necessary by scrupulous cleanliness, by frequent warm baths, careful drying of the skin, and by the use of warm and well-fitting clothing. The patients who are seriously affected suffer much inconvenience, become very much depressed, and require tonic treatment, both from the mental and from the physical aspect.

It is worth mentioning that the patient whom I have mentioned as the "red girl" declared that she was much more comfortable when on several occasions she took small doses of ergot for considerable periods of time. The treatment was adopted with a certain amount of misgiving, and only when she was in a position to be watched carefully. No bad results were noticed, and she certainly said that she felt, and she appeared to be, in better health.

In the milder cases the use of cardiac and nerve tonics, especially digitalis and strophanthus, and strychnine, either in combination or alternately, produce very gratifying results.

NOTE.

¹ Two cases of a series collected by Dr. Lindley Scott (*Brit. Journ. of Dermat.*, vol. xi, p. 276, 1899.)

A CASE OF CHLOROMA, WITH PATHOLOGICAL REPORT AND SOME NOTES DESCRIPTIVE OF THE DISEASE.*

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At the November meeting of the Edinburgh Medico-Chirurgical Society I exhibited a little boy suffering from that exceedingly rare disease—chloroma. The child subsequently succumbed to the disease, and I propose in the following remarks to give a record of the case, together with an account of the necropsy, and some notes of the interesting condition from which the boy suffered.

J. D., aged 5 years, was admitted to my ward in the Hospital for Sick Children on September 30th, 1901, complaining of great weakness and "swelling of the face."

HISTORY.

Family History.—This was unimportant. The father had suffered from an attack of rheumatic fever, and the mother from repeated attacks of bloodlessness. Two children had died during infancy. There was no family history of tubercle or renal disease.

Previous History.—The child was born at full term, and was a healthy baby. He had whooping-cough at six months and measles at three years, and had suffered frequently from bronchitis, but, on the whole, the mother considered him a fairly healthy child until the commencement of his present illness.

PRESENT ILLNESS.

For fully a year patches of ecchymosis were frequently noticed under the boy's skin, which were attributed to bruises. In May, 1901, the attention of the mother was for the first time directed to the extreme pallor of the boy's complexion. For some months previous to this date it was observed that any scratch which he received appeared to suppurate almost immediately. At the beginning of June he was dipped into a horse trough by an older boy, and was wet through. He remained in his wet clothes for some hours, and in consequence got a bad chill and was confined to bed for some days suffering from fever and headache. The child was never the same after the wetting, and seemed to get more easily tired. He commenced to call out in his sleep, and to snore at night, which he had never done previously. His appetite became exceedingly poor, and he became steadily paler and thinner.

At the beginning of August he became dull and languid, ceased to care to play, or to desire to go out-of-doors. On August 16th the mother noticed for the first time that the eyes appeared prominent, and that the veins on the eyelids were dilated. This exophthalmos gradually increased. About the middle of September it was noticed that the boy was becoming deaf, and this symptom also became more

* Read before the Edinburgh Medico-Chirurgical Society.

marked. Ever since he was 3 years of age he had suffered much from toothache, and the teeth had always been bad.

At the commencement of October the child was treated for an abscess of the scalp, and had an attack of albuminuria, accompanied by pyrexia, which lasted a few days.

STATE ON ADMISSION.

The boy looked extremely ill. Development was fair, but nutrition was poor; weight, 39 lb. The complexion was very pale, of a waxy yellow tint. His attitude was normal, and he could stand, sit up, or walk. He was a quiet, placid, good-tempered child.

Cutaneous and Glandular System.—A large number of petechial haemorrhages, about the size and having the appearance of fleabites, were scattered over the skin of the neck, chest, back, abdomen, and all four limbs, the face only being exempt. There were in addition two larger haemorrhages situated over the dorsal portion of the spinal column and over the right knee, while there was a yellow discoloration, as if of an older haemorrhage, situated on the right shin. The skin was somewhat loose, but there was a fair amount of subcutaneous fat. The head was well shaped and the scalp healthy. The face was pale and pasty, with marked puffiness of the eyelids, especially on the left side. There was some oedema and marked anaemia of the conjunctivae. Considerable protrusion of both eyeballs was present, but the patient could close his eyes. The nose and ears were well shaped. There were a few slightly enlarged glands under the lower jaw on both sides, and also in the posterior triangles of the neck and in the groins. The axillary glands were not enlarged. The thyroid was normal in size. There was no dullness over upper part of sternum, pointing to enlargement of the thymus. The thorax was well shaped.

Respiratory System.—The breath sounds were normal all over, and there were no accompaniments. There was no dullness and no cough. The voice was rather low and whispering.

Circulatory System.—The apex beat was in the nipple line, fifth space. There was no pulsation in the neck or epigastrium. The upper border of the area of dullness was in the second space; the right border half an inch external to the right border of the sternum. The left border was in the left nipple line. The heart sounds were healthy in all areas. Loud haemic *bruits* were heard on both sides in the vessels of the neck, loudest on the left side.

Pulse, 110, was irregular in time and force, of fair volume and low tension. The vessel wall was not thickened. The temperature was 99.6° F.

The *abdomen* was sunken. There was no pain or resistance on palpation. No glands were felt, and no fluid was present. The liver and spleen were not enlarged. The note was resonant all over.

Digestive System.—The lips and gums were pale; the tongue dry with transverse grooving. The teeth were extremely bad, both in the upper and lower jaws, more than half of them being carious. The molars were chiefly affected. The breath was very offensive.

The *urine* was clear, amber and acid. There was a slight mucous cloud, but no deposit; albumen (0.4 gr.); urea, 8 gr. Centrifuged: no casts or blood corpuscles.

Blood.—Haemoglobin, 32 per cent. Red blood corpuscles 1,800,000; leucocytes, 24,500. Films showed a large number of lymphocytes, both large and small, the former preponderating, and numbering 73 per cent. Polymorphonuclear 17 per cent. Myelocytes 5 per cent. unclassified, and transitional forms resembling myelocytes 5 per cent. A few nucleated reds were also present.

AFTER-HISTORY.

October 15th. The weight remains stationary. Two fresh haemorrhages have appeared on the outer aspect of the right knee and one over left end of radius. The eyeballs are becoming more prominent and the left eye cannot now be covered with the eyelid without an effort. The deafness also appears to be increasing. The ears were to-day examined by Dr. Logan Turner, who reported that there was some drawing in of both membranes, but no sign of perforation or of other disease. On examining the inside of the mouth a hard indurated swelling of a purplish colour was observed occupying

the hard palate on both sides in its whole extent antero-posteriorly and extending laterally from the teeth nearly to the median raphé. The discoloration, however, extends to the middle line. A similar but smaller swelling has made its appearance on the right side of the lower jaw external to the teeth.

October 22nd. Since last report a smooth rounded swelling, not nodular, has appeared in each temporal region gradually shading off into the surrounding parts. The swelling reaches behind to about half an inch in front of the pinna and in front to the outer edge of the orbit and seems to be continued into the orbit. The swelling is firm but not of a bony hardness. It feels as if immovably fixed to the underlying bone in its deep attachments, but is unattached to the skin. The diagnosis of chloroma was made on this date.

October 25th. The eyeballs are decidedly more prominent and the veins on the eyelids more distinct. There is intoler-

the disc. Retinal veins tortuous and moderately distended in both eyes. Exudation into disc and retina in both eyes. The vessels are lighter coloured than usual in optic neuritis, otherwise appearance is very much that of optic neuritis. Leucocytes have increased to 54,000. The child complains of no actual pain and appears to be happy and contented.

November 2nd. Exophthalmos is increasing and the veins on the face and eyelids are more prominent. The boy is much duller, and is taking less notice. Leucocytes, 68,000; red blood corpuscles, 850,000; haemoglobin, 20 per cent; swelling in temporal regions more prominent.

November 9th. A pale greenish yellow tumour of a jelly-like consistence made its appearance on November 6th at the inner canthus of the right eye and has gradually advanced over the eyeball, covering its lower half. To a smaller extent the left eye is becoming covered with a similar tumour. The boy is now complaining of severe pain

Fig. 1.—Showing the exophthalmos, the infiltration of the eyelids, and the prominence in the temporal region.

ance of light, especially of bright light, and the child lies with the head under the bedclothes. The upper eyelids are infiltrated, especially in their outer halves, with firm smooth swellings which seem to proceed from under the roof of the orbit in the region of the lachrymal gland and extend to the margin of the tarsal cartilage. They resemble the swelling in the temporal region in being firm, smooth and rounded, and unattached to the skin of the eyelid. There is a similar swelling in the right lower eyelid appearing to come from under the lower margin of the orbit, and it occupies the whole extent of the eyelid from canthus to canthus. The patient can still close his eyes with an effort, but the exophthalmos is so marked that during sleep the eyeball is not much more than half covered. There is considerable flow of tears from the eyes which runs over the face. An ophthalmoscopic examination of the eyes was made by Dr. Argyll Robertson, who reported: In right eye a minute extravasation of blood near

Fig. 2.—Showing the tumours commencing to appear in front of the eyeballs.

in the frontal region, which he constantly presses with his hands. Photophobia is increasing, and the head is kept continuously under the bedclothes. The temperature, which previously seldom rose above the normal, has during the last ten days ranged from 99° to 101° F., the pulse also has increased in frequency from 110 to 140. The boy takes his food badly, and is becoming thinner and weaker. He has sleepless nights, and calls out frequently with pain. He complains especially of pain in his eye, which he constantly rubs with his fingers and handkerchief. The tumours in the temporal region appear to have diminished in size. Deafness is increasing. There is very marked optic neuritis in the right eye, and several linear haemorrhages near the margin of the disc to the inner side. The optic neuritis in the left eye is still more marked. There are several haemorrhagic spots opposite the lower margin of the disc. The vessels are still of a rosy colour.

November 12th. The tumour growth now completely covers both eyeballs. The corneae are apparently quite destroyed. The boy cannot discern objects, but can still distinguish light from darkness. The temporal tumours are much smaller. Leucocytes 107,000, red blood corpuscles 815,000, haemoglobin 12 per cent.

November 15th. The boy is much weaker, and has been vomiting at intervals all day. The tumour over the eyeballs is exuding a sanguineous serum. The eyeballs appear less prominent. Leucocytes 123,000. The waxy pallor of the face and engorgement of veins are very striking. The breath is most offensive, and there is a large amount of sordes on the teeth and lips. During the night coffee-ground vomiting occurred several times, and the boy died of exhaustion on the morning of November 16th.

NECROPSY.

The necropsy was performed on November 17th by Dr. Shennan, to whom I am much indebted for the following account of the examination and of the microscopic appearances subsequently found. The surface of the body was very pale. The eyeballs were prominent and pushed forwards out of the orbits so that the eyelids did not meet.

Mouth.—The gums were thickened, pale, soft, and greenish in colour; tongue pale.

Thorax.—On removing the sternum a greenish mass, thicker in the centre than at the periphery, and about the size of a shilling, was found on the posterior surface of the manubrium sterni, in the middle line. This mass was of a bright green colour, and gradually faded on exposure to air and light. On section it was found to be confined to the periosteum, and not to affect the dense bone immediately underneath it. The spongy bone of the manubrium sterni was of a dull greenish colour. The glands in the vicinity were not apparently affected.

The Thymus Gland was unaffected.

The Serous Cavities contained a small amount of clear, pale, straw-coloured fluid. The inner surface of the larynx was pale, and contained a little brownish mucus.

The Lungs, as a whole, were pale, but were interspersed with small irregular patches of congestion, and occasional haemorrhages. In the left lung there were small areas of firmly consolidated lung tissue. The large bronchi, and particularly those on the right side, contained greenish mucus.

Heart.—On the epicardium there was a small green patch near the base of the ventricle, a short distance to the left of the septum, and another smaller one to the right of the septum. All the cavities of the heart were somewhat dilated, and contained *ante-mortem* thrombi of recent formation, pale in the left ventricle but redder in the right. There was marked fatty degeneration of the myocardium of the left ventricle. The arterial valves were competent. On removing the thoracic contents the ribs were observed to be of a green colour throughout their whole extent, the colour being deepest just in front of the angles. The periosteum of the vertebrae from the neck to the pelvis was infiltrated with thickened greenish tissue, continuous with a similar deposit along the intercostal vessels and nerves. The colour was most intense in the neighbourhood of the intervertebral discs, and during the progress of the necropsy it visibly faded.

Abdomen.—There was general pallor of all the abdominal contents, particularly of the intestinal tract. The duodenum was dark from altered blood and green mucus. The stomach was distended and contained "coffee grounds." The small intestine in its lower part showed multiple minute haemorrhages, and contained a large amount of catarrhal mucus. The Peyer's patches showed no visible changes. The follicles of the large intestine were distinct and greenish; the mucous membrane of the appendix was thickened.

Liver.—Bile ducts patent, substance pale, otherwise fairly normal.

Spleen.—Firm; Malpighian bodies enlarged, prominent, and pale. Section brownish in colour.

Suprarenal Capsules unaffected to naked eye.

Kidneys presented very striking naked-eye appearances; not much enlarged, but very pale; of a general pinkish-green colour, and dotted over with distinct green spots under the capsule. On section, numerous bright green areas varying in size from a pin's head to a quarter of an inch in diameter were found. These patches were chiefly placed in the cortical area near the medullae. Both kidneys were similarly affected.

Mesenteric Glands were enlarged and pale. One or two enlarged greenish glands were observed near the head of the pancreas, and others in the same neighbourhood contained brownish pigment. No other green-coloured glands were found in the body.

Pancreas of a pale yellowish-pink colour, and contained small greenish nodules scattered through its substance.

Urinary Bladder distended with clear limpid urine.

Cranium.—On reflecting the scalp green tissue was found extending along all the sutures, particularly the interfrontal, the coronal and lambdoidal extending from the last to the mastoid process, and occurring in thin irregular patches over the bones of the skull. These patches were confined to the pericranium, and could be stripped completely off the bones. On removing the calvarium it was observed that the diploë throughout was of a dirty greenish colour, most evident in the anterior part of the skull. Underneath, and infiltrating the substance of the temporal muscles from below, newgrowths from $\frac{1}{4}$ to $\frac{3}{8}$ of an inch in thickness were found. These were close in texture, firm in consistence, and of a bright green colour, closely resembling the colour of grass. They were firmly adherent to and evidently had developed from the periosteum, and extended deeply into the sphenomaxillary fossae. Aerobic and anaerobic cultures were made from these growths with negative results.

Dura Mater exhibited numerous thin green patches, flat, and irregular in outline. These were especially distinct in the posterior part of the cranium, and were accompanied by numerous small haemorrhages. It stripped off the bone easily, and left a worm-eaten appearance on the inner table of the parietal bones. A broad greenish band extended along the upper wall of the longitudinal sinus.

The Brain was pale and firm, but there was no evidence of any extension to it of the greenish growth.

Spinal Cord.—No morbid change visible.

Base of Skull, Sinuses, etc.—All the bones in the anterior part of the skull were infiltrated with dull green material, especially the spongy tissue. A green mass, the size of a split pea, was found on the anterior glenoid process (sella turcica), and another but smaller one immediately behind the left posterior process. Another was found on the posterior surface of the left lesser wing of the sphenoid. The whole of the frontal bones were green, and also the upper surface of the orbital plate. There was apparent erosion of the left side of the cribriform plate posteriorly, with greenish material appearing through it.

Ethmoid Sinuses.—The condition was one of thickening of the lining membrane of a dull green colour.

Left Orbit.—Green growth similar in colour and consistence to that found in the zygomatic fossae, but occurring in oval, flattened, and sharply defined masses surrounding the optic nerve and eyeball, particularly on upper and external aspects, but also to a less extent below, embracing the optic nerve and not attached to the eyeball, but extending under the conjunctivae. The masses evidently arose from the periosteum on the outer side of the orbital cavity, where it was adherent to the bone. Some haemorrhage in or immediately under the sclerotics. Cornea opaque and green conjunctivae thickened and of a purplish colour.

Right Orbit.—Appearances similar to those on the left side. Eyeball and nerve seem to be unaffected. There is a thick adherent mass on under wall of orbit. Right eye was incised; vitreous humour normal; small haemorrhages near exit of optic nerve, and what appear like tortuous thickened vessels over fundus.

Right Ear.—Semicircular canals and dense bone immediately around them apparently not affected, but middle ear, mastoid process, and periosteum on under surface of temporal bone and adjacent soft structures infiltrated with green material.

Left Ear.—Similar appearances.

Hard Palate.—Periosteum covering it thickened with greenish tissue, less dense than in the orbits and zygomatic fossae.

Soft Palate, Walls of Pharynx, Mouth, and Gums infiltrated with similar material.

The Tonsils were infiltrated with bright grass-green tissue. In the right tonsil there were some small bright-green parts, evidently forming plugs in the crypts. In the left tonsil the infiltration was more diffuse than in the right, and there was an appearance like necrosis. In the maxillary antrum the changes were similar to those in the ethmoidal cells.

Vertebral Bodies were infiltrated with same material as spongy parts of bones of head, having a dirty green colour.

Femur.—The periosteum was of a bright green colour, most intense posteriorly. The fatty marrow had evidently disappeared and its place been taken by greenish pus-like material.

On the day following the necropsy the colour in all the tissues and organs removed from the body, and which were preserved in formalin solution had disappeared; but on subsequent treatment with reducing agents the colour partially returned, indicating the presence of an oxidizable pigment.

Microscopic Examination.

Orbital and Temporal Tumours.—These are composed of a closely arranged fasciculated connective tissue stroma, the spaces of which are packed with cells of uniform size, round in shape, or altered, either from mutual compression or to fit the spaces containing them (Fig. 3). The great majority of these cells correspond in size and structure to the large lymphocyte. This cellular tissue penetrates the muscle, dividing up its bundles and separating individual fibres. It also infiltrates the neighbouring fat. Scattered amongst the cells are rounded clusters of granules which stain faintly both with osmic acid and sudan iii, and are refractile. They disappear when the sections are treated with solvents of fat, for example, alcohol, xylol, or benzol, hence are evidently of a fatty nature. In all the tissues and organs examined the same cells appear even when no evidence of their presence existed to the unaided eye. They pack the intervascular walls and septa of the lung, causing them to appear thick. The portal spaces and fissures of the liver are crowded with cells which also appear between the columns of liver cells in the lobules (Fig. 4). The kidney contains rounded areas in which the tubules are widely separated by the cells, an appearance corresponding to that sometimes seen in leukaemia. The tubular epithelium is cloudy and fatty. The sinuses and pulp of the spleen are full of the cells which dominate the field microscopically.

Lymphatic Glands.—The enlarged green glands from the neighbourhood of the head of the pancreas were examined microscopically. Their sinuses contain dense plugs of cells which *en masse* appear more deeply stained than the rest of the gland (Fig. 5).

The lymphoid tissue in the walls of the intestine throughout is increased, and clusters of the cells are seen deep in the submucous coat.

The bone marrow practically consists of round cells, with rounded nucleus and fair amount of protoplasm corresponding to the cells found in other organs (Fig. 6). The sections seem to indicate that the colour is due to the peculiar clusters of fatty nature, and possibly, in addition, to the presence of an oxidizable pigment. The theories of refraction due to arrangement of the cells and of decomposition seem untenable because in the case of the former the colour would not be lost *post mortem*, and in the latter case it would increase, at least in the deeper parts.

LITERATURE.

The case which I have here described is a very typical one of the disease, both in the symptoms manifested during life and in the *post-mortem* appearances. Chloroma is an exceedingly rare condition; many of the encyclopaedias and recent works on pathology do not even mention the subject, and I

have only succeeded in finding the records of 27 recorded cases.

The first case was recorded by Alan Burns¹ in his *Observations on the Surgical Anatomy of the Head and Neck*, in 1823, who regarded it as a condition differing from any morbid affection hitherto described. He considered that the new growth originated in the lachrymal gland, and was propagated secondarily to the other regions of the head and body. Following Burns, the earlier cases were recorded by Balfour²

fibroplastic tumours, amorphous fibrous tumours, pigmented myxo sarcoma or chloromyxo-sarcoma.

Huber³ defines this condition as a metastatic periosteal sarcoma, a definition which was confirmed by many subsequent observers. He maintains that the tumours always originate in the bones of the head and face, and that the growths in other organs are secondary and originate by metastasis. Recklinghausen⁴ in 1883 pointed out that the tumours found in cases of chloroma differed in many respects from periosteal sar-

Fig. 3.—Tumour. Case of chloroma. $\times 300$ diam.

Fig. 5.—Lymphatic gland. Case of chloroma. $\times 450$ diam.

Fig. 4.—Liver. Case of chloroma. $\times 200$ diam.

Fig. 6.—Bone marrow. Case of chloroma. $\times 450$ diam.

of, Edinburgh, Mackenzie⁵ of Glasgow, Durand-Fardel⁶ of Paris, King⁷ of Glasgow, and Dittrich¹² of Prague, between 1836 and 1855, while more recently Dock⁸ of Michigan and Gustav Lang⁹ of Nancy have written exhaustive monographs on the subject.

PATHOLOGY.

The tumours have been variously described as green cancer,

comas, chiefly in their deficiency of bone formation and in their development from the outer layer of the periosteum. He insists upon the intimate relationship which exists between this affection and leukaemia. He demonstrated that the structure of all the tumours in his case was of a pure lymphomatous character, and in this belief he is supported by Hüring,¹⁰ Dock, and Chiari¹¹ and several other writers, with the result that the

growths are now pretty generally regarded as belonging to the class of tumours known as lympho-sarcomas. Lympho-sarcoma is probably the best definition of the growths found in chloroma resembling on the one hand lymphomas in their histological structure and sarcomas in the fact that they arise from the periosteum and that they spread by the metastasis. Recently the view has been advanced by Cordua and Ricker that a very close relationship exists between lymphosarcomas and tuberculosis.

Colour.

Regarding the cause of the colour of the tumours, which varies from a yellowish green to a bright grass-green, considerable diversity of opinion has prevailed, and the question is by no means satisfactorily settled yet. Balfour thought the colour was due to bile pigment, but no trace of bile has ever been discovered in any of the tumours examined. Dittrich¹² supposed that the colour was the result of decomposition, but this theory is quite untenable, as the green colour is confined to the tumour growths, the other tissues of the body remaining unaffected. Portions of the tumours removed during life have a green colour, and there is a very decided difference between the bright grass-green colour displayed by chloromas and the dirty green of decomposition. Huber made an elaborate series of investigations on fresh tumours to discover the source of the colour, which he ascribed to minute molecular granulations possessing great refractile power and of great brilliance placed in and between the cells, and which he considered communicated an intense colour to the tumours. He believes that the colour is due to the massing of cells while the cells singly are colourless. Virchow,¹³ Dressler,¹⁴ and Chiari are at one with Huber in considering that the colour proceeds from these adipose granulations found in and between the cells. It is still undecided whether the granules can be regarded as true fat granules, or only as an organic combination into which fatty acids enter. The colour quickly disappears from periphery to centre on exposure to air, or on immersion of the tumour in water, alcohol, chloroform, or ether. It is preserved for some days in glycerine and water, and it resists the action of acetic and hydrochloric acid for some hours. Waldstein's idea of the origin of the pigment is that it is a derivative of the blood pigment; but opposed to this view are the facts that it is present in tumours where no signs of extravasation have been detected. Finally, Dock, in giving his adherence to the fatty theory of the colour, considers that it is simply an exaggeration of the greenish tint so common in the neoplasms of leukaemia, and which he maintains is another proof that these conditions are closely allied. In view of the quick disappearance of the colour on exposure to air and on immersion in fluids that have no solvent influence on fats, the theory of the fatty granules being the cause of the colour appears to be a little difficult of acceptance, and it seems to me that the colour is more probably due to some chemical product allied to lipochrome hitherto undiscovered, which on exposure to light becomes oxidized and in the process of oxidation loses its colour.

Origin of Tumours.

It is pretty generally admitted that the tumours originate from the periosteum of the head and face, and that the growths met with in other organs are of secondary formation. Behring¹⁵ believes that they generally arise in the ethmoid bone, and that infection is carried by the venous sinuses. Sauterau¹⁶ and Landolt think that the growth usually originates in the lachrymal gland, and that it differs from other tumours of that gland in afterwards invading the sides of the orbits, the cranial dura mater, and distant parts of the body.

Metastasis.

All are agreed that the tumours subsequently invade the cavities of the skull, the marrow of the bones and the internal organs having a very rapid generalization and multiple metastasis in the body. Nearly every organ has been invaded in the cases recorded by secondary growths, with the exception of the nervous system, which forms a very striking exception to this rule. It is a striking fact that neither the brain nor the cranial nerves have been affected, although lying in closest proximity to the primary tumour. Huge tumours frequently completely fill the orbits, and are traversed by the optic nerves, which are found quite unaltered

in structure. The brain may be, and frequently is, compressed, owing to pressure, but its substance is never invaded by the new growth. The kidneys of all the internal organs are the most frequently affected and infiltrated by the new growths. They most usually infiltrate the cortical portion of the kidneys, in large numbers, and owing to their bright green colour and small size give a mosaic appearance to the cut section. As Lang remarks, the tendency of the kidneys to suffer so frequently is probably due to their very active venous and arterial supply. I have only been able to discover the record of another case besides my own in which the muscular substance of the heart has been infiltrated.

The most characteristic pathological changes are to be found in the osseous system, which is irregularly destroyed at the site of the tumour, and in several recorded cases the bones were so thin as to be transparent. The changes are most pronounced, and always first detected in the bones of the head, commencing as a rule in the orbit, ear, nasal fossa, and temporal regions, and spreading subsequently to the periosteum of other parts of the head and to the dura mater. In the majority of cases green tumours have been found filling the orbits, infiltrating the lachrymal glands, the fat, and the connective tissue, and causing projection of the eyeballs, and tumours of a similar description are frequently found occupying the temporal fossae and replacing the temporal muscles, of which no trace can be found. The nasal fossa, the ethmoid sinuses, and the petrous portion of the temporal bone are frequently infiltrated with those green-coloured growths.

In the case recorded by Durand-Fardel a tumour was found in the auditory meatus completely filling the tympanic cavity. In King's case tumours were found in the mastoids and also in the inferior maxillary bone.

In the case recorded by Balfour green tumours of a cartilaginous nature were found under the scalp in the neighbourhood of the frontal, coronal, and sagittal sutures firmly adherent to the bone, and on removing the skullcap similar tumours were found attached to the dura mater, which had caused absorption and honeycombing of the inner table of the skull. This erosion or pitting is a marked feature in many of the cases. The dura and pericranium are generally most acutely infiltrated with the green colour corresponding to the site of the suture.

In many cases the periosteum of the long bones is of a bright pea-green colour, and the marrow is transformed into a semi-liquid green material resembling pus, both of which conditions were well-marked in my case.

Consistence.

The consistence of the tumours varies considerably, according as they are associated with fibrous, muscular, or osseous tissue. Sometimes they are soft, gelatinous, and elastic, exuding a greenish juice, and described by Balfour as resembling blancmange stiffened with isinglass, while at other times they are hard and cartilaginous, having almost the consistence of schirrus tumours. The cut surface is homogenous with or without fibrous septa, and no trace of blood vessels are to be seen.

Microscopic Appearance.

The tumours are found to consist of large round or oval-shaped cells, a little bigger than a white blood corpuscle, containing numerous nuclei and occasionally nucleoli. These cells are either embedded in an intercellular amorphous material of a very clear and transparent character or in a delicate network, while at other times the tumour is interspersed by coarse bundles of connective tissue forming lines of demarcation. In the midst of this network the granules with the highly refractile properties already referred to are found lying in and between the cells.

Age.

Chloroma appears to be chiefly a disease of children and adolescents, the great majority of cases occurring under 15 years. Of the 27 cases which I have collected, 16 cases were under 15 years, 7 cases between 15 and 20 years, 3 cases above 30 years, while the age of 1 case was not given.

Sex.

Boys seem to be more liable to be attacked than girls, for,

out of the 27 cases referred to, 19 were males and only 7 females, while the sex of 1 case is not recorded.

Relationship to Leukaemia.

Recklinghausen was the first to point out the very close resemblance between chloroma and leukaemia. He called attention to the lymphomatous structure of the new growth, to the condition of the blood in the cases in which it was examined, and to the organs affected, either primarily or secondarily, by chloroma, which are identical with those found in cases of leukaemia. Dock, in his article on the subject, points out a further resemblance in the similarity of some of the symptoms of the two conditions. Thus, deafness is common to both. In chloroma it is due to the pressure of tumours in the internal, middle, and external ear. In leukaemia, though sometimes ascribed to haemorrhage, in many cases it is caused by the pressure of leukaemic tissue in the ear. Exophthalmos is one of the most usual symptoms in chloroma, and a similar condition has been described in several cases of leukaemia. In both conditions anaemia of a marked and progressive nature is present, accompanied by petechiae, extravasations under the skin, epistaxis, and haemorrhages into the conjunctivae and retinae. The blood in every case of chloroma examined has been characterized by a very striking lymphocytosis and by a remarkable diminution in the red blood corpuscles. Dock is of opinion that in the rapidity of its course chloroma stands between ordinary cases of leukaemia and those described by Ebstein as acute leukaemia, a view which still requires confirmation. He considers that there is as strong evidence in favour of the new growths found in chloroma being the source of the lymphocytes as there is of the thymus, bone marrow, and spleen being their source in leukaemia.

Diagnosis

So far as I have been able to gather, the case which I have recorded is the first in which a diagnosis of the condition was made during life. Before the appearance of the tumours a diagnosis would be impossible, as we have then only the symptoms pointing to leukaemia to guide us in forming an opinion—namely, the anaemia, loss of strength, rapid pulse, haemorrhage into the skin and mucous membranes. When subsequently to those symptoms, exophthalmos, failing sight, deafness, tumours in the temporal regions, and other parts of the body supervene, the diagnosis of chloroma should always suggest itself.

Prognosis.

The termination is invariably fatal from exhaustion, the average duration of the case being five or six months, although cases have been recorded by Balfour and Durand-Fardel lasting two years and longer.

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TUBERCULOSIS OF THE CONJUNCTIVA.

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THE following account of two cases of tuberculosis of the conjunctiva that have recently been under my care at the North-Eastern Hospital for Children may not be devoid of practical interest. The facts are shortly as follows:

CASE I.—E. H.,¹ aged 17 months, was seen on October 23rd, 1901.

History.—According to the mother's statement, the baby was weaned at 13 months, and about two months later she "went off her food and began to lose flesh." "A sort of lump" was noticed at about that time in the right lower lid,

and the mother found there was an ulceration inside corresponding to the external swelling. The patient was the younger of two children. There was a miscarriage between the two births. The father is living, and his relatives were said to be free from phthisis. The mother (chest not examined) had a cough and night sweats. The child's maternal grandmother was stated to have died from phthisis.

Present Condition.—A thin, pallid, bad-tempered child, weighing 15½ lb. nude. The inguinal and cervical glands were slightly prominent; the spleen was palpable. Several small circular ulcers were present upon the buttocks—three on the right and one on the left side. The central depressed ulceration, which measured 2 mm. to 3 mm. across, was surrounded by a red areola. The masses appeared to be deposits of tubercle in the subcutaneous tissue. There were moist, broncho-pneumonic sounds over the back of the chest. In the right eye, towards the centre of the free edge of the lower lid, was a shallow notch, covered with a greyish deposit. On evertting the eyelid (Fig. 1) a semicircular ulceration, coated

Fig. 1.

with greyish-yellow material, was seen to be continuous with the notch. The base of the conjunctival ulcer, which measured 7 mm. by 5 mm., was somewhat waxy-looking and nodular. Several tiny, pale, translucent elevations, which at once suggested the idea of miliary tubercles to my mind, lay in the conjunctiva near the ulcer. The cornea was clear. There was no lachrymal or nasal tuberculosis. The right preauricular gland was somewhat swollen.

Diagnosis.—A diagnosis of tubercle of the conjunctiva was made, and the child admitted into hospital. Scrapings from the conjunctival ulcer, after staining by the Ziehl-Neelsen and Ziehl-Gabbet methods, were found to include a limited number of scattered tubercle bacilli. As a rule, the organisms occurred singly, and, on account of their limited number, had to be searched for carefully.

After-History.—When the child was seen on November 13th she was found to have double optic papillitis, some stiffness of her neck, and a typical tubercle in the choroid of the right eye. The tubercle lay not far from the optic disc, to the upper and outer side. It was not well defined, had a fawn colour, was more or less circular, and was about half the size of the optic disc. Its edges, as it were, were moth-eaten. It was crossed by a retinal artery. The child's temperature was febrile, and had risen on more than one occasion to 103° F. It slowly sank into a semicomatose state, and the respirations became of the Cheyne-Stokes type. The temperature rose to 105.5° F., and she died quietly on November 17th—that is, twenty-five days after admission to the hospital, and about three months after the beginning of the illness. To my great regret, permission for a necropsy could not be obtained. For some of the notes of the case I have to thank Mr. J. P. Cullen, late house-surgeon to the hospital.

CASE II.—V. N., aged 15 months, came to my out-patients' on November 27th, 1901.