SCURVY: A SURVEY OF FIFTY-THREE CASES

BY

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Between Aug., 1937, and Feb., 1944, inclusive, 53 patients with scurvy—48 males and 5 females—were admitted to medical wards in an Edinburgh municipal general hospital. The annual number of cases, and the percentage they formed of all medical admissions, are shown in Table I.

TABLE I

Year (Aug.—July)	Cases of Scurvy			Nos. all Medical Admissions			% Incidence Scurvy		
	M.	F.	Total	M.	F.	Total	M.	F.	Total
1937-38 ..	3	—	3	1,055	767	1,822	0.28	—	0.16
1938-39 ..	6	1	7	833	583	1,416	0.71	0.17	0.49
1939-40 ..	5	—	5	649	489	1,138	0.77	—	0.44
1940-41 ..	8	1	9	378	246	624	2.11	0.41	1.44
1941-42 ..	18	2	20	368	283	651	4.89	0.71	3.07
1942-43 ..	8	1	9	459	360	819	1.74	0.28	1.09
1943-44 ..	—	—	—	682	599	1,281	—	—	—

The patients ranged in age from 41 to 82 years. Including the 5 women, 43 were aged 65 or over. Eight of those under 65 were admitted in 1941-2. Fifty-one lived alone (single 27, widowed 17, separated 7); two were married and lived at home. Lodging conditions were: working-men's hostels, 28; private houses, 13; furnished rooms, 8; living with relations, 3; lodgings with board, 1. Forty-eight cooked for themselves, this total including one of the married men who kept house for his wife, who worked and had her main meal out daily. Fifty gave satisfactory details about income. Thirty-four were dependent on an old age pension plus a supplementary allowance which increased with the rising cost of living, giving totals varying from 13s. to 22s. 6d. a week. Thirteen were dependent on private pensions varying from 5s. house-free to 39s. 5d. a week, 10 of them having 25s. a week or more. Three were in gainful employment with 60s. to 80s. a week. From details given regarding expenditure on lodgings (30 to 40% of incomes under 25s. a week), clothing, tobacco, and alcohol (heavy in three instances only), the income remaining for food per week was calculated. Twelve had 8s. a week or less; 13, of whom 7 were admitted before Aug., 1940, had from 8s. to 10s. a week; 25, admitted with one exception after Aug., 1940, had 10s. a week or more. Eighteen had not sufficient to buy a diet adequate in proteins, fats, calories, and vitamins, assuming 8s. a week to be necessary for this until July, 1940, and 10s. a week thereafter (Orr, 1937). Dietary histories showed that the intake of potatoes and vegetables was low in all cases and very low in some. Approximately two-thirds ate fruit—most of them irregularly—when it was obtainable. Patients from this group were naturally admitted in great numbers after 1940 and provided the bulk of the cases seen. They had mainly adequate food incomes. One patient ate regularly in a British Restaurant; six others did so very spasmodically. A few in 1941-2 complained of the high cost of vegetables. Two men who were working said that the shops were closed when they were free to shop. Many complained of lack of cooking facilities in their lodgings. One individual—the remaining married man—had been carefully adhering to a vitamin-deficient diet which had been prescribed for him for

a gastric condition. Physical or mental defects were present in six instances, but in four these coexisted with food incomes of 8s. a week or less.

Clinical Notes

The disease developed most commonly in June, then came May, March, and April in that order. No case began in July, and few in the remaining months of the calendar year. 1941-2 showed an unusual feature with admissions in Nov. and Dec., 1941, and Jan. and Feb., 1942. The time elapsing between the first sign or symptom and admission to hospital was less than one month in 80% of cases. Few arrived within one week and only one after 18 months. The disease, by the usual standards, was mild in 2 instances and moderate in 51. All patients had skin petechiae. In two these were the only sign. Fifteen had deeper haemorrhages in one leg, 23 in both legs, and 13 in both arms and legs. Where teeth existed spongy and infected gums were very common. Bleeding gums were noted on 8 occasions, being present only in association with gross changes elsewhere. The onset and progress of the disease were typical; it appeared first in one leg, then the other, and finally the arms. Discomfort was usually mild at first, but became progressively more severe; within a month most patients were crippled, and were pleased to be allowed to rest in bed. One patient had epistaxis, another intestinal colic with melaena, and three of the most severe had histories of intestinal colic alone. Frank lower-bowel haemorrhage or haematuria was never encountered. "Lumbago" was experienced by three individuals just before the leg symptoms were noted. One female developed a large haematoma of the forearm after a Hess cuff test had been done. Poor wound-healing was noted and reported elsewhere (McMillan, 1943). None of the patients had clinically evident cataracts. Fractional test meals were carried out on 10 patients. The results and the blood findings are given below. In 50 patients the haemorrhages appeared spontaneously. In 3, trauma, by causing grossly excessive bruising, drew attention to the deficiency. One individual, who developed the disease after being confined to bed for six weeks, had haemorrhages on the buttocks only, the legs being unaffected.

Multiple neuritis (3 males) and pellagra (2 males and 1 female) were also recognized clinically. Hyperkeratosis perifollicularis was very common but not universal.

Chemical and Other Tests

1. *Cuff Test*.—Positive-pressure cuff tests—Hess (Hess, 1920) or Göthlin (Falk *et al.*, 1932)—were done on 40 patients before and after saturation with ascorbic acid. Of 22 tested by Hess's method 14 were positive before and negative after saturation, 4 positive before and after, and 4 negative before and after. Of 18 by Göthlin's method, 7 were positive before and negative after, 2 positive before and after, and 9 negative before and after. Neither test was diagnostic, but the Hess method gave a higher percentage of the usually expected result. The results by either method were unrelated to the plasma ascorbic acid level or the saturation requirements.

2. *Vitamin C Content of Urine* (using the dichlorophenol-indophenol indicator).—The urine passed by the patients during their first 24 hours in hospital was collected, stored with due precautions, and examined. The vitamin C content varied from 1.5 to 16 mg., averaging 7 mg. Thirty of them were then tested for deficiency by one of three methods ((a) Abbasy *et al.*, 1935; (b) Eddy and Dalldorf, 1941; (c) Harris and Abbasy, 1937). All were deficient. Further ascorbic acid was then given, in the manner recommended, until saturation was achieved. The results are shown in Table II. There was no steady relationship between the saturation requirements and the clinical extent of the disease.

TABLE II

Method	Amount (g.) Ascorbic Acid required for Saturation								Average (g.)
	2-2.4	2.5-2.9	3-3.4	3.5-3.9	4-4.4	4.5-4.9	5-5.4	5.5-5.9	
(a) ..	1	2	4	4	1	—	—	—	3.18
(b) ..	—	—	1	1	2	1	1	3	4.5
(c) ..	—	1	—	2	—	5	1	—	4.1
Total	1	3	5	7	3	6	2	3	3.85

3. *Plasma Ascorbic Acid Content*.—This estimation was made on 22 patients within 48 hours of admission. All had levels compatible with clinical scurvy—e.g., eight had 0 to 0.04 mg. %; two, 0.05–0.09 mg. %; five, 0.10–0.14 mg. %; four, 0.15–0.19 mg. %; two, 0.20–0.24 mg. %; and one, 0.25–0.29 mg. %. An inconstant relation existed between these figures and the clinical picture, but not to the saturation requirements.

4. *Blood Tests*.—Bleeding time (Dukes's method), 1½ to 3 minutes. Coagulation time (capillary tube with normal control), 3 to 9 minutes, but never longer than the control. Platelet count (dry smear), 120,000 to 340,000 per c.mm.

Blood Picture

A complete blood examination was conducted on 38 males and 2 females within 48 hours of admission. Red cell counts ranged from 1,730,000 to 5,220,000 per c.mm., with 65% of all counts above the 3,000,000 level. Two males had no oligocythaemia. Haemoglobin ranged from 38 to 85% (Sahli), and from 5.3 to 11.9 g. per 100 c.cm. The mean corpuscular haemoglobin (M.C.H.) varied from 16 to 38γγ. White blood cell counts ranged from 2,800 to 12,000 per c.mm. Erythrocytes were mainly normal in size and shape, anisocytosis being noted in approximately 20% of smears and being much more common than poikilocytosis. Ring staining was observed on three occasions. Nucleated red cells were never seen. Reticulocytes ranged from 0.5 to 1.5% with one exception, in which they were 4%, the patient actively losing blood from haemorrhoids. The morphology of the leucocytes was not specially noted. The sternal marrows of 6 patients were examined: five were normoblastic, one megaloblastic. Two of the former showed a few megaloblasts. The presence of megaloblasts was associated with achylia gastrica in two instances and a low free HCl in another. One patient with a markedly macrocytic anaemia and a normoblastic marrow had normal test-meal findings (Case 3, Table IV). Short details relating marrow and blood pictures are given in Table IV.

A morphological classification of the various anaemias was made, using the red cell count and the M.C.H. of each case. The placing allocated to the 6 fully investigated cases was then checked, and it was found that only one had been placed wrongly—as “slight simple microcytic” instead of “moderate normocytic.” With this error corrected the table is reproduced below (Table III), and it is submitted that any error in it lies in the existence of an inflated “simple microcytic” group at the expense of the “normocytic” group.

TABLE III.—Morphological Classification of the Anaemias in 40 Scurbic Patients (after Wintrobe, 1942)

Type	Degree	No.	Type	Degree	No.
Macrocytic	Slight ..	0	Simple microcytic	Slight ..	4
	Moderate ..	2		Moderate ..	10
	Severe ..	0		Severe ..	0
	..	0		..	0
Normocytic	Slight ..	10	Hypochromic microcytic	Slight ..	4
	Moderate ..	8		Moderate ..	2
	Severe ..	0		Severe ..	0
	..	0		..	0

The anaemia present bore no constant relation to the extent of haemorrhages or to the plasma ascorbic acid content or saturation requirements of the patients. It was varied in type, being mainly normocytic, rarely hypochromic microcytic, and more rarely macrocytic.

Treatment

This was dictated at times by experimental needs. The administration of ascorbic acid in addition to the ordinary hospital diet always resulted in quick improvement. Appetite improved, pain and stiffness in the legs disappeared, and within a week the patient felt very well. This change was commented upon by some of the sufferers, who said they “had not been so well for years.”

Particular attention was paid to changes in the blood picture during treatment. Six clinical experiments were designed to elucidate certain points. To save space the observations made have been condensed as much as possible. The blood pictures and the results of treatment of the 10 patients who form the basis of experiments 3 to 6, inclusive, however, were considered interesting enough to be given (see Table IV). Reference to this table is made in the text which follows. It will be noted that the columns for red cell count, Hb, etc., have been subdivided into five. Findings, at any one time in any case, are given in the correspondingly numbered sub-column—e.g., the blood picture in Case 1 on admission can be obtained by reading all the figures in sub-columns 1, and so on. The experiments were consecutive, and the final blood figures in experiment 3, shown in sub-column 2, are the initial figures for experiment 4, the final figures for which are shown in sub-column 3, and so on. Lastly, in order that the duration of each clinical test could be shown, bracketed figures, giving the time in days, have been placed above the red cell counts.

Exp. 1.—Four patients with anaemia ranging from 2,490,000 R.B.C. per c.mm. and 42% Hb to 3,350,000 R.B.C. per c.mm. and 62% Hb were placed on the ordinary hospital diet containing a calculated vitamin C and iron content of 15 mg. and 14 mg. daily respectively. Red cell and Hb regeneration began immediately, a reticulocytosis of 4% being noted in two of the cases.

Exp. 2.—Eleven patients with anaemia ranging from 2,200,000 R.B.C. per c.mm. and 40% Hb to 4,670,000 R.B.C. per c.mm. and 85% Hb were given the same diet (approximately) plus 500 mg. of ascorbic acid daily by mouth until saturated, and thereafter a maintenance dose of 100 mg. daily. Red cell and Hb regeneration again began immediately, and continued until the anaemia was cured. Reticulocytes never rose above 2% in any instance. Over all, the response was as good as in the case of the four who were not given ascorbic acid. In general, the more severe the anaemia the more rapid the rate of red cell and Hb regeneration. Falling M.C.H. values in a number of cases suggested that extra iron would have been advantageous.

Exp. 3.—Ten patients, details of whose blood pictures are given in sub-columns 1 of Table IV, were placed on a vitamin-C-free diet. This consisted of well-cooked meat, tripe, rabbit, chicken or fish, fried bacon, powdered egg, porridge, boiled rice, semolina or custard, bread, margarine, cheese, cocoa or tea. No soups or vegetables, or foods cooked with vegetables, were permitted, and the 4/5 pint daily milk ration was heated to 100° C. for 20 minutes and cooled before issue. Extra vitamins were added by giving 1 drachm Halibol and 6 pulvules of Betalin Co daily by mouth.* Clinical experience of this diet indicated that it contained little or no vitamin C. Its calculated iron content was 6 mg. daily.

The blood pictures of these patients after periods ranging from 9 to 14 days on this diet are given in column 2 of Table IV. Briefly, 5 patients showed increase in red blood cells and Hb, the rate of improvement varying considerably. The remaining 5 showed no change in their red cell count, the Hb also remaining stationary in all but one, in whom it rose 10%. Reticulocytes rose to 4% in one of the patients showing improvement; the others never rose above 1.5%.

Exp. 4.—Six of these patients (Nos. 1, 2, 3, 4, 6, and 7 in Table IV) were kept on the vitamin-C-free diet for further periods, with the addition of 18 gr. of ferrous sulphate daily by mouth, ac. hydrochlor. dil. m. 60 t.i.d. with meals being given also to those with achlorhydria. The blood pictures at the end of this test are shown in sub-columns 3 of Table IV. The red cell count rose in five but remained stationary in one. The Hb rose in all. The patient whose

* Represent vitamin A 60,000 I.U., vitamin D 10,000 I.U., thiamin 6 mg., riboflavin, 1,998 gammas, nicotinic acid 12 mg., pyridoxine 1,200 gammas, plus other factors of vitamin B complex from liver-stomach concentrate and a negligible amount of anti-anaemic factor.

red cell count remained stationary had shown improvement on the previous diet. Two now improving were doing so for the first time, but, as one had a peak reticulocytosis of 3.5% three days after iron was added, the improvement was judged to be a delayed response to the earlier treatment. In the other it may have been likewise. Reticulocytes, except as above, remained below 2%.

Exp. 5.—The same 6 patients were used in this test, their treatment being altered only by the administration of 500 mg. of ascorbic acid daily by mouth until saturated and thereafter a maintenance dose of 100 mg. daily for the remainder of their varying test periods. Their final blood pictures are given in sub-columns 4 of Table IV. The red cell count rose in five and the Hb in four. As the cell count and Hb in those not improving (Cases 1 and 2) were already high when the test began it was thought that they had already reached their maxima. The individual whose blood picture had improved and then remained stationary in the two previous tests now showed a marked improvement, and had a 4% reticulocytosis on the sixth day. Reticulocytes otherwise remained under

the diet. Second was apathy leading to neglect of the same items because they required preparation and cooking. Third was poverty, making it impossible to buy an adequate diet or live anywhere but in the worst type of lodging with poor cooking facilities. The first was not so significant in peacetime, as many countered it by eating fruit. Wartime scarcity of fruit without a compensatory increase in the intake of potatoes and vegetables resulted in such individuals developing scurvy. This group, often younger and better off than the usual scorbutic, was responsible for most of the increase in the disease in 1940-1-2. What probably happened was that those dependent on fruit developed scurvy quickly and were admitted in 1940-1. Those less dependent developed it more slowly and were not admitted until 1941-2, appearing out of the usual season in many instances. This group was the greater, and 1941-2 had many more admissions than 1940-1. In 1942-3

TABLE IV

Case No.	R.B.C. per c.mm. × 10 ⁶					Hb%					M.C.V. (μμ)					M.C.H. (γγ)					M.C.H.C.					Test-meal Findings	Marrow Smears
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5		
1	*10 3.08	10 4.34	18 4.55	4.9 10	—	55	80	85	85	—	91	83	81	79	—	25	26	26.3	24.2	—	28.5	28.5	32.2	31.5	—	Low free HCl	Normoblastic; few megaloblasts
2	3.63	4.15	4.60	4.6 9	—	70	80	85	85	—	89	85	85	85	—	27	27	26	26	—	30.5	30.5	30.5	30.5	—	Normal	Normoblastic
3	2.03	2.50	2.50	3.6 15	—	55	57	60	80	—	98	90	92	88	—	37.8	32	33.5	31.2	—	38.5	35.5	36.5	35.7	—	"	"
4	2.46	3.38	3.93	4.6 14	—	65	70	78	98	—	83	85	85	85	—	37	29	27.8	29.7	—	35	33.8	33.5	34.2	—	Achlorhydria	Normoblastic; few megaloblasts
5	3.20	3.60	—	—	4.04	45	52	—	—	75	—	—	—	—	—	19.8	20	—	—	26	—	—	—	—	—	—	—
6	2.89	2.83	3.44	4.6 13	—	55	50	60	75	—	83	85	81.4	80	—	26.8	24.7	24.3	23.0	—	32	29.2	30	28.5	—	Low free HCl	Normoblastic
7	1.84	1.90	2.20	4.2 11	—	50	50	55	85	—	97.5	92	91	86	—	38	37	35	28.5	—	39	36.8	38.5	34	—	Achlorhydria	Megaloblastic
8	2.61	2.60	—	—	4.04	60	61	—	—	75	—	—	—	—	—	32	32.8	—	—	26	—	—	—	—	—	—	—
9	3.02	3.04	—	—	3.64	77	77	—	—	78	—	—	—	—	—	36	36	—	—	32	—	—	—	—	—	—	—
10	3.98	3.95	—	—	3.85	60	70	—	—	70	—	—	—	—	—	21.2	25	—	—	29	—	—	—	—	—	—	—

* Duration of each test in days, shown thus: $\frac{10}{15}$

2%. Absolute blood findings were by now normal or nearly so. The original megaloblastic marrow was now normoblastic.

Exp. 6.—Four patients (Nos. 5, 8, 9, and 10, Table IV), originally on the vitamin-C-free diet and referred to in experiment 3, were given, at the end of that experiment, ascorbic acid by mouth in saturating doses as detailed before, and thereafter the usual 100 mg. daily maintenance. Their blood pictures at the conclusion of this test are shown in sub-columns 5, Table IV. The red cell count rose in three and remained stationary in one. The Hb rose in all—slightly in one showing a good red cell rise. Improvement began only after two or three days, and was slow initially, accelerating later. Reticulocytes never rose above 2%. The patient whose red blood cells failed to rise (No. 10) later resisted liver injections, thyroid, etc., and the opinion was formed that his marrow was hypoplastic.

As no patient on the C-free diet showed a drop in either red cell count or Hb, regeneration, however slow, must have been going on. Lack of vitamin C alone in the diet did not prevent blood formation. In most individuals its presence accelerated regeneration. For this action little seemed to be required, as it was supplied by an ordinary mixed hospital diet. Iron lack was not a serious factor in the majority of cases investigated.

The anaemias investigated were nutritional in origin. The main causal factor was contained in the vitamin-C-free diet. Lack of vitamin C alone was not the cause of the anaemias, although it might have helped in their development. Iron lack played a minor part.

Discussion

The disease observed was typical "bachelor" scurvy. There were three root causes. First and most important was ignorance, mainly in males, of the need for potatoes and vegetables in

two patients only of this type were seen, and as a result the total for the year was low. The inference was that a lesson was being learnt and that such individuals were eating more potatoes and vegetables, so that vitamin C intake, which deteriorated in the two years after 1940, when shortages and rationing first became apparent, was improving. As this seemed important an attempt was made to define the position in Edinburgh and Glasgow by obtaining from the Municipal General Hospitals and the Royal Infirmary, Edinburgh, and the Municipal General Hospitals and the Western, Royal, and Victoria Infirmarys, Glasgow, the number of scorbutics treated by them over the same period. The results (Table V) showed the same rise and fall as in the local observation, and it is suggested that the same reason also holds.

TABLE V

Aug.-July, Year	Col. 1: Edinburgh			Col. 2: Glasgow	
	Scurvy Nos.	% Medical Admissions	Rate per 100,000 Pop.	Scurvy Nos.	Rate per 100,000 Pop.
1937-38 ..	11	0.11*	2.35	24	2.14
1938-39 ..	23	0.25*	4.89	36	3.19
1939-40 ..	13	0.16*	2.75	28	2.48
1940-41 ..	27	0.36	6.55	40	3.83
1941-42 ..	45	0.61	10.52	66	6.31
1942-43 ..	26	0.35	6.08	50	4.78

Note.—Percentage incidence of scurvy to medical admissions in Glasgow hospitals not shown, as data of total medical admissions could not be obtained.

* Cf. 0.14% in Boston City Hospital over the period 1930-9 (Faulkner, 1941).

The close similarity between Edinburgh and Glasgow is capable of explanation by the fact that both have approximately the same intake of vitamin C per head of the population (personal

communication from the Ministry of Food). This intake is much below the average for all towns in Britain, and therefore the figures for vitamin C nutrition elsewhere are presumably better. The percentage incidence of scurvy of all medical cases in Edinburgh is much lower than in the hospital in which the investigation was made. This hospital serves mainly the elderly poor, whose vitamin C nutrition is probably lower than that of other classes of the population.

The improvement noted must be credited to the activities and propaganda of the Ministry of Food. Nevertheless it is suggested that so long as the scarcity of fruit exists the concessions at present enjoyed by children and expectant mothers should be extended to the elderly. Scurvy, which is only one evidence of faulty nutrition among the aged poor, will need more than propaganda for its abolition, and it is suggested that the provision for them of clean cheap lodgings, with canteen facilities and very discreet supervision, is one which local authorities might consider as the most practical step.

Clinically the only unusual complaint was lumbago, which it is suggested was the result of small deep haemorrhages in the muscles of the back, and indicates an unusual cause for this complaint in poorly nourished individuals.

The anaemias in the cases investigated showed no new factors so far as the peripheral blood was concerned. Although in no patient was the blood picture completely normal, in some it was very nearly so, and agreement is reached with the opinions of others that (a) anaemia and scurvy need not coexist in man (Crandon *et al.*, 1940); (b) when they do coexist the anaemia often bears no relation to the extent of the haemorrhages or the plasma ascorbic acid content (Croft and Snorf, 1939); and (c) the anaemia is varied in morphological type, being mainly normocytic (Parsons and Smallwood, 1935). The marrow findings were also similar to those recorded by others. These earlier findings were: (a) a gelatinous mass with failure of erythropoiesis (1 case) (Harris, 1927-8); (b) moderate hyperplasia with scattered small groups of erythroblasts and no fibrosis (1 case) (Mettier *et al.*, 1930); (c) one normal marrow, and one megaloblastic marrow associated with macrocytosis and achylia gastrica (Jennings and Glazebrook, 1938); and (d) one normal marrow and two showing diminished erythropoiesis (Israëls, 1943). The change from a megaloblastic to a normoblastic type with only dietary replacements was interesting. This has been noted in non-scorbutics with nutritional anaemia with (Groen and Snapper, 1937) and without (Napier *et al.*, 1938) free HCl in their gastric juices. The inference is that the marrow changes in scurvy are not specific.

As regards the cause of the anaemia of scurvy many views have been expressed. In 1930 it was thought confidently that there was a specific anaemia due to vitamin C deficiency (Mettier *et al.*, 1930). Since then, however, many observations have been made. The following are noteworthy: (a) vitamin C lack will not affect blood formation (Crandon *et al.*, 1940); (b) Hb and red cell regeneration with reticulocytosis occurs in scorbutics on a vitamin-C-free diet (Lozner, 1941; Ungley, 1938); (c) ascorbic acid has failed to cure an anaemia in experimental scurvy which did react to germinated oats (Aron, 1939); (d) vitamin C was necessary in one deficient individual to prevent the progress of the anaemia (Vaughan, 1934); (e) vitamin C is necessary in some deficient individuals before the anaemia will respond to treatment (Kenney and Rapoport, 1939; Dyke *et al.*, 1942). Belief in the need for vitamin C has therefore dwindled, and it has been suggested that the anaemia of scurvy is due to lack of other factors (Croft and Snorf, 1939). The present experience confirms points a, b, and e.

Lastly, as the anaemia of scurvy is due to a complex deficiency, with vitamin C acting only as an adjuvant, and as it is usually moderate in degree, the often-observed absence of reticulocytosis is not surprising. To obtain it, even where the anaemia is severe enough for a good reticulocyte response to be expected, it would be necessary to supply all deficient factors at once—a form of treatment rarely given.

Summary

The social and economic backgrounds in 53 adults with scurvy are detailed, with clinical features including blood changes and biochemical findings.

The causes of scurvy of this type are assessed as ignorance, apathy, and poverty.

The incidence of scurvy in the series is compared with the percentage for the main hospitals in Edinburgh and Glasgow for each year from mid-1937 to mid-1943. The significance of the figures is discussed.

A morphological classification of the anaemia of scurvy is made. The type of sternal marrow in six cases is indicated broadly. The anaemia is shown to be nutritional in origin and to be capable of alleviation in the absence of vitamin C, which is, however, thought to act as an adjuvant to the regenerating factors.

Suggestions are made for the elimination of scurvy.

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URTICARIAL REACTIONS AND DESENSITIZATION IN ALLERGIC RECIPIENTS AFTER SERUM TRANSFUSIONS*

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While a great deal of research has been done on the haemolytic and the pyrogenic transfusion reactions, less attention has been paid to the so-called "allergic reactions." They are said to occur in about 1% of transfusions (Wiener *et al.*, 1941; Hoxworth and Skinner, 1941), and the incidence seems to be the same whether blood or plasma or serum is administered.

Immunologically the word "allergy" covers the changes in reaction towards increased and reduced sensitivity due to the presence of acquired antibodies. Clinically, however, the term "allergic transfusion reaction" is used, in a more restricted sense, for the occurrence of such phenomena as urticaria, angioneurotic oedema, bronchial asthma, and, in rarer instances, shock. It is commonly assumed that the cause of these syndromes lies in the transfusion of blood from the allergic donor to the normal recipient (*Lancet* editorial, 1941; Colonnell, 1943). Scarcely any attention has been paid to the role of the allergic recipient in the production of transfusion rashes, and only one case report of an allergic recipient developing a transfusion rash was found in the literature (Stewart and Bates, 1938). Neither is it yet established whether the first transfusion sensitizes or desensitizes the reacting recipient for subsequent transfusions with human material: Whereas Györgi and Witebsky (1929), Wiener *et al.* (1941), and Kilduffe and De Bakey (1942) believe in the development of an allergic supersensitivity in the interval between repeated transfusions, Young (1942) reported apparent desensitization.

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