Much has been accomplished, and the start is a promising one.* At other universities plans are being developed which will contribute to the same end. Differing in detail and shaped by local conditions, they will provide a welcome stimulus through rivalry. There is still a long way to go before the aim of the University of London is realized and before the peculiar opportunities present here in London are developed fully. When that time comes the postgraduate institutes will send out the future leaders of medical thought and practice, and will be able to welcome those who seek to advance knowledge by research and to improve their skill for the relief of suffering.

SMALLPOX IN STAFFORDSHIRE, 1947

OUTBREAK AT BILSTON

BY

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The following report covers the outbreak of smallpox which occurred in the borough of Bilston and in the neighbouring areas of Coseley U.D.C., Willenhall U.D.C., and Dudley C.B., as it is assumed that all the cases were from the same source. Thirty cases were confirmed by the Ministry of Health and seven others were removed to hospital as suspects. One associated case occurred in the Birmingham area—a medical student who had visited the smallpox hospital; this is not included in the present series. Six cases were fatal—five haemorrhagic and one confluent smallpox.

History of the Outbreak

An Army sergeant aged 23 was granted compassionate leave from India. He left Agra by train on Feb. 17, 1947, boarded a plane at Karachi on the 20th and, flying via Basra, Cairo, Malta, and Marseilles, arrived at Heathrow Airport on the 23rd. Next day he travelled to his home in Bilston. He had been vaccinated in infancy and again on Nov. 3, 1944, and Feb. 15, 1946.

On March 1 he felt slightly ill, but remained ambulant until he developed a rash on March 6, when he said he felt as if he had "flu." The local medical officer of health, Dr. B. C. Haller, did not feel happy about the case and attempted to obtain the opening of the smallpox hospital. However, further opinion was sought through the regional office of the Ministry of Health, and a confident diagnosis of chicken-pox was made on March 8.

The patient remained at home, and his mother developed a rash on March 21. A diagnosis of chicken-pox was again made. An unvaccinated man of 21 years, who had visited the soldier on March 6, developed a more severe rash on March 25. Further consultations took place and specimens were sent from the two later cases for laboratory investigation. A preliminary report on April 1 suggested that the condition was variolous. Further experts were called in, and a conference took place on April 3, at which time "reliable clinical opinion still regarded the Bilston cases as chicken-pox" (Regional Ministry Circular).

On the 4th the mother and brother of Case 3 were taken ill and developed rashes on the 8th. By this time confirmatory reports on the laboratory investigations left no doubt that Cases 2 and 3 were smallpox, and the hospital was opened on the 9th, the first two cases having by this time recovered. The outbreak was regarded as variola minor (*Med. Off.* 1947, 77, 152), but subsequent events proved the infection to be of the major variety.

From Case 1 three further cases originated: the grandmother developed haemorrhagic smallpox and died before removal, and the father and sister developed modified eruptions. No further cases were reported from the known source, but ample opportunity for spread of the infection had been afforded in the 34 days which elapsed between the appearance of the rash in the soldier and the opening of the hospital. One case was known to have travelled from Bilston to Coseley by bus in the late prodromal stage.

Subsequent groups of cases developed in which no apparent origin could be traced, despite vigorous detective work on the part of the staff. The last case was admitted to hospital on July 9 with a confluent rash after being ill at home for six days; an initial diagnosis of measles had been made. This patient lived some four miles from the original focus and her source of infection remains unknown. She had numerous visitors during her period at home, but no contact cases were reported. The 30 cases are classified in Table I and their histories given in Table II.

TABLE I—Summary of Confirmed Cases

	Severe Cases (15)	Mild Cases (15)	
Haemorrhagic	.. 5 (all fatal)	Copious discrete	.. 1
Confluent	.. 8 (1 fatal)	Moderate discrete	.. 1
Semi-confluent	.. 2 (none fatal)	Mild discrete	.. 6
		"A few spots"	.. 7

Commentary

Cases were seen before admission by experts of the Ministry's Regional Panel, and where doubt existed further examinations were made after admission.

In the *Monthly Bulletin of the Ministry of Health and Public Health Laboratory Service*, July, 1947, special attention was drawn to the fact that the three contacts of Case 9 who developed the disease had been unsuccessfully vaccinated on May 17, 1947, and revaccinated on May 23. This was later found to be incorrect. When examined on the 23rd the reaction to the incisions performed on the 17th was very indefinite and further incisions were made. By the 25th, however, the vaccination of the 17th showed a good reaction.

Group 7 (Bilston).—Opinion was sought in regard to Case 22, aged 7, who was gravely ill. As the other children in the household presented minor lesions they were admitted to hospital. Cases 21 and 23 were regarded by the Ministry expert as confirmed smallpox, but an infant aged 10 months and an older sister, both vaccinated, were not confirmed. When Case 21 was seen in hospital on June 30 a scar was noted on his ankle, and it was suggested that he might have been the original source in the household. No other lesions were then present. Local opinion considered that the scar was due to an old infection caused by a protruding nail. Further opinion on July 7 doubted if the case ever was smallpox. Case 23 was very fretful and obviously ill on removal, but the rash failed to develop beyond the macular stage. She was vaccinated after admission to hospital.

Case 24.—This boy had papules on the forehead only, which soon scabbed and left depressed scars showing staining. The laboratory results were negative, but his was regarded as a highly modified case when seen on July 7. His sister was removed to hospital as a suspected case, but her condition soon subsided and she was regarded as suffering from a vaccinal lichen. It is possible that the boy also was suffering from an eruption of this type.

Case 30 (Dudley).—Clinically this was the most interesting case of the whole outbreak. The prodromal phase was marked with headache, chill, malaise, and backache. The rash appeared on June 19 and streptococcal septicaemia was diagnosed. The patient was removed to the infectious diseases hospital on June 21 by ambulance and before being sent to the ward he was seen by a medical officer who had seen Case 9. As Case 30 presented a similar picture he was transferred to the smallpox hospital. He had a marked

*In addition to the Postgraduate Medical School of London, institutes have been established, or are in process of development, in child health, neurology, laryngology and otology, ophthalmology, psychiatry, diseases of the chest, cardiology, dermatology, orthopaedics, urology, and dental surgery.

TABLE II.—Case Histories

Case No.	Sex	Age	Source of Infection	Vaccinal State	Final Diagnosis	General Remarks
BILSTON CASES						
<i>Group 1 (8 cases)</i>						
1	M	23	India	Infancy 3/11/44	Mild discrete	Prodromal phase 1-6/3/47, "like 'flu.'" Rash on palate, face, back, shoulders, and chest. Quick maturation and slight depth
2	F	50	Son (Case 1)	15/2/46 Infancy	"	Febrile 19-21/3/47. Rash on 21/3/47: palate, face, trunk, forearms, legs. Well-marked vesicular stage. Laboratory confirmation
3	M	21	Case 1	Unvaccinated	Semi-confluent	23/3/47, severe malaise; 25/3/47, rash profuse on face, forearms, palms, legs, and soles. Laboratory confirmation
4	F	48	Son (Case 3)	Infancy 3/4/47	Confluent	Onset 4/4/47: marked rigors. Rash 8/4/47: profuse, typical distribution. Penicillin given from 14/4/47. Laboratory confirmation
5	M	17	Brother (Case 3)	3/4/47	"	Onset 4/4/47: prodromal phase marked. Rash 8/4/47. Penicillin given from 14/4/47
6	M	51	Son or wife (Case 1 or 2)	1914-18 10/4/47	Mild discrete	Onset 8/4/47: malaise. Rash 11/4/47. 20 lesions: forehead, arms, scapulae. Laboratory confirmation
7	F	19	Brother or mother (Case 1 or 2)	Infancy 10/4/47	"A few spots"	Onset 8/4/47: slight malaise. Rash 11/4/47. 9 lesions in all. Laboratory confirmation
8	F	79	Grandson (Case 1)	? Infancy	Haemorrhagic	Onset 8/4/47: gravely ill. Petechial rash 10/4/47. Died 11/4/47
<i>Group 2 (4 cases)</i>						
9	M	70	Unknown	Unknown ? Infancy	Haemorrhagic	Onset 26/4/47: headaches. 29/4/47: rash; petechial on trunk and extremities. Bruising on arms, hands, and feet. Blood p.r. Penicillin given. Died 2/5/47. Laboratory confirmation
10	F	64	Husband (Case 9)	2/5/47 (primary reaction)	Confluent	Onset 7/5/47: prodromal phase slight. Rash on 11/5/47. Penicillin given from admission on 11/5/47
11	M	30	Case 9	3/5/47 (primary reaction)	"	Onset 7/5/47: severe pain in abdomen. Rash on 11/5/47. Penicillin given
12	F	41	Case 9	2/5/47 (primary reaction)	"A few spots"	Onset 11/5/47: symptoms slight. Rash on 13/5/47: 7 pustules in all. Positive laboratory culture
<i>Group 3 (4 cases)</i>						
13	F	27	Unknown	Unvaccinated	Haemorrhagic	Onset 9/5/47: severe sickness, headache. Rash on 12/5/47; diagnosed as scarlet fever. Admitted 16/5/47. Petechial rash: confluent on face, neck, and throat; discrete on back, abdomen, and limbs. Palms and soles clear. Blood from all orifices. Died 16/5/47
14	F	49	Daughter (Case 13)	Infancy 17/5/47	"	Onset 29/5/47: intractable headache, abdominal pain. Rash first appeared 31/5/47.
15	F	14	Sister (Case 13)	Infancy 17/5/47	Mild discrete	Confluent petechial rash by 2/6/47. No maturation. Died 5/6/47
16	F	12	Sister (Case 13)	Infancy 17/5/47	"	Onset 30/5/47: no symptoms, but acneiform rash which was vesicular on 31/5/47. No prodromal stage. Rash on 1/6/47. Vesicular. Ambulant throughout.
<i>Group 4 (1 case)</i>						
17	F	11	Unknown	Unvaccinated	Confluent	Onset 16/5/47: abdominal pain. Rash 19/5/47. Treated with penicillin from 19/5/47
<i>Group 5 (1 case)</i>						
18	F	39	Unknown	Infancy 4/6/47 (successful)	Moderate discrete	Onset 1/6/47: rigors, etc. Rash 4/6/47; maculo-papular, mainly on legs and arms. None on face. Treated with penicillin
<i>Group 6 (2 cases)</i>						
19	M	61	Unknown	Infancy	Copious discrete	Onset 9/6/47: backache. Atypical rash on 13/6/47; papular on forehead and scalp, acneiform on body. Specimens reported "presumptive negative." Quick maturation and removal on 17/6/47. Later material positive. Treated with penicillin
20	F	61	Husband (Case 19)	Infancy 16/6/47	"A few spots"	Vague onset 26/6/47. Rash appeared 28/6/47. Scattered papules on body and extremities. None on face. Laboratory confirmation
<i>Group 7 (3 cases)</i>						
21	M	11	Unknown	May, 1947	"A few spots"	Removed to hospital with Case 22. A few indeterminate lesions. Laboratory-negative
22	M	7	Unknown. ? Case 21 (brother)	Unvaccinated	Confluent	Onset 18/6/47: pains in back, severe diarrhoea. Rash 20/6/47; confluent. Treated with penicillin. Died 2/7/47
23	F	2	? Case 21 (brother)	"	"A few spots"	Onset 20/6/47. Removed same day with macular rash which did not mature. Laboratory-negative
<i>Group 8 (1 case)</i>						
24	M	10	Unknown	23/6/47	"A few spots"	Onset 30/6/47: little discomfort. Rash on 3/7/47, forehead only. Laboratory-negative
COSELEY CASES						
<i>Group 1 (2 cases)</i>						
25	F	78	Unknown	Infancy	Haemorrhagic	Source probably indirectly from original Bilston case. Onset obscure (patient an invalid). Rash on 7/5/47; petechial. Died 15/5/47
26	M	72	Sister (Case 25)	13/5/47	"A few spots"	Onset 22/5/47: slight symptoms. Two lesions on wrist on same day, positive for variola. No other lesions
<i>Group 2 (2 cases)</i>						
27	F	18	Possibly Group 2 (Bilston)	6/5/47	Confluent	Onset 13/5/47: prodromata fairly severe. Rash 16/5/47; initial diagnosis "measles." Admitted 19/5/47. Penicillin given
28	F	52	Daughter (Case 27)	20/5/47	Semi-confluent	Onset 27/5/47: headache. Rash 29/5/47, papular on admission on face, neck, trunk, limbs, and in the axillae
WILLENHALL AREA (1 case)						
29	F	19	Unknown	Unvaccinated	Confluent	Onset 3/7/47: dysphagia. Rash developed 6/7/47: original diagnosis "measles." Removed 9/7/47. Gravely ill. Penicillin given
DUDLEY AREA (1 case)						
30	M	45	Unknown	Infancy 25/6/47	Mild discrete	Onset 16/6/47. Original rash 19/6/47. Later crop 1/7/47

vesicular rash on the forehead, face, neck, and thorax; pronounced excoriation of the skin in the neck area; a papular rash on the arms and legs but none on the palms and soles; a haemorrhagic rash on the lower thorax and abdomen; and some lesions in the mouth. He complained of severe abdominal pain. His was suspected to be a haemorrhagic case, and penicillin was administered. The rash continued to extend and the haemorrhagic areas became brighter until June 24, when the rash faded quickly, although the tempera-

ture remained raised and the abdominal pain persisted. Laboratory findings at this stage were negative. By June 30 the rash had completely faded, and a Ministry expert expressed the opinion that it might have been erythema multiforme. There were never any bullae, severe stomatitis, or pseudomembrane in the mouth. On July 1 a new crop of lesions appeared, beginning as a vesicle on the abdomen within a previously haemorrhagic area. Specimens gave a positive culture for variola. By July 4

there were more papules present on the hands and chest, the temperature became normal, albumin disappeared from the urine, and the patient felt better. On July 7 an expert confirmed the rash as being a modified smallpox of some six days' duration. Further progress was uneventful. While for record purposes this case was classified as mild discrete smallpox the possibility remains that it was a haemorrhagic case, with a prolonged prodromal period and slow maturation, which recovered.

Suspected Cases

The following four suspected cases were removed to hospital but were not confirmed as smallpox.

An unvaccinated child of 7 years had severe vomiting and epistaxis. Next day a provisional diagnosis of " ? varicella, ? variola " was made and she was admitted to a special isolation unit. On admission she was delirious, with a profuse macular rash on the face, trunk, and palms of the hands. By the following day she had developed post-occipital glands and the rash was fading. Subsequent progress proved the condition to be rubella.

A woman aged 27 developed a profuse papular rash on the hands, shotty to the touch, with a few vesicles, 16 day after vaccination. Laboratory evidence was negative and the lesions soon cleared, leaving considerable brown staining. This was probably a vaccinal eruption. There was no previous history of urticaria.

A girl aged 22 who had been vaccinated in infancy and again on May 17, 1947, developed a rash on June 14 after a well-marked period of sickness, abdominal pain, back-ache, and conjunctivitis. She had three papules on the forehead, one on the chin, and one on the right leg which became vesicular. Opinion was divided, but she was removed to hospital, where laboratory evidence was negative. The scarring from the lesions was depressed and showed staining.

A man aged 31 who worked in Bilston was vaccinated on May 21, 1947, and developed a rash on June 17 with no initial prodromata. He was removed to hospital with a generalized rash, which gave negative laboratory evidence.

It is suggested that the last two cases may possibly have been late effects of the vaccination.

General Measures Taken in Bilston

Contacts.—All possible steps were taken to obtain lists of contacts, who were kept under surveillance for a period of 21 days to cover any possibility of a prolonged incubation period in vaccinated or modified cases. In the later stages of the outbreak considerable help was given by the Army authorities, a field hygiene unit being drafted in to help in the daily visitations, which then numbered several hundreds.

Vaccination.—Vaccination was offered to all known contacts, and a special clinic was opened to facilitate the work of the public vaccinators. All contacts received three incisions. No endeavour was made to advocate mass vaccination, as it was felt that the protection of the known contacts was the important factor. However, by the middle of May the public panicked at the continued incidence of cases, and the demand for vaccination became so great that assistant medical officers of Staffordshire County Council had to be called upon to act as deputies for the public vaccinators. It is estimated that over half the population of Bilston were vaccinated at the clinics and works or by the practitioners. No cases of encephalitis following vaccination were reported in the Bilston, Coseley, and Willenhall areas.

Chicken-pox.—Section 147 (1) Public Health Act, 1936, was brought into operation and chicken-pox was notifiable from May 19. All cases were visited by the medical officer of health, and several adult cases remained suspect until proved negative.

Staff.—All staff in any way connected with the cases were revaccinated at six-weekly intervals, as it was felt that a virus of very high virulence was responsible for the outbreak.

Hospital Arrangements.—A small disused infectious diseases hospital was opened by the Smallpox Board and staffed by volunteers. Although the hospital was situated in Bilston the distribution of the cases gave no evidence of aerial spread.

Treatment of Patients

General.—Patients were nursed until the crusting stage in darkened rooms. The eyes were treated with boric lotion and sulphacetamide drops. Frequent mouth-washes were given. Lesions occurring on the face and neck were treated with hot sodium bicarbonate compresses, as they were found to be very soothing.

Sedatives.—"Nembutal," 1½–4½ gr. (0.1–0.3 g.), was administered according to the age and condition of the patient.

Use of Penicillin.—As already indicated, penicillin was administered to most of the severer cases. In the first two to receive it it was started in the pustular stage, 20,000 units being given intramuscularly at three-hourly intervals, then being changed to 100,000 units six-hourly. It was later suggested that a dose given twice daily would maintain an effective concentration and cause less disturbance to the patients. Later cases received 1,000,000 units twice daily from admission to the crusting stage. The dosage was purely empirical. This is a greater dose than has previously been noted in the treatment of smallpox (Easton, 1945; Foulis, 1945; Pierce, 1947). One cannot claim too much from the small series, and it is not suggested that penicillin influenced the course of the virus infection. In the pustular stage there was much less photophobia and pus formation, and the nursing staff noted agreeably the great diminution in the quantity of soiled linen. Cultures taken during the pustular stage grew only penicillin-resistant *Staphylococcus aureus*.

The mortality rate compares favourably with other recent epidemics, only one confluent case being fatal—that of a previously debilitated child.

TABLE III.—Comparison with Other Recent Outbreaks of Smallpox

Outbreak	Total Cases	Deaths	Haem. and Haem. Confl.	Confluent	Semi-Confl.	Mild	Severe Cases*	
							%	Mort. %
Glasgow, 1942 ..	36	8 (22.2%)	3 (3)	9 (5)	2	22	38.8	57
Edinburgh, 1942 ..	36	8 (22.2%)	6 (6)	5 (2)	3	22	38.8	57
Middlesex, 1944 ..	11	3 (27.3%)	1 (1)	2 (2)	—	8	27.3	100
Middle East, 1944 ..	48	13 (27.1%)	11 (10)	5 (3)	10	22	54.1	50
Merseyside, 1946 ..	31	9 (29.0%)	5 (5)	7 (4)	—	19	38.7	75
Bilston, 1947 ..	30	6 (20.0%)	5 (5)	8 (1)	2	15	50	40

* Severe cases comprise the haemorrhagic, confluent, and semi-confluent. The bold figures in parentheses indicate the number of fatal cases.

Lessons of the Outbreak

Once again an outbreak of smallpox followed a confident diagnosis of chicken-pox by competent experts. This also occurred in 1947 at Scunthorpe (*Medical Officer*, 77, 152); in the Middlesex outbreak of 1944 (Bradley, Davies, and Durante, 1946); the Edinburgh outbreak of 1942 (*B.M.J.*, 1944, 2, 54); and at Birkenhead in 1946 (Pierce, 1947). Had the original case at Bilston been removed to complete isolation it is probable that the outbreak would have terminated in the original group. One can but echo C. Killick Millard (1947): "Chicken-pox in adults should always be regarded with suspicion."

The possibility of a modified attack of variola should always be borne in mind when suspicious rashes occur in vaccinated persons who have recently arrived in this country by air. The impact of such a case on a comparatively unvaccinated population was well demonstrated in the Bilston outbreak. One would have expected further cases to arise, especially in the overcrowded conditions prevailing in the area, and the early removal of the patients, with vaccination and close surveillance of the contacts, must have been contributory factors in limiting the spread. Mild missed cases in vaccinated persons must account for the missing links in the spread of the outbreak, the termination of which can be described only as natural or spontaneous.

Laboratory investigations have been of great help in confirming some cases, especially in the original group and in highly modified attacks such as Case 26. However, time must elapse before the receipt of the reports and of negative results in cases showing definite clinical signs.

As in previous outbreaks, vaccination did not fully protect within the first week of the vaccination period. Many contacts were vaccinated too late in the incubation period, owing to delay in diagnosis or even in sufficient suspicion of the true nature of the case. Confluent cases occurred where successful vaccination had been carried out nine and eight days before the appearance of the true smallpox rash, and in one haemorrhagic case successful revaccination had been carried out 12 days before, yet the case had a fatal termination. Modified cases occurred where vaccination had been carried out 12 days before the rash appeared. Many individuals vaccinated in the Services during the recent war years gave reactions which indicated absence of immunity.

An important administrative point in dealing with vaccination of school-children is the necessity for obtaining the written consent of the parents. In the rush of children coming for vaccination from the schools it was assumed that parental consent had been given. Later it was found that some children had been vaccinated "to be in the fashion," without parental consent.

Summary

An outbreak of smallpox is described originating in a soldier who travelled from India by air and was at home for some days before he developed a modified attack of variola which was regarded as chicken-pox.

Of the 30 confirmed cases, 15 were severe, with 6 deaths—5 from haemorrhagic smallpox and 1 in an unvaccinated confluent case.

I wish to express my appreciation of the very great help given to me by Dr. B. C. Haller, medical officer of health for Bilston, during my period of special duty in the area and for his permission to utilize the various records and reports. My thanks are due to his staff for their ready co-operation at all times. I am greatly indebted to Dr. F. Asker, medical officer of the Joint Infectious Diseases Board, and to Miss Marian Curtin, the matron of the Moxley Hospital and Bilston Smallpox Hospital, for their help in giving me access to the cases and treatment records and for permission to use the records in collating this report. I also wish to record my thanks to Dr. G. Ramage, medical officer of health for Staffordshire, for his permission to publish this report.

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ABSORPTION OF VITAMIN D IN STEATORRHOEA

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Osteomalacia, though rare in this country, may sometimes be seen as a complication of steatorrhea. Ryle (1924) and others have suggested that the formation of insoluble calcium soaps in the fatty intestinal contents inhibits calcium absorption in this condition. Although unabsorbed fat in the bowel does affect calcium absorption (Telfer, 1926-7), soap formation cannot entirely explain the failure to absorb calcium, otherwise the patients should absorb calcium normally on a fat-free diet. In fact, restriction of fat intake alone does not improve calcium absorption (Bauer and Marble, 1932; Bassett *et al.*, 1939), but vitamin D rapidly restores it to normal even with a normal fat intake, indicating that the patients are vitamin-D-deficient. It was suggested that this was due to a failure of absorption of the vitamin, but no direct evidence of such an effect has been given. In three cases successfully treated with vitamin D, Bassett *et al.* (1939) used large doses (225,000-900,000 i.u. daily) by mouth, these doses being similar to those required in cases of vitamin-D-resistant rickets (McCance, 1947); they obtained equivocal results when smaller doses (10,000 i.u. daily) were given parenterally to another patient. Bauer and Marble (1932) obtained an immediate response with 10 mg. of ergosterol daily by mouth.

When a woman with osteomalacia due to steatorrhea recently came under our observation the absorption of vitamin D was investigated by comparing the responses to oral and parenteral administration, using doses known to be adequate for treatment of osteomalacia of dietary origin (Liu *et al.*, 1935).

Case History

The patient, a nun aged 61, had worked in Poona from 1932 to 1937. In 1938 a right hemicolectomy, including resection of the last 4 in. (10 cm.) of the ileum, was performed for carcinoma of the caecum; healed tuberculous mesenteric glands were found at operation. After this operation she had diarrhoea, and in July, 1944, she was admitted to this unit for anaemia. Steatorrhea with megaloblastic anaemia was then found. A sternal puncture showed the sternum to be soft; plasma phosphatase was 14 King-Armstrong units, but serum calcium and phosphate were not estimated and osteomalacia was not suspected at that time.

Treatment was begun with a low-fat diet with extra meat, weekly liver injections, and added vitamins A and D (1,500 units daily), and this regime was continued after discharge. The anaemia and diarrhoea responded fairly well, but in the spring of 1946 she had severe pains in the spine, round the trunk, and in the sacro-iliac joints. Radiographs revealed generalized osteoporosis, and calcium sodium lactate (6 g. daily) was prescribed. This helped to control the diarrhoea, but produced little change in the bone pains. These were rather better after a summer holiday, but this improvement may be ascribed to sunlight rather than to the treatment, for in the spring of 1947 her condition had again become much worse. Every movement of the trunk was very painful; from the lying position she could not sit up without pulling herself up by her arms; her muscles felt weak and she was getting involuntary spasms of the abdominal muscles. Her ribs were very tender. Chvostek's sign was positive, Trousseau's sign