almost touched the ground. The effect of this was that the huge tumour pressed downwards on the diaphragm, rendering inspiration impossible, and the patient never breathed again. I believe, and so does Dr. Horne, that but for this unfortunate act the woman would have been all right in a few minutes.

Such are the particulars of the single fatal case which occurred in my practice, and in no other did cause for anxiety arise. In this case, without doubt, death was due to asphyxia. Respiration first failed; the heart did not cease to beat for some time subsequently.

After this lengthened experience in the use of chloroform, it is not surprising that I continue to give it the preference as an anæsthetic, and that I hesitate to believe that if proper precautions be taken it is more dangerous than ether.

There is no doubt—and it is admitted on all hands—that chloroform is more energetic than ether, that it acts much more quickly, and that if given in a concentrated form it kills rapidly. In other words, it is a much more powerful agent than ether; is consequently more dangerous in unskilled hands; and that the patient requires to be more carefully watched by the administrator than if ether were employed. But, in my opinion, these are insufficient grounds for rejecting it, and I do not think they counterbalance the objections which exist to the use of ether, and which are very obvious: (a) The inhalation of ether is very irksome to the patient, and few patients who have subsequently taken chloroform are willing to take ether again. (b) It is most irritating to the air passages, and the irritation does not by any means always pass off when the inhalation is suspended. (c) Vomiting is more easily excited by ether than by chloroform; and when it does occur after the inhalation of chloroform it is in general less distressing. (d) The effects of the ether, even when vomiting has not occurred or has ceased, last much longer; specially a feeling of nausea and the taste of the ether in the mouth remains a long time, and sometimes lasts for days. (e) Ether must be given in a concentrated form; if air be freely admitted anæsthesia cannot be produced; so the patient has to be half suffocated, and compelled to re-inhale air already expired; whereas, in using chloroform, pure air only moderately charged with the anæsthetic need be used.

In administering chloroform, three things are absolutely essential for its safe use: (1) the chloroform must be pure; (2) the apparatus used must be such as to admit air with the utmost freedom; (3) The administrator should give his whole attention to his duty, constantly and carefully watch the respirations of the patient, and frequently also feel the pulse, which is most easily done in the temporal artery.

With respect to these, I may say that I fear the chloroform in common use is often far from being as pure as it should be, and is sometimes very defective in this respect.

As to the apparatus used, I give the decided preference to that known as Junker's. In it, the air being forced through the chloroform, it is impossible to administer it in a concentrated form; while, moreover, perfectly pure air enters the mouth pretty freely round the edges of the mouthpiece. For many years I have used no other. It is not so portable as Skinner's, which in midwifery practice answers well enough; but I never employ it in any surgical operation, and I believe that the immunity I have enjoyed from trouble is in no small degree due to my having long ago adopted this method of administering chloroform.

Skinner's is, in my opinion, far from being a satisfactory inhaler; the quantity of chloroform on its surface, and consequently inhaled by the patient, varies every minute; sometimes a quantity is poured on it by the person in charge, and it will then drop down on the face, and even into the mouth of the patient. This is impossible when Junker's inhaler is used. Then again, the chloroform on its surface evaporates rapidly, and none is inhaled for some moments, and the patient is apt to rouse up to more or less consciousness, to be again subjected to perhaps the inhalation of the drug in a too concentrated form, and I have often thought that to this not a few of the fatal cases are due. For the safe use of chloroform it should be a maxim to give plenty of pure chloroform, and never to allow the necessary degree of anæsthesia to vary.

Some practitioners administer chloroform on a pocket-handkerchief or piece of lint laid over the mouth and nose.

I have never seen this done without having the account of the murder of Benhadad as given in the Second Book of Kings forcibly brought to my mind; and I would commend the study of that chapter of the Bible to all practitioners who think of using this dangerous method.

If chloroform is to be safely given, it is essential, in addition to procuring a pure drug and selecting the best inhaler, to see that the person who administers it not alone understands what he has to do, but conscientiously carries it out. Thus if he is watching the steps of the operation instead of carefully observing the condition of the patient, the fatal result, if there be one, lies at his door: and fatal results under such circumstances there certainly will sooner or later be. The failure to observe this rule will probably account for the majority of the accidents which occur with chloroform.

Ether being a less powerful anæsthetic than chloroform, and being also less depressing, it can without doubt be given with somewhat less care than chloroform; and if neither a proper inhaler nor competent chloroformist can be obtained, it is better to use ether. Again, in very tedious operations I generally deem it wiser to substitute ether for the chloroform after two hours have elapsed, not that I by any means do so always.

In conclusion, without entering into the vexed question as to the cause of death under either ether or chloroform, I am, as the result of my own practice, decidedly of opinion that, with due care and attention to the rules laid down—namely, (1) to see that chloroform be pure, (2) that a proper inhaler be used, (3) that the respiration and pulse be watched, and (4) that the needful degree of anæsthesia be steadily maintained—that the use of chloroform is safe, certainly quite as safe as ether, while its effects are infinitely less disagreeable to the patient both during and subsequent to inhalation.

I do not believe it likely that the controversy as to the relative merits of the various anæsthetics will ever be definitely settled; each have their advantages and their disadvantages; none are absolutely safe, nor is it likely that any such will be discovered; but I believe that with proper care the number of fatal cases will be greatly reduced. Perhaps I should add that whenever I have given ether I used Ormsby's inhaler, which so far as I know is the best.

ON DETACHMENT OF THE INTERNAL EPICONDYLE OF THE HUMERUS.

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THERE are so many points of practical interest in the diagnosis and treatment of this injury that it is certainly worthy of special discussion. For unless the surgeon be familiar with the nature of the accident, its frequency, and the extreme trouble that may be experienced in preventing marked impairment of the functions of the elbow-joint he may be surprised and chagrined at the imperfect results which sometimes follow the treatment of so apparently slight an injury. Although Mr. Benjamin Granger, so long ago as 1818, drew attention to the subject in an admirable paper¹, and the chief writers on fractures and dislocations have referred to it from time to time, I have not been able to find a complete account of the accident and its occasional complications, and have therefore thought it of interest to collect the records of cases under my own observation as well as some of the scattered accounts of the experience of others.

It is unfortunate that there exists some confusion in naming the strong projection just above the inner side of the elbow. By many it is referred to as the *condyle*, by others (Quain, Macalister, etc.) as the *epicondyle*, in France it is termed the *epitrochlea*. As it is not an articular eminence and does not correspond to a true condyle of the femur it seems most correct to use either of the latter terms—epicondyle by choice. The anatomical peculiarities of the internal epicondyle—its strong projection inwards, by which it shelters the ulnar nerve, and affords leverage to the pronator radii teres, and flexor carpi radialis—are well known. But it is advisable to point out two or three other features which will be seen to be

¹ On a particular Fracture of the Inner Condyle of the Humerus, *Edinburgh Medical and Surgical Journal*, vol. xiv, p. 196.

of importance with regard to fracture or detachment of the epicondyle. Considering the number of muscles which are attached wholly or in part to this projection of the humerus, the pronator radii teres, palmaris longus, flexor carpi radialis, flexor sublimis digitorum, and flexor carpi ulnaris, it is only natural that Granger and others should have attributed to sudden muscular action the detachment of the epicondyle. But it is well known that this accident is only common during childhood, or before the age of 20, when fractures by muscular action are especially rare. Nearly all the cases I have observed have been in boys. M. A. César² collected fourteen cases, of which ten occurred in patients under 16; of five cases noted by Hamilton,³ four occurred under the age of 15. The experience of other writers fully confirms the statement that nearly all the cases occur between the ages of 6 and 17 or 18. Now, at this period, the epicondyle exists as a separate epiphysis, to the under surface of which the very strong internal lateral ligament is attached. It may be further noted that a fibrous band of varying strength also passes over the ulnar nerve between the epicondyle and olecranon, a band which, according to Mr. Bland Sutton, is really a degenerate muscle. So that the epicondyle is firmly connected to the ulna, and any force sufficient to dislocate the latter when transmitted upwards, as in a fall on the hand, will throw a severe strain upon the line of union of the epiphysis. Directly this gives way an outward or backward dislocation at the elbow will occur with comparative ease, and I have seen it produced by the surgeon's examination in a case of separation of the epicondyle. Hence the frequency with which both fracture and dislocation occur together.

Fig. 1.—a. Internal epicondyle. b. Internal lateral ligament. Forward dislocation of elbow with fracture of olecranon and separation of internal epicondyle (epiphysis). Specimen in Cambridge Museum (Sir G. M. Humphry).

In Germany the frequency with which an outward dislocation at the elbow is complicated with detachment of the internal epicondyle has been pointed out by several surgeons, and is by one good authority even regarded as an invariable accompaniment (Hueter). This I am convinced, from observation both in children and adults, is a mistake, although I believe the epicondyle is much more frequently torn away than is supposed in cases of dislocation in young subjects, whether forwards, or, as is more common, outwards. The late Professor Hueter seems to have been the first to call attention to this in *Langenbeck's Archiv*, Band ix, 1867, p. 936-939. Schüller⁴ said that in all the cases of outward dislocation which he had observed the internal epicondyle had been detached. Supposing the dislocation remains unreduced, the epicondyle, which retains its attachments to the ulna, and is hence drawn in front of the trochlear surface of the humerus, is said to constitute an obstacle to reduction. Bardenheuer, in three cases of resection of the elbow-joint on account of old outward dislocation of the forearm, found the epicondyle detached. In the living subject he observed a similar detachment seven times in connection with dislocation; five times with more or less complete outward displacement; and twice with backward dislocation. In four cases the accident consisted in a fall on the outstretched hand; in three on to the inner surface of the forearm.

It is probable, then, that in a considerable proportion of the cases the epicondyle has been detached as an epiphysis

by indirect violence transmitted through the forearm and internal lateral ligament, the lesion being an example of what the Germans term an "Abressfraktur." In certain other cases the projection is knocked off by direct violence, and I believe muscular action is responsible for but a very small proportion, if any.

The separate projection of the epicondyle first occurs at about four or five years; at about the same date it begins to ossify, and the final union with the humerus takes place between the seventeenth and twentieth years. A nearly vertical line continued upwards from the inner border of the trochlea would after the ninth or tenth year practically correspond to the outer margin of the epicondyle, the latter having a biconvex outline, and measuring at its greatest from 15 to 17 millimetres (about half an inch) in height, 12 millimetres from before backwards, and about 8 millimetres across. It is one of the smallest epiphyses in the body, and it is remarkable that its detachment should be liable to be followed by such serious results as some of the following cases will exemplify. When it is much displaced the elbow-joint is probably involved, though this cavity need not necessarily be opened.

Fig. 2.—Vertical section through lower end of humerus at age of 17, showing part of the lower epiphysis, that for the internal epicondyle (a), and its relation to the ulnar nerve (b). c. The elbow-joint.

The accompanying sketch, taken from the humerus of a lad aged 17, shows the size of the epicondyle shortly before it joins with the shaft, and the relation of the ulnar nerve to it (the latter is of special interest owing to the symptoms of irritation or pressure upon the nerve which have occasionally followed detachment of this epiphysis). It will be seen that the lower end of the bony epicondyle is situated about 1 centimetre above the synovial reflection and the lower epiphysal line of the humerus. In the interval between the two are some little nuclei of bone, the occurrence of which is not uncommon in this region.

One point of interest still remains to be noticed. The periosteum over it is thin, and in cases of detachment is probably nearly always, if not invariably, torn through—a fact of practical interest, since it accounts for the rarity with which bony union follows separation of this epiphysis. I have repeatedly ascertained that long after this accident, although the little piece of bone may be distanced but 1 or 2 centimetres from its original attachment, fibrous union only has occurred. In this respect the epicondyle differs from nearly all the other epiphyses, which unite by bone even if considerably displaced, owing to ossification of the bridge of periosteum which connects them with the shaft.

Cases of detachment of the epicondyle may be divided into two groups.

The first class of cases consists of those in which the epicondyle is detached and displaced downwards, and unites nearly invariably by fibrous tissue, but in which no grave impairment of function results so long as proper treatment is adopted. Under the head of proper treatment one would include the use of an angular splint for a fortnight or rather more, and passive motion of the joint begun early and persevered with. The latter is especially indicated since bony union of the detached portion is hardly to be expected. The splint should not be a firmly-padded inside one, since such a splint has a tendency to press on the displaced fragment and

² César: *Thèse de Paris*.

³ Hamilton: *On Fractures and Dislocations*.

⁴ *Surgical Anatomy*, p. 237.

is very uncomfortable to wear if, as so often happens, there is considerable swelling about the inner aspect of the elbow. An outside angular one is better, or a moulded poroplastic felt one leaving the epicondyle region exposed; or, if an internal one be employed, a circular depression in the padding should be made over the seat of fracture. A brief abstract of a few cases of this class will suffice.

CASE I.—E. R., a boy, aged 10, fell on the curb-stone, the point of his right elbow striking the ground. A backward and outward dislocation of the radius and ulna was thus produced, with detachment of the internal epicondyle. Reduction, outside angular splint. Three weeks later the epicondyle was found displaced slightly downwards and backwards. Both flexion and extension somewhat limited, but he recovered completely under passive motion.

CASE II.—H. T., aged 11, had his epicondyle detached by a fall on to the hand; he was positive that the elbow had not been struck. Epicondyle readily felt and could be moved laterally, full relaxation of the flexor muscles had no effect upon the displacement, which was chiefly downwards. Outside angular splint, circular pad over fractured part. Ultimately fibrous union but almost perfect use of the joint.

CASES III and IV.—In both these cases, young boys, the forearm was dislocated outwards at the same time that the epicondyle was dragged off by the traction on the internal lateral ligament. In both the small fragment of bone was drawn under the trochlear surface, and was not detected in one until the dislocation had been reduced.

CASE V.—B. B., aged 14; one arm "gave way" as he was crawling on hands and knees. Dislocation of forearm outwards, with detachment of the epicondyle. At the end of four weeks' treatment the latter remained in a position close to the coronoid process, united only by fibrous tissue to the humerus. Extension less by 15° than on the other side. Eighteen months later I carefully examined the elbow again, and found the epicondyle (2 centimetres in long diameter) still quite movable. The elbow was considered as strong as the other one, but in lifting weights he felt occasional pain in the region.

Several other cases which I have followed up have shown practically complete recovery of power in the elbow, although the epicondyle remained united to the humerus only by fibrous tissue. These cases afford sufficient proof that the detachment of the epicondyle may be followed by almost complete restoration of movement in the elbow, and contradict the statement of Malgaigne and Coulson that some stiffness and deformity are almost inevitable. I need only add that Dr. Clement Dukes narrates a similar case in the *BRITISH MEDICAL JOURNAL*, 1874, vol. ii, p. 403 (a lad, aged 16, who tore off his epicondyle in a fall from a horizontal bar), Hamilton⁵ two others (in one of which the epicondyle was said to have been displaced the extraordinary distance of $1\frac{1}{2}$ inch and there immovably fixed), Troschel (quoted by Gurlt) another, etc.

We have now to consider the cases in which the accident has been followed by a surprising amount of stiffness or practical ankylosis of the elbow, and, as already noted, this result is regarded as the most frequent one by some writers. Mr. Coulson, in a discussion at the Royal Medical and Chirurgical Society on January 11th, 1859, stated that he had seen a great many cases of this fracture in boys, and thought their treatment was almost always followed by deformity. Thus, in one case, he was consulted by Mr. Key, the patient, a boy, having separated the internal epicondyle a fortnight previously. The elbow could neither be flexed nor extended. Mr. Key "refractured the part," and kept the elbow flexed for six weeks longer, the boy recovering very good movement. The same surgeon said that he had in two other cases been also obliged to produce a "refracture," and he thought the deformity was due to "the coronoid process getting behind the internal condyle."

Malgaigne⁶ records one case in a boy of 10, who fell on the path, the inner side of his elbow being driven into the gravel. No crepitus was at first present, and owing to the swelling no diagnosis was made until the eighth day, when the internal epicondyle was plainly made out to be broken off, but without marked displacement. The forearm was kept flexed on a splint, and some pressure made on the epicondyle; passive motion was begun at the end of a fortnight. Although but little inflammation was present, Malgaigne states that flexion could only be obtained between 80 and 140 degrees after two months and a-half had elapsed, and regards some stiffening as "almost inevitable."

M. Marjolin⁷ showed a case of rectangular ankylosis of the elbow in a boy, aged 12, after separation of the internal epicondyle, at the Paris Société de Chirurgie, 1861. A discus-

sion was held on it, and passive motion under anæsthesia strongly advised, but the ultimate result is not stated.

Hamilton records another case with a similar unfortunate result, and as a further example I may quote the following: W. W., aged 7, fell on the right arm, and separated the internal epicondyle, dislocating the forearm backwards. He came to the clinic two days later when the swelling was very great. Under anæsthesia, however, the diagnosis could be effected, and the reduction made. Plaster-of-paris bandage. He was sent out of hospital and told to return in a fortnight; unfortunately he did not do so for several weeks, by which time movement in the joint had become much impaired, and did not improve greatly.

Mr. B. Granger, of Burton-on-Trent, who has the merit of first accurately describing the detachment of the epicondyle, well pointed out the not infrequent untoward results which followed it; and as his paper is not in a very accessible quarter, I shall be forgiven for quoting at some little length from it. In one case a boy, aged 11, dislocated his forearm and detached the epicondyle; the dislocation was easily reduced, and the arm kept in a sling. "When the tumefaction, which was exceedingly great, had gone down, the forearm was found immovably fixed at right angles with the humerus." By perseverance in passive and active motion, at the end of three weeks a considerable amount of use had been regained. Minute directions as to continuing the manipulations were given him, and he was not seen again for a considerable time. It was then found that the elbow was fixed in a position of complete extension, as immovably as before. He slowly regained a good deal of power in flexion, but the report leads one to believe that the result was far from being perfect.

In a second case, a boy, aged 8, detached his epicondyle, and "from the moment of accident lost all sensation in the little finger and inner side of ring finger, successive crops of vesications forming on these parts during the three or four months which followed the accident." The muscles of the little finger were "paralysed and useless" for some time. He subsequently followed a very laborious occupation, and slowly acquired a large amount of function in the ulnar nerve, though slight evidence persisted of the injurious pressure which had been exerted on it. Two other cases are mentioned briefly, in which precisely the same results ensued on detachment of the epicondyle—namely, paralysis of the parts supplied by the ulnar nerve and trophic changes in the skin affected. Both are said to have ultimately recovered.

The parallel between my next two cases and those of Mr. Granger is exact.

CASE VI.—W. E., aged 10 years and 6 months, fell on his right elbow across a bar; he stated that he struck the outer side, but this was doubtful. The result was that the internal epicondyle was separated; an internal angular splint was applied. I examined the case twelve days later, and the complete absence of the normal projection of the epicondyle was extremely marked. The detached piece of bone was displaced backwards and downwards, and was fairly fixed in its new position. The elbow had been kept at a right angle, and he resisted efforts to extend it further than a few degrees beyond this. As he had considerable pain during the last few days (the splint having been left off, and the imperfectly fixed fragment no doubt irritating the ulnar nerve), it seemed best to reapply the splint for a short time longer before beginning passive motion. At the end of three weeks passive motion was instituted, but he would not move it at all himself, and, as it was very stiff, I anæsthetised him for the purpose of breaking down any adhesions that might be present. It was interesting to note that the greater part of the stiffness was purely due to tonic muscular contraction; for whilst the range of flexion had before been limited to about 15° when under the anæsthetic, a range of at least 90° was at once obtained without the least force. Evidently, however, some fibrous adhesions (?extra-articular) were responsible for some of the limitation, as when the arm was fully extended or flexed they were felt to give way. The epicondyle, as previously noted, was drawn downwards and fairly fixed; its lower point must have been close to the coronoid process. A regular course of passive motion was instituted, but great difficulty was experienced in obtaining the power of flexion, any attempt at which caused him pain. I am not able to state that he perfectly recovered. This case made it quite clear that the chief difficulty to be met lay in the pressure on the ulnar nerve, for nothing else would account for such reflex spasm disappearing almost entirely under the anæsthetic. A short time after seeing this case, another came under my care in which the cause was still more obvious.

CASE VII.—H. W., aged 13, whilst "turning cart wheels" on his hands, fell and detached the epicondyle of one humerus. He was treated at Guy's Hospital in the most thorough manner, and, from particulars I was fortunate enough to obtain from one of the dressers who had attended to him, it was ascertained that passive motion was tried for long, and that he was twice anæsthetised with the view of overcoming the rigid extension of the elbow. When he came to the London Hospital at the end of some four or five months the condition was as follows: His left arm was practically useless, since he could not bend the elbow more than a few degrees, and he complained of great pain if any attempt

⁵ *Fractures and Dislocations.*

⁶ *Treatise on Fractures* (Packard's Translation), p. 442.

⁷ *Langenbeck's Archiv*, vol. 21, p. 237.

were made to increase this. Further, there was evidence of serious injury to the ulnar nerve. The little and half the ring fingers were anæsthetic, there was wasting of the short muscles of the former and of the adductor pollicis, and the interossei would hardly act at all. The epicondyle was readily felt to be drawn downwards and a little backwards, and that region was very tender to palpation. Seeing that all ordinary means had failed and that the muscles were wasting, I thought it advisable to relieve the condition by operation, to which the parents readily consented. He was admitted under my care by the kindness of Mr. Treves. Under antiseptic precautions I cut down upon the epicondyle, and found it firmly fixed in the position described, with the ulnar nerve stretched over its posterior and outer surface. The nerve was not distinctly made out to be inflamed. It seemed inadvisable to fix the epicondyle in position, as it would have been necessary to divide all the muscles and ligaments attached to it, so it was carefully excised. The elbow-joint was necessarily opened. He made a good recovery with the exception that a small abscess (probably not in the joint) formed and had to be drained. This should not have occurred, and I am inclined to attribute it to the splint having been applied too tightly and so irritating the small wound. At any rate, the ultimate functional result was very satisfactory. Sensation returned in the anæsthetic area within a few weeks; power was regained over the interossei, etc., and he was able to bend the elbow to about 50°. Some six months later I got him to return for examination, and although slight limitation of both flexion and extension remained the arm was thoroughly useful, all pain on movement had disappeared, and he considered the arm practically as strong as the other one.

It may of course be suggested, looking at the ultimate favourable result in Granger's cases, that an operation was not necessary, but, generally speaking, it is exceptional for symptoms of pressure on nerves due to bone (not recent callus) to subside entirely; and it may be mentioned that Bardenheuer and other German surgeons have actually excised the elbow for conditions similar to that which my patient presented. The part removed proved on section to include the whole of the small epiphysis for the internal epicondyle.

The accompanying engraving, taken from a photograph,

shows the extreme limit of flexion at the elbow before the operation, only about 10 degrees, and this was accomplished with some pain.

To summarise: 1. Detachment of the internal epicondyle (as an epiphysis) is a very frequent injury in early life, and often accompanies dislocation of the elbow joint.

2. The detached fragment is displaced downwards, and is rarely, if ever, reunited by bone.

3. In the treatment passive motion should be commenced within three weeks, and should be persevered with until the joint regains its function.

4. In several cases, owing to pressure on the ulnar nerve, great limitation of movement, and trophic changes in the region supplied by that nerve, have resulted. In such cases it may ultimately be advisable to excise the detached piece of bone, but excision of the joint, which has been performed in one or two cases, is quite unjustifiable.

IMPROVED METHOD OF EXAMINING THE AUDITORY CANAL AND MEMBRANA TYMPANI.

By JOHN WARD COUSINS, M.D.LOND., F.R.C.S.,

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DURING the last two years, both in public and private practice, I have constantly employed the aural speculum and head rest which I now submit to the criticism of my professional brethren. They were exhibited in the Section of Otology at the annual meeting of the Association in 1890, and although it is true they are only modifications of ordinary instruments, still I believe that in many cases they will render the examination of the membrana tympani and audi-

tory passage more easy, and tend to facilitate accurate diagnosis.

The speculum with the mirror and lens attached to it, and placed opposite to each other, is represented in Fig. 1. The instrument is constructed with a broad metallic ring, which can be fixed to the funnel-shaped tube by a bayonet-joint, and on the rim the concave reflector is fixed with a short handle working in a ball and socket joint, so that it can be turned in any direction and secured in any position. Within the ring, and movable on a hinge, is a convex lens with a focus of about 3½ inches. When not in use the lens can be folded within the speculum and the mirror utilised as a cover.

Fig. 1.

Fig. 2.

The correct position for a patient during an aural examination is represented in Fig. 2. The rest consists of a strong wooden stem with a handle fixed near the upper end for the patient to hold, and a support for the head, well padded and covered with leather. The headpiece is attached to a movable slide, which is enclosed within the stem, and is constructed so that it can be adjusted at any required height. With this simple contrivance both ears can be alternately examined by directing the patient to turn round the head without any other change of position.

In examining the ear the auricle must be drawn upwards and backwards, the speculum held by the left hand, and the mirror and lens manipulated with the right. Good daylight can be used for the illumination, and when this is not available I employ a gaslight or electric lamp, elevated about one or two feet above the head of the patient. The position of the mirror must be regulated so that the pencil of light falls upon the bottom of the meatus, and this will make the tympanic membrane and the upper part of the auditory canal clearly visible. The lens will often be found an additional aid in diagnosis, and for the purpose of getting rid of the reflection of the mirror from its surface it is generally necessary to give it a little obliquity.

The plated funnels are made in various sizes, and can be utilised for the ordinary method of aural examination. The mirror and lens can be obtained with the specula from Messrs. Maw, Son and Thompson, and I am indebted to Mr. John Banks (of that firm) for carefully carrying out my design. The entire instrument, including five funnels and the case, weighs only 4 ounces.

Ears are not always easy to examine. The external passage is often small and tortuous. Sometimes epithelial scales, fibres of cotton-wool, and other foreign substances, mixed with cerumen, obstruct the illumination. In many cases the meatus must be carefully cleansed before the condition of the membrane can be accurately observed. The manipulation of