

Public Health Section

OBSERVATIONS ON ANÆMIA IN THE MALNAD PARTS OF THE MYSORE STATE

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THE State of Mysore is divided roughly into two areas—the Malnad and the Maidan. The former comprises of parts of the districts of Shimoga, Kadur, Hassan and Mysore. The so-called Malnad area skirts the Western Ghats all along, studded with well-wooded evergreen forests; the rainfall ranges from 35 inches to an average of 360 inches. Last year, *i.e.* 1946, one of the places recorded 580 inches. This paper is based mainly on the observations made in the Shimoga district and its neighbouring taluks of Kadur district and part of Hassan district. The conditions in a similar area of the Mysore district are said to be very much better than in any other district and so nothing is said of that area. The first observation by one of the authors (N. A. A.) was made in the years 1940 and 1941, when he was stationed at Hassan. Cases of extreme anæmia with enlargements of spleen complicated with ankylostomiasis were noticed taking resort to the hospital. At that time not much enquiry was made into the causation of this condition beyond considering the curing of the patients. The two taluks, Belur and Saklespur, of Hassan district in addition to having well-wooded hills and valleys have plantations of coffee, orange, cardamom and paddy fields. In Kadur district too the conditions are alike; whereas in Shimoga district one finds more of areca-nut gardens and paddy fields. The ghat area rises up to 5,000 feet and there are deep valleys in between. During the monsoon weather plenty of hill-streams and torrents rapidly flow along, dividing and cutting off villages from external contact. During summer there is not a drop of water in many places. The rainy weather lasts from the middle of June till the middle of October. Roads are few and are of a very primitive character, with the exception of the provincial roads and a few fairweather District Board roads. It is bad enough during summer to transport either people or material; it is impossible in the rainy weather; some places become temporary islands for 3 months in the

year. Since the year 1943 up till now on an average 500 cases of anæmia of an extreme degree have come for treatment to the McGann Hospital, Shimoga, every year. This constant flow of these cases every day attracted our attention. Whatever the cases were, whether acute, chronic, surgical or medical, they were complicated with ankylostomiasis which made the recovery difficult. Owing to conditions of war that existed in the major part of these years for want of sufficient staff and equipment very many details could not be worked out; besides, the extremely poor condition of the patients made it practically impossible to carry out all the necessary investigations. Anything was a torture and anything might kill them. This year the investigations were carried on in a better fashion in 50 cases. As a routine in all the 2,000 cases blood counts were made, percentages of hæmoglobin calculated, and the stools and blood were examined for parasites. Amongst women patients pregnancy added to the complication and made it worse. At one time it was thought that transfusion of blood might improve matters. To our disappointment it did not help much. During these trials it was a problem to get donors. Every second person that one could place one's finger on was anæmic and could not afford to lose any blood; and whenever a willing fit donor was found, these extremely anæmic bloods never matched. In one or two cases we persisted trying to find a suitable donor and patiently cross matched as many as 50 bloods and not one was compatible. Plasma also was tried but with disappointing results. It appears that their system is already water-logged and cannot tolerate any further fluid intake. It is not the quantity that one has got to think of in these cases, but it is the improvement of the quality. We have no facilities to transfuse concentrated R.B.Cs. As a next step we tried injecting blood intramuscularly. In some cases it did give a response to a certain degree; patients that were chalky white soon got a darker hue about them and gave a chance for further treatment with liver and iron. It is surprising to see people walk into the clinic with as low a blood count as $3\frac{1}{2}$ lakhs per c.mm. and hæmoglobin about 12 per cent. It is true they are beyond all chances of recovery; but yet they are alive. The table just gives an idea as to the blood counts, colour index and other details and also the percentage of low blood counts that were found in these 33 cases which will be a fair indication of the other cases.

General examination.—The patients are extremely ill, highly anæmic with hollow sunken pale eyes, puffed out cheeks and pot bellies. Their limbs are just like sticks hanging from

TABLE

The figures below show the total R.B.C. count of each of the 33 patients among men and women in the years 1945 and 1946

Total R.B.C. count in terms of millions

	Below ½		½ to 1		1 to 1½		1½ to 2		2 to 2½		2½ to 3		3 to 3½		3½ to 4		4 to 4½		4½ to 5		Above 5		Total
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	
1945	3	..	25	51	20	56	33	29	19	28	34	27	20	28	18	18	18	24	22	10	8	1	492
1946	2	..	20	37	35	56	26	21	35	25	38	15	30	15	28	18	27	11	15	3	8	1	466

The above figures show that on an average 500 cases are admitted into this hospital for the treatment of anæmia.

The table below shows 33 cases worked out in the available details from the limited staff and materials.

TABLE--contd.

Case number	Age	Sex			Stools	Urine	Gastric analysis
1	23	F.	Pregnancy 7½ months, III para, spleen +.	R.B.C. 1.5, Hb. 20%, C.I. 0.7, B.P. normocytic hypochromic, W.B.C. 4,200, D.C. poly 52%, eosino 6%, lympho 40%, large mono 2%.	Ankylostoma ova +.	Normal	..
2	20	F.	Pregnancy 8 months, II para, spleen ++.	R.B.C. 0.86 million, Hb. 10%, C.I. 0.6, B.P. moderate anisocytosis, W.B.C. 2,600, poly 43%, eosino 7%, lympho 50%, no megaloblasts. Normocytes predominant.	Do.	Albumin ++.	..
3	24	F.	Pregnancy 7 months, V para, spleen +.	R.B.C. 0.92, Hb. 15%, C.I. 0.8, B.P. normocytic hypochromic, W.B.C. 3,000, D.C. poly 45%, eosino 6%, lympho 47%, large mono 2%.	Roundworm ova +.	Normal	..
4	50	M.	Fever since 3 months, spleen +++.	R.B.C. 2.48, Hb. 30, C.I. 0.6, B.P. normocytic hypochromic, W.B.C. 3,200, poly 35%, eosino 10%, large mono 5%, lympho 50%.	Roundworm ova, ankylostoma ova +.	Do.	Normal
5	23	M.	Dysentery and fever 6 months, spleen -.	R.B.C. 1.56, Hb. 35, C.I. 1.1, B.P. normoblasts, normocytes predominant, W.B.C. 5,700, poly 51%, eosino 7%, large mono 3%, lympho 39%.	Ankylostoma and roundworm ova +.	Do.	No free HCl in the fasting sample, rest normal.
6	30	M.	Fever 2 months, spleen +++.	R.B.C. 1.42, Hb. 25, C.I. 9, B.P. normocytic hypochromic, W.B.C. 4,400, poly 55%, eosino 6%, large mono 2%, lympho 37%.	Roundworm ova +.	Do.	Tendency for hyperchlorhydria.
7	20	F.	Pregnancy 7½ months, I para, general œdema.	R.B.C. 1.06, Hb. 15, C.I. 0.75, B.P. normocytic hypochromic, W.B.C. 12,400, poly 45%, eosino 7%, large mono 3%, lympho 45%.	No cyst, no ova.	Albumin +.	..
8	22	F.	Pregnancy 6½ months, II para, spleen ++++.	R.B.C. 1.28, Hb. 15, C.I. 0.6, B.P. hypochromic microcytic anæmia, W.B.C. 2,800, poly 49%, lympho 32%, eosino 13%, large mono 6%.	Ankylostoma and roundworm ova +.	Normal	..
9	25	F.	Pregnancy 7 months, II para, spleen ++.	R.B.C. 1.32, Hb. 20, C.I. 0.8, B.P. hypochromic anæmia, W.B.C. 4,100, poly 50%, lympho 39%, eosino 9%, large mono 2%.	<i>E. histolytica</i> cyst +.	Do.	..

The above may be taken as examples of usual types of anæmia met with in these parts.

TABLE—contd.

Case number	Age	Sex			Stools	Urine	Gastric analysis
10	18	F.	Pregnancy 6 months, I para, spleen +.	R.B.C. 1 million, Hb. 20, C.I. 1.0, B.P. normoblasts a few, normocytic hypochromic.	Normal	Do.	..
11	24	F.	Pregnancy 5 months, spleen -.	R.B.C. 1 million, Hb. 20, C.I. 1.0, B.P. normocytic anæmia, W.B.C. 6,000, D.C. poly 62%, lympho 38%.	Do.	Do.	..
12	20	F.	Malaria 1 month, spleen +.	R.B.C. 2.15, Hb. 25, C.I. 0.6, W.B.C. 4,600, poly 55%, lympho 38%, B.P. microcytic hypochromic anæmia, eosino 3%, large mono 4%.	Roundworm ova ++.	Do.	..
13	20	F.	Pregnancy 6 months, I para, spleen ++.	R.B.C. 1.58, Hb. 35, C.I. 1.09, B.P. hypochromic anæmia, W.B.C. 4,200, poly 52%, lympho 40%, eosino 4%, large mono 4%.	Normal	Do.	..
14	30	F.	Pain in the chest and abdomen, spleen +.	R.B.C. 0.98, Hb. 25, C.I. 1.25, W.B.C. 6,400, poly 56%, eosino 6%, lympho 38%, B.P. normocytic anæmia, a few megaloblasts, normocytes predominant.	<i>E. histolytica</i> cysts +, roundworm ova +.	Albumin +.	..
15	26	F.	Dysmenorrhœa, spleen +++.	R.B.C. 0.54, Hb. 15, C.I. 1.36, W.B.C. 4,000, poly 60%, lympho 35%, eosino 3%, large mono 2%, B.P. normocytic anæmia, a few normoblasts seen.	Ankylostoma ova +.	Normal	..
16	30	F.	Fever since 3 months, spleen ++++.	R.B.C. 2.3, Hb. 45, C.I. 0.98, W.B.C. 4,600, poly 48%, lympho 38%, eosino 14%, B.P. microcytic anæmia.	Normal	Normal	..
17	28	F.	Pregnancy 6 months, spleen ++.	R.B.C. 1.7, Hb. 25, C.I. 0.73, W.B.C. 6,500, poly 52%, lympho 34%, eosino 14%, B.P. normocytic anæmia.	Roundworm ova +.	Do.	..
18	25	F.	Pregnancy 6 months, III para, spleen ++, dysentery 15 days.	R.B.C. 2.8, Hb. 25, C.I. 0.44, W.B.C. 5,000, poly 63%, lympho 30%, eosino 3%, large mono 4%, B.P. marked hypochromic microcytic anæmia.	<i>E. histolytica</i> cysts ++.	Do.	..
19	38	F.	Spleen +.	R.B.C. 0.84, Hb. 25, C.I. 1.5, W.B.C. 4,800, poly 66%, lympho 32%, eosino 2%, B.P. normocytic anæmia.	Ankylostoma ova +.	Albumin traces.	..
20	38	M.	Fever 3 months, spleen +++.	R.B.C. 1.25, Hb. 30, C.I. 1.2, W.B.C. 6,200, poly 48%, eosino 7%, large mono 2%, lympho 43%, B.P. normocytic hypochromic.	Do.	Normal	No free HCl in the fasting sample. The rest tendency for hyperchlorhydria.
21	35	M.	Spleen +.	R.B.C. 0.82, Hb. 15, C.I. 0.9, W.B.C. 3,200, poly 52%, lympho 38%, eosino 6%, large mono 4%, B.P. microcytic anæmia.	Do.	Do.	No free HCl in the fasting sample. The rest normal.
22	50	M.	General weakness and breathlessness since 3 months.	R.B.C. 4.18, Hb. 65, C.I. 0.8, W.B.C. 3,800, poly 62%, eosino 4%, large mono 2%, lympho 32%, B.P. hyperchromic anæmia of a moderate degree.	Normal	Do.	..
23	48	M.	General weakness and breathlessness.	R.B.C. 1.2, Hb. 35, C.I. 1.46, W.B.C. 5,000, poly 65%, lympho 33%, large mono 2%, B.P. normocytic anæmia, normoblasts—a few, no megaloblasts.	Do.	Do.	..

The above may be taken as examples of usual types of anæmia met with in these parts.

TABLE—concl'd.

Case number	Age	Sex			Stools	Urine	Gastric analysis
24	45	M.	Spleen +++.	R.B.C. 1.02, Hb. 15, C.I. 0.75, W.B.C. 5,200, poly 58%, eosino 6%, large mono 4%, lympho 32%, B.P. microcytic anæmia.	Ankylostoma ova +.	Albumin traces.	Normal curve.
25	17	M.	Do.	R.B.C. 3.28, Hb. 40, C.I. 0.61, W.B.C. 6,200, poly 62%, eosino 4%, large mono 2%, lympho 32%, B.P. normocytic anæmia.	Do.	Normal	..
26	25	F.	Dysentery, pregnancy 5 months, V para, spleen ++.	R.B.C. 0.97, Hb. 15, C.I. 0.78, W.B.C. 6,800, poly 60%, lympho 36%, eosino 1%, large mono 3%, B.P. normocytic anæmia.	<i>E. histolytica</i> cyst, roundworm, and ankylostoma ova +.	Do.	..
27	30	F.	Pregnancy 4 months, spleen +++.	R.B.C. 1.25, Hb. 25, C.I. 1.0, W.B.C. 7,800, poly 49%, lympho 42%, eosino 5%, large mono 4%, B.P. normocytic anæmia.	Ankylostoma ova +.	Albumin traces.	..
28	20	F.	Pregnancy 7 months, spleen ++.	R.B.C. 1.08, Hb. 20, C.I. 0.9, W.B.C. 3,400, poly 46%, eosino 5%, large mono 1%, lympho 48%, B.P. normocytic anæmia.	Do.	Normal	No free HCl in the fasting sample. The rest normal.
29	25	F.	Pregnancy, IV para, swelling of the hands and feet.	R.B.C. 0.85, Hb. 20, C.I. 1.18, W.B.C. 6,200, poly 53%, lympho 40%, eosino 3%, large mono 4%, B.P. normocytic anæmia. A few normoblasts seen.	Normal	Do.	..
30	22	F.	Pregnancy 8½ months, spleen +.	R.B.C. 1.6, Hb. 20, C.I. 0.6, W.B.C. 4,700, poly 46%, large mono 6%, eosino 10%, lympho 38%, B.P. microcytic anæmia.	Roundworm ova +.	Do.	..
31	25	M.	Spleen +++.	R.B.C. 1.4, Hb. 30, C.I. 1.07, W.B.C. 2,400, poly 75%, large mono 1%, lympho 24%, B.P. normocytic anæmia.	Ankylostoma ova +.	Do.	No free HCl in the fasting sample. The rest normal.
32	30	M.	Spleen +++ dermatitis, liver ±.	R.B.C. 750,000, Hb. 20, C.I. 1.3, W.B.C. 4,000, poly 58%, lympho 38%, eosino 2%, large mono 2%, B.P. no megaloblasts, normocytic anæmia.	Ankylostoma and roundworm ova +.	Do.	Do.
33	38	F.	Puffiness of the face and œdema of the feet, liver ±, spleen ±.	R.B.C. 840,000, Hb. 25, C.I. 1.4, W.B.C. 4,800, poly 60%, lympho 34%, eosino 6%, B.P. normocytic anæmia, a few normoblasts.	Ankylostoma ova +.	Do.	Both total and free HCl, much higher than normal.

The above may be taken as examples of usual types of anæmia met with in these parts.

the body. They are short of breath and with some difficulty they do walk along into the clinic. In some there is general anasarca. In such cases the abdomen, the feet and the cheek are swollen up. The spleen is enlarged to a very great extent occupying almost the whole of the abdomen, including the pelvis even. The spleen takes different shapes, in some cases lengthens like a ploughshare (see plate XVII). The liver is enlarged in many cases. The heart invariably shows myocardial degeneration. The patients show certain amount of congestion of the lungs. The skin is dry—dermatitis, sores and ulcers are found. These ulcers start as small pimples on the lower extremities and before the

end of a week they occupy a large area. They are indolent, callous, pale and chronic; in some cases as old as a couple of years (see plate XVII).

Apart from malaria and helminthic infections, which are the causative factors, the extremely poor condition of these patients is, due to neglect on their part, due to economic reasons and ignorance.

Hæmatological findings.—From the above figures it is noted that 16 per cent of cases show a total R.B.C. count of less than one million. Between 1 to 1½ million the percentage works out at 15 per cent. The percentage of women is greater than that of men. Amongst women even anæmias of pregnancy are included.

The colour index in these low count cases is more often above one. The details are :—

1. *Size and shape of R.B.C.*—Most of these cases show a vacuolated normocyte. In some, microcytes and normoblasts are found. No megaloblasts were seen. All the cases showed a certain degree of anisocytosis but normoblasts were predominant.

2. *W.B.C.*—Between 2,400 to 6,000 per c.mm. is the usual count.

3. *Differential count.*—There is a slight increase in the eosinophils in most of the cases.

Stools.—Most cases show ankylostoma ova, roundworm ova and *Entamæba histolytica* or cysts. Some specimens showed the presence of more than one type of helminthic infection. No *Tania* of any sort was noted.

Urine.—Only a few cases showed the presence of albumin.

Gastric analysis.—Owing to the extremely delicate conditions of the patients, the gastric juices of only 10 patients from the above list were examined. It is concluded that most of them showed either a normal hydrochloric acid content or showed a tendency for hyperchlorhydria. In no case hypochlorhydria was noticed.

Radiological findings.—Photographs of 4 cases are shown in plate XVII. Only a few cases, *viz.*, eight, were examined, since the patients could not tolerate even a barium meal examination under fluoroscopy owing to tendency to vomiting. They could not take more than 4 oz. at a time. It is seen from the pictures that the stomachs are extraordinarily small and in all the 4 cases they are more or less tubular and spasmodic. They showed a tendency towards hyperactivity after release of the spasm. The spasm disappeared after a time in some.

Some 200 years ago in this very same area prospered a kingdom known as Bidanur. Bidanur, the capital city now known as Nagar after its conquest by Hyder Ali, had, it is said, a population of 5 lakhs. There were different nationalities : Chinese, Portuguese, French, English, Mahrattas, Mohammedans and the local Hindu population. Even now the ruins remain. This Nagar to-day has not a population of five hundred. It is a desolate dilapidated village. A scion of one of the ancient families is trying to bring it into some shape. This place is right at the head of the ghat with thick forests all round and the rainfall is about 200 inches per year. The villages round about are no more than little hamlets of one or two houses and a few thatched huts. In some villages one finds only a single house. The population is declining. In some villages comprising one house and its lands there are just two people and probably one of them may be ill. For a population of 5 lakhs in a town to exist with prosperous villages all round, there must have been some sort of a system in those days to render these places healthy. In the wake of

war and destruction the civilization that existed then dwindled; the system then was soon forgotten; the new methods of another civilization did not suit; desolation set in.

Nutrition.—The food of the average farm labourer is very poor; it is protein and fat-free. He just lives on rice boiled or made into a conjee; he does not know what dhal or milk is like. From childhood he has not tasted milk either human or otherwise. Women die either during pregnancy or during labour or soon after it. Maternal mortality is very high. For want of milk, children are brought upon rice conjee from early infancy. Most of them are vegetarians but they do not even consume vegetables. They may have a chilli or an onion. Even the non-vegetarians by virtue of necessity have become vegetarians. Beyond occasionally having some game or some meat when available, when a sheep is slaughtered once in a way, or some fish during season, they mainly live on rice or rice conjee. On the outskirts of the Malnad some Goulics rear herds of buffaloes in the forest. They do not sell milk or buttermilk. They just get the butter out and the rest is given back to the animals. As one goes interior, the cattle are miserable specimens. They are small in stature, as big as a full-grown sheep. Their yield is very poor; about a *pau* or less of milk per head is all that one can get and that during the rainy season when there is some jungle fodder available. During summer they feed on any refuse and even faecal matter. These cattle are maintained more for providing manure than milk.

Owing to disease and ill health the farmer does not start his day's work before 9 a.m. Within a couple of hours the sun is up and the day gets too hot. He gets his usual rigor and fever and for the rest of the day he is bed-ridden and useless; so, economically, he is a loss and a drag on the family and the country. His working capacity is reduced to a very low level. Nature is bountiful and kind to him. Without much labour he gets one crop annually : it is the rainy season crop. His methods of agriculture are primitive. In these parts one can manage to raise at least two crops in the year easily. Owing to depopulation labour is not available. What labour is available comes from the west coast during the seasons only. As a result much of the arable land is left fallow.

Treatment.—The usual treatment followed in these cases at this hospital is firstly attention to diet. Such of those as are meat-eaters are given a mixed diet consisting of eggs, bread, butter and coffee in the morning; meat curry and rice in the afternoon; and at night a vegetable curry and either chapatti or rice. In addition they also get two pints of milk per day. As for pure vegetarians egg is served in the shape of flip; bread, butter and coffee in the morning, vegetable curry and rice in the afternoon, and chapatti and vegetable curry in the night. They are also given two pints of milk

PLATE XVII

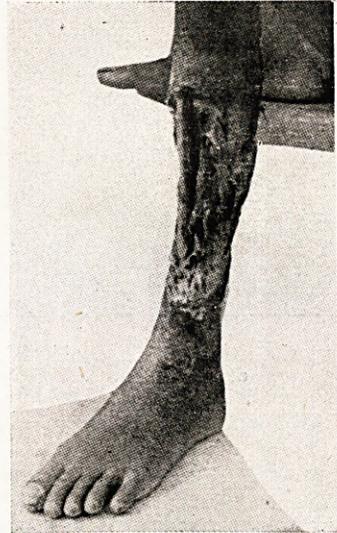
OBSERVATIONS ON ANÆMIA IN THE MALNAD PARTS OF THE MYSORE STATE : N. A. AIENGAR, B. R. LAXMA
NARASIMHALU NAIDU, C. B. KRISHNAMURTHY AND B. RANGANNA. (P. H. S.) PAGE 488

Radiograms of stomachs of four cases.

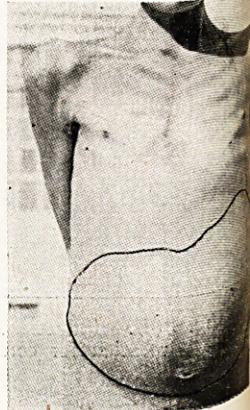
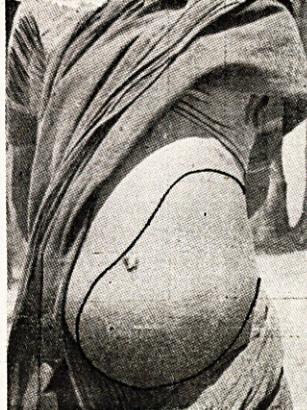
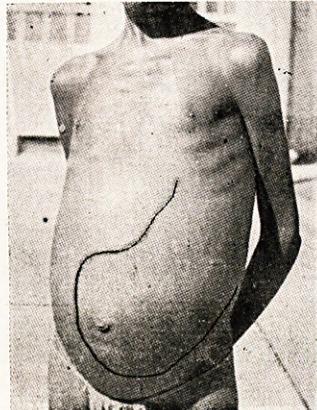
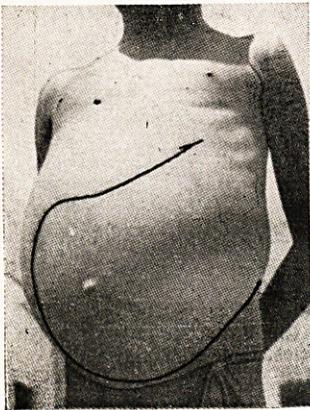


- Note.*—1. The peculiar tubular-shaped stomach.
2. The irregular formation of duodenal cap.
3. The hyperexcitability of the stomach wall.

Photographs of nutritional ulcers of two cases.



Photographs of persons with enlarged spleen.



per day. The extremely bad cases have got to be fed very carefully since they develop diarrhœa if their full quota of diet is given. During seasons oranges are given free to all deserving poor patients.

As for medicines, they are put on injections of liver extract and a mixture consisting of ferri-et-ammon citras, quinine sulph, acid hydrochlor dil, liquor arsenicalis and aqua. Nicotinic acid or yeast tablets are administered daily as a routine. The deworming operations are started with care. They are undertaken only when the patients get to a fairly tolerable condition when they can put up with a purgative. The skin is attended to for any dermatitis and the ulcers, if any, are cleaned up. As their general condition improves, automatically the ulcers heal without any further treatment. Whenever possible the foot of the bed is raised. It is observed during the course of treatment that many of these cases show some improvement till they reach a level of 2.5 to 3 million R.B.Cs., and there seems to be a sort of a dead stop at that. Nothing seems to improve them or, if at all, the progress is very very slow. The enlargements of spleen reduce only to the level of fibrosis; beyond that nothing helps them; but when there is a response, the reduction in their size is something marvellous. Spleens that occupied the whole of the abdominal cavity and were felt low down in the pelvis, have been reduced to the extent of just being palpable. It is the extreme cases that are very difficult to handle. Unfortunately for these patients many of them cannot stay in a hospital long enough. Wherever there has been some improvement, patients have stayed for over 6 to 8 months and yet at that time one cannot pass them as fit and normal individuals to be sent out. Since most of them are farmers and farm labourers, they get back too soon to attend to the farmyard work or it may be that somebody brings them information from the village that a calf has been killed by a wild animal; nothing can keep them back when such news arrives. They rush back to the villages only to get worse very soon and either collapse there or come back to the hospital in a much worse condition. The artificial surroundings of a hospital and the diet supplied there, they cannot get in their homes. Unless they are educated in a proper form so that they understand what health means to themselves, to their family, and to their country at large, this constant and rapid depopulation in this part of the country will go on. Recently one of us had a conversation with a large estate owner in the interior of this part of the country. The gentleman informed him that if the government did not take some radical step soon enough to prevent this depopulation, the gardens and fields would be no more there in a few years and the country would be one wide area of jungle. In his opinion there was no labour available at all. Even at the increased rate of payment of wages people refused to go to these parts and settle,

because of ill health. Fresh and vigorous blood must be brought into the country to settle down living under all sanitary principles. This alone seems to be the remedy. Otherwise it is a fight against all odds to try to cure these people. Nay, it is a waste.

We have tried in these cases the various products of liver extracts of different makes like Anahamin, Neo-hepatex, Hepatex T., Reticulin, T.C.F. Liver Extract, etc. It is observed that Anahamin and Neo-hepatex give a good initial stimulus in cases in whom the colour index is above 1. This is later kept on well by other crude liver extracts. In some cases intramuscular blood has also given the starting stimulus. Later, crude liver extracts maintain the regeneration better than the highly potent liver extracts. We might mention that cases where Campolon has been exhibited, quicker changes are noted. No two cases respond similarly to the same brand of liver extract. Very rarely have we found any anaphylactic reaction of a serious nature setting in. In only one extreme case where a potent liver extract had to be exhibited, and where it was reported that the person did not tolerate any sort of a parenteral treatment with liver extract, the patient had to be desensitized first.

Conclusion

1. A study of 2,000 cases of anæmia admitted to the McGann Hospital, Shimoga, and spread over a period of 4 years has been made.
2. Most of these cases are tropical, nutritional, macrocytic, hyperchromic anæmias.
3. The main causes are malnutrition or deficient nutrition, malaria and helminthiasis.
4. Contributory causes are a degenerate or dead civilization, lack of education and poor economy.
5. No curative procedure is of any avail since it involves a large portion of the population.
6. Widespread sanitary measures involving a lot of finance, universal useful education, and raising the standards of living are the only remedy. This appears to be impracticable at present under the existing conditions.

The authors take this opportunity to thank Dr. V. V. Monteiro, M.B., B.S., F.R.F.P.S. (Glas.), L.D.S. (Eng.), Senior Surgeon with the Government of Mysore, Bangalore, for kindly affording the opportunity and facilities to study and report this problem.

CORRIGENDA

THE EFFECT OF PROCESSING AND SOURING MILK BY THE INDIGENOUS METHOD

By K. S. RANGAPPA

In the June 1947 *I.M.G.*:

Page 320, column 2, line 4, for 'scalding' read 'holding'.

Page 322, under *Discussion*, column 1, line 19, for 'The allowance' read 'When allowance'.