between the levels of the two schools; but School III, which started lower, was on the final test significantly higher than School I. No explanation for this has been found. It would also appear from the figures that the increases have tended to occur in the spring months (see Chart).

Chart showing mean haemoglobin levels of school-children and pregnant women, 1942-4.

Since the same children have been tested throughout the period their average age has risen by two years, and it might therefore be thought that the rise in the haemoglobin level was due to this. That aspect has been investigated by comparing the mean haemoglobin levels of the children, divided into two-yearly age groups. It was found that the slight increase present with advancing age could not account for the rise in the haemoglobin levels between the first and final readings. No difference between the sexes was observed.

As was reported by Davidson and Donaldson (1944) children from School I were given ferrous sulphate for three months, and those from School III ferrous sulphate and ascorbic acid for six months. The improvement resulting from this treatment was apparent, especially among the younger children, up to a year from the conclusion of medication. The haemoglobin figures for these children were accordingly not included in the mean levels recorded for 1943. By June, 1944, there was no difference between the levels of those who had had treatment and those who had not, so the haemoglobin levels of both groups have been included in calculating the means for the last examination.

Pregnant Women

A comparison has been made between the haemoglobin levels of pregnant women from the same antenatal clinic in 1942 and 1944, grouped according to the trimester of pregnancy and the number of pregnancies. The results show a progressive fall in the haemoglobin level during the course of pregnancy, which was most marked in the case of women who had had three or more pregnancies. In each group the figures for 1944 are approximately 10% higher than those for 1942. Thus it was found (Table; Chart) that in 1942 the mean haemoglobin level of 64 primiparae in the second trimester was 77.0%, while in 1944 61 primiparae, at the same stage of pregnancy, had a mean of 86.8%—an increase of 9.8%.

Discussion

It is thus apparent that both the school-children and the pregnant women have in 1944 a much more satisfactory haemoglobin level than in 1942. This increase in the mean haemoglobin is due to a marked improvement in those who were most anaemic. Thus it was found that a mean increase of 11.7% had occurred in those children whose haemoglobin was less than 80% in 1942, whereas those who had a level of 80% or more showed a mean increase of only 2.6%. Or, put in another way, while in 1942 39.3% of the children had haemoglobins of 80% or less, in 1944 only 12.3% were at or below this level.

It is impossible to be certain of the cause of this improvement. It would appear from the data given in the Report of the Special Joint Committee, set up by the Combined Food

Board, on Food Consumption Levels, 1944, that there has been no material increase in the gross amounts of foodstuffs available for civilian consumption in this country between 1942 and 1943-4. Qualitatively, however, there has been an increase in the calcium, iron, and vitamin B available, the last two owing to the replacement of white flour by national wheatmeal flour. McCance and Widdowson (1940) give figures of 0.66 mg. per oz. for national wheatmeal bread and 0.28 mg. per oz. for white bread. In the course of a study of school-children's diets being made in Edinburgh it has been found, using the above figures for iron in bread, that the calculated daily iron intake of 20 children varied from 14 to 26 mg.—mean 19 mg. If the same amounts of white bread had been eaten instead of wheatmeal the iron intakes would have been from 9 to 21 mg., with a mean of 14 mg.

In Edinburgh during the past two years there have also been an increase in the number of children having school milk and an improvement in the school meals, both of which factors may have raised the protein intake of the children. The children reported on here have been divided into groups according to whether they were having school dinners or not. In Dec. 1943, those with school dinners had improved more than those without; but by June, 1944, there was no difference in the haemoglobin levels of the two groups. The school meals thus do not appear to be an important factor. Again, whereas the school milk may have raised the protein intake of the children, the pregnant women had not received any supplementary rations when the tests were made, on their first visit to the clinic, so there is no reason to believe that their protein intake is better than it was two years ago.

For the above reasons we consider that the increase of iron in the diet has been the chief factor responsible for the raised haemoglobin levels. It is also possible that the increase of calcium and vitamin B has facilitated the absorption of iron—the former by precipitation of the phytin, the latter by improvement of absorption.

Summary

A survey of the haemoglobin of school-children and pregnant women, made in Edinburgh during the past two years, has shown that there has been a progressive rise in the mean haemoglobin levels of these two sections of the population. The cause of this rise is discussed, and evidence is put forward to suggest that the introduction of national wheatmeal flour has been an important contributory factor.

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INDUSTRIAL PROBLEMS IN THE MIDDLE EAST

BY

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During four years of war industrialization has taken place on a scale hitherto unknown in the Middle East. For security reasons details cannot be given, but it may be stated that a large number of R.E., R.A.O.C., and R.E.M.E. workshops and factories have been set up for the manufacture of articles ranging from anti-tank mines to hospital bedsteads. Other large units repair and maintain tanks, guns, vehicles, and instruments. These installations have presented industrial problems varying from those met with in the United Kingdom at the time of the Industrial Revolution to tetra-ethyl-lead (T.E.L.) hazards. All this has taken place in countries with a predominantly agricultural economy and little or no pre-war industry. Many thousands of fellahin who had previously known only the bullock-cart and the ancient plough of biblical pattern have become fitters, welders, blacksmiths, and the like.

Equipment and machinery for the most part have had to be imported, and have often arrived broken or with parts missing or have been lost at sea. Production lines have had to be created in buildings never intended for industrial use. Huge workshops have appeared covering many square miles of desert. Environmental difficulties have further complicated this remarkable industrial expansion.

Environmental Difficulties

Operational needs led to the siting of many War Department factories in unhealthy spots, in overcrowded slums, in malarious swamps, and in some cases near primitive native villages. Steps were always taken to improve the factories and to reduce the amount of dirt, flies, mosquitoes, and other insects. So far as was possible British personnel have been protected against typhoid, smallpox, and typhus. In the case of native employees, protection has been afforded against typhoid and smallpox, and regular disinfection has been arranged. In some cases lethane belts have been of value in keeping natives louse-free, but they lose their efficiency after 14 days. No skin sensitivity has been noted in Egyptian labourers, but British personnel have often suffered from intense irritation after using these belts.

Even though the native workers usually return to their homes each evening, regular monthly disinfection has reduced both the number of louse-infested men and the degree of infestation. Records kept at one disinfection centre showed the following figures.

Proportion of Men found Lousy each Month before Disinfection

1943					
January	80%	May	20%	September ..	4%
February	80%	June	18%	October	11%
March	50%	July	9%	November ..	12%
April	46%	August	8%	December ..	12%

These precautionary measures have had a marked influence in preventing disease. During the twelve months under review approximately 43,000 cases of typhus were notified in Egypt, the majority in Cairo. Yet in Cairo area factories under our supervision, among 4,000 British troops working in the closest contact with 20,000 employed civilians, there were only 4 British and 21 native cases of typhus during the year—compared with an estimated rate of 2.5 per 1,000 population over the same period. All our cases were in the first six months of the year—before typhus vaccine was available for general inoculation.

Even in Cairo standards of sanitation were low. Whole districts were without any water carriage system, and promiscuous and indiscriminate defaecation was customary. Proper conservancy systems were invariably installed, and, in addition to being taught their work, native employees were "house-trained."

Ventilation and lighting have given rise to various problems. The intense summer heat has necessitated the provision of double roofing for many workshops. This simple measure lowers the internal temperature by several degrees. The provision of fans has been restricted owing to shortage. In some factories the ordinary fan has been entirely contraindicated owing to the danger of an electric spark causing an explosion. In such shops ventilation has been maintained by extractor fans installed on the exterior of the building. The constant sunshine experienced in Egypt has rendered the daylight illumination of most factories good, but nocturnal lighting has been difficult owing to the shortage of high-power electric bulbs. In the former civilian factories taken over, the illumination had to be modified and improved in the majority of cases. The latest machinery, which had just started to arrive in the Middle East, is usually self-lighted by adjustable lamps. In an underground basement where A.T.S. were operating mechanical accountancy plant the provision of daylight-type artificial illumination reduced the incidence of cases of headache and eye-strain from over 50 to less than 5 a week.

The shortage of British man-power has led to the posting of many men of low medical category to base installations, and great care has to be exercised by medical officers to ensure that the physical defect is such that it will not interfere

with the efficiency of a man's work, will not be aggravated by the nature of his employment, and will not render him specially prone to industrial diseases. Thus, men down-graded on account of dermatoses or chronic pulmonary disease have had to be weeded out after posting to T.N.T. factories. Similarly, care has been taken in the selection of native workers; but employees have been accepted for non-hazardous occupations at a much earlier age than would be legal in the United Kingdom. These juveniles have proved most efficient workers, and their health has benefited by the greatly improved nourishment resulting from the wages they earn.

In spite of linguistic difficulties Egyptian labourers have speedily been taught to use complicated machinery, and have developed considerable skill, while their capacity to work for prolonged periods without evidence of fatigue surpassed that of the British personnel. Particularly did this apply to monotonous repetitive work. In general, the native labourer was found to be unadaptable. While quickly learning one job, he cannot be switched over to a different task with any degree of success. This inability to accommodate himself to fresh work has prevented the rotation of labourers in hazardous occupations. The usual British practice of never keeping a worker who is exposed to industrial hazard on a dangerous task for very long, but of switching him on to a safe post at regular intervals, has been tried many times with native workers, but has had to be abandoned. This non-adaptability has resulted in natives being kept on highly dangerous tasks for 8 to 12 hours daily for many months, and a high incidence of toxicosis was expected. These fears have, with one exception, proved groundless, and the resistance of the native epidermis to such toxic substances as T.N.T., lead, and various oils has been most noticeable.

Industrial Fatigue

In one huge tank workshop near Alexandria 300 British "other ranks" were closely studied over a period of eight months in 1941. They were subjected to prolonged fatigue for 18 consecutive weeks, during which they had no leave and no days off. The actual hours worked ranged from 72 to 84 a week. The main points that emerged from this study of 1,467 cases of sickness or injury involving a wastage of 8,770 man-days were as follows:

First, sickness, disability, and injury rates were increased by the period of prolonged fatigue.

Secondly, the extent to which sickness was thus increased was much the same in the Army in Egypt as in civilian employees in the United Kingdom, despite a much closer control of feeding and housing arrangements than is ever possible among civilians.

Thirdly, the nature of this sickness was similar to that which follows fatigue in the United Kingdom. The principal cause of wastage of man-power was the common cold. The next most important cause, sandfly fever, may be regarded as an Egyptian condition corresponding closely to influenza. Infections of areolar tissue and those diseases of the skin which cause invalidism were also manifestations of a lowering of the general resistance. Combined with this was a steady increase in minor and major injuries, especially at the end of the working day.

Fourthly, the most potent "psychological incentive" operated for just so long, and no longer. In this group of men "just so long" was about four weeks. At the beginning of this study the working week was increased suddenly from 56 to 80½ hours, and there was at that time a considerable "psychological incentive." The work was done, and there was no significant increase in sickness rates till just over four weeks later, when the steady rise in the incidence of sickness began. An exactly similar situation arose again, and there was the same time-lag.

Accurate recording is essential in this kind of study, and it was found useful to have two or more different records which could be cross-checked, and which showed the same material from different angles. Absolute figures for new cases, man-days lost, and so on were difficult to bring into perspective. Percentage figures—relating, for instance, the man-days lost to the man-days that might have been worked assuming no sickness of any kind—gave a truer picture. But what appeared to be the simplest and most sensitive index of general health in a group of men was the average disability period, a figure which was worked out each month. This figure was arrived at by dividing by the number of cases under treatment

in any one month the sum of the days during that month on which they were treated. Thus, if five individuals were treated during one month for two, seven, three, six, and five days respectively, the sum of these days is twenty-three, and the average disability period for any one of these five cases is 4.6 days. This figure, of course, was irrespective of the clinical condition for which the men were being treated. It was an index of the rapidity of recovery of the group as a whole from disease or injury of any kind. The point is well shown by the following comparative figures in this particular group of 300.

Month, 1941	New Cases	Man-days Lost	Average Disability Period
March ..	89	358	4.0
April ..	123	540	4.4
May ..	187	855	4.6
June ..	228	1,156	5.1
July ..	275	1,873	6.8
August ..	302	2,447	8.1
September ..	153	942	6.2
October ..	110	599	5.5

The hours of work were increased in early April, and the period of long hours continued till the middle of August. It is perhaps worth noting, too, that with shorter hours and men on leave a maximum output of tanks was achieved in October; this was bettered in November, and the output reached a new record figure in December.

Certain conclusions were put forward tentatively after consideration of these records.

1. Young healthy adult males who are well fed, well housed, and well cared for can work effectively for long periods without showing signs of strain or ill-health provided that their hours of work do not exceed 60 a week. This is a maximum and not an optimum figure. The optimum may well be appreciably below 60 hours a week.

2. If such men are made to work more than 60 hours a week for more than four consecutive weeks there will be a rise in the incidence of sickness and disability among them. This rise will be due to conditions of minor ill-health—typically the common cold—associated with a lowering of the general resistance to disease, and will continue, and increase, until such time as the hours of work are reduced again to a figure below 60 a week.

3. Where a group of men has a high rate of sickness due to a prolonged period of fatigue from overwork, steps should be taken at once to reduce the hours of work to below 60 a week and to grant leave. No other measures will affect the situation appreciably.

4. The most potent "psychological incentive" will not keep a large group of men in good health if that group is working more than 60 hours a week for a longer period than four weeks.

As a result of this study the many large R.A.O.C. and R.E.M.E. installations in the Middle East were all instructed to work a 57-hours week. In emergencies these hours were occasionally increased, but never for more than three weeks. The system of recording sickness rates was also generally adopted.

Methods of Recording Sickness

This method of recording sickness is being described in full elsewhere by one of us (I. H. F.). Briefly, a daily note was kept of "all sick." This included every man not 100% effective. Thus men receiving specialist treatment of any kind were included, as were men doing a full day's work but under treatment for, say, corns. Cases under this heading would range from men in hospital or on sick leave, through the "excused all duties" and the "light duties" group, up to men returned to duty that day. This figure was related daily to the ration strength of the unit and expressed as an average weekly percentage figure to the nearest one-half per cent.

This method was applied to all R.A.O.C. and R.E.M.E. base installations in the Middle East. Records were kept by companies (usually 300 to 400 strong). In all companies and in widely differing areas the usual figures were below 5%. A local epidemic of, say, sandfly fever might bring the figure up to nearly 10%, but that happened rarely. In the company previously referred to the figure ranged constantly from 3 to 4%. In 18 weeks of prolonged hours of work there was no appreciable effect for four weeks. After that period the sickness rates rose steadily to just over 30%. At that point

hours were reduced and leave was granted, but it was six months before the weekly figures had returned to the usual level below 5%.

Major and Minor Injury Rates

It was not possible to record sickness rates among civilian native employees, as the Army does not accept responsibility for the treatment of diseases other than the essentially industrial; but over the last two years injury rates have been recorded. Injuries were classed as major—i.e., involving injury pay of some kind—or as minor; in the latter case they were trivial injuries treated by native medical orderlies. These orderlies had all to be trained, and they were given first-aid supplies according to scales depending on the number of men employed, type of work, usual nature of injury—cuts, burns, eye injuries, etc. All injuries were recorded as major or minor, and rates were standardized to the number of injuries per 100 employed civilians per month.

Major Injuries

Table I compares major injury rates in two base workshops each employing over 7,000 civilians. One installation was engaged on the production of war stores ranging from ration-boxes and refrigerators to gun-mountings and blast-furnaces. The other was concerned with the repair and maintenance of all types of instruments, guns, and vehicles.

TABLE I.—Major Injury Rates per Month per 100 Employed

	1942			1943								
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.
Production	2.2	2.9	2.1	2.9	2.6	1.9	1.6	1.4	1.8	2.0	1.8	1.2
Repair and maintenance	4.4	4.4	3.1	4.2	4.1	4.2	3.2	3.1	3.6	3.2	2.6	1.9

These figures represented 1,759 major injuries in a year among an average civilian strength of 7,192 on the production side. The corresponding figures for the repair and maintenance installation were 2,972 major injuries with an average daily strength of 7,166 civilians. As anticipated, more injuries occurred on the repair side than in straight production; but in both cases there was an improvement over the year, due to the adoption of different safeguards and also to the increasing skill of the natives employed. The rise in June, 1943, was due to a rush of work essential to the Sicilian campaign.

Minor Injuries

In each of 24 sub-workshops—factories ranging from units of 100 to 3,000 civilians with a sprinkling of British troops as overseers—minor injury rates were similarly recorded and standardized to the rate of minor injuries per month per 100 employed. These were trivial injuries—cuts, abrasions, burns, etc.—treated by the native orderlies and rarely seen by a medical officer. These figures brought out clearly several points of interest.

Effect of Increasing Skill.—Three shops, each employing some 300 natives, were engaged on the production of wooden articles—tables, chairs, packing-cases, ice-boxes, ration-boxes, desks, etc. Shop No. 1 had been in existence in peacetime with much the same employees. Shop No. 2 was a wartime creation, and at the time of this study most of the native employees had been engaged on the same jobs for over twelve months. Shop No. 3 had been started two months before, and all the employees were new recruits and learnt their jobs the hard way. Table II shows the injury rates in these three different groups—each of similar size and engaged on much the same work.

TABLE II.—Minor Injury Rates per Month per 100 Employed

	1942			1943					
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Shop No. 1	15	17	14	11	10	12	16	11	12
Shop No. 2	26	25	31	28	30	27	29	25	27
Shop No. 3	81	59	47	41	43	33	37	34	31

The same point was shown equally well in a shop (No. 4) in which the average civilian strength leaped from 600 to 1,200 in the first week of March, 1943 (Table III).

Shop No. 5, which showed very constant figures, was a peacetime workshop employing over 3,000 natives, making hospital beds, Soyer stoves, and the like. In this shop expansion took place early in the war, and as it was in an isolated district its employees, once they had moved to this area with their families, tended to remain. Frequently the injuries have been of the "avoidable" type. Thus

TABLE III.—Minor Injury Rates per Month per 100 Employed

	1942			1943					
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Shop No. 4	88	92	83	74	71	163	148	139	123
Shop No. 5	45	43	41	52	59	47	54	43	48

many of the "foreign bodies, eye" injuries would not have occurred if the victim had used the eye-shields provided. It may be worth noting here that almost all British cases of "F.B. eye" were back at work within 48 hours, whereas natives sustaining the same injury were as a rule off work for 5 to 7 days. This is a difference easily explicable in a country in which some 90% of the population have trachomatous eyes. Another prevalent avoidable injury has been burns of the feet, due to the practice of working bare-footed in foundries and blacksmiths' shops. Boots were provided for these workers, but it took some time to teach them that they should be worn on the feet and not dangling round the neck.

Specific Hazards

There was a risk of plumbism in some installations, the chief of which were (i) battery reclamation, (ii) petrol storage, (iii) printing.

Battery Reclamation

In the reclamation of batteries the following processes are carried out: (a) Preparation of metal by breaking down old accumulators with the lead run out in a reducing furnace:—This is done in the open, hence is not very dangerous. (b) Casting of plates:—The lead is melted in a cauldron and poured into moulds. The danger from fumes has been minimized by the provision of hoods with extractor fans. (c) Pasting:—The paste is made by mixing litharge, lead chromate, and a binder manually, as a mechanical mixer is unobtainable. The risk of inhalation and skin absorption of lead is very high. The paste is introduced into the prepared frames with a hand spatula. Dust has been lessened by keeping the floors, benches, etc., constantly damp, but the risk of absorption through the skin prevails, as gloves have been found useless. (d) Drying:—The plates, having been pasted, are dried in a chamber heated by the fumes from the cauldron in the casting-room. As this room is only entered for the purpose of adding or taking out plates, the danger from inhalation of a lead-impregnated atmosphere is of short duration. (e) Forming:—The dry plates are immersed in weak sulphuric acid and charged with electric current. This process is carried out in a large well-ventilated room, so that a high concentration of fumes is not obtained. (f) Mounting:—The charged plates, or electrodes, and the electrolytes are now brought together to make the accumulator, the plates being placed vertically in the cells suspended by hooks and separated from each other by insulating-rods. They are then fixed to the cover and external connexion by lead soldering. During this process lead fumes are evolved from the solder.

Careful watch has been kept on the physical condition of the employees, and during two years' service no cases of lead poisoning have been detected. This is remarkable; for if, in the United Kingdom, men had worked under similar conditions there would have been many cases—some probably fatal. The only time when there has been any suggestion of symptoms due to lead was during Ramadan. At this time, for 28 days, no practising Moslem eats or drinks while the sun is up. Thus any inhalation or ingestion of lead dust is taken in a pure state, not being diluted by the presence of water or food in the stomach. During this time the number absent without leave rose, and the usual complaint was gastric upset from keeping Ramadan. Investigation revealed the following facts, which bear out the theory that this sickness was caused by mild degrees of plumbism.

Work	Average No. of Days Absence per Employee	
Pasting	..	3.2
Casting	..	1.0
Charging	..	0.6
Assembly	..	0.5
Stripping	..	0.5

This order corresponds with the danger from plumbism, except in the case of charging or formation, in which the inhalation of sulphuric acid fumes would tend to cause gastritis. Blood counts of workmen employed in the most hazardous processes for over a year revealed no abnormality excepting a 70% haemoglobin level, which is a figure considered well above the average among the Egyptian working-class.

T.E.L. Hazard

In the summer of 1943 eleven natives in one civilian petrol installation died as a result of acute T.E.L. poisoning. All became maniacal at some stage of the brief illness. The factors leading to this situation were as follows:

1. The work of filling 4-gallon "jerricans" from a feed-pipe with taps opening off it was done in a small building with no ventilation whatsoever. Since this was done at night there was a complete black-out, and because of the danger of fire there was a blast-wall entirely covering each door and window.

2. This was the hottest summer in Egypt for the last 34 years.

3. T.E.L. concentration in the petrol had just been increased from 2.6 to 4.8 c.c.m. per imperial gallon.

4. In view of the Sicilian campaign this plant was working 24 hours a day seven days a week, and because of the shortage of labour two 12-hour shifts were operated. Or, in other words, at one and the same time these natives were subjected to minimal ventilation, maximal heat volatilization of T.E.L., and maximal periods of exposure—with disastrous results.

Either 70- or 80-octane petrol was in general use at this time, both grades containing enough lead to need precautionary steps. An investigation had already been made into all W.D. petrol stores to ascertain the hazards and apply the appropriate precautionary measures. Three additional main sources of possible poisoning had been detected: (a) Washing of cans:—The cans are washed with petrol, and the washer gets his clothes saturated with petrol. (b) Storage in underground sheds:—Some of the tins leak, with the result that the sheds are filled with fumes. (c) Sealing of "leakers":—Leaking tins are filled with petrol and the leak is soldered.

Precautionary measures adopted included careful selection of personnel, regular medical examination, provision of overalls, showers, and daily milk to handlers, external storage of petrol, and substitution of 70-octane petrol for washing cans.

Printing Presses

Most of the W.D. printing presses have been taken over from civilian owners. In none of the British or native employees at these presses have we ever noted anything even remotely suggestive of lead poisoning.

Over the last three years we have observed natives at risk from T.N.T., lead, T.E.L., Diesel oils, and other industrial toxic substances for long hours each day over long periods. In the T.E.L. incident quoted, toxic effects were almost entirely due to inhalation. In all other cases we were constantly impressed by the way in which the native epidermis seemed impervious to lead, T.N.T., and a variety of oils.

Summary

A few of the difficulties and problems following the introduction of W.D. workshops and factories into the Middle East are reviewed.

Methods of recording sickness and accident rates are discussed, with some notes on the relation between fatigue and sickness.

Problems associated with special hazards are described.

A CLASSIFICATION OF DEATHS OF MEDICO-LEGAL IMPORTANCE

BY

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For many years deaths of medico-legal importance have been classified into three groups according to the cause of death—viz., coma, syncope, or asphyxia. Three series of pathological changes have been described as characteristic of these types of death. In particular the post-mortem signs of asphyxia have always been regarded as forming a distinct pathological entity.

I have analysed the results of many hundreds of necropsies in order to determine whether asphyxial deaths can be differentiated from other deaths of medico-legal importance on the basis of a qualitative difference in the pathological changes. The conclusion I have drawn is that reliable differences cannot be detected on the basis of morbid anatomical observations alone.

In all forms of death of medico-legal importance the findings at necropsy may be divided into two groups. The first group comprises the basic pathological changes of circulatory failure such as visceral congestion and capillary haemorrhages. These non-specific changes are always present in greater or less degree in deaths from any cause. The second group consists of the pathological changes which are dependent on the type of death—e.g., the local injuries to the neck in throttling and strangulation, and the colour of the blood in acute carbon monoxide poisoning. Such changes are best described as special pathological changes. It would appear that a sufficiently clear