consequently they will

develop a more prolonged period of meatal erythema than is usual. If such people are persistently exposed to a meatal stimulus, such as occurs in repeated swimming, then they may develop osteomata.

Variations in sea temperature and salinity

Temperatures in the oceans range from –2° C. to more than 30° C. The lowest value is limited by the freezing point of sea water and the upper limit by processes of radiation and exchange of heat with the atmosphere. Temperatures greater than 30° C. may occur in land-locked tropical seas such as the Red Sea and the Persian Gulf.

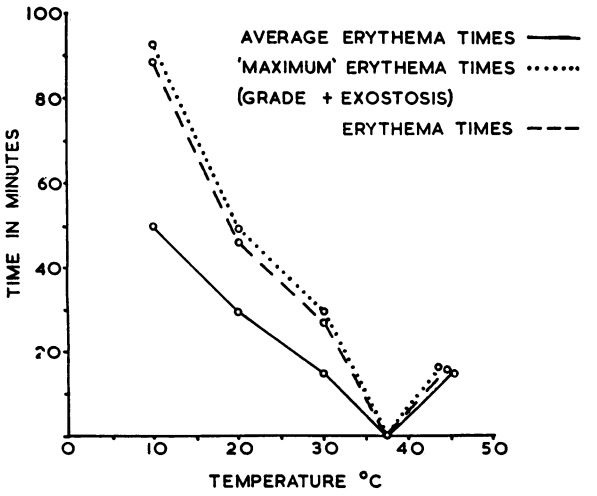


Fig. 3. Graph showing average "erythema times" for varying water temperatures.

The annual variation of the sea surface temperature is small in the tropics, being only 1° to 2° C. In the Southern Oceans the annual range reaches a maximum of 5° to 6° C. and then decreases by about 2° C. in the Antarctic. In the North Pacific and North Atlantic Oceans the average annual range is about 9° C. in latitude 40° N. and gradually decreases when approaching the Arctic.

By studying the isothermal lines on world maps drawn for the months of February and August, it is found that the average August temperature of the sea around the South Coast of England is 16° C.—the same as around the coast of Holland. By February the temperature of the sea has dropped to 10° C. for England and 5° C. for Holland. In the Mediterranean, the summer sea temperature is 25° C. and winter 13° C. Variations of sea temperatures around the Dutch East Indies is small and the level remains close to 27° C.

These variations may help in explaining the differences which occur in the racial incidence of meatal osteomata. Either a severe stimulus applied for a short time—as in bathing around our own coast—or a mild stimulus but applied for a lengthy time—as in the all-the-year bathing in the East Indies. With certain exceptions the salinity of the oceans remains markedly constant with an average figure of 3.5 per cent. It is, therefore, difficult to see what part salt concentration could play in explaining differences in racial incidence of osteomata.

Anthropological data

A " predisposition " to meatal osteomata is now probably universal in man, but in some races the formation of abnormalities, owing perhaps to direct hereditary effects, is much more common than in others.

The highest frequency of meatal osteomata is found among the old Aborigines of North America and in Polynesia. They are also common in parts of Mexico, Peru, Bolivia, South Sea Islands and in parts of Europe. However, as they usually occur in less than 20 per cent. of any population they should be regarded as racial peculiarities not racial characteristics.

The possible aetiology of such osteomata has been widely discussed in the past, but it is important to distinguish between systemic (or predisposing) causes and exciting causes. The exciting causes, when the predisposition exists, may I think be anything—mechanical or chemical—that produces a meatal erythema. It is interesting to note that the condition is extremely uncommon in both the Chinese and Negro races—in both bathing is not popular. The temperature of the water is undoubtedly important unless it be so warm that all-year-round bathing is possible. The Italians, whose coastal waters are warm in the summer but relatively cold in the winter, rarely develop osteomata—a minimal stimulus and only applied for a relatively short period of time.

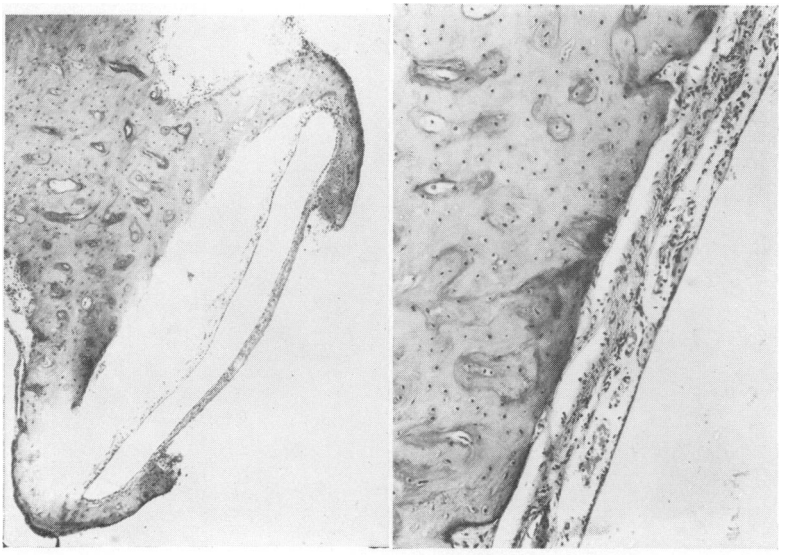
Animal experiments

In order to test the theory that meatal osteomata arise in susceptible individuals as a result of the effects of cold water in the external auditory meatus, an attempt was made to produce such lesions experimentally.

Adult guinea pigs were used as these are strong, easy to handle and possess suitable external auditory meati. The latter closely resembles that of the human ear canal although histologically one notices a much thicker subcutaneous layer extending down to the tympanic membrane. Here, although thin, it may partially insulate the underlying periosteum from the meatal epithelium and make the production of " artificial osteomata " more difficult.

After induction of anaesthesia with intraperitoneal Pentothal (concentration 40 mgm. in 1 c.c.)—0.1 c.c. per 100 gm. body weight—a polythene bag was placed over the animal's head. This bag had a hole cut in it for

the mouth and nose and two holes for the ears. This covering prevented the head from being soaked with water and was firmly attached to the hair with adhesive. A small polythene cannula was placed in the right ear and adjusted until it rested close to the tympanic membrane. The size of the tubing was such that the irrigating fluid flowed back freely between cannula and meatus. Water pressure was from the cold water tap, the water then flowing through tubing immersed in a container filled with ice and salt mixture. The flow was kept at approximately 30 c.c. per minute and the temperature constant at 12° C. The irrigation was continued until the anaesthetic had worn off and the animal began to move.



(*a*) (*b*)

Fig. 4. (*a*) Histological section showing vasodilatation within the tympanic membrane of the guinea pig following meatal irrigation with water at 10° C. (*b*) Histological section showing subcutaneous vasodilatation in the deep bony meatus after similar irrigation.

In order to prevent a state of hypothermia occurring, rectal temperatures were taken at regular intervals and an electric hair dryer used to warm the trunk of the animal. Irrigations were repeated at weekly intervals until the animal died or it was destroyed for a specific reason. The head was then removed and the ear sectioned after the method described by Friedmann (1956).

Experimental results

It is obviously essential to confirm that reflex meatal erythema does occur following the irrigation of cold water into the guinea pig's external

auditory meatus. Consequently the investigation which had been carried out on human volunteers was repeated on the experimental animals. The same range of temperatures was used but a reduced rate of flow. All irrigations were performed with anaesthetized animals and in each case the left ear was untouched and served as a control (Figs. 4*a* and *b*).

The erythema times were reduced as compared to the human results, but the pattern remained much the same, i.e. the colder the water the longer the duration of reflex erythema.

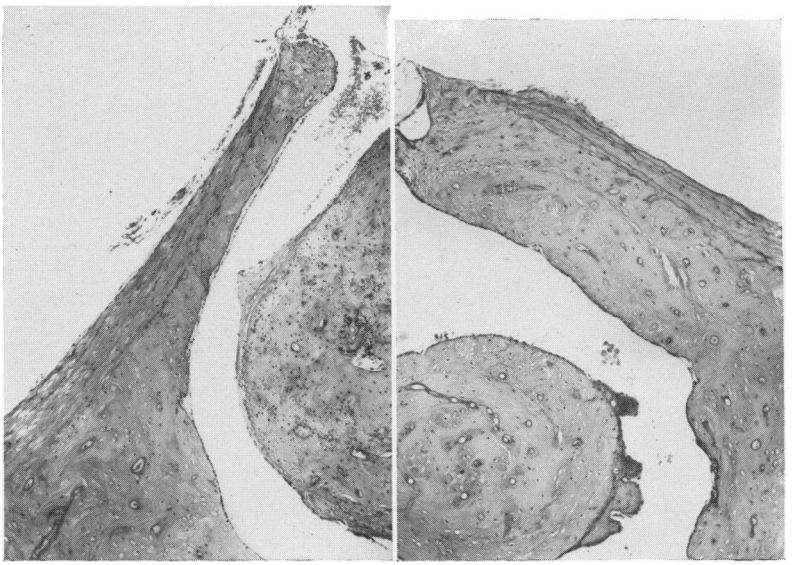


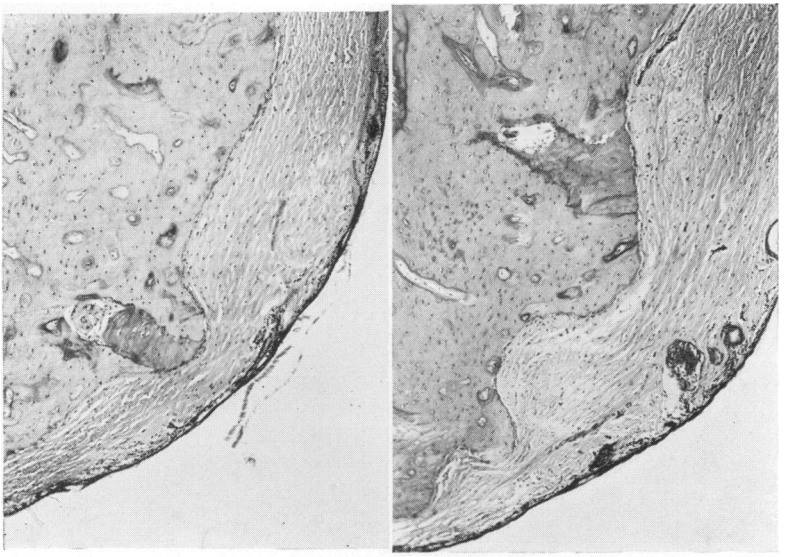
Fig. 5. (*a*) and (*b*) New bone laid down close to the tympanic annulus.

It was decided to carry out the major irrigation experiments with water whose temperature was as low as any acceptable swimming water might be...12° C. It was also proposed to irrigate this water continuously for a longer time than would be willingly tolerated by a human swimmer. Under these conditions a total of 10 hours' irrigation time might have the same stimulating effect on the deep meatus as several years actual swimming in an indoor bath.

Considerable difficulty was experienced in keeping the experimental animals alive through repeated irrigations. However, after a total of 11 hours of irrigation, five animals showed a laying down of new bone in deep meatus close to the annulus (Figs. 5*a* and *b*) and one of these had a small "seedling" osteoma growing on the posterior meatal wall (Fig. 6*a*). The only animal surviving a total of 16 hours of irrigation was found to have two seedling osteomata growing from the meatal wall

close to the tympanic annulus (Fig. 6*b*). None of these small osteomata were visible on the routine pre-irrigation inspection of the animals' ears, carried out to ensure that the meati were free from wax or food debris. Sections from the control ears showed no abnormal changes.

Although these experiments may be considered as being somewhat crude and artificial, in that they have been carried out on a non-aquatic mammal and with water at a temperature which would be avoided by all except the hardiest of human swimmers—the experimental findings are in many ways applicable to the changes known to occur in man.



(*a*) (*b*)

Fig. 6. (*a*) Section shows the formation of a small " seedling " osteoma on the posterior meatal wall close to the tympanic membrane. (*b*) Two small " seedling " osteomata forming close together on the posterior meatal wall.

Comparative anatomical studies

If man, swimming for only comparatively short periods of time, can develop meatal osteomata, then it is interesting to speculate whether a similar condition may occur in the bony meati of the aquatic mammals who spend most, if not all, of their lives in water.

Thanks to the kindness of Dr. F. C. Fraser I was able to study the collection of heads of aquatic mammals kept in the Department of Zoology, British Museum (Natural History). Figure 7 is a photograph of the skull of a sea lion, which is typical of aquatic mammals, and shows that these animals do possess a bony meatus. However, no osteomata were found in any specimens.

Almost all mammals can swim to some extent. To merit the term aquatic, a vertebrate must be sufficiently at home in the water so that it will instinctively seek it for concealment or escape. The ability to swim does not mean that it has of necessity developed organs that are more highly specialized for such usage than those found in its closest wholly terrestial relative. However, it does mean that such a vertebrate must have evolved some form of valvular mechanism for closing both nostrils and ears when submerged. The degree of aquatic specialization in mammals is dependent upon the amount of its connection retained with the land. There is a tendency for the elimination of the pinna in aquatic mammals, partly following the law that ultimately the aquatic life will

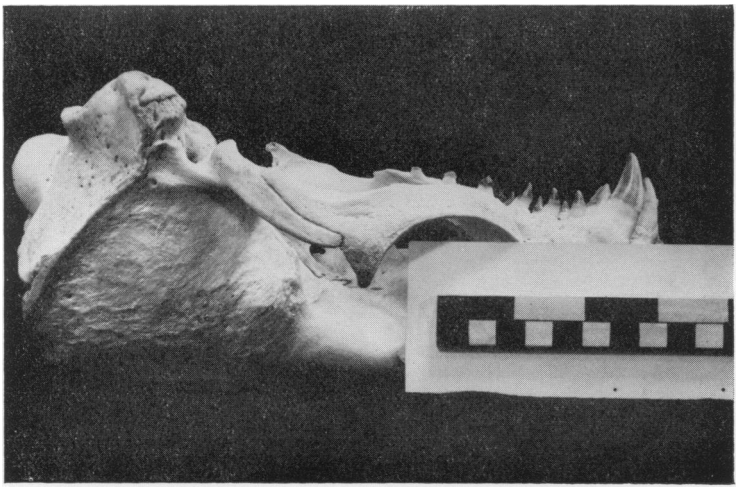


Fig. 7. The skull of Otaridae (sea lion) showing the presence of a bony external auditory meatus. No meatal osteomata were found in any aquatic mammal.

eliminate superfluous prominences upon the body, and partly because of the ultimate disuse of the pinna as an accumulator of atmospheric sound waves.

The platypus has unusual ears; lacking a pinna the musculature enables it to cock the external orifice forwards. This opening lies at the posterior end of a facial furrow, the edges of which act as a pair of long eyelids by which the external ear is tightly closed when the animal submerges.

In the hippopotamus the well formed pinnae are markedly dorsal in position. Immediately prior to submergence the entire base of the ear contracts and this compresses and shortens the lumen of the external ear. The extremely vigorous twitchings of its ears seen after re-appearance is possibly indicative of the closure being not at the external opening but slightly deeper, so that some effort is required to dispose of lodged water.

In all the Pinnepedia, the cartilaginous meatus does not extend laterally from the end of the bony meatus. Usually it turns sharply upwards, reaching the body surface some distance dorsal to the direct line. In the Otaridae (sea-lions) the outer cartilaginous meatus is furled. Muscular action results in further tighter furling.

Probably the commonest method by which an aquatic mammal prevents water entering its ears is by pulling into the external orifices a valvular plug, perhaps homologous with the antitragus. This is well shown in the seals, but the precise functioning of this mechanism is not uniform and the same result may be attained in different genera by complex variations in the actions of the small auricular muscles, which are usually found to be well developed.

The oldest, phylogenetically, and the most highly specialized group of aquatic mammals are the Cetacea. There is no doubt that the Cetacea hear well under water and also produce a variety of sounds in this medium. No pinna is found and in the Toothed Cetaceans the external auditory meatus is a continuous narrow tube about 0.5 mm. in diameter at its external opening but 5 mm. at its inner end. In the Whalebone Whales the meatus lies in a deep groove between the squamosal and para-occipital processes and is invested in a considerable amount of tough fibrous tissue. Dissections by Fraser and Purvees have shown the whole meatus to be filled with an epidermal plug. This is not an amorphous secretion but an intrinsic part of the meatus.

In the fully adapted Cetacea, sound waves are collected under water by means of small bony and air surrounded canals and conducted to the tympanic conus. The sound waves pass across a heavy and relatively rigid ossicular chain to an acoustically isolated inner ear. However, in the partially adapted aquatic mammal, a terrestial middle ear mechanism is still required and adaptation to under-water hearing has not occurred. Yet despite this they all close their external auditory meati when submerging.

It would appear to make little difference to the animal if this were carried out or not, for none dive deep enough to produce serious pressure differences across their tympanic membranes. Perhaps it is because continued exposure of their bony meati to cold water would eventually lead to osteomata formation and meatal stenosis—with consequent impairment in the perception of air-borne sounds. In the fully adapted Cetacea there is no longer any need for a patent external auditory meatus and this has become occluded in the Whalebone Whales, not by bone but by a specialised plug of sound-conducting material.

Discussion

Among the many varied causes suggested for the formation of osteomata in the bony external auditory meatus are traumatic fractures of the

canal walls resulting in a circumscribed periostitis and chronic middle ear suppuration causing a secondary inflammation of the meatal mucosa with subsequent fibrosis and ossification. Syphilis and gout have both been held responsible and are quoted as possible causes in relatively modern textbooks. As recently as 1957, Simpson *et al.* state: " The multiple sessile form of meatal exostosis results from abnormalities in ossification of the tympanic plate." They continue, however, " the role of wetting and temperature change is uncertain but the condition appears to be more common in swimmers ". The possibility that abnormalities of ossification might be an important aetiological factor requires further consideration.

At birth the external auditory meatus consists of an outer cartilaginous part derived from the primary meatus, and an inner membranous portion derived from the tympanic ring. The principal ossification centre for the head of the tympanic ring appears in the 36 mm. foetus (about nine weeks) and one week later four secondary centres appear—the ring being now **C** shaped. By the eleventh week these secondary centres have fused with the primary centre and the head now lies beneath the first branchial arch.

The gap in the tympanic ring is closed through fusion superiorly with the squama of the temporal bone at birth. After birth the tympanic ring grows postero-laterally to form the tympanic part of the temporal bone. Formation of the bony wall of the external auditory meatus is continued by the growth of two bony primordia. One of these arises from the anterior segment, the other from the posterior segment of the tympanic ring. These processes grow towards each other and eventually fuse to form the ventral wall of the bony meatus. From these two processes are formed the greater part of the bony external auditory meatus; the non-articular part of the temporo-mandibular joint; the sheath of the styloid process and the plate of bone which underlies in part the apical portion of the petrous bone.

The development as described offers no explanation for the formation of sessile osteomata arising solely from the region of the tympanic annulus by aberrant ossification. This form of osteomata is never seen in children or adolescents unless there is a history of regular swimming. If abnormal ossification is really an important aetiological factor then similar lesions would occur in other parts of the bony meatus—in actual fact only the solitary osteoma occurs and that usually at the junction of bony and cartilaginous portions. Osteomata would also be expected to develop in the other structures derived from the tympanic ring—and this is not so.

The investigations which have been carried out suggest that almost invariably meatal osteomata are the result of prolonged stimulation of the bony external auditory meatus of susceptible individuals with cold water. It is now necessary to consider the manner in which this stimulus may act.

The human external auditory meatus is lined with stratified squamous epithelium and there is little subcutaneous tissue between it and the cartilaginous canal. In the bony part of the canal even the dermis is markedly reduced, being only 0.1 mm. in thickness in the region of the tympanic annulus.

It has not yet been successfully explained how mechanical forces stimulate deposition of bone and how lack of function brings about resorption. The most popular hypothesis assumes that mechanical stimuli such as increased vascular tension may cause new bone formation. Bone tissue as such is resistant to pressure as well as to tension. Thus as long as pressure does not interfere with blood supply and drainage, increased tension may act as a stimulant to bone formation. Prolonged reflex vasodilatation occurring in the deep part of the bony meatus following cold water swimming offers such an increase in tension, for there is no " insulating " layer of subcutaneous tissue between epithelium and underlying periosteum in the deep meatus. In susceptible individuals with greatly prolonged vasodilatation and with frequent repetition of the stimulus, new bone formation occurs. More laterally the subepithelial layer is thicker and the effects of the vasodilatation less marked. Consequently osteomata are not found in this region unless developing as a new growth.

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VISIT OF THE PRESIDENT TO AFRICA

THE PRESIDENT, SIR ARTHUR PORRITT, and the President of the Royal College of Surgeons of Edinburgh, Professor John Bruce, are making a three weeks' tour of Africa, visiting surgical centres in Khartoum, Nairobi, Makerere, Salisbury, Cape Town and Durban, culminating in the meeting of the Association of Surgeons of South Africa to be held in Johannesburg in mid-September. During their stay in Johannesburg, the President and Professor Bruce will be admitted to the Honorary Fellowship of the College of Physicians, Surgeons and Gynaecologists of South Africa. They will also participate in the examination of candidates for the Final Fellowship of the College of Physicians, Surgeons and Gynaecologists of South Africa, and both Presidents will give surgical lectures at the centres they visit.