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## Modern troglodyte : his diseases and problems

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THE MODERN TROGLODYTE  
HIS DISEASES AND PROBLEMS

BY  
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SENIOR THESIS PRESENTED TO  
THE UNIVERSITY OF NEBRASKA  
COLLEGE OF MEDICINE  
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- CONTENTS -

Introduction -----	p. 1
PART I Problems Anticipated -----	p. 3
PART II Problems Discovered -----	p. 15
PART III Management of Shelter Problems -----	p. 26
PART IV Results of Shelter Problem and Disease Management ----	p. 47
Conclusion -----	p. 52
Bibliography -----	p. 53

## INTRODUCTION

In the times of peace between World War No. 1 and World War No. 2, we could pick up an occasional newspaper and read how in future wars the aeroplane was to play a tremendous part; of how it was to become a front line offensive weapon. We read but believed with reservation. But with the offensives directed against China, Ethiopia, and the Civil War in Spain, we began to see the use of the aeroplane in warfare.

But we of America had only seen a small part of a gigantic drama to be played in the skies in Total War. Since September, 1940, we have seen the aeroplane play a role like never seen before in the history of the World. The people of England saw planes come up out of the East - not one or two - but in wave after wave - hundreds of planes of all types let loose on them an inferno the like of which they believed could only exist in Hell.

This type of warfare imposed upon the peoples of the British Isles many problems. It placed the entire country actually on the firing line with all of its problems of defense and offense. England did not have a real offense, but she was willing to defend, and not yield, until time would permit her to launch an offense, even while watching the everlasting destruction which was being dealt out to her. Her peoples were driven from their homes to the Air-Raid shelters to seek protection from the Axis bombers. It is to the medical problems of this phase of the present war about which this paper is particularly concerned.

The Shelter problem was, and still is, a very real one especially to the larger cities of the British Isles. With Total War now being fought on many fronts, the same problems will have to be met in many large cities throughout the World. It is not inconceivable that our Coastal cities that are even now undergoing blackouts may, before too long, have to send their civilian population to the Shelters for protection. Thus, to us here in the United States, this problem is one very much worth knowing about - as it is one that does not run true to expectancy.

PART I

PROBLEMS ANTICIPATED

"To every action - there is an equal and opposite reaction", -  
Thus, the provision of air raid shelters for all follows on indiscriminate bombing by aeroplane.

Between April 19 and May 22, 1939, Mr. J. and E. Hall made some tests of shelters for factory workers. They experimented in two types of shelters. One was steel with cement floors completely below ground; the other being of cement and partially above the ground. The capacity of either was 50 people, fitted with electricity, and telephones. Tests showed that they could be occupied for 2 hours without ventilation, with entrances sealed, without serious effects to the occupants. If there was no gas alarm, the doors need not be sealed, thus increasing the length of stay. At the end of 2 hours, however, there was some discomfort and mental confusion. The CO<sub>2</sub> of the atmosphere rose to 5 plus %, and the O<sub>2</sub> decreased about 14%. This increase in CO<sub>2</sub> caused headache, nausea, vertigo, and panting. To remedy this, they placed 40 pounds of soda lime in a number of containers, and the increase of CO<sub>2</sub> was only to 3.8%, and the symptoms disappeared. If the stay was to be over 2 hours, then, they advised O<sub>2</sub> to be supplied. (1).

Thus at first we see that the shelters used were small and only intended for an hour or two hour's occupancy during day-light raids. With the progress of the war, and with the beginning in September of

1940 of the night Air-Raids - since then havoc could be dealt out with less chance of being blown out of the skies by Anti-Air craft shelling and protector planes - the people were driven to the shelters for longer periods. They became dormitories for all-night use. Principally used were the Subways of large cities. One Vault in East-end London, which was intended for 5,000, was used nightly by 10,000. (2).

The surface shelters became more and more unpopular, for in the flocking to the deep tubes they had fellowship, light, freedom from noise, and sometimes room to lie down. Thus the temporary refuge became a permanent dormitory. There resulted gross overcrowding, lack of sanitation, lack of sanitary supervision, no heating, poor ventilation, lack of proper sleep, nervous strain, and improvised meals. This, to any M.D., totals up to one thing, - "Disease". (3).

Norman Gerald Horner, M.D., F.R.C.P., - the Editor of the British Medical Journal stated that the problem of the shelters by October, 1940, was becoming a "Front Rank Public Health Problem" as people were using the deep shelters more and more for longer periods of time (4). The problem was intensified by the coming of the Catarrhal Season. There was the fear lingering in many minds of an Influenza Epidemic like that seen in the last war. Unless effective measures are promptly taken, they could foresee with the approach of winter a state of affairs, with respect to infections and contagious diseases, which might prove more devastating than the Blitzkrieg. (4).

It was reported in the September 21, 1940 issue of the B. M. J. that the Minister of Home Security and Minister of Health have together appointed a Committee to investigate the effect on the public health of the present use of Public Air Raid Shelters. Lord Horder is Chairman of the Committee, and other members are: Sir Wyndham Deeds, Mrs. Atkinson, Sir Alexander Rouse, and Dr. B. W. S. Mackenzie (of Ministry of Health). (5).

The Committee went to work immediately, and in a very short time made recommendations which were placed before the Ministries of Health and Home Security. They were made after day and night tours of the Shelters by members of the Committee. At first, it was thought that the findings, with their recommendations, should be held as confidential - but later it was decided to publish them.

The Crux of the problem was overcrowding, and to which must be added a wholly inadequate supply of sanitary arrangements -- all intensified by the advent of the epidemic season. Young children who had not yet become inured to endemic infections were at the greatest risk. Their evacuation from areas subject to nightly attack is the only real satisfactory remedy, that is, to a properly constructed family shelter, since the Nasopharyngeal flora there would be the same to which they have become accustomed to in their homes. Also, they could be evacuated to outlying areas. However, others remain, and thus adequate sanitary equipment should be provided for in all shelters and emptied and cleaned daily. The Committee recommended one chemical closet for every 20 inmates. There may be expected a



reversal in the history of decline of alimentary infections due to improper fecal disposal. For this reason, the case of anti-enteric inoculation is being forced to the front, although it will only prevent one group of diseases. To wait for a major disaster before preventing it is bad medicine. But inoculation should not be regarded as a substitute either for the constant hygienic care of shelters or for the most stringent cleansing and chlorination of water mains which have been damaged.

As history of epidemics shows, the prevention of air-borne infections is a difficult problem. But the consequences of rapid and massive transmission of infection are so grave that every possible means should be tried to minimize them.

Ideal (Utopian) Standards of Cubic air space per person is 1000 cu. ft. with 3 air turnovers per hour. However, this is not met in many places. In army barracks it is 600 - in schools it is 420 - on ships it is 120. The Committee recommends 50 cu. ft. as the best that can be attained practically. This, however, will not give security against infection. Glover in his Calculation of the risk of Cerebrospinal Fever, defined severe overcrowding as a distance of less than one foot between beds -- even twice that if ill ventilation. Poor ventilation will increase with the coming of winter. Since safety cannot be attained by natural spacing -- other methods will have to be turned to, in the destruction of the microorganisms in the air of the shelters. One is by the use of ultraviolet light, another by spraying with disinfectants, etc. These will have to be investigated, and the results put in effect as

quickly as possible. (6).

Sir Arthur MacNalty states that due to the menace of the shelters, the risk of enteric infection has increased, as a result of the sanitary conditions. With the shelters we can anticipate abnormal rises in the curves of disease incidence, outside and above their seasonal rises. To blindly not use simple preventative measures is unwise. Sir Arthur recommends a gradual increase in an inoculation policy against Typhoid and Para-typhoid. Since it would be impossible to do a mass inoculation, he suggests that it be confined (at first) to those areas needing it worst; that is, where water mains and sewer mains have been damaged, and where great masses daily and nightly use the shelters. With time and with increase in facilities, it should be increased to form a mass inoculation. (7).

Lt. Col. H. J. Bensted, M.C., M.R.C.S., noted specifically another disease which may, due to shelter conditions, present a front rank menace. He states that the menace of direct infection in air-raid shelters is generally appreciated, and the introduction of bunks may lessen the chance of a Diphtheria carrier passing on the organism by direct projection of droplets. It is often forgotten, however, that the bacilli can remain viable in dried secretions and may be disseminated when blankets are shaken in the air, or dust on the floor is disturbed ( I will refer again to this point later showing results of many experiments conducted). Dispersal of children and immunization has done much to reduce epidemics. The immunity to Diphtheria acquired from active immunization is lasting, possibly for life. If it had been more widely practised during the last

10 - 15 years in children of pre-school age, the danger now of Diphtheria would have been largely eliminated. (8).

Dr. R. G. Wills recommended that large scale inoculation of children against Diphtheria, Scarlet Fever, and Whooping Cough be initiated at once. (9). I wonder, however, if he thought of the practicability of such a mass job. I believe that Col. Bensted summarizes it better considering a more workable plan. To immunize all now for Diphtheria is a terrific job. Thus any mass inoculation must be applied to pre-school ages, and the other age groups be dealt with in an ascending order. (8).

Dr. Phillip Elman early in the history of the modern Troglodyte wisely picked out another disease to hang a danger flag on. In an article in the B. M. J. he states that with the advent of the epidemic season, the Home Front doctors have a real problem facing them. An epidemic of Influenza with its sequelae would be magnified many-fold in severity due to the crowded and unfavorable conditions of the shelters, both public and private. The grave condition is the spread of Tuberculosis. In the thickly populated districts of London such as the East end, many healthy persons run a grave risk of contact with advanced and open cases of Lung Tuberculosis. Whereas, in normal times there was some measure of segregation from other members of the family and the community at large. The ideal, of course, is to place them in sanitariums, but this was never accomplished even in peace times. Now an additional danger has been added. With the advent of an epidemic of Influenza and acute respiratory infections, the danger of such cases to themselves and to others will be increased

to such an ominous degree that the spread of the Tuberculosis bacillus becomes a weapon no less deadly than bombing itself. (10).

Dr. D.L.T. Bennett, M.R.C.S., T.D.D., D.P.H., states that many Tuberculous patients spend their nights in close company with others in both the larger shelters and in the Anderson type shelters (family type). He knew of one case where a patient had a hemoptysis during the night, and only by utmost persuasion was not allowed to return the following night. The fact—that the shelters are crowded; that children frequent them; that advanced Tuberculous patients frequent them ; - suggest the possibility of an infection of the massive type. With the approach of the epidemic season, the shelters not being properly ventilated and warm, mental and physical stress, the loss of sleep, will all undermine vitality. The immediate consequence of lowered resistance, loss of vitality and weight is the increase in incidence of Tuberculosis, and in those with Tuberculosis, an increase in symptoms, which increases their power to spread the disease. The future effects we can only surmise, but one cannot doubt that the campaign against Tuberculosis will receive a setback. Dr. Bennett believes that the immediate necessity is to prevail on all Tuberculous patients to "stay put" at night in their own homes for both their own good, and the welfare of the public at large. In their own homes, notwithstanding a direct hit, the danger is not too great. For future work he advises that the Committee of Tuberculosis in the Ministry of Health consider the possibilities to remedy the situation in a more permanent light by evacuation, etc. (11).

Dr. Stallybrass says that the shelter problem is mainly epidemiological, but also is parasitological, as bugs, fleas, and lice might breed or be transferred in shelters. Air-Raid Shelter Marshalls should be trained to recognize these pests. Spread of infectious diseases varies directly with proximity, aggregation, number, and length of exposure. These all increase in shelters - hence an expected rise in infectious diseases. Spread is mainly by parasites, excreta, respiratory droplets, and contact. (16).

There is feared at present two parasitic diseases which may prove to be very much of a nuisance to the shelter population even though they are not of a fatal outcome. These two diseases are Scabies and Pediculosis. Two conditions, according to Dr. A.M.H. Gray, are necessary to lice infestation. No. 1 is contact with persons or articles already infested; No. 2 is conditions favorable for breeding on the person. There are two factors necessary for increased breeding on a person: The continuous wearing of clothes so that lice are kept at an even warm temperature, and failure to wash clothes to mechanically decrease the population of the lice. These conditions can be all found to be present in the shelter population, for these people come nightly to the shelters and never completely, and mostly not even partially, undress upon retiring. The same clothes are worn without change for long periods of time. Their homes often have been demolished, and opportunity and a place for cleansing of clothes and body are not available to them. They are crowded close together in the shelters, and transmission of the diseases from person

to person is easy. Toilets are inadequate and often unsanitary.

Through them the louse of Pediculosis could be easily transmitted. (12).

Dr. P. A. Buxton told of experiments on the counting of head lice in the normal peacetime population. Averages of percentage involved ran from 4% to 33%, depending on the classes of people examined. The highest count was a 33% average. This percentage was derived from occupants of the jails where the inmates all had their heads shaven upon entrance, and a count was made of lice in their hair. True, this is not an average of the people expected to be seen in all of the shelters, but it will mimic certain shelters in the poorer districts. Most lice were found on those people with large amounts of hair. Other counts were made of other classes of people. It was found that individuals who were deloused, and then had them return in short periods, had become infected again. (13).

Dr. J. R. Busvine draws our attention to a pest, seen in peacetime in crowded districts. He states that under present conditions, peoples' standards of hygiene are bound to suffer, and another result that is likely to be is a spread of bed bugs. This unpleasant pest has only to be carried in the bedding of a few people to the large shelters to establish itself. (18).

Body lice and crab lice are in themselves an irritable affair and a morale destroyer, but the possibility, however, of the appearance of louse-borne disease is of greater importance. Typhus was formerly not uncommon in England, and if it were reintroduced at a time when lice may become common due to shelter conditions, a disastrous epidemic might occur. (14). Dr. Melville M. Mackenzie states that the epidemic form of louse-borne Typhus fever is asso-

ciated with famine and overcrowding. He believes that malnutrition is as great a factor, or even more so than the overcrowding. However, both factors exist in the shelters, as the feeding problem is in itself a big one. Another factor is widespread movements of Civil or Military populations, thus bringing non-immunes into a district, where Typhus is endemic. Most important is the control of the louse. Persons with the disease must be carefully rid of lice, as one louse can transmitt the disease. (15).

Other diseases as Relapsing Fever, Trench Fever may become prevelant. It must be remembered that Typhus is one of the few diseases that could be introduced through enemy action. Infected lice could be spread over our cities from planes. They would survive even though dropped from great heights. With the crowded shelters, lack of proper changing of clothes, and general unsanitary conditions, it would spread like wildfire. Simple measures taken now are much more effective than to wait till the problem has become a menace. (14).

Dr. W. Lees Templeton tells that he has read of the onset of what Germans call "Kellergrippe" or "Cellar Flu", the symptoms of which read to him surprisingly like "Trench Fever". He states that it is surprising that this type of infection has not been anticipated to any greater extent than it has in shelter diseases, since the conditions would be very similar to those prevailing in Trench warfare. It would be important thus to deal with the louse problem, since "Trench Fever", and presumably "Shelter Fever", will be transmitted through the same agent. (17).

Typhus, transmitted by the louse, *Pediculus Corporis*, is a disease not to be taken lightly; for at the present writing, it is a killer which may turn the tide for the Allied Side. Its story is one that has twisted history in the past. It is the handmaiden of war. It lies quiet for decades, then strikes with fury, feeding on victims of war, famine, revolution, and human oppression. To realize the power of this giant of death, a glance at its past performances may be worthwhile. Typhus was largely responsible for Napoleon's debacle in Russia. It took a vicious swipe at the French in the Crimea. During the first World War, it ran riot in Serbia. The Austrian army waited on the border for months, afraid to invade the country while Typhus was rampant. Finally, the disease ran its course, leaving 300,000 dead. Then it skipped to Russia, where it killed 3,000,000 - nearly twice as many Russians as were killed by German guns. The German High Command now has set the stage for an epidemic of Typhus for itself. It has shuffled people from Typhus to non-typhus districts. The army has disrupted normal life, leaving millions cold and hungry. It is among them that Typhus finds a happy hunting ground. Lack of food lowers resistance. Lack of fuel means people rarely take baths. Instead they wear all the clothes they have; thereby providing lice a place to breed. Let a population sink to this state, and a single infected louse can set off a disastrous chain of events. Is it any wonder now that medical authorities in England have begun to worry about this dreaded disease? For they have all of the potential qualifications for such an



epidemic broiling in their shelters; lack of food and sleep, close quarters, perfect breeding grounds for the louse, and poor bathing facilities. In March of last year, Poland had 26,000 cases in Warsaw alone with deaths running at 400 per day. The disease has broken out in Finland, Yugoslavia, Rumania, and occupied Russia. Cases are beginning to appear in Belgium and Holland, where the disease has not been for dozens of years. It has invaded Germany, where they are frantically trying to curb it. It has hopped the quarantine belt that it failed to hop in 1914-18, for it was a miracle that Typhus never appeared on the Western Front. Now England is waking up to the fact that it could hop the channel. It can be stopped, if we of the medical profession use our knowledge of preventative medicine before the spark becomes a roaring fire.

PART II

PROBLEMS DISCOVERED

Dr. Bryant W. Knight in the November 2, 1940 issue of the B. M. J., was the first to report a "New" disease. He states that in the last war "Trench Foot" was attributed to the combined effects of cold, wet, and long standing. In the last few weeks in London, there have been occurring cases of a very similar syndrome. Commencing with swelling in the foot, it progresses up the leg. At first painless, it subsequently becomes painful, with red, shiny skin and stiffness of the ankle joint. In one case, it proceeded to blistering of the skin in the ankle region. In this group, the syndrome was there, but all three of the etiological factors were absent. In the A. R. P. personnel, the etiological factors are present - but no syndrome - not a single case. The one factor common to all these patients has been a history of spending the night hours in a sitting position, either in the house or a shelter, without compensating rest in the horizontal position during the day. In the present small series of cases, the use of a deck chair, with its wooden bar pressing in or near the popliteal fossa, is more productive of the condition than in one foot only, and it is interesting to learn that they sat or slept with the knees crossed, the leg which was usually uppermost being the one in which the condition developed. Most cases, so far, were in the middle-aged and in mothers. There was no special increase in the average varicosities or in cardiac lesions. (19).

The Editor of the British Journal, "Lancet," also noted the increasing appearance of the now labeled "Shelter Legs" in reports of the doctors. He states on December 7, 1940 that it started within a few weeks of the bombardment of London. The appearance, as described above, suggested an early cellulitis, but there seems to be no primary infection, though bullae and superficial ulcers may appear later. Thrombophlebitis may also develop and should always be suspected where one leg is more swollen and painful than the other. Elderly women seem to be the most commonly affected, but cases also occur in men and young people. Deck chairs are suspected as a likely cause of the trouble; they are used freely in the shelters, and the wooden cross-bar causes pressure on the back of the thigh or on the popliteal vessels. Patients sometimes complain of swollen ankles after long sea voyages when much of the time has been spent in deck chairs. The condition has been seen in people flying home from Cape-Town; the aeroplane seats are rather low and of a similar pattern to a deck chair. It seems that the circulation cannot be maintained against gravity unless there is a rest period at intervals. The edema and the reddening of the skin clear up at once if the patient is put at rest in bed, but such complications as ulceration and thrombosis naturally require prolonged treatment. The elderly and obese are loth to make use of bunks in the shelters even where they are provided, and since they are apt to sit about all day as well as all night, they readily acquire "Shelter Leg". Doctors can only hope to prevent this ailment by constantly impressing on their older

and heavier patients that they must get their feet up for several hours out of the twenty-four, - if not at night, then during the day. (20).

Dr. J. McMichael states that with the development of aerial bombardment, Carbon Monoxide (CO) poisoning will become a clinical problem of increasing practical importance. The sources of poisoning that are likely to become frequent are ruptured gas mains, attempts to heat poorly ventilated shelters by means of open fires, and exposure to explosive gases. The management of accidental CO poisoning necessitates a certain knowledge of it. A case record of it illustrates the point. A young man of 18 was admitted to Hammersmith Hospital at 4:30 A.M. on October 3, 1940. He had gone with a companion into an Anderson (Family) shelter the previous evening. Feeling cold, they had taken with them some burning coals in a bucket. Three hours later a neighbor visited the shelter and found both lads drowsy. The patient who had vomited, could not be roused; the other boy was in a dazed state. A dog in the shelter was taken out but died. On hospital entrance, the patient showed T was 96.8 , P was 140 , B.P. was 78/50 , R was 20, no pink color of lips and fingers, noisy respiration, chest revealed crepitations in upper right lobe, positive sugar in urine, and EKG changes. Since no full history was available at the moment, the following possibilities were considered: (a) Pneumonia, - but temperature was sub-normal. (b) Diabetic coma, - but no acetone breath, no diacetic acid in the urine, eyeball tension was normal, and no hyperpnea.

(c) CO Poisoning, and with Pneumonia and Glycosuria as complications; hence O<sub>2</sub> was given. The patient came out and was disoriented for a time - also some memory damage for a while. In summary Dr. McMichael says to be on the lookout for CO Poisoning in shelter cases. Symptoms are: Increasing headache, decreased vision, hyperpnea, confusion, vomiting, giddiness. Collapse often follows removal to open air. Many complications as mental impairment, tachycardia, EKG changes, glycosuria, and pulmonary lobular collapse leading to broncho-pneumonia can be expected. Treatment is removal from poisoned atmosphere, O<sub>2</sub> with CO<sub>2</sub>, and warmth. (21).

Dr. Simon Behrman on October 19, 1940 reports that during the past few weeks he has seen 5 cases of sleep palsy of the musculo-spiral nerve. In all of these paralysis was first noticed after sleeping on the concrete floor of air-raid shelters. (22).

Dr. H. W. Hills on November 2, 1940 reports a personal experience. He stated that for some time he was awakened with a tingling in the hand of the side on which he was lying. At first, he ascribed it to circulatory embarrassment - then he noticed the little finger escaped. He concluded that the median nerve was affected and that probably the musculo-spiral nerve had been compressed during sleep as it wound round the humerus. If the elbow is kept at right angles to the body, the arm cannot be compressed in this way. He thought he could escape this tingling also if the upper limb was kept straight and away from the body, with the forearm pronated. Some can sleep with their lower arm behind them, which should be the best position

of all for avoiding this paresis. (23). Both hope that bunks will soon be provided to make these things of the past.

Casualties occur even in shelters. An example of one is reported by Dr. H. T. Laycock. Because of the present attention being devoted to the use of bunks arranged one above the other in air-raid shelters, the following case is of interest. A boy of 13 was sleeping in an upper bunk, 6 feet above the floor level, the bunk being 30 inches wide. In sleep he turned over and fell out onto the floor. He was admitted to a hospital with vomiting and severe pain. A laporatomy was done, and it was found that his spleen was torn almost completely in half. They did a splenectomy, and the patient recovered. This accident might have been averted by the simple expedient of fixing a board at the side of the bunk away from the wall. (24).

Dr. Caplin reports a rather serious Ammonia gas poisoning incident, - 75 cases. Early in September, 1940, during a heavy air-raid on London, a large brewery whose cellars were being used as a shelter received a direct hit from a bomb. A fragment of flying metal pierced the connecting pipe of an ammonia condenser, and gaseous ammonia was set free. First Aid parties came to the rescue, and they were taken to hospitals. In all 75 cases were admitted, but only 47 of them were detained. Nine cases were then classed as mild and were discharged within a few hours. Twenty-seven were classified as moderate; of these 3 developed pulmonary edema within 6 hours, and died; 9 developed Broncho-pneumonia the second and third days, and of these

3 died; the rest recovered. Of the remainder 11 patients, who were classified as severe, 7 died in 2 days, and 4 recovered. (25).

There is developing in England two throat conditions which are demanding attention. Only one applies to the shelter population, but both are as a result of air-raid conditions, and I will present both; namely, "Evacuee's Sore Throat" and "Shelter Tonsillitis" as described by Dr. T. B. Layton, Senior Surgeon of Throat and Ear Department of Guy's Hospital. In this article he says that there are two forms of tonsillitis in evidence at the present time which resemble one another in so far that instead of their indicating tonsillectomy, this operation is definitely harmful. (a) Evacuees Sore Throat - This depends on the fact that if a young person entirely changes his mode and site of living, the hygiene of the upper respiratory tract is altered and will take some time to adjust itself to the new surroundings. During this time he or she suffers from a series of sore throats that closely resemble the recurring attacks of tonsillitis for which tonsillectomy is so beneficial. The difference is that for these patients it will not cure the attacks, which are likely to continue longer than they would if the tonsils were left alone. Considerable experience was had in this sort of thing prior to the war in young Irish and Welsh girls coming to London to train for nursing. It was thought at first some virulent strain of organism was kept in London, and that the young girls had not quite adult bodies, with the resistance of the infant. In the last year however, it has been noticed that it works the other way

around, for many young adults, children, and adolescents who lived in London and have been moved to outer areas have developed this same thing. At first operation was advised, but it was postponed by the patients in many cases, and now it is realized that operation is definitely contra-indicated in these cases. (b) Shelter Tonsillitis. - This is not as yet prevalent, but likely to become so, with the wet and the cold, decreased ventilation, and closer lying. The lymphoid tissue is the first to react, - it swells and is edematous; there is a diffuse redness, which may be more pronounced in the tonsils. As many people still associate increased size of tonsils with need for surgery, they are being so advised. As the tonsil is merely performing its function of reacting to increased microbial invasion, operation will not benefit, and may be disastrous. When the tonsils have been removed, the protective mechanisms of the pharynx are thrown upon the mucous membrane as a whole. This is recognized by looking at the posterior pharyngeal wall, where it is dull, red, and boggy. Thus, Dr. Layton recommends that, with the exception of the rare emergency, that tonsillectomies be discontinued until springtime to enable the clinical distinguishment between a real need for tonsillectomy, and a need for not doing a tonsillectomy. (26).

Of the known 3,000 species of mosquito, 29 are found in the British Isles. The malaria carrier of the Isles is *Anopheles Maculipennis*. Recently it was discovered that a species, the *Culex Molestus*, was breeding continuously in the tube shelters. It was



never noticed much before now as all the conditions necessary for great proliferation were not present. No doubt, a few have been there for a long time feeding on the transients of the Subways, the workmen and the porters; breeding in the stagnant pools. Now with the great invasion nightly of the tubes, the food supply, the blood of humans, has increased. With subsequent increase in breeding the condition has become serious. Steps are being taken by the London Passenger Transport Board to drain the pools and/or treat them with disinfectants. This, like in Panama, should control the problem. (27). It is interesting to note that the Species *Culex molestus* was first located in Britain by John F. Marshall and J. Haley in October of 1934. Hence it is truly a "new" problem arising from shelter conditions. (28).

War or no war - bombing or no bombing, children are being born in homes, in hospitals and in shelters. In a report before the Central Midwives Board, Dr. E. Morland noted the effect of the war on increased need for midwifery service. Many doctors have given up their maternity work for war service. In some places A. R. P. workers have been given instruction in midwifery. If time, he believes a woman in a shelter in labor should be regarded as a civilian casualty and conveyed to a hospital or First Aid Post where a doctor is in attendance, and not to be handled by midwives. If this is not possible, then the next best possible course is to have a capable midwife in attendance, and not to call a doctor who may be occupied with duties which would endanger the lives of many if he

left his post. (29).

In December of 1940, Dr. Keith Simpson reported a series of cases which are interesting due to their association with conditions of the Air-Raid shelters. He states that soon after serious night air attacks on London began in September of 1940, it became clear that the incidence of the various diseases commonly responsible for sudden death had changed. There was an appreciable rise in deaths from Senility, Acute suppurative bronchopneumonia and Pulmonary embolism. Dr. Simpson presents his own list of Autopsies from Guy's Hospital and various districts in London, for cases of sudden death excluding crime, accident, maternal and newborn for the months of September and October for 1939 and 1940. I will list only those showing a decided rise, or closely associated with deaths due possibly to where they may be traced to shelter conditions.

	<u>1939</u>	<u>1940</u>
Senility -----	6	16 (9)
Coronary -----	67	55 (12)
Hypertension -----	8	12 (4)
Ruptured Aorta -----	3	6 (2)
Cerebral Hemorrhage -----	18	16 (4)
Pulmonary Embolism -----	4	24 (21)
Broncho Pneumonia -----	8	18 (11)
Poisoning -----	41	22 (2)

( ) shows the number dying in, or soon after leaving air-

raid shelters.

It is noted that deaths from poisoning which are mainly suicidal has dropped. It had been at a peak at the time of the declaration of the war.

It may reasonably be supposed that the increase in sudden deaths from Senility and Broncho-pneumonia is due to the greater exposure of older people both in their battered homes and their journeys to and from air-raid shelters. It is, however, to the six-fold increase in the occurrence of total Pulmonary embolism that our attention is drawn, and to the fact that 21 out of the 24 died in, or shortly after leaving the air-raid shelters. It is thus clear that the increase in the number of deaths from this cause is a direct result of the confinement, and a succession of cases in which the details of history recurred with striking constancy at once disclosed the cause. A typical example is of a woman, age 60, who took a deck chair with her to the shelter and sat in it continuously for 10 hours. When she got up, she complained that her legs were numb and cramped, her ankles swollen. Some 8-10 minutes after leaving the shelter to walk home, she collapsed in the street - dead. On autopsy it was revealed she was stout build, mild varicosities, slightly obese, mild fatty degeneration of the myocardium, with fresh ante-mortem clots in the tibial veins, but with most of the clots lodged well down in the first sub-division of the Pulmonary arteries. They were new clots and never laminated. Thus the precipitating circumstance was without a doubt a long period of rest in a deck chair or some

similar seat, the front edge of which pressed into the legs as they lay over it, compressing the veins and causing obstructions, stasis, edema and thrombosis, - probably in that order. Here is something of real danger to life, and this increase in percentage is greater than anything yet traceable directly to the shelter. The elderly people must be given provision for lying down. We are struck here by the crime of the deck chair, for we have met it before in the cases of "Shelter Legs". In fact in the case just outlined, the lady had a mild case of Shelter Leg, before dying from Pulmonary Embolism. It seems that not only are the aged in danger, but this might be increased to anyone who has ever developed a case of "Shelter Legs", - as it is a step in the mechanism which leads to death. Thus to anyone ever having a case of Shelter Legs, they should regard it as a warning signal and avoid any condition which may cause it, notably the deck chair. It is noteworthy that cases of fatal Pulmonary embolism are already decreasing in December concurrently with the provision of bunks for sleeping. Thus a hazard was met, was analyzed as to etiology, and is being dealt with successfully.

It is noticed also in the autopsy list that in all of the causes listed, the shelters were a precipitating cause of death, but in most cases that the rise was not over that for 1939 or not much over. Nevertheless, there must have been an added strain imposed by the shelter conditions, or war conditions, to cause the death in or shortly after leaving the shelters. (30).

### PART III

#### MANAGEMENT OF SHELTER PROBLEMS

The Crux of the problem is overcrowding, to which must be added a wholly inadequate supply of sanitary arrangements. The problem is intensified by the Catarrhal Season with possibilities of an Influenza epidemic. Skin diseases have been reported among the shelterers. Various Contagions may be expected in view of the fact that thousands of people never undress themselves night after night and lie in squalid proximity. (4). Dr. J. Alison Glover presided over a meeting of the Royal Society of Medicine in which the shelter problems were discussed. Dr. P. C. Stock of the Ministry of Health gave a brief history of recent events. With the onset of the air offensive there was a rush to the tube shelters. Fundamental problems were overcrowding, defective ventilation, lack of sanitation, dampness due to faulty roofing, flooding of entrances with storm water, condensation of moisture on the walls, inadequate lighting, lack of heat, and absence of piped water supply. (31).

I spoke previously of the special danger that the children were subjected to in the shelter, constituting one of the main shelter problems. Mr. John Audric, a sincere schoolmaster, wrote an article in the British Journal Lancet, however, touching on a rather important point, which he titled "Bombs or Health". He stated that there are too many schools, especially in the not too heavily populated areas with an over-developed siren complex. The wail of the siren is the command for rapid exodus from the warm classrooms and a pro-

cession to the shelters. These shelters are bad enough in the summer, but many times worse in the winter, and the children will be forced to sit there and shiver in the gloom, possibly the inciting cause to a pneumonia. Should the children in the safer urban schools chance bombs or chance health? The shelters used by the children are those used by the general public at night, and they are left in a deplorable condition, - poor heating, poor lighting, poor ventilation. There is infested bedding, used at night by people with infectious diseases. He believes the children in the less dangerous areas are paying too great a price for their safety in their daily processions to the shelters. (32). Thus we read now of a man, not a doctor, who has the health of those under him in mind, seeking a wise course of action. To write like this, to advocate risking the terror of the Blitz is indeed courageous, but possibly isn't it also wise too? In my reading of the British Journals I not infrequently see articles showing a cool level-headed course of events taken by those who are under constant threat of death. A concrete example is in an article I have mentioned where I showed that where before danger was actually there, there was a high peak in the number of suicides, but once the danger was there, the number fell off rapidly. The talk of Wing Commander R. D. Gillespie at the Joslyn Memorial this winter also illustrated this same thing.

However, the general policy for children in the heavily bombed areas is evacuation. Malcolm McDonald announced on December 28, 1940, a list of new government powers. The responsibility of whether

children should be evacuated should rest with the parents with one exception. He has issued a new order under which any child thought to be suffering, or to be in such a state of health as to be likely to suffer in body, or in mind, as a result of war conditions can be compelled to be examined by a doctor. If the examination is positive, his or her removal from the dangerous area will be compulsory. Also the government has arranged for the medical inspection of all children in the shelters, so that their general health will be watched and diseases spotted in the early stages. Also the government has powers to compel any person thought to be suffering from an infectious disease or infected with vermin to be medically examined, and to, if positive, insist on their isolation, removal to a hospital, or cleansing. Medical inspections in schools have played an important role in improving the health of the nation. Now it is the turn of the medical inspections in shelters to do their share. (33).

Dr. Joan McMichael was also impressed with the overcrowding, for she listed it as the most important factor in the spread of epidemics. The possible sources of illness were many, - droplet infection, direct contact, defective sanitation, animal pests, mosquitos, deficiency diseases, hours in cramped positions. Lord Horder, she says, wants people to use Anderson shelters more, but here we see overcrowding also with decreased safety, decreased warmth, and lack of comfort. She, in almost journalistic language, refers to another problem, the toilet problem, or as she has labeled it "The Scandal of the Bucket". Also, she cites another reason for

the overcrowding - the fact that many are bombed out, and hence use the shelters not necessarily for safety, but just for a home. (34).

Now during all this time, the authorities in England were not just talking, sitting about and leisurely discussing affairs of State while the Germans were bombing them ( as we often picture the English Nobleman), - for Mr. Mac Donald, Minister of Health, announced on October 26, 1940, that 489,000 school children had been evacuated from London. This is 56% of them. Also, the aged and infirm are being removed. This will help the shelter problem for those for whom it is necessary to remain in the danger zones. (35).

Dr. Charles Key states that to decrease the overcrowding, new shelters had been provided and could accommodate 80% of the population of the areas. In the public shelters, there is provision for 19% of the people and used by 4%. Domestic shelters must be provided due to the shift in the population during day and night as not all are in ideal locations when alarms are given. (42).

The editor of the B.M.J. states that Medical Aid posts have been provided in the larger shelters. A compartment has been isolated from the main shelter and contains equipment for dealing with minor ailments and accidents. Beds will be provided at rate of 2 beds and 3 tier bunks for each 500 persons, 6 feet space from center to center of bunks. (36). I have read in the reports of Parliament of the drugs and equipment provided in these Posts, and inexperienced as I am of the needs of such a place, they seemed to me to be very adequate. To list them would be too long. Mr. MacDonald stated in



December, 1940 that 32 London boroughs had made arrangements under which doctors were present in shelters all night, paid regular visits, were on call, depending on the size of the shelter; 8 boroughs had regular sanitary inspections by doctors; and 24 boroughs had officers to deal with general shelter conditions. (37). By January of 1941 about 100 fully trained nurses had been allocated to various London boroughs for shelter work. These are paid, full time nurses. In addition, 300 trained and auxiliary nurses have been provided. In addition, 4 matrons serve as inspectors for supervision of activities of these nurses. (38).

Dr. E. M. H. Herbert also advocated the use of Medical Students for shelter work. He stated that here was a great opportunity for medical students to practise and study medicine in the raw in the shelters, as well as to give a great deal of aid in the new problems confronting the country in the shelters. This was done as I gathered in short notices here and there throughout the Journals. (40).

Dr. W. Lees Templeton very early advocated that one of the first accommodations to be provided for was lying down. This he recommended due to several reasons. The first was due to the increasing number of "Shelter Legs". Also, he brought out the fact that shelters, as much as possible should be of the underground type as "Noise" is eliminated, and he believes people are kept awake not from fear, but from noise. A deep shelter thus quiet with bunks gives them a sense of security which will enable them to relax, sleep more comfortably, and the next day to be able to do their jobs better and

with less susceptibility to disease. (39). In December, the Duke of Devonshire announced for the government that bunks had been installed for 206,000, and that 200,000 had been issued, but not installed in England. (41). By February 22, 1941, Dr. Charles Key stated that 420,000 bunks had been installed, and that they were being put in at the rate of 60,000 to 70,000 per week. Thus, shortly every one of the 80 tube stations as well as many others would have its complement. (42).

Previously, I have mentioned in an article by Dr. P. L. T. Bennett (11). that he advocated that those who had Tuberculosis adopt a "Stay Put" attitude by remaining in their homes during air-raids in order not to expose others. In review of a number of articles in reply to him, many ideas were offered. Many scoffed at the idea that we as doctors should be so cruel as to not allow tuberculous patients to come to shelters, for the mental stress of being in their homes during an air-raid was terrific. Dr. Bennett was accused of having not seen or been in a serious raid. (43) (44) (45).

Dr. Philip Ellman recommends that all admitted to a public shelter be required to take a health examination by a local medical officer, which if he passes will grant him the right to possess a "Season Ticket", which will have to be renewed periodically. Doubtful cases must be referred to a consultant for judgement. In this way authorities can 1. Know all positive cases and the severity of the case 2. Demand isolation of advanced cases with treatment in institutions 3. Evacuate all infective cases to outlying areas for

treatment. 4. To provide special work and shelters for quiescent cases. (10). Dr. P. A. Galpin, a Tuberculosis officer, states that on an administrative basis, measures fall into two classes -- those of control of spread of infection, and those of control of conditions in shelters that would lower resistance. They should:

1. Decrease the child population in shelters by persuading parents to accept government evacuation;
2. Evacuate sick and invalids;
3. Organize shelters on following lines -- Three classes of shelters, I - Allocate parts or whole shelters to children, and allow in only those adults who have Health Card to show they are free from chronic chest diseases as Tuberculosis, Bronchitis, Bronchiectasis, etc. , II - Shelters for ages 14 - 18 arranged as in I., III - Shelters for adults and need have no health card. (46).

Dr. C. K. Cullen believes that if tuberculous patients are not allowed in big shelters and made to stay outside in homes or in Anderson shelters, or sent to big hospitals in the cities (where they say now that the Germans are deliberately bombing), that there will be a great tendency for the patients to hide, with resulting increase in the spread of tuberculosis. Hence he advises that they be provided with satisfactory accommodations in deep shelters, but be kept isolated from the others in places which are made attractive enough to overcome the possible pride hurting segregation. (47). Dr. R. M. Orpwood agrees with Dr. Cullen and believes if a plan such as this is not done, the tuberculous patient will disappear from the dispensaries to endanger a nation. The T B officer will become a policeman in

the minds of the patients and they will thus become a "hunted" class , instead of a class to whom the government is trying to give honest help. (48).

Dr. Mc Michael says , "That to provide at the same time bad shelters with efficient medical aid is like throwing banana skins on to a rush hour pavement and handing out splints five yards down". (49). Thus efforts were made by doctors , by the government , and by scientists to reduce the bad shelter conditions. The Editor of the Lancet spoke generally on this. He stated that with the rise in  $CO_2$  , or the decrease in  $O_2$  , that there will not result a problem unless shelters are made air-tight. The only real danger would be the spread of infections. Possibly aerosols could be used for this. Discomfort arises from objectionable smells and from stagnation of warm , moist air around each occupant. Fortunately the sense of smell is easily fatigued so that an odor which is at first objectionable , soon passes unnoticed . In a crowded space the heat engendered by the occupants raises the air temperature considerably unless there is a brisk ventilation and the unpleasantness is aggravated by stagnation of the air. Hence Air-movement is necessary at all times . Fans would help this. If occupants had to sleep on a drafty floor there would be much complaint , but when bunks are installed the picture will be changed . Danger of infection is always great -- for even a public spirited person with a cold is not going to risk his life to protect his neighbor from that cold. He will go to the shelter and let his friend take his own chances . Health bays in shelters or strictly Health Shelters will help in this respect . (50).

C.H. Andrews , M.D., F.R.C.P., F.R.S., and a team of workers at the National Institute for Medical Research made a number of quite extensive experiments with respect to control of air-borne infection in Air-Raid shelters. They published that infection via the air may be conveyed in one of three ways: 1. Relatively large droplets , .1 mm to 1.0mm. in diameter which will cover distances of 15 feet but will reach the ground quickly. 2. Similar droplets of .1 mm. or less , which will become so small through evaporation before they reach the floor so that as "droplet nuclei" , consisting of a few bacteria , they can float in the air for hours to days. Viability of the bacteria varies . Pneumococci and streptococci are especially resistant. 3. Organisms reaching the floor , bedclothes , and other objects may survive on the dust which may be subsequently swept up and re-suspended in the air to become a source of danger . The tuberculous bacilli , hemolytic streptococci , and diphtheria bacilli are among those which may survive in the dust. Since we do not know the relative importance of the three -- it is best at this time to try to cope with all of the means of conveyances. They used various methods in the enumeration of bacteria in the air . Most bacteria were the non-pathogens . They used the Strep. veridens as an index -- the same as B. coli is used in water hygiene analysis . Blood-agar containing 1:500,000 gentian violet may prove of value in suppressing many unwanted "tin cans and kettles" such as air cocci , while permitting the Streptococci to grow. They are using counter measures of determination also by spraying the air with fluids containing the various organisms and

viruses , and then making quantitative determinations for them from the air , dust , etc -- in varying time intervals. No method for the control is as effective as adequate spacing , but in the shelters this is impossible , hence the search for methods of control where proper spacing and ventilation cannot be achieved.

Results were :

I . Organisms in coarse droplets. Here reference is made to those droplets spat, coughed , or sneezed directly from one person to the other . Control may be by :

1. Isolation of the infected.
2. A sheet or plaster board or other material between the heads of adjacent sleepers.

3. Masks

- a. The Surgeon's mask -- not too effective.
- b. Cellophane mask between two layers of gauze is cheap and effective.
- c. Yashmak mask is effective.
- d. Masks should be so designed so as not to be able to reverse them . In sleeping, the gauze mask is the most comfortable , and since droplets are not spread so much during sleep , they are satisfactory.

II . Organisms in droplet nuclei .

1. Ultra-violet light. There have been many reports of its value in American Journals. It was tried. A germicidal Ultra-violet lamp , consisting of 2 - 12 inch quartz tubes suspended in a bowl, was placed in a room of 800 cu. ft. -- so protected that it would not .

shine into the eyes (important) - yet radiating from the floor up to the ceiling . A mist of Strep. , Sal. , and Staph. was sprayed into the room and kept circulating with fans . Plates were made. Without the lamp a fall was recorded of 23,000 to 17,000 in 20 minutes. With the lamp a drop was made of from 23,000 to 115. This rate of fall would be achieved by a ventilation turnover of 30 changes per hour. Even more striking results were obtained when bacteria were sprayed into the room continuously . Instead of a banking-up effect , a fall of from 18,000 to 730 per plate occurred in 10 minutes. It is believed a duct system could be installed , where the air is passed by a circulating fan through a cloth filter and then over lamps . The air on exit from the duct would be free of pathogens . Such a system would be efficient - but the cost is too high at present.

III . Bactericidal Mists (Aerosols) . Several considered were good.

1. Hexyl-resorcinol - good but not available in quantity.
2. Eugenol-carbinol - odourless , non-toxic , available, but yet of undetermined value.
3. Resorcinol - good but need too high a concentration.
4. Sodium hypochlorite . Available , effective in low concentration (1% solution sprayed in amount of 5 c.c. in a room of 1000 cu. ft. will rapidly kill 95% of Strep.) , a valuable deordant - but does

corrode metal, hence cannot be used in presence of certain electrical equipment , as telephone switchboards. The shelter should be sprayed before daily occupancy , and at intervals during the occupancy. If an epidemic is in force , the spraying should then be continuous. "Perhaps the shadow of Lister would note that something like his carbolic spray was again coming into its own".

#### IV . Organisms on Dust.

1. Floors. The best material to use in the treatment of floors is liquid parafin (Spindle Oil). It is cheap and available. Instead of being fluffy , the dust will be adherent and can be swept out. It will not tend to become dispersed in the atmosphere with stirring caused by sweeping or walking.
2. Bed Clothes. Two methods are available.
  - a. Treat the clothes with some one of several anti-septics.
  - b. A second better method is the application of very small amounts of liquid paraffin as a solution of Spindle Oil in white spirit (a petroleum solution or product used in dry cleaning). Blankets soaked in a 30% solution and then freed of excess by centrifuging, retain only 3% of their weight of oil , but are not perceptibly oily to the touch. They are in fact almost indistinguishable from untreated blankets . The shaking or beating of these



oiled blankets result in the liberation of only a small amount of dust , which settles rapidly - while in the control blankets there is shown an increase in air suspension of bacteria and dust for long periods of time. Results were the same with artificially infected blankets. Hence since it is highly effective, inexpensive, requires no elaborate apparatus other than that used in laundries , it should be considered. (51).

Very complete studies in the Reduction of Dust-borne infection by the treatment of bedclothes were done by M. Van den Ende and his associates. The results were identical with those listed above . He even "borrowed" bedclothing from shelterers - treated them and then returned them the same day. They noticed no difference in them. Later they picked up the bedclothing and found that they retained their effectiveness for long periods , even though by now they were almost filthy. (56).

Dr. John. C. Thomas reports that treating floors with spindle oil over a period of months in hospital wards, canteens, and shelters has showed a constant reduction (80% or over) in the number of organisms in the air. It must be re-applied at intervals. (52). Dr. M. Van den Ende reports similar results and states that a clean air is better than the highly polished floors, even though they are dull and not so good looking. (53). Thomas and Ende report that some Spindle oils have carcinogenic properties. Refined oils cost some more but not excessively so and should be used in places where there is apt to be contact between the oil

and skin as in the treatment of bedclothes. (54).

Crosbie and Wright made a very extensive study of the subject of the frequency of diphtheria bacilli in dust and in air , and the efficiency of various methods for their destruction and for the prevention of contamination of air from dust. Studies were made in controlled laboratories, hospitals, and Air-Raid Shelters. Of 8 samples taken from air-raid shelters, 3 contained no diphtheria bacilli , of which 2 of these were from floors recently disinfected. From the other 5 , gravis strains were readily isolated. In one shelter the dust had been proven free of diphtheria bacilli after disinfection - the shelter used the next night , and on the following morning the dust contained large numbers of gravis organisms. They found that in control laboratories the bacilli remained virulent for over 3 months. Floors were treated with spindle oil and the air contaminated by sweeping, and plates were made. The results were ran against other floors non-treated. A tremendous reduction was noted in the air of the rooms where the floors were treated. In fact the air of the rooms where the floors were oiled showed no diphtheria organisms , and only a very few others. (55).

Twort and Baker, in the course of investigations on germicidal aerosols , thought of the possibility of interference with the activity of the germicidal mist by different kinds of smoke - especially tobacco smoke. Hexy-resorcinol and E. coli were used . It was found out that smoke exhaled from one ordinary cigarette completely annuled the activity of the germicide , which was in a concentration sufficient to kill 50% of the test organisms

in 5 minutes and 100% in 15 minutes. The smoke alone had no effect on the bacteria. Thus they advised "No Smoking" in shelters where aerosols are used. (57).

Due to recent developments in flash photography , which has increased our knowledge of the particles in human sneezing to a point which justifies some practical conclusions as to the best methods of preventing spreading of infection , R.B. Bourdillon and O.M. Lidwell did some experimenting. In an ordinary sneeze , droplets have an initial velocity of as high as 150 feet per second and come mostly from the mouth. The tighter the teeth and mouth are held together - the finer the spray and hence the longer the droplets remain suspended and the more dangerous the conditions. Effective range is from 4 to 6 feet. Suggested controls are by the use of the handkerchief and masks. However, why not abolish the sneeze reflex by pressure on the nose with the index finger. Educate the public not to sneeze - as they have been taught not to spit in public. (58).

I previously mentioned the possibility of a spread of Bed bugs. Several methods of extermination are described by Busvine.

1. Fumigants for places comparatively air-tight.

a. Hydrogen cyanide is the most efficient. Its only drawback is its great toxicity to man and its lack of odor. In practice , 12 - 24 oz. / 1000 cu. ft. is used with an exposure of 6 hours and airing for 24 hours before re-inhabited.

b. Sulfur dioxide is cheap and with its strong odor is free from hazard - but effectiveness is questioned - also its

dosage. Laboratory tests now show that the new eggs are rather more resistant - 2 to 3 times more than adults. Busvine recommends that 3 pounds of sulfur per 1000 cu. ft. for 6 hours can be relied upon to kill all with exception of a few eggs. If sufficient remain to cause trouble - refumigate within 6 weeks before they become adults and lay eggs .

2. Liquid and Powder insecticides are not practical as likewise is the use of heat. (18).

Dr. Stanley Alstead suggested the use of thin slabs of charcoal 36" x 36" x 2" , to be placed along the roof in the shelters to absorb the odors of the shelter. He states that he has used charcoal in hospital cases of his where there was considerable odor , as in cases of suppuration. He would place lumps of charcoal in a sack - lay it near the wound - friends would visit the patient and not notice the odor. (59). The Editor of Lancet wondered why during air movement by ventilating fans in the shelters , that they could not pass it through a charcoal filter. (60). I would think that they could pass it by an Ultra violet light and sterilize it at the same time if they went to all that work.

For many of the infectious diseases we do have a distinct prophylaxis. For diphtheria we have two agents ; Toxoid anti-toxin and Alum precipitated toxoid , as well as the anti-toxin alone. A widespread campaign was begun in the Isles and many communities even of great size report that they are nearly 100% immunized. (8). From Measles the sting can be removed by the use of adult serum for children known to have been exposed to it . Whooping Cough

can be immunized for. Scarlet Fever likewise. For diseases as these, there has been initiated as rapidly as possible, extensive campaigns. Typhoid , Para-typhoid , and Smallpox long ago were on a mass scale regime. (7).

And now to the control of a disease which to my own mind would be the most serious of all, once started. It alone could beat England , and against which a fight would be hard - once begun - but easily beaten if started early. This disease is Typhus . Dr. A.M.H. Gray states that the most important measure for preventing infestation is the changing of clothes , especially the undergarment , at night , and the regular washing of underclothes. In peacetime body lice are rarely seen and then only in tramps and inhabitants of common lodging houses who rarely change their clothes. In the last war infestation with lice was high when the troops were compelled to wear their clothing for long periods at a time - but rapidly fell off when they were living under more favorable conditions. Body lice live and breed in the underclothing, and nits are usually only found on body hairs of those heavily infested. If clothes are allowed to get cold , breeding is rather effectively controlled , hence all should remove all clothing worn during the day upon retirement at night. This one act alone would seriously cut down the lice population. Boiling will kill lice , but even washing mechanically removes them . (61). To prevent lice from being popular is the single greatest aid we have in the prevention against Typhus. True that Dr. Harold Cox in the Rocky Mountain Spotted Fever Laboratory in Montana has developed a vaccine - but it is not available in

tremendous quantities and is not a proven vaccine as yet. The best motto is "No Lice".

Sir Wilson Jameson offered a little homely advice. He states that clothing can be de-verminized by the people themselves by baking them in their own ovens , where public sterilizers are not available. (64).

After the Blitz had been the order of the day for several months , the Horder Committee , which was the initiating factor in much of the work that I have mentioned, made another report to Parliament and requested government action. I will list the recommendations , with the action taken by the government as of Jan. 4 , 1941 :

1. Tuberculosis.

- a. Hospitalize "open" cases that frequent shelters -  
by force if necessary.
- b. Anderson type family shelter for each tuberculous family.

Government: Granted for a. ----Priority for b.

2. Louse Infestation.

- a. Courses in hygiene to shelter authorities and wardens with pamphlets giving briefly the essential facts of life history of louse , flea , bed bug , and simple measures in dealing with the pests.
- b. Selected insecticides , with instructions for use be provided.
- c. Compulsory powers for delousing.
- d. Get an accurate incidence of louse infestation.

Government: The Ministry of Health to investigate all above , make cost estimate , and order as they decide. Compulsory powers granted.

3. Bug Infestation.

- a. Walls in shelters be painted with an impermeable paint to close up all cracks.
- b. Disinfect all infected shelters.

Government : Granted.

4. Masks.

- a. Recommend use of masks for shelterers.
- b. Recommend a cellophane type , but also advise ordering gauze and yashmak types also.

(Instructions be issued as to their use.)

Government: Orders have been placed for masks. ( Dr. Chas. Key reported on Feb. 22, 1941 that 200,000 were available and that 100,000 have already been distributed. (42).

5. Lozenges , gargles , and throat sprays.

- a. Not sufficient evidence for their use but does not wish to discourage their private use.

6. Smoking.

- a. Only in special compartments in shelters.

Government : Granted.

Thus we see that both the Horder Committee and the Government are not inactive. (62).

In September of 1941 , after a year of night bombardment, the Editor of the Lancet re-visited many different types of Public

to note their conditions. His results were:

1. Tube and Tunnel Shelters.

- a. Bunked for 22,800 , but could accomodate ten times that, as many prefer mattresses on floors.
- b. Medical Aid Posts , canteens , drinking water facilities, and laboratories are standard in all. Some even have laundry stations and baggage rooms for bedding which is kept clean.
- c. Doctors , nurses, and assistants are on regular duty.
- d. They still do not use their ventilation to the best advantage. Non-diming of lights keeps children awake.
- e. Children under 5 yr. have a tendency towards bronchitis , but since Aid Posts have been spraying throats at night this has decreased.

2. Large Basement Shelters.

- a. Have steel bunks, white washed walls, laundries , canteens , medical services , water closets, air-conditioned , and have bedding disinfected once a week. These are excellent and unrecognizable from eight months ago.

3. Small Basements and Crypts.

- a. These vary from excellent to very bad.

4. Trenches and Railway Arches.

- a. These are the ones which had to be "built around" the people. Many Pounds have been spent on their improvement and are really in quite good condition. People occupying them are mostly of the lower classes.



5. Surface and Domestic Communal Shelters.

- a. Not used much and conditions are worse than primitive  
in them.

As a whole the improvement seems to be almost unbelievable. (63).

## PART IV

### RESULTS OF SHELTER PROBLEM AND DISEASE MANAGEMENT

Lord Horder gave a summary of the results of the first year of work in the country's fight against the problems imposed by the night bombing of the Isles in a talk before the Royal Society of Arts , entitled , "The Modern Troglodyte (Cave-dweller) ". He stated that the people were in shelters because: bombed out of homes , homes not protected , terror , and noise. Here was a ripe field for preventative medicine , for these people submitted to the advice of the Doctor and Nurse. In September of 1940 the authorities viewed the Shelter Problem as one full of alarming hygienic hazards. However, there was an obstinate good health. The anticipated epidemics did not arrive. Lice and bugs were not difficult enemies. There was no apparent rise in diphtheria , the country over. The usual seasonal outbreak of measles was not of the virulent kind, the influenza curve did not reach epidemic heights --- only Cerebrospinal fever had shown an increase to near epidemic heights. Public authorities wondered as to the reason for the general good health. Was it due to a better state of nutrition, greater dispersal of the population , or , where the shelterers were concerned , to the fact that many of them had been living under better conditions than in their own homes , with more fresh air , less heated atmospheres , and more regular living.

There are of course unknown elements in the very determination of epidemics and the rise or fall in the virulence of a bacterium

or virus , unknown to us. You cannot start an epidemic by bad conditions (?) but if an epidemic does start, then bad conditions affect both the numbers of cases of the disease that occur and the severity of them.

But what does it mean when the comfortably housed shelter visitor expresses surprise at the places and attitudes in which many of these folk get their sleep ? And that they are not only patient, but good humoured in the midst of it all ? It means that there is alas , too little difference between their nights in the large public shelters last September and their nights in their own homes. This great and cataclysmal upheaval has brought into the shelters for our inspection the slum conditions of which we said we were heartily ashamed and which , but for the war, we were rapidly changing. Is it to be wondered at that with these better conditions that they are happier and healthier. Their morale is good. Here is the field for health education , for these people are easily moulded -- they accept advice , they submit to immunizations. Why here is the doctor's dream of a field for preventive medicine and health education.

But the danger is still present , the good fortune experienced during a winter past can not be expected of a winter to come and vigilance must be maintained . (64)(65).

However, I do not quite agree with Lord Horder that conditions were as cheery as he states for in reports that I have read there are "Shelter" diseases which are still rising in incidence. Dr. A. Murray Stuart (66) and Dr. A.M.H. Gray both state that Scabies is on the increase -- going higher than the peak seen in the last

war. Birmingham, Cardiff, Glasgow, and Liverpool report great increases in Scabies. Pulmonary Tuberculosis and Non-Pulmonary Tuberculosis in Glasgow has increased 20% . (68) . Dr. Weaver reports in the B.M.J. in November 1941 that Diphtheria has reached epidemic proportions in some Cities but is being controlled and seems to be on the decline due to active treatment and prophylaxis . (69).

The following Vital Statistics show more accurately the true course of Health and Disease during the War:

Death Rates from all causes other than violence.  
per 1000 living

Quarter	: 1936	: 1937	: 1938	: 1939	: 1940	: 1941
First	14.6	15.6	13.0	14.5	19.2	15.9
Second	11.2	11.0	11.1	11.1	11.0	11.6
Third	9.2	9.1	9.4	9.3	9.3	8.9
Fourth	11.4	11.8	10.9	11.0	11.5	?

This shows the increase in the death rates in the first Quarter of 1940 due probably to the War and Shelter conditions and being steady during the months not in epidemic seasons. It shows the improvement in the first quarter of 1941 over 1940, but still being higher than other years in the past -- so there is still work to be done.

Tuberculosis Death Statistics  
Resp. T.B. : All other T.B.  
Males : Females : Males Females

1938-39	12,724	8,983	2,244	1,921
1939-40	13,560	9,447	2,279	1,986
1940-41	14,068	9,774	2,579	2,321

These figures speak for themselves. There is a continual rise.

The most prevalent form of Tuberculosis besides Respiratory is Tuberculous Meningitis and it is mostly in children.

Deaths from Cerebrospinal Fever

	<u>Male</u>	<u>Female</u>
1938-39	307	226
1939-40	1162	853
1940-41	1303	980

This shows a great and steady increase.

Other Infections and Disorders (Deaths)

Disease	Half-Yr	1938-39	1939-40	1940-41
	July-Dec	1238	990	1,485
	Jan-June	1142	995	1,476
Diphtheria			↓	↑↑
Whooping Cough	: " "	356 844	385 282 ↓	396 1,555 ↑↑
Measles	: " "	140 186	117 ↑ 292	565 1,042 ↑↑
Acute Polio & Polio-enceph.	: " "	210 55	88 ↓ 59 ↓	102 66 ↓↑
Scarlet Fever	: " "	112 100	81 ↓ 83 ↓	71 76 ↓↓
Erysipelas	: " "	114 169	79 ↓ 122 ↓	92 126 ↓↑
Ear & Mastoid	: " "	531 714	475 ↓ 537 ↓	472 492 ↓↓
Influenza	: " "	1,196 7,050	971 ↑ 10,498	984 6,003 ↑↓
Pneumonia	: " "	9,349 15,924	7,480 ↑ 19,781	9,414 17,890 ↑↑
Bronchitis	: " "	9,578 21,331	10,107 ↑ 34,852	11,429 25,211 ↑↓
Rheumatic Fever	: " "	457 541	414 ↓ 510 ↓	341 367 ↓↓

↓ Compared c 1938-39

↑ Comp. c 38-39

↓ Comp. c 39-40

Those that rose in 1939-40 are Measles , Influenza , Pneumonia , and Bronchitis. Of these , in 1940-41 , Measles and Pneumonia still continued to rise . Influenza and Bronchitis dropped but were still above 1938-39 levels --- Hence bad but getting under control. Those that rose in 1940-41 over 1939-40 levels were Diphtheria , Whooping Cough , Measles , Polio., Erysipelas, and Pneumonia ; Of these , Diphtheria , Whooping Cough , Measles, and Pneumonia were above both 1938-39 and 1939-40 levels.

CONCLUSION

To me this problem of the Modern Troglodyte is one of vast scope , not only to those of England -- but to us , for may not the same problems be experienced here in America. It is a health problem applicable to crowded conditions everywhere -- in the Army -- in the Navy -- in our slums. Doctors should be keenly aware of Preventative Medicine , and in the Shelters it can be studied as nowhere else.

I believe that without the intensive efforts made by the British , that they might have had an epidemic of great severity of one type or another. The advances in Medicine , including the great advances seen by the use of the Sulfa Compounds , must have played a remarkable role in the control of death. Lord Horder , while being very unassuming and loth to accept praise, must be credited with averting by every possible means , a catastrophe which may well have wrecked England during a period when the health of a nation was imperative. The results, I believe, were not luck, as he so modestly puts it , but the result of the combined work done by England under his Leadership.

It is true that certain diseases did rise and are still rising -- but are rising less rapidly than expected at first and are reasonably well under control.

In a year and a half the problems imposed by the Night Bombing with the nightly trek to the Shelters , have been met and conquered -- due to the efforts of the Medical Profession.

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