streams of carbonic acid from every point of the earth's surface, of which this salt, together with silica, forms the greatest part; its geognostical distribution extending from the newest tertiary deposit to the oldest primitive rocks. From its combination with lime, carbonic acid is evolved partly by sulphuric and hydrochloric acids, which exist in the interior of the earth, sulphate and chloride of lime being thus formed; and partly by a simple process of calcination which is continually carried on at a certain depth, in consequence of the heat inherent to the interior. Berzelius believed that the action of the heat, and, therefore, a continued evolution of carbonic acid from limestone, ceased at the depth of two or three fathoms from the surface, in consequence of the very bad conducting power of the stone. But Bischof has proved that if limestone is exposed to a high degree of heat it cannot retain its cohesion and firmness; in fact, under such circumstances, the rock soon cracks in every direction, is disintegrated into fragments, and thereby affords ample room for the continued influence of the heat, which is, of course, assisted by the presence of a large amount of aqueous vapours. This is, only on a larger scale, the very same process which we may every day observe in our artificial lime-works.

In a subsequent communication I intend entering into the physiological effects and the therapeutical action of carbonic acid, both as gas and when dissolved in water.

ART. VII.—*Observations on Encysted Tumours*. By HENLEY THORP, M.D., F.R.C.S.I., L.K. & Q.C.P.I., Letterkenny.

DURING the last ten years I have been called on to operate upon several cases of encysted tumours, and as my experience of these growths, at least as they occur in the orbital region, does not correspond in some respects with Mr. Hamilton's, as published in his memoir in the last number of this journal, I am induced to give a brief account of a few cases, out of many others, which have come under my notice, and to append a few remarks upon encysted tumours generally, as well as upon those which occur in the neighbourhood of the orbit in particular.

CASE I.—In the summer of 1853, a farmer, aged 30, consulted me respecting a swelling that occupied the outer part of the left

superciliary arch; it commenced at boyhood and enlarged slowly, was oval in form, about the size of a walnut, and projected downwards so as to occupy the corresponding portion of the eye-lid; the integuments were of a dusky-red colour from a remarkable increase in the number and size of the cutaneous blood vessels; the skin moved freely, but the tumour itself was evidently closely adherent to the subjacent parts; it was also tense, and possessed a certain degree of elasticity as well as fluctuation. A transverse incision through the skin and orbicularis, along the lower edge of the eyebrow, exposed the swelling, which was, in the first instance, detached from its connexions by a process of tearing and cutting—using alternately the handle and blade of the scalpel—at length it was found impossible, from the tumour's tenseness and size, to depress it sufficiently to permit of its separation from the orbital plate, to which it closely adhered; a puncture obviated this difficulty, by emptying the sac, which in a collapsed condition was cautiously dissected from its bony deep-seated attachments, and removed entire; the cyst was thin, but strong, presenting internally a pearly lustre; the contents were semifluid, viscid, and glairy; that portion of the superciliary ridge upon which the tumour rested was rounded off, and presented a blunt depression.

CASE II.—James Dogherty, aged 22, a constabulary recruit. There exists at the outer and upper part of the orbit a smooth globular swelling, about the size of a pigeon's egg; it is situated so as to lie for the most part on the frontal bone, but it entrenches also on the upper lid; the outer extremity of the brow crosses the tumour below its centre; fluctuation is tolerably distinct; the integuments move freely over its surface, but it is evidently fixed to the parts beneath; the lid, where it overlies the tumour, is of a purplish red colour, but towards the temporal region the discolouration is not so manifest. The patient states that the swelling has existed for several years, but that its rate of growth has latterly very much increased. The cyst was brought into view by a transverse incision above the brow, and separated from its cutaneous connexions with tolerable facility, when transfixion with a tenaculum enabled me to free it from the periosteum, and dissect it out entire. The bone presented a well-defined hollow, which interrupted the continuity of the temporal ridge close to the external angular process. The cyst contained a finely granular substance, of the consistence of thick cream, and of a pure white colour.

CASE III.—William Wallace, aged 6, was brought to me by his father to have a tumour extirpated, which, springing from the cavity of the right orbit below the eye-brow, formed a prominence in the upper lid about the size and shape of a small marble; the swelling, which existed from birth, was smooth and softish, and the skin over it presented no preternatural vascularity or deviation from its natural condition. The cyst was exposed by a horizontal incision parallel with the folds of the lid; it was very thin, and was accidentally punctured, while separating it from the loose cellular tissue around, so that the contents, which were limpid and clear as water, escaped; however, the collapsed sac was seized with an Asselini forceps and completely removed; it had a slight connexion with the orbital plate of the os frontis.

CASE IV.—On the 17th of last September, I removed an encysted tumour from a girl named Mary Macklin, it was placed just above the centre of the left eye-brow; was oval in form; about the size of a kidney-bean; presented an irregular surface; felt rather firm; did not fluctuate; was movable, and the skin covering it presented no discolouration or alteration of structure. The sac was exposed in the ordinary manner, and, after transfixion, completely dissected out; it was not adherent to the bone beneath. The contents were a mixture of steatomatous substance, chalk-like material, and short slender hairs.

No surgical subject possesses greater interest than the pathological history of encysted tumours generally—the large size they are capable of attaining—the deep position they occasionally occupy in the visceral cavities, and their strange and unexpected contents invest these formations with an interest not subordinate to that of any others occurring in the organism. Although the mode of origin of growths such as those produced in the ovaries, amongst the abdominal and pelvic organs, at the bottom of the orbit, &c., cannot be explained upon the principles long ago suggested by Sir A. Cooper, the correctness of the views of this distinguished surgeon, as applied to superficial and subtegumentary wens and cysts, can scarcely be disputed; various circumstances connected with the pathology and symptoms of the tumours last referred to demonstrate their character—they are not new growths, but sebaceous follicles distended into sacs, by reason of imperforate or obstructed excretory orifices, and retained contents. Such swellings are commonly met with in situations where the sebaceous glands are largest and exist in greatest

numbers, *e.g.*, on the head, face, and posterior aspect of the trunk; when small, they occupy a position immediately under the skin, or are closely connected with it; on the surface of the tumour, in its early stage, and corresponding with the impervious opening of the duct, a dark point may often be discovered—here a probe can be pushed into the cavity of the follicle, and the contents expressed; its interior is lined with a stratum of epithelium or thin cuticle, and the contents, however heterogeneous, be they limpid as water, viscid as honey, pap-like or fatty, pultaceous or etheromatous, hairs or horns, whether they present under the microscope the appearance of epithelial scales, perfect or disintegrated, fatty particles, crystallized or amorphous or other elements, they are all the secreted products of the internal surface of the cyst, and correspond in every respect with the substances which a tegumentary glandular follicle is capable of furnishing. Facts like these establish beyond all doubt the opinion of Sir A. Cooper as to the follicular origin of encysted tumours, when subcutaneous or superficial. But the fact of such tumours being occasionally congenital—adherent to bone—occupying a position remote from the skin, and separated from it by a layer of muscle, has opposed itself to the unexceptional adoption of the doctrines enunciated in the *Surgical Essays*, and has led to the opinion that certain swellings of this class, although not far removed from the surface, are nevertheless adventitious growths—new formations—differing essentially from the subcutaneous variety. But it does not appear impossible that a body small at first, and connected with the skin, or even developed in its substance, should as it enlarged in size, come to occupy a deeper position, and be detached, in process of time, altogether from its original connexions. Let us suppose a cyst, for example, to originate in the skin, covering the orbicularis palpebrarum, it enlarges in size and presses backwards, gradually the fibres of the muscle separate, and the tumour passes through them until the greater portion of its bulk lies upon a plane subjacent, but, the tumour being globular, the action of the muscle must now of necessity tend to place it in a still deeper position, and finally, by reapproximation of its fibres, to close over and separate it altogether from the cutaneous texture; embedded at length in a loose areolar tissue, in close proximity with the periosteum underneath (which is fixed), and pressed upon in front by the muscular structure of the orbicularis (which is movable), it necessarily contracts adhesion to the former. It is no objection to this explanation to say, that encysted tumours are often congenital—the same causes are in

operation during intra-uterine life as exist after birth—the skin is formed at an early period of foetal development, and the sebiparous glandules are in a state of great perfection and activity at birth—their orifices are probably as liable to become obstructed during gestation as at any other period of existence, nay more so, from anatomical imperfection—if the anus may be congenitally imperforate why should a follicle not suffer from an analogous abnormality.

In practice, encysted tumours, provided that they have attained a certain size, and have existed for a moderately long period, will always be found underlying the subcutaneous muscles, when these latter present themselves; at least my own experience does not furnish an example to the contrary; and, when a bone lies near, they are very prone to contract an adhesion to it, and indent its surface. No doubt the common wen, when it occupies the higher regions of the head, seldom attaches itself to the pericranium, a fact readily explained by the mobility of the scalp in which it is embedded, and the intervention of the epicranial aponeurosis, the motions of which it is compelled to follow, but within and about the orbit and frontal region, where no such structure separates the tumour from the fibrous covering of the bone, the two will be found more or less intimately adherent.

Although the majority of encysted tumours of the orbital region belong to the variety technically called hygroma—thin cysts with watery contents—it is not to be supposed that this locality is not obnoxious to other descriptions of these swellings. The second case detailed in this communication was an example of etheroma, and the sac possessed by no means an inconsiderable degree of strength and thickness. In cases Nos. 3 and 4 the integuments presented quite a natural appearance. In the third case the tumour was not adherent. In one of the patients, the swelling was more globular than oval; and in the girl Macklin the cyst had an irregular outline, and contained, not a fluid, but a suet-like substance, calcareous matter and hairs. The conclusion, therefore, forced upon me is, that encysted tumours in the neighbourhood of the orbit do not possess *peculiarities*, although they frequently differ in many respects from congenerous swellings of the head and face.

In all operations which interest surfaces so much exposed to view as the eyelids and parts adjacent, a point of no inconsiderable importance is the avoidance of unsightly scars and cicatrices, all incisions here should, if possible, be parallel to the natural folds and ridges of the skin. I have never found it necessary to deviate from

this principle, nor have I ever met with a case requiring a crucial incision; certainly a vertical division of the lid should not be practised if at all avoidable.

Although in removing the tumour great caution is necessary to avoid an opening, it may be advantageous, on certain occasions, after the cyst has been for the greater part isolated (as when the bone is deeply indented, or the tumour sinks far into the orbital cavity), to permit a portion of the contents to escape through a small puncture, the partial collapse of the sac will diminish its size, and thus permit a more distinct view of its deep-seated attachments. In the first case referred to it would have been perfectly impossible to effect the separation of the tumour from the roof of the orbit, were not this expedient adopted.

After the operation sutures are indispensable; the edges of the wound, from want of due support, have a great tendency to become inverted; a few interrupted stitches made with a slender sewing needle and fine waxed thread, with strips of court plaster at intervals, supported by a well-adjusted compress offer the best means of insuring an accurate union; as for metallic ligatures, I have almost renounced them, and I am not ashamed to confess the heresy.

In cases where the total extirpation of the tumour is impossible, from its deep position or intimate connexion with important organs, a secondary growth is very liable, in process of time, to make its appearance. The tumour is said to "grow again;" but this language is inaccurate: no doubt a swelling does grow, but it is an *adventitious one*, engrafted upon the remnant of the former cyst, which, continuing to perform its function as a secreting surface, furnishes an unorganized product that acts as a foreign body, round which the cellular tissue solidifies into a sac. It is thus relapses occur, and hence the advantage of being able to remove every portion of the tumour. When seated in the orbit, if deeply rooted, a cystic growth is one of very serious import, and may easily be confounded with other causes of Exophthalmos;* nor is laying open the sac, and exciting a suppurative action unattended with danger. We must recollect that the periosteum of the orbit is continuous with the dura mater; and further, that a delicate sheath of the subarachnoid cellular tissue

* Several years ago a case of exophthalmos was admitted into the City of Dublin Hospital, under the care of Dr. Jacob. The eye-ball was greatly protruded, the cornea dull, and the lids congested and of a purplish colour. It was decided to extirpate the globe, and afterwards to remove the contents of the orbit, if necessary. The first incision at the outer canthus opened a cyst, which immediately emptied itself, and permitted the eye to resume its usual position.

is continued forward around the blood vessels and nerves that enter posteriorly; moreover, that the ophthalmic is in communication with the cerebral veins through the cavernous and other sinuses. Inflammation may readily extend by any of these routes from the orbital cavity to the brain and its membranes; nor is this occurrence by any means rare. Mackenzie, Wardrop, and other ophthalmic surgeons, give cases. When I read of encysted tumours frequently operated upon, both in London and Dublin, before a radical cure could be effected, I may be permitted to congratulate myself at being more fortunate with my cases.

ART. VIII.—*Some of the Watering Places and other Health-resorts of Switzerland.* By H. R. DE RICCI, M.D.

(Continued from vol. xxxii., p. 330.)

I WAS not strictly correct when I asserted just now that the water of Loèche evolves no gaseous products; it does give off about 10 cubic centimetres of nitrogen, and two cubic centimetres of oxygen and carbonic acid gas, in all about 12 cubic centimetres of gases from every 1000 grammes of water, but no sulphuretted hydrogen is evolved until the water has been bathed in, when its presence can unmistakably be detected by the olfactory organs, without the aid of lead test paper; this is supposed to be due to the decomposing action of the sebaceous exudations of the skin on the sulphates contained in the water.

Although Loèche does not offer much in the way of amusements, still its environs are full of beauty and interest. One of the curiosities of the place is the ascent called the ladders, which leads from the valley to the village of Albinen, situated on a high alp on the top of the Wandfluch, on the right of the valley when looking towards the Ghemmi. There is a constant intercourse going on between the inhabitants of Loèche and those of Albinen, but, owing to the precipitous cliffs which hem in the valley on all sides, there is no path by which the natives can communicate except by going a round of nearly six miles, whilst Albinen and the baths are not more than one mile apart; one at the bottom of the valley, the other perched on the top of about 150 feet of perpendicular rock. In order to save themselves this long circuit, the inhabitants have for