manifest, and the count remained more or less constant at this level until after confinement. When she was last seen her condition was excellent. The blood findings were: R.B.C., 3,990,000 per c.mm.; Hb, 12.04 g.% (Sahli); W.B.C., 8,650 per c.mm.; M.C.H., 30.2 $\gamma\gamma$.

Case 4.—A male creole aged 22 had been sick for nine months with weakness, dyspnoea on exertion, and bleeding from the gums. When seen, pallor was marked, and there was some periodontal ulceration and sponginess of the gums, with secondary infection of the left wisdom tooth and oedema of the left cheek. The blood findings were: R.B.C., 1,890,000 per c.mm.; Hb, 8.26 g.% (Sahli); W.B.C., 5,600 per c.mm.; packed cells 27.4%; M.C.H., 43.7 $\gamma\gamma$; M.C.V., 144.9 μ ; bleeding time, 4 min.; coagulation time, 6 min. Subtertian and benign tertian malaria parasites were found. Van den Bergh: 0.6 mg. bilirubin per 100 c.cm. Stools: ankylostome ova +; urine: pus cells ++. Spleen just palpable. Treatment with yeast 3 oz. daily was begun, with quinine gr. 15 intramuscularly for four days. No treatment for hookworm was given. The patient was unusually co-operative, and in eight weeks was back at work, the R.B.C. count being 4,350,000 per c.mm., the Hb 13.44 g.% (Sahli), and the M.C.H. 30.9 $\gamma\gamma$.

Case 5.—A female Hindoo aged 38, 7-para, had complained of extreme weakness and troublesome diarrhoea since her confinement five weeks previously. Pallor and weakness were marked, and the blood findings were: R.B.C., 620,000 per c.mm.; Hb, 3.22 g.% (Sahli); M.C.H., 51.9 $\gamma\gamma$. No malaria parasites were found. Stool examination showed neutral fat and fatty acids ++; no ova or protozoa were present. The spleen was palpable on inspiration. Clinically the case did not resemble sprue, and a diagnosis of nutritional macrocytic anaemia was made. Yeast, 6 oz. a day, was given. Mist. bismuth. sed. 1/2 oz. four-hourly was prescribed for the diarrhoea, which cleared up within 48 hours and did not trouble the patient again except during several nights one week later. This again responded to the bismuth mixture. Two weeks after starting treatment mild glossitis and angular stomatitis similar to Case 2 were noted. This disappeared as the clinical condition improved. The patient was not seen again until approximately five months later, during which time the yeast had been taken irregularly. She was, however, very well. The R.B.C. count was 3,620,000 per c.mm.; the Hb 12.3 g.% (Sahli), and the M.C.H. 34.2 $\gamma\gamma$.

Case 6.—A male Hindoo aged 26 had been ill for five months with weakness, palpitations, and dyspnoea. Pallor of the mucous membranes was marked, and the blood findings were: R.B.C., 1,320,000 per c.mm.; Hb, 6.30 g.% (Sahli); M.C.H., 47.7 $\gamma\gamma$. No malaria parasites were found. He was given yeast, 2 oz. four times a day, and improvement was rapid and continuous. In seven weeks the R.B.C. count was 4,100,000 per c.mm., the Hb 13.8 g.% (Sahli), and the M.C.H. 33.8 $\gamma\gamma$. He is now well and has resumed work.

Conclusions

Sediment obtained from distilling-vats after fermentation has ceased is potent in the treatment of tropical macrocytic anaemia. This potency is due to the presence of autolysed yeast, which has been shown to contain the factor or factors necessary for the normal maturation of red cells and in whose absence an anaemia of the macrocytic type develops. Certain members of the vitamin B complex are also present in the yeast sediment, which has been used successfully to treat angular stomatitis and glossitis and pellagrous dermatitis.

It is preferable to obtain yeast sediment from factories producing unbleached sugar, as the yeast content is higher and calcium sulphate is absent. The latter may produce diarrhoea, possibly on account of its bulk. The yeast sediment used is obtained as a waste product and hence it is cheap. It is also acceptable to religious sects that will not eat beef flesh.

Concentration of the yeast extract and distribution from hospitals, estates, child welfare centres, and schools might be undertaken with valuable results in a country where tropical macrocytic anaemia is common, such as it is in Mauritius.

I am indebted to Mrs. D. Collins, M.Sc., for the analysis of yeast samples; to superintendents of the various district hospitals for permission to treat cases; and to the manager of Medine estate for supplies of yeast. I should like also to thank Dr. d'Arifat, Ag. Director, M. and H. Dept., for permission to publish this paper.

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FAMINE OEDEMA IN PRISONERS OF WAR

BY

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Oedema or dropsy occurring under conditions of starvation or of semi-starvation has been recognized since the earliest days, in particular being associated with war, and records of it occur in literature of the ancient world. In more modern times Napoleon's army is stated to have suffered in this way in its retreat from Moscow in 1812, and there have been such records from time to time under famine conditions in Ireland, India, China, the Siege of Paris, and Central Europe from 1914 onwards during the 1914-18 war; and in these histories the clinical picture has been fully described and many theories of causation advanced (*Official History of the War*, 1914-18). These theories are all, of course, from the days when accurate biochemistry was unknown and the vitamins equally so, although it was appreciated that the empiric use of certain foods—e.g., citrus juice—did help to cure conditions such as scurvy. A frequent comment in some records is that no evidence of scurvy appeared and that people died of dropsy alone—a clinical finding worth remembering, as scurvy was greatly feared in times of want. Another observation is that in the civil population dropsy affected the adult males rather than the women and children, and it is generally agreed that when famine conditions were ameliorated most of the surviving sufferers were restored to normal health. The mortality figures vary greatly, in some cases being 50%; but seldom is there any clear reasoning as to the cause of the dropsy—simply that it was due to insufficient food.

Aetiological Factors

What are the possible and what the probable causes of such oedema or dropsy? First, avitaminosis beriberi—the wet type of beriberi with its leg weakness, unsteadiness of gait, dyspepsia, anaesthesiae, and paresthesiae—must be considered. Secondly, nephritis. Richard Bright's (Boyd, 1938) description in 1827 of oedema and albuminuria as the main clinical features and the naked-eye observations of the diseased kidneys is historic. The war nephritis described in detail in the *Official History of the War* (1914-18), and considered to be no different from the acute nephritis of civil life has also to be borne in mind, noting that dyspnoea was often the presenting symptom, oedema was of short duration, and acute uraemia was frequent. Thirdly, we have food deficiency: famine oedema, the German *Oedemkrankheit* or *Kriegsödem*, the French *Oedème de la famine ou de la guerre*—oedema associated with famine and commonly with war, so frequently partners. These are the most likely causes of oedema occurring in comparatively large numbers of persons and under the circumstances to be stated.

Cases from German Prison Camps

Recent examination of some repatriated prisoners of war, captured in May-June, 1940, in France, reveals that these men developed, in one case at four months, in an average at eleven months, and in one case at as long as fifteen months after capture—i.e., in 1941, and while in Germany—oedema of legs, face, and genitals, preceded by malaise, dyspnoea, and severe headache. Their condition otherwise at that time is not known to us, nor have we any record of the results of the examination of their urine. They were stated to be suffering from nephritis. After capture in 1940 the men were marched considerable distances on an extremely poor diet and in battle dress, some without overcoats, eventually reaching prison camps in different parts of Germany, where they were put to work, still on a diet very low in quality and quantity. This diet is described by each of them separately as consisting daily of one-fifth of a loaf of black bread, a pint of thin soup with some cabbage in it, and a few half-rotten potatoes. On occasion a portion

of swede turnip was given in place of potatoes. This diet does not work out at the claimed German ration containing 55 g. of protein a day and amounting in energy value, from this and other ingredients, in all to about 1,800 calories, but was in fact gravely lacking in protein, especially good-quality animal protein, and was far from sufficient for men who were put to work. In addition the winter of 1940-1 was severe and their clothing inadequate. At about this time—spring, 1941—it was reported by delegates of the Protecting Power and the International Red Cross Committee that there was an outbreak of nephritis among the prisoners of war. The chief symptom was said to be oedema, but hypertension, haematuria, and albuminuria were also reported to be present. These men, diagnosed as cases of "nephritis," are presumably those who have now been repatriated.

Their own description is that their morbid condition began in every case with what they describe as "asthma" or as such shortness of breath that they required to attain a position of rest in the sitting posture. Some stated that they had much diarrhoea; two said that they were constipated; none of them was clear about any great alteration in their output of urine, but some had to rise for this purpose from time to time through the night. Oedema now appeared in their ankles and faces, often becoming extreme and involving also the genitals, the abdomen, and even the hands. Headache became very distressing, and they felt confused in their minds and unable to concentrate on things like simple games and books. None of them described any defect of vision or any superficial ocular discomfort, but their eyes ached with their headaches. When asked whether they noticed any diminution of visual acuity in the dark they were clearly at a loss, and it may be presumed that night-blindness was not present (Weekers, 1943). They were admitted to the local prison camp hospitals, where most remained for upwards of three months and some for as long as a year, although in the majority the oedema cleared up after some 6 to 8 weeks, sometimes relapsing when they got up. While in hospital they were given a rather more generous diet, salt-free, and some had injections, which are presumed to have been diuretics, while others had blood-letting performed. They all knew of other cases in their camps and hospitals, but these others are not with them now.

Red Cross parcels began to arrive about the spring of 1941, and the men were able to get protein food in greater quantity; with this the oedema and all other symptoms cleared up fairly rapidly, but after a period of failure of parcels to arrive or after return to work the oedema was apt to reappear. On disappearance of the oedema their limbs were lamentably wasted.

These men, now in this country and on an adequate diet, have no oedema, no headache, and no symptoms or signs to suggest a fairly recent nephritis, and their general nutrition is reasonably good. Their urine is quite normal, chemically and microscopically; blood pressure, ophthalmological examination, blood urea, and renal function tests are also normal. The men do have symptoms, such as pain in the back, aches generally, depression, and post-prisoner-of-war mentality, and they fear that their kidney lesion will recur. Many of them believe that they are no longer virile, or that, if virile, they are sterile, and reassurance as to this has helped them considerably.

Reviewing their state in 1941 and their present condition, and thinking of the causes of such oedema previously noted, it is thought more than probable that they come under the third category—food-deficiency oedema. Had they been true nephritics it is unlikely that they would have recovered so completely and been without signs or symptoms of nephritis to-day. They did not show the ataxia, leg weakness, dyspepsia, and sensory symptoms of beriberi, nor did they reveal the oral signs that are so often associated with a vitamin B deficiency.

This condition of famine oedema is essentially a hypoproteinaemia (McLean, 1922; Youmans, 1941) and is not a vitamin deficiency (Aykroyd, 1930), although some degree of this may also occur; in suggested proof of this the answers to a number of questions—avoiding leading questions so far as was possible

—revealed that, as already stated, no eye abnormalities occurred; none of them had any signs or symptoms referable to the mouth, such as painful tongue, angular stomatitis (Clarke and Prescott, 1943), bleeding or painful gums; none had pains in the legs or arms; and none had at any time haemorrhages or skin lesions, thus suggesting strongly that even the prison diet contained sufficient to eke out the men's own stores of vitamins A, B, pellagra-preventive factor, C, and K. Admittedly they had headache intense enough to disturb their powers of concentration, and depression, which under the circumstances was not unexpected; but these can be explained without postulating gross vitamin B deficiency.

Commentary

The condition described is one of much interest and importance to-day in view of its probable widespread distribution. It has been recognized before, and its aetiological factors have been worked out with observations on the biochemistry and on the question of vitamin or endocrine disturbances. Starling (1896a, 1896b) long ago showed the existence of an equilibrium between capillary blood pressure and colloid osmotic pressure, and that disturbance of this in the way of lowered protein in the blood would, in the presence of sufficient sodium chloride, the chief solute of oedema fluid, permit the diffusion of fluid from the blood into the tissues. McLean (1922) pointed out the importance of posture and of gravity in the production of oedema when blood protein was lowered, and showed that complete rest in the prone position would bring about a reduction of such oedema (Weech, 1936), also noting the alteration in the blood of the albumin-globulin ratio, the lowering of the former—often by a half, producing a ratio of 2:2 instead of the normal 4:2—being responsible for oedema, the globulin rarely going below normal. Aykroyd (1922) and Weech (1936) discuss treatment in some detail, mentioning animal experiments, and stress the importance of relying on a good mixed diet with sufficient but not excess protein, this tending to produce gastro-intestinal disturbances such as diarrhoea. In this respect they consider that it is not reasonable to try to give protein intravenously—e.g., in the form of plasma or stored blood transfusion—because the amount transfused cannot contain more than a limited quantity of protein. The total of fluid and the effect of such a procedure is only likely to cause greater oedema, pulmonary and otherwise, with possibly fatal results. This should be borne in mind when starved populations are being relieved. Relief should be by good mixed diet alone—not too high in protein, and containing, so far as possible, all the accessory food factors (*Bulletin of War Medicine*, 1944). Such a diet can be worked out comparatively simply without including a great many complex substances. McCarrison (1920) gives an excellent survey of the endocrine disturbances brought about in such conditions of semi-starvation, and these might be studied with advantage by persons organizing relief.

The importance of these observations in regard to our own returned prisoners would appear to be that the men think that they have had a serious kidney disease, that it will probably recur, and that their virility has been sapped. They therefore need careful reassurance as to the true facts—namely, that they have not been suffering from a pathological condition which has done them any permanent harm. It is important that hospitals generally should be advised of the existence of this state of matters, because in a number of cases these men have been instructed to take great care to avoid getting wet feet, or cold, and warned to wear woollens next their skin and generally against hard work. Their cases have mostly been labelled "nephritis, recovered from," and a guarded prognosis has been given in the form of a recommendation that they could be employed in Category C. In view of the anxiety state which has been produced in most of them (Newman, 1944) it would perhaps be wiser that some should be discharged from the Services with the reassurance that before long they will find themselves fit normal men, able again to take their places in the general labour market, and that such of them as wish to remain in the Services should be kept temporarily in a lower category and rehabilitated gradually at a convalescent depot.

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Medical Memoranda

Prevention of Industrial Dermatitis

The admittedly high incidence of industrial dermatoses in many of our war factories is a serious matter, and doubtless the present increase is attributable to several factors, among which the difficulty of selecting personnel for hazardous jobs, the introduction of new hazards and inexperienced workers, and inadequate facilities for proper cleansing of the skin all play a part. To these must be added the difficulty in getting certain types of work-people to use thoroughly such preventive measures as are provided against well-known skin hazards. Constant supervision by the foremen and charge-hands is essential to deal with this, and, in addition, the works doctor, by paying frequent visits to each department, must see that such supervision is exercised. Barrier creams, for which so much is often claimed, have their uses, but in my experience they are disappointing, and necessarily depend too much on the intelligent co-operation of the workman.

Two of the most common and most troublesome varieties of industrial dermatitis met with in aircraft and other machine factories are undoubtedly oil acne from close and long contact with brown machine-cutting oils, and paraffin dermatitis due to degreasing and cleaning engine parts in paraffin baths and bench troughs. These two hazards may give rise to a high incidence of skin trouble and to a very large amount of compensatable absence from work, and, of course, interruption of production and constant replacement of skilled personnel, who dislike the jobs. Faced with this problem in several of the factories in my medical charge, I sought in vain for some new, easily applied, and efficient means of meeting it, until my attention was arrested by a leading article on skin hazards in aeroplane manufacture (*B.M.J.*, 1942, 1, 188), reviewing a report by L. Schwartz and J. P. Russell (*Publ. Hlth. Rep.*, Wash., 1941, 56, 1581) on the subject, in which reference was made to the use of neutral sulphonated castor oil in 2% wetting agent as a substitute for soap after work. This suggested to me the possible value of such an emulsion as a skin cleanser after hazardous work instead of using, before work, barrier creams or lanolin mixtures, which invariably were dissolved off by the oil or paraffin.

With the assistance of my pharmaceutical suppliers various experiments were made and several mixtures were tried, including three of a different nature kindly sent me for trial by Dr. M. W. Goldblatt, of Imperial Chemical Industries. Ultimately a comparatively cheap source of supply of the neutral sulphonated castor oil was found; this was obtained in bulk and the wetting agent was added. It is distributed, where indicated throughout our factories, in gallon tins or bottles to the departments concerned, which dispense it to each wash-place in a round "elastoplast" tin, the lid of which is pierced with two opposing 1/4-in. holes. Directions for use are put over the wash-place, and consist of the simple instruction to wash the hands in water (hot or cold), then, while still wet, to pour a tablespoonful of the "hand cleanser" into one palm and rub well into both hands and forearms. It is then rinsed off in cold water. This procedure has proved an immediate and popular success, the skin being left clean, supple, and quite comfortable, both after long soiling with machine-oil or engine-grease, and after immersion in paraffin.

The use of this cleanser has since been extended with equally good results to various other jobs the chemical agents of which remove the normal sebaceous matter of the skin and cause a dry fissured dermatitis so prone to secondary infection; and to the stores, where the handling and cleaning of rust-proofed

and greased bar and sheet metal is a frequent cause of skin eruptions. The rubbing down of plaster castings, causing traumatic dermatitis, had also given trouble, and this, too, is obviated by the use of the "hand cleanser." The method was first put into use in our main factory in Nov., 1942, and the following table shows the marked reduction already achieved both in the incidence of all forms of dermatitis in the factory and in the incidence of oil acne and paraffin dermatitis in the machine-shops alone:

	Dermatitis Incidence			
	Factory		Machine Shops Only	
	1942	1943	1942	1943
Average operative personnel	3,300	3,350	500	505
Cases not losing working time	375	162	67	17
Cases losing time beyond shift	39	23	5	1
Total Cases	414	185	72	18
Percentage	12.5%	5.7%	14.2%	3.5%

Oil acne affecting the front of the thighs due to oil-saturated aprons has been prevented by waist-high metal guards on the automatic cutting machines.

I have to thank the Senior Medical Inspector of Factories for his interest in and sympathetic attitude towards this experiment and its results, and it is with his approval that this preliminary report is published. His department of the Ministry of Labour has sent a member of its Dermatological Advisory Panel to investigate my method and dermatitis statistics, and doubtless will consider the question of its general adoption. This, however, must depend upon the Ministry of Food's making a higher allocation of the oil to supplement the present very limited supply of the raw material.

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Skin Eruption due to Luminal

In the course of psychiatric practice one occasionally meets with instances of the intentional swallowing of a large quantity of luminal (gr. 50 to 100), but recovery usually ensues with energetic treatment. On the other hand, from time to time instances of cutaneous eruptions after the ordinary use of luminal have been recorded, though these cases must be very rare. The following recent case gave rise to much interest.

REPORT OF CASE

The patient, an unmarried woman aged 55, has been resident in this mental hospital since Oct., 1932, when her case was diagnosed as acute mania. She has been mentally deranged for 23 years, but showed no evidence of organic disorder until Dec., 1942, when she had two spontaneous epileptic convulsions. The Kahn test was negative, but the pupils were unequal and cerebral arteriosclerosis was suggested. In July, 1943, she again had epileptic fits, and was given luminal (phenobarbitone) 2 gr. twice daily, starting on July 19.

On Aug. 8 a morbilliform rash was noticed on various parts of the face, trunk, and limbs. It extended rapidly, and became especially thick and confluent on the back and on the extensor surfaces of the arms and legs, leaving the flexures comparatively free. The temperature on the first day was 103.2°, and a mild pyrexia persisted for two weeks, varying from 99 to 101°. On the seventh day of the rash the cervical glands were enlarged, but there was no abnormality of the mouth or pharynx. At the end of two weeks the rash began to fade. On the tenth day of the rash a blood count showed a slight leucocytosis: red cells, 4,530,000 per c.mm.; Hb, 90%; C.I., 1; white cells, 10,500 per c.mm.—polymorphs 78%, eosinophils 1%, basophils nil, lymphocytes 17%, monocytes 4%. The luminal was discontinued on Aug. 8. There was considerable desquamation when the rash had faded, and it was not until about five weeks after the drug had been stopped that the skin recovered its normal appearance.

On Dec. 14 the patient was again put on luminal. This time 3 gr. was given twice daily. After a week an eruption appeared on the limbs; but it was much less intense, and disappeared in two or three days in spite of continuing with the drug. There was no pyrexia. The blood calcium on Dec. 22 was within normal limits. She is still taking the drug daily without any further skin trouble.

COMMENT

Diagnosis was at first in some doubt, but the possibility of specific fever was excluded and a drug eruption suspected. This was confirmed by reference to the literature. Menninger (*J. Amer. med. Ass.*, 1928, 91, 14) recorded 3 cases of his own and collected records of 41 others. He found that a luminal eruption may arise in one of two forms—either an early one with urticarial wheals occurring soon after administration of the drug, or a later maculo-papular eruption sometimes like scarlet fever and at other times like measles. The latter type of rash is accompanied by pyrexia in more than 50% of cases, the erup-