Schneiderian folds are protected below by special valvular cartilages. The cornua trabeculæ lie between and below the capsules.

Neither in Ganoids nor in Teleostei are there any special cartilaginous nasal capsules; but, in Acipenser and the Teleostei, a recess is formed in front of the antorbital (lateral ethmoid) cartilage, in which the membranous capsule is lodged. But, in Lepidosteus, the long nasal capsules travel to the end of the snout, and are lodged on each side of the rostrum terminally.

The essential nasal capsule in the Amphibia is primarily a distinct crescentic cartilage; but the walls, floor, and septum of the olfactory region are largely constituted by the skull proper.

In the snake, the nasal capsules are simple curved cartilages, so bent as to appear reniform, the "hilus" being the external nostril; they are well bent over the membranous lining, and, by their inner edges, grow down and meet the coalesced trabeculæ.

In the rest of the Sauropsida and in the Mammalia the essential nasal capsule is a more or less tubular cartilage, which combines above with the large intertrabecular or ethmo-nasal septum, and behind with the lateral cranial outgrowth in the ethmoidal region. Turbinal growths of the capsule may be seen in a rudimentary form in lizards, turtles, and crocodiles, but these are in the region of the inferior or maxillary turbinals, which are supplied by the fifth nerve. In birds, very perfect turbinals are formed, which are highly complicated in the Ratitæ, but these are mainly outgrowths from the vestibular region, and are also supplied by the fifth nerve, so that the true olfactory region is not complex. In the Mammalia, the hinder region, which alone is supplied by the olfactory nerve, is highly complicated by ethmoidal turbinal outgrowths, as well as the nasal and maxillary regions in front of it.

In both Myxine and Petromyzon, the small and oval auditory capsules coalesce with the skull, and are composed of hard cartilage; but each only contains a double semicircular canal, comparable to the anterior and posterior canals of other types.

In Selachians and Sturgeons, the large cartilaginous auditory capsules are imbedded in and coalesced with the side walls of the very perfect chondrocranium. There is a very small opening above into each, the *aqueductus vestibuli*, representing the primitive auditory involution, and there are three perfect semicircular canals.

In Lepidosteus, the cartilaginous capsules are perfect and ovoidal, and become ossified by centres which are called præotic, epiotic, opisthotic, and sphenotic. Teleostei agree with Lepidosteus in these respects, but they have also a pterotic. These ossifications are not confined to the capsule proper, but extend also to the chondrocranium with which the capsules are completely blended.

In the Urodeles, there is a præotic, which also belongs to the alisphenoidal region, and an opisthotic, belonging also to the exoccipital region.* Each capsule, which chondrifies from below upwards, becomes perfect, and then opens infero-laterally to form the fenestra ovalis, which appears in this group for the first time, and is closed by the stapes, a separately developed cartilage belonging to the hyoid arch. This description is equally applicable to the auditory capsules of the Anura, but in several of the lower and more generalised types of these, the greater part of the occipito-otic region becomes converted rapidly into bone, without distinction of elements. In this case, however, the bone divides afterwards into regions.

In the Sauropsida, each cartilaginous auditory capsule can be distinctly traced from the contiguous parts of the chondrocranium, but coalesces more or less with it, especially below. It soon loses the ovoidal form, on account of the huge development of the semicircular canals. In all, a fenestra ovalis is formed as a secondary space which becomes closed by the stapes. There is nearly always a fenestra rotunda, and this is a primary and not a secondary opening; it is only closed by membrane. The normal ossifications of the capsules in reptiles are a præotic in front, an opisthotic behind, and an epiotic over the junction of the anterior and posterior canals. The stem of the Y-shaped suture dividing these is vertical; the opisthotic surrounds the fenestra rotunda, and divides it from the fenestra ovalis, which latter is bounded behind by the opisthotic, and in front by the præotic. These three periotic centres, which do not unite with each other, coalesce as a rule with the bone nearest to them—viz., the præotic with the alisphenoid, the epiotic with the supra-occipital, and the opisthotic with the exoccipital.

In Birds, the auditory capsules correspond very closely with those of reptiles, but the epiotic and opisthotic are very small. All the centres of this part of the head speedily unite with the surrounding bones before they unite with each other.

In Mammals, the auditory capsules are modified very largely by the size of the highly developed cochlea, and by the frequently large development of the mastoid region. The lobulated cartilaginous capsules

early become continuous with the adjoining parts of the chondrocranium. Ossification, which begins in the substance of the cartilage endosteally, is extremely irregular, and the centres very soon coalesce; but, as a rule, three can be made out in the upper part of the proper petrous region—a distinct præotic, a small epiotic, and a much larger opisthotic tract, the latter occupying nearly all the mastoid region except its upper part, as well as the lower face and greater part of the cochlea. In certain types, the ossified auditory capsule ankyloses more or less with contiguous parts, especially with the tympanic; but, in the largest and the smallest of mammals—in whales, on the one hand, and in shrews and bats on the other—the petromastoid, or whole ossified capsule, is quite distinct both from the tympanic and from the surrounding cranial bones. The relations of the fenestræ to the bony elements is the same as in the Sauropsida.

THE ANTIDOTES FOR STRYCHNINE.

By ROBERT BARNES, M.D.,

Obstetric Physician to St. George's Hospital.

HAVING had occasion to study, experimentally and clinically, the action of strychnine, I was much interested in the notice of the experiments of Messrs. Greville Williams and Waters on the antidotal action of " β lutidine", in the number of the JOURNAL for March 11th. I earnestly hope that further experiments will be carried out, to test the correctness of their theory, in some country in which scientific research is not yet paralysed by the tyranny of ignorance. My immediate object is to invite attention to the value of nitrite of amyl in strychnine-poisoning. This agent is not mentioned in the text-books; but it is probably much more efficacious than any of those which are commonly specified. Antidotes, it must be premised, are of two kinds: 1. The true antidotes; those which destroy the poison by decomposing it, or by annihilating it in essence, or by producing inert combinations. These are the chemical or mechanical antidotes. 2. Those, which, not altering the poison in its essence, counteract its action upon the organism. These are the physiological antidotes. In our endeavours to rescue a patient from the action of a poison, we have three indications: 1. To discharge the poison from the stomach, if it have been introduced by that organ, by the aid of the stomach-pump and emetics; 2. To administer antidotes that destroy or neutralise the poison in the stomach, or in the system; 3. To administer means that will sustain the patient against the action of the poison—in short, keep him alive until the poison is exhausted.

To apply these principles to strychnine, I am unable to judge how far the new organic base β lutidine belongs to the chemical or physiological class of antidotes. Strychnine is, unfortunately, a very stable substance, not easily attacked in its integrity; nor is it easily discharged in substance by vomiting or the stomach-pump. By the time that symptoms of strychnine-poisoning are developed, enough may have entered the circulation to lead to a fatal result, without absorbing more from the stomach. In practice, we shall commonly be reduced to the use of those means which counteract its toxic influence.

There is good evidence to show that strychnine kills by repeated violent shocks, exhausting the nervous centres, especially the respiratory and spinal centres; and that, if these shocks could be moderated or averted, the patient might be kept alive until the danger had passed, by the elimination of the poison. I had the good fortune, in the præ-hysterical epoch of legislation, occasionally to assist Marshall Hall in his experiments *ad hoc*. It is well known now that a frog, poisoned by strychnine, may not exhibit any tetanic action if it be kept absolutely quiescent; but that the same dose will kill it, if, by stimulating the diastaltic functions, as by touching its body, or even by shaking the table upon which the frog rests, tetanic action be evoked.

The first imperative rule to observe, then, is to avoid every possible cause of physical or emotional disturbance. Agents that have to be administered by the mouth contravene this rule; the attempt to swallow will excite a tetanic fit. Agents that act by inhalation do not contravene this rule. Of all the agents with which I am acquainted, which possess any virtue in stilling the diastaltic function, and in subduing muscular spasm, not one equals the nitrite of amyl. In obstetric practice, we are met by the formidable conditions of morbidly exalted, diastaltic, and spasmodic action: puerperal convulsions; and that irregular action of the uterus called hour-glass contraction. Both these conditions are physiologically allied to tetanus. In my *Obstetric Operations* (third edition), I recommended nitrite of amyl to subdue irregular and excessive action of the uterus. The value of chloroform in counteracting puerperal convulsions is now familiar; but I believe nitrite of amyl is even more valuable. By applying this principle, I have had the satisfaction, as I believe, of saving several lives; and

* There is a separate pterotic in the Axolotl

amongst them one or two women who had signed antivivisection petitions. I did not stop to inquire if they were willing to be saved by practice based upon vivisection; but I should hope to be forgiven. The means by which the necessary knowledge was obtained may, in their particular cases, be condoned by the end to which that knowledge was applied.

I have had the rare opportunity of treating a case of strychnine poisoning. I was called to a gentleman who had inadvertently swallowed a poisonous dose. I saw him within a short time of the accident. He was in the most violent tetanic spasms; opisthotonos was so marked that his body was arched back, and respiration was nearly suspended. Pending the fetching of the nitrite of amyl, the fits recurred at short intervals with unabated energy. I obtained the assistance of a young medical friend, who sat by the bedside, diligently watching, and making the patient inhale nitrite of amyl the moment the premonitory twitchings or facial expression appeared, and always with the effect of averting or greatly moderating the fits; and, to make the evidence complete, when the warning was not seized in time, the fit appeared in nearly its original intensity. This treatment, continued during sixteen hours, resulted in the recovery of the patient. It was impossible to determine with precision the dose taken. We had only the physiological test to satisfy us that he had taken enough to destroy life.

The spasm-subduing virtue of nitrite of amyl has lately been most happily illustrated, in a case of *enclitonnement* of the placenta by hour-glass contraction, by Dr. Fancourt Barnes. This case was published in the JOURNAL for March 18th, page 377.

ACUTE TRAUMATIC MALIGNANCY.

By HENRY B. WALKER, L.R.C.P. & S.ED., Lowestoft.

SOME cases seeming to confirm the theory implied in the heading of Mr. Barwell's paper in a recent number of the JOURNAL, have fallen under my notice, and may be interesting.

CASE I. Mr. H., a master mariner, aged 53, was always healthy until fourteen weeks before death, when he was struck violently in the right hypochondrium by the shaft of a cart. The blow felled him, rendering him insensible, and it was some time before he could be removed to his own house. Here he was laid up for two days, and, though feeling "very sore and ill," he then started in charge of his ship on a trip to Sunderland. During the voyage, he was in much pain, and on his return to Lowestoft was again laid up at home; feeling better after some rest, he took another voyage, but was so ill that he had practically to give over the command to his chief officer, and when he reached port, to place himself under a doctor's hands. His symptoms were frequent vomiting, complete loss of appetite, and intense pain in the region of the liver, shooting across the epigastrium. He was much bruised, and very tender. I saw him on his return to Lowestoft, and he was then very ill, with high temperature, thirst, constant vomiting, and wasting. On examining the abdomen, I found there was some remaining sign of the bruise—discoloration, etc.—and he was extremely tender all over the region of the liver in front, the tenderness extending to the left hypochondrium and down nearly to the navel. I could not detect any sign of enlarged liver, but there was some jaundice, with pale stools and constipation. A fortnight later, his condition becoming gradually worse, a well defined hard and tender bossy mass with rounded edges, under which the fingers could be passed, was found projecting below the ribs (at a point which would be intersected by a line drawn perpendicularly from the anterior superior spinous process of the ilium), and extending well into the left hypochondrium. This mass, which was taken to be liver, extended downwards and to the left side, till it filled the abdomen in front to a level with the umbilicus. Its extreme hardness, and the constant presence of sharp lancinating pain, together with the cachexia accompanying it, led to a diagnosis of malignancy, which was confirmed by an eminent consultant. Towards the last week of his life, the patient vomited a quantity of blood, containing pyriform and oval multinucleated cells. After the last hæmorrhage, the patient died exhausted.

I could get no *post mortem* examination, but there was no doubt in the minds of three medical men as to the nature of the disease, and it was believed to be carcinoma of the liver, invading the stomach secondarily. There was no history of malignancy in the family, though several members had died about the same age as my patient. No history of dysentery or syphilis was attainable. I may state that both the patient and his friends assigned the accident as the cause of his illness, and certainly facts seem to warrant them in doing so. He certainly never recovered the effects of his bruise, had not complained before, and died fourteen weeks after he received it.

CASE II. Mr. F., a farmer, was out shooting; and, while he was trying to force his way through a hedge, a thorn penetrated his trousers and wounded his prepuce, causing blood to flow. He took little heed of it at the time; but a few days later, feeling some heat and uneasiness, he found swelling and irritation about the wound. This rapidly increased, and he then consulted his medical man, who advised certain remedies. The penis grew worse, and the whole glans presented a mass of carbuncular hardness in a short time, and was very painful. An incision into it giving no relief, and suspicion being confirmed on consultation, the penis was amputated, and the growth proved to be an epithelioma. This was only a few weeks from the date of injury.

CASE III. A gentleman rode to hounds, mounted on a very broad-backed horse, and in the evening felt the inner side of his left thigh stiff and sore. The stiffness persisted, and was followed by a slight fulness, and finally by a well defined tumour about the size of an orange, nestling amongst the deep muscles of the thigh. This was removed by operation, and proved to be a small spindle-celled sarcoma.

CASE IV was related to me by a lady whom I was attending in labour. Her brother was playing football, when he received a kick on the shin. This led to severe inflammation, which laid him up for some time. On apparent recovery, a hard swelling remained on the tibia, which soon began to cause pain and enlarge. As it increased and bore suspicious characters, the limb was amputated at the knee-joint, but the growth recurred, and the patient lost his life. I asked the lady what the growth was, and she said, "The doctors did not call it a cancer, but by a queer name—'sarcoma'."

In all the foregoing cases, the patients confidently referred to their injury as the cause of their trouble; and in all except the last, I can state that minute inquiry failed to trace a family history of malignancy. In the last case, I have no note on this subject, and therefore cannot speak with certainty, but I believe I was assured that such was the case in this one also.

A DISPLACED LEUKÆMIC SPLEEN, CAUSING OBSTRUCTION AND DEATH.

By M. COLLINS, M.D., Scarborough.

ON February 15th, I received a message to "come at once and attend K.P., who was in labour." I found the patient, aged 36, very much emaciated, and presenting a peculiar but very suggestive waxy appearance. A quick and feeble pulse, dyspnoea and urgent fecal vomiting, had set in already. The os was patulous, so as to admit the examining finger readily: the posterior lip was hard and nodulated. Otherwise the uterus was in its normal unimpregnated condition.

On inspection, the abdomen appeared to be as large as at the sixth month of utero-gestation; but by manipulation, I could detect a solid mass in the left inguinal, and half the left lumbar regions. Its upper margin was sharp and well defined, corresponding to a line drawn from the umbilicus to the crest of the ilium. The right lumbar and inguinal regions were tympanitic. The liver was visibly enlarged, projecting below the ribs, and filling up the left hypochondriac region.

That there was neither labour nor pregnancy, was manifest; and it was equally evident that the patient was *in articulo mortis*. As the hand of death was upon her, I deemed all operative interference imprudent. Enemata, draughts, etc., were administered, but in vain. She died within forty-eight hours.

The patient died, as she had lived, in the belief that she was *enccinte*; for the patulous condition of the os, pain, a gradually increasing abdominal tumour, etc., led a certified nurse to an erroneous diagnosis. I could not dissuade either from their mistake. The nurse stoutly and rudely maintained that the patient was *de facto* in labour.

Post Mortem Examination.—On opening into the abdomen, I found the spleen filling up the left inguinal and half the left lumbar regions. Its internal surface was uppermost, and its external undermost. The gastro-splenic and suspensory ligaments were elongated. The spleen weighed two pounds and eleven ounces. Its external surface was traversed from above downwards by a well marked fissure, which gave the organ a bilobed appearance. On section, considerable resistance was offered to the knife by a thickened capsule and trabeculae: it presented a bloodless, homogeneous, reddish-brown appearance. The intestines and omentum were pushed to the right side, and those lying contiguous to the spleen were dark and considerably congested. Part of the descending colon and sigmoid flexure were pressed upon; and the latter was atrophied to about the size and thickness of the finger of a glove. There were some seybala in the colon. The uterus was normal, with the exception of a patulous os and nodulated posterior lip. A small abscess, nearly as large as a pigeon's egg, was found in the left broad ligament. It contained about a drachm of horribly offen-