consumption." In what way and to what extent this blood defect may be salutary as regards tuberculous lung disease, we can only conjecture. My own idea is that it may be by inducing an air hunger, and so stimulating lung function and nutrition. Anyhow, when we reflect that the quality of the blood is quite good, we can understand that treatment to improve the health generally rather than the blood specially is what is required.

4. **UNUSUAL SEQUELA OF HERPES ZOSTER (¿ POSTERIOR POLIOMYELITIS)**

By **Alexander Bruce, M.D., F.R.C.P.Ed., Physician, Edinburgh Royal Infirmary**

In view of the attention which has been recently drawn, more especially by Déjerine, Thomas, and Laminière, to the lesions of the spinal cord subsequent to herpes zoster, and as a contribution to the symptomatology of presumptive lesions of the posterior coru, the following unusual case appears to be worthy of being recorded:—

On the 2nd of May of the present year, Miss C., stationer, aged 54, began to suffer from herpes zoster on the right side at the level of the 7th and 8th intercostal spaces. The attack was a very severe one, greatly prostrated the patient, and compelled her for three weeks to remain in bed. When she was allowed to get up she could walk quite well at first, but after a few days she observed a degree of weakness and a numb feeling in the right leg. This numbness was first felt below the knee, and then gradually passed up the right thigh and the right half of the trunk as far as the lower limit of the herpetic eruption. It then affected the corresponding part of the left side of the trunk, and extended downwards along the left lower extremity as far as the foot. Thereafter it began to diminish, and in a fortnight had almost entirely disappeared, only a slight tingling and numbness of the toes of the right foot remaining.

During this fortnight the right foot felt constantly cold, but when put to the ground gave a sensation as if there were hot pipes under the floor. The lower part of the back also felt very warm in bed, as if the patient were lying on hot bottles. She also noted that the lower part of the trunk and lower extremities had ceased to perspire.

Two or three days after the beginning of the numbness she drew
the attention of her physician, Dr Thin, to her condition. On his first examination, Dr Thin discovered a degree of tactile anaesthesia over the right gluteal region and the upper part of the thigh. On a second examination made on June 12th by Dr Thin and myself, it was found that there was analgesia over the whole of the right lower extremity and of the right half of the trunk below the level of the herpes. It was stated also by the patient that her sensibility to temperature was defective—that when she put her foot into very hot water it felt as if it were cold. A careful examination showed that this thermoanaesthesia was present on the right side over the lower part of the abdomen and the right lower extremity, i.e. over practically the same area as that which was analgesic. Tactile sensibility, except over the area on the buttock and upper part of thigh already referred to, was perfect on the right side. The patient could feel the ground under her foot perfectly well. She was perfectly conscious of the position of her limbs, and could imitate with the left limb accurately any position into which its fellow on the right might be placed. There seemed to be no material diminution of muscular power while the patient was in bed, but when the attempt to walk was made there was a degree of weakness of the right lower limb.

The deep reflexes were exaggerated on the right side, and the plantar reflexes were extensor on the right side and flexor on the left. There was no affection of the sphincters.

As the patient was regarded as suffering from an unusual form of organic affection of the spinal cord, and as she could not be adequately nursed in her own house, her removal to the Royal Infirmary was recommended. She was admitted to that Institution five days later, on the 17th of June, and the following notes with regard to her case were made, with the assistance of my Resident Physician, Dr Hugh Wilson:—

The family history appears to be unimportant. Father died at sixty-three of some unknown cause; mother at seventy-three of cancer in the abdomen. One brother is alive and well; a second brother died of consumption.

Patient suffered from measles, scarlet fever, and smallpox as a child, and from dry pleurisy two years ago; otherwise she has enjoyed good health, has had a comfortable home, light work, and sufficient food. She is a particularly intelligent, sensible woman, quite free from any of the stigmata of hysteria, and, apart from a somewhat exhausted look, evidently the result of her recent
illness, she appears fairly healthy. There is no cyanosis or œdema anywhere.

The cicatrices of the herpes form a zone about 4 inches broad round the right side of the trunk from the middle line in front to the middle line posteriorly over the 7th and 8th intercostal spaces.

The circulatory system showed no abnormality, except an accentuation of the second sound of the heart in the pulmonary area. The pulse-rate was 80 per minute. The pulse was regular in time and force.

The respiratory system was practically normal, with the exception of a possible slight rise of pitch in percussion of the right apex.

The alimentary system was normal.

The urine was acid, showed a specific gravity of 1018, and contained no abnormal constituents.

_Nervous System._—_Sensory Functions._—On the examination of the sensory system it was now noted that the dissociation symptoms observed on the 12th of June were no longer limited to the right lower half of the trunk and right lower extremity, but had affected the corresponding parts of the left side in an identical manner. Careful testing elicited no loss of tactile or muscular sense on either side below a line slightly above the level of the umbilicus, with the exception of a small area over the right gluteal region and right upper part of the thigh. Here light touches were with some difficulty recognised. Elsewhere sensibility to touch was acute, and its localisation accurate. The muscular sense of both lower extremities was in no way impaired. Below the level of the umbilicus, there was complete loss of sensibility to pain and to temperature, as indicated in the accompanying Figures 1 and 2. Between the level of the umbilicus and that of the lower border of the herpetic eruption the loss of pain and thermal sense was not quite absolute.

There was a complete absence of perspiration over the lower part of the trunk and the lower extremities. The patient said that when in her usual health she did not perspire readily, but her skin was now unusually dry all over this area.

The abdominal and epigastric reflexes were not elicited on either side. The plantar reflex was extensor in character, with separation of the smaller toes (signe d'éventail of Babinski) on both sides. There was a marked increase of the knee-jerks, Achilles-jerks, and adductor-jerks on both sides. Direct muscular irritability was also considerably increased. There was no ankle clonus.
Apart from the feeling of pain on the right side, due to the herpes, there was no girdle pain or feeling of constriction round the body.

**Motor Functions.** — While the patient lay in bed the strength of the lower limbs seemed to be fairly equal on both sides. It seemed somewhat impaired as tested by the power of pushing and drawing up the limb and by the movements at the ankles. The patient could not stand or walk without support. With support she could walk a few steps, then became greatly exhausted, and had to be put back to bed. The muscles of the lower limbs felt somewhat flabby. There was no inco-ordination of the movements of the lower limbs. The circumference of each thigh was 13\(\frac{1}{2}\) inches, that of each calf 10 inches.

There was no loss of power in the hands or arms. The biceps, triceps, and supinator jerks were equal on both sides, and were not exaggerated.

The functions of the cranial nerves were unaltered. There was no nystagmus. The pupils were equal and reacted to light and accommodation, and all the movements of the eye-ball were normal. The fundus oculi on both sides were normal. The field of vision was normal. There was slight pain on pressure above the left eye-brow.

The subsequent history of the patient during the time of her stay in hospital showed a somewhat rapid recovery from the
motor symptoms, and a more gradual and less perfect subsidence of the sensory phenomena.

On the 10th June it was noted that she began to perceive a pin-prick on the dorsum of the right foot as painful, and on the same area she could recognise a stimulus of very hot water as such, but could not recognise cold as such, or detect a slight elevation of temperature. Above the dorsum of the foot her sensory symptoms remained unaltered.

The general condition had considerably improved, but not sufficiently to permit of her being allowed out of bed.

In the evening, patient noted that for the first time since the beginning of her illness her feet began to perspire. The perspiration was copious, and made the feet feel wet and cold.

On the 20th of June the analgesia and thermoanæsthesis were lost as regards the dorsum of the foot, and slightly diminished between the ankle and the knee of the right leg. Here the prick of a pin, or a pinch, or the application of a test-tube containing very hot water caused a slight tingling sensation which could not be further differentiated.

On being allowed to get out of bed, patient could walk a few steps with support, but felt very insecure and became readily exhausted.

On the following day painful and thermal stimuli were readily recognised as such over the lower part of the right leg, and slightly over a corresponding area in the left leg.

On the 23rd of June an area extending forwards from the spinal column posteriorly for about four inches along the 9th, 10th, and 11th ribs on the left side was noted to be red and oedematous, slightly raised above the surface, and very tender to pressure. The colour over the area was fairly uniform, was not accompanied by vesiculation, and partly disappeared on pressure.

Pain.—A pin-prick was felt sharply below the knee on the right side, and faintly over the right thigh as high as Poupart's ligament. Over the lower abdomen, between the level of the umbilicus and Poupart's ligament, pain was not perceived on either side, and there was complete analgesia on the left lower extremity as far down as a level slightly below the knee. There was a narrow zone of hyperalgesia above the level of the umbilicus.

Temperature.—Below both knees, but especially on the right side, differences of temperature could be recognised fairly well. On the thighs, and on the lower part of the abdomen to a level
of about one inch higher than the upper limit of the analgesic area, heat was not recognised from cold. This level corresponded to a line drawn between the anterior extremities of the 9th ribs. Above this line a hot test-tube applied over the zone of the herpes caused both pain and a sense of heat.

_Tactile Sensibility_ was quite normal, the area of partial anaesthesia on the right side having now disappeared.

_Vaso-motor Symptoms._—A slightly heated test-tube caused ready and persistent flushing of the skin over the lower part of the abdomen on both sides.

_Motor Functions._—Patient could now walk without support, taking short steps, evidently from dread of falling. There was no ataxia, and the muscular sense was quite normal.

During the following month the motor power in the lower limbs gradually improved, and does not call for special remark until about the beginning of August, when it was noted that the plantar reflexes had become definitely flexor in character. From this date up to the present time they have remained so. At no subsequent examination has any extensor response ever been elicited. The deep reflexes remained active, though not to the same degree as at first.

As regards the sensory functions, the tactile and muscular senses have remained throughout, and are at present (23rd November) absolutely normal.

The further history of the analgesic and thermoanæsthetic areas is as follows:—

The analgesic zone gradually contracted from below upwards. On the 3rd of July it was limited to an area from about one inch above the umbilicus to the level of the lower part of the abdomen. This area of analgesia remained more or less constant until she left hospital on the 5th of September. By the 23rd of November the area of complete analgesia had entirely disappeared.

During July and August the thigh and upper part of the leg showed somewhat varying degrees of sensibility to pain. Occasionally when the patient was tired during the examination the sensibility was found to be again lost, but the condition most frequently present was a diminution of the acuteness of recognising a pin-prick as painful. That condition in indicated in Fig. 3 (dotted vertical lines.)

At present (23rd November) the analgesia has entirely gone, but
the prick of a pin is not so acutely felt over the thighs and the lower part of the abdomen as elsewhere. As the analgesia diminished it was noted that stroking with a brush caused intense hyperæsthesia. This phenomenon gradually disappeared.

**Temperature.**—The perception of differences of temperature was somewhat irregularly regained. The area of thermoanæsthesia contracted from below upwards. Cold was recognised as such before heat. By the 9th of August the zone of complete thermoanæsthesia was limited to an area extending from the 9th rib to the level of the crest of the ilium. Below this a very hot test-tube caused pain and prickling as well as a sensation of heat, which was only recognised after some delay (Fig. 4).

On the 23rd of August it was noted that application of a cold test-tube applied to any part of the area which was primarily thermoanæsthetic caused a painful prickling sensation. On several occasions it was noted that there was an exaggerated sensibility to heat, cold, and to pin-pricks above the level of the herpes, but these exaggerations were very fugitive, and have now absolutely disappeared.

**Status praesens.**—Patient has entirely recovered her power of walking. The epigastric and abdominal reflexes have returned. The plantar reflexes are both

![Fig. 3](image3.png)

**Fig. 3.**—Vertical lines show area of analgesia found on 31st August. Vertical dotted lines show area of blunted pain sensibility.

![Fig. 4](image4.png)

**Fig. 4.**—Oblique lines show area over which cold test-tube caused great hyperæsthesia. Oblique dotted lines correspond to the area of reduced and delayed sensibility to heat.
flexor. The knee-jerks are somewhat active; the Achilles-jerk is present and active. There is no ankle clonus. There is no area of complete analgesia, although there is some diminution of the acuteness of pain-perception over the thighs and the lower part of the abdomen. There is slight confusion between the hot and cold test-tubes, but after a slight delay they can generally be accurately perceived except on the back of the left foot, where the cold tube is called hot and produces a painful stimulus. A very warm test-tube is well recognised as such, and also produces a painful cutting sensation.

Patient suffers greatly from troublesome paræsthesiae; the thighs constantly feel as if burning, and the feet and lower parts of the legs as if encased in ice.

The general health is now very good.

**Commentary**

When the patient was examined on the 12th of June by Dr Thin and myself the following symptoms were present and had to be accounted for:—

1. Muscular weakness of the right lower limb;
2. Exaggeration of the deep reflexes;
3. Extensor plantar reflex;
4. Loss of pain sense in the right lower limb and lower part of the right side of the trunk;
5. Loss of thermal sense in the same region;
6. Conservation of muscular sense; and
7. Conservation of tactile sense in the same region (with the exception of a slight area of anaesthesia over the buttock and thigh).

The motor symptoms were of such a nature as to postulate the existence of an organic lesion as distinct from a mere functional disturbance, and to point to a lesion, moreover, involving some part of the upper motor neurones.

The sensory phenomena were practically identical with the dissociation symptoms so often found in syringomyelia, and pointed to a lesion of the base of the posterior horn.

The fact that the motor and sensory phenomena were on the same side of the cord and not on opposite sides, as in the Brown-Séquard syndrome, indicated that the path for the conduction of
thermal and painful stimuli was involved before it had crossed to the opposite side of the cord, and further that the path from the opposite side was not involved.

The lesions in syringomyelia indicate that the loss of the conduction of painful and thermal stimuli with the conservation of the tactile and muscular sense depends upon a lesion at the base or in the substance of the posterior horn. A lesion, therefore, occurring in that situation would produce the sensory symptoms above noted.

The difficulty now arose of finding a point at which the pyramidal tract could be simultaneously involved. It is usually supposed that the pyramidal tract terminates by sending its fibres directly forwards and inwards towards the cells in the anterior cornua, but recent researches, in particular by Dr Sutherland Simpson and Dr Jolly (1) in Professor Schäfer's laboratory in the University of Edinburgh, demonstrate that, in the monkey at any rate, this is not the case, but that in the cervical, thoracic, and lumbar regions the fibres pass from the pyramidal tract directly inwards to the outer half of the base of the posterior cornua. The accompanying illustration (Fig. 5), published with the consent of the authors of the paper and the Council of the Royal Society, Edinburgh, demonstrates this fact very clearly. It will be obvious that a lesion involving the base of the posterior cornua in the area containing the degenerated fibres would produce both the sensory and the motor symptoms above mentioned. It will be noted also that such a lesion would almost certainly involve part at least of the intermedio-lateral tract, and be responsible for the interference with the sweat secretion present at the beginning of the illness.

The lesion, from its gradual onset and limitation, was probably...
of vascular origin, either thrombotic or inflammatory, arising in connection either with the postero-lateral or the posterior cornual arteries, or perhaps the mid-cornual branch of the central artery. Such a lesion causing a pressure upon and disturbance of function of the terminal fibres of the pyramidal tract, the cells involved in thermal and painful conduction, and those of the intermedio-lateral tract associated with the function of sweating and of vaso-motor control, would explain the symptoms completely (Fig. 6).

The subsequent extension to the other side could only be attributed to the occurrence of a similar lesion on the opposite side of the cord.

So much attention has been paid to the symptomatology of the vascular lesions of the anterior cornua that the explanation of affections of the posterior and lateral cornua have been largely overlooked. In a communication by Dr Harvey Pirie and myself (2) in the Review of Neurology and Psychiatry at the beginning of this year, attention was drawn to the association of the intermedio-lateral tract in the dorso-lumbar region with the function of sweating in the lower extremities. Since the patient was first seen and the diagnosis made, an interesting paper has been published by André-Thomas and Laminière (3) in which vascular congestion, haemorrhagic foci, and disturbance of the grey matter on the side of a herpetic eruption and in the region of the lateral horn are described and figured. I have taken the liberty of reproducing one of their figures (Fig. 7), which shows the occurrence and site of such a haemorrhage, and it will at once be seen that were such a haemorrhage to extend downwards into the lower dorsal and lumbar region it would account exactly for the symptoms of the disease.

The varying degrees of recovery of each function would depend upon the greater or less destructive action on the part of the original lesion.
Whether or not the view taken as regards the nature of the lesion be correct, the case is of interest as showing that herpes zoster is a condition which may leave effects more extensive than those due to the spinal ganglion in which the lesion originally occurred; and it will probably be found, on further investigation, that pathological changes are confined not merely to the posterior root-ganglion and to degenerations in the peripheral and sensory nerves consecutive to its destruction, as has been so well shown by Déjerine and André-Thomas (4), but that there are not infrequently widespread lesions within the cord itself.

Literature

1. Sutherland Simpson and W. A. Jolly. "Degenerations following Experimental Lesions in the Motor Cortex of the Monkey." _Proc. Roy. Soc. of Edin._, vol. xxvii., No. 3, 1907, p. 281.
2. Alexander Bruce and J. H. Harvey Pirie. "A Plea for the Study of the Intermedio-lateral Cell-system of the Spinal Cord." _Rev. Neurol. and Psychiat_. Jan. 1907, p. 1.
3. André-Thomas et Laminière. "Les Lésions Medullaires du Zona." _Rev. Neurol._, July 30, 1907, p. 693.
4. Déjerine et André-Thomas. "Les Lesions radiculo-ganglionaires du Zona." _Rev. Neurol._, May 30, 1907, p. 627.

Meeting III.—December 18, 1907

Dr James Ritchie, President, in the Chair

I. Exhibition of Patients

This was a Clinical Meeting held in the Royal Infirmary.

1. _Dr Alexander Bruce_ exhibited the following cases:—

   (a) Syringomyelia of the spasmodic type, involving the left upper extremity.

   (b) A hemiatrophy of the left half of the tongue, associated with lateral and rotatory nystagmus more marked on looking to the left side.

   (c) A case of myasthenia gravis.

   (d) An amyotrophic lateral sclerosis beginning somewhat acutely with hemiplegic symptoms and progressing rapidly.

   (e) An aneurism of the left internal carotid artery with rupture into the cavernous sinus.

   (f) A unilateral exophthalmos involving the right eye, associated with tremors in the right arm and leg, slight swelling of the right