RAT-BITE FEVER FROM A KITTEN

BY

ARTHUR F. COLE, F.R.C.S.Ed.

Cases of fever of unknown origin are met in general practice and treatment is often symptomatic until the cause of the illness is known. In certain cases, like this one, a definite diagnosis will indicate an absolute cure.

Case History

A school teacher, aged 31, arrived at the Frederick Andrew Convalescent Home, West Malling, on December 3rd, 1935, having been treated for septic lymphangitis in London over a period of three months. The history of the illness at once suggested that the cause might have been an infection by *Spirillum minus*; in brief, that it was an example of sodoku, or rat-bite fever.

August 24th, 1935.—Whilst on holiday in a Devonshire farmhouse she was stroking a sick kitten, and was promptly scratched and bitten on the little finger; the slight wound was cleansed in running water, painted with iodine, and healed without any dressing.

September 2nd.—On returning to London the patient noticed the little finger was beginning to swell and to be tender for the first time. It became red and throbbled, and she felt quite ill.

September 6th.—She consulted a doctor, who incised the little finger, but found no pus.

September 7th.—Alarmed by a spreading lymphangitis the doctor sent her to hospital, where she was admitted, and remained till November 30th.

SPREAD OF INFECTION

Under nitrous oxide anaesthesia further incisions were made and drained with subcutaneous rubber strips, but again no pus was found. Unfortunately the temperature charts and notes taken during these three months in hospital had been mislaid. The history given by the patient, however, and checked by the recollections of the staff, indicated that there was a severe infection of right hand and arm; that fever and prostration accompanied a lymphangitis extending to the shoulder; that the fever had periods of remission; and that there was an anomalous rash more marked at some times than at others.

During the first six weeks treatment had included boric foment, saline arm baths, magnesium sulphate compresses, antiphlogistine, ultra-violet rays, and arm-splinting. Sleeping draughts had been given. Later a culture of *Staphylococcus aureus* was made from the wound, and an autogenous vaccine was prepared and used in ascending doses. An irregular pyrexia was thought to be a reaction to the vaccine, but it seems that fever had existed before the use of the vaccine was begun and continued after it ceased; the *Staphylococcus aureus* was possibly a secondary contamination. Three days before leaving hospital there was a pyrexial attack (102° F.), with a generalized aching and a rash, followed by sweating.

December 3rd.—She was admitted to the convalescent home, looking tired and debilitated; her history suggested the diagnosis.

CLINICAL EXAMINATION

December 13th.—It was learned that the patient had been sweating at night, and was not looking well, though her temperature was only 100° F., and her respirations and pulse rate were normal. The tongue was clean and moist, the teeth were in order, and the throat was normal. The bowels were being opened regularly. Knee-jerks and pupils reacted normally. There was no coryza, but a slight tendency to cough; the lungs were normal. No abnormality was detected in the urine. There was tenderness over the lower ribs on both sides, and in the dorsal spine, and discomfort on deep pressure over the liver and spleen, neither of which organs could be felt. There was some headache, with stiffness in the neck and in the temporo-mandibular joints.

The whole body was covered with a maculo-erythematous rash, most vivid in the upper chest, on both sides of the neck, and on the forehead, where it had a circinate appearance. There was no itching, or sign of seborrhoea of the scalp. The lymphatic glands were enlarged in both axillae and both posterior cervical regions, but the largest was the right supratrochlear gland; this was very tender, soft, and mobile. There was an unusually vigorous overgrowth of hair of recent development over the right forearm and the dorsum of the hand and fingers, in marked contrast to the left side; even the patient's thoughts ran to fur; but the explanation probably lay in the many treatments in hospital rather than in the kitten factor.

Haematology and Biopsy

Blood examination showed nothing abnormal except a leucocytosis of 16,000 per c.mm.; haemoglobin was 85 per cent. Differential count: polymorphs, 82 per cent.; eosinophils, 2 per cent.; lymphocytes, 14 per cent.; large mononuclears, 2 per cent.

In the hope of demonstrating a cause I injected 1 c.cm. of 1 per cent. sodium citrate into the supratrochlear gland, and after slight massage a blood-stained fluid was withdrawn, from which films were made. No spirilla were seen, and cultures on agar and blood serum were sterile.

FURTHER INVESTIGATION

December 21st.—The patient had been living a quiet, convalescent home life, but stated that she had had night sweating, and there was a slight rise of temperature, with exacerbation of the erythematous rash on the neck and forehead. It was again explained to her that it was highly probable that she was suffering from rat-bite fever, but that her blood not having proved positive it might be possible to make the diagnosis indirectly by watching the effect of neosalvarsan injections, or directly by removing a gland during an attack and inoculating a guinea-pig. The patient, being most intelligent and anxious to give all possible help, agreed that no treatment should be given until the next attack, which it was prophesied would come shortly. All preparations were made.

December 28th.—A similar attack began at 11 a.m., with a temperature of 101.8° F., erythematous rash, tender glands, and an aching body. The blood films were again negative. Leucocytosis, 13,000 per c.mm.; haemoglobin, 83 per cent. Differential count: polymorphs, 86 per cent.; lymphocytes, 12 per cent.; large mononuclears, 2 per cent.

Under local anaesthesia the enlarged supratrochlear gland was excised, placed in sterile citrate solution, and within forty-five minutes was handed to Dr. Constant Ponder of the Kent County Laboratory at Maidstone. The gland was divided into three portions, and one-third was ground up and injected subcutaneously into a guinea-pig. The other portions were used for special histo-pathological investigations.

SPECIFIC THERAPY

January 1st, 1936.—As promised, the patient received 0.3 gram of neokharsivan in 5 c.cm. of distilled water intravenously; the wound of the gland excision had healed normally, but was still tender.

January 7th.—The patient left the home very much improved in health and spirits; the rash, which had lingered in an unobtrusive fashion even between bouts of fever, seemed to disappear within a couple of days of the injection. It was explained that a further dose might be required later, and an explanatory letter was sent to her doctor.

January 28th.—Thirty-one days after inoculation the guinea-pig showed conjunctivitis of the right eye, and seemed less active. Blood films were found to contain a minute spirillum answering the description of *Spirillum minus*, the specific cause of rat-bite fever. This identification was confirmed by Dr. C. M. Wenyon, Director of the Wellcome Bureau of Scientific Research.

January 31st.—The patient, on being informed that the diagnosis of rat-bite fever had been proved, wrote to say that she was "feeling much stronger, and that it had not

been found necessary to have a further injection of neokharsivan."

February 14th.—A further letter stated that she was free from symptoms, but that the site of injection had been tender, with some stiffness; massage had improved it.

Hypertrichosis

The profuse development of coarse hair on the right forearm and dorsum of the hand and fingers has been noted, and was a source of anxiety to the patient. Hypertrichosis may be associated with lesions of the adrenals, and although no record of examination of the human adrenals in this disease can be found, yet in animals experimentally infected the spirilla can be found aggregated in this situation. In all probability it was a reaction to local treatments, perhaps activated by spirillar toxins. But, at the same time, alopecia has been noted in some animal experiments. The rash during pyrexia was maculo-erythematous, with no signs of papules or urticaria or subsequent desquamation; between attacks it was just visible.

The glandular enlargement was both local and general. The supratrochlear gland was the first to be enlarged and tender, and was the one selected for excision. The smear made from it during the preliminary investigation did not show the presence of the spirillum, yet from the subsequent successful inoculation into the guinea-pig this negative finding may have been the fault of the examiner; as the average spirillum measured only 2.5μ when found in the guinea-pig it might have been missed without much difficulty.

Commentary

This case illustrates several points of importance. Obviously there is value in an accurate history. Quite apart from the kitten bite, or scratch, it was clear that a quiet, latent period of nine days was followed by local swelling and tenderness. Later on, development into a series of pyrexial attacks over some months naturally suggested rat-bite fever, which name does not exclude the fact that the infection has been spread by both brown and black rats, cats and kittens, dogs, ferrets, and even by a pig.

Another point suggested by the history is that no improvement resulted from a great variety of treatments whilst in hospital: the patient stated that a severe attack occurred three days before she left the wards, and it was four months before the neokharsivan injection abruptly terminated the illness. It is of interest to note that the duration of (presumably) untreated cases has been reported as being four, eight, and even twenty years.

In this case the patient estimates that during her stay in hospital there were ten to twelve attacks of fever: it is clear that in the convalescent home, on December 13th, December 21st, and December 28th, pyrexia was present. Most records in other cases mention 104°F. , or more, but in this case it seems that 101° to 102°F. was the maximum temperature reached during the attacks.

Perhaps the value of this clinical and pathological record of a case of rat-bite fever met in general practice lies in the reminder that the disease is of world-wide distribution. As in this case, its real character is occasionally masked by sepsis; at each operation, however, there was failure to find pus. In the presence of a spreading lymphangitis, such as this case presented at the beginning, the problem before the surgeon is a difficult one, unless his vision is microscopical, with the clinical history as a fine adjustment.

No attempt has been made at a bibliography on the subject of rat-bite fever, since Dr. Andrew Robertson's review in the *Annals of Tropical Medicine and Parasitology* (October 22nd, 1930, xxiv, No. 3) is comprehensive, giving some 250 references.

RAT-BITE FEVER FROM A CAT

BY

J. V. LAVERICK, M.R.C.S., L.R.C.P.

LATE RESIDENT MEDICAL OFFICER, ST. ANDREW'S HOSPITAL,
DOLLIS HILL

The comparative rarity of this condition seems sufficient justification for putting on record the following case.

Case History

The patient, a nulliparous woman aged 42 years, had always enjoyed good health previous to her present illness.

May 16th, 1935.—Whilst attempting to separate two fighting cats she sustained a severe bite on the left forearm, together with multiple scratches on both the forearm and the hand. The bite was painted with iodine and sutured in the out-patient department of the Redhill County Hospital, and healed by first intention. About ten days later she felt unwell and was feverish, and the wound, which previously had been healthy, broke down and became septic. This was accompanied by lymphangitis and axillary lymphadenitis.

May 30th.—Her temperature had risen to 103°F. , and she was admitted to Redhill Hospital. At that time her general toxic state appeared more severe than could be accounted for by the local condition. She was treated by injections of sodium cacodylate and anti-streptococcal serum; after three days the local condition had much improved and her temperature had fallen to normal. There were no rigors and no mental symptoms at that time.

June 6th.—A week later, however, she suffered from delusions and was "peculiar mentally," resembling a case of delirium tremens. The next day her mental condition had become so much worse that she was transferred to Park Royal Hospital for observation, but for family reasons she was removed to her own home the same day.

June 7th-16th.—She then ran an irregular temperature and was treated at home by her own doctor for sepsis of the left forearm. Her mental condition steadily improved, but on June 16th she was admitted to St. Andrew's Hospital suffering from an abscess in the region of the bite, pyrexia, and general malaise.

EXAMINATION AND OPERATION

On admission her temperature was 103°F. , pulse 134, respiration rate 20, and she looked ill. Her mental state had obviously improved, and she answered questions quite rationally, but appeared to be frightened by the lights in the ward and was somewhat suspicious of the other patients. Over the lower end of the left ulna, on the site of the original wound, was an abscess two inches by one and a half inches in size, with a marked lymphangitis and enlargement and tenderness of the axillary glands. On the outer side of the right arm, a few inches above the elbow-joint, were two dusky red patches, about one inch in diameter, which did not fade on pressure.

On the following day her temperature was 100°F. , and the pulse rate 110; the abscess on the left arm was incised and about two drachms of thin pus were evacuated. The temperature fell and remained normal for a week, and the wound, which was being treated with saline baths and flavine and paraffin dressings, steadily improved.

A week after the operation, however, the temperature again rose to 103.8°F. , and the pulse to 100, though the patient's general condition was, if anything, rather better than before. The ecchymoses on the right arm had faded, and no fresh ones had appeared. At this time a swelling about two inches by one and a half inches in size was noticed on the dorsum of the left forearm. There were no signs of inflammation, but it was incised and a little serous fluid, but no pus, was evacuated. The following day the temperature was again normal. During the next fortnight the general condition improved, but the temperature showed periodic rises, which were not accompanied by malaise; both wounds remained healed, and she was discharged on July 10th.