much that she could not get her collars on. On examination, it appeared that there was a large goitre. There was no goitre when I made a general examination of the patient in November.

On January 27th the patient's neck measured 14½ in. in circumference, then 1½ gr. thyroid extract were given night and morning, and by March 6th the neck was reduced to 13½ in. in circumference, but the goitre could still be felt under the skin on deglutition. There were no mental aberrations.

On analysis we find:

1. That all the cases except No. 1 improved markedly under treatment with thyroid extract.
2. That Cases III, V, and VI show a strumous family history.
3. That Cases IV, V, and VI show a family history of goitre.
4. That Cases III and IV show cardiac complications.
5. That Case V is an instance of acute myxoedema, which is, I believe, somewhat rare.
6. Case VI is a case of acute goitre.
7. In none of the cases were there any marked mental symptoms.

THE MORBID ANATOMY OF ERYTHROMELALGIA BASED UPON THE EXAMINATION OF THE AMPUTATED EXTREMITIES OF THREE CASES.*

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ERYTHROMELALGIA is the name given by Weir Mitchell¹ to a condition of the extremities in which redness and pain are associated. Sir Thomas Barlow² in contrasting the disease with Raynaud's disease, summarizes the differences thus: Dependence produces considerable increase of the dusky red or violaceous tint of the extremity affected; the arteries in this position of the limb may pulsate forcibly; pain is common, sometimes constant, and more especially when the limb is dependent or the parts pressed upon; in wintry weather, or on the application of cold, the conditions are relieved; on the other hand, warmth and summer weather increase the pain; there is no loss of sensation, but there may be increased sensitiveness; the local temperature of the affected parts may be raised or lowered; gangrene does not occur; the affection is asymmetrical; there is a certain amount of swelling, sometimes allowing pitting on pressure, sometimes not; incisions over such swelling, even down to the bone, have proved useless; excessive pain on pressure upon the nerves supplying the parts affected is not found; muscular wasting is found, but explainable by the disuse of the limb, and is not at all as severe as in cases of disease of the peripheral nerves; a reaction of degeneration in the nerves of the affected parts has not been found; the deep reflexes, with few exceptions, are not reduced. The disease may occur alone, or may be associated with other grave disturbances of the central nervous system; for example, hemiplegia, general paralysis, tabes dorsalis, myxoedema, disseminated sclerosis, and chronic myelitis.³ Cases occur which are somewhat similar to the cases described by Weir Mitchell, but which point to a relationship with such diseases as Raynaud's disease and sclerodermia, and Cassirer⁴ in a recent monograph has endeavoured to draw clinical distinctions between these three maladies and the affections intermediate between them.

The three cases examined and reported upon in this communication were typical ones of erythromelalgia. The pain was so severe, and the affected extremity so useless that amputation was performed.

Method of Investigation.—The affected parts after removal were hardened in alcohol (Case I and Case II) or in Müller's fluid (Case III). Sections were made of the soft tissues of each digit, the phalanges being resected from the periosteum; in the case of the foot (Case I) the sections made were representative of the whole length of the digit, including the ends of the toes; in the other two cases a ring of tissue was examined, the length of which, measured along the axis of the digit, was about half an inch. The sections were cut in paraffin for the study of the vessels, and in celloidin for that of the nerves. In order to detect any recent nerve degenerations the nerves were stained by a combination of Busch Benda and van Gieson's methods, and in some cases by Marchi's method. In addition, portions of the larger vessels

and nerves of the parts affected were dissected from the adjacent tissues, mounted as above, and cut transversely and longitudinally, and subjected to the same method of staining. The special points investigated have been: (1) Arterial and venous changes; (2) changes in the nerves, especially the finer terminal branches with respect both to a replacement of nerve fibres by fibrous tissue, and also to recent changes degenerative in character. In estimating the possible vascular and nervous changes, constant reference was made to sections prepared from the digits of the foot of patients of a similar age dying from some malady not likely to cause peripheral vascular and nervous disease, for example, death from perforation of a gastric ulcer in a young woman.

CASE I.

A. K., a young woman, aged 24 years, was admitted to University College Hospital under Dr. Charlton Bastian's care; subsequently she was admitted to St. Bartholomew's Hospital at Rochester, and amputation was performed for extreme pain. This patient had suffered from her symptoms for five years. The left foot would become reddish blue, especially when held dependent or when it was kept warm; there was also some puffiness and hyperaesthesia. There were brief periods when the foot in parts became doubtfully slightly anaesthetic, but such anaesthesia was never permanent. There were also nutritional disturbances of the nails and skin; there was no reaction of degeneration. The plantar reflex was absent in this foot, and very feeble in the right foot; the knee-jerks were brisk; there was some tenderness in the calf muscles. When the foot was placed in warm water patches of salmon-red colour appeared in the midst of the general blueness of the extremity.

Morbid Anatomy.

(a) *Vessels.*—Some thickening in the intima was present in all the digital arteries, and in those of the third toe it was considerable. Irregularly disposed thickening was also present in the internal and external plantar arteries, especially in the latter. The most pronounced changes were met with in the venae comites of these vessels. The lumen of the veins accompanying the external plantar artery was almost quite occluded by clot, and marked canalization was present. The dorsal artery and veins were normal.

(b) *Nerves.*—In no case of a digital or plantar nerve was any recent degeneration discovered. Abundant nerve fibres were seen in the case of the digital nerves distributed to each toe except in the case of the great and second toe, in which the nerve fibrils were very much scattered instead of being collected into coarse bundles; in no case, however, were bundles of fibrous tissue found containing less than a dozen nerve fibres. The plantar and musculo-cutaneous nerves were quite healthy.

CASE II.⁵

P. N., a pointsman, aged 29 years, was admitted to University College Hospital under Dr. Bradford's care. Ten years previous to the onset of his symptoms he had been struck on the back of the left wrist; an abscess developed and slowly healed. Nothing abnormal was noticed till three years before he came under Dr. Bradford's care. As in Case I, the affected hand became blue and was mottled with salmon-red coloured areas; there was pain, increased by warmth, oedema which pitted, and there were nutritional disorders of the skin and nails; the former was quite glossy, and the latter more opaque than natural and showed transverse ridges. Sensation was perfect in every digit and in all parts of the hand, wrist, and forearm; there was no hyperaesthesia; there was no reaction of degeneration.

Morbid Anatomy.

(a) *Vessels.*—The digital arteries and veins of the thumb alone showed extensive thickening of the intima; the arteries of the index finger showed less but obvious thickening of the intima, whereas in the digital vessels of the rest of the fingers the changes in the intima were very slight. Some intimal thickening was visible in the ulnar artery, the deep palmar arch, and in the comes nervi mediani; in these vessels and in the radial artery, the elastic lamina of Henle was very deficient.

(b) *Nerves.*—There was no trace of recent degeneration in any of the nerves, digital, radial, median, or ulnar, except in the digital nerves of the index finger, in which some nerves and some nerve-endings in the skin showed staining attributable to the osmic acid. This was probably an artefact and due to the fact that the amputated hand had been hardened in alcohol. There was no fragmentation whatever of the medullary sheaths.

CASE III.

E. B., a young woman aged about 20 years, came under the care of Sir Thomas Barlow. Previous to her admission to University College Hospital, she had had symptoms for eighteen months following a slight injury to the right hand. This injury was immediately succeeded by swelling, inflammation, and aching pain. She was treated at various institutions and in one the affected hand was incised and scraped, but with no benefit. The hand continued to be very painful, occasionally the arm throbbed from the fingers to the elbow; sometimes it felt hot at others it was very cold; passive movement of the hand was possible but painful; there was puffiness of the dorsum of the hand and of the fingers, the nails were ribbed and the skin was thin and somewhat polished; pressure caused pitting of the subcutaneous tissues; there were areas of localized tenderness and blotches of purple coloured skin; there was no anaesthesia; the pain was of a "tingling" character; the nerve trunks were not tender. At the time of the amputation it was thought that some of the vessels (anterior interosseous) bled less than usual.

* Read before the Pathological Society of London.

Morbid Anatomy.

(a) *Vessels*.—The digital arteries of the fingers showed very slight thickening, those of the thumb showed obvious thickening in the internal coat. The ulnar artery showed some thickening of the internal coat but the radial artery showed much more pronounced changes.

(b) *Nerves*.—There was no definite sign of recent degeneration in any of the nerves, nor was there an apparent deficiency of nerve fibres or increase of fibrous tissue in the larger nerve trunks or in the digital nerves.

No syphilitic history could be obtained in any of the above cases, nor were there any symptoms or signs of central nervous disease.

I should like to include in this analysis the report of a case by Dr. F. Parkes Weber¹² which he has called an "anomalous and asymmetrical case of sclerodactylia with Raynaud's phenomena." Dr. Parkes Weber is not inclined to consider the case one of erythromelalgia and therefore I do not include it in the analysis. However, it has so much in common with several of these nine cases and I am the more wishful to call attention to the case as the morbid anatomy of the vessels and nerves has been investigated.

A patient, A. B., aged 25, a waiter, had considerably wasting and contraction of the muscles of the left leg; the skin of the left foot was tense, shiny, and livid and decidedly cold to the touch; the colour sometimes was dark purple, almost black. When the foot was made warm he suffered from pain in the foot; there was pain also when the foot was cold; dependency did not produce pain. There was an ulcer of the great toe, the fourth and fifth toes were wanting; the nail on the great toe was absent and those of the two remaining toes were quite horny; there was a scar on the heel; the right foot (except for some scars, purpuric spots, and some pigmentation), was healthy. Both knee-jerks were present; there was no reaction of degeneration and the anterior and posterior tibial arteries pulsated in both limbs. There were no abnormalities of sensation.

Amputation was subsequently performed. Examination of the internal plantar and dorsal arteries showed decided thickening of the middle coat but no endarteritis obliterans or thrombosis; also some thickening of the intramuscular arterioles was noticed. Dr. F. E. Batten examined the nerves and found they were quite normal. Dr. Parkes Weber looked upon the case as one of "idiopathic obliterative arteritis." There were, however, so many symptoms common to this case and those reported in this communication that it is possible to group them together, more particularly as the microscopic evidence in all cases points to vascular change.

Of the 9 cases of erythromelalgia which have been subjected to examination, 1 case (Weir Mitchell and Spiller)⁶ showed what appeared to be a reduction of the number of nerve fibres in a portion of nerve excised with an increase of fibrous tissue; there was, however, no anaesthesia in those parts to which the nerve was distributed; there were changes in the arteries. In another case (Auerbach)¹⁰ there was degeneration of certain posterior nerve roots, but the peripheral nerves were quite healthy. (No mention is made of the morbid anatomy of the vessels in this case.) In Weir Mitchell's first case⁶ the nerves showed no change, but changes were present in the arteries; in his second case⁷ the nerves removed were quite healthy. Dehio's case⁹ showed narrowing of the lumen of the artery, with thickening of the intima, and no changes were found in the ulnar nerve. In Sachs' and Wiener's case the vascular changes were probably primary, and the increase of fibrous tissue in the nerve trunks was probably secondary.

In the cases reported in this communication vascular change was present in all (least in Case III). Such change was mostly an increase in the intima of the arteries, and occasionally thrombosis and changes in the inner coat of the veins. The nerves were investigated even to their terminations, and no degeneration was found, nor was there any suggestion of increase of fibrous tissue in the trunk of the nerves.

Dr. Parkes Weber's case, even though it is not called erythromelalgia, at any rate affords proof that many of the leading symptoms, so like those of erythromelalgia, are associated with vascular changes, the nerves being quite normal.

In no case has recent degeneration of nerve fibres been demonstrated, and in not one of the nine cases analysed was anaesthesia ever present. As a result of a consideration of these reported cases, it would appear that erythromelalgia when occurring independently of central nervous change, is associated with but one morbid picture, that of local vascular change.

I desire to express my gratitude to my colleagues for permission to make use of the clinical reports and the material of their cases, and to Mr. Sherstone Baker for sending for examination the foot amputated in Case I.

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PREVACCINATED SMALL-POX.

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THE article in the BRITISH MEDICAL JOURNAL for January 17th, 1903, is very interesting. When it appeared I was about to send my notes on the following cases, believing them to be unique.

The source of infection was the father of the family, who consulted me on December 15th, 1902. He had sickened the day previously (December 14th) immediately after dinner, with vomiting, shivering, and epigastric pain. The pain became general all over the body, particularly in the lumbar region. He now looked very ill; the tongue was furred, and the temperature 101.6°. He was sent home to go to bed, and was given a diaphoretic mixture to be taken every two hours. On December 16th the temperature was 100°; he was perspiring profusely, and felt much better.

On December 18th the patient, whom I had not visited on the previous day, walked into my surgery at 9.30 a.m. Fortunately there was no one else there at the time, and I saw him at once. He expressed himself as feeling quite well, and intended going to work as an extra help at the post office, but thought he had better call in and tell me. As it was rather dark I did not notice his face, but on taking his pulse I immediately saw the rash on his wrist, and then on looking elsewhere found it well marked on his face, head, body, and limbs, including the soles of the feet and the palms of the hands.

He was removed to hospital early the same day. The rash had evidently appeared late on December 16th or early on the 17th, because on the 18th it was observed that it was taking a rapid course. He had been vaccinated once in infancy. I could not trace how he became infected, but there were several cases from other parts of the town in hospital.

On December 20th the wife and three children were vaccinated by me, the two youngest being primary. Four insertions were made in all of them, and all were successful except in the eldest child and the mother, in whom three out of four took. The ages of the children are 7, 9, and 11 years respectively. It will be noticed that the vaccinations were not performed until two days after their father had been removed to hospital, or five days after the appearance of the rash. The mother would not give her consent before because her husband was known to be averse to it. My next visit to the house was on December 25th, and there was nothing unusual to note.

On December 28th, the ninth day of vaccination, and the twelfth or thirteenth day of "contact," one of the primarily vaccinated cases was very ill. It was considered to be due to the constitutional disturbances of vaccinia. A diaphoretic mixture was given, and some simple local treatment. On December 30th, on inquiry at the house, it was found that the patient was "all right." I did not go in and see the case.

On January 6th, 1903—the eighteenth day of vaccination and twenty-first of "contact"—the rash was first seen by me. The temperature was subnormal and the patient apparently quite well. The rash consisted of vesicles on the flexor surfaces of the upper limbs and fronts of the thighs. The other parts of the body showed small scabs. The other primarily vaccinated child was shown to me on January 2nd. I then saw two vesicles in the right popliteal space. There were doubtful abortive spots on the face and body. I gave it as my opinion—scabies having been precluded—that the rash was of a very doubtful nature, but might be a general vaccination rash—that is, cow-pox. I was called in on January 6th to see the eldest girl, and I then formed the opinion that all three had modified small-pox, and reported them accordingly.

The last of the children sickened on January 4th, with vomiting, headache, and pains in the lumbar region. On January 6th, at 11.30 a.m., the symptoms were the same, but there was no vomiting. The temperature was 100.4°, and at 8.30 p.m. 102.2°.

When I visited early in the day the mother was as well as usual. At 8.30 p.m. she was lying down on the sofa with shivering, headache, and general pains. Her temperature