CERTAIN COMMON DISEASES of CHILDHOOD in RELATION to their SOCIAL BACKGROUND

A PROBLEM in SOCIAL MEDICINE.

Thomson Memorial Medal, 1946.

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INTRODUCTION

An attempt is made in this essay to correlate certain of the commoner diseases of childhood with their environmental and economic background. Ten cases are considered in all.

Cases I - IV deal with certain aspects of Tuberculosis in children, cases V and VI discuss upper respiratory tract infections, VII and VIII are devoted to Juvenile Rheumatism, IX deals with Gastro-Enteritis and X with Nutritional Anaemia. All the cases have been admitted to R.H.S.C. Edinburgh in the last four months.

That such diseases really are a social problem is evident when one considers the Registrar-General's figures for the period 1930-32 in England and Wales. For this survey the population was divided into five social classes dependent on the occupation of the father.

Class I - higher ranks of business and professional life;
II - retail trades, clerks, teachers etc., farmers;
III - skilled labour;
IV - Neither artisan nor wholly unskilled, farm labourers;
V - unskilled labour.

Though not exactly coextensive with income groupings, the association between class and income is nevertheless very high.
Mortality of Legitimate infants and children aged 1-2 years, according to social class of father: England and Wales 1930-32.

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<th>Rate /10,000 legitimate live births for deaths under 1 year or per 100,000 legitimate children at ages 1-2 years.</th>
<th>Mortality rate of children of specified class as percentage of that of all legitimate children.</th>
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<td><strong>0-1 year</strong></td>
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<td>Tuberculosis</td>
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<td>30 60 90 110 130</td>
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<td>Bronchitis etc.</td>
<td>127 28 61 112 145 163</td>
<td>22 48 88 114 148</td>
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<td>24 32 88 150 163</td>
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<tr>
<td>Gastro-Enteritis</td>
<td>72 28 40 70 73 118</td>
<td>39 56 88 106 164</td>
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These three diseases therefore present a social gradient. Rheumatism and Nutritional Anaemia were not considered in this survey.

The effects of social class on mortality increase with advancing age from 0-4 weeks, when class V ratio is 1\frac{1}{2} times that of Class I, to 6-9 months, when class V ratio is 5\times 4 times that of class I. At subsequent ages, however, up to two years there is no appreciable change in social class ratio.

The ratio of V:I is 5.4 at 9-12 months,
The ratio of V:I is 5.1 at 1-2 years.

Maximal sensitization of Mortality Rate to social factors appears to be at the end of the first year. This is illustrated when one compares the mortality rates of towns with high and low rates of overcrowding respectively, and also when we contrast the urban mortality rate with that in rural districts.
CASE I - TUBERCULOUS MENINGITIS

Name of patient: George Blackie
Address: 2 Longlands Bank, Hawick
Age: 18 months
Birthday: 3rd June
Recommended by: Dr. Mekie
Date of admission: 18/2/46
Date of examination: 20/2/46
Died: 28/2/46

Family
Father - 37 years Tweed warehouseman
Mother - 35 years
Children - 5
Male 10 years
Male 7 years
Male 5 years
Dissimilar Twins masculo - 18 months

Complaints: -
Drowsiness 10 days
Feverishness 10 days

HISTORY
The baby's condition has been worthy of attention since about Christmastime when he became fretful and a little irritable. "Girny" was the word the mother herself used. He lost interest in his toys and the intelligent look previously manifest in his eyes was no longer apparent. He has been a little constipated for the past week and for the last few days his appetite has been noticeably poorer, the child seeming to lose all interest in food. 10 days prior to admission he began to vomit after a meal and he has done that on four occasions since then.

By day he has been rather drowsy and listless and at night he often felt "burning hot" indicating some degree of pyrexia. He was also very restless at night, tossing about incessantly and continually throwing off the blankets.

On the day of admission i.e. 18/2/46 the mother noticed a great deterioration in the child's condition. Previously of a good pink colour, today George became very pale "like a ghost" and he was grey round lips, eyes and nose. In the morning the mother was greatly alarmed by the child's eyeballs "rolling up" at This has not happened since.
There is no history of any respiratory symptoms. Cough has never been present nor any dyspnoea. There is no history of any rash or other skin lesions: no urinary symptoms. The child has never given the impression of being in pain. The family doctor who has been looking after the child for one week prior to admission to R.H.S.C. prescribed sulphonamide tablets of which five in all have been taken.

PREVIOUS HISTORY.
Ante Natal period was uneventful. The child was born at Elsie Inglis Hospital and was a breech delivery. He was a full-time baby, the birth weight being 6 lbs. 1 oz. He was originally breast fed supplemented by National Dried Milk for three months, but he did not do very well and so was put on to Sister Laura's food until ten months during which time he gained weight quite well.

Milk which he takes now is from Haverside Cooperative Society and is said to be pasteurised. He had cod liver oil as an infant. He has not been vaccinated but was immunised against diphtheria four months ago.

He cut his first tooth at 5½ months, could sit up unsupported at about 8 months, stand up at 12 months and was "toddling" by 13 months. He can now say a few words and is beginning to form sentences.

Previous illnesses are two in number - measles and Chicken-pox, neither of which was severe. There were no complications in either case.

GENERAL EXAMINATION

STRUCTURE.
The height of the baby was 31 inches which shows no deviation from normal standards. As regards proportions the head appeared a trifle large as compared with the rest of the body. When the arms were placed by the sides the tip of the middle finger reached to a point 1½ inches above the knee. The legs themselves showed no undue elongation or shortening once the degree of flexion was undone, and from the above findings we can state confidently that the proportionate relationship of the body was good.

Anatomical regions.
HEAD: The dome-like or rather arched structure of the cranial vault was observed. The circumference of the head as measured round the widest part was found to be 18 inches which exactly corresponds to the standard measurement for this age. The biparietal diameter was /
was a little longer than the bitemporal, indicating that the
head was slightly narrower in front than behind. The general
shape of the head was that of a square with a prominent forehead.
Anterior Fontanelle was closed.

FACE was in good proportion to the size of the head. EYES were
brown in colour but dull, lustreless and somewhat sunken.

NOSE measured 1½ inches from nasal process of frontal bone to
tip of nose. It was not sunken, saddle-shaped nor unduly promi-

MOUTH: The long axis was horizontal: no drooping of the corners.
The child had 18 teeth, 9 on upper jaw and 9 on the lower, which
is normal for this age. Jaws themselves were quite symmetrical.

EARS were equal in size on the two sides and relationship to rest
of face was in keeping with the age of the patient.

NECK was rather thin and slender showing no abnormal swellings
or prominences.

THORAX: General shape was circular rather than oval which was to
be expected at this age. The circumference as measured just below
the nipples was 18" which is well within normal limits. The
costo-chondral junction could be felt but not seen. The costal
angle was neither increased nor decreased.

ABDOMEN was not prominent but rather was somewhat sunken having a
flat appearance tapering rather suddenly to the symphysis pubis.
There was some hollowing in each flank. At the upper boundary
the costal margin was very distinct and prominent.

ARMS were slender and fragile looking measuring 11½ inches from
acromion to tip of middle finger. There was no alteration in
carrying angle nor any bending of the bones. Wrist epiphyses were
not visible. Fingers were fine and tapering with no evidence of
clubbing.

LEGS measured 12½ inches from greater trochanter to tip of medial
malleolus. The knees and thighs were kept continually flexed.
Again no epiphyseal enlargement was detectable.

NUTRITION.
The weight of the child was 16 lbs. 2 oz. which is at least
6 lbs. short of the standard weight. That the child was under-
weight was corroborated by the fact that the general nutrition was
very poor indeed.
In the thorax the ribs did not have their usual covering of
fat/
fat and were visible especially in the lower part of the chest. The scaphoid abdomen was poorly covered, the fatty layer being greatly diminished. In the face the cheeks were deceptively chubby and the angles of the jaw only slightly prominent but the shoulders and groin did not possess their usual rich endowment of fat and likewise the limbs gave the impression of sticks round which the skin was but loosely draped. Extensor tendons on the back of the hands were freely visible.

On picking up the skin in the aforementioned parts, particularly that in the lower abdomen and in the limbs we found that it remained wrinkled for a while instead of springing back briskly to the former position.

C. SURFACES

SKIN: The general colour was pale and pasty without the normal bloom. Cheeks were a little flushed being of a dull red rather glazed appearance. There was no limb mottling. A silvery white scar was visible over the left frontal eminence, measuring $\frac{3}{4}$ inch. There was no cyanosis, no jaundice.

The texture of the skin was soft and smooth but definitely inelastic. It was everywhere rather moist.

Hair of scalp was fair and scanty with no luxuriant growth. It was lustreless and thin. Eyebrows were poorly developed and eyelashes were long and tapering, slightly curved toward the ends.

Nails reached to end of fingers. There was no evidence of nail-biting.

MUCOUS MEMBRANES. Lips were full and red, but somewhat dry: no fissuring. Tongue was fairly moist, but covered with coarse white adherent patches indicative of infection with thrush fungus.

Buccal mucosa was pinkish in colour with a few white circumscribed patches especially near alveolar margins, indicating also a thrush infection.

 Conjunctiva was paler than usual suggesting some degree of anaemia.

MUSCULAR CONDITION

Muscular TONE was tested by alternate flexion and extension carried out at elbow and knee joints. In the arms the tone was very poor indeed the limb being quite flaccid and flopping about in all directions.

The legs were held in a position of flexion with knees flexed on thighs and thighs on abdomen. As regards posture on standing baby up he toppled to one side showing intense muscular weakness. The grasp was extremely poor with both hands probably because the child /
child was too apathetic to realize what was being done.

Decubitus: The child lay curled up in an attitude of flexion resisting intensely any effort to turn it on to its back.

Muscular activity was practically nil during examination. There were no characteristic wriggling movements of the limbs.

Muscular coordination as evidenced by the above findings was very poor. The neck was rigid and could not be flexed on to the thorax. Expansion of thorax was reasonably good, the alae nasi were not in action.

**MENTAL CONDITION.**

Consciousness. The impression given by the child at first sight was one of quiet and peaceful sleep and the careless examiner might easily not realise the underlying pathological process. Actually the child was comatose, detached from his surroundings, completely un-cooperative and "untouchable"; his eyes, when open, staring blankly into far off distance. He did not respond to any stimuli, either voice, sudden noise, or touch unless these were very strong.

As regards intelligence no estimate of this could be gauged due to the extreme apathy during the examination.

Emotional tone: The child did not cry during the examination. On pulling back the bed-clothes he clutched at the sheet - Stalker's sign.

On being roused from his coma-vigil he became irritable and fretful, but soon relapsed into his former comatose condition.

**EXAMINATION of SYSTEMS**

a) **NERVOUS SYSTEM.**

The mental condition has been considered above.

Neck rigidity was very pronounced. Kernig's sign was positive as was Brudzinski's sign, i.e. flexion of thigh on attempt at flexion of neck and contralateral flexion of thigh on flexion of opposite thigh.

Reflexes:

Knee and ankle jerks were not obtainable. Biceps, triceps and supinator jerks were present, but reduced. The Babinski response was
was extensor on both sides. Pupils were equal, dilated, regular in shape and reacted uggishly to light. There was no nystagmus, ptosis or strabismus at the time of examination. Ophthalmoscopic examination did not show miliary tubercles. There were no convulsions at this stage.

Ears: There was no discharge and the ear-drums showed no evidence of inflammation.

Lumbar puncture. C.S.F was under increased pressure. It was a clear fluid, which formed a spider-web, coagulum after one and a half hours.

Bio-chemical report.

The C.S.F. contained numerous cells, mainly mono-nuclears, but these were rather less numerous than usual in a T.B. Meningitis. Bacillus tuberculosis were isolated.

Chlorides - 636 mgms. per cent.
Protein - 120 mgms. per cent.
Sugar - 11 mgms. per cent.

Tâche cérébrale was in evidence: i.e. when the skin was stroked with examining finger on forehead a red flush appeared after short interval and persisted for about three minutes. This is an index of vasomotor instability.

b) RESPIRATORY SYSTEM.

Respiratory rate was slow - 20 per minute. There was no distress, no stridor, no history of cough and the alae nasi were not in action. There was no discharge from the nose. Tonsils were not enlarged. Thorax moved well with respiration.

Percussion: Gentle percussion produced a resonant note all over chest equal at similar levels on both sides. There were slight degrees at certain places but as this was symmetrical we can assume it was due to variation in thickness of chest wall.

Auscultation: Breath sounds were generally faint, like a mixture of innumerable soft rustlings of wind blowing through the grass commonly known as vesicular breath sounds. There were no accompaniments. Throat swab showed a heavy growth of thrush organisms.
c) CARDIO-VASCULAR SYSTEM.
There was no cyanosis, no distended veins, no visible pulsation and no oedema anywhere.
Pulse:- rate 124 per minute - regular, forcible, bounding and of good volume.
Heart:- no precordial pulsation, apex beat was in fourth interspace within the mid-clavicular line. In all areas the heart sounds were closed.

d) DIGESTIVE SYSTEM
There was a history of vomiting and constipation. The appearance of mouth, tongue and shape of abdomen have been considered above.
Faucial region was normal.
Abdomen gave a heaving movement on respiration, particularly noticeable in upper part. There was no visible peristalsis. Palpation systematically done, both superficial and deep could detect no finding of pathological significance. The percussion note was uniformly dull; no tympany and no shifting dullness. Liver and spleen were not enlarged.

e) GENITO-URINARY SYSTEM.
The kidneys were not palpable: external genitalia well developed.
Urine showed a trace of albumen, no pus cells, no R.B.C., no casts.

DIAGNOSIS is one of tuberculous meningitis with no chest signs, the X-ray of the lungs being negative.

COURSE of DISEASE.
The condition followed a steadily downhill course. In the later stages nystagmoid movements of the eyeballs, ptosis and spastic paralysis were in evidence and profound cachexia was the dominant feature. Just before death on 28:2:46 convulsions, epileptiform in type, made their appearance.

N.B. For aetiology and Social background, see under discussion of "T.B. in Children" at end of Case 4.
This case was admitted to Ward 5 R.H.S.C. on 9:12:45 as a case of mild bronchitis and gastro-enteritis, and after five days in hospital he was discharged cured. He was re-admitted on 29:12:45 again with diagnosis of gastro-enteritis and was discharged on 2:1:46 with condition much improved. However he was re-admitted on 16:1:46 having a history of cough and cold of two days' duration and X-ray findings showed a suspicious area at the hilum which was due to a primary tuberculous infiltration.

This patient therefore is a good example of the subject under consideration as both tuberculosis and gastro-enteritis have definite relationships to the social background of the individual, and in this case the housing conditions were found to be extremely bad. Only the tuberculous aspect of the case will be considered here. Gastro-enteritis is discussed later.

Name of patient: Anthony McDougal
Address: 12 Craigmillar Castle Road
Age: 5 months
Birthday: 14:6:45
Date of first admission: 9:12:45
Date of third admission: 16:1:46

Family: Father - U.S.A. M.N. negro: reported to have V.D. has deserted wife.
Mother - Well: 28 years.
Children - 8: 5 male, 3 female.
Male: 13 years
Female: 10½ years
Male: 9 years
Male: 7 years
Female: 5 years
Female: 3½ years
Male: 2 years
Male: 5 months.

Two of the children have congenital syphilis. The oldest child has a chronic cough. The children are of the same mother but of different fathers. Ten people live in two rooms, among them an aunt who has been under treatment for tuberculosis for some time past.

Home conditions will be considered more fully later.
a) **Time of first admission.**

**Complaint:** 1) vomiting, 2) diarrhoea (one week), 3) slight cough (intermittently two months).

**History:**

The baby was quite well until one week prior to admission when he began to vomit his bottle feeds. At first this occurred only once or twice in the day, but soon he began to vomit shortly after every feed. The vomit was copious, but not projectile. About the same time diarrhoea made its appearance. The stools were of soft, almost liquid, consistency and bright yellowish-green in colour, about 6 per day. The child was irritable, fretful, crying and wailing miserably and continuously. His appetite was poor. There were no urinary symptoms, no rash, no discharge from ear or nose.

The mother took him to the clinic where she was advised to give him glucose water, milk of magnesia and when these had no effect, dried milk and water. The child also was given a chalk mixture from the clinic which went "straight through him" and had no effect on the diarrhoea.

In addition he had had a cough for one or two months but this had never been severe.

**Previous history.**

Antenatal period was uneventful. The delivery was spontaneous at home, the birth weight being 6 lbs. 10½ oz.

The baby was never breast fed but has been reared on National Dried Milk. He has received cod liver oil and orange juice in adequate dosage.

He has not been vaccinated nor has he been immunised. He has had no previous illnesses.

**GENERAL EXAMINATION**

A. **STRUCTURE.**

The height of the baby was 24 inches which corresponds to the standard height for the age of five months. The proportionate relationship of the body was good, the limbs not being disproportioned in relation to the trunk.

Anatomical /
Anatomical regions.
HEAD: the cranial vault was dome-shaped wider behind than in front and the head circumference as measured round the widest part was 16.8 inches which is well within normal limits. Anterior Fontanelle was felt as a diamond shaped structure with sutures radiating from each corner. It measured 1\(\frac{1}{4}\) inches anteroposteriorly and admitted three fingers. It was slightly sunken though not as much as one would have anticipated considering the duration of symptoms.

The head was oval-shaped rising rather steeply posteriorly. There was no bossing or craniotabes i.e. no evidence of rickets. Bitemporal diameter was smaller than biparietal.
FACE: did not appear unduly small or large relative to head. Frontal eminences stood out prominently.
EYES were brown in colour, bright, clear and lustrous. They were not sunken and long axes of palpebral fissures were parallel.
NOSE was the typical flattened squat nose of a half casta.
MOUTH showed a slight drooping of the corners: otherwise no abnormality. There were no teeth.
JAWS: the chin was rather pointed and the angles of the mandible quite prominent.
EARS were small relative to size of head: equal in size on both sides.
NECK was quite thick and neither shortened nor elongated.
THORAX: general shape of thorax was circular rather than oval. The circumference just below nipples was 15\(\frac{3}{4}\) inches, which compares favourably with standard readings for this age. Costo-chondral junctions could be felt but were not visible. I was impressed with a hollowing in the lower part of the sternum associated with a small transverse furrowing on left side radiating from the ensiform cartilege and affecting 7th, 8th and 9th ribs and corresponding intercostal spaces anteriorly. Subcostal angle was obtuse measuring about 110\(^\circ\).
ABDOMEN: was in my opinion a little sunken especially superiorly where it merged evenly into the thorax. There was some hollowing in both flanks. The contour of the abdomen was smooth and regular, umbilical scar showing no abnormality.
ARMS: were slender measuring 9\(\frac{1}{2}\) inches from acromion to tip of middle finger. Fingers were rather broad and coarse looking with no evidence of clubbing. Wrist epiphysis not seen.
LEGS: measured 10\(\frac{1}{2}\) inches from greater trochanter to tip of medial malleolus. Ankle epiphyses were not enlarged. Toes were not clubbed.

B. NUTRITION.
B. NUTRITION.
Child's weight before the start of the illness was 16 lbs - a good weight for the age of the baby, but he has lost 2 lbs. in the course of the week. Nevertheless the nutrition of the body was remarkably good, the ribs being well covered and the supraclavicular and inguinal pads of fat in evidence. Only on the abdomen was it evident that there had been some weight loss, the skin, on being picked up by the examining hand, showing undue wrinkling before falling back into place.

C. SURFACES.
SKIN: the typical pigmented mahogany-like skin of a half caste was seen. There was no limb mottling. As regards texture there was some loss of elasticity particularly over the abdomen. It felt somewhat dry to the examining hand. Hair of scalp was luxuriant, thick, black and "fuzzy." Eyebrows of a similar colour stood out well. Eyelashes short. Nails reached to end of fingers and showed no evidence of nail biting.

MUCOUS MEMBRANES.
The lips were full and of red colour rather dry however. Buccal mucosa was uniform pinkish red colour without any pathological finding. Tongue was clean and fairly moist, with papillae standing out prominently. Conjunctiva showed no anaemia.

D. MUSCULAR CONDITION.
Muscular TONE as tested by alternate flexion and extension of elbow and knee was very good, there being neither spasticity nor undue flaccidity.
As regards POSTURE the baby could lift up its head without difficulty. Its grasp was strong and firm. He clutched eagerly at a piece of ribbon and also at the measuring tape.
DECUBITUS: the child preferred to be on his back but did not resent any effort to turn it on to its side.
Muscular ACTIVITY was quite marked during the examination. The child was rather restless, performing wriggling movements of the limbs from which he appeared to derive much pleasure.
Muscular COORDINATION as evidenced by hand grasp and movement of the eyes was quite good.

E. MENTAL CONDITION.
Consciousness: the child was alert and was fully aware of his surroundings. He looked interestingly at the examiner and seemed to be taking it all in.
As regards Intelligence a rough gauge made by use of the eyes, and response to stimulation by noise showed no defect. The eyes themselves were bright, clear and vivid.
Emotional Tone: the child cried for part of the examination.
He was irritable and a little fretful to begin with but soon became quiet and cooperative.

EXAMINATION of SYSTEMS.

(a) ALIMENTARY SYSTEM

Signs of Function
(1) Appetite: prior to his illness Anthony had a good appetite but it has been poorer for the last week.
(2) Thirst: he has never been troubled by excessive thirst.
(3) Nausea and Vomiting: have been the main feature for the past week. They have been discussed under "history".
(4) Abdominal Pain is difficult to judge in a patient this age but there is no history of spasms of colic.
(5) Bowel action: diarrhoea has been prominent recently; the stools were liquid, light green, offensive with no mucus.

Upper Alimentary Canal including mouth, lips, tongue, palate and fauces presented no abnormality and have been referred to above.

Lower Alimentary Canal.

ABDOMEN.

Inspection: abdomen was evenly continuous above with the cylindrical thorax merging into this latter at the ensiform cartilage. It was a little sunken especially below the umbilicus and there was some hollowing in both flanks. Umbilicus was a small puckered scar roughly midway between xiphisternum and symphysis with no hernia or congenital defect. Abdomen moved well with respiration. There was a gentle, even rise and fall of the abdominal wall, the whole region moving as a mass with no part remaining rigid. There were no distended veins on abdominal wall. The rippling fluctuation called peristalsis could not be seen, the pattern of the surface remaining unchanged.

Palpation: superficial palpation: at every part the finger sank easily into the yielding abdominal parietes. At no point were any tenderness or rigidity encountered. Deep palpation revealed no enlargement of liver and spleen and no scybalous masses.

Hernial orifices: inguinal, femoral and umbilical were palpated but no protrusion was found in any instance.
Inguinal Glands could be felt on both sides as a few small shotty hard lumps freely movable. PERCUSSION yielded a uniformly resonant note everywhere. AUSCULTATION supplied no further information.

(b) RESPIRATORY SYSTEM

There was a history of slight cough which was harsh, loose and ringing in character. There was no cyanosis or dyspnoea. Ææ nasi were not in action.

The thorax moved well with respiration both sides moving equally. Respiratory rate 26 per minute; no stridor. PERCUSSION produced a resonant note over the whole chest surface varying slightly in degree at certain places notably in the sub-clavicular region on both sides which appeared slightly hyper resonant. AUSCULTATION: breath sounds were well heard all over the chest - puerile breathing with a thin chest wall. Again the sounds were like the "rustling of innumerable leaves in the trees" i.e. the breathing was vesicular. The only finding of significance was the presence of accompaniments both inspiratory and expiratory. These were heard in all areas with the exception of the right axilla. For the most part they were medium pitched whistling sounds - rhonchi, but in some areas I could make out coarse, rather bubbling sounds indicative of the presence of crepitations.

(c) CARDIO- VASCULAR SYSTEM

There was no cyanosis, oedema, visible pulsation or distended veins.
Pulse: rate 126 per minute; regular; good volume.
Heart: apex beat was located in the fourth interspace just inside the mid-clavicular line.
Heart sounds were closed in all areas.

(d) NERVOUS SYSTEM.

There was no neck rigidity or Kernig's sign. Knee, ankle, biceps, triceps and supinator jerks were all brisk. Babinski response was flexor.
Pupils were equal, regular, symmetrical and reacted well to light. There was no nystagmus, ptosis or strabismus. Ophthalmoscopic examination was negative.
Ears - there was no discharge and eardrums showed no evidence of inflammation. No sensory loss anywhere.
Lumbar puncture was unnecessary in this case.

(e) GENITOURINARY SYSTEM.

Kidneys /
Kidneys were not palpable, external genitalia normally developed. Urine was lemon-yellow in colour, S.G. 1014 acid in reaction and contained no albumen or other abnormal constituent.

This completed the examination at the time of first admission. The child was discharged cured but returned on 29/12/45. At this time the HISTORY was as follows:

After discharge from R.H.S.C. the child has never been really fit. He was fed on lactic acid milk but his motions still continued loose green and slimy, passing about four per day. Vomiting has been a feature for the last two days.

The cough has been slightly more severe recently, often described as "hacking" in character. A definite loss of weight has been noted by the mother.

EXAMINATION. At this time showed a pronounced loss of weight in the course of one week. The ribs stood out quite clearly in the thorax and the abdomen was more scaphoid, the skin dry and inelastic and wrinkling when picked up. Fontanelle was depressed slightly and eyes sunken i.e. all stigmata of slight dehydration.

In the chest movement was unimpaired, the diaphragm moving well, percussion note resonant but breath sounds, though vesicular, were very loud in places and inspiratory and expiratory accompaniments could be heard.

The baby was put on to lactic acid skimmed milk and water four-hourly and the condition very rapidly improved.

Blood Film done on 29/1/46 showed:

- Neutrophils 20.5
- Small lymphocytes 20
- Large lymphocytes 48.5
- Monocytes 12

R.B.C. showed marked anisocytosis.

The child after only another ten days at home was readmitted 16/1/46 with history of Cold and Cough of two days' duration.

HISTORY. The child was perfectly fit from the time of last discharge till two days prior to admission when he suddenly developed a severe cough. This cough is described as harsh and "rasping", occurring especially at night. The paroxysms of coughing appeared to
to cause the child much pain as he screamed vigorously after every bout. He was also very feverish at night and sweated greatly while in bed.

There has been no alimentary upset since last admission.

**EXAMINATION** showed the child to be quite well-nourished having regained some weight; fretful and intelligent, looking eagerly around.

**RESPIRATORY SYSTEM.**
- Chest moved evenly and uniformly.
- Respiratory rate 40 per minute: shallow but no distress. The cough was loose and ringing in character. Sibilant and sonorous rhonchi could be heard all over the lungs.

**X-RAY** of chest showed some increased striation of right upper lobe, very suggestive of an early tuberculous infiltration. In my opinion there was also slight enlargement of the hiliar glands.

Gastric Lavage was negative for B. Tb. on 29/1/46. A Gland was palpable behind sterno mastoid on right side. Mantoux Test was strongly positive.

General condition of the patient was good, however, and the prognosis appeared quite favourable always keeping in mind the constant bugbear of blood spread with a resultant miliary tuberculosis.
CASE III - ABDOMINAL TUBERCULOSIS.

Name of patient  Stewart Finlayson
Address  26 Raebeneath Terrace, Edinburgh
Age  4 years 6 months
Recommended by  Dr. Halder
Date of admission  2/3/46
Date of examination  26/3/46.

Family:
Father  35  Typewriter mechanic.
Mother  36
Children  2
  Male aged 6 years
  Male aged 4 years 6 months.

Complaints
1. Anorexia  2/52
2. Abdominal Pain  2/52

HISTORY.
Two nights prior to admission Stewart was put to bed as usual about 7 o'clock and at 11 when his mother went to "lift" him she noticed he was sweating heavily and was very hot and feverish. He was also extremely restless tossing about continuously and suddenly began muttering and shouting in his sleep. The mother thinks he was "delirious".

Prior to this for the past two weeks his appetite has been very poor. His mother "tempted" him with all kinds of attractive dishes but all with no avail. Also he has had vague abdominal pain in the region of the umbilicus for about the same time. This occurs especially after meals, has never been severe or stabbing and is not associated with nausea or flatulence. The bowels have been constipated, the stools of normal colour but of hard consistency.

A prominent feature for the last month or so has been a progressive diminution in the child's energy. Previously active and keen to play with friends and toys latterly he has been "always tired" and only wished to sit by the fire. He lost interest in toys and companions. A few days ago while sitting by the fire he "went cold all over his spine". There has never been any history of cough.
cough: his mother thinks he has been passing less urine recently: no rashes and no vomiting.

Previous History.

Antenatal period showed N.A.D. The delivery was spontaneous and the child full-time. Mother suffered from a breast abscess and accordingly the child had to be put on the bottle. He was put on artificial feeding with Ostermilk but did not put on weight satisfactorily and so Robinson's Patent Barley was substituted with beneficial results. The mother admits however there has always been a good deal of trouble with his appetite. Vaccinated at 6/12 and immunised at 1 year. Their milk supply is NOT PASTEURISED.

GENERAL EXAMINATION

A. STRUCTURE.

Height of child was 40½ inches, a little taller than the standard height for this age. The proportions of the various parts were on the whole satisfactory but the head was a little small as compared with trunk.

Anatomical regions.

HEAD: the cranium was well vaulted. Circumference was 19 inches - slightly below average for this age. Anterior Fontanelle was chosed and bitemporal diameter shorter than biparietal, indicating a broadening antero-posteriorly. There was no bossing or any abnormal prominence on the cranial surface: no evidence of cranio-tubes.

FACE: was in good proportion to the head generally.

EYES were blue, clear and lustrous with the long axes of palpebral fissures parallel. They were definitely not sunken.

NOSE was thin and pointed: not squat.

EARS were small and well shaped equal in size on the two sides.

MOUTH: long axis of the mouth was straight with no drooping at the corners.

CHIN was well formed and delicately pointed: jaws symmetrical. The child had 20 teeth. The central incisors in front were a little stained being brownish-black in colour: a few teeth showed early caries.

NECK was thin and swan-like.

THORAX: general shape was oval: there was no abnormality of formation: costo-chondral junctions were not visible and subcostal angle was of standard dimensions.

ABDOMEN was rather full especially superiorly where it stood out as a small mound in continuity with thorax: inferiorly it tapered gently /
gently to the symphysis. It was definitely convex above the umbilicus and less convex below. It did not give the appearance of distention.

**ARMS** were fine and comely with long tapering delicate-looking fingers showing no clubbing; wrist epiphyses were not visible; carrying angle was not altered.

**LEGS** likewise were slender and fragile-looking in good proportion to the rest of the body: toes were not clubbed.

**B. NUTRITION.**

General nutrition was moderate. Although the ribs had some covering of fat and the superficial fatty layer of the abdomen was present there was no doubt that the nutrition would be somewhat better for a lad of this age. The limbs were too thin and the fatty layer was scanty especially in the upper arms. Cheeks were however quite well filled out.

**C. SURFACES.**

**SKIN** was generally pale with a slight malar flush at time of examination. There was no limb mottling. Texture of skin was a little inelastic and non-resilient not falling back into place so readily as one would have expected. It was generally moist and warm to the touch especially in the axillae. There was no cyanosis, jaundice or any rash.

**HAIR** was dark, luxuriant and the eyebrows well developed as though pencilled in. Scalp was clean. **MUCOUS MEMBRANES:** lips were rather paler than usual being a light pinkish red: they were moist to the hands and the buccal mucose showed no abnormality. Tongue was of red colour, with a little white fur on the dorsum but quite moist. Conjunctiva showed no evidence of anaemia.

**D. MUSCULAR CONDITION.**

Like nutrition muscular TONE was less than average, the limbs being rather too flaccid. The child did not show any signs of activity during the examination, lying quite passively all the time. Observing him while he was unsuspecting, I noticed that he did not seem to have much interest in his toys and preferred to be flat in bed, not sitting up. Expansion of the thorax was free.

**E. MENTAL CONDITION.**

The child was bright and alert with an intelligence well in advance of his years. He wondered why he had been so "tired" recently but said he now had more energy. He appears to have had a very
very sheltered life at home with rather over-solicitous parents and as a result he is of the "old fashioned" type somewhat like Peter Pan.

EXAMINATION of SYSTEMS.

(a) ALIMENTARY SYSTEM

Signs of Function
(1) Anorexia has been a feature for two weeks.
(2) There has been no excessive thirst.
(3) Nausea has occasionally been present but no vomiting has occurred.
(4) Vague dull abdominal pain in the region of the umbilicus has already been alluded to.
(5) Constipation has been the rule.

Upper Alimentary Canal including mouth, tongue, fauces etc. have been considered above. Tonsils were not enlarged.

Lower Alimentary Canal

ABDOMEN.

On inspection the abdomen was slightly but definitely protuberant as referred to above. Umbilicus, a small puckered cicatrix, midway between ensiform cartilage and pubic symphysis was not everted.

The abdomen moved well with respiration with a gentle heaving movement. There were no distended veins or striae, the latter being associated with long continued distention. Slight dimpling of the surface could occasionally be made out running from left to right and indicative of peristalsis.

Superficial palpation showed that at no point was the abdominal wall tender, for the child did not resent the presence of the palpating hand.

Deep palpation could find no enlargement of either liver or spleen but on very deep palpation I could elicit some tenderness to the right of the umbilicus and a small hard mass freely movable on the deeper tissues could be felt. This was in all probability an enlarged gland.

Percussion note was dull all over the abdomen but no shifting dullness or fluid thrill could be elicited.

(b) RESPIRATORY SYSTEM

There was no history of cough, no cyanosis, no stridor or haemoptysis: alae nasi were not in action.

Thorax
Thorax moved well with respiration and the excursion was equal on the two sides. Respiratory rate 24 per minute and the breathing was quiet and unimpeded. Percussion note was uniformly resonant.

Auscultation: the breath sounds were faint but present in all areas: the rustling noise characteristic of vesicular breathing was heard: there were no accompaniments. Throat Swab was negative.

X-ray showed no demonstrable pulmonary lesion.

(c) CARDIO-VASCULAR SYSTEM.

There was no cyanosis, oedema, visible pulsation or distended veins.

Pulse: rate 108 per minute: regular: rather thin and thready in type.

Heart: apex beat was in fifth interspace within the mid-clavicular line: heart sounds in all areas were closed.

(d) NERVOUS SYSTEM

Pupils were equal, regular, reacted briskly to light. Tendon jerks were present, equal on the two sides and neither exaggerated nor diminished. Plantar response was flexor. There was no neck rigidity. Kernig's sign was negative.

EARS: there was no aural discharge: drum was not congested.

(e) GENITO-URINARY SYSTEM

Kidneys were not palpable. External genitalia N.A.D. Urine had no abnormal constituents: it was yellow in colour S.G. 1014 and acid in reaction.

Course. MANTOUX TEST was done on 20/2/46 and was strongly positive. During the child's stay in Ward I R.H.S.C. the pyrexia has subsided and general condition has improved considerably under conservative treatment. The child also feels much less tired and now sits up and chats with his companions. His appetite is improving and the attacks of abdominal pain are now less frequent.

X-RAY of abdomen showed a few calcified masses especially on right side and the diagnosis is almost certainly one of abdominal Tb.
CASE IV - ABDOMINAL TUBERCULOSIS
- thought to be BOVINE infection.

Name of patient: Alistair McDermid
Age: 10 years 5 months
Address: East Brooklyn, Callander.
Recommended by: Doctor in Callander
Date of admission: 21/3/46
Date of examination: 28/3/46.

Family:
Father: aged 35, Sheep farmer
Mother: aged 30
Children: 2 males, 13 years and 10 years 5 months

HISTORY.
Eighteen months ago the patient had his tonsils out at Stirling Royal Infirmary. About one year ago he came back from school one evening complaining of feeling "off colour" and "out of sorts". He was shivery and had two rigors. He was put to bed and the temperature was found to be 103°F. At this time it was noted that a gland on the left side of the neck was enlarged. The breath was foetid and the mouth dry. He was put on a course of Sulphonamide, taken to Stirling Royal Infirmary where the temperature settled but the pulse remained very erratic becoming very rapid on the slightest excitement or emotion.

He was discharged and returned home but still kept running a temperature which at night often reached 101°F. He was now put to bed again for four weeks and while at rest complained of flitting pains in hips and dorsal sum of right foot.

His health was reasonably good until three weeks ago when the pyrexia was again in evidence, and his mother said he was "blue-looking" at times. Occasionally he complained of a dull pain in the lower abdomen and in the thighs.

Never at any time has there been a cough: there are no night sweats: appetite has been quite good all along and bowels regular, neither constipation nor diarrhoea being complained of.

PREVIOUS HISTORY.
The mother was well in the antenatal period. The boy was born at St. Johnston's Hospital, Perth. He was a full-time baby and a forceps delivery as the lie was transverse.

Birth weight was 9½ lbs. He was breast fed for five months.
when he gained weight well. This was later supplemented by Sister Laura's food.

He had Mumps at 3
Measles at 8 (severe attack)
Tonsillectomy at 8½.

The family milk supply is NOT T.T. The milk is obtained from two cows on the farm. Neither of them has been examined by the local veterinary authorities and one of them is reputed to have an "infected udder". Therefore the evidence for a bovine infection though not conclusive is highly suggestive. (vd. later).

GENERAL EXAMINATION

A. STRUCTURE.

The height of the patient was 54 inches which is slightly above the average for this age. Proportionate relationship was satisfactory.

Anatomical regions.

HEAD: general shape was circular with a well vaulted cranium. The circumference of head as measured round the widest part was 22 inches which is about one inch larger than the standard for this age. Bitemporal diameter was smaller than biparietal, indicating that the head was a little broader posteriorly. There were no abnormal prominences or bossing of the cranial bones. Anterior fontanelle was of course closed.

FACE like the head appeared large and "chubby".

EYES were blue, clear and piercing looking with the long axes of palpebral fissures parallel. They were not sunken.

NOSE was squat and broad with no abnormality.

EARS were well shaped: of equal size on the two sides.

MOUTH: tended to droop a little at the corners.

CHIN was rather receding: jaws symmetrical.

TEETH: he had 21 teeth, none of which showed any evidence of caries.

NECK was thick and rather wider posteriorly.

THORAX: general shape was oval rather than circular: it was generally powerful-looking and well-formed. Costo-chondral junction could not be seen: there was no kyphosis or scoliosis and subcostal angle was obtuse measuring 110°.

ABDOMEN was not distended but was quite full. The flanks were well filled out and there was no tapering toward the symphysis pubis. At the upper margin the costal margin was not prominent.

ARMS /
ARMS were well-shaped, sturdy giving appearance of strength. Wrist epiphysis not visible: no clubbing of fingers. LEGS likewise were well-formed: no prominent angle epiphysis and no toe clubbing.

B. NUTRITION. This was everywhere excellent. Thorax and abdomen had a liberal covering of fat. The subcutaneous fatty layer was easily picked up between finger and thumb. Limbs also were well covered, supraclavicular pad of fat quite obvious. The cheeks were chubby and angles of jaw not prominent.

C. SURFACES. SKIN was everywhere of good colour. The cheeks were red and freckled. There was some mottling of the limbs and the general appearance was of the bloom of health. As regards texture it was springy and elastic, readily falling back into place on removal of the fingers. There was no cyanosis, jaundice or rash: skin rather moist. MUCOUS MEMBRANES: lips were of a full red colour: quite moist to the touch: buccal mucosa showed no abnormality. Tongue was covered with a thin white fur which came away on the examining finger: it was moist to the touch. Conjunctiva was bright red with no evidence of anaemia.

D. MUSCULAR CONDITION The muscular tone was everywhere good. The limbs were neither spastic nor unduly flaccid. The boy was active during the examination and seemed quite anxious to use his limbs. Coordination as tested by grasp and posture was excellent. Questioning revealed that the boy had walked at about one year, and previous to that had been able to hold up his head by four months.

E. MENTAL CONDITION The child is of a bright intelligent nature, easy to converse with and apparently very knowledgeable on the subject of nature. He lives on a sheep farm and takes considerable interest in farm life. He is reasonably clever at school and keen on his work.

EXAMINATION of SYSTEMS.

(a) CARDIO-VASCULAR SYSTEM There was no cyanosis, oedema or distended veins. Pulse: rate was 92 per minute: regular: good volume, but not forcible.
Heart /
Heart: there was no pulsation in precordium. Apex beat was in fourth interspace in mid-clavicular line: it was not diffuse or forcible. Heart sounds were closed in all areas.

(b) RESPIRATORY SYSTEM.
There was no cyanosis and no stridor: no history of cough and dyspnoea recently.
Thorax moved satisfactorily with respiration. Movement was equal. Respiratory rate 20 per minute. Percussion note was resonant everywhere.
On auscultation breath sounds were loud in all areas - typically puerile - but everywhere vesicular: no accompaniments were audible.
Throat Swab was negative for B. Diphtheria and H.S.
X-RAY showed no evidence of glandular enlargement: primary focus was not seen.

(c) ALIMENTARY SYSTEM.
Upper alimentary canal including mouth, tongue, fauces have been already discussed. Tonsils had been removed.
Lower alimentary canal.
On inspection abdomen was rather prominent but not distended: no striae and no veins: no peristalsis.
Palpation: to superficial palpation the abdomen was soft and yielding presenting no guarding anywhere. On deep palpation liver and spleen were not enlarged. A few hard indefinite masses were felt in right iliac fossa - ? Tb. glands.
Percussion note, however, was quite resonant in all areas. Auscultation gave no further information. There was no shifting dullness.
X-ray owed a few calcified glands on right side of abdomen.

(d) GENITO-URINARY SYSTEM
Kidneys were not palpable and the external genitalia presented no pathological feature. The urine contained no sugar, albumen or other abnormal constituent.

(e) NERVOUS SYSTEM.
Pupils reacted briskly to light, were regular in shape and symmetrical. Reflexes were rather sluggish but all present.
Plantar response was flexor. Neck rigidity and Kernig's sign were absent.
Lumbar Puncture was not done.
EARS: had no discharge and the ear drum was not inflamed.
MANTOUX TEST was strongly positive.
COURSE.

With conservative treatment the condition has greatly improved. Pyrexia has subsided and B.S.R. readings now normal and the child should soon be ready for discharge.
DISCUSSION.

Under the heading of "Tuberculosis in Children" four cases are discussed. They are:

1. Case of Tb. meningitis
2. Case of "Primary Complex Tb."
3. Abdominal Tuberculosis.

The aetiology and pathogenesis of Tb. in children will first be reviewed and finally each case will be carefully correlated with its social background and home conditions.

Diagrammatic representation of Tb. in children.

(A) PRIMARY INFECTION by INHALATION.

(B) PRIMARY ALIMENTARY INFECTION.
The "PRIMARY FOCUS" may be defined as the structural change or reaction of tissue due to B.Tb. at the site of first recognizable localisation.

"PRIMARY COMPLEX" may be defined as the primary focus together with Tb. lesions in lymph glands in close topographical relationship.

Mode of Entry of B.Tb. may be by
1. Inhalation ) affecting Lungs 30%
2. Ingestion ) affecting Intestine 15%
    Tonsils & Skin 5%

In each case a primary complex is formed.

Primary infection of LUNG: most cases are thought to be due to human bacilli though in Scotland quite a number of cases may be due to the bovine type.

As B.Tb. is unable to penetrate healthy bronchial mucous membrane, it must reach tiny respiratory bronchiole and alveolar duct before infection is set up.

First we see a small area of caseous bronchopneumonia with outside it a layer of fibrous tissue leading to the encapsulation of the focus: majority of cases become calcified and even ossified and give a picture of a primary healed focus so familiar in the X-rays. Sometimes however the body is unable to localise the focus and the caseous process may spread to involve whole lobe succeeded by liquifaction and cavity formation (see later). The focus is known as the GHON FOCUS. Its site of predilection is on the right side especially in the middle lung fields: usually subpleural in position its size is very variable, a recent focus measuring from 2 mms. - 2 cms. diameter and a final healed focus may be about the size of a pea.

Primary Complex of Renké can be divided into Parenchymal and Glandular portions.- concomitant with formation of primary focus in lung parenchyma the adducent lymphatics become involved and a similar process occurs in corresponding Hilar glands.

Glands involved: first to be affected are those actually in the lung itself and lying along branches of the bronchi and terminal branches of pulmonary artery.

Then paratracheal trocheobronchial and interbronchial groups become site of Tb. infiltration. The pathological process is always the same - exudation and caseation followed by encapsulation and calcification but the glandular changes tend to be more severe and pronounced than those in the parenchyma and therefore the glandular element is potentially the dangerous one particularly when we remember the anatomical position i.e. those glands are on the "last lap" of the lymphatic system near opening of thoracic duct.
FATE of PRIMARY COMPLEX

In vast majority of cases primary complex is symptomless and the only proof of its existence is the development of a positive tuberculin test. In an unfortunate few however a further stage takes place and this may affect either the glandular or parenchymal part of the primary complex.

A. GLANDS

(1) These may become enlarged and act as a mediastinal tumour causing pressure symptoms, the two main ones being Cough and Stridor. This is presumably what has happened in Case II under consideration.

(2) Further an enlarged gland may ulcerate into a vein producing a blood stream spread of infection. If the number of bacteria is large and probably also if the "soil" is impoverished by such factors as bad housing conditions, poor hygiene etc. there will occur an acute disseminated form of Tb. causing a very severe and fatal disease analogous to septicaemias in pyogenic infection which goes under the connotation of Acute Miliary Tb. with death inevitable usually from Tuberculous Meningitis. Again, this fulminating picture may be absent but the periodic discharge of small numbers of B. Tb. into the blood may result in isolated deposits of B. Tb. causing e.g. Tuberculosis of Bone, Joint and Kidney.

Lastly in older children a rare form of the disease known as Chronic Miliary Tuberculosis can occur. Here the lesions in the lungs are similar to those in the acute type but are more sharply defined i.e. there is less discrepancy between the forces of destruction and repair. Such a disease may continue for many years with remissions and exacerbations but the tendency is always to recovery. Calcification is usually the end point of these foci but some may progress by caseation and liquefaction to cavity formation, the cavity being of a thin walled "punched-out" type which usually heals or may persist unchanged for many years.

(3) Lastly an enlarged gland may ulcerate into a bronchus producing diffuse spread through the lungs either a Tb. bronchopneumonia if the foci are scattered haphazardly through the lungs, or a Tb. caseous pneumonia if the condition is localised to one lobe. Cavities if they form are of the "acute" type i.e. multiple or irregular shape and lined by a ragged layer of necrotic yellowish-white debris. Both conditions are associated with a bad prognosis.

B.
B. **FOCUS**: may cause extension of disease by enlarging instead of healing.

(1) It may caseate and discharge into a bronchus, producing either a Tb. broncho-pneumonia or caseous pneumonia.

(2) Rarely it may ulcerate into a blood vessel and cause a miliary spread.

(3) The adult type of pulmonary Tb. is very seldom seen in children making its appearance about puberty. We can confidently state that adult pulmonary Tb. is not due to neglected treatment in childhood. In the adult the disease develops in a body rendered allergic by primary infection, but many years may intervene between primary infection and date of development of adult Tb. We have no means of knowing how long this period is but in the case of young adults receiving their primary infection early in adult life and developing adult pulmonary Tb. relatively soon, it is plausible to state that the primary lesion may be relatively widespread and some of its caseous areas do not heal but discharge instead, giving pulmonary Tb. but Extension of primary focus is not a common method of development of adult pulmonary Tb., this disease being essentially bronchogenic and due either to:

(a) endogenous infection due to reactivation of a latent focus resulting from the early bacillaemia and usually situated at the apex, or

(b) exogenous infection from without.

(4) Tb. pleurisy may also occur in older children and a serous effusion at this age is practically always due to Koch's bacillus.

**ABDOMINAL TB.**

Embraces Tb. of intestine, mesenteric glands and peritoneum. It is much commoner in children and usually is due to the swallowing of milk, infected with the bovine or "dysgonic" type of B. Tb. This disease is all the more distressing because it is preventable by the adequate Pasteurisation of milk. Some organisms infecting by ingestion are caught up in the pharynx and side-tracked to the cervical lymph glands, but the majority are swallowed, pass through the stomach into the intestine where the development of the primary complex occurs in a manner strictly analogous to that described under the lungs, with the exception that often the site of entry of B. Tb. in the intestine may heal leaving absolutely no trace or alternatively only a tiny puckered scar may testify to the point of entrance of the organism.

Pathologically /
Pathologically we may recognise three types of abdominal Tb. - Tb. Enteritis where the pathological feature is intestinal ulceration; Tabes mesenterica where the main brunt of the disease falls on the lymph glands and Tb. Peritonitis - ascitic and plastic forms - where the whole peritoneal lining becomes affected with gross adhesions and matting together of coils of bowel and omentum. These forms are only recognised for purposes of description and any combination of the three conditions may coexist.

Before grouping the cases under consideration on a pathological basis a few words are necessary about the pathogenesis of Tuberculous Meningitis, as case 1 is an illustrative example of the condition. It is one of the three clinical forms of acute miliary Tb. according to whether the symptoms are referable to

1. **BRAIN** - meningeal form
2. **LUNGS** - pulmonary form
3. General infection without focal signs - Typhoid form.

The old view of the pathogenesis of Tb. meningitis was that B. Tb. was carried direct to the meninges by the blood stream and gave an immediate inflammatory reaction, but Rich and McCordock in America and later Dr. MacGregor working in R.H.S.C. Edinburgh have thrown doubt on this theory and it is now generally believed that the infection is due to a Tb. deposit actually in the brain substance i.e. due to the rupture of tiny subcortical tuberculomata. Such lesions are often multiple and often no larger than a pea and when sufficiently superficial it may burst through into subarachnoid space and discharge B. Tb. with a subsequent heavy meningitis.

Rich proved that injection of massive doses of B. Tb. did not produce immediate meningitis but only a few discrete tubercles in meninges and cortex from which a diffuse meningitis may subsequently develop.

In the gross the brain presents the following characteristics: dura is tense, cerebral convulsions flattened and dry: exudate varies with site of original Tb. focus. When rupture occurs into ventricles or basal cisterns infection carried by C.S.F. along natural passages and there it is most abundant at base of brain, optic chiasma, inferior surface of pons and over vermis of cerebellum and median surface of hemispheres.

Exudate is at first turbid and opaque but later becomes gelatinous and yellowish green: grey tubercles can be seen in subarachnoid space specially in neighbourhood of the Sylvian Fissure. Section of the ventricles shows them to be distended due to obstruction caused to circulation of C.S.F. by the obliteration of the basal cisterns and of foramina of Luschka and Magendie in fourth ventricle.
Primary points of infection are:-

- 75% in chest,
- 20% in abdomen,
- 2% in neck glands.

We are now in a position to group the four cases on a pathological basis.

**CASE I** is one of tuberculous meningitis but here the primary point of infection was not seen in the X-Ray of the chest, although this by no means rules out the chest as the source of primary infection: it is very likely that the causative organism was of the human type.

**CASE II** illustrates symptoms arising due to the primary complex. The parenchymal element or Ghon's focus was seen in the upper right lung field and there was also some enlargement of the hilar lymph glands. In contrast to I the prognosis here is good and the condition will settle down provided no such tragic accident as ulceration into a blood vessel occurs.

**CASES III and IV** can be conveniently considered together as they are almost definitely examples of a bovine infection caused by drinking non-pasteurised milk.
SOCIAL CONDITIONS in relation to TUBERCULOSIS.

Perhaps no disease is so closely interwoven with its social and economic background as is tuberculosis. Recognised as THE social disease, par excellence, it has been treated as a national problem since 1912 when first regulations for its compulsory notification were issued. Successive Public Health Acts have transferred responsibility for its treatment to Local Authorities, and have made statutory the provision of specialised medical officers, dispensaries and institutional beds. The preventative aspect of the problem has also been stressed particularly the routine examination of contacts and careful supervision of the exsanitorium patient.

First let us consider the incidence of INFECTION (not the incidence of disease) as applied to children. It is found that incidence of infection increases with each advancing age group. Thus Lloyd, working in London, did a tuberculin investigation on 1000 children in 1930-31 and found 23% of those between ages 1 and 5, 39% of those between 5 and 10, and 58.3% of those between 10 and 15 were infected as evidenced by a positive Mantoux reaction. Fleming in a recent statistical survey on Glasgow children has substantiated these findings.

The most important factor that can be found to explain incidence variations among members of the same age group is known contact. Groups of children known to be contacts inevitably show higher incidence rates than groups where there is no known history of contact.

Urban communities with their thickly spread populations and overcrowded conditions naturally show a higher incidence rate than do rural areas where the population is more scattered.

Relationship of Tb. to Age.

When we consider the different age groups in children many illuminating factors come to light. In the first place Infant Mortality rates from Tb. have shown a most satisfactory drop during this century although the under-5 group, as contrasted with the 5 - 14 group, leaves much to be desired. Especially between the ages of 5 and 9 is the rate very low. From 15 onwards the rate rises sharply reaching its peak in early adult life.
In this discussion we are mainly concerned with the under-5 group as Cases 1 and 2 fall under this category. (See later)

The ECONOMIC FACTOR has long been recognised as of paramount importance in relation to Tb. In contrast to the uniformity of incidence rates amongst different economic strata it is found that mortality rates vary considerably at different income levels. In general the higher the income level the lower the tuberculosis mortality.

Poverty begets all these conditions which lower general resistance to disease thus "pandering" to B. Tb. and encouraging spread of infection. It is responsible for malnutrition - this has been specially noticeable in war-time when the current emergency has played havoc with many Tb. schemes. It is responsible for poor housing conditions, the importance of which factor cannot be over emphasised. Families crowded together often under conditions of defective sanitation and squalor, living in close and intimate contact in often shockingly limited space form an ideal pabulum on which B. Tb. can thrive.

We shall now pass on to a consideration of the individual cases.

CASE I  TB. MENINGITIS: George Blaikie, aet. 18 mths.

Family History: The family stay in Hawick and consist of Father, Mother and 5 children, the latter ranging in age from 10 yrs to 18 months.

Father, aet. 37, was a small thin pale and rather cadaverous looking man, with a slight Kyphosis, but quite well dressed and intelligent. On being questioned he admitted a vague history of "chest trouble" dating back for many years. This has only amounted to a chronic cough and a tendency to "wheeze" during the winter months. When asked directly about the possibility of Tb. he said that he himself had never been X-Rayed and apart from his brother (vide infra) there was no history of Tb. in the family. His occupation is that of a Tweed warehouseman which necessitates working long hours in a stuffy atmosphere. He feels he "does not get nearly enough of the fresh air".

The Mother on the other hand looked strong and robust. She was proud of the fact that she had "never had a day's illness in her life". She was keen on housekeeping and tried to make as comfortable a home as possible for the children. She gave the impression of competence and sincerity - a good mother.
Children: are five in number: the eldest a lad of 10 has always been healthy apart from Chickenpox and Measles in childhood. He plays games and is keen on outdoor sports. She can never remember his having a cough. He had a "threatened mastoid" at the age of 10. The other two boys aged 7 and 5 respectively have also been very healthy children, the younger of whom is just beginning school. Now we come to the Twins aged 18 mths., one of whom is the case under consideration. The previous history has been discussed already, the most important points being the fact that the MILK the baby now takes is pasteurised and that at the age of one year the baby had Measles. It is interesting to note the important part played by measles in either lowering the resistance and making the patient more susceptible to tuberculosis or by "lighting up" a latent Tb. focus.

House: consists of two apartments on the ground floor of a tenement. Conditions must therefore be crowded as two rooms are not sufficient accommodation for seven persons. The father and mother sleep in one bed in the kitchen, the three elder children in another bed and each of the babies has a cot. Lavatory accommodation appears to be adequate there being one W. C. for the family but it is often shared by the people "up the stairs" whose W. C. has "broken down". The house is definitely not sunny and the mother complained bitterly of the lack of sunshine due to the crowded nature of the locality. As regards fresh air she has always encouraged the children to go out and play and keeps the windows of the house open where possible. They have suffered severely this winter from inadequate supplies of coal and often have not been able to put on a fire until evening. From the above findings we can conclude that the house was rather dark and depressing - a potent influence for ill health. Such a house will encourage and mask dirt, the effect of light and sunlight needing no emphasis. Darkness is also a cause of waste from additional artificial light required. It is safe to say that the window space was less than the standard - 1/10 of floor space.

Careful enquiry was made for dampness of the house but no history of this could be obtained. There is no bath but hot water is available. There is a little garden space at the back.

Mode of Infection: - /
Mode of Infection:— by far the most important single fact in this case is the following statement:—

An uncle (father's brother) who lived in the same tenement (one flat above) has had a BAD CHEST COUGH for years and was removed to Hawick SANITORIUM where after one week's illness he died from "galloping consumption".

There can be little doubt that here we find the source of infection and when we learn that the man was frequently in the child's house and often used to sit with George on his knee, playing with him and fondling him, our supposition becomes almost a certainty. As mentioned previously the mortality rate for Tb. in children is highest in the under-5 group and here we find the reason for that preponderance.

Let us consider an infant born of parents, or as in George's case with a relative with undiagnosed or untreated Tb. Such a child will be liable to receive his primary infection at an early date unless careful precautions are observed from birth onwards. Before he has had time to develop his immunity he will be receiving further doses of infecting organisms which may only too easily overwhelm his relatively puny powers of resistance and lead to an acute fulminating miliary Tb. with a terminal Tb. meningitis, where so far from being confined to the original site of infection, whether this be in the lungs or elsewhere, the infection is so severe as to break down the local lymphatic resistance and invade the bloodstream resulting in widespread dissemination of lesions all over the body. There is an old French saying which is peculiarly applicable here. It says that "Tb. like syphilis is shared among the members of the family like the daily bread".

It is only too easy to imaging this tragic state of affairs happening in this case. One can only be shocked at the premature cutting-off of a young life so full of promise and the occurrence is particularly heinous because it is definitely preventable. Consider the different course of events if instead of being allowed to roam at large, this unfortunate relative had been confined in a sanatorium and properly treated there. Such an occurrence which is alas only too common should spur us all on to greater efforts in the early diagnosis and treatment of adult cases of Tb., the provision of well-equipped sanitoria and more and more Tb. dispensaries. It is only by this means that the incidence of this terrible condition of Tb. meningitis, striking as it does at the youngest and most promising of our population will be reduced.
CASE II - TUBERCULOSIS of MEDIASTINAL LYMPH GLANDS

Anthony MacDougal  12 Craigmillar Castle Road,
Age 5 months.

Family History: Ten people live in two rooms consisting of
mother, eight children and an "aunt" (mother's sister).

FATHER: is a citizen of U.S.A. and is at present serving in
the Merchant Navy. He is a negro. Nobody seems to know anything
about his present whereabouts. He is said to have deserted
his wife and to have lived an "immoral life". He is also reputed
to have some form of venereal disease. It is very doubtful if he
was married to Anthony's mother at all. Naturally he was not
available for interview so one can only surmise as to his
personality.

MOTHER: aged 28: was a surprisingly sensible woman of robust
constitution. Obviously very poor with old and tattered clothes,
she appeared to take a keen interest in her family and was very
worried about Anthony of whom she seemed to be very fond. She
admitted that her home conditions were grossly overcrowded and
bitterly blamed her "husband" for his desertion. She said she
quite enjoyed housekeeping "if only she could get into a better
house".

"AUNT": mother's sister who stays in the same house has had
a chronic cough for years and recently has been under treatment
for Tb. She is described as being very thin and pale, very
"fragile" and takes repeated paroxysms of coughing "as though she
was coughing her lungs out". Living in such close contact with
such a person it is scarcely to be wondered at that Anthony has come
to develop Tb.

CHILDREN: altogether there are eight children ranging from
a boy aged 13 to Anthony at 9 months. The eldest boy has had a
chronic cough for about two years which was diagnosed as "bronchitis
following measles". Two children, one boy and one girl, have
genital syphilis for which they have been receiving treatment
for a long period of time. Most of the children have had measles
and whooping cough. The boy aged 9 was seriously ill with di-
phtheria at the age of 7, and the one aged 3½ is troubled with
"tonsillitis". The two eldest children have had "growing pains"
recently. Like Anthony three of the family suffered from
Gastro-Enteritis in the first year of life.
HOUSE: consists of two rooms in which the ten people live. It is one of the new Corporation Houses built in the slum clearance area at Craigmillar. The defect in this case therefore is not so much an extrinsic one as regards bad housing as an intrinsic difficulty due to overcrowding.

Sleeping arrangements are as follows: there are two normal sized beds in the house in one of which the mother, aunt and three of the children sleep. In the other bed four other children sleep and there is a special cot for Anthony. Such conditions are of course nothing short of deplorable.

The house is supplied with a W.C. for the family. Bath facilities are available but there has been no hot water for some months and they have had to heat water on an ordinary fire. The house does get plenty of sunshine and is airy though the mother complains of the cold in the winter-time.

Food has been "very difficult" this winter, and sometimes the children have had to go hungry. In my opinion the household has been in grave financial straits. There is no dampness in this locality and a small garden in the front of the tenement is much appreciated by the children.

We can sum up by saying that overcrowding is the "primum movens" of this case. When so many persons are living in such intimate contact, however good the actual house itself, infection introduced by one member of the family is bound to be transmitted to others.

Mode of Infection: it is very probable that as in Case I the child was infected from his "Aunt" who was presumably an "open" case with a positive sputum. The infection could have taken place either directly or via dust, the child crawling about on a dirty floor and the bacilli having retained their virulence in the dust for a considerable period of time.

The difference between this and case I is merely one of degree. In this case we are not presented with the fulminating overwhelming picture of a miliary septicaemia but instead infection has occurred as indicated by the clinical and radiological findings. It is unlikely that such a case will progress as did Case I to a generalised miliary Tb. as the child may by repeated minimal infection be able to build up an immunity. The ideal would be to separate him from his home environment where with the constant exposure to infection his developing immunity may be gradually worn down or suddenly and completely overwhelmed giving us the picture of Case I in duplicate.
CASES III and IV can be conveniently considered together as both present many similar features, in each case the condition being almost certainly due to an infection by the bovine type of B. Tb. introduced into the body by drinking infected milk.

CASE III.

Stewart Finlayson; aged 4 years 6 months; 26 Roseneath Tce.

Family History: the family live in a tenement in Roseneath Terrace and the household consists of Father, Mother and two children, the younger of which is the patient under consideration.

Mother: aged 36; was a healthy looking woman who has no relevant past history of illness. She was an intelligent person, ready to cooperate and gave the history clearly and concisely. She was perhaps the oversolicitous type of parent as she looked, and in fact, was extremely worried about her child's health. She admitted that she had cajoled, wheedled and tried every ruse in her power to try to make Stewart eat more but all to no effect. By this time every meal in the house had become a sort of ceremony since she used to dread the thought of the next meal and worry because her son's appetite was so poor. She admitted that the house, although accommodation was adequate, was rather dull and depressing. She also said she had never encouraged Stewart to go much out of doors and would not allow him to play outside. He has always been in adult company, seldom in the company of children.

Father's occupation is that of a typewriter mechanic. His health has always been good. The income of the family appears to be adequate.

The elder boy aged 6 years is well but is described by the mother as being rather "fragile" - "as though a puff of wind would blow him away". Like Stewart he does not play outside but is quiet and studious preferring to sit indoors.

An aunt of the children has been attending a doctor for some time on account of her "lungs". Just how far this piece of information can be relied on is difficult to say.

House: is the ground flat of a tenement in Roseneath, consisting of three apartments and a bathroom. Overcrowding therefore is not a factor here but the whole house is dull sunless and cheerless, and exercises a depressing effect on the whole family. Darkness seems to come very early even at this time of year and unnecessary light must be burnt. The welcome rays of the sun seldom percolate through /
through these windows situated as the house is in a build-up area, and at best of times in a rather dingy street.

There is one W.C. for the family. The house is not damp, but the mother does not appear to realize the benefits of fresh air and always keeps the windows tight shut at night.

Mode of Infection: the milk which the family obtain from a dairy in the vicinity is non-pasteurised. The mother has "never bothered" to get Stewart pasteurised milk. The benefits of Pasteurisation will be described after a resumé of Case IV.

CASE IV  Alistair McDermid: aged 10 years 5 months: East Brooklyn, Callander.

In this case home conditions are at first sight excellent. The child lives on a sheep farm, has always had an open-air life with plenty of fresh air and exercise. We do not wonder so much at the child described in Case III falling victim to the B. Tb. but certainly this boy appeared to have all the essentials for a healthy life.

Father is a sheep farmer aged 35 and has always been extremely healthy. He rises early in the morning, circa 5.30 a.m. and works very hard on the farm. There is no history of Tb. in the family.

Mother, aged 30, is also healthy. She had an attack of "pneumonia" recently but has now fully recovered. On interview she was a robust looking woman, healthily tanned with a good colour and physique. Though naturally a little worried about her son she appeared an eminently sensible and intelligent parent.

Children: there are two children, the case under consideration being the younger. Elder boy has always been healthy and keen on the open air.

House: the family live on the farm at Callander. The farm house is said to be quite comfortable, consisting of four rooms and bathroom. Therefore again there is no thought of overcrowding. The house is airy and gets plenty of sun, though it is often very draughty in winter-time. W.C. accommodation is adequate a modern type being installed. There is plenty of hot water and bath facilities are available. In general the standard of living is very good indeed.

Mode of Infection: /
Mode of Infection: again this must be due to a bovine infection transmitted through non-Pasteurised milk. There are two cows on the farm from which the family obtains its milk supplies. The boy says that one of them has an "infected udder".

TB. and MILK SUPPLY.

By isolation of B. Tb. from a sufficiently large number of cases and determining the type it is possible to indicate the proportion of each clinical group due to bovine infection. In 1932 the following figures were obtained in 0 - 4 group (Savage).

<table>
<thead>
<tr>
<th>Condition</th>
<th>No. of Cases</th>
<th>% Bovine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tb. Cervical Glands</td>
<td>21</td>
<td>85.7</td>
</tr>
<tr>
<td>Lupus</td>
<td>75</td>
<td>57.3</td>
</tr>
<tr>
<td>Meningeal</td>
<td>23</td>
<td>34.8</td>
</tr>
<tr>
<td>Bone and Joint</td>
<td>88</td>
<td>27.3</td>
</tr>
<tr>
<td>Genito-Urinary</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>-</td>
<td>29.7</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>3</td>
<td>33.3</td>
</tr>
</tbody>
</table>

Though not quoted it was also found that a high percentage i.e. over 75% of abdominal Tb. in children was due to infection with bovine type of bacillus.

It has been calculated that 1% of respiratory and 23% of non-respiratory deaths in each year are due to the bovine bacillus, or put another way some 2,000 deaths occur annually from this cause in England and Wales and in Scotland the figure is even higher relative to this population. Such a state of affairs is all the more reprehensible because we have the remedy in our own hands i.e. the adequate Pasteurisation of milk.

Cows are liable to Tb. and the percentage of cows which react to Tb. i.e. "reactors", varies widely from 10% to even 80% according to the area but for cows in England as a whole the most reliable figure is 40%.

"Reactor" cow is merely one that is infected with the Tb. Bacillus and it will only be infective if the lesions are large enough and also communicate with the exterior i.e. through lungs, intestines, uterus or udder. It is thought that 2.5% of all reactors are infected at any one time which applied to all cows is about 1% and one in 500 of all dairy cattle suffer from Udder Tb. and therefore are potentially dangerous to man.

The percentage of mixed milk infected with the Tb. Bacillus varies greatly in different areas from 2% to about 13% with an average figure of 6%. When milk from many sources is bulked B. Tb can usually be found in 100% of the samples. The effect of this is obvious and has been particularly noticeable during war-time with the pooling of milk generally practised.

Prophylaxis /
Prophylaxis entails such factors as adequate and periodic examination of all cattle, hygienic methods of milking, including clean hands, carefully washed pails, etc. and above all pasteurisation of milk supplies i.e. the raising of milk to 140°F for 30 minutes followed by cooling.

In America where pasteurisation is enforced by law, cases of surgical Tb. are an extreme rarity.

These two cases therefore illustrate a social problem rather different from that considered in the first two cases but nevertheless just as important in its own way.
ALLERGY and IMMUNITY in TB.

No discussion would be complete without a short consideration of this vexed question.

KOCH'S PHENOMENON first showed different reaction to B. Tb.

(i) animal infected for first time.
(ii) animal already infected with Tb.

He used guinea pigs for the experiment. In the first case there was no reaction for some days after which time an abscess appeared at site of inoculation, broke down to form an indolent ulcer accompanied by swelling of lymph glands in the vicinity showing that the bacilli were not retained at the site of inoculation. This was followed by general infection and death in 2-3 months.

In the second animal the bacilli were retained at site of inoculation. There was local swelling and redness but no involvement of the regional lymph glands. The local reaction went on to acute inflammation and massive necrosis. Such a response can be elicited by injection of dead bacilli and is an expression of hypersensitiveness (allergy) to the protein products of B. Tb. In the Allergic body therefore the relatively bland tuberculoprotein acts as a powerful irritant and a necrotising poison, the characteristic features of allergic reaction being local sensitivity and rapidity with which organism is dealt.

It was formerly believed that no real difference existed between allergy and immunity. It was thought that the local sacrifice of tissue was necessary for the protection of the rest of the body, but Rich and most other modern observers believe that allergy and immunity are really quite different entities, i.e. in animal already infected with Tb. the bacilli are held locally and are more easily killed but this is due to antibodies (immunity). This means that the infected body is more resistant (relatively immune) to living B. Tb. but is sensitized (allergic) to bacterial products and therefore both states represent response to different elements in B. Tb.

B. Tb. produces endotoxins which act as antigens, stimulating tissue cells to produce antibodies. This effect is not shared by tuberculin. It must be realized that the immune state in Tb. is only relative and not fixed and may quite well be overcome by massive infection. It is also modified by such factors as state of nutrition and intercurrent disease. Allergy on the other hand indicates /
indicates an altered state of the tissues usually in the direction of hypersensitivity. Tuberculin can evoke hypersensitive reaction in patient already infected with B. Tb. and therefore forms basis of skin sensitivity test but has no effect in animal or human who is not infected.

Therefore a positive tuberculin test means definitely that infection has occurred but one is not entitled to say that the symptoms are due to tuberculosis, but if the test is negative we can say with assurance that the child is not infected with B. Tb. and therefore the symptoms cannot be tuberculous in origin. We must however note two fallacies. In the first place allergy takes 4-8 weeks to develop, therefore in a suspected case it is wise to repeat the Mantoux reaction in such a period. Secondly in very acute and fulminant cases e.g. Tb. meningitis the reaction may be negative. This is exemplified by Case I of this series where a positive Mantoux was not obtained. Cases II, III and IV all showed strongly positive tuberculin reactions.

In the clinical field we can consider three conditions, the pathogenesis of which is still rather obscure but which are now thought to be allergic manifestations to B. Tb. These are:

1. Erythema Nodosum.
2. Phlyctenular Conjunctivitis.
3. Epituberculosi s.

1. Erythema Nodosum:— was at one time thought to be a manifestation of rheumatic infection but this view has fallen into disfavour; the condition now being thought to be closely related to Tb. It is said to appear very early in Tb. infection i.e. just after allergy. It is believed that the rash represents a very violent allergic reaction. In a good percentage of cases Erythema Nodosum is followed by signs of Tb. - especially tuberculous pleurisy. It is commoner in females.

2. Phlyctenular Conjunctivitis:— also commonest in children and thought to be an allergic response to B. Tb. Typical lesion is the phlycten i.e. localised patch of conjection in bulbar conjunctiva with base at limbus and narrower end toward the fornix. At the limbus in the middle of the base of this conjection there appears a small greyish white elevation. At first epithelium is intact over it but soon a shallow ulcer with a whitish base appears, lasts a few days and then epithelium rapidly grows over it and congestion fades.

Epituberculosi s /
3. Epituberculosis:— refers to the sudden appearance of a dense shadow in lungs of infected children. Many theories have been advanced for its causation. Some observers believe it represents an intense perifocal reaction involving the primary focus and its lymph gland component. It takes the form of oedema, the result of an allergic tissue response to toxic products of bacilli in primary focus itself. It subsequently resolves and is seldom associated with any systemic upset. Prognosis is excellent.

The view is now advanced that the condition merely represents collapsed lobes, and there is also the conception that the state is really one of caseous pneumonia where the focus has discharged material containing only a few B. Tb.

Finally it may be said that the whole question of allergy in Tb. is very intimately bound up with that enigma known as "constitution" and also with personal idiosyncrasy.
CASE V. Case of Naso-Pharyngitis and slight Bronchitis associated with extremely bad housing conditions.

Name of patient: Mary Townsley
Address: 132 High Street, Edinburgh.
Age: 9 months
Recommended by: Mother
Date of admission: 24.1.46
Date of examination: 30.1.46

Family History:
Father: aged 36: labourer, formerly gypsy.
Mother: aged 44
Children: 10
- Male - died at 6 months from convulsions and meningitis in Glasgow.
- Twins
  - Male 12 years
  - Male 9 years
  - Female died at 5 years from an accident.
  - Female 7 years
  - Male 6 years
  - Female died at 14 days in Simpson's.
  - Male 3 years
  - Female 9 months.

Complaints:
1. running nose
2. sneezing
3. coughing

History.
The child was quite well up till one week ago when it started running from the nose, sneezing, and a slight cough developed. The cough has become worse during the last week. It is harsh, husky, and ringing in character occurring usually in paroxysms and sometimes waking the child out of its sleep.

Usually a "very good baby" and full of life, for the past week she has been listless, "wanting to lie" and irritable if disturbed. She frequently gives vent to a peculiar moaning cry.

Appetite has been reasonably good, the feeds consisting of oats, puddings and soups. Her bowels have been regular but the mother noticed a greenish colour of the stools on the day before admission. The baby has been listless at nights and feverish and hot on occasions.

There has been no trouble with the passage of urine till the day before admission, but since then she has only passed water.
water once. She had a "hard coughing bout" at 5 p.m. and
the mother noticed a few fine streaks of blood in the spit.

Previous history.

During the antenatal period the mother was not well. She
attended Cowgate Dispensary with a "Toxaemia" associated with
swelling of the legs and face and raised blood pressure.

After delivery she developed White Leg and was confined to
bed for one month. The baby was full-time; a spontaneous
delivery, the birth weight being 5 lbs. She was a very poorly
child but did surprisingly well. She was not breast fed as the
mother did not have an adequate supply of milk. The feeding
consisted of equal parts of milk and water, under which the child
"came on all right".

They attended no Clinic; the baby has Cod Liver Oil occasional-
ly and Orange Juice daily. She has not been vaccinated nor
immunised. She went off the bottle one month ago. The child
sat up unaided at 6 months and according to the mother is now
very strong. So far she has not cut any teeth.

GENERAL EXAMINATION

A. STRUCTURE.

The height of the baby was 26\(\frac{1}{2}\) inches which was definitely
small for this age. Proportionate relationship of the various
parts was satisfactory, the limbs being in good proportion to the
trunk.

Anatomical Regions.

Head: the dome-like structure of the cranial vault was observed.
Circumference of the head was 16\(\frac{1}{2}\) inches, the anterior fontanelle
being one finger open. Biplaritel diameter was longer than
bitemporal. The general shape of the head was oval; there were
no abnormal prominences and no bossing. Craniotabes could not
be elicited.

FACE was neither large nor small as compared with the size of the
head.

EYES were rather dull, lustreless and a little sunken.

NOSE and EARS showed nothing to note; the mouth drooped a little
at the corners. There were no teeth.

CHIN was rather square-shaped. The neck was thin and slender.

THORAX: general shape was circular. Circumference as measured
just below the nipple was 17\(\frac{1}{2}\) inches which compares favourably
with /
with normal standards. Cöeto-chondral junctions could not be seen.

ABDOMEN was slightly protuberant, especially above the umbilicus, and it tapered gently towards the pubis. ARMS were thin and slender measuring 9½ inches from the Acromion to tip of middle finger. Wrist epiphyses were not visible. Fingers were slender with no evidence of clubbing. LEGS measured 10½ inches from greater Trochanter to tip of medial malleolus. Again no epiphyseal enlargement was detectable at the ankles.

B. NUTRITION.

The weight of the child was 17 lbs. The subcutaneous layer of fat was surprisingly rich all over the body. The ribs were not visible and the abdomen well covered. The cheeks were chubby and the angles of the jaw not unduly prominent. On picking up the skin in these areas, the above findings were corroborated.

C. SURFACES.

SKIN: general colour of the skin was pink like a soft rose petal. Cheeks were a little flushed and there was some mottling in the limbs.

On admission the child was very dirty. The texture of the skin was soft, smooth and elastic. It was everywhere moist to the touch. The scalp was dirty and showed a number of boils. The hair was thin, fine and lustreless, without the usual luxuriant growth.

MUCOUS MEMBRANES: there was a watery rather irritating discharge from the nose which had slightly excoriated the upper lip. The lips were full and bright red in colour. The tongue was moist and slightly furred. The throat showed catarrhal inflammation of the fauces and a mucopurulent discharge in the region of the tonsils. The conjunctivae were a light pink colour.

D. MUSCULAR CONDITION.

Muscular tone as tested by alternate flexion and extension at the elbow and knee was surprisingly good.

Decubitus: The child lay on its back but did not resent being turned over on to its side. Muscular activity during examination was marked, the child making wriggling movements of the limbs. A loud cry persisted during the examination. Muscular coordination as evidenced by movements of the eyes was satisfactory. The child could sit up unsupported.
E. MENTAL CONDITION.

Consciousness: the child was alert and conscious during the examination, crying loudly the whole time, but appeared to be "taking it all in".

Intelligence: as estimated by movement of the eyes and the hand grasp, was unimpaired.

Emotional tone: the baby cried lustily during handling. She was irritable and clearly resented being disturbed.

EXAMINATION of SYSTEMS.

(a) DIGESTIVE SYSTEM.

Tongue was lightly coated with a fine white fur. There were no teeth.
The throat, as mentioned above, was congested.
The abdomen moved freely on respiration.

Palpation: there was no resistance anywhere to the examining finger. The liver and spleen were not palpably enlarged and there were no other masses in the abdomen. The urinary bladder was full and was easily felt as a rounded, soft swelling, about two fingers' breadth, above the symphysis. The umbilicus showed no abnormality.

(b) CARDIO- VASCULAR SYSTEM.

There was a slight bluish tinge in the cheeks, showing the presence of cyanosis. No distended veins were visible and there was no oedema. Pulse rate was 140 per minute - regular, forcible and bounding.

Heart: apex beat was in fourth space well within the mid-clavicular line. The heart sounds were strong, regular and closed in all areas.

(c) RESPIRATORY SYSTEM.

A nasal discharge was evident, sneezing and coughing were both pronounced, the throat showing catarrhal inflammation. The respiratory rate was 36 per minute, and the throat swab showed no diphtheria bacilli and no haemolytic streptococci.

The chest moved well and symmetrically with respiration.

Percussion yielded a resonant note in all areas.

The breath sounds were everywhere relatively loud due to thinness of chest wall, like the rustling of wind through autumn leaves i.e. vesicular type of breathing. A few scattered rhonchi could be heard particularly in the upper lung fields and at the left base.

(d) GENITO-URINARY SYSTEM.
(d) **GENITO-URINARY SYSTEM.**

The kidneys were not palpable and the external genitalia showed no abnormality. The bladder was distended. The urine was lemon-yellow in colour, clear, S.G. 1020, acid in reaction and contained no abnormal constituents.

(e) **NERVOUS SYSTEM.**

The baby was fully conscious, very active and irritable. There was no neck rigidity. The pupils were regular, symmetrical and reacted briskly to light. The tendon reflexes were all present and brisk; no sensory loss.

A Furuncle was present at the right auditory meatus. There was no aural discharge, and the ear-drums were not inflamed on either side.

**DIAGNOSIS.**

The case is one of **Acute Naso-Pharyngitis** with slight bronchitis, associated with furunculosis.

**COURSE.**

Under routine treatment the patient's condition greatly improved and after one week the baby was discharged.

The baby was readmitted on March 21st with the following complaints:

1. Cough for two days
2. Heavy breathing for one day
3. Drowsiness for one day.

**HISTORY.**

Since discharge at the end of January the baby was quite well until two days ago when a cough started in the morning. At first it was just a little "tickle" in the back of the throat but soon increased in frequency and violence. Last night the respiration became very heavy and laboured, the nostrils moving backward and forward with each breath. The short dry cough persisted by night and the child "changed colour quickly". She fluctuated from deathly pallor through a light shade of blue to a deep red. There has been no vomiting, the motions are quite normal and the urine has been very "strong" recently.

On the day of admission the mother noticed that the child had become very drowsy. It was difficult to rouse her and she bitterly resented any interference. She was hot and feverish.
Examination on admission showed a very marked deterioration in the child's condition since January. The predominant feature was loss of weight. The ribs were scarcely covered at all and stood out prominently. The abdomen was sunken and the skin picked up between finger and thumb easily wrinkled, testifying to great loss of subcutaneous fat. According to the mother the weight loss has amounted to 7 lbs. in seven weeks and the present weight is 12 lbs. 10 oz. Temperature on admission was 102°F, pulse 144 per minute and respiration rate 50 per minute. A tinge of cyanosis was evident in lips, cheeks and tips of fingers.

The mental condition: the child was drowsy and comatose, very difficult to rouse and when awakened cried plaintively. She was detached and apathetic. As yet there was no neck rigidity and Kernig's sign was not positive.

An X-Ray of the lungs showed the typical "snow storm" appearance of miliary tuberculosis. An area in the right upper lung field was suggestive of the primary focus. No enlarged mediastinal glands were seen.

**SOCIAL CONDITIONS.**

This case, par excellence, illustrates the point of the essay. The social background is absolutely deplorable and must be the focal point of all the evils which have beset this unfortunate family.

The family consists of father, mother and there have been 10 children, 7 of whom are now living. Father, aged 36, was demobilised from the army at the beginning of this year. He obtained a job as a labourer but is now unemployed again. Before the war he was a gypsy with no fixed abode and they all lived in a caravan touring the country. He is described as being strong and healthy, but rather undependable and flighty in disposition. The present weekly income is £3:10/- on which 8 people have to live. The father is desirous of returning to his former vagrancy, but the mother opposes this suggestion strongly.

Mother, aged 44, described herself as "never very strong". She is subject to frequent colds and her strength has been sapped by repeated child bearing. Formerly a gypsy like her husband she has no wish to return to the old way of life. She wants a settled home /
home and complains bitterly of the squalor in which she finds herself. She was very dirty indeed and obviously poverty-stricken but quite intelligent and well spoken. She admits that home conditions have been "getting her down" recently. She is clearly embittered by circumstances.

At the angles of the mouth a few reddish scars were seen suggestive of the rhabdades of syphilitic infection.

Children: the first child, a boy, died at the age of 6 months in Glasgow of "convulsions and meningitis". The second boy aged 12 is quite well. In childhood he had measles and whooping cough and is sometimes troubled with a cough which is never severe. The next boy aged 9 has been perfectly healthy. A girl died at 5 years of age due to an accident. Another girl aged 7 years is quite fit and a boy aged 6 had measles badly when an infant and is subject to recurrent sore throats and "growing pains". Next a girl died in Simpson's Maternity Pavilion at the age of only 14 days. Last but one a boy aged 3 is quite well except for frequent colds and "attacks of flu" and finally Mary, the youngest member of the family, has been discussed already.

HOME: words cannot describe the unutterable squalor and filth in which this family live. The dwelling does not merit the term of "home", but is merely an ending set up a close in the High Street. There is only one room in which 8 people live. Sleeping arrangements are as follows:—there is only one bed in the house on which five people sleep, including the baby. The remaining three sleep on the floor.

Sanitary accommodation is even more deplorable. There is only one lavatory outside shared by no fewer than 21 persons.

The house is dull, and dingy. They never "see the sun". From early evening onwards they have to grope about by the miserable light of a candle. The house is draughty and part of the roof has collapsed. There is no bath, no hot water on the premises, and only one window in the house. Dampness has been a feature all through the winter and the mother has come to dread a shower of rain. The mother admits that the house is dirty and there are often "nasty smells" about the place. There is no food store available let alone a cool place with a window opening directly into the open air. This winter they have been desperately short of coal and have felt the cold very badly.

Food difficulties have also been pronounced and the general nutrition of the family is very bad.
In few cases nowadays can there be such a mixture of overcrowding, poverty, misery and squalor. That the house should have been condemned long ago is only too plain to see. It is easy to imagine, with the general lowered resistance of such a family from economic, social and nutritive factors, why upper respiratory infections - nasopharyngitis and bronchitis - are so prevalent. These conditions always abound under circumstances of lowered bodily resistance, and are essentially "social diseases".

The serious factor in this case however is the subsequent development of a miliary Tb. in a child previously fit apart from some nasal catarrh. As to the cause of infection we can only speculate, as there is no history of Tb. in the family, but it is not difficult to realize that under such abominable home conditions a ready "soil" is found for the acid-fast bacillus. The aetiology and pathogenesis of Tb. in children have been discussed previously. This case is intended to illustrate the relationship between environmental factors and bronchitis and upper respiratory infections in general.
CASE VI. Case of Bronchitis and ? Broncho-Pneumonia.

Name of patient Ann Marshalsey
Address 13 Downfield Place
Age 2 years 11 months
Recommended by Dr. Young
Date of admission 17.1.46
Date of examination 23.1.46
Date of discharge 30.1.46

Family
Father aged 37 rubber-worker
Mother aged 38
Children 4.
  ・ Female aged 13
  ・ Male aged 10
  ・ Male aged 8
  ・ Female aged 2 years 11 months.

Complaints
1. Cough (four days)
2. Feverishness (two days)
3. Loss of appetite (four days).

History.
The illness began five days prior to admission. The child, previously a good eater, suddenly went "off her food", had no desire to get up and wanted to stay in bed. She was drawsy and sleepy all day. A slight cough developed that night and has persisted since, becoming more troublesome. The mother describes it as "tight and harsh" and it did not yield to household remedies. The cough tended to occur in spasms especially when the child woke up at night. The next day she was more "felled" but improved on the following day and was allowed up for a few minutes. She was much worse after this however and the mother describes her now as definitely "weak" and "soft". The night before admission her breathing became heavy and laboured, the baby giving short pants through the mouth. Her nostrils were in movement. The mother noticed Ann was "burning hot" and feverish at night. She has also been very thirsty. There has been no vomiting. The bowels have been rather constipated but a motion was obtained with the aid of syrup of figs.

The /
The mother noted that the child's urine has been a peculiar red colour for the last two days. It does not give the impression of blood. The baby's habits are clean. There has been no nasal discharge and no gross colour change.

Previous History.
During the pregnancy the mother was troubled with much sickness. The baby was full-time, a spontaneous delivery and the birth weight was 8 lbs. 10 oz.
Breast feeding was carried out for two months and then she was transferred to the "bottle" on which she did very well. Orange juice is given daily. Ann has always been a good baby and seldom cries. She has been vaccinated, but not immunised.
She cut her first tooth at four months, walked at one year and is now talking satisfactorily.
She has had no previous illnesses.

GENERAL EXAMINATION.

A. STRUCTURE.
The child was 33 inches in length, which is two inches less than the average length for a three-year-old child. The head seemed slightly large in proportion to the size of the body, but this was probably exaggerated by the plentiful growth of hair. The arms when placed by the sides brought the finger tips to three inches above the knees. The legs were neither shortened nor unduly elongated, and measured 15 inches from the greater trochanter to the medial malleolus.

HEAD: the head was vaulted from side to side and to a lesser degree, antero-posteriorly. The circumference of the head round the widest part was 20 inches, one inch more than is expected in a child of this age. The bitemporal diameter was considerably smaller than the biparietal, but this appeared to be partly due to the parietal eminences being symmetrically prominent on both sides. This gave the head a general egg-shaped appearance.
The anterior fontanelle was closed.
FACE: the eyes were blue, clear, bright and shining and neither sunken nor infected.
The nose was not sunken nor saddled, and measured 1½ inches from the top of the nasal bone to the tip.
The mouth was easily inspected and nothing pathological detected.
The long axis was in the horizontal plane, and the gums symmetrical.
The teeth were regularly spaced, without gaps. They were not carious nor peg-shaped, and showed no signs of decalcification. They were clean and polished in appearance. There were 10 present in the lower and 10 in the upper gums, which is what you would expect in an average three-year-old child.
The jaws appeared at first to be small, but this was due to the large chubby cheeks, and on palpation proved to be well proportioned and symmetrical.
The ears measured 2 x 1 inches in size, appeared well formed, the lobules being free.

NECK: This was not shortened, although the head was held well forward, giving the appearance that it was rather short at the back. There was no limitation of movement.

THORAX: The circumference was 20 inches, a normal measurement for an average child of this age. The chest appeared broad, and was flattened anteriorly. There was a distinct tendency towards Kyphosis posteriorly, the dorsal vertebrae being convex and prominent. The costo-chondral junctions were felt but could not be seen.

ABDOMEN: In shape, the abdomen was not prominent nor flattened, but smooth and regular, the surface being continuous with the front of the thorax.

ARMS: These measured 14 inches from acromion to finger-tips. They were well-shaped with no deviation of the joints not bending of the bones. The wrist epiphyses could not be seen and were not broadened. The hands were well-shaped, and the fingers were not deviated. The finger-tips were full and slightly pinkish, suggesting possibly a very early stage of clubbing. This last finding however was by no means definite.

LEGS: These measured 15 inches from the greater trochanter to the medial malleolus, and were well-shaped, showing no deviation nor bending. The ankle epiphyses were not seen. The toes showed no clubbing.

B. NUTRITION - the Fatty Layer.

The weight was 32 lbs. - a good average weight for three-year-old children. (The average is 30 lbs.) The ribs were well covered, and could not be seen at all. Over the abdomen the fatty layer could be seen as a transverse roll, and a thick layer of healthy, elastic skin could easily be picked up between finger
finger and thumb. The shoulders showed a considerable fatty covering, and the groin also was well padded. The forearms and legs were well covered and the bony points were nowhere prominent. The hands and feet also were plump and the extensor tendons nowhere visible. The proximal phalanx of the fingers were well covered with fat. The face was round, the cheeks plump, and the line of the jaw obscured by this fatty tissue.

C. SURFACES.

SKIN:
Generally the skin was pinkish in colour, with faint mottling over the trunk and upper limbs. The cheeks were flushed and reddish in colour, contrasting with the circum-oral pallor and pale forehead. The ears were pinkish. The lips were slightly cyanosed, being a faint blue colour. There was no jaundice nor oedema. The texture of the skin was soft, smooth and elastic, and tended to be slightly dry (as felt in the axillae and on the brow). The hair was luxuriant and silky over the whole of the scalp. The eyebrows were well developed, and the eyelashes long and tapering. The nails reached the ends of the fingers, and showed no evidence of biting.

MUCOUS MEMBRANES:
The lips were full, bluish-red, with no fissuring. The tongue was very clean, moist, reddish at the tip, with the papillae showing clearly. The gums and buccal mucosa were pinkish and not pathological. The conjunctivae showed no signs of anaemia nor jaundice.

D. MUSCULAR CONDITION.

Muscular Tone: The limbs could be moved with no muscular resistance - the muscles almost appeared to be flaccid.
Posture: She could not stand up unaided, and her limbs appeared flaccid. She tended to sit with the head held well forward and the back bent in the thoracic region.
Activity: During the examination the child moved but little, except her hands (which played with a piece of ribbon) and her head, which she moved about freely in a quietly interested way. She did not appear restless.
Muscular Co-ordination was good. She sat forward, helped to remove /
remove her own clothing, grasped her ribbon firmly, opened her mouth and put out her tongue, etc. Sphincter control appeared to be efficient.

E. MENTAL CONDITION.

Consciousness. The child was alert and fully aware of its environment, taking an intelligent interest in those around it. She understood and responded well to our questions, and opened her mouth and put out her tongue when asked, proving that her intelligence was unimpaired. She did not speak, however, during the examination, but quietly and promptly obeyed instructions. She also moved her head about from one side to the other, and looked about her with obvious interest and intelligence. Muscular control also was very good.

Emotional tone: She appeared to be emotionally stable, as judged by her quiet interest, lack of crying during the procedure, and the tacit acceptance of being examined. She showed no signs of being irritable - rather the reverse.

EXAMINATION of SYSTEMS.

A. RESPIRATORY SYSTEM.

A frequent dry hacking tight cough was prominent. The child breathed through the nose and the alae nasi were slightly in action. A bluish purple coloration of lips, cheeks and lobes of ears testified to the presence of slight cyanosis.

The Thorax moved well and symmetrically with respiration. Respiratory rate was 50 per minute: there was no stridor i.e. the high pitched whistling sound betokening some degree of obstruction. Respiration was not inverted. Accessory muscles of respiration were not in action.

Percussion produced a resonant note in all areas except, in my opinion, for the right base where the note was flat and colourless.

Auscultation: the breath sounds were everywhere vesicular (this term has been explained before). High pitched musical and sibilant rhonchi were present in all areas of the chest. No crepitations were heard at this stage.

B. CARDIO-VASCULAR SYSTEM.
B. CARDIO-VASCULAR SYSTEM.
There was a slight cyanotic tinge in the cheeks, lips, lobe of ear and distal phalanges of the fingers.
Pulse: rate 140 per minute: regular: forcible and gave a "slapping" sensation to the examining finger.
Heart: no precordial pulsation: apex beat was in fourth space inside mid-clavicular line: sounds in all areas closed and well conducted to the stethoscope, being loud and booming.

C. ALIMENTARY SYSTEM.
Lips were bright red in colour but dry. Tongue was covered with a delicate white fur through which the red papillae could be clearly observed: dry. The fauceal region was reddened and injected but the tonsils were not enlarged.
Abdomen gave a heaving movement with respiration, particularly marked in upper part. On palpation there was nowhere any resistance, the hand sinking easily into the soft yielding parietes. Liver and spleen were not enlarged to palpation and soft scybalous masses could be felt.

D. GENITO-URINARY SYSTEM
Kidneys were not palpable: external genitalia normally formed.
Urine was orange in colour: S.G. 1024: acid in reaction with no abnormal constituents.

E. NERVOUS SYSTEM
Consciousness and emotional tone have been referred to above. There was no neck rigidity. Tendon jerks were all present, equal on the two sides and quite brisk.
Pupils were regular and equal reacting briskly to light. There were no abnormal eye movements.
Ears: both eardrums were a definite pink colour, showing a slight degree of inflammation.

COURSE.
The next day the child was still very flushed and feverish with a high temperature. The cough was still hard, dry and apparently unproductive. She coughs violently when she starts to cry. By Auscultation at the right base on the following day coarse bubbling noises occurring both in inspiration and expiration were heard. These were crepitations. An X-Ray taken at this time showed a slight but definite area of opacity at the right base very suggestive of a small patch of broncho-pneumonia.
Two days later the crepitations had given place to rhonchi in all areas. The temperature was now settling and general condition improving. At this stage the right tonsillar gland was found to be enlarged but not tender or inflamed. The urine was bright yellow containing pus cells 3-6 per H.P. field.

Throat swab showed neither Cl. Diphtheriae or Haemolytic Streptococci.

Under treatment with sulphamethazine - ½ gm. 4-hourly - and an alkaline mixture - potassium citrate and sodium bicarbonate, grains XX of each 4-hourly - combined with a steam kettle, the illness cleared up satisfactorily.

**DIAGNOSIS:** the case is one of acute bronchitis, which has descended the respiratory tree giving a localised area of broncho-pneumonia.

**AETIOLOGY.**

Defences of the respiratory tract play an integral part in protecting the tract from marauding influences both endogenous and exogenous.

These defences consist firstly of a mucus blanket which acts like a sticky flypaper spread in a thin transparent layer and kept constantly on the move by the second important factor i.e. ciliary action.

Muco-ciliary activity extends from the nose where it is aided by fine hairs which enmesh organisms, through the nasopharynx, larynx, trachea to bronchi, as far down as a point where the smallest bronchioles expand into terminal alveoli. This mechanism is the primary defence of the respiratory tract, but if the mucus stagnates it may act as a nidus for the luxuriant growth of bacteria. In the healthy respiratory tract, however, the mucus is swept along by the corkscrew action of the cilia and therefore flows to the exterior carrying organisms with it.

The exquisitely sensitive larynx protects the lower respiratory passages. When irritated the cough reflex takes place causing forcible expulsion of foreign material. Organisms passing beyond larynx /
larynx must still run the gauntlet of muco-ciliary activity in trachea and bronchi and only if all these fail to stem the advance will the battle be fought in the lungs which constitute the last line of defence, pitched in many ways on unfavourable terrain.

In this case the primary defences have failed to the extent of producing a bronchitis and with this condition especially in children, there is the ever-present danger of spread to the lung parenchyma with bronchitis and broncho-pneumonia.

Bronchitis can be caused by downward spread of a coryza. The cold is neglected and "goes to the chest". It may also occur as an incident in one of the specific fevers - measles, whooping cough, influenza and enteric fever. Invasion by commensal organisms or organisms of chronic respiratory disease can take place when resistance is lowered e.g. by bad food, overcrowding, etc.

The infection is usually mixed, the commonest organisms found being pneumococci, streptococci, Friedlander's pneumobacillus and Pfeiffer's bacillus.

The mucous membrane of the bronchi becomes hyperaemic, red and congested. In severe cases it has a velvety appearance often likened to a damask rose.

Microscopic examination shows desquamation and degeneration of the ciliated epithelium with infiltration of the bronchial wall by inflammatory cells and a secretion of mucin in the lumen.

The clinical picture is extremely variable depending on extent and severity of infection. Generally it may be said that the further down the respiratory tract infection descends, the greater systemic upset is occasioned. Therefore the picture can vary from a mild tracheo-bronchitis with little malaise and no pyrexia and systemic disturbance to a very severe grade of case in which the infection spreads to the finer tubes producing a suffocative bronchiolitis practically indistinguishable clinically from a true broncho-pneumonia with its typical "patchy" distribution of lesions in both lungs. In young infants this danger of broncho-pneumonia is extremely real and every case of bronchitis should be treated as a potential candidate for broncho-pneumonia and therefore the illness should command careful supervision and treatment if this often lethal complication is to be obviated.
SOCIAL CONDITIONS.

In comparison with case V this case may seem in the nature of an anticlimax but, nevertheless, the same factors though in less degree are operative here too.

FAMILY consists of father, mother and four children.

Father: aged 37, is a rubber worker by profession. He has been recently demobilised from the army after serving some years in Italy and the Middle East. He is described as a healthy man but suffers from "winter colds". At present he is on night shift and works very long hours. He is always "dog-tired" after his work. He is said to be a "good father", keen on his children and desirous of bettering their station in life. He does not like the locality in which they live.

Mother: aged 38, was a small, anaemic-looking person, dressed rather shabbily in old clothes but quite clean. She seemed of moderate intelligence. Like her husband she is also subject to frequent colds and always has a "tickle" in the back of her throat. She seems to have been a good mother with much sound common sense but wishes she and the children could get out of town into the country and sighs for a little more money to spend on such things as food and clothing.

Children.

Catherine, the eldest aged 14, has always been healthy, her only previous illness being chicken-pox. William, aged 10, is troubled with "tonsils and adenoids" for which the doctor has advised an operation. He is subject to frequent colds and has a continuously "running nose" and frequent bouts of coughing. Norman, aged 8, had a bad attack of bronchitis two weeks ago and has always been "troubled with his chest". Anne herself, aged 2 yrs. 11 months, has never had any chest trouble prior to this illness. Even with her poor social background she was yet an attractive child, a sentiment well expressed in the words of Shakespeare:

"Sweet are the uses of adversity which like a food, ugly and venomous, wears yet a precious jewel in its head".

The three elder children go to Dalry School. The mother says they are all "keen on it". She describes this part of the town as "very smoky", an important factor predisposing to respiratory infections in general.

House.

The family live in the second flat of a tenement in Dalry, the whole block giving accommodation to between 20 and 30 families, there /
there being three landings in the tenement. Their home has two small rooms one a kitchen and the other a "sitting-room". Six people living in such small space is a definite example of overcrowding. Bedding accommodation is adequate, the two boys sleeping in one bed, and the girl and mother in a "single" bed. The baby had a cot to herself but this broke recently and since then she has been sleeping with her mother. The father is on night shift and sleeps during the day.

There is a small W.C. on the landing shared by three families. There is no hot water and for cooking etc. all water must be boiled up. The mother admits she is definitely "cramped for room".

The house is poorly ventilated, the family "never bothering about fresh air". It is often very stuffy with a vitiated atmosphere. The house, according to the mother, is kept "as clean as possible".

There is no dampness in this vicinity but the sun is seldom seen from one year's end to another. The rooms have been cold this winter.

Again we find the familiar story of striving to "make ends meet"; again the tale of scrimping and saving, of doing without necessities in an attempt to "put away a little extra". This family must typify thousands of working class families of the present day. The mother, industrious and devoted to her children, handicapped in every way and at every turn by overcrowding, dirt and poverty not to mention the wartime exigencies of food and fuel, yet carries on gallantly, taking each hurdle in her stride.

One can easily understand the prevalence of upper respiratory infections in a household such as this. Living in such intimate contact with each other in their overcrowded apartment is a perfect paradise for spread of infection by direct contact, droplet method or through the medium of fomites. Upper respiratory tract infections are always most prevalent where resistance is low and social conditions poor. Bad nutrition, overcrowding, chilling and exposure to draughts, rapid changes of temperature etc. all lower the resistance of the mucous membrane of upper respiratory tract and make it much easier for infection to occur, either exogenous from another person or endogenous spread downwards by bacteria normally commensal. Mention may be made of the good effect of vitamins, especially A, on maintaining the integrity of epithelial surfaces and thus raising the standard of that ill-understood quality which for want of a better name we still term "resistance".
JUVENILE RHEUMATISM

The clinical notes of two such cases will be described, the aetiology of the condition will then be discussed and finally the social aspect will be presented.

CASE VII.

Name of patient Douglas Sandilands
Address 12 Robertson's Close, Cowgate
Age 7 years 8 months
Birthday 21st June
Date of admission 17.2.46
Date of examination 24.2.46
Recommended by Cowgate Dispensary

Family.
Father aged 37
Mother aged 36
Children 3 - two living.
Female died at 3 days, premature.
Male 16 years
x Male 7 years 8 months.

Complaints
1. Pain in left leg (one day)
2. Boil on neck (five days)
3. Loss of appetite (two weeks).

HISTORY.
The afternoon before admission the child was sitting at the pictures when suddenly his left leg became very painful especially in the region of the hip joint. This persisted for the rest of that day but by night the left foot and ankle were the chief sites of pain. That night he was very restless, tossing about incessantly and unable to sleep. His mother says he was very irritable; he had great thirst and felt very hot. On the day of admission he was still very flushed and there was still pain in the left hip and ankle joint. He has had no history of sore throat recently.
Headaches have been complained of lately in the mornings. There has been no vomiting and the bowels have been quite regular. The appetite however has been poor for some weeks and the mother thinks the boy has lost weight recently.

Previous History./
Previous History.

The antenatal period was uneventful; the child was born at home being a full-time baby and a spontaneous delivery. The birth weight was 7½ lbs. He was breast fed for four months and did very well, after which he received cow's milk. He was vaccinated at six weeks and has been immunised at school. He had measles at three years, whooping cough at four years and chicken-pox at four years. No history of Scarlet Fever.

GENERAL EXAMINATION.

A. STRUCTURE.
The height of the child was 51 inches, which compares favourably with the usual standards. Proportionate relationship of the various parts was good.

Anatomical regions.
HEAD was uniformly vaulted; circumference was 19½ inches - slightly small for this age. Anterior fontanelle was closed and bitemporal diameter was smaller than biparietal. There was no bossing and no cranio-tabes.
FACE was normally proportioned as regards the head. Eyes were blue, bright and intelligent-looking. The long axes of the palpebral fissures were parallel.
NOSE was delicately shaped and finely pointed.
EARS were not unduly large and lobules were free.
MOUTH was in good proportion and not gaping.
CHIN was well formed and pointed. The boy had 20 teeth which were in good condition, showing no evidence of caries.

THORAX: the general shape was ovoid with no abnormality of structural formation. Costo-chondral junctions were not visible.

ABDOMEN was flat especially superiorly. It was not distended and was evenly continuous with the Thorax.
Arms were thin and slender, the fingers long and tapering with no clubbing. Wrist epiphyses were not visible and the carrying angle unaltered.
Legs were in good proportion to the rest of the body. No ankle epiphyses were visible and the toes were not clubbed.

B. NUTRITION.
The general nutrition was a little below average. The ribs could just be made out and intercostal spaces were visible. On the abdomen a thin layer of subcutaneous fat could be picked up between finger and thumb.
Limbs were thin and the face rather cadaverous looking.
C. SURFACES.

SKIN: The cheeks were flushed as was the forehead. There was no mottling in the limbs. The skin was moist and perspiring. There was no erythema or rash. The texture was soft, smooth and resilient; it was warm to examining hand. There was no cyanosis and no jaundice, but a few scratches on the skin of the hands and wrist. Hair was black, luxuriant and eyebrows well marked. Scalp was clean.

MUCOUS MEMBRANES: lips were of full red colour and quite moist. Tongue was moist with a delicate white fur on the dorsum. The throat was not congested, but the left tonsil was definitely enlarged. This did not apply to the right side. Conjunctiva was pinkish-red in colour, with no evidence of anaemia.

D. MUSCULAR CONDITION.

The muscular tone was satisfactory. The muscles of the left leg were extremely and exquisitely tender, and movement of the affected limb appeared to be very painful. Activity was limited at this time. The child was most comfortable lying on his back with hip and knee flexed.

E. MENTAL CONDITION

Consciousness: the boy was well aware of his surroundings; there was no coma.

Intelligence: he was a quiet, rather inexpensive child, with very limited powers of conversation. He seems to have been a typical Cowgate "tough".

EXAMINATION of SYSTEMS.

A. LOCOMOTOR SYSTEM.

There was no local swelling of the affected joints or increase in local temperature. The left leg lay flexed at hip and knee, abducted at hip and slightly everted. Flexion of hip and knee was painful. The whole limb was tender from hip to ankle, but no point of maximal tenderness could be found, the tenderness appearing to be generalised over musculature of left leg.

B. CARDIO-VASCULAR SYSTEM.

No cyanosis was detectable, no dyspnoea and no oedema. No distended veins were seen. Pulse rate was rapid - 140 per minute. It was regular in time and force; volume was rather poor and thready. No change could be appreciated in the character of the pulse wave and the arterial wall was not palpable. Heart: There was no epigastric pulsation, but the apex beat was slightly diffuse. It was located in the fifth interspace within the /
the mid-clavicular line. No thrill was imparted to the examining hand. Heart sounds in the mitral area were faintly "muffled". This applied particularly to the first sound. There was no reduplication of either sound and no murmurs were present. In the aortic area the sounds were comparatively loud and booming with some accentuation of the aortic second sound again no murmurs being heard.

C. RESPIRATORY SYSTEM.
There was no history of cough, no dyspnoea and no cyanosis. The breathing was quiet and the thorax expanded well and symmetrically. There was no dullness on percussion, the lungs yielding a uniformly resonant note throughout. The breath sounds were everywhere vesicular and no accompaniments were audible. Vocal resonance was normal. Throat swab was negative for haemolytic streptococci. X-ray of the chest A-P view showed no lesion.

D. ALIMENTARY SYSTEM.
There has been no vomiting and the bowels are regular. The tongue had a white fur and the left tonsil was enlarged. Abdomen moved well with respiration. No enlargement of liver or spleen was detectable on deep palpation and there were no other palpable masses.

E. GENITO-URINARY SYSTEM.
Kidneys were not palpable as external genitalia were well formed. The urine was lemon in colour S.G. 1016, neutral in reaction and with no abnormal constituents.

F. HAEMOPOIETIC SYSTEM.
B.S.R. on admission was 12 mms. per hour. Haemoglobin was 85%; R.B.C. 4,000,000 per cubic m.m.; W.B.C. 12,000 per cubic m.m. A lymph gland in the posterior triangle on the right side was slightly enlarged but not tender. There was no lymphatic enlargement in Axillary or Inguinal regions.

G. NERVOUS SYSTEM.
Temperature on admission was 100°F. There were no signs of Meningeal irritations. Pupils were equal, regular and reacted to light. All tendon jerks were present and brisk, equal on the two sides. Plantar response was flexor.

Provisional Diagnosis /
Provisional Diagnosis was one of acute rheumatic Arthritis and the patient was put on Sodium Salicylate and Sodium Bicarbonate, 30 grains of each 4-hourly. Complete bed rest was enforced. In a few days the temperature settled and the B.S.R. came down to normal limits. The pain subsided and so far evidence of Cardiac damage has been inconclusive.
CASE VIII.

Name of patient  Jean Howieson
Address  10 Forrest Hill, Galashiels
Age  11 years 4 months
Birthday  3rd October
Recommended by  Dr. McLay
Date of admission  18/3/46
Date of examination  24/3/46.

Family
Father  aged 46  scavenger
Mother  aged 41
Children  7
Male  17 years
Male  16
Male  14
Female  13
x Female  11 years 4 months
Male  10
Female  4

Complaints
1. Cough  
2. Pallor  } three weeks.
3. Breathlessness  

HISTORY.

The girl was quite fit until three weeks ago when she started to cough during the night. At first dry and irritating, the cough has now become loose and moist, but is always worst at night, when it occurs in paroxysms, or if she is out in the open air. The sputum is clear and frothy. There has never been any blood in it.

Formerly of quite a good rosy colour she has been very pale for the past three weeks, but the mother has never noticed her blue at all. She has been very listless for a similar time, having "no life in her". She preferred to sit by the fire and had no desire either to go to school or to play outside with her companions. She has never been noticed to be feverish during this period. Recently she has been becoming progressively more dyspnoeic, any slight exertion such as going upstairs being attended with considerable distress and discomfort. Bowels are regular /
regular - takes a laxative once per week. Appetite is rather capricious; no urinary symptoms and no nocturnal frequency. There has been no history of sore throat in the past few months, but she tells a vague story of "growing pains" about three months ago. This consisted of a more or less generalised aching sensation most severe in the legs. There have been no rashes.

Previous History.

The mother was well during the antenatal period. It was a precipitate birth, full-time with a birth weight of 7 lbs. She was breast fed for three months and then put on to pasteurised milk on which she gained weight satisfactorily. She cut her first tooth at the age of 7 months, "talked and walked early". She has not been vaccinated, was immunised at 8 years. During her childhood she has suffered from frequent headaches - ? acidotic. She had growing pains in the left leg on a few occasions and sometimes they were generalised. Three years ago she had a brisk epistaxis. The mother has always felt that Jean was "weaker" than her other children.

GENERAL EXAMINATION.

A. STRUCTURE.

The height was 53½ inches; the proportions of the various parts were on the whole satisfactory, but the legs seemed rather long as compared with the trunk.

Anatomical regions.

HEAD. The cranium was dome-shaped and arched antero-posteriorly. Circumference was 20 inches and exterior fontanelle closed. There was no bossing, no abnormal prominences, no cranio-tabes and general shape of head was oval.

FACE was in good proportion to head. Eyes were bright and shining, and the long axes of palpebral fissures horizontal. The eyes were definitely not sunken, nose was thin, pointed and tapering, ears small and delicately shaped. Mouth was rather small and drooped at corners. Chin was pointed sharply and jaws were symmetrical. There were altogether 19 teeth; one extra one was out of position and placed in gum in front of others. The teeth themselves were in a very poor condition showing an advanced degree of decay, but the breath was not foetid.

THORAX /
THORAX was oval in shape with no structural defect visible. Costo-chondral junctions were not visible. There was great pulsation of the whole precordium and epigastrium.

ABDOMEN was flat with no distension and some hollowing in both flanks.

The arms were proportionate, thin, slender and fragile, the fingers were thin, delicate and tapering with a slight but definite "beaking" of the terminal phalanges.

Legs also were long and thin, ankle epiphyses not enlarged and the toes were not clubbed.

B. NUTRITION.

The general bodily nutrition was poor. The ribs stood out prominently, possibly in part due to the diffuse pulsation in the precordial area. The fatty layer of the abdomen was manifestly diminished. Limbs were thin with little subcutaneous fat and the cheeks were certainly not chubby.

C. SURFACES

SKIN: was pale generally, not even in the cheeks was there any flush. It was smooth, moist and perspiring especially in the axillae. No petechial haemorrhages were visible anywhere. There were several small circumscribed port wine marks on both arms. Hair was lank, lustreless, dull and thin. Eyebrows well marked and eyelashes tapering and curved at the ends.

MUCOUS MEMBRANES: The lips were definitely pale and this applied also to the tongue which was moist and clean with no evidence of furring. The throat was not congested and both tonsils were enlarged. The conjunctivae were a pale pink colour, betokening some degree of anaemia. No cyanosis and no jaundice were present.

D. MUSCULAR CONDITION.

Muscular tone was less than average, a certain weakness and flaccidity being obvious. Power, as tested by hand grasp and pushing against resistance, was better than expected. Activity was negligible. The child lying on her back unwilling to move because of the dyspnoea present even at rest in bed.

E. MENTAL CONDITION.

The girl was fully conscious, nervous and very apprehensive and worried about herself. She was also inclined to be introspective. She was a good conversationalist and her intelligence was above the average. She was left-handed.

EXAMINATION /
EXAMINATION of SYSTEMS.

A. CARDIO-VASCULAR SYSTEM.
There was no cyanosis, great dyspnoea, even on the slightest exertion, but no oedema was present and capillary pulsation could not be elicited. The pulse rate was 130 per minute, regular in time. Volume was very poor and the pulse was thin, thready and at times could hardly be felt at all. Arterial wall was not palpable.

Heart: Pulsation was very obvious in the precordium and extended far out towards the Axilla and downwards into the Epigastrium, and up into the neck. It was a heaving movement corresponding to Cardiac systole. The apex beat was located in the sixth interspace, fully an inch outside the mid-clavicular line. On palpation a marked systolic thrill was felt at the apex just like the purring of a contented cat.

Auscultation showed that the heart rate was fast; there was no apex-pulse deficiency. A loud rumbling systolic murmur was heard in the mitral area. This was transmitted up into the axilla where it could be plainly heard. Also a softer rasping presystolic or mid-diastolic murmur was present in a localised area.

The heart sounds in the mitral area were difficult to recognise due to the loud cardiac bruits. In the aortic area no systolic murmur was audible, but a softer blowing diastolic could be heard transmitted downwards along the left lateral margin of the sternum.

B. RESPIRATORY SYSTEM.
She has a history of cough and dyspnoea of three weeks' duration. There is no stridor and no nasal discharge. Respiratory rate is 32 per minute. Thoracic expansion was poor due to the gasping character of the respiration. It was practically confined to the lower part of the chest.

Percussion showed no dullness generally, but I was of the opinion that the note at the left base was flatter than it should have been.

Breath sounds were everywhere vesicular and a few fine tinkling almost consolating crepitations were diffusely distributed over each lung field.

Vocal resonance was equal on both sides and not altered in quality.

C. GENITO-URINARY SYSTEM/
C. GENITO-URINARY SYSTEM.
Kidneys could not be felt. The external genitalia were normal and the urine showed nothing of significance.

D. NERVOUS SYSTEM.
The child was apprehensive as already mentioned. There was no neck rigidity. Pupils were equal, regular in outline, symmetrical and reacted well to the light stimulus. Knee jerks were very brisk indeed as were the ankle jerks, probably due to the nervous condition of the patient. Plantar response was flexor. Ear drums showed no pathological finding.

E. DIGESTIVE SYSTEM.
Tongue was moist and clean and tonsils enlarged on both sides. There was no evidence of pyorrhoea although the teeth were in a shocking condition. The abdomen moved but slightly with respiration. Epigastric pulsation has been referred to above. On palpation, the recti on both sides showed a slight degree of guarding. This could however be overcome once the patient's cooperation was gained and was functional in nature. The liver was found to be enlarged and could be felt well out to the side, one and a half fingers' breadth below the costal margin. It was smooth, soft and not tender. The spleen was not enlarged either to percussion or palpation. No palpable masses were felt elsewhere.

F. LOCOMOTORY SYSTEM.
No symptoms referable to the joints have been complained of. There was no swelling, tenderness or inflammatory redness of any joint at the time of examination.

Provisional Diagnosis.
The condition is one of severe Rheumatic Carditis with no Arthritic involvement and no history of Chorea or of Scarlatina.

X-Ray taken soon after admission showed gross enlargement of the cardiac shadow of the typical "mitral shape" i.e. affecting mainly the right side of the heart. Each lung field showed some opacity, mainly basal in distribution indicating some congestion and pulmonary oedema.

Blood Culture was negative; no growth of organisms after three days. The B.S.R. at the time of admission was 30 mms. per hour.
COURSE.

Adequate rest and hospitalisation have done this case some good, but she is still very breathless and considering the extent and advanced condition of the Cardiac lesions the ultimate prognosis is very poor indeed.

She has been treated with Pheno-Barbitone grains $\frac{1}{2}$ T.I.D. and Syrup of Codein Phosphate one drachm per day for her cough. She had a recurrence of Epistaxis on the night of the 25th, associated with Tachycardia to the extent of 158 per minute. Throat swab showed no Cl. diphtheria and no H.S.
AETIOLOGY of JUVENILE RHEUMATISM.

Like tuberculosis rheumatism is essentially a "social disease" and does not lag far behind it as regards repercussions on the community. It has been estimated that after an attack of clinically demonstrable rheumatic fever 1/3 of the children will escape carditis, 1/3 will die in ten years from continued and recurrent attacks of acute rheumatic carditis and the remaining 1/3 are crippled by the disease and die between the ages of 20 and 40 of Congestive Heart Failure. If we wish to see the process in its actual making it is to the growing child we must go.

There are really three clinical pictures interwoven in the rheumatic syndrome, these being:

1. Carditis
2. Arthritis
3. Chorea.

These may occur in any combination i.e. chorea and carditis, carditis and arthritis etc., but it is very rare for arthritis and chorea to occur together. This is probably a pain-saving device of the part of nature.

Carditis is mentioned first to emphasize its importance. Rheumatism is essentially a disease which "licks the joints but bites the heart," and it is folly to regard it primarily as a disease of the joints with involvement of the heart as a "complication". Rather should we picture it as a widespread affection of small arterioles all over the body setting up a condition of inflammation, acute, subacute or chronic, particularly noticeable around the joints, in the heart (pancarditis), and in the subcutaneous tissues (rheumatic nodules).

The malady is essentially one of childhood but is modified by age i.e. chorea, nodules and especially carditis, so common in children gradually decline as adult life is approached when arthritic involvement comes to dominate the picture and unless previously present carditis assumes a subsidiary role. It is of the utmost importance to be aware of the often peculiarly insidious onset of rheumatism in the child. In the majority of cases there is no history of acute arthritic symptoms, but more often the story is vague and inconclusive, the child merely being "off colour", pale, probably and "out of sorts" with vague "growing pains", and even in such a case auscultation may already reveal irreparable cardiac damage. The disease also tends to be relapsing /
relapsing in childhood, each successive attack leaving the heart noticeably changed for the worse and the whole picture is one of a long continued, smouldering process breaking out now and again, often for no apparent reason, into fresh bursts of activity.

In a recent statistical survey carried out at R.H.S.C. Edinburgh the cases were divided into three groups - Choreic cases, Arthritic cases and Primary Carditis cases. An extensive follow-up was done extending over many years and the following figures were obtained.

1. **CHOREIC CASES**
   - Heart normal: 60%
   - Organic cardiac lesion: 25%
   - Dead: 14%

2. **ARTHritic CASES**
   - Heart normal: 36%
   - Organic cardiac lesion: 34%
   - Dead: 30%

3. **PRIMARY CARDITIS CASES**
   - Heart normal: 18.5%
   - Organic cardiac lesion: 33.8%
   - Dead: 47.7%

4. **General Survey of All Types**
   - Heart normal: 43.4%
   - Organic cardiac lesion: 29.1%
   - Dead: 27.4%

These figures are self-explanatory and need no further comment.

Before discussing predisposing factors to the rheumatic state, the present day concept of the bacteriological causation of rheumatism will be considered. The streptococcus has for long been thought to play a big part in the pathogenesis of the condition and in 1900 Poynton and Payne claimed they had isolated the causative organism, the so-called "diplococcus rheumaticus", a strain of streptococcus. Other workers, however, failed to confirm these findings and the fluid from the lesions is practically always sterile.

An undoubtedly important aetiological factor is the occurrence of previous tonsillitis and sore throat probably H.S. in origin: it is also important to note the typical latent period following the sore throat - 10 to 20 days after it - before the development of /
of Rheumatic symptoms.

Assuming a streptococcal infection we can consider three possibilities.

1. The organism has invaded blood and has localised in synovial membrane of joints and in serous sacs producing an acute inflammatory reaction with a polyarthritis, pancarditis and rheumatic nodules. But to this conception there are two grave objections. In the first place streptococcal lesions of the synovial membranes etc. are usually purulent but with rheumatic fever no suppuration occurs, and secondly the lesions of rheumatism as already mentioned are practically always sterile.

2. The organism may produce a toxin which is specialised to act mainly on serous and synovial membranes.

3. The prevalent view at the present time is that the rheumatic state is due to absorption in latent period of streptococcal products which produce a state of allergy (bacterial hypersensitivity). In the allergic body normally bland products can act as powerful irritants (e.g. tuberculin reaction).

Arguments in favour of Rheumatism as an allergic reaction.

1. Antecedent infection of throat with H.S. and evidence of these organisms in throats of rheumatic cases.

2. Occurrence of recrudescence of rheumatic fever after a streptococcal throat infection.

3. The latent period before onset of symptoms which is thought to be necessary for the various metabolic changes to take place.

4. Involvement of joints, typical of allergic reactions e.g. serum sickness.

5. Skin eruptions also very typical of allergy. These include erythema multiforme and erythema nodosum.

6. Allergic skin reactions with extracts of cultures of haemolytic streptococcal in rheumatic subjects.

7. In quiescent cases rheumatic syndrome may be induced by the injection of above-mentioned extracts.

8. An anti-haemolysin persists in serum of cases.

Experimental /
Experimental Evidence.

<table>
<thead>
<tr>
<th>Antecedent history of H.S. infection</th>
<th>Rheumatic cases</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.S. present in throat</td>
<td>78%</td>
<td>46%</td>
</tr>
<tr>
<td>Group A: H.S.</td>
<td>87%</td>
<td>42%</td>
</tr>
<tr>
<td>Allergic skin reactions to extract of H.S.</td>
<td>75%</td>
<td>24%</td>
</tr>
</tbody>
</table>

Lichtwitz (1944) suggests that rheumatism is essentially a symmetrical sensitisation of mesenchymal tissues due to lack of control of antibody formation by the autonomic nervous system. He also suggests that later there takes place a conditioning of the synapses of the autonomic nervous system to a particular pattern allowing other factors e.g. mental and physical fatigue, bad nutrition, overcrowding, dampness etc. to favour an exacerbation of the rheumatic state. He considers all rheumatic subjects as essentially a group of patients with a poor serological response to sensitisation and antibody formation and emphasises the unity of all the chronic rheumatic diseases, i.e. in children, we have a cellular sensitisation by haemolytic streptococcus with or without a virus and the clinical picture is that of juvenile rheumatism. In adults a similar slow response in antibody formation, increased by fatigue, worry and emotional stress may be grafted on e.g. a dyscrasia of uric acid metabolism or an endocrine or sympathetic - parasympathetic instability and when such an individual becomes sensitised to chronic infection by bacterium or virus or both or to food or a drug the clinical picture of gout or of rheumatoid arthritis appears. Local trauma and local hyperaemia establish site of an attack in much the same way as hyperaemia occurs at the site of an Arthus phenomenon (focal necrosis on intravenous injection of antigen into sensitized animals).

Diseases due to haemolytic streptococci all appear as one aetiological unit. Let us consider the example of a H.S. of high virulence spreading rapidly from person to person in a community. If it gets into the throat of one person it may merely set up a sore throat with possibly slight pyrexia and no other symptoms i.e. the person is quite well again within a week or so. In another person the same strain of organism might again set up a sore throat, but if the patient had no immunity to the erythrotoxicant toxin the syndrome known as scarlatina might develop. Both conditions are due to the sense organism and therefore the first person, though showing no complications himself, may infect others with scarlatina.

Again /
Again the organism may be very virulent and spread into the blood stream producing a fulminating septicaemia and pyaemia with a very grave prognosis.

Other people might show erysipelas or cellulitis and finally if allergy is present rheumatic fever may develop. Such a spread may also cause otitis media, mastoiditis, meningitis, and bronchitis.

Rheumatism is a disease, widespread in the temperate zones, but rare in tropics. Attempts have been made to show that certain physical types of person are more susceptible than others, i.e. the Rufus type to Rheumatic Fever and the asthenic, vesicoprototic and emotional type to rheumatoid arthritis but this comparison cannot be pushed too far. Social conditions are extremely important in its causation - they will be reviewed later. The age incidence is striking, the disease being very rare under three years of age and still uncommon till 5. After that it rises sharply to a peak between the ages of 8 and 10. After this the number of first attacks falls off as puberty is approached, but recrudescences are frequent at this age. The sex ratio shows that girls are slightly more often affected than boys i.e. F : M equals 1.7 : 1.

PATHOLOGY.

Fibrous tissues and serous membranes are attacked with the production of the Aschoff body, a proliferative lesion comparable with the miliary tubercle in Tb. Earlier than this according to some observers there occurs a degenerative change in the collagen - fibrinoid degeneration of Klinger so that the connective tissue assumes a lattice-like appearance like canalised fibrin. An exudative lesion consisting of the pouring out of serum also occurs.

Aschoff body as seen in the myocardium is lemon shaped or oval in shape, may be just visible to the naked eye and is paravascular in distribution being related to the tunica adventitia of a small arteriole. It has four components:-

(a) Centre of necrotic material,
(b) Aschoff cells which are epithelised in type, usually multinucleated and with a basophilic cytoplasm. They are probably derived from the histiocytes and are really giant cells resembling those of Hodgkin's disease rather than Tb. giant cells.
(c) Lymphocytes and Plasma cells with an occasional polymorph.
(d) Fibroblastic proliferation with subsequent fibrosis and cicatrisation.

Cardiac /
Cardiac lesions are in the nature of a pancarditis affecting fibrous tissue in epi-, myo- and pericardium. Aschoff bodies are seen most typically in the myocardium but also occur in more diffuse form in valves, synovia skin etc. Exudation characterises the early phases and is followed by proliferation. In the valves post-inflammatory adhesions and contraction occur with subsequent stenosis and incompetence. Myocardial weakness and pericardial adhesions complete the picture.

Valvular lesions affect mitral, aortic, tricuspid and pulmonary valves in order of preference. In fection appears to begin in valve ring. In the gross the valves are thick swollen and inflamed. Along the line of closure of cusps are found a row of tiny, bead-like warty nodules called vegetations. They occur on auricular surface of mitral and ventricular surface of aortic. Firm and adherent, if rubbed off, the underlying surface is raw. The mural endocardium may be involved i.e. with the development of McCallum Patch which is found on the left auricle above mitral valve. It becomes scarred and contracted and may form an ideal nidus for lodgement of streptococcus viridans and the development of subacute bacterial endocarditis.

The typical myocardial lesion is the Aschoff body and these are most abundant at base of interventricular septum and in the left auricle. They are usually paravascular in distribution being related to medium sized arteries.

Pericardial lesions: rheumatism is the commonest cause of pericarditis. The exudate is sero-fibrous never purulent; chief element is fibrin and when deposited on both surfaces the membrane presents a "bread and butter" appearance.
SOCIAL FACTORS in relation to RHEUMATIC INFECTION.

Two cases are considered. The first of these, Case VII, is Douglas Sandilands aged 7 years 8 months. He was a fairly straightforward case of acute rheumatic arthritis with only minimal signs of cardiac involvement. There was no previous history of sore throat or of scarlatina and the child did very well with rest and hospitalisation.

Family consists of father, mother and two children living. Father: aged 37, works in Duncan's Chocolate Factory from 7 a.m. until 5.45 p.m. He and his wife were incompatible and he is now living apart from her and the children. He had an attack of rheumatic fever at the age of 29 and since then has been subject to periodic "joint aches" especially in the winter-time. The influence of heredity on rheumatism is difficult to gauge. It has long been recognised that several members of a family are frequently affected by Rheumatic Heart Disease as also are successive generations. There MAY be an inherited tendency, but as adverse environmental factors are so likely to affect successive generations living under the same social conditions it is reasonable to blame the environment rather than any definite hereditary taint.

Mother: aged 36 was a small, assertive not very intelligent person dressed shabbily and not very clean. She was bitter at her husband and at life in general. Her health has been quite good recently but some years ago she had an attack of "pleurisy" which kept her in bed for two weeks. There was no hospitalization and apparently no follow-up for Tb. In my opinion she was a poor mother, being rather callous as far as her child was concerned. She admitted she "hadn't cared for him as well as she might have". It might be mentioned in this connection that M.R.C. report No. 114, 1927, showed that maternal care was inferior, amount of exposure greater and clothing less adequate among the rheumatic group than among the controls. Also illness was more frequent among the parents of rheumatic children.

Children: the eldest boy, aged 16, has been very healthy as a child and is now working. He has had no rheumatic history and never suffered from "growing pains" as a child.

Douglas, the case under consideration, has had no previous history of sore throats and no scarlatina or otitis media. Lately he has been anorexic and has lost weight. The child does not seem to have been well cared for. Living in an atmosphere of an unhappy /
unhappy marriage he has been definitely neglected. Many times he has been soaked and has had to sit about the house with wet clothes and wet feet, either because no change was available or because the mother was too apathetic to bother. He has sometimes felt "chilled to the bone". Again the bed he sleeps in, like the house itself, is damp especially during the winter and he has often felt this at night. He often has "colds", but these seldom "go to the chest". He is compelled to take his meals out and careful enquiry into the dietetic history showed that the caloric intake is grossly inadequate. The effect of the good and liberal diet given in hospital has been very pronounced and he admitted to me that he was better fed than he had ever been in his life before. It is interesting to note that dietary factors have been often invoked as a cause of the rheumatic syndrome. Excess of starch and lack of fat in the diet have been blamed by some workers and various vitamin deficiencies have been held responsible by others, but Schlesenger points out that such factors are related to unhygienic home conditions and poor maternal care.

House: consists of one apartment in a tenement in one of the worst and most densely populated slums in the city. Formerly four people occupied this room but since the father has left, Douglas shares it with his mother and brother. The worst feature of the house is dampness which can be seen seeping through the walls, especially bad during the winter-time. As already mentioned the two beds in the room are frequently damp and they often hear the "drip-drip" of water at night. Window space is poor and the house is sunless and dull, but often very draughty in windy weather. Fuel has been short this winter. There is never any hot water and this must be boiled up on the fire as there is no stove. A small W.C. is situated outside the house and is shared by six families and often more. From description it appears to be anything but modern in design.

Again a typical social problem is presented. Though overcrowding is not a factor in this particular case, bad housing, faulty dietary habits, marital incompatibility, with all its repercussions both social and ethical, defective sanitation, and possibly heredity are all in evidence. As for tuberculosis, bronchitis and gastro-enteritis, such an environment is ideal for the ministrations of the "rheumatic virus". Rheumatism is rare in the upper classes and where housing conditions are good, all too common in the lower working classes. Rheumatism occurs 20 to 30 times more frequently among the poor children of an industrial town than among children of the well-to-do.
Wallace believes that rheumatism is not most prevalent in the very lowest stratum of society, but hits most hardly at the poor artisan family such as is typified here. It has a definite senso/indidence being specially widespread in cold, damp and wet weather and incidence of cases is therefore highest at the end of winter, January to March being the peak months. It is easy to understand this as it is just at this period of the year that the body is at its "lowest ebb" and less capable of withstanding the onslaught of rheumatic infection. In people living in such poor economic circumstances, holidays in the country are short and often impossible for financial reasons therefore minor catarrhal infections and acute illnesses tend to become protracted.

As to the mode of infection we can at present only speculate, but assuming the causative agent to be a haemolytic streptococcus with or without a concomitant virus it is reasonable to suppose the direct contact, droplet infection and infection by fomites are the means whereby the disease is transmitted. Such factors are especially liable to be applicable in overcrowded and overpopulated districts and many statistical surveys have shown the prevalence of rheumatic infection in just such areas.

Although this case was clinically mild and so far the heart appears undamaged, one must however view the future with some apprehension. If the child could be removed from his environment and well looked after, one could say that the ultimate prognosis was excellent. However, if he returns to his bad home conditions the stage will soon be set for a recurrence of the infection and the whole process may smoulder on for years till eventually the heart becomes permanently affected. It is also extremely difficult to enforce adequate rest for the patient under home conditions like these. Such a boy should not be pitch-forked suddenly into the rough and tumble of life, but the keynote of after-treatment should be graduated exercise i.e. exercise well within his capacity. Such an ideal could only be properly carried out in special "rheumatic schools" and it is to be hoped that under the medical service of tomorrow sufficient provision will be made for such centres and an attempt made to cut down the incidence of this crippling malady of childhood.

CASE. VIII/
CASE VIII. Jean Howieson aged 11 years 4 months.

The family consists of father, mother and 7 children.

Father: aged 46, is a scavenger. He has always been a fit man with no "rheumatick" history. He is said to be a "good father", keen on his children and trying to do his best by them.

Mother: was a pale, thin woman of 41, quite well dressed, clean and intelligent, with a vague "rheumatic" history. She was obviously worried about Jean whom she had always felt to be the "weakest" of her children and necessitating most attention. She is keen on her new house, apparently an efficient housewife, but complains of the food queueing and feels her family are "not getting enough nourishing food".

Children: are 7 in number. The eldest, a lad of 17, is a mill-worker. He is quite healthy apart from the usual childhood illnesses. He has no history of Scarlatina. Second boy, aged 16, works in the bakery and is troubled by "occasional sore throats", otherwise healthy. A boy aged 14 is still at school. He had a bad attack of measles when very young, and is "growing too fast". A girl aged 13 is quite healthy. The next child, Jean, aged 11 years 4 months has already been discussed. A boy aged 10 is subject to frequent "colds" during the winter months, and the youngest, a girl aged 4, has had whooping cough but has now recovered and is quite fit.

House: is comparatively new, consisting of 5 apartments. Sleeping accommodation is quite good, there being four beds and a sofa. The house is quite bright and gets a fair amount of sun at some times of the day. There is a W.C. and hot water available. There are, however, two drawbacks viz. dampness and cold.

Though new, the house is damp. This applies to floors and walls and often the beds at night, and is due to the close proximity of the house to a river. Also this winter they have had practically no coal, supplies in this part of the country apparently being very short. They have of course no electric heater and have often had to go to bed early at nights as only there were they decently warm. The mother has always tried to see that Jean did not get wet feet, but, as she says, with such a big family it was difficult to give each one equal attention.

Summary/
Summary.

As regards home conditions this case compares favourably with the previous one, but as regards prognosis the outlook here is very much worse. This girl typifies the sub-acute and insidious form of rheumatic infection of childhood. Symptoms previous to the present illness have been very vague, consisting of slight "growing pains". Now after an illness lasting only two weeks, we find the child anaemic, extremely dysphoetic even at rest and with signs indicating an advanced cardiac lesion. Though recovery from the present attack is probably the damage done is so severe that it is unlikely the child will live any longer than two to three years at the most. Such a case is indeed a tragedy and should spur us on to new efforts in early diagnosis or prophylaxis of juvenile rheumatism. With regard to prophylaxis it has been found that in children proved susceptible to rheumatic infection by e.g. hereditary or environmental conditions, the use of sulphonamides after the initial Tonsillitis has reduced the incidence of rheumatism. Research on such lines is clearly indicated and it may be that Penicillin will have an important part to play in this connection.
CASE IX

CASE of GASTRO-ENTERITIS

Name of patient: Anne Meldrum
Address: 8 Loaning Road, Restalrig.
Age: 8 months
Birthday: 15.5.45 At Simpson's.
Recommended by: Dr. Ferguson
Date of admission: 27.1.46
Date of death: 14.2.46

Family
Father: aged 43 Engine-fitter
Mother: aged 40
Children:
- Female: 21
- Female: 17
- Male: 15
- Female: 12
- Female: 7
- Miscarriage at three weeks
- Female: 8 months

Complaints
1. Crying
2. Fretfulness

HISTORY.
This baby has been "off colour" for two weeks. She has been crying almost continuously. She is fretful and irritable and has a tight little cough which has been worse for the past week or so, during which time she has been kept in bed. Her mother thinks she is much weaker than formerly and is rapidly losing strength. She is quite keen to take her feeds but rapidly loses interest in them. She is very thirsty but has not vomited. Her bowels are constipated, there having been no motion for two days.

Weight loss has been evident recently. The urine is darker in colour than formerly and is being passed more often.

The child's colour is bad. She is pale and rather waxy in appearance; since the day before admission. Though the general mood has been one of fretfulness the child has occasional "bright spells" when she appears to take more interest in her surroundings.

Previous History /
Previous History.
The antenatal period was uneventful, the mother being quite well, and attended Simpson's Clinic. The baby was premature, a breech delivery and weighed 5 lbs. 6½ oz. at birth. She was fed first on cow's milk and then on Ostermilk. Orange Juice has been given but she "won't take" Cod Liver Oil. She sips but slowly from a spoon and is less eager to eat than the other babies.

She cut her first tooth at 6 months, at which time she had a screaming attack and also vomited. She now holds her head up well. She has neither been vaccinated or immunised and attended Lochend Welfare centre.

GENERAL EXAMINATION.

A. STRUCTURE.
The baby's height was 25½ inches, a little below average for this age. Proportional relationship was good, the arms, legs and head bearing a satisfactory relation to the trunk.

Anatomical regions.
HEAD: cranium was dome-shaped and vaulted; circumference was 16½ inches. Anterior fontanelle admitted the tips of two fingers. It was sunken and non-resilient. There were no abnormal prominences or projections of the skull. The occiput rose steeply and the vertical region was slightly flattened, the general shape of the head being oval. Cranio-tubes was absent.
FACE: was not disproportionate to size of skull. Eyes were sunken, blue in colour and rather dull with horizontal palpebral fissures. Nose was squat and broad superiorly. Ears rather large as compared with the rest of the face. The long axis of the mouth was horizontal but the corners tended to turn up slightly. Chin was square-shaped and rather "pugilistic". Jaws were quite symmetrical.

The child had four teeth, two on each gum. All were clean and polished with no signs of caries. Neck was thin and slender and seemed to have difficulty in supporting the head.

THORAX: general shape was circular; general structure was good but a slight hollowing was evident in the lower part of the sternum. Costo-chondral junctions could be felt, but were not visible. Subcostal angle was obtuse.
ABDOMEN: was if anything slightly protuberant, especially superiorly. Inferiorly it merged evenly into the pubic symphysis. It was convex above the umbilicus and concave below. Umbilicus itself was a puckered cicatrix with no pathological features.

ARMS: measured 10½ inches from acromion to tip of middle finger. Fingers were small and stubby and showed no clubbing. Wrist epiphyses were not visible.

LEGS: were in good proportion to trunk measuring 11½ inches from greater trochanter to tip of medial malleolus. The ankle epiphyses were not enlarged and toes not clubbed.

B. NUTRITION.

Weight of the patient was 14 lbs. 6 oz. which is well below average for this age. The ribs had a poor covering of subcutaneous fat, the intercostal spaces standing out prominently. The abdomen likewise was poorly padded and the skin on being picked up by finger and thumb wrinkled markedly before slowly going back into place. The supraclavicular pad of fat was diminished and the buttocks thin and wasted. Limbs too were very slender and a fold of skin could be seen extending downwards from the shoulder.

C. SURFACES.

SKIN was pale and waxy-coloured generally, apart from a slight bluish purple cyanotic tinge in the cheeks and extremities. It was smooth, fairly moist and surprisingly elastic. No jaundice was visible. Hair was scanty, thin and lustreless: eyebrows could scarcely be seen. The scalp was clean.

MUCOUS MEMBRANES: lips were red and moist with no fissuring; tongue was moist and clean with prominent papillae. The fauceal region was definitely inflamed being a dark red haemorrhagic colour. A slight colourless nasal discharge was present. Conjunctivae were light pink in colour - sclerae slightly blue in tint.

D. MUSCULAR CONDITION.

Tone was very poor, the limbs flapping about weakly in all directions. Strength was definitely very poor, and activity much impaired. She could hardly grasp the examining finger when held out to her. Expansion of thorax was satisfactory.

E. MENTAL CONDITION /
E. MENTAL CONDITION.
The child was conscious and took note of her surroundings. Intelligence as tested by such devices as the eye movements was unimpaired.

As regards emotional tone the child cried plaintively and miserably during the whole examination, the keynote of the condition being one of dejection and wretchedness. The cry, however, was rather weak and often just amounted to whimpering.

EXAMINATION of SYSTEMS.

(A) ALIMENTARY SYSTEM.

Signs of functions.

(1) Appetite has been capricious from birth. It has always "been difficult to make the baby take her food", but this has been specially noticeable in the last two or three weeks.

(2) There has been no excessive thirst and

(3) Nausea and vomiting were not in evidence at this stage (see later).

(4) Diarrhoea likewise had not developed at this juncture, the bowels being constipated prior to admission.

Upper Alimentary Canal.
The tongue was surprisingly moist and quite clean. The buccal mucous membrane showed no evidence of thrush infection. Four teeth were present in all and no caries could be seen. The throat was generally inflamed and congested, being bright red, almost scarlet, in colour. Tonsils were not enlarged.

Lower Alimentary Canal.
Abdomen had a decreased covering of subcutaneous fat. It moved well with respiration especially in the upper part. Umbilicus showed no finding of significance. There were no distended veins on the abdominal surface and no striae. A slight rippling movement of the surface was present in the left hypochondrium, which testifies to the presence of peristalsis. There was no resistance to palpation, the hand sinking easily into the soft yielding parietes. Liver and spleen were not enlarged and no masses were felt. Percussion yielded a uniform resonant note.
B. CARDIO-VESTICAL SYSTEM

Slight cyanosis was present in lips and cheeks. No oedema visible. The pulse was regular, very rapid - 155 per minute, soft, thready and of very poor volume.

Heart: Apex beat was located in the fourth space within mid-clavicular line. In all areas heart sounds were closed.

C. THE GENITO-URINARY SYSTEM

The kidneys were not palpable and the external genitalia showed nothing to note. The urine was pale yellow in colour, acid in reaction and with no abnormal constituents.

D. RESPIRATORY SYSTEM

The baby was slightly cyanosed. She had a frequent loose, moist cough, not causing her much distress apparently. The harsh noise like the whistling of the wind, to which we designate the term of stridor, was present on inspiration. Alae nasi were in action in both inspiration and expiration.

A slight nasal discharge was present, exuding from both nostrils. It had slightly excoriated the upper lip.

The chest expanded satisfactorily on respiration. Percussion note was resonant in all areas and in my opinion slightly tympanic at the right apex. On auscultation the breath sounds were everywhere vesicular and scattered "wheezey" sounds were heard accompanying both inspiration and expiration, most marked at both bases and altering appreciably when the child coughed i.e. rhonchis.

E. NERVOUS SYSTEM.

The child was fully conscious but feeble, weak and debilitated. There was no neck rigidity, pupils were equal and reacted well to light. Tendon reflexes were all present but somewhat diminished. Ear drums were not inflamed, but there was much wax.

Provisional Diagnosis: at this stage was one of Acute Bronchitis associated with poor home conditions.

Course of Disease.

On the day after admission the child appeared better, but cough was still prominent and we were anxious due to the passage of loose stools. She was put on oral Sulphamethazine. Two days later frequent vomiting developed and the Sulphonamide preparation had to be discontinued. At this stage the temperature was normal and
and the colour fairly good. A throat swab was negative for diphtheria organisms and for H.S.

Six days later the vomiting, after some improvement, became more copious, occurring after every feed. The motions became frequent, loose, and of green colour. She was put on a half strength Hartmann's mixture. The next day the baby did not look well. She was very pale and her eyes were sunken. Further loose stools were passed and she vomited on two occasions, but as yet there was no undue dehydration although the subcutaneous fatty layer was diminished from the time of admission. On the next day the child's condition was much improved. No further vomiting had occurred and the stools, much less frequent, had reverted to the normal brownish yellow colour, but four days later the vomiting appeared again. On examination both ear drums were found to be inflamed and there was a discharge of wax from the left ear.

**Stool Culture:** Bacillus proteus was isolated. There were no pathogens of enteric or dysenteric groups. The following day the vomiting became more pronounced and the loss of subcutaneous fat over the abdomen more evident. The skin on being picked up was loose and fell into wrinkled folds. The baby still paid attention to its surroundings, but was very quiet and only occasionally emitted a weak moaning cry. The motions had again become green and loose. She was accordingly put on skimmed milk with lactic acid, also milk of magnesia was given after a gastric lavage. Stools were again negative as regards culture. In the evening she developed a small, dry, irritating cough and pyrexia of 100°F.

Rhonchi were very evident in both lung fields and a steam tent was employed. The next day the liver became palpable. Its lower border smooth and soft, not apparently tender, was felt a full three fingers' breadth below the costal margin. Anterior fontanelle was now depressed and hardly pulsating. The cheeks were rather sunken. Temperature was subnormal and the vomiting and diarrhoea still persisted. A last attempt was made to improve the condition by gastric lavage and feeds consisting of lactic acid and skimmed milk, but the following morning she was very much worse. She became comatose with gasping respiration and died at 12.30 p.m.

**POST-MORTEM REPORT.**
POST-MORTEM REPORT.

"External Appearance: the body was that of a female infant small for her age. She was fairly well nourished and appearance did not suggest severe dehydration.

HEAD: brain and meninges were healthy. Both middle ears contained pus.

THORAX: serous sacs were healthy as were mouth, pharynx and larynx. Trachea showed no congestion at upper end but towards bifurcation became mildly congested and this appearance was continued into the main bronchi. Some frothy fluid was present in the bronchial lumen. Lungs were well expanded, but for a small area of partial collapse at the back of both apices. There was no significant congestion. Slight increase of consistency of the left lower lobe suggested the possibility of an incipient pneumonia, but there was no definite consolidation. On section some excess of white mucus was seen in many of the small bronchi throughout both lungs, specially marked in left lower lobe where the mucus had a slightly yellow colour. Some turbid fluid exuded from the general surface of lungs. Oesophagus was healthy and Heart showed nil to note, the myocardium being slightly paler than usual.

ABDOMEN: peritoneal sac was healthy. Stomach was of average size with no pathological feature. There was no inflammatory change in the intestine. Liver was definitely enlarged. It was pale yellow on outer surface and a number of paler white spots showed through its capsule. The nature of these was doubtful; they did not project above the general surface and were not palpable. On section liver tissue was pale yellow, mottled with red congested patches. The surface was greasy and the tissue generally friable. Appearance suggested an advanced degree of fatty degeneration. The spleen was not enlarged and kidneys were paler than usual.

Summary.

1. Bilateral otitis media.
2. Slight bronchitis and ? commencing pneumonia in left lower lobe.
4. Marked fatty degeneration in the liver."
DISCUSSION.

AETIOLOGY and PATHOLOGY of GASTRO-ENTERITIS.

Acute enteritis or gastro-enteritis of children is an infection or intoxication of acute onset characterised by an alimentary derangement in which diarrhoea is the most constant symptom and vomiting and constitutional disturbances are frequent concomitants.

It is usual to group infantile diarrhoea under three heads but the division is artificial and convenient for purposes of description as the three "types" are closely inter-related.

A. Dietetic  
B. Parenteral  
C. "Infective".

It is with the last mentioned that we shall deal mainly here. The age incidence is in the first year of life, greatest between 1 and 6 months, and the mortality rate is higher than that at any other age. Infantile Immunity is unknown in this disease. One should note at the outset the almost complete "escape" of infants exclusively breast fed; the qualification is important because of the frequent practice of "mixed feeding" even of new-born infants. Bottle fed babies therefore are the main victims as in this case, and there seems to be a special liability in infants fed on sweetened condensed milk.

Diet is undoubtedly a factor in the production of this condition. Overfeeding and especially over feeding with carbohydrate, including the pernicious habit of giving cereals before the age of 6 months, leads to fermentation in the gut with irritation of mucosa, and diarrhoea. Similarly, excess of fat in the day may produce diarrhoea with loose, curdled, acid and very foetid stools. This happens when the child is given too many extracts and emulsions in the course of the day. Such cases are usually relatively mild and are equally distributed throughout the year, but by such an illness the child has been rendered more susceptible to infection and, with the onset of a complicatory otitis or pyelonephritis, a dangerous condition may be precipitated. Since, as a result of the damage to the intestinal mucose, the child's tolerance to diet has been reduced, any further dietary error may be fraught with the greatest danger, the child losing weight rapidly and becoming debilitated and exhausted, or passing on more slowly to a marasmic condition.
Again some of the milder examples of gastro-enteritis or intoxication, and some more severe ones, are caused by infective processes, the seat of which is far removed from the gastro-enteric canal. The symptoms of diarrhoea and vomiting in children may be said to take the place of headache and malaise in older people. The diseases specially concerned in this parenteral diarrhoea are acute otitis media, acute mastoiditis, any acute respiratory infection especially alveolar pneumonia, acute pyelitis, meningococcal meningitis and occasionally tooth eruption may be accompanied by a flitting diarrhoea. The fact that those infections occur more frequently in the winter months is rather against them playing any serious part in the causation of infectious enteritis, which is pre-eminently a disease of the summer months. One should not regard in such cases the diarrhoea as primary, but should look for the cause paying particular attention to throat, ears and urine.

An infective cause has always been the most attractive of theories to explain the condition, but very often, as in this case, bacteriological examination of the stools is negative. Organisms cultured from the faeces include streptococci, B. proteus, B. enteritides, dysentery bacilli, typhoid and paratyphoid organisms and B. lactic aerogenes and organisms of doubtful pathogenicity such as B. morgani, Paracolon bacilli and Giardia intestinales. Recently some workers claim to have isolated a filterable virus which may be the true aetiological agent. Such work obviously requires to be substantiated. In the majority of cases, however, no specific organisms can be isolated. In clinically similar cases B. morgagni, Paracolon bacilli and other organisms are found and the clinician is in doubt as to whether they are causal or are normal inhabitants of the alimentary tract which have multiplied as a result of the pathological process in the intestines. Indeed if there were a specific organism it is remarkable that breast fed children should be so seldom attacked, for although their diet is obtained direct from the source and is almost invariably sterile, the frequency with which organisms may be introduced into the mouth of the breast fed child by his own hands, or by those of his nurse or playmates and along with any article that it can lay its hands on, makes it difficult to understand how he so frequently escapes. It may of course be a question merely of mass dosage and that the particular parasite, whatever it may be, requires a special pabulum e.g. cow's milk, for its development. Possibly chemical changes consequent on the bacteriological decomposition of milk are an important factor. Breast milk is not liable to the bacterial contamination of cow's milk. When the infant is taken off the breast and is introduced to cow's milk he is exposed to a variety of /
of infective and toxic agents some of which may well be responsible for enteritis. This together with the susceptibility of the child explains the age incidence. Breast feeding does not provide protection, it merely eliminates exposure to infection, the exposure occurring at a time when the infant's alimentary canal and digestive processes are attempting to adapt themselves to artificial feeding and are therefore more susceptible to infection.

Milk is the most likely article of diet responsible for the conveyance of the disease, but the manner in which it is infected is as yet uncertain. It may be contaminated at any stage from the cow to the infant's mouth, by those handling the milk, or those preparing it for the child.

As already stated, a marked seasonal incidence was until fairly recently a prominent finding. The peak time of the year was late summer i.e. at a time when the mean atmospheric temperature was at its highest. It was common to get outbreaks of "Summer Diarrhoea" which swept across the country with epidemic prevalence in the months of July, August and September, but in recent years the epidemic has been much less marked although the case incidence is still at its highest in July, August and September.

When "summer diarrhoea" was prevalent its incidence varied from year to year depending on whether the summer was hot or cold. In 1898, 1899 and in 1911 the biggest epidemics occurred because these summers were exceptionally hot. Indeed in 1911 the infant mortality rate in England and Wales from this disease was 36.20, while in 1912 (a cool summer) it was only 7.72. In 1921 (another hot year) the rate however was only 14 and since then no higher rate than 3 has been recorded. The relation of hot weather to the condition is not properly understood, but it may be related to the greater number of flies in such weather causing contamination. Evidence is accumulating that the fly is probably an important vector in this disease. A fact of definite significance in the above connection is that gastro-enteritis is much commoner in towns where scavenging arrangements are poor, where no water carriage system is in use, where yards are badly paved, and where much contaminated dust is present, ready to infect any milk and food on which it may be blown.

The German school, headed by Finkelstein and Rietschel, point out that the acme of the death rate does not follow some time after the acme of the temperature in warm summers, but coincides with it.

They /
They therefore suggest that the temperature itself is perhaps the exciting factor and that the condition is of the nature of a "heat-stroke". To quote Rietschel "the high surrounding temperature in the homes of the poor is the most important link in the chain of damaging influences for the infant during summer".

Finally a feature of note, well exemplified by the case under consideration, is that the condition of gastro-enteritis seldom occurs in an absolutely normal child. Most frequently it is merely the terminal phase of a long-drawn out illness, characterised by recurrent attacks of dyspepsia and anorexia from which the child has never completely recovered. Perhaps she has always been left underweight with a lowered resistance to infection and diminished tolerance to food i.e. marasmic, and with each dyspeptic turn the condition has deteriorated. It is equally striking that it is a disease almost wholly of the lower strata of society where adverse hereditary factors, overcrowding, bad housing and sanitation etc. all play their part. Outbreaks are also likely to occur where children of a susceptible age are congregated together as in paediatric hospitals and wards, nurseries, creches etc. Rickets, malnutrition, respiratory infections and any debilitating illness which lowers the resistance of the infant increases the liability to enteritis.

In contrast to the often violent course of the clinical illness, post-mortem findings are surprisingly few. Often the alimentary canal is quite normal macroscopically as was noted at autopsy in this case. Sometimes congestion of intestines is seen, and if during life, blood and mucus were present in the stools (ileo colitis), circular ulcers about the size of a pin-head might be present situated usually in the lower ileum and colon. Mesenteric lymph glands are not enlarged.

Only one finding is practically constant and that is Fatty Degeneration of the Liver. Boyd showed that portal blood in fatal cases contained a toxic substance allied to histamine, the injection of which into other subjects could cause grave collapse and shock. It is a plausible theory to postulate the presence of a hepatogenous virus but so far this has not been demonstrable. Liver damage appears to be the most important factor in prognosis. If diarrhoea and vomiting are prolonged beyond 2-3 days fatty degeneration occurs also in heart and kidneys and the lungs may collapse at their bases, giving a terminal broncho-pneumonia.

SOCIAL /
SOCIAL CONDITIONS in this CASE.

General social considerations have been discussed above.

The Family consists of Father, Mother and 6 children living.

Father: aged 43 is an engine-fitter. He has always been a healthy man and keen on an open-air life. He has worked very long hours especially during the war and has had a lot of night work. He is described as a decent, clean living man, keen on his home and family life. Recently he has had a "bad cough" but no digestive disorders.

Mother: aged 40, was a pale, pasty woman who looked anything but fit. Her clothes were old and tattered but she was quite clean in her person. Enquiry elicited that she was extremely ill two years ago when she was admitted to the Royal Infirmary with a septic abortion, remaining in hospital for one and a half months from where, after a protracted and tempestuous illness, she was discharged. She is due to go into hospital again in the near future for the repair of an incisional hernia. Her health, in the past two years has been definitely poor as she has never really recovered from this illness. She has felt less able to cope with her household duties and has been much more easily tired than previously. She admits that she "just had not been able to look after her family as she used to do".

Children: are six in number. The oldest, a girl aged 21, developed disseminated sclerositis two years ago. She is now a chronic invalid. Apart from this she had been quite healthy. Next a girl, aged 17, is troubled with frequent sore throats and has had a cough all last week. A boy, aged 15, is quite well. He had measles and whooping cough in infancy. A girl, aged 12, has had a very bad cough all winter. This week she has been confined to bed, coughing and spluttering almost continuously. She has occasional attacks of "growing pains". A girl, aged 7, is also confined to bed "with bronchitis", according to the mother. Her previous history is quite satisfactory. Three of the children also suffered from gastro-enteritis in their first year of life.

House: The family lives in a small house of three rooms in the Restalrig district. Overcrowding is therefore definitely established, three rooms for eight persons being most inadequate accommodation. There are three beds and a cot for the patient. The house has a W.C., but no bath or hot water. The mother has been much troubled with flies, which she has tried to catch by a fly-paper. Two of the rooms are very dull, and dingy: the other gets /
gets more sun. The family has been cold this winter from lack of fuel, but the house is not damp.

SUMMARY.

Again we are presented with a typical social problem. Overcrowding, malnutrition and some degree of maternal neglect are among the predisposing factors to the condition. In addition, the child was bottle fed from birth and was a typical candidate for enteritis, being weakly and, as the mother admitted, less robust than the other children. That the condition was largely due to the social background is undoubted. The incidence of bronchitis in the household during this week may have been an important "trigger" in setting up the alimentary condition. The recommendations mentioned under Juvenile Rheumatism and Tuberculosis are also applicable here and only by better housing, better sanitation and especially better care of food and milk shall be cut down the incidence of this infantile scourge. The same sentiments are applicable to Case II in this series which, although considered primarily as a case of childhood tuberculosis, has a history of Gastro-Enteritis too in the causation of which also the bad social conditions must have had an important part to play.
CASE X. CASE of NUTRITIONAL ANAEMIA associated with bad housing conditions.

This case was admitted to the ward as one of subacute leukaemia with a marked lymphocytosis and slight pneumonia. Since admission however the white count has fallen appreciably and repeated blood examinations have proved that in fact we are dealing with an iron deficiency anaemia.

Name of patient: June Williamson
Address: 18 Harewood Road, Craigmillar
Age: 2½ years
Recommended by: City Hospital
Date of admission: 4.2.46
Date of examination: 7.2.46
Date of discharge: 23.3.46

Family:
Father: aged 37
Mother: aged 34
Children: 6
- Female: 16 years
- Female: 11
- Female: 7
- Female: 5
- Female: 4
- Female: 2½

Complaint:
- Cough for two weeks
- Dyspnoea

History:
The child was quite well until two weeks ago when she began to cough. The cough was first dry, irritating and apparently unproductive, but it later became easy and moist. Latterly it was very severe, racking and frequent and often made her vomit. At this time the child was blue in colour and respirations were rapid, heavy and laboured with some inspiratory recession of the thoracic wall. She was in bed and Thermogène was applied to the chest. On 3rd January the doctor was called in and the child was sent to the City Hospital as a case of Pneumonia. Five days later on February 4th she was transferred to R.H.S.C. with a diagnosis of subacute leukaemia.
Previous History.
In the antenatal period the mother had a threatened abortion at the third month. The symptoms disappeared under conservative treatment. She attended the antenatal Clinic at Elsie Inglis. It was a full time birth and a spontaneous delivery at home, the birth weight being \(8\frac{1}{2}\) lbs. Artificial feeding was employed from the start, the child being fed on pasteurised cow's milk and she gained weight well. At three months she was in the Deaconess Hospital for a week with acute Bronchitis, and at 15 months she had another attack of Bronchitis associated with anaemia.

GENERAL EXAMINATION.

A. STRUCTURE.
The child was 32\(\frac{1}{2}\) inches in height - small for her age. Proportionate relationship of various parts was satisfactory.

Anatomical regions

Head was of good shape, well vaulted. The circumference as measured round the widest past was 18 inches and the anterior fontanelle was closed. There was no bossing, and cranio-tabes felt for at the occipito-parietal junctions could not be elicited.

Face was in good relationship to the head as regards size. Eyes were bright and clear with long axes of palpebral fissures parallel. Nose was small and rather retroussé. Forehead was prominent.

Ears were small and well shaped. Mouth was small and pouting.

She had 20 teeth, a few of which showed evidence of caries.

Neck was thin and slender, wider posteriorly.

Thorax: No abnormality of shape was visible, the general shape being circular. Sternum was flat with no bony prominences. Costo-chondral junctions were not enlarged. Expansion of the chest was moderately good, but less on the right side than on the left.

Abdomen: was rather prominent as compared with Thorax. It did not taper much inferiorly. Umbilicus stood out well and a small Hernia was visible at this point. The other hernial orifices presented no abnormality.

Arms were thin and slender. There was no alteration in carrying angle and wrist epiphyses were not enlarged. When the child stood up the arms reached to a point two inches above the knee showing that the proportions were good. Fingers were not deformed and showed no clubbing.

In the legs ankle epiphyses were not enlarged. Toes were not clubbed, and like the arms proportionate relationship was good.
B. NUTRITION.

The general nutrition of the body was poor. In the Thorax the ribs and intercostal spaces stood out prominently. On the abdomen the fatty layer was markedly diminished and the limbs looked like sticks round which the skin had been loosely draped. The cheeks however were quite fat.

C. SURFACES.

SKIN was extremely pale all over the body, with a few small, reddish-purple bruises on the right side of the forehead. Its texture was smooth but it was inelastic and wrinkled easily when lifted up. Neither rash nor cyanosis was visible and jaundice was not present.

MUCOUS MEMBRANES were also very pale and anaemic. The lips, gums and buccal mucosa were a pale pinkish colour and the tongue was also paler than usual with a few scattered dark red papillae on the dorsum. Both conjunctival sacs were markedly anaemic on inspection.

D. MUSCULAR CONDITION.

Muscular tone as tested by flexion and extension at various joints was quite good. Movements were well coordinated, but the child was definitely a little weak. She could sit up in bed, but activity generally was diminished. Her face was expressive; the alae nasi were not in action.

E. MENTAL CONDITION.

The baby was fully conscious and took note of her surroundings. She was quiet and rather preoccupied, but occasionally a little fretful and whimpering. She could form short sentences and her intelligence was quite satisfactory for her age.

EXAMINATION OF SYSTEMS.

(a) CARDIO-VASCULAR SYSTEM.

Cyanosis and oedema were absent: no pulsation anywhere. Pulse was soft, regular in time and force and of good volume; B.P. 105 / 84. Heart: no visible precordial pulsation: apex beat was in fourth space just inside mid-clavicular line. It was quite forceful and there was no thrill. Sounds were strong and well conducted to the stethoscope, being closed in all areas. Capillary fragility was not increased.

(b) /
(b) RESPIRATORY SYSTEM.

Cyanosis was absent; no nasal discharge; alae nasi were not in action and stridor was absent. Breathing at time of examination was quiet and regular, mainly thoracic in type with an occasional loose easy cough.

Chest moved less well on the right side inferiorly and was a little flattened in this area.

Percussion note was resonant except at the right base where the note was definitely dull and flat. At the left base too a little impairment was detectable.

Breath sounds were everywhere vesicular even at the bases, where a few coarse, crackling and bubbling sounds i.e. crepitations, could be heard both on inspiration and expiration more obvious on the right side.

X-Ray showed consolidation of right lower lobe.

(c) ALIMENTARY SYSTEM.

The pale colour of all the mucous membranes has been alluded to already. Throat was not inflamed. Abdomen slightly prominent, moved well on respiration and a small umbilical hernia was visible. Palpation at no place met with any resistance, the parietes being lax and soft. Liver and spleen were not enlarged, nor could any scybalous and other masses be felt.

(d) GENITOURINARY SYSTEM.

Kidneys were not palpable or tender. External genitalia normally developed and the urine contained no abnormal constituents.

(e) NERVOUS SYSTEM.

She was quite conscious and wanted to be petted and fondled. Neck rigidity was absent as was Kernig's sign. Pupils reacted briskly to light, were equal and regular in shape. Tendon reflexes were all present and plantar response was flexor. There was no disturbance of sensation and the ear-drums were not inflamed on either side.

(f) HEMOPOTETIC SYSTEM.

Pallor was the main objective sign in this case, affecting all mucous surfaces. A few small firm glands were palpable in neck, posterior to sterno-mastoid left axilla and both inguinal regions. Spleen was not enlarged to percussion or to palpation.

On admission

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<td>H6</td>
<td>25%</td>
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<tr>
<td>R.B.C.</td>
<td>1,120,000 per c.mm.</td>
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<tr>
<td>W.B.C.</td>
<td>12,400 per c.mm.</td>
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7/2/46 Differential Count /
7/2/46  Differential Count

W.B.C.  Neutrophils  44%
        Eosinophils  1%
        Basophils  -
        Large lymphocytes  1%
        Small lymphocytes  52%
        Monocytes  1%
        Megalocytes  1%

R.B.C. showed severe anisocytosis with many large and fewer small cells. Poikilocytosis was less marked. Cells stained unevenly, some being well filled and others poorly filled. A few showed polychromasia. Erythroblasts and normoblasts were present constituting about 2% of nucleated cells.

9/2/46  H 6  18 mgms. %
        R.B.C.  1,660,000 per c.mm.
        W.B.C.  10,000 per c.mm.

16/2/46  Differential Count

W.B.C.  Neutrophils  45%
        Eosinophils  6%
        Basophils  1%
        Large lymphocytes  9%
        Small lymphocytes  35%
        Monocytes  4%
        Erythroblasts  -
        Normoblasts  4/200 W.B.C.

R.B.C. were hypochromic showing considerable anisocytosis. Mean cell diameter was increased. Platelets showed no abnormality.

21/3/46  Differential Count

W.B.C.  Neutrophils  62%
        Eosinophils  3.5%
        Basophils  1%
        Large lymphocytes  2%
        Small lymphocytes  22%
        Monocytes  4.5%

No immature W.B.C. were seen.
R.B.C. were unevenly stained suggesting an anaemia, with some slight anisocytosis. Platelets were normal.

Provisional /
Provisional Diagnosis was one of Iron deficiency anaemia.

Course of Disease: The effects of Iron therapy has been nothing short of miraculous and the child has improved out of all recognition. At the time of discharge she was active, lively and taking a keen interest in her surroundings. Her cheeks had a healthy red coloration, her lips and buccal mucosa were a fine pinkish red colour, very different from the waxen pallor presented on admission. The conjunctiva, though still a trifle pale, were a much more definite pink, and the prognosis provided the child is adequately cared for is excellent.

These clinical findings have been substantiated by repeated haematological investigations. The child was grossly anaemic on admission with a blood picture very reminiscent of a leucemic process. One must assume that the primary cytosis was in this case a result of the respiratory infection present at this time — a not uncommon finding in childhood when the reaction of the blood to an acute infection may often be lymphocytic instead of polymorphonuclear. Under therapy the blood picture has undergone a marked change: the anisocytosis becoming much less marked and the cells much less hypochromic. Haemoglobin and R.B.C. have shown a steady increase and the lymphocytes a steady decrease, the differential count latterly being almost normal.

DISCUSSION.

THE BLOOD in INFANCY and CHILDHOOD.

The Haemopoietic System of the child and infant like all other systems at these age periods undergoes developments, modification and growth and is moreover peculiarly adapted to meet the requirements of these phases of life. The foetal blood contains more cellular elements than that of the normal adult, and at birth the circulation has to make a rapid adjustment to meet the requirements of the richer respiratory oxygenation. Haemoglobin and R.B.C. are considerably reduced during the first ten days of life, this being responsible for the common finding of physiological icterus. The leucocyte picture also alters, but the change is more gradual and not till the age of 14 is it identical with that of the normal adult. In infancy and childhood, there is little reserve bone marrow and any extra demand results in an over-activity which /
activity which will furnish numbers of immature cells to the blood. Foetal extra medullary centres of haemopoiesis in the liver and spleen are easily reactivated in the young infant.

Haemoglobin at birth is found to have an average of 145% Haldane. In the first three months of life there is a drop to 75% Haldane; the drop is specially pronounced in premature children where the figure may reach 50%. Iron derived from Haemolysis of unwanted R.B.C. in the first few weeks of life is useful in augmenting the store of iron in the liver and is used during the age period of 3-6 months. There should be a gradual rise in Haemoglobin which should reach 80% to 90% at the age of 6 months and thereafter remain steady. Mackay, who has done much research on this subject, found that during the first part of life, Haemoglobin was 1 to 4 percent lower in artificially fed infants than in those fed on the breast.

R.B.C. count at birth varies from $6\frac{1}{2}$ to $7\frac{1}{2}$ million per c.mm. During infancy the R.B.C. count of the artificially fed child is slightly lower than that of the breast fed infant. At birth peripheral blood contains quite a number of nucleated red cells, usually normoblasts. Reticulocytes are always numerous, comprising 10% of the R.B.C. at birth, but falling to the normal adult figure of less than 1% by the end of the first week.

W.B.C. fall rapidly from 18000 per c.mm. at birth to about 14000 two days later, then there is a slight rise to about 17000 at 12 days and from then onward for the next 12 years the count gradually falls to the average adult figure of 6000 per c.mm.

There is a polymorphonuclear leucocytosis at birth which rapidly declines in the first week and for the remainder of infancy and childhood the number of circulating polymorphs is the same as that of an adult. Lymphocytes however increase rapidly after birth and reach a maximum on the 12th day, after which they slowly fall reaching the normal at 12 years of age. The lymphocyte of infancy is predominantly the large lymphocyte, the monocyte is more abundant in infant and child than in the normal adult, the average figure being 9%.

Factors influencing blood picture in infancy and childhood.

It has been shown that in childhood abnormal haematological findings are much more an index of disturbance of function rather than
than an exact diagnostic picture, the disturbance being due to nutritional deficiency. The reaction of the blood is dependent on such factors as general condition, nourishment, environment, heredity and development. To understand such findings we must carefully correlate clinical and laboratory methods where the exact procedure of the haematologist is interpreted from the aspect of clinical experience in terms of individual variable factors, individual variation being more pronounced in a child than in an adult where the haemopoietic system is relatively stabilised.

General development: The normal healthy active child well-nourished, living in good housing conditions, with an adequate supply of fresh air and sunshine, responds to an infection in a much more dramatic and competent way than the ill-nourished, ill-cared-for, feeble child, such as we are dealing with here. In the one the antibacterial powers of the body will combat the infection well and throw it off in a few days, in the other the illness may drag on for weeks or even months, and anaemia, so common in the under-nourished, makes the child a much more ready candidate for infection.

The lymphatic system is very highly developed in children. Its purpose appears to be two-fold; firstly it safeguards against spread of infection and secondly it almost certainly plays a part in the immunity mechanism.

The younger the child the more sensitive the haemopoietic system to extraneous influences; leucocytes especially are extremely variable. It is of great importance to understand the leucocytic response to infection in a child because the unwary might easily diagnose a primary blood disease. The relatively unstable and more flexible system of a child may react by very high white count and the pouring into the circulation of many primitive myeloid cells. In many cases including the one under consideration the reaction is predominantly lymphocytic instead of polymorphonuclear, and indeed in this case a diagnosis of subacute leukaemia had been made. In children the leucocyte count is easily influenced by temperature.

DYSHAEMOPOIETIC ANAEMIAS of CHILDHOOD.

The common ones are due to iron deficiency associated with under nutrition, infection, toxaemia and marasmus conditions. Iron deficiency anaemia in infancy can be due to deficient antenatal storage, to deficient post-natal supply or to a combination of the two.
Two thirds of the iron present in the human foetus at birth is laid down in the last three months of intra-uterine life. This store derived from the mother is augmented by iron derived from the haemolysis of effete R.B.C. in the first few weeks of life. The foetus is usually a merciless parasite, gathering even from an anaemic mother enough iron for its own purposes.

Mackay has carried out extensive research in London on the nutritional anaemia of infancy. She finds that, especially in children of poor classes, during the milk feeding period and particularly after the third month, an anaemia is quite common, well below the physiological limits, due to failure to ingest sufficient iron during this early stage of life. Also this anaemia of the third month does not show an improvement during the remaining months of the milk feeding period. Anaemia in infancy may be prevented by two methods: (a) the laying down of an adequate antenatal supply of iron which can be done by attending to the maternal diet during pregnancy; and (b) by the ingestion of a full supply of maternal milk. Mackay emphasises that the margin of safety in iron derived from milk is extremely small, so unless the management and technique of breast feeding is competent and maternal nutrition satisfactory, anaemia may develop. Though neither human milk nor cow's milk has a rich quantity of iron, cow's milk is definitely poorer in iron, and artificial foods, that are not entirely dried milk may be very poor indeed. This child was fed, from birth on pasteurised cow's milk, but seems always to have been pale and her resistance to infection always low. Such a state of affairs may be combated by the addition of iron to bottle feeds, and the Cow and Gate Company have patented a form of food called "Hemolac" which contains additional iron. The importance of anaemia, as stated above, lies in the predisposition to infection and the increased severity of infection when it develops. The whole may act as a vicious circle as infection itself tends to produce anaemia. Excessive prolongation of the milk feeding period is inevitably associated with anaemia, because the rapidly growing child requires a diet progressively rich in iron.

SOCIAL RELATIONSHIPS IN THIS CASE.

The family consists of father, mother and six children.

Father: aged 37, is in the army. He has always been a healthy and energetic man and takes a keen interest in his family.

Mother: aged 34, was a very thin, pale, rather fragile woman obviously very poor and tired looking. She has been quite healthy, but is troubled /
troubled with palpitation, slight breathlessness on exertion and is very easily exhausted by her housework. She admitted that "food had been very difficult" and June appears to have been fed on a diet consisting mainly of carbohydrates. Her breakfast consisted of bread and milk, and no porridge. For dinner she had mainly potatoes with a little gravy. Meat was given on rare occasions only, but she sometimes had fish and never eggs. Vegetables were very seldom given. Tea again consisted of bread, scones and weak tea, and she had a slice of bread and jam before bedtime. At this age the child should have a daily intake of at least 15 mgms. of iron and a diet such as this is manifestly deficient in iron-containing foods.

The children: six in number, all girls. The oldest, aged 16, is very pale but seemingly healthy and working. The second, aged 11, is troubled with a cough in winter months. The third, aged 7, was very anaemic in infancy but has since improved. The fourth, aged 5, is quite healthy. She had measles at three years of age. The fifth, aged 4, is also very pale and is subject to tonsillitis and bronchitis. The sixth, aged 2½, is the patient under consideration.

The home consists of two apartments and a bathroom in a new block of tenements in the slum clearance area at Craigmillar. The family lives in the top floor; overcrowding is therefore present. There are three beds in the house; hot water is available. It is a bright and airy house, but has been cold this winter owing to scarcity of fuel. The mother says the family is very poor, and she has had to economise in food.

From this it is apparent that the aetiological factors in this case are not lack of sunshine and air, or bad sanitation, but perhaps overcrowding and certainly grossly inadequate and faulty diet associated with some degree of maternal neglect.