THE SPREAD OF INFANTILE GASTRO-ENTERITIS IN A CUBICLED WARD

By K. B. ROGERS, M.D. (Lond.)

From the Children's Hospital, Birmingham

(With Plates 6 and 7 and 1 Figure in the Text)

CONTENTS

INTRODUCTION

Of recent years the strain of *Bacterium coli* described by Bray (1945), Giles & Sangster (1948), Taylor, Powell & Wright (1949), Smith (1949) and Rogers, Koegler & Gerrard (1949), has been found to be intimately associated with epidemic infantile gastro-enteritis.

This organism has been given various names: for convenience it will be referred to as the α-type of *Bact. coli*, which is the name given to it by Giles & Sangster (1948). Bray (1945) described this organism as *Bact. coli* var. *Neopolitanum*, and Taylor *et al.* (1949) called it D433. These organisms have been shown to be serologically identical. In the autumn of 1947, a second serological type was found by Giles, Sangster & Smith (1949) in cases of epidemic infantile gastro-enteritis and was called by them type β. At this date this second serological type was more frequently isolated than the first, or α-type.

Bray (1945) found that 4 % of his 100 healthy controls in close contact with cases of gastro-enteritis were excreting the α-type of *Bact. coli*. Giles *et al.* (1949) investigated a large number (721) of controls who were inmates in hospitals in which the type strains of *Bact. coli* were present, and found 1·8 % were excreting the α-type of *Bact. coli*. Taylor *et al.* (1949) chose 208 controls who were not hospital contacts but were of the same age group and the same 'hospital class' as her cases of gastro-enteritis: the type strains of *Bact. coli* were not isolated from this group. One hundred and eight children under 1 year old attending the Birmingham Children's Hospital casualty and out-patient departments for minor conditions, in which there were neither vomiting nor diarrhoea, had faecal swabs

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examined for the presence of the α-type of *Bact. coli*. None of these swabs was positive.

It is considered that the controls in the series of Bray (1945) and Giles *et al* (1949) should be classified as healthy contacts, since the work that is to be described will demonstrate the possibility that these controls were really carriers who probably acquired the organisms in hospital.

Since these type strains of *Bact. coli* have been looked for at the Birmingham Children's Hospital the intimate association between their presence and the occurrence of gastro-enteritis has been noted. It was, therefore, decided to use these type strains of *Bact. coli* as 'indicator organisms' to observe their mode of transmission within a ward made up of separate cubicles. In this paper a 'cubicle' is the name given to a room completely separated from the corridor and the rest of the ward. At the Birmingham Children's Hospital all the children of less than 1 year of age are nursed in the Parsons' block, which has three floors, each floor being divided into ten cubicles in each of which there are cots for two babies. One problem was to determine how infection from a gastro-enteritis patient in one cubicle could be transmitted to another patient in a different cubicle.

Enteritis associated with type strains of *Bact. coli* is usually a disease of the very young, 0–18 months; above this age very few children are affected. In the studies at the Birmingham Children's Hospital no adult has been found to carry the type strains of *Bact. coli*. This is very different from the findings of Stevenson (1950) and those of Taylor *et al.* (1949).

Payne & Cook (1950) throw some doubt on the association of infantile gastro-enteritis with the presence of *Bact. coli* type D433 (α). But Cook (in a personal communication) states that one of the healthy babies from whom D433 was isolated in May 1949, had symptoms of gastro-enteritis in the previous February, and that D433 was isolated at this date. Payne & Cook (1950) also state that of eleven patients suffering from gastro-enteritis only five excreted *Bact. coli* type D433 (α). Four of the six remaining cases occurred in the same month, but no search was made for other strains of *Bact. coli*, and, unfortunately, none of the cultures isolated from these patients was preserved (Cook, personal communication).

The classification of the severity of any gastro-intestinal disturbance is one of the biggest obstacles to the comparison of the results of different workers. Payne & Cook (1950) distinguish between feeding difficulties and infantile diarrhoea and vomiting: so fine a distinction would probably not obtain universal acceptance.

If the faeces of patients infected with organisms of the Salmonella or Shigella groups are cultured on MacConkey's medium, the growth which results consists largely of colonies of *Bact. coli* with relatively few colonies of the pathogenic organisms. There is no selective medium for the isolation of the α- and β-types of *Bact. coli*, but cultures on MacConkey's medium from the faeces or napkins of children suffering from epidemic gastro-enteritis often give heavy pure growths of these organisms.

The preponderance of pathogenic over non-pathogenic organisms, in cases of gastro-enteritis associated with the type strains of *Bact. coli*, is thought to account for the relative frequency with which this type of infection spreads throughout a

cubicled ward, compared with the infrequency of spread of Salmonella or Shigella infections. On one occasion a cubicle housed two babies who had been admitted on the same day, one baby was infected with *Salmonella typhimurium*, the other was a patient with enteritis associated with the β-type of *Bact. coli*. Cultures were made from a loopful of dust from the cubicle, and the β-type of *Bact. coli* was present, whereas from more than 1 g. of dust no Salmonella was isolated. The child infected with *Salm. typhimurium* recovered, and his faeces became free from this organism but *Bact. coli* type β was now present. He was discharged well, to be re-admitted later with a much more severe enteritis, this time associated with *Bact. coli* type β.

These findings do not agree with those of the Australian workers—Rubbo (1948), Mushin (1948) and Mackerras & Mackerras (1949)—who studied large epidemics of infantile gastro-enteritis caused by organisms of the Salmonella group. Rubbo (1948) investigated *Salm. derby* and Mushin (1948) *Salm. bovis-morbificans*. In both epidemics the infection was shown to spread within the wards.

Mushin (1948) found five of eleven samples of dust to be infected with *Salm. derby*, but Mackerras & Mackerras (1949) were unable to find *Salm. bovis-morbificans* in the dust of the wards concerned. These workers found that mice acted as carriers, and Mackerras & Mackerras also incriminated cockroaches. Neither of these vectors was present in the Parsons' block at the Birmingham Children's Hospital.

Mushin (1948) was unable to look for adult carriers, but Mackerras & Mackerras (1949) found two members of the staff and one mother to be carriers of the causative organism. These findings differ from mine in the few cases of Salmonella infection I have investigated, but it may be that my patients were not excreting so many organisms.

Rubbo (1948) and Mushin (1948) also proved that there had been cross-infection between wards; infection in one ward was definitely responsible for infection in three other wards, possibly also in a fourth. This again is not in agreement with my findings, and it may be that the absence of animal vectors in the Birmingham Children's Hospital accounts for this discrepancy.

INTER-WARD CROSS-INFECTION AT THE BIRMINGHAM CHILDREN'S HOSPITAL

The first 18 months' study of epidemics of gastro-enteritis in the Parsons' block has shown no evidence that any inter-floor cross-infection has ever occurred, except when a patient has been deliberately moved from one floor to another.

In 1949 a motile strain of *Bact. coli* type α was isolated from a patient on the top floor of the Parsons' block. This organism spread to several infants, but was never isolated from any patient on the other two floors. A child who was excreting this motile organism was transferred to a ward where children over 1 year old were housed, and 2 weeks later a 4-year-old child started an attack of severe gastro-enteritis associated with this type strain of *Bact. coli*. This case was described by Rogers *et al.* (1949). She was the oldest child at the Birmingham Children's Hospital to develop severe symptoms of enteritis associated with the presence of the α-type of *Bact. coli*. Because of this infection, the twenty-six other children

in the ward were swabbed, eight were found to have the α-type of *Bact. coli* in their faeces. Four of these children had no symptoms ($1\frac{1}{2}$, 2, 2 and 4 years old), one ($3\frac{1}{2}$ years old) had a few loose stools, two (14 months and 2 years old) had mild diarrhoea for 2 days and one (2 years old) had diarrhoea for several days. None of these children, except the child previously reported by Rogers *et al* (1949), was really ill, and these transitory upsets might not have been noted if the α-type of *Bact. coli* had not been isolated. The type strain of *Bact. coli* was not isolated from any of the older children in the ward. All the strains recovered were motile and were traced back to the one patient admitted to the top floor of the Parsons' block. For many months no other motile strains were recovered.

17 August 1949 was the last date on which the α-type of *Bact. coli* was isolated on consecutive days from a patient on the middle floor of the Parsons' block. Since then the α-type of *Bact. coli* has been isolated from patients on the top floor of the block for 65 consecutive days, and on the bottom floor for periods of 68, 65, 59, 24 and 11 consecutive days, a total of 286 days. It has been present at the same time in the wards above and below the middle floor for a continuous period of 21 days. This lack of inter-floor cross-infection supports the hypothesis that the spread of infection within the wards of the baby block of the Birmingham Children's Hospital must be carried by articles common to each ward. Investigations have, therefore, been concentrated on these articles.

Colebrook (1950) and his colleagues have carried out intensive studies to show the ease with which exposed wounds or burns become infected, and how such infected wounds can cause fresh infection in other patients in the ward. It was thought that the spread of infection from a child suffering from gastro-enteritis might follow the same routes that Colebrook observed in the cross-infection of burns. Children with gastro-enteritis pass many rather fluid stools into their napkins. By analogy the faeces may be considered equivalent to the wound's discharge, and the soiled napkin equivalent to infected dressings. Experiments were carried out to verify the hypothetical similarity of the spread of infection in these conditions, using the type strains of *Bact. coli* as the indicator organisms instead of the Griffith's types of Streptococcus.

TECHNIQUES EMPLOYED

Whenever possible, swabs of faeces were obtained in preference to rectal swabs, which were often found to give very poor cultures, or even no growth. If enough material was present from a child with gastro-enteritis, a wet smear was examined for *Giardia lamblia*. The swabs were inoculated on MacConkey plates and, if any gastro-enteritis symptoms were present, they were also plated on Hynes's modification of Leifson's desoxycholate citrate agar medium. Selenite broth was added to the tube containing the swab so that the swab was covered by the solution. The selenite broth was incubated for 18 hr. and subcultured on to desoxycholate citrate agar medium. All non-lactose fermenting colonies were subcultured on to Christenson's (1946) modified urea medium, and if no alteration of the medium was observed after 5 hr. incubation, the biochemical reactions of the organisms were investigated. Any strains giving reactions suggestive of a Salmonella or

Shigella were examined serologically, and if positive were sent for confirmatory identification to the appropriate reference laboratory.

Tests for the α- and β-types of *Bact. coli* were made by using a modification of Bray & Beaven's (1948) slide-agglutination technique. All positive results were checked by sugar reactions and a subculture of the organism was sent to Dr Joan Taylor who very kindly checked its identity. At least four separate colonies were tested from each plate; if more than one colonial type of *Bact. coli* was present at least one of each variety was tested.

Bourdillon, Lidwell & Thomas (1941) published details of a slit sampler, which was later modified and fully described by Bourdillon, Lidwell & Schuster (1948). This slit sampler was used with MacConkey plates to investigate aerial contamination during periods of activity in the ward.

Contamination of blankets and sheets was tested by brushing them with sterile nail brushes towards plates of MacConey's medium.

In order to test for contamination of various surfaces, samples from these were obtained by rubbing them with bulky swabs which had been moistened in broth. These swabs were then replaced in the broth, incubated for 18 hr. and subcultured on to rather dry MacConkey plates. Any coliform colonies that grew were tested by slide agglutination for the identification of type strains. Very often large mucoid colonies of *Bact. coli* were present, and these tended to obscure the colonies of the type strains of *Bact. coli* unless the plate was very dry.

Dust from the floor was tested for contamination after sweeping the cubicle with an autoclaved dustpan and brush, and pouring the dust into a large sterile test-tube. Part of the dust was added to nutrient broth which was incubated and then treated in the same way as the broth cultures of other samples.

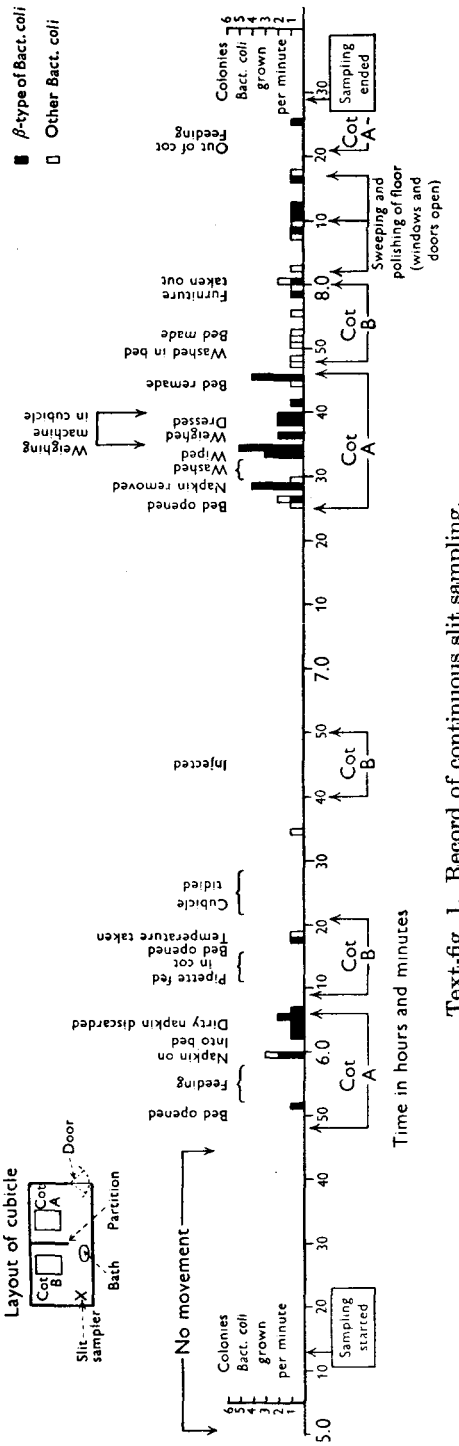
Contamination of articles, such as brooms, was tested by pouring a pint of nutrient broth into an autoclaved fish-kettle type of sterilizer, sousing the broom or polisher up and down in the broth and then pouring the contaminated broth back into its bottle through a sterile funnel. The broth was treated in the same way as the other broth cultures. The hand-towel was examined by pouring broth across its surface into a sterile bottle through a sterilized funnel.

RESULTS

(*a*) *Aerial contamination*

Slit sampling during the ordinary ward activities showed that showers of the type strains of *Bact. coli* were thrown into the air whenever the blankets or towels of a child harbouring these organisms were disturbed. This was very noticeable during bed making and the bathing of a baby. When the cubicle which housed a case of gastro-enteritis was swept with an ordinary broom, it was usual to recover the type strain of *Bact. coli* from the air.

Text-fig. 1 shows the results obtained by exposing a continuous series of plates in a slit sampler in the cubicle of a gastro-enteritis patient during the early morning activity. To prevent the diagram from being too confusing only the movements that were found to cause dispersion of *Bact. coli* into the air are recorded. The



Text-fig. 1. Record of continuous slit sampling.

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washing and gowning of the nurses is not indicated. On entering a cubicle nurses wash and put on a clean gown; they wash and change their gowns between any manœuvre implicating a different baby, and finally they remove their gowns and wash before leaving a cubicle.

During the sampling an accurate account was kept of all activities occurring within the cubicle. Thus it was noticed that the type strains of *Bact. coli* were often isolated when the weighing machine was brought into the cubicle.

The baby in cot A suffered from gastro-enteritis associated with the β-type of *Bact. coli*: the baby in cot B was a premature baby being nursed under an oxygen tent. The oxygen tent had to be moved before each manipulation of this baby, but this is not indicated in Text-fig. 1.

(*b*) *Contamination within a cubicle*

The dust from the floor, the bath, the plug that went into the bath, the table used whilst the baby was being fed, the cot side, blankets and sheets, toys, the thermometer and the powder in the nursing chair of each child, the cracks where the window panes are sealed into the metal framework, the ledge on which notes were rested and the hand-towel used to wipe the hands of anybody handling a baby, were all heavily contaminated with the type strains of *Bact. coli*.

(*c*) *The speed of contamination of a cubicle*

When an infant harbouring a type strain of *Bact. coli* has been admitted to a cubicle in a ward which has been free from that particular type strain of *Bact. coli* for many weeks, the cubicle has been shown on several occasions to become contaminated in those places already described within 18 hr. of the child's admission.

(*d*) *Survival of the α- and β-types of* Bact. coli *in dust*

Dust from a cubicle housing a child excreting one of the type strains of *Bact. coli* was collected and kept in 7×1 in. test-tubes near an open window in the laboratory. The test-tube was shaken daily, and then a sample of the dust was placed in nutrient broth. After 18 hr. incubation, the broth was subcultured on to MacConkey plates, and the colonies that grew were tested for the presence of the type strains of *Bact. coli*. In January the type strains of *Bact. coli* survived for only 4 days. In summer the type strains of *Bact. coli* were still surviving in a sample of dust after 11 days, further tests could not be made as the sample of dust had been expended. Another sample gave a growth of a type strain of *Bact. coli* on the fifteenth day, but tests on subsequent days were negative. Between the eighth and fifteenth days one sample occasionally failed to grow any of the type strains, so that after the eighth day the number of viable organisms remaining in the dust must have been small. In the winter of 1950–1 a sample of dust was kept undisturbed until tested 27 days after it was collected, and the type strain of *Bact. coli* had survived in large numbers (Rogers, 1951*b*).

(*e*) *Mode of spread of contamination between cubicles*

The floor polisher and broom used to sweep out all the cubicles were found to be heavily contaminated with the type strain of *Bact. coli*. On one occasion the broom

was washed in 5 % lysol and hung out in the sun to dry, but even this treatment did not kill the type strains of *Bact. coli*.

Pram. The pram used to take children to and from the ward to the operating theatre or X-ray department is washed out with 5 % lysol on its return to the ward. The type strains of *Bact. coli* survived this treatment.

Weighing machine. The children in the ward are weighed every other day, half of them being weighed on one day and the other half on the following day. A senior nurse wheels the weighing machine into the cubicle where a more junior nurse has already prepared the baby for weighing. A clean napkin is placed on the pan of the weighing machine and the baby is placed on this. The senior nurse should only handle and record the weights, but often the baby kicks and the nurse's hand instinctively rises to control the kicking and is very liable to touch a protruding leg or foot. To prepare the baby the bed is opened, the baby is undressed and left wrapped in a blanket until the weighing machine is ready. All these manœuvres are just those liable to contaminate the air if the child is harbouring the type strains of *Bact. coli*, as is illustrated in the record in Text-fig. 1.

Swabs were taken before the weighing machine was taken into each cubicle and, as it passed from one contaminated cubicle to another, progressively it got more and more contaminated with the type strains of *Bact. coli* which were also isolated from the pan on which each baby was placed, and from the weights and the trolley on which the weighing machine was mounted. When on other occasions the contaminated weighing machine was taken into a cubicle in which the children had no type strains of *Bact. coli* in their faeces, it might well be the means of infecting these children with these organisms.

Dirty linen basket. The specific strains were also recovered from the dirty linen basket.

Towels. A nurse's fingers were cultured, after she had thoroughly washed and dried her hands; the type strain of *Bact. coli* present in the cubicle was recovered. It was thought that these organisms came off the towel.

Pls. 6 and 7 illustrate the various places from which the type strains of *Bact. coli* were isolated.

(*f*) *Aerial contamination of the out-patient department*

Slit sampling was carried out during out-patient and casualty department activities. At the time of writing the α- and β-types of *Bact. coli* have not been recovered from the air, but another type of *Bact. coli* (Hall), which has been independently isolated by Dr Taylor and ourselves, was isolated on one occasion from the air of this department.

Because of the findings described in the paper by Rogers & Koegler (1951) on inter-hospital cross-infection, it is felt that children may be infected in the out-patient department.

DISCUSSION

In a cubicle housing an infant with gastro-enteritis associated with a type strain of *Bact. coli* it has been shown that the air of the room becomes contaminated when the towels or blankets which have not been oiled are disturbed. This accounts for the widespread contamination of the cubicle that can always be demonstrated and explains the ease with which another baby in the same cubicle acquires infection with the same type strain of *Bact. coli*.

Table 1. *All admissions to Parsons' block, infants less than* 1 *year old*
(1 November 1949 to 28 February 1950)

Admitted	323
Exclude*	22
Total	301

Admitted with *Bact. coli* type α or β	16†
Acquired *Bact. coli* type α or β in hospital	107
Total	123

Infants with *Bact. coli* type α or β					Gastro-enteritis but not *Bact. coli* type α or β			
	No.	%	IVD	CHL		No.	IVD	CHL
No symptoms	28	22·8	—	—	No symptoms	—	—	—
Mild gastro-enteritis	36	29·3	—	—	Mild	7	—	—
Ill with gastro-enteritis	59	47·9	45	25	Ill	12	5	4
	123	100	—	—		19	—	—

IVD, intravenous drip; CHL, chloromycetin given.

Total cases of gastro-enteritis, 114

With *Bact. coli* type α or β, 95 (83·3 %) Without *Bact. coli* type α or β, 19 (16·7 %)
There were no Giardia, Salmonella or Shigella infections during the period under review.

* Exclude: cases not admitted for gastro-enteritis but dying within 4 days of admission, 22.
† Children admitted with α- or β-type *Bact. coli*:

12 were transferred from other hospitals where they had been in-patients
2 had attended the out-patient department of the Birmingham Children's Hospital several times just prior to their admission
2 were admitted direct from home, without contact with a hospital or institution

Total 16

One of the outstanding features of these epidemics of enteritis in a ward composed of cubicles is that very often the cases of gastro-enteritis are not in adjoining cubicles, but in cubicles scattered throughout the ward. This spread is probably explained by contaminated brooms, floor polishers, prams and weighing machines.

An analysis was made of all the patients in the wards of the Parsons' block at the Birmingham Children's Hospital over a 4-month period. The results are given in Table 1. Infants marked 'Ill' required rehydrating by a parenteral route.

In Table 1 the group of patients with gastro-intestinal disturbance without the association of either the α- or β-types of *Bact. coli*, include children named Hall (ill) and Fallows (mild). The *Bact. coli* associated with these children's illnesses were used to immunize rabbits. The antisera and the strains of *Bact. coli* were sent to Dr Joan Taylor who found these organisms to be the same as two of her strains

isolated from cases with infantile gastro-enteritis. Her strains were numbered E 891 and E 990 corresponding with Hall and Fallows respectively. Since these anti-sera to the Hall and Fallows strains have been available, the Hall type of *Bact. coli* has been isolated from infants with gastro-enteritis on several occasions, but the Fallows strain has been isolated on only one further occasion.

An analysis of ninety-nine cases of congenital pyloric stenosis admitted over 1 year, is shown in Table 2. Nowadays, the treatment of this condition, if no avoidable complications occur, is a straight forward surgical procedure. The figures in this table show that during one year thirty of the ninety-nine babies developed

Table 2. *Ninety-nine operated cases of congenital pyloric stenosis*

(1 April 1949 to 31 March 1950)

		Days in Hospital						
		Pre-operative		Post-operative		Average extra stay	Total extra days	
Complications	No. of cases	Average	Limits	Average	Limits			Comments
None	69	2·1	0–17	8·1	3–15	0	0	One death 3 days post-operative
Infections	3	1·3	1–2	29·3	19–43	21·2	63·6	Cases developing: respiratory infection, mastoiditis, abscess of the jaw
Wound sepsis	14	1·5	1–2	21·4	14–77	13·3	186·2	Includes: one case re-admitted for 8 days. One case died with Staphylococcal septicaemia
Gastro-enteritis	13	2·5	1–7	37·2	7–113	29·1	378·3	Includes: eight cases re-admitted for between 7 and 88 days

Complications added 628 extra days to the stay of thirty patients. (60 % of extra days were added for gastro-enteritis.)

cross-infections in hospital which caused the wastage of 628 hospital 'bed days', 60 % of this wastage being due to gastro-enteritis. To this must be added the nursing time wasted, the untold worry and the loss of at least one life.

The figures given in Tables 1 and 2 give cause for concern, but it must be remembered that the Parsons' block at the Birmingham Children's Hospital housed only children of the age group which is susceptible to this form of gastro-enteritis. The epidemics described by Rogers & Koegler (1951) show that this hospital is no different from any other hospital if the patients are carefully watched for cross-infection of the type that has been described. It is felt that the problem that has been presented is one that confronts all paediatric hospitals which admit babies under 18 months.

The time of survival of the organisms in dust and the speed with which the infected baby's environment is contaminated have been discussed and, although the spread of infection has been considered only within a hospital, the following

case history suggests that such events occur outside hospital, and that contact with the contaminated environment may be short.

Philip J. was admitted to the Birmingham Children's Hospital with gastro-enteritis, associated with the β-type of *Bact. coli* on 2 April 1950. He had been ill since 24 March. His only suggestive contact with possible infection was his regular attendance at a welfare centre. On 3 April Suzanne P., Philip's cousin, was taken by her mother to Philip's home, a visit not repeated for several weeks before or after that date. Suzanne was placed in Philip's pram and given his teddy bear to play with. No other contact with gastro-enteritis could be elicited. On 13 April she developed enteritis which persisted. She was brought to the Birmingham Children's Hospital on the 19th, when a swab of the faeces showed the presence of the β-type of *Bact. coli*. Suzanne's probable contact with infected material, pram and toy, was 5 hr.

This paper is concerned only with cross-infections in gastro-enteritis, but it is obvious that other infections may spread by the same paths. It is hoped that alterations in basic routine, introduced into one ward for an experimental period, will show whether cross-infection can be controlled by attention to the faults that have been disclosed. The proposals will form the basis of a further communication.

SUMMARY

The type strains of *Bact. coli*, described by Bray (1945), Giles & Sangster (1948), Giles *et al.* (1949), Taylor *et al.* (1949), Smith (1949) and Rogers (1951*b*), because of their very intimate association with epidemic infantile gastro-enteritis, have been used as indicator organisms to show that the method of cross-infection of epidemic gastro-enteritis is very like that of the cross-infection of burns.

It has been shown how a cubicle becomes widely contaminated within 18 hr. and that type strains of *Bact. coli* will remain viable in dust for at least 27 days. Communal articles used throughout a ward are blamed for the inter-cubicle spread in a divided ward.

The intimate association of the α- and β-types of *Bact. coli* with outbreaks of gastro-enteritis is demonstrated, and figures are given to show how these outbreaks prolong the patient's stay in hospital and waste valuable hospital space.

This work has been made possible by the co-operation and help of many people to whom I express my thanks: the Nursing and Medical Staff of the Birmingham Children's Hospital; my laboratory staff and colleagues; Dr R. E. O. Williams who lent the slit sampler, Miss Hilton and Dr Joan Taylor who have helped in many parts of this work, and Mr J. G. Williamson for the photographs.

Fig. 1.

Fig. 2.

Fig. 3.

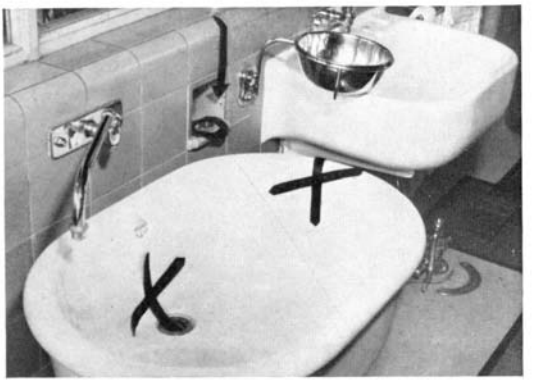

Fig. 4.

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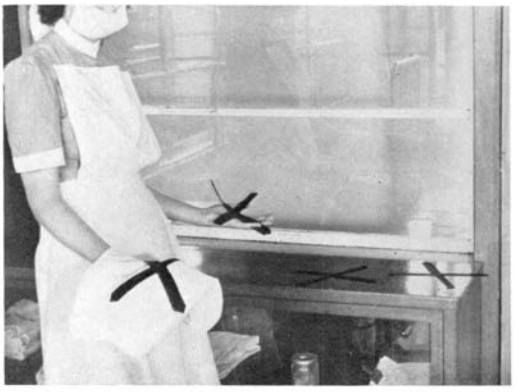

Fig. 5.

Fig. 6.

Fig. 7.

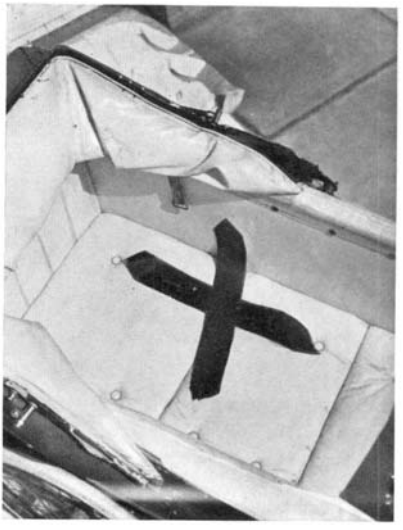

Fig. 8.

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EXPLANATION OF PLATES 6 AND 7

(Black crosses, arrows and circles indicate surfaces from which type strains of *Bact. coli* have been recovered.

Plate 6

Fig. 1. Sheets. Blankets. Table.
Fig. 2. Cotside. Nursing chair. Floor.
Fig. 3. Drawer of nursing chair: thermometer in vaseline and powder puff.
Fig. 4. Bath. Plug. Plug hole.

Plate 7

Fig. 5. Towel. Nurse's hand. Ledge.
Fig. 6. Weighing machine: pan, weights and table.
Fig. 7. Broom. Polisher. Dirty linen basket.
Fig. 8. Pram.

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