atresia successfully treated by operation, 4 were subsequently found to be mongols, while Grove and Rasmussen (1950) found 3 mongols among 11 cases of duodenal atresia or stenosis.

One of us (L.L.R.W.) recently observed mongolism in three successive infants with duodenal atresia at necropsy, in Cardiff, and from personal communications we have learned that Miss I. Forshall, in Liverpool, has seen four cases, and Miss V. Smallpeice, at Oxford, two cases.

From our observations there would appear to be a high incidence of mongolism in infants suffering from intrinsic malformations of the duodenum, the overall frequency in 25 years being approximately one in three. It is remarkable, however, that during 1951, after our interest had been drawn to the association, all five cases of duodenal atresia or stenosis admitted to Great Ormond Street have been found to be mongols; in two of these the latter condition was not recognized until post-mortem examination. Our recent experience suggests that the frequency of associated mongolism may be even higher than one in three.

A possible explanation of the paucity of recorded instances is that most uncomplicated cases of mongolism do not come under medical observation until there is obvious retardation of mental progress, at the end of infancy or later. On the other hand, most cases of duodenal atresia or stenosis die in the neonatal period at a time when the classical appearances of mongolism, though present, are not conspicuous.

The features of mongolism in newborn infants are perhaps not as widely appreciated as they might be (Carter and MacCarthy, 1951). On clinical inspection the immediate general impression is that the baby has an odd appearance. Only a careful systematic examination will elicit the presence of some of the signs of mongolism.

The head is usually rounded, and on palpation of the sagittal suture a third fontanelle may be found. The facial contour is square; the oblique palpebral fissures are small and measure less than the interocular distance; medial epicanthic folds are usually present; the nasal bridge is depressed; the ears are poorly formed and have a crumpled appearance; the tongue tends to protrude. Fingers are somewhat short and the little finger may be incurved owing to a short middle phalanx; a single transverse palmar crease is often present; the axial triradius is in an abnormal position (Penrose, 1949). A high maternal age affords further circumstantial evidence.

At post-mortem examination the most characteristic internal finding is a disproportionately small cerebellum and brain stem; associated malformations, notably cardiac septal defects, may be encountered.

It must be emphasized that no one feature is peculiar to mongolism, nor is any sign of invariable occurrence; it is the presence of a majority of these signs, however, which enables one to make the diagnosis with reasonable certainty, even in the newborn.

In view of our observations it seems important to seek evidence of mongolism in all infants with suspected duodenal obstruction, since such finding may influence the decision to operate.

Summary

In a consecutive series of 32 infants with congenital atresia or stenosis of the duodenum a high incidence of mongolism was observed.

The frequency of this association has not been generally appreciated, presumably because most children with duodenal atresia or stenosis die during the neonatal period, when mongolism is apt to be overlooked. The features of the newborn mongol are therefore reiterated. It is felt that the early recognition of mongolism in a newborn child with suspected duodenal obstruction may be of practical importance in the management of the case.

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ACUTE INFECTIOUS LYMPHOCYTOSIS REPORT ON A GROUP OF CASES IN A DAY NURSERY

BY

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Acute infectious lymphocytosis was first described as a specific disease by Carl H. Smith, of New York, in 1941. It chiefly affects children below the age of 10 years, and is known to occur sporadically and also in small epidemics, particularly in institutions and among members of the same family. The literature and features of the condition were fully reviewed by Smith himself in 1947. Most of the case reports have come from North America, and the largest recorded outbreak there involved 86 persons in an institution for mentally defective and epileptic patients (Barnes *et al.*, 1949). During the last few years instances of the disease have also been reported increasingly in Europe. Thus the condition has been encountered in Finland (Klemola and Hamarinen, 1947), in Switzerland (Gsell, 1947; Landolt, 1947; Martens, 1948), in France (Debré *et al.*, 1948; Lamy, 1948; Bernard *et al.*, 1948), and in Germany (Recknagel, 1948; Koch, 1949; Heni and Zeh, 1949), as well as in Austria, Czechoslovakia, Greece, the Netherlands, Sweden, and Spain.

In this country, Kilham and Steigman (1942) first pointed out certain similarities to infectious lymphocytosis in three children whose blood showed an increase in the number of small lymphocytes and gave a negative Paul-Bunnell reaction. Later, Steigman (1946) briefly described a small outbreak affecting six children in a village in Southern England in 1942. Isolated instances of the condition in the East End of London have been reported from this hospital (Sita-Lumsden, 1947) and from Mile End Hospital (Dolphin and Popham, 1950). An account of three cases was also published in Northern Ireland (McCollum, 1949).

Six cases which appeared to originate in a day nursery in East London are described below. The first three were encountered in hospital practice.

Case 1

A female infant aged 1 year and 4 months was first sent to the out-patient department of the London Hospital from a local day nursery on August 4, 1950. She had always had a tendency to pass offensive loose stools with mucus, but for the previous fortnight this had been worse and she had had about seven motions daily. She was, however, still eating well and had not vomited. Her development and previous health had been normal apart from a severe attack of whooping-cough and intermittent right otorrhoea. She was the youngest of four children, and the mother reported that the others, who were all boys, were also liable to pass loose stools. The eldest had had diarrhoea for three weeks about three months previously, and the second had had it for one week a fortnight previously.

On examination the child looked healthy, and her temperature was normal. The right eardrum was hyperaemic and dull; otherwise there were no abnormal signs. The lymph nodes and spleen were not enlarged. A rectal swab revealed nothing abnormal in a film or on culture.

On treatment with dietary restriction and a kaolin mixture the stools diminished in number but remained loose and offensive. A week after her first attendance she had lost 2½ oz. (71 g.) in weight and appeared paler. The blood then showed a haemoglobin concentration of 74%* and a white-cell count of 79,400 per c.mm., with 95% lymphocytes, which were normal in appearance.

On the following day, August 12, she was admitted to hospital. She was now fretful and had a temperature of 102° F. (38.9° C.). The tonsillar lymph nodes were palpable. The fauces were slightly congested and showed some post-nasal mucous discharge. Both eardrums were hyperaemic. Otherwise she was normal.

The stools were found to contain many flagellates and cysts of *Giardia lamblia*. No pathogenic organisms were grown on repeated culture of stools and rectal swabs. Throat swabs and urine tests showed nothing abnormal, the erythrocyte sedimentation rate (Wintrobe) was 12 mm. in one hour, and a tuberculin jelly test proved negative.

Treatment consisted of intramuscular penicillin (100,000 units twice daily) and 0.5% ephedrine nose drops. The temperature declined for the first two days, then rose to 103.4° F. (39.7° C.), while a severe aphthous stomatitis developed. This appeared clinically characteristic of a

*The alkaline haematin method of estimation with photoelectric colorimetry was used throughout; 100% = 14.8 g. of haemoglobin per 100 ml.

herpetic infection; numerous small ulcers developed on the tip of the tongue and on the buccal mucous membrane, and vesicles spread on to the lips and skin outside the mouth.

The blood count on August 14 showed: haemoglobin, 65%; white cells, 80,000 per c.mm., with 91% lymphocytes. On August 19 blood was taken for Paul-Bunnell and herpes complement-fixation tests; both were negative in all dilutions. The fever appeared unaffected by penicillin, but the temperature, though swinging, declined gradually and reached normal after 12 days.

On August 22 the white-cell count had fallen to 24,500, with 72% lymphocytes. A course of mepacrine (0.05 g. twice daily for four days) was then given for the giardiasis, as well as a ferrous sulphate mixture for the anaemia. Further progress was uneventful, and the child's condition was fairly satisfactory. Three further stool tests demonstrated disappearance of the *G. lamblia* parasites.

On August 31 the blood count showed: haemoglobin, 65%; red cells, 4,060,000 per c.mm.; white cells, 11,400, with 62% lymphocytes. By September 11 the haemoglobin concentration had risen to 76%, while the white-cell count had fallen to 7,900 per c.mm., with 52% lymphocytes and 10% eosinophils. On September 27 the leucocyte count was normal (see Table I).

The complement-fixation test for herpes was repeated on August 31 and again on November 1, but remained negative. The Paul-Bunnell test was also negative again on the latter date.

Case 2

A boy aged 2 years and 5 months, the youngest brother of Case 1, also attended the nursery. He first came to the out-patient department on August 23, 1950. Like his sister, he had passed loose stools intermittently before. He had also been treated for enteritis in a fever hospital in April, 1949. He now had a cough of one week's duration, and during this time had had up to five watery motions daily.

On examination he looked healthy, and his temperature was normal. Except for the presence of post-nasal mucopus in the pharynx and slight prominence of the abdomen there were no abnormal signs. A blood count showed 79,400 white cells per c.mm., of which 97% were lymphocytes; these were normal in appearance. A stool specimen contained *G. lamblia* cysts and flagellates. A course of mepacrine, 0.05 g. three times daily for five days, was prescribed, and the boy was removed from the nursery.

A week later, on August 30, the mother reported that he still passed four or five loose motions without mucus every

TABLE I.—White Blood Cell and Differential Counts of Affected Children

Case No.	Date (1950)	Total Count per c.mm.	Lymphocytes % (total per c.mm.)	Eosinophils % (total per c.mm.)	Neutrophils %	Monocytes %	Basophils %
1	Aug. 11	79,400	95 (75,430)	1 (794)	4	—	—
	" 14	80,000	91 (72,800)	—	9	—	—
	" 22	24,500	72 (17,640)	—	24	4	—
	" 31	11,400	62 (7,068)	—	35	3	—
	Sept. 11	7,900	52 (4,108)	10 (790)	33	5	—
	" 27	5,200	58 (3,016)	1 (52)	36	5	—
2	Aug. 23	79,400	97 (77,018)	—	3	—	—
	" 30	61,000	91 (55,510)	2 (1,220)	7	—	—
	Sept. 6	19,600	69 (13,524)	8 (1,568)	21	2	—
	" 13	10,200	49 (4,998)	2 (204)	47	2	—
3	Aug. 30	40,000	88 (35,200)	—	11	1	—
	Oct. 20	10,400	74 (7,696)	4 (416)	22	—	—
4	Sept. 22	42,700	91 (38,857)	3 (1,281)	6	—	—
	" 28	31,800	85 (27,030)	4 (1,272)	9	2	—
	Oct. 19	10,100	42 (4,242)	5 (505)	47	6	—
	Dec. 11	10,000	20 (2,000)	3 (300)	75	2	—
5	Sept. 19	14,800	79 (11,692)	—	21	—	—
	Oct. 5	15,300	78 (11,934)	2 (306)	18	2	—
	" 19	23,800	78 (18,564)	4 (952)	18	—	—
	" 26	11,000	66 (7,260)	5 (550)	26	2	1
6	Oct. 12	50,400	84 (42,336)	5 (2,520)	11	—	—
	" 20	40,800	70 (28,560)	4 (1,632)	23	3	—
	Nov. 7	5,700	28 (1,596)	10 (570)	58	4	—

day. He had also developed a cold, but was eating well. There were no new signs except those of coryza. The blood count showed: haemoglobin, 86%; leucocytes, 61,000 per c.mm., with 91% lymphocytes and 2% eosinophils. A specimen of stool and a rectal swab revealed no abnormality on film or culture.

During the following week the motions became normal again and the boy began to gain weight. On September 6 the haemoglobin concentration had fallen to 74% and the white-cell count to 19,600 per c.mm., of which 69% were lymphocytes and 8% eosinophils. The stool was again normal on film and culture. A week later the white cells had diminished further to 10,200, and the differential count was normal (see Table I). A Paul-Bunnell test on October 11 showed heterophil antibodies within normal limits (up to a titre of 1:10).

The two elder brothers were also examined. The first was a schoolboy 5½ years old. He also had occasional diarrhoea, but repeated stool examination showed nothing pathological, and his blood count was normal on two occasions. The second brother, aged 3½ years, attended the same day nursery as the two younger children. He was seen on August 23, when he had diarrhoea and signs of bronchiolitis; he was found to pass *G. lamblia* flagellates and cysts in his stool, and his white blood count was 14,300 per c.mm., of which 55% were polymorphonuclear neutrophils and only 42% lymphocytes. He was given a course of mepacrine, 0.05 g. three times daily for five days, and the diarrhoea subsided after a week. Three further stool tests were then negative for *G. lamblia*. On September 16 he was quite well; the blood count showed a haemoglobin content of 74% and 19,800 leucocytes per c.mm., with 53% lymphocytes and 10% eosinophils. Subsequently the white-cell count fell to normal levels. In October he had some loose stools again, and a specimen once more revealed a few *G. lamblia* flagellates.

The mother of these children had no diarrhoea. Her blood count and stool examination were normal.

Case 3

A baby girl attended the same day nursery as the children described previously. In June, 1949, she had had bacillary dysentery of the Flexner type and had been treated with sulphaguanidine. After that she continued to pass five or six relaxed stools daily, and because of this she had been seen at the out-patient department in November, 1949, when she was 17 months old. Stool examination then revealed the presence of many cysts of *G. lamblia*. She was given mepacrine, 0.05 g. twice daily for 10 days. Subsequently her motions were normal until February, 1950, when she started having intermittent diarrhoea again. Stool and rectal swab examinations were normal in February and March, but on May 5 many *G. lamblia* cysts were again present in the stool. After another course of mepacrine, 0.05 g. twice daily for five days, the stools became normal. In August she was brought up again because of mild diarrhoea. Two rectal swabs and two stool tests showed nothing abnormal, but a blood count on August 30 demonstrated a haemoglobin concentration of 79% and a leucocytosis of 40,000 cells per c.mm. with 88% lymphocytes. At that time she had coryza and a cough, but the fauces appeared normal, and lymph nodes and spleen were not enlarged. Unfortunately, she then ceased to attend the hospital and was not brought to the nursery again until mid-October. On October 20 she was examined there and appeared healthy. The jugular lymph nodes were palpable, the fauces were slightly injected, and the abdomen was rather prominent. The white-cell count was now 10,400 per c.mm., with 74% lymphocytes.

Investigations at the Nursery

Thus *G. lamblia* infestation was known to be present in four, and lymphocytosis, presumably of the acute

infectious type, in at least three children attending this particular nursery. It was decided to make further investigations there in order to determine the incidence of the two conditions.

The nursery is a fairly spacious and modern building in one of the back streets of Whitechapel. At the time of the inquiry there were 53 children in daily attendance from Monday to Friday.

It would have been most interesting to carry out weekly clinical examinations, blood counts, and stool tests on all the children and their adult attendants in the nursery. But, as time and laboratory facilities were limited, it was decided to deal with not more than six persons on any one day and to go through the whole nursery population in that manner. Blood counts and stool tests were only repeated in those in whom clinical or laboratory findings suggested some abnormality.

Between September 11 and October 26 all the children at the nursery were examined personally, and at least one blood count and stool test were performed on each of them. Blood samples were also taken from the 22 adults who were working there; only eight stools were obtained from these. It may be stated at once that nothing abnormal was found in the individual tests on the adults.

Nine children were shown to pass *G. lamblia* cysts in their stools. With the members of the family of Cases 1 and 2 this adds up to 12 infested children out of 53. The real incidence may be assumed to have been considerably higher, as it is well known that *G. lamblia* may be found only after repeated testing of stools and that one examination per case will discover only from one-third to one-half of the actual number of infections (see Boeck, 1927). Moreover, the faeces were examined by inspection of wet films in saline and not by concentration methods.

The blood counts revealed only one further definite and one probable case of lymphocytosis. Adding the previous patients, this gives a total of 5 out of 53 children in the nursery.

Case 4

A boy aged 3 years had been perfectly well without complaints of any kind. On examination on September 22 he appeared healthy, and his rectal temperature was normal. There were no abnormal signs; his lymph nodes and spleen were not enlarged. Surprisingly, his white-cell count was 42,700 per c.mm., of which 91% were normal lymphocytes and 3% eosinophils. His stool on that day contained many cysts of *G. lamblia*.

On September 28 the leucocytosis was reduced to 31,800 per c.mm., with 85% lymphocytes and 4% eosinophils. After another three weeks the count had returned to normal levels at 10,100 per c.mm., of which only 42% were lymphocytes, but still 5% eosinophils. A Paul-Bunnell test was negative. Like the other children with giardiasis he was given a course of mepacrine, and three subsequent stools were free of parasites. In December he was admitted to hospital suffering from concussion and fracture of the left tibia after an accident. His blood count then showed a haemoglobin concentration of 70%, white cells 10,000, with only 20% lymphocytes and 3% eosinophils (see Table I).

Case 5

A girl aged 3 years and 4 months, who had been free of symptoms, was first examined on September 19, and appeared healthy. Her rectal temperature was normal. The only abnormal signs were the presence of post-nasal muco-

pus and of palpable jugular and right posterior cervical lymph nodes. Her blood count showed 14,800 white cells with 79% lymphocytes. Her stool specimen on October 2 contained many cysts of *G. lamblia*.

She remained well and was given a course of mepacrine. As the initial lymphocyte count was high, further samples of blood were examined at intervals. On October 5 this showed 15,300 leucocytes per c.mm., of which 78% were lymphocytes. By October 19 the total count had risen to 23,800, still with 78% lymphocytes. A week later it had fallen to 11,000, with 66% lymphocytes. The stool was free of parasites on October 24.

This girl thus had an absolute lymphocytosis reaching three times the maximal normal value, which according to Smith (1941) should be about 6,000 lymphocytes per c.mm. at this age. It may be argued that she had a non-specific lymphocytosis due to upper respiratory tract infection, but against this it should be pointed out that the increase in the number of lymphocytes was more marked than in that condition (see Smith, 1941) and ceased fairly suddenly.

The other 47 children showed no gross clinical abnormality, but some evidence of upper respiratory tract infection was found in no fewer than 17. The leucocyte counts varied from 5,200 to 21,100 per c.mm. with an average of 11,200, and are arranged according to age groups in Table II, together with those of the adults. Whenever a child had more than one count, only the first has here been used for calculation, in order to avoid weighting the averages in favour of high values.

TABLE II.—Other White-cell and Lymphocyte Counts in the Nursery

Age	No. of Persons	Average Total White-cell Count per c.mm.	Average Total Lymphocyte Count per c.mm.	Corresponding Lymphocyte Percentage
3 months-1 year	4	12,875	8,686	67.5
1-2 years	12	12,008	7,297	60.8
2-3 "	15	10,513	6,253	59.5
3-4 "	9	10,700	5,757	53.8
4-5 "	7	10,971	5,377	49.0
All children	47	11,200	6,523	58.2
Adults	22	9,014	3,402	37.7

Kato (1935) found in a large series of normal American children that the average white-cell count gradually fell from 11,000 per c.mm. at the age of 3 months to about 7,500 at 9 years, and that the average absolute lymphocyte count declined from over 6,000 in the second month of life to the adult level of 2,500 at 15 years, being equalled by the granulocyte count at 4,000 per c.mm. at the age of 4 years. Again, Smith (1941) states that the maximal normal absolute number of lymphocytes drops from approximately 7,000 per c.mm. at 1 or 2 years of age to 6,000 at 3 or 4 years, and finally to 5,000 at puberty, while the maximal normal lymphocyte percentage is about 60 between 6 months and 2 years of age and 50 by the end of the sixth year.

A variety of normal values are given in textbooks, but at least in comparison with these American data the average total white-cell and absolute and relative lymphocyte counts will be seen to have been high in the nursery. Therefore it would seem quite likely that there were some more cases of infectious lymphocytosis with only slight blood changes. However, many mild infections will cause a slight absolute lymphocytosis in children, and thus I have thought it best not to label any case as acute infectious lymphocytosis unless the absolute

lymphocyte count exceeded twice Smith's maximal normal value for the age concerned. Only the patients described so far satisfied this criterion.

I thought it would be interesting to investigate the family of Case 4 in order to see whether any other members had lymphocytosis or giardiasis. This boy had an elder sister and a 6-year-old brother who were school-children. The mother was asked to bring them to the nursery to be examined. She herself had a normal white cell and differential count; the brother's counts were also normal on three occasions and his stool was free of parasites; but the sister (Case 6) had lymphocytosis

Case 6

A girl aged 7 years was first seen on October 6. She had had intermittent frontal headaches for a few months, and her appetite had been only moderately good. She had also complained of toothache and right earache for one week, and had had several carious teeth extracted on the morning of the day when I first saw her.

On examination she was pallid but well nourished. Her tonsils and jugular lymph nodes were slightly enlarged. Otherwise, apart from the tooth sockets containing fresh blood clots, there were no abnormal findings. The first blood count was performed on October 12. It showed 50,400 white cells per c.mm., with 84% lymphocytes, which were normal in appearance. On October 20 the white-cell count had fallen to 40,800, of which 70% were lymphocytes and 4% eosinophils. On the same day the Paul-Bunnell test was negative. The girl was not seen again until November 7, when the white-cell count had returned to normal; her stool then contained no parasites. She was well during the whole of this period. One further stool test proved normal.

Discussion

These six cases satisfy all the criteria of acute infectious lymphocytosis (Smith, 1941)—namely, marked leucocytosis with absolute lymphocytosis; benign clinical course; absence of splenomegaly and of significant lymphadenopathy; negative Paul-Bunnell test; and no manifestations of infectious mononucleosis or of leukaemia—lymphocytes of small normal mature type.

Epidemiology.—As regards the epidemiology of the disease, the present experience confirms that its infectivity generally tends to be low. Reyersbach and Lenert (1941) encountered only 16 cases during six months in an institution housing 108 children; I found only five on mostly single blood estimations in the course of about two and a half months in a day nursery with 53 children. However, in some reports the condition has affected a higher proportion of children in more epidemic form (Finucane and Philips, 1944; Barnes *et al.*, 1949). It is also possible that some of the contacts may be infected without developing fully characteristic blood changes; this may have happened, for instance, in the second brother of Case 1. The incidence among members of the same family has been observed before (Smith, 1944; Moyer and Fisher, 1950) and is well illustrated by the present cases.

Incubation Period.—This has been estimated as being between 12 and 21 days (Smith, 1944); in one of the cases of Barnes *et al.* (1949) it appeared to be 16 days. It may be assumed that my Case 6 acquired the infection from her brother (Case 4), who attended the nursery, and it is interesting that their lymphocyte counts, while falling, reached roughly similar levels at an interval of just over three weeks. It is less safe to assume that Case

2 was infected by his sister (Case 1), as both attended the nursery; in these, the corresponding interval was just below two weeks. If these intervals are any guide to the incubation period, it would agree fairly well with the suggestions made by the observers quoted above.

Symptomatology.—The symptomatology in these patients was similar to that of previously recorded cases. In a considerable proportion there may be no symptoms at all, and the condition may be discovered only on blood examination; this occurred in two of my six cases. Of the possible clinical features, fever is said to be present in some cases at the onset. It was found in only the first of these patients, but here it was severe, as in Duncan's (1943) case. Abdominal symptoms are not infrequent and may even simulate an acute surgical condition; the commonest complaint is diarrhoea, which may occur in mildly epidemic form (Peterman *et al.*, 1949), and this was present in three out of the six cases described here. Perhaps it is more likely to occur in those with previously abnormal bowel function, for in all three patients with this symptom there was a past history of loose stools, and *G. lamblia* infestation may have played a part. Mild upper respiratory infection is common in this disease: some evidence of it was found in five of these six patients. Symptoms or signs of meningeal irritation have been reported in occasional cases, but were not evident in the present ones. As regards skin manifestations, it is of interest that Smith (1944) observed a herpetic eruption on the face of a child at the onset of the disease. In my first case the aphthous stomatitis and vesicles on the lips strongly resembled herpetic lesions; yet the complement-fixation test for herpes was repeatedly negative. One wonders whether acute infectious lymphocytosis should be remembered as a possible cause of apparent herpetic eruptions and also whether a virus might be cultured from these vesicles in lymphocytosis.

Haematological Findings.—These correspond to those observed elsewhere. In five of my six cases the maximal total white-cell counts exceeded 40,000 per c.mm. The highest proportion of lymphocytes varied between 79 and 97%. The lymphocytes were normal in size and structure, and thus differed from those usually found in glandular fever. The total duration of the abnormal lymphocyte levels could not be estimated, as no observations were made while these were rising from normal. The periods of fall lasted two to four weeks, and this agrees approximately with Finucane and Philips's (1944) observation that the leucocytosis lasted from two and a half to seven weeks, with an average probable duration of about five weeks.

An absolute eosinophilia has been observed by several previous authors (Finucane and Philips, 1944; Landolt, 1947; Barnes *et al.*, 1949). The figure of 400 per c.mm., which is often given as the upper limit of normal (Whitby and Britton, 1950), was exceeded in all my six cases, and at least five of them had more than 790. In two of them the maximum eosinophilia occurred after the peak of the lymphocytosis. Monocytes were often absent at the height of the disease and reappeared towards the end as they do in other acute infections. The platelets were always plentiful in the films.

Differential Diagnosis.—In arriving at a diagnosis several diseases had to be considered. Glandular fever first came to mind, but there was no splenomegaly and little lymph-node enlargement, which was confined to the neck; also, the leucocyte count showed a greater

increase, the lymphocytes were normal in type, and the Paul-Bunnell test was negative in four cases. Leukaemia was ruled out by the benign course, and by the absence of lymphadenopathy, of abnormal blood cells, and of thrombocytopenia. There was no clinical evidence to support the possibility of whooping-cough. Chronic non-specific lymphocytosis of the type which may accompany and follow upper respiratory or other infections was unlikely to be the cause as the leucocyte response was too marked and short in duration.

Possible Relationship to *G. lamblia* Infestation.—Finally, this question has to be discussed. The total incidence of giardiasis in 12 out of the 53 children at the nursery, as determined by mostly single stool tests, is probably within the usual limits, for Boeck (1927) found that the incidence in children reported in the literature varied from 14 to 40%, and it is known to be even higher in residential institutions (Brown, 1948). There is still no agreement concerning the pathogenicity of these parasites, but they can probably be responsible for malabsorption (Véghelyi, 1940) and may sometimes cause enteritis (Miller, 1926; Ormiston *et al.*, 1942). Among my 12 cases of known *G. lamblia* infestation it was noteworthy that 7 had a history of diarrhoea within the last month, whereas only 5 out of 40 children without parasites in their stools had had this experience. However, it must also be remembered that diarrhoea by itself may wash *G. lamblia* flagellates down from the duodenum and jejunum, which are their habitat. It is interesting that the 12 children in this series who are known to have harboured the parasites included five out of the six cases with lymphocytosis, and that at least four of these six were passing *G. lamblia* at the time of the disease; but there is no proof of any definite association, and this will have to be a matter for future investigation.

Summary

Six cases of acute infectious lymphocytosis are recorded. The patients were children whose ages ranged from 16 months to 7 years. Five of these attended a day nursery in the East End of London, and the sixth was the elder sister of one of the others.

The constitutional symptoms were fairly severe in the youngest child, who had marked fever and aphthous stomatitis; the latter resembled a herpetic infection clinically, but was not associated with a positive complement-fixation reaction to herpes simplex. The other cases were mild, and at least two patients had no symptoms attributable to the condition.

Four of the six children were found to pass *G. lamblia* flagellates or cysts in their stools, and a fifth had received two courses of treatment for this infestation during the previous year.

Three of the patients attended the out-patient department of a hospital because of diarrhoea. The others were found on the basis of mostly single blood counts performed on the remaining 50 children attending the nursery and on 23 adult and two child contacts in the course of about six weeks. Single stool tests, performed simultaneously, showed that a total of 12 out of the 53 nursery children harboured *G. lamblia* parasites.

The epidemiology, clinical features, blood changes, and differential diagnosis of acute infectious lymphocytosis are briefly discussed in relation to the cases described.

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TUBERCULOUS MENINGITIS

TREATMENT WITH STREPTOMYCIN AND
PARA-AMINOSALICYLIC ACID

BY

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An apparent cure, without sequelae, can be expected in 50% of cases of tuberculous meningitis treated by streptomycin, and, provided skilful treatment is given early in the disease, a higher percentage can make a complete recovery. In an attempt to increase the recovery rate by using para-aminosalicylic acid (P.A.S.) in combination with streptomycin 35 cases of tuberculous meningitis were treated and reviewed at Castle Hill Hospital.

On admission all cases were classified as: (1) Early case (E)—fully conscious patient, with no focal signs, slight nuchal rigidity but with abnormal cerebrospinal fluid. (2) Middle case (M)—fully conscious, but sometimes drowsy and lethargic, with nuchal rigidity and focal signs. (3) Advanced case (A)—unconscious or deeply stuporous patients.

The diagnosis was confirmed by isolation of the tubercle bacillus from the cerebrospinal fluid in 30 cases. The five in which tubercle bacilli were absent showed other specific signs and symptoms of the disease.

The results of treatment were assessed after a minimum survival period of one year from the date of admission, and cases were observed for up to 30 months.

Treatment

All cases were given a six-months' course of intramuscular and intrathecal streptomycin combined with oral P.A.S. The daily dose of intramuscular streptomycin was 1 g. and was given to all patients in two twelve-hourly doses of 0.5 g. The daily dose of intrathecal streptomycin was 100 mg. for patients of 5 years and over, and 50 mg. for those under 5 years. Oral P.A.S. was given in gradually increasing dosage as follows: 3 g. for patients 12 years or over, 1.5 g. for those 5–11 years, and 0.75 g. for those 1–4 years—1 dose daily for three days, then 2, 3, 4, 5, and 6 doses each for three days, so that at the end of 18 days each patient was receiving six doses a day at intervals of two-and-a-half hours, from 9 a.m. to 9.30 p.m. The tendency to nausea and vomiting was much reduced if the patient ate something before a dose—for example, a few biscuits and milk. An alkaline mixture given before a dose may help in preventing nausea, and a chalk-and-opium mixture may be given for the treatment of diarrhoea. However, with the above dosage these symptoms were rarely met with. P.A.S. was given continuously throughout the patients' stay in hospital in the recommended dosage. On discharge it was continued as a bacteriostatic agent at a reduced dosage throughout the period of observation.

Treatment was given for six days a week, Sunday being a complete rest period. All patients were kept in bed for the six-months course of streptomycin treatment. A radiograph of the lungs was taken and full chemical and bacteriological examinations of the cerebrospinal fluid (C.S.F.) were made monthly. Patients were not allowed up until the C.S.F. was normal, and they were kept in hospital for at least one year.

Diagnosis

In the known tuberculous child with obscure symptoms, spread to the meninges must always be considered; the incidence of meningitis is highest in the first three months after the development of the primary lung lesion. Children exposed to tuberculosis at home must be kept under observation for the beginning of a primary lung lesion and for subsequent spread to the nervous system. The signs and symptoms of tuberculous meningitis are varied, but most cases conform to a general pattern. Rarely the onset is sudden, with focal signs in the nervous system such as convulsions, cranial nerve paralysis, and limb paralyses. More often the meningitis begins insidiously, with symptoms which may at first mimic minor ailments.

The disease tends to be most treacherous in infancy and early childhood, with a more vague onset and more rapid progress than is usual in the older patient. In older children listlessness and irritability may be the first symptoms: an otherwise good-natured and happy child loses interest in his toys and quarrels with his playmates. The parent may remark that he is easily tired and that he falls asleep in a chair or at mealtimes. Headache is a common complaint of older children in the early stage, and vomiting may occur.