

INTRODUCTION

The cases of Kala Azar here brought under review have been treated at the Foster Hospital of the English Baptist Mission, at Chow-Tsun in the Province of Shantung, North China. With one or two exceptions, they have all come from two areas, in the same district, about 100 miles from the hospital. There are sporadic cases within a few miles of it, but in the areas above mentioned the disease is endemic, nearly every village having a certain number of cases, and a majority of the families having a past or present history of the disease.

Owing to the great distance from the hospital to the homes of the patients, and the impossibility of ensuring regular attendance at the Out-patient Department of such as come from the immediate vicinity, all the cases have been admitted to the wards and remained there during the course of treatment. Close observation has been possible in every case. All cases without regard to end-result have been included in the report so that a true estimate of the results of treatment can be obtained.

The writer has personally supervised and examined every case, and all laboratory methods have been under his direct supervision. He has also personally examined every microscopical slide and has seen the Leishman-Donovan body in every case in which it has been reported

as present.

DISTRIBUTION OF THE DISEASE IN NORTH CHINA

The first case of the disease to be reported from North China was that of a German soldier in the year 1900. In post-mortem preparations, were found small round bodies the exact nature of which was not known at the time, but which were without doubt Leishman-Donovan bodies.

Between the years 1900 and 1911 eight other cases were reported. One of them was a British soldier and the others Chinese.

There have been two main surveys to discover the distribution of the disease in China, one by Cochran (1911-1913) and one by Young in 1922. These show that the disease is endemic over the following provinces, viz most of Chihli, Shantung, north-western Kiangsu, northern Anhui and northern Honan, also areas in Hupeh and lower Kiangsu¹. These areas are shown on accompanying map.

Napier and Muir quoting Rogers state that most of the cases come from the Yangtse valley, but this is not borne out by the two above mentioned reports. There have been a few cases south of the above river, but these may have been infected elsewhere.²

Judging from our own cases the disease seems to be most prevalent amongst the rural population, that is those living in the small villages, and this seems to be true for India also³. In China many were from the plains

DISTRIBUTION
OF
KALA-AZAR
IN
CHINA



but some from the low hills bordering the plains.

The importance of the disease is not only due to the high mortality which attends it, but also to the long periods during which the patients are incapacitated.

Most of them come from the farming class, and are generally very poor. They have to commence work very early in life and it is a serious handicap to the family when one of its younger members is not able to take his or her share in the general work of the family.

Control and treatment is complicated by several factors. Firstly, there are very few qualified medical men in China at the present time, and hospitals are very widely separated from each other. The expense which would be incurred by patients in travelling to hospital is often prohibitive, apart from the fact that few hospitals, which are nearly all supported by foreign missionary societies, can afford to treat large numbers of cases free of charge.

In the present thesis it is proposed to review about 90 cases treated in the hospital. It has not been possible to investigate the cases in their own environment owing to the great distances involved, and therefore the observations will be confined to such inferences as can be drawn from the history of the individual and his family, together with such particulars as have been obtained about the life of the community in which he lived, together with our own observations on the diagnosis and general course of the disease under treatment.

All the patients have been Chinese. The writer has

only heard of one foreigner being affected and this case was not under his personal observation.

HISTORICAL OUTLINE

The disease was noted in the Garo hills in India in 1869. It was endemic and was confused with Malaria. In 1875 it became epidemic and the death rate was very high. As late as 1899 Ross supported Rogers in the belief that the disease was malarial.

It was thought by others to be ankylostomiasis⁴ plus malaria .

In the year 1900 Leishman found the parasites known as leishmania-donovani in films taken from the spleen of a soldier who died from the disease contracted at Dum-Dum. He described this in 1903 in which year Donovan found the same parasite in a blood film⁵ from the spleen taken during life .

In 1904 the disease was discovered in the Sudan by Neave, and from this time on numerous cases were discovered in that country. In the same year Christophers described the parasite as found in persons with enlarged spleens.

Leishman in his original paper written in 1903 described the bodies he found as degenerate trypanosomes⁴ but Donovan disproved this in the same year .

In 1904 Rogers published a paper entitled "Leishman-donovan bodies in malarial cachexia and Kala-azar" and in the same year cultivated the parasite and dis-

covered the flagellate stage .

From this time it became known that Kala-azar and the so-called "malarial cachexia" were one and the same disease and the name Kala-azar was taken to include all such cases. The name now covers Indian kala-azar and the Infantile form as found in the Mediterranean.

From this time on a great deal of work has been done in an endeavour to discover the method by which the disease is spread. An account of these researches is not within the scope of this thesis but it may be said that no definite conclusions have been arrived at up to the present time.

As would be expected a mortality of 95 per cent in untreated cases, has led to a large number of drugs and remedies being tried, and as Brahmachari remarks "the history of the evolution of the treatment of Indian kala-azar is a very interesting study". Quinine was at one time used extensively and cures were reported. Some of these were in the early days and may have been in cases of malaria which were confused with kala-azar, or possibly cases of spontaneous cure which is known to occur.

Brahmachari reports that he found it useless by any method of administration.

In 1913 Gaspar Vianna healed muco-cutaneous Leishmaniasis with intravenous injections of tartar emetic. Castellani used the same methods in 1914 for the treatment of tropical kala-azar .

This drug has now become the standard treatment for the disease, but various preparations of antimony have been and are still being used.

Since the introduction of the above drug other drugs have been introduced, e.g. Iodine, Chinosol, Formaldehyde Eusol, Bismuth - Sodae - Tartrate, and various colloidal preparations.

Taking everything into consideration, the writer has not seen sufficient evidence of the value of these various drugs to induce him to substitute them for Tartar Emetic or Sodium-Antimony-Tartrate and he has therefore no personal experience of them.

Two cases treated with a new preparation styled "Van Heyden 471" will be reported under the heading of "Treatment".

ETIOLOGY

Leishmania donovani is accepted as the organism which is the cause of kala-azar and it is at present classified with *Leishmania tropica* and *Leishmania infantum* in the genus *Leishmania*. It should be noted however that it is regarded by some as a Herpetomonad although the weight of evidence seems to be in favour of the former classification.

Some observers regard the three parasites above mentioned as identical, and others state that *Leishmania donovani* and *Leishmania infantum* are the same parasite.

Leishmania donovani can be recovered from practically every case of kala-azar and the organism can be grown in pure culture, but Koch's postulates are not fulfilled in that the disease cannot be reproduced in animals by inoculation of the organism so cultured⁷.

In spite of the lack of complete fulfilment of Koch's postulates, the weight of evidence is in favour of the *Leishmania donovani* being the cause of kala-azar as seen in India. The cases seen in China, and in particular those dealt with in this communication seem to be identical with the Indian type.

It is convenient here to give a brief description of the organism and the following account is summarised from Brahmachari's description⁸ which has been adopted with modifications from Manson. "The Leishman-donovan body is a small rounded or ovoid organism measuring 2-4 microns in diameter. Stained by Leishman's stain, two lilac coloured chromatin masses are seen, one larger than the other surrounded by a cytoplasm which takes on a faint bluish tint. The larger mass is generally oval and centrally placed in the resting stages, elongated and situated in the periphery, in the pre-division stage of the parasite. The smaller mass which stains more deeply than the larger is like a short rod, and is either at right angles, or at a tangent to the nucleus. One or more vacuoles occur in the cytoplasm".

In this series of cases the parasites have corres-

ponded to the above description. We have relied upon puncture of the liver or spleen, and have not specially looked for them in the peripheral blood. The time usually occupied in searching a film or films from the latter source is considerable, and from a diagnostic point of view of no special value as compared with the examination of the blood from the organs named above. Moreover, we have found puncture of the liver a procedure devoid of danger and have performed splenic puncture where necessary without any complications. The routine examination of the peripheral blood in a large series of cases might have been of benefit from the etiological point of view but as stated above it was outruled by the time factor.

The parasites we have examined obtained as described have been in most cases extra-cellular and both the round and torpedo shaped forms have been seen.

We have not had the opportunity of carrying out any work in connection with the other forms of Leishman-donovan body, nor have we had any experience with the results of its inoculation into man or animals.

Some reference to the work of others on these subjects would here be appropriate.

Napier and Muir state that it is probable that the parasite was originally an insect flagellate and that the infection of man was more or less accidental and not an essential part in its life history.

In 1904 Rogers discovered that the bodies obtained

by spleen-puncture could be made to grow in normal saline plus 5% sodium citrate if the uniform temperature was 22°C and that they would develop into typical Herpetomonas.

A medium known as the N.N.N. medium is now usually employed for the cultivation of the parasites. These parasites ultimately develop into a flagellated stage. The parasites have been cultivated in this manner from the peripheral blood and this method is used for the purposes of diagnosis.

INOCULATION EXPERIMENTS

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Brahmachari states that dogs, monkeys, white mice, rats and other rodents are inoculable with *L. donovani* but in the case of dogs with difficulty, and further that according to the method of inoculation a local or general lesion may be produced.

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R. Knowles and B.M.D. Gupta describe transient infections of both men and animals with *Leishmania-donovani* such being the rule in experimental animal infections and remark that this makes it difficult to use such animals for testing any treatment. They also suggest that such mild infections may be common in man in endemic areas.

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F.P. Mackie and B.M.D. Gupta infected two out of twenty white mice injected intra-peritoneally with the emulsified intestinal contents of bed-bugs fed two to twenty one days earlier on leishmania - containing spleen juice from human kala-azar, one of the positive bed bugs having been thus fed seventeen days before it was found

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to be infective. The same observers also found flagellates in sand-flies (*P. minutus*) in Assam. H.E. Shortt and C.S. Swaminath¹⁴ infected mice peritoneally with the emulsions of the contents of the hind-gut of bed-bugs fed on kala-azar patients' blood nine days before, and obtained infection in one animal.

Rogers previously suggested that bed-bugs could be the carriers of the disease and Patton showed the developmental stages of the parasite in the stomach of the bed-bug. The above facts seem to be an advance in knowledge with regard to the bed-bug inasmuch as Napier and Muir¹⁵ state that despite numerous experiments nobody has succeeded in transmitting the infection through its agency.

The sandfly has been under suspicion as a means of spreading the disease, but it is an insect difficult to work with and in addition has a natural flagellate. Investigations are at present being undertaken in China with regard to the insect. Nothing can be said other than that it is under suspicion.

A great deal of experimental work has been done with the flea, but without definite results. It too has a natural flagellate which may cause confusion in experimental work.

Conorhinus rubrofasciatus and the mosquito have been suggested as the possible transmitters of the disease, and the dog as an agency in its transmission, although no dog has been found in India naturally affect-

ed by the disease.

In dealing with the disease as exemplified in this series of cases, references will be made to points of importance in connection with the above insects and the dog. It will be sufficient to state here that the bed-bug, flea, sandfly and mosquito all occur in China. The writer has no personal knowledge of *Conorhinus*.

ENVIRONMENT

Nearly all our cases have come from two areas in Shantung on an average some 100 miles from the hospital. There are endemic areas, but sporadic cases have also come from other regions nearer the hospital but only one or two isolated ones from the immediate vicinity.

In the majority of cases a definite and intelligent statement could be obtained that other cases were to be found in the same village. The actual figures show that in 71 cases (81%) there were other cases in the same village. In the remainder there was either an absence of any record or a doubtful statement. In one case there seemed to be no doubt that no other case had occurred in his village, but the patient had been away from home and had lived in an endemic area for two years.

CLASS

The patients were all of the poorer class and were nearly all engaged in agricultural work.

GENERAL CONDITIONS OF LIFE

Amongst people of this class there is generally overcrowding. The villages have no system of sanitation and refuse of every description is merely thrown into the courtyard or into the roads. Urine is allowed to soil the ground but faeces are disposed of in the manner indicated below.

The houses themselves are often built of mud with thatched roofs, and the floor is usually of earth. In the winter there is in most cases an entire absence of ventilation. There is no provision at all for personal cleanliness and most of the patients of this class very rarely take a bath. There is usually great overcrowding in the houses themselves, and even if the principle of isolation of those with infectious disease were understood, there is as a rule no provision for it.

The clothing of the Chinese of this class in winter consists of garments thickly wadded with cotton wool. They are not washable, the wool being replaced and the garments remade at the beginning of each winter.

These conditions are obviously calculated to favour disease and to cause its spread. Moreover they favour the development of the bed-bug which probably few houses are without. Lice and fleas are also equally common, and the houses also harbour biting insects such as the mosquito. The house-fly and other flies similar to it develop in swarms during the hot weather and are allow-

ed to settle on food or drink at will.

CLIMATE

This is of the "continental" type, that is with extremes of heat and cold. During the winter it is extremely dry with temperatures falling many degrees below freezing point day and night. The cold weather commences in October and the average temperature becomes gradually lower until in December, January, February it is often ten or twenty degrees below freezing point during the night. This is not a great discomfort because of the dryness of the atmosphere. From March onwards the weather gradually becomes warmer until in June, July, August and the first part of September it is extremely hot, and in July and August there is little variation between the day and night temperatures.

T.C. McCombie Young adduces evidence to show that the distribution of kala-azar in India is related to a high degree of humidity combined with a mean minimum temperature of the coldest month of not less than 50°F. ¹⁶

In China the rainy season is short and a high degree of humidity is only present for at the most three months, viz. June, July and August and even in these months it could never be so high as in Assam to which Young refers. The remarks on temperature do not apply to China where the temperature is consistently lower than this in the winter.

WATER SUPPLY

The water supply is sometimes obtained from shallow wells and very often from the nearest stream. Both resources are open to pollution and it would be safe to say that the water is always polluted and there are strong possibilities of faecal pollution.

This might be taken to support the suggestions that kala-azar may be a water borne disease. The Chinese as a race invariably drink tea and it is only those who cannot afford this luxury who drink water. Even so they believe that to drink cold water is harmful and therefore it can be said that they never drink it. The only exception is in the case of a man carrying a heavy load in hot weather and he will only drink cold water when it is impossible to get anything else.

Failing tea the class of patients with whom we are dealing would invariably drink hot water which is probably boiled in every case.

The possibility of the disease being carried directly by drinking water is therefore remote. On the other hand it is not the water itself which is regarded as a danger but rather the temperature of it, that is the fear of getting a chill, because cold water from any source will be sprinkled on fresh vegetables without regard to the source of supply.

DISPOSAL OF HUMAN EXCRETA.

The possibility of the human excreta being a

source of infection has been in the minds of various
observers. Manson and Low¹⁷ thought that drinking water
might be contaminated by human faeces, the parasites
being eliminated with the faeces. Young¹⁶ in mentioning
site infection as the most striking feature associated
it with faecal pollution.

There is a real possibility of this in China. In
North China every available piece of land is cultivated, and
the amount of animal manure is far from sufficient. Con-
sequently human faeces is a valuable commodity and is
carefully preserved.

It is used in two forms. In the one it is dried on
special grounds in the sun and then used when it is
quite dry as manure on the fields and vegetable gardens.
Now whilst any parasites might be supposed to be killed
by the sun in the summer and by the drying process, any
rain which falls would of course wash the faeces and drain
away. There being no sewers in rural areas and small
towns this water can contaminate streams, pools and the
ground. In the other form the manure is used as a liquid
and applied directly to crops.

Now whilst the Chinese mostly for reasons of their
own boil their drinking water, they take no precautions
as to such vegetables as are eaten raw, beyond washing
them in water which is no doubt polluted, and which very
likely is polluted with faecal matter. The vegetables
themselves have practically been treated with liquid

human faeces.

There is therefore no evidence of faecal accumulation being concerned in the spread of kala-azar but the customs of the people make it a possibility.

This of course raises the question as to whether the *Leishmania-donovani* occurs in the faeces of those affected. Brahmachari¹⁸ states "that it is only rarely that the faeces contain Leishman-donovan bodies and that generally speaking the examination of them gives negative results. Some observers have found "bodies" suggestive of leishmania and this author only refers to one case in which they were certainly found in the mucous stools of a patient.

If kala-azar can be conveyed by the urine there is a strong possibility of it in rural China, as all urine is allowed to soak into the ground without regard to proximity of drinking water or habitations.

H.E. Shortt and R.T. Sen¹⁹ report nine cases in which they made cultures on N.N.N. medium of the urine of kala-azar cases, and obtained positive results in three, the deposit after centrifuging being used for the purpose Napier and Gupta²⁰ working with Knowles, report that in six untreated cases of kala-azar they failed to cultivate the parasites from the urine, and since the work of Shortt, made sixteen further attempts with only negative results, but after adding some of the patients' blood to the urine they got positive results. They therefore

think that the organism is only found in the urine when some pathological condition of the urinary track is present.

INSECT LIFE

Mosquitoes are common all over North China but there does not seem to be any authoritative classification of them available. The anopheles is known to the writer and there appear to be others of the culex and other varieties. Wenyon has shown the developmental stages of leishmania tropica in stegomyia fasciata and he suggests that it may be the carrier of leishmania-donovani. Malaria does occur in Shantung, but we have not had any cases from the areas in which the majority of our cases live. Mosquitoes are without doubt present there. Many of the people use nets which are not very efficiently used although the mesh is a very small one.

THE SAND FLY is found in most areas in Shantung and probably exists in the areas in which the disease is endemic but up to the present time, no definite evidence is available.

The bug, flea and louse are common to all parts and are probably present in all the houses and certainly on most of the persons of the lower classes.

FAMILY HISTORY

In 19 cases (22 per cent) one or more members of the family other than the patient had or had had the disease. This information was obtained from the patient. The remaining members of the family were not always seen, but the disease is so well known in the endemic areas that the statements are probably correct. The actual family incidence is as below :

In 15 cases there was a history of 1 other case
" 3 " " " " " 2 " cases
" 1 " " " " " 3 " "

On the other hand the following figures are also of interest.

In 1 case there was a large family with no other case
" 1 " " were 5 other children and no other case
" 1 " " " 6 " " " "
" 1 " " " 8 " " " "

These two sets of figures taken together do not indicate a high degree of infection as far as transmission from one member of the family to another is concerned. Moreover with a common means of infection e.g. a biting insect or a common source of infection, e.g. faecal pollution it is surely strange how in so many cases other members of the family have escaped.

AGE INCIDENCE

The age incidence is as given below. The youngest patient was aged 2 and the oldest aged 48. The follow-

ing table gives the details :-

Under 3 years of age				1 case	
"	10	"	"	36	41%
"	20	"	"	29	33%
"	30	"	"	19	21%
Aet.	30	"	"	1	"
"	43	"	"	1	"
"	48			1	"

The age incidence in this series corresponds to that found in the Indian type of the disease and not the Mediterranean type, in which the cases are practically all under 5 years of age²¹. These figures are also very similar to those given by C.W. Young²² for N. China in a comparative table compiled from the results of different observers.

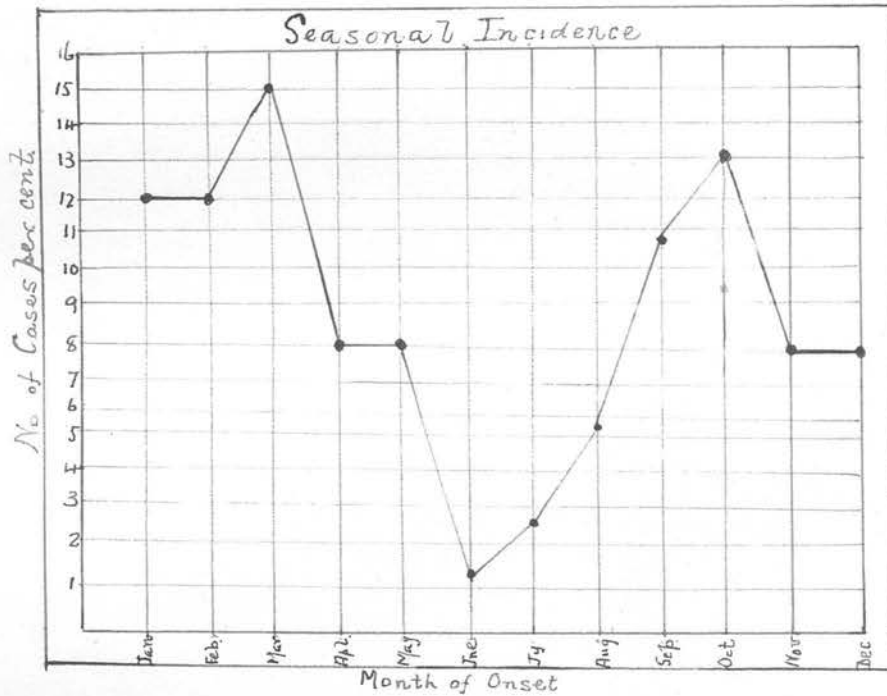
SEX

Only 10 cases were of the female sex, that is about 9%. This does not indicate any preponderance of cases amongst the male sex. In China the male children are considered more valuable and get preferential consideration. The proportion of males is however higher than in the figures for other cases coming to hospital.

SEASONAL INCIDENCE

The table given indicates the months of onset of the disease as worked out from the statements of the patients, which were taken with great care. It should be

noted that in some cases the patients were so young or the disease had so long a history that the actual date of onset was difficult to determine. As far as possible the statements of the younger patients were checked by reference to the family.



It will be noticed that the greatest number of cases occurred during March, that is towards the end of the cold weather, but that a second peak in the curve, shows an increased onset in the month of October that is at the close of the hot weather.

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Napier and Muir state that no seasonal incidence has been claimed for the disease but go on to say that in Assam tea gardens the increase is at the beginning of the cold weather and in Calcutta during December, January, February and March. Rogers found that among the Europeans in Calcutta, that the onset was more frequently at the beginning of the hot weather and at the end of

the cold weather.

Brahmachari²⁴ contents himself with saying that he is not satisfied that most of the sporadic cases in Bengal begin in the cold weather.

In this series the majority of cases undoubtedly commenced during the cold weather and this seems to correspond more or less with the statements of the other observers as quoted above.

RELATIONSHIP OF DATE OF ONSET TO DATE OF INFECTION

If the incubation period of the disease were known with certainty, it might be possible to form an idea as to the date of infection and from this to gain some information as to the etiology. In other words, we might be guided by the habits of the patients, or the type of insect prevalent, at the period of the year in which the majority of the patients were infected.

The incubation period as given by many observers varies within wide limits, and therefore it is impossible to draw an inference of any value.

It has been given as as short a period as 10 days, and as long as 2 years.

Manson²⁵ gives a case that became infected after 10 days and Napier and Muir²⁶ one where the period was undoubtedly 14 days. Brahmachari²⁷ quotes a case of his own, as having contracted the disease after 21 days but goes on to say that it might be as long as fifteen months or longer.

The generally accepted idea is that it varies from
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six weeks to three months.

If we were to take it as three months, then according to our graph, the date of infection in the greatest number of cases would be during the coldest weather, that is in December, or January and the same would be true if the shorter period of six weeks were taken.

If the second peak in the curve is considered an allowance of three months would bring date of infection in August or if six weeks in August or September.

The only inference that can be drawn is that if the period of six weeks to three months covers the incubation period then in this series of cases the majority would certainly not have been infected during the sandfly season or during the mosquito season, although body parasites would probably be prevalent. In the case of the second period of greater onset, the possible time of infection in August or September would be later than the usual sandfly season, but during the mosquito season.

These arguments cannot be of great value because of the uncertainty of the incubation period and moreover it cannot be stated at present on certain evidence that the insect life is the same in these areas as in the immediate vicinity of the hospital although there is little doubt that the usual conditions prevail.

SYMPTOMATOLOGY AND DIAGNOSIS

Duration of Disease. The duration of the disease before admission varied from two months to periods of more than two years, the average time being from six weeks to eighteen months. In some of the cases with a history of long duration it is possible that the early stages of the disease were confused with other infections not necessarily kala-azar, but on the other hand the onset as described by patients was as a rule quite typical.

ONSET The invariable history was ^{of} a period of fever of several months' duration, followed by the appearance of a swelling under the left ribs which is described by the patients as being the spleen. The fever was described as being high and of daily occurrence.

Apparently only one rise of temperature was noticed by the patient in one day. Most of them said it was malarial fever. A few of the patients said that they had continuous fever until the time of admission, but the majority only referred particularly to the initial fever, so presumably the temperature after this had not been sufficiently high to call attention to it.

In most cases there was a history of epistaxis, and ulceration of the gums and in many of diarrhoea with passing of blood.

One case was seen in which a large defect had been left after an attack of Cancrum Oris, and in which the disease was apparently cured. Two other cases had the

same complication on arrival. As a general rule the patients came to hospital only complaining of enlargement of the spleen.

GENERAL CONDITION ON ADMISSION

The patients and especially the children were as a rule emaciated, but not nearly to the same extent as the Indian cases judging from photographs seen. They had a moderate degree of anaemia, an enlargement of the Spleen and sometimes of the Liver, a protuberant abdomen, often with distended veins and sometimes slight oedema of the feet.

In nearly every case there was ulceration of the gums, sometimes with loss of teeth.

Foetor of the breath was common and was generally associated with ulceration of the mucous membranes of the mouth.

Other signs and symptoms noted were Cough, Otorrhoea Laryngitis and Periostitis of the Maxilla.

The patients were almost without exception able to walk into the hospital.

FEVER

In the majority of cases the temperature on admission was only one or two points above normal with a small evening rise and in many cases it remained like this throughout the disease. It was not noticed that in this type of fever the temperature always came down to normal as a result of treatment. In fact it was often

noticed that it kept somewhat above normal throughout the course of treatment. This has been noticed by another observer in North China (E.B. Struthers²⁸) who says "In some cases the repeated injections of sodium antimonytartrate seem to keep the temperature between 99° - 100°F. It falls to normal however on discontinuing the injections".

Some observers have classified the various types of temperature chart according to definite types of pyrexia. Brahmachari gives no less than eight such types. He goes on to say however that the great peculiarity of the pyrexia is its variable nature.

In this series we have found this marked variability and it has not been possible to classify the cases with any degree of certainty, especially as in some the type is not entirely due to the kala-azar itself but to some superadded cause.

Moreover the varying types of pyrexia do not seem to be of any special significance clinically. There is however, one particular type which is of undoubted importance and that is one in which, more than one rise of temperature is shown in the twenty-four hours. The most common is a double rise and this phenomenon is so well known to the laity in India that they will say that they are suffering from "Daukalin" (double rise) fever²⁹. In some cases a triple rise is seen.

There is a difference of opinion as to the frequency with which this double rise appears and also its diagnostic significance. Muir thinks that it can be demonstrat-

ed in almost every case, and Napier in the majority of cases. It is certainly true from observations in this series that the temperature must be recorded at frequent intervals if this characteristic form of pyrexia is to be observed in cases in which it is present. We have made a practice of keeping a three hourly chart during the first week of admission. This is generally a period of investigation and usually before treatment is commenced.

The figure shows only 27 cases (31%) with a double rise, and one with a triple rise. In some cases this feature is more marked than in others. Sometimes it occurred during a course of treatment and our impression is that it may, in untreated cases, occur at intervals with periods of apyrexia, or of pyrexia of a different type intervening. In those cases in which it occurred during treatment the treatment had apparently not been able to control the infection sufficiently to abolish this double rise. The low percentage given above tallies with the absence of any reference to it by Chinese patients. Evidently it is not well known to the laity in China. It may be noted here that Rogers³⁰ recorded a series of 83 cases in which 25.3% showed a double remittent fever.

As to the diagnostic value of the double or triple type of pyrexia, we have found that cases in which it does occur are undoubtedly kala-azar and we have not found it in cases in which the diagnosis was doubtful.

It is obvious from these figures that it cannot be relied upon as a means of diagnosis or in other words its absence does not indicate that the patient concerned is not suffering from kala-azar.

Another type of case may be referred to in which pyrexia was practically absent on admission and continued so, sometimes showing rises of temperature as treatment commenced and at other times remaining apyrexial or practically so throughout the disease. These apyrexial periods seem to be a feature of the disease.

The accompanying charts show typical forms of pyrexia in this series.

SPLEEN

This was enlarged in all cases but one and generally out of proportion to the Liver. The exception was a child with Cancrum Oris admitted in serious condition. No history could be obtained nor was a complete examination possible. The Spleen was not palpable nor was the Liver enlarged. The case was undoubtedly one of kala-azar (Case 24).

In some patients the Spleen was enlarged to an enormous degree, the lowest point coming to within a few inches of pubic arch, and in other cases the lowest point would be the inter-spinous line with the extreme right point within a few inches of left anterior superior iliac spine. These were of course children. There was no opportunity of estimating the rate of growth of

the organ, and the absence of cases of malaria did not permit of our comparing the size and consistency of the organ in the two diseases.

Under treatment there was a progressive diminution in size, and many cases the organ was not palpable on discharge. In other cases however during the whole course of treatment the diminution in size was not great, and even when the patient was apparently cured (after say a period of 3 months) the spleen was still large, sometimes extending to or below the level of the umbilicus. There seemed to be no method of causing this type to return to normal and cases have been seen at intervals for several months after being discharged as cured, the spleen even then being practically the same size as when the patient left hospital. It is probably due to a condition of fibrosis.

There are two precautions necessary when examining the spleen. Firstly the patient should be in the recumbent position. Secondly care should be taken, especially after a period of treatment that the outline of the organ should not be taken as indicating the exact size. In many cases the spleen is "floating" and what is apparently an enlarged spleen can be pushed up and made to disappear under the costal arch.

LIVER

The liver was enlarged in 57 cases that is in 69% of the cases definitely kala-azar, and varied from being just palpable to extending four fingers breadth below the

right costal margin. The enlargement was always in a downward direction.

In one case it was enlarged out of proportion to the size of the spleen and in another the liver was not enlarged at all whereas the spleen extended as far down as the level of the anterior superior spine.

CIRCULATORY SYSTEM

The chief sign that we have found has been that of weakness of the myocardium. A tic-tac rhythm on listening over the praecordia has been the most common evidence of this.

Dilatation too has been common with wavy impulses in the region of the apex beat. In some cases the left ventricle has been dilated with displacement of the apex beat to the left. The right side of the heart has rarely been enlarged. Murmurs have been frequent but have not been attributed to any valvular disease. In a few cases oedema of the legs of circulatory origin has been noticed on admission. Ascites arising during the course of treatment will be referred to under the heading of "Complications". Myocardial weakness has been present in the great majority of cases.

RESPIRATORY SYSTEM

Bronchitis has been most frequently noticed. Sometimes this was part of the disease as first seen and in view of the irritating effect of antimony preparations as used in treatment, was a source of danger and difficulty

when treatment commenced. Its development during treatment caused considerable delay in its progress and pre-disposed towards the more dangerous complication of Pneumonia. Muir mentions irritation of the vagus due to pressure of the enlarged spleen as a cause of distressing cough. We had not thought of this as a possible cause, but it may account for the constant cough, not allayed by ordinary treatment, which has been seen in several cases.

DIGESTIVE SYSTEM

Inflammation and softening of the gums often with loosening of the front teeth has been so common as to be the rule rather than the exception. Septic inflammation of the mucous membrane of the mouth and also of the tonsils has been common. In many instances this has accounted for foetor of the breath.

In a number of patients these septic processes have led to painful enlargements of the submaxillary glands, and of those in the neck. These latter have often become normal under ordinary treatment, but several have resulted in large abscesses requiring incision.

As a general rule there has only been little interference with the appetite.

Cancrum oris will be referred to later, but is no doubt connected in some way with the septic state of the mouth, and perhaps it is a further stage which develops in those cases with ^{un}usually low resistance.

Diarrhoea with the passing of blood has been an

almost constant sign amongst the younger patients. We have thus described it because we have not been able to satisfactorily determine its nature. In every case in which it occurred the stools were examined microscopically but we have never found the *entamoeba hystolytica*. In fact our investigations have been negative except for the ova of *ascaris lumbricoides*, which is extraordinarily common in the Chinese. These cases may have been bacillary forms of dysentery but did not appear to us as such.

"Dysentery" is very common in N. China and few Chinese seem to escape it, but in our experience amoebae are rarely found. It is quite possible that the condition is due to an enteritis which is a part and parcel of the disease. It has proved resistant to the usual forms of treatment. Emetine has not proved of value, but we have not found it possible to try dysenteric sera and bacteriological investigation has not been feasible owing to absence of expert assistance. Both Napier and Muir and Brahmachari suggest that either the *entamoeba hystolytica* or one of the bacilli associated with dysentery is commonly found, but as stated above, although we have searched carefully for the amoeba we have not been successful in our search. The last named writer states that it is usually a terminal affection. We have found it to be a constantly recurring one during treatment and has not as a rule been of serious import. It has however been a reason for the lengthening of the course of treat-

ment, although rarely for its cessation.

Melaena has not occurred in this series.

NERVOUS SYSTEM

There is nothing that calls for remark under this heading, except that two cases of Herpes zoster occurred and that in one it followed upon injection of T.C.C.O. mixture, the formula for which will be referred to later. The mixture was injected near the spine into the latissimus dorsi muscle.

SKIN AND SUBCUTANEOUS TISSUES

There is no remark to be made under this heading except that it was not noticed that the skin was darkened in colour. Probably all patients tend to be dark and a slight alteration in colour would not be obvious.

GENITO-URINARY SYSTEM

There is nothing to note in connection with this system. A few cases had slight albuminuria on admission. Albuminuria often of a transient nature sometimes occurred during treatment. This will be referred to again in its relation to treatment. There was one case of Chronic Parenchymatous Nephritis.

BLOOD

After investigating the history of the case and examining the patient clinically we have followed a definite routine, the results of which will be given in order. The peripheral blood has been examined with a view to estimating the percentage of haemoglobin and the

numbers of red and white blood corpuscles respectively. A blood film has been examined, the general characteristics of the various elements being noted, and a differential leucocyte count done. At the same time 5 c.cms of blood have been taken into a test tube in order to obtain the serum for the formalin test which will be described later. The final step has been the puncture of the liver followed in a few cases by splenic puncture, these two last methods with a view to clinching the diagnosis by the finding of the Leishman-donovan body.

We have found this a useful mode of procedure, the evidence for or against the disease being gradually built up and in addition we have avoided the possibility of doing liver or spleen puncture in, for example, a case of leucocythaemia.

MICROSCOPICAL EXAMINATION

Leishmania-donovani. The reasons for not carrying out a routine examination of the peripheral blood for the parasites have already been given.

RED BLOOD CORPUSCLES

The lowest count per cubic millimetre has been 2,050,000 and the highest 4,056,000, the average being 3,880,000. There were no special changes in the shapes of the corpuscles nor were there any special types of cell to be noted.

During treatment the numbers gradually increased but only in rare cases did they approach the normal which is

taken as 5,000,000 per cubic millimetre. A synopsis of cases will be given in which the increase can be seen in any particular case.

HAEMOGLOBIN

This was reduced in all cases, the majority ranging from 55% - 65%. During treatment the percentage increased but as is shown in the table below there was still a deficiency in the majority of cases when they were discharged from hospital.

Hb %	<u>NUMBER OF CASES</u>	
	<u>On admission</u>	<u>On Discharge</u>
30	1	
40	1	
45	4	
50	6	
55	13	1
60	24	5
65	14	6
70	10	17
75	3	11
80		6
85		4
90		1

NOTE : The smaller number of cases in the second column is due to the fact that certain cases died and the blood was not examined; other cases were taken home unexpectedly and no opportunity occurred for examination.

COLOUR INDEX

This ranged from 0.63 to 1.5 the latter figure being reached in one case. In a total of 88 cases in which the data are available 38 (46%) showed an index of 1.00 or over.

This does not point to an anaemia of any definite type as consistent throughout the series.

It is interesting to note that Napier and Muir³¹

adopting the European standard for the colour index, say that the anaemia is rather of the pernicious than the chlorotic type whereas Brahmachari³² states that in his series it was more of the chlorotic type, but states that the normal for the Indian is 0.76.

We have no information as to the normal for Chinese. ||

The foregoing estimations do not give any great help in diagnosis, although of course the alteration in the condition of the blood as judged by the percentage of haemoglobin and the number of red cells, during treatment is a guide to the progress of the case.

WHITE BLOOD CORPUSCLES

There is very definite help in the diagnosis of the disease to be gained from the observation of the numbers of white cells and of the proportions of the various types of cell as compared with what is found in the normal individual.

As a general rule, there is a marked reduction in the number of white cells and in addition the proportions of all types are altered in that polymorphonuclear cells are reduced in numbers whereas the mononuclear cells show an increase.

TOTAL COUNT

In 82 cases the average number of cells per cubic millimetre was 3819. This is somewhat lower than the figure given by C.W. Young³³ in a series of cases in N. China. In one case (No 31) the count was as low as 1250 and it is interesting to note that this case left hospit-

al apparently cured with a total count of 4160. Another (No 14) with a count of 1875 on admission was also cured and had a count of 5,000 on discharge. A third case (No 30) in which on admission the total count was 1875, had a most unfortunate history. He developed jaundice, ascites and had a conservative mastoid operation from all of which he made a good recovery. Finally he developed orbital cellulitis and left hospital in a hopeless condition.

In 49 cases (60%) the total count was below 4,000 per cubic millimetre.

This proportion seems to be lower than in Indian cases in which it is stated that 80% of cases have a total white blood count of less than 4,000 per cubic millimetre.

The following table gives an indication of the count in these cases.

<u>Cells per c.mm.</u>	<u>No of cases.</u>	<u>Under 4000 per c.mm.</u>
5000 or more	10	
4000 " "	23	
3000 " "	34)	
2000 " "	12)	= 60%
1000 " "	3)	

As a general rule in cases of kala-azar the leucocyte response to infection e.g. pneumonia either does not occur or is less marked than usual and this absence of leucocytosis makes it difficult for the patients to withstand such an infection.

There are also cases of uncomplicated kala-azar in which the leucopenia is not marked, and certain cases

show a definite leucocytosis without any other cause than the disease itself to account for it.

One such case (No 15) is here quoted. The patient, aged 16, has been ill for 11 months, the illness commencing with high fever. The spleen and liver were enlarged and the general appearance was consistent with kala-azar. There were no complications present, and no sign could be found of any superadded infection. The white cell count over a series of estimations on admission averaged 14,000 per cubic millimetre. The polymorphonuclear leucocytes were consistently about 80%. There was a very distinct double rise in the temperature and the globulin test was positive. Puncture of the liver did not show any Leishman-donovan bodies after several examinations. Splenic puncture was not done because at that time we were somewhat nervous about the procedure. Whilst therefore the diagnosis could not be clinched there was distinct evidence in favour of kala-azar. Treatment was carried out by means of injections of tartar emetic and two months later the white cell count was 20,000 per cubic millimetre with 81% of polymorphonuclear cells. The patient developed nephritis, ascites and jaundice. He was discharged from hospital a few days after the last estimation of leucocytes with the above complications, a positive globulin test and very little hope of recovery. He had received in all 0.3 grams of Tartar Emetic. One year later he was reported quite well and to have made a complete recovery.

It need hardly be said that the character and general course of the disease was not easy to understand, although we still think that it was a case of kala-azar.

There is no doubt that leucopenia in association with the clinical signs of kala-azar is of assistance from a diagnostic point of view, but it should be noted that in this series - 10 cases had a cell count of 5,000 or more and of these five cases had over 6,000 cells per cubic millimetre.

It is appropriate here to discuss the proportion of red cells to white. Normally this proportion is 5,000,000 to 8,000 or 630 to 1. Napier and Muir give it as 555.1

34

Rogers has laid down the following rule "that in any cases of fever which may possibly be kala-azar the finding of less than 1 white to every 1500 red cells and still more of greater degree of relative leucopenia will be almost diagnostic of the disease."

35

Napier and Muir referring to this point say that they have seen cases in which the proportion was greater but which were not kala-azar, but that the proportion in this disease is usually more than 1000 - 1.

Brahmachari says that this relative leucopenia is of great diagnostic importance in kala-azar if present, but that it is not infrequently absent.

In this series out of 77 cases in which the full details are available only 25 (32%) showed a proportion of 1000 - 1 or more. In no case was it higher than 2650 - 1. The average was 1-860. These cases were

definitely kala-azar not only clinically but in the majority of cases were confirmed by liver puncture.

In this series therefore, it cannot be said that the proportion is usually 1000-1. or more. It may be that cases in China do not in this respect correspond with the Indian ones. The proportion depends on two factors. In cases of marked anaemia with great reduction in red blood cells, the proportion would not be so great, and on the other hand the same would apply if the white cells show a high count. In this case it is obviously due to the general high average of the white cell count, because the cases as a rule did not show great reduction in the red cells, 68% having a count of 3,000,000 cells or more per cubic millimetre.

It should be noted also that Rogers refers to "any cases of fever". Many of our cases were almost apyrexial and perhaps this diagnostic sign may be more common in acute cases with high fever.

Whilst we have found this relationship of the numbers of the two kinds of cell of assistance when present, it has not been of great value in diagnosis. It must not be forgotten that in the case of superadded infections a leucocytosis may be present and even if a much less marked one than should ordinarily occur, it would disturb the balance and obscure the ratio. Many of the patients have mild septic infections which might accomplish this.

PROPORTIONAL CELL COUNT

The alteration in the proportions of the various types of white cell is in our experience of more value than the actual number of the white cells. The polymorphonuclear cells have been decreased in number in every case, the lymphocytes and mononuclears if taken together, have been increased. The most striking fact has been the increase of the mononuclear cells.

The average numbers are as follows :-

Polymorphs	<u>49%</u>
Lymphocytes	24%
Large Mononuclear	<u>22%</u>
Eosinophils	2.24%

These figures correspond closely to those given
³⁶ by Young in a series of cases in North China.

The main diagnostic point is the decrease in polymorph cells and increase in the mononuclear cells. This has been invariable throughout our series and we regard it as practically diagnostic of kala-azar. In six cases in which the percentage of polymorph cells has been 60 or over, this relative increase in the mononuclear cells has still been apparent. In only one case did the former reach 70%. The latter were in one case as low as 9%.

There has not been the increase in small lymphocytes given by Napier and Muir who give the typical count as 51%. Young gives his own figure as found in North China as 38% for lymphocytes and quotes Knowles as giving

26%. Our figures correspond to the last one.

As to eosinphils, in 89 untreated cases of kala-azar eosinphils were noted in 38 cases and the average percentage as given in the table is 2.24%. There seems to be some difference as to the normal for a healthy individual. Young in China, referring to it as 0.5% but does not say whether he intends this to refer to Chinese or not. He further quotes Knowles as giving 2% for the healthy individual, and Napier and Muir give the same figure.

As to our figures in kala-azar it is much less than that of Knowles who gives 5.92% whereas Young gives 1.62%. We have not seen any cases of ankylostomiasis and have not therefore had the opportunity of judging the effect of kala-azar on the high percentage of eosinphils found in that disease.

Most Chinese are affected with *ascaris lumbricoides* and this may have had an effect on the numbers of this type of cell present.

EFFECT OF TREATMENT

During treatment the following changes in the composition of the blood may be noticed. The number of white blood cells increases, gradually approaching the normal, and the polymorph. cells gradually increase in numbers. At the same time the percentage of the other types of cell tends to revert to that seen in normal blood. This will be referred to later as these phenomena are an important factor in deciding the period of

treatment required.

It was not possible in all cases to complete the examination of the blood before the patients left hospital. In 49 treated cases the results were as follows:-

Average number of white blood cells	6640 per c.mm.
" percentage of Polymorphs	62%
" " Small Lymphocytes	21%
" " Large Mononuclears	11%
" " Eosinphils	2.1%

The following table shows the total white count in the same cases to advantage.

<u>Cells per c.mm.</u>	<u>No. of cases</u>
11000 or more	2
10000 " "	1
9000 " "	1
8000 " "	5
7000 " "	8
6000 " "	11
5000 " "	16
4000 " "	5

It is instructive to compare these figures with those in the cases before treatment, as shown in the previous table.

TESTS FOR KALA-AZAR

Haemolytic Test (Globulin Test). This test was originally suggested by Ray³⁷. It is performed as follows :-

Two drops of the patient's blood taken say from the finger, are dropped into ten times their volume of distilled water in a suitable test tube. The actual proportions of blood and water are not of importance but we have found that too great a proportion of blood may obscure the reading of the test.

In cases of kala-azar there is a turbidity throughout the fluid and on standing there is a white flocculent precipitate. This appears to be a modification of Brahmachari's test in which the serum of the blood is used in a similar manner. We have used Ray's method throughout.

The turbidity was thought to be due to incomplete haemolysis, but the precipitate has been proved to be serum-globulin. It has also been found that in the blood of kala-azar patients the serum globulin is much increased over normal and the concentration is higher than in any other disease³⁸. The test is now very often known as "Globulin Precipitation Test".

There is some difference of opinion as to the value of this test as a means of diagnosing obscure cases which simulate kala-azar.

³⁹
Sia performed the test on 86 cases suffering from various diseases including ten of anaemia. They found that the test was only positive in kala-azar and that all the cases of kala-azar gave a positive reaction.

⁴⁰
C.W. Young also working in North China says that the test is positive in all well developed cases of kala-azar and that it was absent or doubtful in one case in which the child had only been ill six weeks and in whom the spleen was just palpable. He also reports the test as negative in eleven specimens of sera from experimentally infected dogs.

Napier and Muir suggest that it is not positive in the early stages of the disease.

In Case No 24 of this series it will be noticed that the test was positive. This was an "early" case.

It has been proved that this test is constant in well developed schistosomiasis and that it tends to disappear under treatment.⁴⁰

There does not appear to be any other disease with the exception of schistosomiasis in which the test has proved to be positive. In some cases there appears to be a cloudiness due to the undissolved nuclei of leucocytes which may give rise to difficulty in reading the result. This has been reported to occur in leukaemia. In such cases it will be well to use the serum of blood only which will avoid this difficulty.

The precipitate produced in the haemolytic or serum-globulin test is dissolved by dilute acid which is not the case in the turbidity arising from undissolved nuclei.

In 92 cases considered the test was recorded on admission in 86 and all were positive. In 4 cases the result was not recorded. In one case (No 16) considered to be Splenic Anaemia the result was \pm . In the above 86 cases the diagnosis was confirmed in 67 by the finding of the Leishman-donovan body, but the remainder were undoubtedly kala-azar. In these the parasite was not searched for except in three in which liver puncture gave a negative result.

A further case of interest (No 74) was one in which the clinical aspect was one of kala-azar, but as a result

of investigation was diagnosed as splenic anaemia. The haemolytic test was negative as was the formalin test (see below). Six months later both the above tests were positive and there was a double daily rise of temperature. The organism was discovered on liver puncture and under antimony treatment a perfect recovery was made.

Some observers have endeavoured to make this test a quantitative one. It is true that as the treatment is continued and improvement takes place, the precipitate gets much finer, less flocculent and above all takes much longer to settle down. It may be possible to classify the results of the tests by means of these observations but we have not had the opportunity of carrying them out over a series of cases.

Reference to the possibility of this method being used as a criterion of the cure of kala-azar will be made later.

We have found the test most useful, being present in every case of kala-azar and in the small number of doubtful cases in which kala-azar was thought to be a possibility but which were subsequently diagnosed otherwise, the test was negative or "plus-minus".

In one case quoted above which turned out to be kala-azar at a later date the test failed to discover the fact.

ALDEHYDE (Formalin, or Formol-gel) TEST

This was first introduced by Napier in 1921 and consists of the addition of 1 drop of clear blood serum

to 1 c.c.m of commercial formalin in a tube preferably 3" x $\frac{1}{2}$ ".

Muir classifies the results under four different headings, but we have only taken note of the first of these. It is, that, within twenty minutes the whole serum will become solid and opaque like the white of a hard boiled egg. This, according to Muir, is absolutely diagnostic of kala-azar.

The results which we have marked positive in this series are those which have conformed to this description. Others, including some which Muir classes as doubtful, we have marked as negative.

There is another method of performing this test by placing a drop of serum on a glass slide and inverting it over a dish containing the formalin, the vapour of which acts in the same way as the liquid in the first method. This method is of value when only a small amount of serum is available. We have used the first named method as a rule.

This test was also used in the diagnosis of syphilis but time required for solidification was longer, being from 24 to 30 hours. It was not, however, found reliable.

In kala-azar it is the time required for solidification that is important. Muir however says that in malarial cachexia and in some cases of malaria, phthisis, leprosy etc. the serum will become solid but will remain quite clear for some time and regards this as a doubtful reaction, but that if given in a case of long-standing

fever with enlarged spleen it would be a "negative" result as for kala-azar.

In our case in the positive reaction the serum becomes opaque and solid within twenty minutes.

The results have been as follows :-

In 69 cases of kala-azar the test was positive, and of these in 58 the diagnosis was confirmed by the finding of the parasite. In 4 cases the parasite was searched for by puncture of the liver but was not found, and in the remaining 7 cases the organism was not searched for.

We can however safely say that all the cases included in the 69 were kala-azar without doubt and the test was positive in each case.

There were however a number of cases in which the test failed.

In five (Nos 50, 51, 66, 67, 81) cases in which the Leishman-donovan body was discovered in either the liver or spleen on puncture, the test was negative, In two of these there was no change whatever. Of the remaining three, one showed a viscous condition in 24 hours' time, another only a slight milky white appearance of the serum and the third a solidification which only appeared in 30 minutes. A case already referred to under the heading of the haemolytic test was originally diagnosed as splenic anaemia^{and} gave a positive test after a further eight months' duration of the disease.

Under the same heading a case was mentioned in which the haemolytic test changed from negative to positive during the treatment. The formalin test remained negat-

ive throughout.

In a case (No 16) of Splenic anaemia the test was negative.

Summarising these observations we get the following results. In 74 cases of undoubted kala-azar 69 gave a positive test, and 5 a negative one. The test was therefore negative in 6.7%.

⁴¹Struthers gives a negative result in only 2 per cent of cases out of a series of 138. Napier and Muir on the other hand obtained negative results in one series of 2% and in another of 15%. They call attention to two facts viz. that in cases of three or four months standing the result is usually doubtful and in some negative and that misleading results occur with frequency in the cold weather.

In the above series of doubtful results, in one, the duration of the disease was 5 months, and in another 6 months, but in the others it was eleven months or more.

In three of the cases the tests giving the doubtful results were performed within a day or two of each other and in these and in one other case the test was carried out during the cold weather. In these four the onset of the disease was in the cold weather. It is difficult to see how the test can be affected by the temperature because the laboratory is heated, but the temperature of the laboratory in winter is never so high as the atmospheric temperature in the hot weather.

F.F. Elwes, Menon and Ramkrishnan⁴² tested 81 posit-

ive kala-azar cases with 53 positive, 10 doubtful, and 18 negative results. In 19 patients negative for parasites on liver puncture 8 gave positive results.

As to the results in other conditions, Struthers⁴¹ tested 67 cases of various diseases, including seven of Banti's disease and three of chronic malaria with enlargement of the spleen and found the test negative in each case.

Our own results indicate that the test is a valuable one but not without possibility of error and the results of Struthers work in North China are of the same nature.

Further reference will be made to the effect of treatment on this test.

LIVER AND SPLEEN PUNCTURE

The only infallible test in the diagnosis of kala-azar is the finding of Leishman-donovan body. We were at one time so impressed with the dangers associated with puncture of the spleen that we did not use the method at all but relied upon puncture of the liver. At a later stage whilst still aware of the danger associated with splenic puncture we considered it to be justifiable in those cases in which the organism was not found in the material obtained from the liver.

TECHNIQUE

The previous procedures eliminated the possibility of leucocythaemia, or other disease in which there was abnormal tendency to bleeding. The patient was given three doses of calcium lactate or chloride, one on the

previous evening, one early in the morning of the day of operation, and the third immediately following the procedure.

A record syringe (5 c.c. or 1 c.c.) was used with a medium-fine needle. The syringe and needle after sterilising were made perfectly dry by means of alcohol and ether.

Liver Puncture

The site of puncture was in the mid-axillary line about the middle of the right lobe. The needle, not connected with the syringe was quickly passed through the skin into the muscles. The patient was then told to hold his breath and the needle carried well into the liver substance.

The hand was immediately removed from the needle, and the patient allowed to take a breath or two, the movement of the needle indicating that the liver had been reached and the absence of control of the needle obviating damage to the liver. Moreover the patient had an opportunity of preparing for the next stage.

The patient was again told to hold the breath and the syringe was immediately connected up and whilst the patient was thus holding his breath, suction was applied by means of the piston and the needle rapidly extracted. It is important that the patient should not breathe whilst the movements of the outer end of the needle are not free. No attempt is made to obtain blood in the syringe. In the majority of cases no blood is seen in

in it. There is invariably some liver tissue or blood in the needle and this is sufficient and more desirable than blood in the syringe. The contents of the needle are spread on one or more slides which are allowed to dry in air. It is well to make a "tail" to the films. No pressure is necessary on site of puncture, but a binder is applied tightly round the chest until the next day.

Splenic Puncture

The same procedure is adopted, but the needle can in most cases be carried in the first stage to the surface of the spleen and the puncture made whilst the patient holds his breath. It is equally important to avoid movement whilst the outer end of the needle is controlled and it is well to fix the spleen with the left hand. The needle is entered obliquely into the organ and the same procedure as in the case of the liver adopted. Pressure is made on the site of puncture for half an hour following the procedure and the patient kept in bed until the next day.

STAINING OF FILMS.

We have used Borroughes & Wellcome "Soloid" preparation of Leishman's stain and have followed the procedure described by Muir⁴³. The stain is kept on for two minutes, an equal quantity of distilled water added, and the mixture left for half an hour. The film is washed and dried in the usual way.



Liver puncture has been done in 69 cases and puncture of the spleen in 10 cases. The latter was usually done after a puncture of the liver gave a negative result. We have not experienced any untoward results from these procedures nor have we found the patient inconvenienced in any way. In one case (No 17) a curious train of signs and symptoms followed on the evening of the day of puncture of the liver. The patient had abdominal pain, rapid pulse, and some slight resistance over the upper part of the abdomen. We did not consider that his condition had anything to do with the puncture of the liver but we could not make any other diagnosis. A laparotomy was done as the condition of the patient seemed serious. No abnormal condition was found and the patient made a perfect recovery from the operation and from the original disease.

RESULTS

In the 69 cases of liver puncture and 10 cases of splenic puncture the following results were obtained.

In the liver the parasite was found in 60 cases, that is in 87% of the cases examined by this method. In the remaining 9 cases the parasites were not found in the liver but in 4 of these it was found in the spleen, the remaining 5 not being submitted to splenic puncture.

The spleen alone was punctured in 5 cases only and found positive in each case.

In one case both organs were punctured and the Leishman-donovan body found in each.

To summarise

	Total number of cases	<u>88</u>
	Puncture of the Liver in	69 cases
	Leishman-donovan bodies found in	60 " = 87%
	" " " not found in	9 " = 13%

x	Puncture of the Spleen in	10 cases
	Leishman-donovan bodies found in	10 " = 100%

x In 5 of these cases the splenic puncture followed puncture of the liver.

In view of the greater danger of splenic puncture as compared with liver puncture, it is undoubtedly the correct procedure in the interests of the patient, to examine the liver first.

This is emphasised by the fact that in the cases in which liver puncture was used, it yielded a positive result in 87%.

The danger of liver puncture is so small and the procedure so easy, that it should, in our opinion, be performed in every case resembling kala-azar.

As to microscopical examination of a film, it is well to note that the "tail" of the film is the most likely place in which to find the Leishman-donovan body.

COMPARISON OF DIAGNOSTIC DATA

A chart showing the results obtained with various tests for comparative purposes is here given.

COMPARATIVE RESULTS OF DIAGNOSTIC DATA

No	Ray	Formalin	Liver & Spleen	Temperature	Blood Proportion	No	Ray	Formalin	Liver & Spleen	Temperature	Blood	Proportion
3	+	+	+	+	+1-1012	54	+	+	+	+	+1-810	
6	+	+	+	+	o	55	-	-	O	-	+1-750	
12	+	+	+	-	+1-600	56	+	+	+	+	+1-1000	
13	+	+	+	-	+1-730	57	+	+	+	-	+1-870	
14	+	+	-	-	+1-1090	58	+	+	+	-	+1-820	
15	+	+	-	+	-1-275	59	+	+	+	-	+1-1000	
16A	+	-	-	-	-1-549	60	+	+	+	-	+1-660	
17	+	o	+	-	+1-760	61	+	+	+	+	+1-760	
20	+	+	+	+	+1-811	62	+	+	+	+	+1-870	
21	+	+	O	+	+1-1370	63	+	+	+	+	+1-780	
25	+	+	-	+	+1-861	64	+	+	+	+	+1-800	
26	+	+	O	-	+1-740	65	+	+	+	-	+1-1400	
27	+	+	o	-	+1-630	66	+	-	+	-	+ o	
28	+	+	+	-	+1-1000	67	+	-	+	-	+1-1200	
29	+	+	+	+	+1-1200	67a	+	+	+	-	+ o	
30B	+	+	O	-	+1-1520	68	+	+	+	-	+1-970	
31	+	+	O	-	+1-2650	69B	+	+	O	-	+1-1100	
32	+	+	+	-	+1-580	72	+	+	+	+	+1-860	
33	+	+	+	-	+1-760	74	+	+	+	+	+ o	
34	+	+	+	-	+1-750	75	+	+	+	-	+1-1060	
35	+	+	+	+	+1-1140	76	+	+	+	+	+ o	
36	+	+	+	-	+1-1000	77	+	+	+	+	+1-800	
37	+	+	+	-	+1-850	78	+	+	+	-	+1-800	
38	+	+	+	-	+1-610	81	+	-	+	+	+1-1000	
39	+	+	+	-	-1-560	82	+	+	+	-	+1-1100	
40	+	+	+	+	+1-670	83	+	+	+	-	+1-700	
41	+	+	+	-	o	84	+	+	+	+	+1-810	
42	+	+	-	+	+1-670	85	+	+	+	-	+1-900	
43	+	+	+	-	+1-900	86	+	+	+	-	+1-800	
44	+	+	+	-	+1-1000	87	+	+	+	+	+1-950	
46	+	+	+	-	+1-1000	88	+	+	+	-	+ o	
47	+	+	+	-	+1-900	89	+	+	+	-	-1-700	
48	+	+	+	-	+1-680	90	+	+	+	+	+1-1100	
49	+	+	+	+	+1-660	91	+	+	+	+	+1-830	
50	+	-	+	+	+1-800	92	+	+	+	+	+ o	
51	+	-	+	-	+1-780	80	+	+	+	-	+1-900	
52	+	+	+	+	+1-730	79	+	+	+	+	o o	
53	+	+	+	-	+1-1000							

N.B. The numbers of tests performed do not necessarily correspond with numbers stated elsewhere. Only those in which data are sufficient are included here.

NOTE : Ray = Haemolytic Test Blood(+Blood picture
 Formalin = Formalin Test (generally conforms
 Liver)+Presence of L.D. Bodies (to that of kala-azar
 Spleen)- absence of L.D. Bodies - does not conform
 Temp(+ Double rise present. Prop'n = Proportion of white
 (- " " absent cells to red cells.

A. Case of splenic anaemia. B.Diagnosis doubtful.O.Test not done

COMPLICATIONS

Looking over these cases, complications seem to be the rule rather than the exception and the kala-azar cases are a constant source of anxiety, especially as a great deal more responsibility falls on the medical attendant than is usual in hospital practice in this country. This is largely due to a shortage of skilled nurses. In fact in some cases the complications might have been avoided if it had been possible to keep a more careful watch over the patients. We have found it more difficult in summer because a Chinese patient who is perspiring freely will purposely throw off all bed-clothes and even sit in a draught from open windows to "cool off".

Bronchitis has been common and has been of a recurring variety. This has in most cases arisen during treatment and is possibly due to irritation caused by the antimony injections.

Cough sometimes associated with bronchitis and at other times without obvious cause has been common. A reference has been made to such cases under the heading of "Spleen".

Laryngitis has been noted in a number of cases and has been of a chronic nature with in most cases almost complete loss of voice. Syphilis was suspected in some and ruled out by a negative Wassermann reaction. We have often thought that it was possibly a definite manifesta-

tion of the kala-azar.

Pneumonia A number of cases of broncho-pneumonia were associated with the bronchitis. In several cases a lobar pneumonia caused the death of the patient. It is one of the complications to be dreaded as it is rarely recovered from.

Pleurisy was noticed in one case and was associated with ascites.

Glossitis was quite a common complaint but yielded to simple treatment. It was generally found in the children and seemed to be connected with the treatment.

Cancrum Oris. Five cases occurred, three of which died, one recovered after having a severe haemorrhage from the inside of the mouth, probably from the facial artery (No 34) and one was not treated.

In addition to these cases there were a number of cases of ulceration of the mucous membranes of the mouth of a septic nature which may have been a "pre-cancrum" stage. There was one case (No 70) of membranous tonsillitis from which large sloughs separated. It simulated diphtheria closely and anti-diphtheritic serum was given as a precautionary measure.

Oedema of the Glottis, followed laryngitis in one case (No 53) led to the death of the patient.

Diarrhoea This was constantly occurring and has been referred to in its association with the passing of blood per anum under a previous heading.

Jaundice has occurred in three cases only.

Ascites occurred to marked degree in five cases. In one there was a Parenchymatous Nephritis but in the others the cause was not obvious. There was a weakness of the myocardium in all cases but this did not account altogether for the condition. In one it was associated with severe pain over the region of the spleen. It was generally associated with some degree of oedema of the feet.

All these patients did badly, one died in hospital one recovered at home and the remainder returned home not greatly improved by treatment.

Erysipelas occurred in three patients, in each case on the face.

Periostitis of Maxilla was seen in number of cases and caused a hard swelling sometimes painful to the touch. In one it was followed by pneumonia.

Albuminuria was often present during treatment but was usually transitory.

Otorrhoea was common and in one instance led to a radical mastoid operation being required.

Orbital cellulitis with proptosis of the eyeball occurred in two cases (Nos 30 and 77) although in one the condition may have been due to thrombosis of the cavernous sinus following infection of the lateral sinus.

Numerous septic processes of various parts of the body were met with but do not need special mention.



EFFECTS OF CANCRUM ORIS IN KALA-AZAR
NEITHER DISEASE ACTIVE.



KALA-AZAR
LINES SHOW EFFECT OF TREATMENT ON SIZE OF SPLEEN

TREATMENT

In the introduction to this thesis a brief reference has been made to the methods used in the treatment of the disease.

It is to be expected that in the search for a drug which would act as a specific for kala-azar, not only would a large number of different drugs be used, but that cures would be claimed for the majority of them.

There seems to be no doubt that there are cases of spontaneous cure. Records of such cases do not seem to be common although these natural cures have been placed as high as 25% by some observers.

In obtaining the family history of our cases we have been informed by the patient on several occasions that some member of his family had recovered from the disease, but of course we have no proof that the condition was really kala-azar.

There is another variety of case in which recovery seems to take place as a result of some inflammatory condition supervening. Such a condition seems as a rule to be one that would normally produce a marked leucocytosis e.g. pneumonia, cancrum oris or large abscesses. In pneumonia it is unfortunately the fact that many patients die, and the same applies to cancrum oris. We have already referred to one instance of the latter disease in which a cure had undoubtedly been established by this means.

The Chinese have a considerable knowledge of medic-

ine (as distinct from surgery) and have methods of treatment of their own for most diseases. The writer has been informed by a Chinese physician of repute, who had received a "western" training, that, for example, cases of leprosy had been cured by Chinese physicians and it is remarkable that none of our cases of kala-azar seem to have been treated by their own physicians. There is no record of any of them having been treated by cauterisation over the spleen, a method which has been used in other countries before the introduction of western science.

In the case of a patient developing one of these acute inflammations during the course of treatment, it is probable that the treatment would be carried on, without regard to the possibility or otherwise of such infection being able to cure the original disease. It is difficult therefore to estimate the influence of such infections on the course of kala-azar.

It is remarkable how writers who have claimed good results from other forms of treatment, have in general come back to some form of antimony as the most generally useful.

Napier and Muir remark that "consistent success has never been obtained by any other method or with any preparation except by the intravenous injection of either sodium or the potassium antimony nitrate".

Tartrate

This statement seems to be true as far as can be gathered from literature. Brahmachari for example re-

marks that formaldehyde acted like a specific in the cases in which it was used, but goes on to say that he had not given the treatment a further trial.

It seems to be true that writers who report good results with drugs other than antimony or with other preparations of it than the two mentioned, invariably return to these, that is to Tartar Emetic and Sodium Antimony Tartrate.

POTASSIUM ANTIMONY TARTRATE - SODIUM ANTIMONY TARTRATE

These are the two drugs used throughout this series with the exception of two cases which will be referred to in which a special preparation was used.

In about the first 20 cases the Potassium salt was used, and then the Sodium salt was given a trial. Our general idea was that as far as the effect on the disease is concerned there is little to choose between the two and therefore no distinction will be made in reporting the results. On the other hand, whilst it is claimed that the Sodium salt is the less toxic, and perhaps the less irritating to the mucous membranes, we have not found a great difference between them in this respect either, judging from the effects on the patients. We have however used the Sodium preparation in the last seventy cases or so.

These two observations confirm the experience of other writers who however emphasise the importance of the purity of the drug.

There seems to be some difference of opinion as to the sterilisation of solutions. Castellani and Chalmers think that changes giving rise to toxic products occur if an autoclave is used and recommend flowing steam on two or threesuccessive days. Brahmachari recommends boiling for ten minutes.

We have used the following method. Distilled water is used and this is brought to the boil by means of a water bath and allowed to boil for one or two minutes. The requisite amount of drug is then added, and the solution allowed to boil for half a minutemore. It is then removed from the bath and allowed to cool. The solution is used and used only on the day of preparation. Any excess over the amount required is discarded.

This method appears to be very satisfactory and we have not had any indications of toxicity or of incomplete sterilisation,

ADMINISTRATION

This has invariably been by the intravenous route, using a record syringe. The needles should be as fine as is consistent with the allowing of blood to flow into the syringe, that is, as a test of the needle being in lumen of the vein. It is necessary of course to avoid injecting into the subcutaneous tissues. The solution being irritating, it gives rise to great pain if so injected and in addition may make it impossible to use the vein again. This is an important point. In small children the choice of veins may be limited. In general

the veins in the region of the elbow have been used. In some cases we have used the external jugular vein and in others the veins of the leg. We have never failed to complete the course of treatment because of the difficulty in finding a suitable vein and have never had any difficulty with even the youngest patients. This is due in measure to the presence of other children giving confidence to the patient. It is also due to the use of a fine needle which causes very little pain, and does not damage the wall of the vein to any extent.

It is not feasible to sterilize the syringe between the injections, which really ought to be done, because in every case the blood of the particular patient receiving the injection flows into the syringe. As they all have the same disease it is not of great importance but some may have concurrent diseases which may make sterilisation of the syringe between the cases desirable. The nearest approach to perfection in this respect has been the thorough rinsing of the syringe in boracic lotion, by suction with the piston, between each injection.

An appropriate number of needles has been used, and these have been sterilised by boiling after each injection. This has enabled the work to be carried out without delay.

DOSE

In our early cases we used a 1% solution and followed the system of Castellani and Chalmers⁵. It was soon found however that the use of a solution of this strength

necessitated an amount of over 10-12 c.c. in adult cases on the maximum dose. We therefore soon began to use a 2% solution and followed the dosage advocated by Napier and Muir. The initial dose in an adult varied from 0.5 - 1 c.c. with a maximum of 5 c.c. increasing the dose weekly by 0.5 c.c. In a few cases it was possible to get up to 5.5 c.c. as a maximum dose and 6 c.c. was tried on one or two occasions. We had to revert in each case to a maximum of 5.5 c.c. In adult cases we found it possible to increase the dose weekly according to the system as a general rule.

In children we found that we could not follow any definite system. In the younger ones say up to six years of age we commenced with 0.25 c.c. in those who were weak or running a high temperature. In ordinary cases an initial dose of 0.5 c.c. could be given and in these we increased the dose by 0.25 c.c. weekly. We did not lay down any rule, as to the maximum dose for children according to age. Each individual dose was regulated by the response of the patient to the previous injection.

If there was undue coughing, vomiting or giddiness, the dose was reduced on the next occasion. In some cases a child aged eight was able to take a maximum dose of 2.5 c.c. on successive occasions, and in others a child aged ten could not tolerate more than 1.75 c.c. as a maximum in spite of more than one effort to increase it by 0.25 c.c.

In every case irrespective of age, the general condition of the patient was taken into account with reference to the presence or absence of e.g. bronchitis, diarrhoea, albuminuria. With reference to the latter we think it wise to test the urine for albumen before each injection although owing to inadequate staff we were not able to do so. The urine was however tested as a routine in all cases each Monday morning. If albumen was found in a case not previously showing it, the injection was not given on that day and subsequently the case was treated on its merits. Sometimes the injections ceased until the urine was free from albumen and in others small doses were given and the case carefully watched. The same principles were applied to the other conditions named above.

In cases which for any reason seem intolerant of the drug we think it dangerous to push the dose. The drug is a toxic one and great care should be observed in using it. We have found special difficulty in some of the children and if there was any doubt as to whether an injection should be given or not on any particular day, or as to whether the patient would tolerate any given dose, the decision was likely to err on the side of omitting the injection or of giving a smaller dose.

GENERAL OBSERVATIONS

On arriving in hospital it is wise to put the patient to bed and certainly if there is any fever, they should remain there whilst it lasts. In view of the

seriousness of Chest complications should they develop it is highly necessary that the patients should not get a chill. This is particularly difficult in China where the people do not realize the danger in this respect when freely perspiring. Moreover during the hot summer nights when the patients prefer to sleep with the upper part of the body uncovered, a cold wind is likely to spring up which is a source of danger. In children we make it a rule that they shall wear a thin flannel or wool garment which cannot be unbuttoned, night and day, and in adults we make the same provision but the garment is of ordinary hospital pattern. We regard this as of great importance. Great skill in diagnosis and specific treatment is of little value, if the patient develops pneumonia.

DIET

This should be as generous as possible, without allowing over-feeding. *

COURSE OF TREATMENT

Except in those cases which are confined to bed because of high fever or for other reasons, we did not consider it necessary for the patient to be recumbent during the injection. We do however wherever possible arrange for the patient to lay down immediately after it.

Effects following injections. In many cases there is no effect whatever and the patient would immediately carry on as usual if allowed to do so.

Temperature There is often a slight rise of temperature following the injection but if this is not more than two degrees it is not considered of importance.

Coughing. This refers to a fit of coughing immediately following the injection and is to be distinguished from that in connection with an affection of the respiratory tract such as bronchitis. It usually indicates that the dose has been too large or perhaps that the injection has been given too rapidly.

Vomiting We have noticed this sign following the injection on a number of occasions, but not so often as the preceding sign. It has the same significance but is a stronger indication than the above.

We have never had to stop a course of treatment because of either of these symptoms, but we invariably give a smaller dose on the next occasion. We do not agree with Napier and Muir that the vomiting is connected with the quality of the solution. If this were true it would occur more often during a series of injections with solution from the same bottle whereas it only occurred occasionally and generally only in one case out of ten or twenty.

Giddiness This is often reported by patients who are reaching the limits of tolerance. It is usually mild. We have never seen a patient who required assistance when walking back to his bed. If experienced the dose should be reduced by 0.5 to 1.c.c. next time.

It should be noted that these symptoms referred to above whilst in general indicating an overdose, do not necessarily indicate that the patient cannot tolerate such a dose. In some cases it is true that it is an indication that the maximum dose for the individual has been reached. This is not governed by the age of the patient, but probably is more dependent on body weight. In a few cases it is an individual idiosyncrasy. The dose as reduced should be gradually increased by 0.25 c.c. and it will often be found that not only is this tolerated but that it can be increased beyond the previous limit which induced the symptom.

GENERAL EFFECTS DURING THE COURSE OF TREATMENT

Temperature This has already been referred to. The response to treatment is so variable that the only observation that can be made is that the injections tend to bring the temperature down. In some cases apyrexial on admission the temperature tends to become remittent as treatment proceeds. The effect of another drug (Van Heyden 471) will be referred to under another heading.

Spleen. The change in this organ has already been referred to. In 57 cases in which the size was noted on discharge from hospital the spleen was not enlarged in 10 cases, and only just palpable in 19 cases.

In two cases the reduction in size was only slight. In the remainder the organ was reduced in size.

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Struthers says that the spleen receded behind the

costal margin in four cases, out of sixty.

Liver. This organ was in general greatly reduced and most cases either normal in size or just palpable under the costal margin. There is not the same tendency to what is probably a fibrotic condition with more or less permanent enlargement as in the case of the Spleen.

Blood. The alterations in the condition of the blood during treatment have already been referred to.

HAEMOLYTIC TEST

This test was applied in 52 cases on completion of treatment, and in which the disease was considered to be cured. Those which were only treated for a short period are not included.

The test has been called a precipitation test, but apart from the formation of a precipitate there is an indication of the progress of the disease, in the rate at which the turbidity, which appears on mixing the blood and water, becomes a sediment at the bottom of the tube. In an untreated case this precipitate is coarse and rapidly forms a sediment but as the case progresses towards a cure the precipitate becomes finer and may take as long as two hours to settle. We wish to call attention to this point again because it may explain the differences between our results and those of other observers.

We should only record a negative test if the appearance coincided with that in a healthy individual,

that is, in which there was no turbidity at all.

Taking the above criterion, we find that in 53 cases we obtained the following results:-

In 2 cases there was a negative result.

In 15 cases it was slightly positive, that is, there was a very faintly seen turbidity which took any time up to two hours or even longer to settle.

In the remaining 36 the test was positive to varying degrees.

Amongst these cases the following are of interest :-

CASE NO 6 Duration of Treatment - 11 mos.

Completion of Treatment 27.12.22

Total amount of Drug used 3.44 grams

General condition - Haemolytic Test

27.12.22	Good	Slightly +
28. 3.23	"	Slightly +
1. 5.23	"	Slightly +

CASE NO 17 Duration of Treatment - 11 mos.

Discharge from Hospital 2.2. 23

Total amount of drug used 2.80 grams

General condition Haemolytic Test

2. 2.23	Good	+
17. 7.24	Good - no relapse	0

These two cases are of course exceptions in respect of the duration of treatment. They are amongst the first few cases and were of the nature of experiments.

They illustrate two points. One is that a long course of treatment does not give a negative haemolytic test, and secondly (Case 6) that the test may remain

positive long after treatment has ceased and without any indication of relapse.

These results do not coincide with those of other observers, but we are certain of the correctness of our findings. They have been invariably checked by two observers. C.W. Young⁴⁴ mentions 68 cases with a negative test. Struthers²⁸ says that in 37 apparently cured cases seventeen (46 per cent) gave a negative result, sixteen (43 per cent) gave a doubtful positive result and four (11 per cent) a strongly positive result.

We cannot account for this discrepancy in the results. As already stated we have been careful to look for the slightest turbidity and if it existed the result was recorded as positive. The absence of a sediment in a period of from half an hour to two hours may perhaps be regarded as negative by others and if this were so seventeen of our cases would be classed as negative which would accord with the figures of Struthers.

FORMALIN TEST

A positive test is taken to be one in which solidification and opacity appear within twenty minutes. Any reactions occurring after this period are included as negative results.

Adopting this standard we have the following results of tests taken on completion of treatment

In 46 cases in which the test was done	
23 "	were negative = 50 per cent
22 "	" positive
1 "	was doubtful that is a "plus-minus" result

All these cases were classed as cured and in some there were reports that there had not been any relapse.

Napier and Muir say that this test is very often positive in patients who have completed the course of treatment and who are considered cured. They further say that the reaction will in almost every case be quite negative six months after the patient has completed the full course and been considered cured. We have not had the opportunity of investigating this. Our reports on the after history of patients have as a rule been from friends and not from the patient himself.

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Struthers in 37 cases gives the results as negative in 54 per cent out of this number.

These results are more in accordance with our own than is the case with the haemolytic test.

DURATION OF TREATMENT

The average duration of treatment is 4.1 months. The two cases mentioned previously as being under treatment for eleven months are exceptional, and could without doubt have been discharged earlier. They were in the nature of experiments and were within our first twenty cases. We regard 3 months as the minimum duration of treatment. There have only been three cases discharged within a less period. On the other hand it is necessary in some cases, especially those in which for some reason, only small doses of the drug can be given or in which the course of treatment is interrupted, to

continue for six months. These cases are the exception.

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Struthers gives the average duration as fifteen weeks.

TOTAL AMOUNT OF DRUG

In those cases considered cured the average amount of drug used per case was 1.76 grams. If we take as adults those over eighteen years of age, the average amount used in twenty cases was 2.15 grams. In children it is a little more difficult to compute, but taking thirty-three cases twelve years of age and under, we find the average amount to be 1.4 grams.

To summarise :-

In 64 cases the average amount was 1.76 grams
x " 20 " eighteen years of age or over it was 2.15 grs
x " 33 " twelve " " " or under " " 1.40 "
x These are included in the total of 64.

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Knowles has suggested that 2 grams is a sufficient adult dose. E. Muir in his book advocated a course which would give a total of 5 grams. Napier and Muir mention the routine course of treatment in Calcutta which gives a total of 2.64 grams for an adult, but parasites are searched for in a splenic film and by means of culture before this amount is accepted as sufficient. The same writers suggest that in duration of treatment they are guided by the length of time that is required for the temperature to be brought down to normal, after the injections are commenced.

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Struthers found that the average weight of patients

was 67 lbs and the average total amount of drug used was 1.19 grams and therefore argued that for an adult of 120 lbs 2.16 grams would be required and for an adult of 150 lbs about 2.7 grams would be required.

It may be noted that the figure given for a patient weighing 120 lbs corresponds closely to the average amount in our case of those over eighteen years of age.

We find it impossible to draw any definite conclusions as to the amount of drug required. We have given as much as 3.12 grams in one patient aged 15, and in a patient aged twenty four 1.99 grams and classed both as being cured.

It would seem impossible to judge the cure or otherwise of a case by the amount of drug given but we should other considerations apart, aim at a total of 2.5 grams for a full grown man and would not attempt to give a figure for children according to age, the total amount in our case being so variable.

RESULTS OF TREATMENT

For the purpose of tabulating results the only cases that ought to be classed as cured would be those who for a long period following completion of treatment, had been under observation by a competent observer. This has been impossible, but in our case, the patients have mostly come from two areas and constant comings and goings between the hospital and these districts, of patients and their friends, would make it highly probable that we

should hear of old cases that were not cured. We have made a practice of enquiring as to the condition of our cases, and in judging patients to be cured we have taken these facts into consideration as well as the condition of the patient on leaving hospital. The latter has been considered the deciding factor because obviously, general statements of the former kind cannot be accepted as evidence. There is no doubt however that if any number of our old patients had relapsed or died, we should have been informed.

The following figures give the results of our treatment.

Total number of cases	90		
Number of cases cured	64	=	71.1 per cent
" " " not "	11	=	12.2 " "
Died	<u>15</u>	=	<u>16.7</u> " "
	90		100.0
	<u>==</u>		<u>=====</u>

The cases indicated as not cured are those whose condition was not satisfactory at the time they left hospital. Some may have improved later. On the other hand there is no doubt that some died after leaving hospital.

We have received further reports from 20 patients amongst the 64 classed as cured, and these are to the effect that they are in good health. In 19 of these the period that has elapsed since completion of treat-

ment ranged from three months to two years. The other case reported one month after leaving hospital.

These results may be compared with those of

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Struthers who gives :-

Number of cases under review	100
Cured	61
Improved (treatment not complete)	18
Died	21
	<hr/>
	100

Another observer in North China ^{H₆} gives in a series of eighteen patients

Marked improvement or cure	72%
Mortality	17%

CAUSES OF DEATH

In the sixteen cases which died in hospital the causes of death are as given below :-

Cancrum Oris	2
Pneumonia and Cancrum Oris	1
Pneumonia	3
Oedema of the Glottis	1
Orbital Cellulitis	1
Anasarca	1
Membranous Tonsillitis	1
Diarrhoea	1
Unexplained	4

15

COMMENTS

Cancrum Oris. These two cases developed the condition during the course of treatment. One having pneumonia in addition, is referred to below.

Pneumonia. One case had an attack of pneumonia and was

making a good recovery. This was complicated by spread to the other lung and the onset of rapidly spreading gangrene of the cheek. The other cases developed during treatment, two of them within the first two weeks.

Oedema of the Glottis This patient was nearing the end of the course of treatment when he developed a severe laryngitis, followed by acute bronchitis. The terminal phase was oedema of the glottis (No 53).

Orbital Cellulitis It is probable that this condition was due to infection from the mouth which was very septic. There was a protrusion of the eyeball and chemosis. The antrum of Highmore was explored with a negative result. Pus, which had an offensive odour, was evacuated from the orbit. The patient died five days after this operation probably from spread to the meninges (No 77).

Anasarca. On arrival this case had general oedema and in spite of treatment got steadily worse. Although there was myocardial change with dilatation of the heart on admission it was not clear that this was the primary cause of the oedema (No 52).

Napier and Muir mention progressive ascites unaccompanied by general anasarca as seen in advanced cases and due probably to cirrhosis of the liver. They also refer to general anasarca as occasionally present and refer to the cause as not being clear. The cause in this case was not determined.

Membranous Tonsillitis This was very like a case of diphtheria and diphtheroid bacilli were found in the throat. Anti-diphtheritic serum was administered without effect.

(No 70)

Diarrhoea The patient had an uncontrollable diarrhoea which was present on arrival and steadily got worse during the one month the patient was under treatment. It was accompanied by albuminuria.

Unexplained. The first case (No 43) was taken ill whilst under treatment and died in a few hours time. The only complaint was of a epigastric discomfort. There was nothing in the condition previously to suggest the cause of the death.

The second case (No 49) was doing well under treatment and was due for an injection on the day of death. He became unconscious about 2 o'clock in the morning and died without recovering consciousness. The urine contained no albumen a few days previously. There were not any indications of cause of death.

The third case (No 56) was a source of anxiety from admission with recurring attacks of diarrhoea, vomiting and abdominal pain. He gradually got worse but there was no determined cause of death.

The fourth case (No 72) had constant abdominal pain for a week previous to death for which no cause could be found. An abscess of the liver was suspected but not discovered.

It was not possible to make a post-mortem examination of any of these cases, public opinion being averse to such procedures. } file

TREATMENT OF COMPLICATIONS

Cancrum Oris The general treatment advised for this condition is an extensive one involving excision of the area involved. We have not undertaken this in any case. The patient has rarely been in a condition to undergo such an operation. Moreover the operation is not as a rule a very successful one. A still more important fact is one which would not be considered in an enlightened country. In the first place the parents or friends of the patient are generally so far away that it is impossible to consult them about the case and we are loth to undertake an operation without their permission, especially in cases in which the operation is of doubtful value.

In the second place a death following an operation even after an interval is a very serious matter for the hospital and for the surgeon concerned.

We have therefore adopted other lines of treatment. The most important is in the nature of prophylaxis. Many patients especially children have septic conditions of the mouth and these no doubt predispose to the onset of cancrum. In every such case the mouth is swabbed out several times daily with hydrogen peroxide and an anti-septic mouth wash, generally Eusol, is used constantly.

The former procedure is carried out by a nurse with cotton wool pledgets soaked in the peroxide.

The only drug we have tried to any extent has been Neosalvarsan (914) and this has been given in every case in which there has been a suspicion of commencing cancrum oris. We have used it in four cases of this nature. They were cases in which there was an inflammatory process of the mucous membrane of the mouth with sloughing of the tissues and an offensive odour. The outer surface of the cheek showed no signs of commencing gangrene but was swollen and shiny. One patient had a smart haemorrhage from the inside of the mouth. Three recovered including the one who had haemorrhage. In the other the process was arrested but the patient died from a condition not connected with the mouth.

In no case did the ulceration or necrosis spread to the outer surface of the cheek.

We cannot prove that Neo-salvarsan had a beneficial effect but the condition improved after it was given.

In three cases the patient died from the disease. One only remained one day. The parents refused permission to operate and the child probably died after leaving hospital. In two of the three cases treated, Neo-salvarsan was used but failed to stay the rapid spread of the disease, and in one, intravenous injections of gentian violet were also tried, but without benefit. These two cases had arrived at the stage of the gangrenous condition showing on the outer surface of the cheek

and our treatment was of no avail.

We therefore suggest that the first series mentioned were possibly the early stages of cancrum and that the condition without prophylactic treatment would have involved the whole thickness of the cheek giving the appearance typical of cancrum oris and we think the measures were of great value. It is impossible to distinguish between the merits of the local treatment and intravenous injections of Neo-salvarsan respectively. The former should never be neglected in any septic condition of the mouth and should of course be continued in the fully developed cases. We think however that Neo-salvarsan was of assistance especially in the early stages. As to the cases that died, the only alternative treatment to ours would have been operation. We also thought of the possibility of using "Mercurochrome 220" a very valuable antiseptic which has been used intravenously for septic conditions of various kinds.

The injections of antimony should be pushed as much as possible in all cases showing any indications whatever of cancrum oris.

DIARRHOEA

The relationship of the blood in the stools to true dysentery has already been found. Even if the amoebae were not found we should in cases of doubt give a course of Emetine, although as a general rule we have not seen any great benefit from its use.

Generally speaking we have found that the diarrhoea or "dysentery" improves with the condition of the patient

and we think that the antimony injections should be continued if at all consistent with the condition of the patient and if that condition seems to improve. The doses must of course, be carefully regulated.

Some cases are very difficult to deal with and treatment seems to be of little avail, the problem being one of combatting the original condition viz. kala-azar.

The preparation we have used to the greatest extent has been Kaolin (bolus alba) and it has proved of undoubted value. As it is not absorbed into the system, the dose is just as much as the patient can take. Sometimes Bismuth preparations are better, having in contrast to Kaolin, an antiseptic action.

Other treatment would be on general lines.

ANAEMIA

This does not call for special comment except to say that we used "Collosol Ferrum" subcutaneously with benefit in one case which did not respond to other treatment.

Our intention was to use the transfusion of citrated blood in a few cases, but although we had a number of people whose blood was "grouped" we could not find a suitable donor at the time required. Nevertheless, we consider this a method with great possibilities, especially in those who do not seem to have power to react to treatment. There are many such who whilst overcoming kala-azar infection do not seem to progress in health and strength correspondingly.

CIRRHOSIS OF THE LIVER

We have put under this heading those cases in which jaundice and ascites have been associated because a cirrhotic condition of the liver would seem to account for the combination of these two signs in some cases. Brahmachari suggests the possibility of the liver being loaded with Leishmania as a cause of ascites. There is no specific treatment for these conditions, it being on general lines, but the antimony injections should be continued, as in some cases the jaundice improves as the treatment continues.

The treatment of other complications does not call for special mention. It would be on general lines and outside the scope of this thesis.

OTHER PREPARATIONS OF ANTIMONY

Reference will only be made to two preparations which seem to be of unusual value.

⁴⁷
Urea Stibamine Brahmachari has recorded further successful trials of this preparation, including the recovery of some cases, which had resisted other antimony preparations such as two grams of sodium or potassium antimonyl tartrate.

⁴⁸
H.E. Shortt and R.T. Sen have confirmed these favourable reports, the initial dose for an adult being 0.1 gram increased by 0.05 gram in each subsequent dose up to a maximum of 0.25 gram.

Average uncomplicated cases were cured as shown by

negative cultures of the spleen blood with a total of about 2 grams in twenty days. The maximum required in twenty one consecutive cases was 3.85 grams and the average amount was 2.6 grams for all classes of case. The amount was given in 12 injections over thirty-two days, as compared with 30 doses and ninety days in cases of sodium antimony tartrate.

49

Brahmachari and others find that the drug is excreted more rapidly than tartar emetic, so that it is not cumulative in action, whilst as it is also less toxic they consider it a safer drug to use.

This drug is being used in China at the present time but there does not seem to be any record of the results obtained. The writer has no personal experience of it.

"Van Heyden 471" (meta-chlor-para-acetyl-amino-phenyl-stibiate-of-sodium)

50

L.E. Napier reports eleven cases treated with this preparation with very remarkable results, the temperature falling to normal in 5.5. days the spleen blood being negative for parasites on culture within three weeks. He says that the drug is more rapid in its action than urea-stibamine, that it is an easily prepared compound undergoing no change in the Indian climate, but that its price is too high for general use in India. He advised 0.2 grams for the first dose and subsequent ones of 0.3 grams on alternate days. It is given intravenously ten to fourteen doses being given. The spleen is rapidly reduced in size and cures are more rapid than in any other form of treatment.

The writer after reading the above report was able to obtain samples of this drug from the agents in North China and tested it in two cases. For a long period succeeding this it was not possible to obtain supplies and these were only again available just before he left China. The drug is however far too expensive for extended use amongst a class of people who are unable to pay for the cost of even the ordinary treatment.

The drug is a yellowish powder and was supplied in ampoules containing doses of various sizes. It was dissolved in distilled water just before use in a manner similar to that employed when using Neo-salvarsan.

The first case on which it was tried was a child who had not had any other treatment. The case sheets have unfortunately been misplaced and cannot be included with those accompanying this thesis. The patient was however treated personally and a general statement can be given without however being able to support it by actual data.

The results in the case were as follows. Smaller doses were given than those indicated by Napier the patient being about seven years of age. The temperature came down rapidly, the spleen diminished in size more rapidly than was the case with the sodium antimony tartrate, & there was a remarkable absence of signs of irritation of the bronchial mucous membrane. The course of treatment lasted a little less than six weeks and the patient was obviously cured. He was not seen again but as he came from a district quite near to the hospital, had intelligent parents, and was introduced by one

of the Chinese physicians on the staff of the hospital the absence of further news after six months is positive evidence that, in that period, there had been no relapse. The writer's impression was that this drug was specific for kala-azar, that it was superior to the sodium-antimony tartrate or tartar emetic and that a cure could be made in six weeks or less in the average case.

The second case was not treated throughout by this drug but two doses (the only available supply) were administered under the following circumstances.

The patient aged 48 was admitted and definitely diagnosed as kala-azar, the parasites being found in the Liver. For the first 4 days after admission during the time that the case was being examined no treatment was given and the pyrexia was mild, running up to 101.5°F in the evening. On the sixth day it became remittent and developed a marked double rise. The temperature continued in this manner varying from 103° - 105°F in the evening until the 18th day, and there were rigors on two occasions. During this period four injections were given of sodium antimony tartrate each of 0.50 c.c. 2% solution the last being given on the 15th day. The temperature still continued in like manner. On the 19th and 20th days injections of "Van Heyden 471" were given of 0.10 grams and 0.15 grams respectively. Without further treatment of any kind the temperature came down on the 24th day and during the remainder of the period of treatment with the sodium salt was practically normal.

The patient was discharged in four months time in good condition.

As stated above it was not possible to continue the treatment with "471" because of the inability to obtain further supplies. This case however illustrates the effect of the drug on the temperature. On account of the age of the patient, the high temperature, and general condition we could not have pushed the dose of the sodium salt, in fact we were not happy about the giving of a small dose like 0.5 c.c. of a 2% solution.

A section of the temperature is here given and the case report will be included along with the others (No 84).

OTHER METHODS OF TREATMENT

One other method only will be referred to. Some cases are so seriously ill on arrival at hospital that it is inadvisable to commence the treatment immediately with injections of antimony. In some there are hyperpyrexia, chest and other complications, and it is difficult to decide upon a course of action. The underlying cause is kala-azar and until this infection is controlled the patient is in grave danger. Napier and Muir suggest that in such cases a preliminary dose or several doses of T.C.C.O. mixture should be given intramuscularly, the object being to promote a leucocytosis.

51

The prescription as given is - Turpentine, Camphor, Creosote, of each 1 drachm with Olive Oil $2\frac{1}{2}$ drachms.

The dose is 5-10 minims.

We have used this on several occasions in such cases

but without obvious benefit. In most cases of the above nature we find it advisable to wait a few days before commencing treatment by injections of antimony. The temperature often subsides and the patient's condition improves enabling the ordinary treatment to be commenced. Otherwise we commence with small doses (0.25 c.c.) of the antimony solution.

The same writers advise these injections of T.C.C.O in the case of hard fibrous spleens which do not become smaller under ordinary treatment. We have only experimented in one or two cases of this kind but without obvious benefit.

TEST OF CURE

There is a problem which if solved would have far reaching results concerning both the patient and the physician.

Under the present method of treatment the patient is incapacitated for a period of 3-6 months. In China he is invariably away from home for the whole of this period. This is a serious matter for any patient and particularly for the poor. It is equally serious for the hospital, where accommodation is seriously taxed.

It is necessary to enquire if there is any means of knowing when to discharge the patients as having received sufficient treatment. If we had any definite means of determining this period, it is possible that many cases might be discharged at an earlier date with advantage to everybody concerned. Again, a relapse

after treatment is a serious matter for the patient especially as his home is at a great distance from the hospital. In the case of malaria he can either continue to take quinine as supplied from the hospital or can procure it locally. In the case of kala-azar he must return to hospital and will probably require another long course of treatment.

We must also consider whether it is possible or not to give a too prolonged course of treatment with antimony salts. Struthers and Chi⁴¹ quote from an article by Dr Ross on "The Principle of Repeated Medication for Curing Infections", whom he says suggests a similarity of the treatment of various parasitic infections such as kala-azar, syphilis etc. to that of malaria, pointing out that continued medication over a long period is essential to effect a cure. He also suggests that heroic doses of quinine are more likely to do harm than good.

Struthers suggests that the same is true in regard to the use of antimony in kala-azar, but in connection with this only says that each case must be considered on its own merits and the patients given doses according to their condition. This writer comes to the conclusion that there is no certain criterion of cure for kala-azar unless failure to cultivate parasites from the spleen be so considered, and that prolonged treatment is necessary for three, four or five months.

⁵²
Brahmachari calls attention to the dangers associated with a possible cumulative action of the drug. He makes

the following suggestion as to the criterion of cure.

"The injections should be continued until fever has been absent for a month. The blood should then be examined. If the leucocyte count is 7500 or more and constantly remains at that level then the treatment must be discontinued. If however there is a tendency towards decrease in the leucocyte count then the treatment must again be persisted in until the leucocyte count becomes 7500 or more.

53

Napier and Muir also discuss this important point. They lay emphasis on the absence of fever for one month, after two months treatment and a total dosage of 2.64 grams of the drug and moreover during this period an uninterrupted recovery. Such a patient is considered cured. They appear to modify this statement by saying that a film from material obtained from the spleen must not show any parasites, and culture not show any flagellates. Moreover the blood count must be satisfactory, the white cells not being less than 6000 per c.mm.

They lay down a general rule that time required for the temperature to reach normal is related to the length of treatment required, e.g. if the temperature comes down after two weeks then two months treatment is required, if three weeks, then three months is required and so on to a period of four months.

It would appear that this, summarised, means that the general condition of the patient is satisfactory, and that no one factor gives the guidance we require.

It should be noted also that these authors give 6000 white cells per c.mm. as satisfactory as compared with Brahmacharis figure of 7500 per c.mm.

We must now consider what evidence there is to be found in this series of cases, which guide us in determining the end-point of treatment.

GENERAL CONDITION OF THE PATIENT

A patient benefiting by treatment soon shows evidence of this but this general condition cannot indicate the time when treatment should come to an end. The infection may be controlled, the parasites may be few in number, or of low virulence, but may not be entirely destroyed. On the other hand, if treatment is stopped and the patient in good health the natural forces of the body may be able to eliminate the remaining organisms.

The patient's condition gives valuable help but cannot do more than this in guiding us as to when our work is completed.

FEVER

This has not been of assistance on the lines laid down by Napier and Muir in their general rule as quoted above.

Many of our cases have shown very little pyrexia on admission and this with the tendency for the temperature to keep up a little during the treatment makes it difficult if not impossible to say when the temperature actually "comes down". Again some cases after a period of apyrexia

develope fever during the early stages of treatment, which is not due to any complication. Here again it would be difficult to make the necessary calculations. In other cases the temperature will remain up for six weeks in spite of treatment but it will not require any longer to cure such a case than one in which the temperature was reduced more rapidly. One of our cases had high fever for six weeks during the progress of treatment, but he was cured in about $3\frac{1}{2}$ months and remained so eight months later.

In cases with a high remittent fever on admission, the general rule of Napier and Muir may be of guidance, but cases such as the above quoted, test the rule without proving its infallibility.

²⁸
Struthers remarks that the temperature becomes normal in from two - six weeks.

That the temperature should have been normal for a period before discharge is necessary but this period cannot be absolutely defined. The case quoted above after running a temperature for six weeks remained normal for the remaining nine weeks of the treatment but we considered it necessary to continue the injections for this period. Another patient only on one occasion reached a temperature of 101°F and it was on the normal line for about nine weeks during the course of treatment. Nevertheless it was obvious that at least three months' treatment was necessary and in point of fact it was continued until the patient had

received 2.58 grams of the salt in a period of nearly three months.

We think therefore after our own experiences that the time which it takes for the temperature to come to normal is not of great value in determining the period of treatment required. Moreover that in our series this period was in some cases not easy to estimate and in others impossible to determine.

As to pyrexia before discharge we think that it is impossible to fix a definite period for this. A period of a month's duration would be of value in determining the cessation of treatment but as indicated previously such a period may be observed in the second month of treatment and this could not be taken as a definite guide inasmuch as if it were the treatment could be terminated in two months or less which in our opinion would not be satisfactory.

SPLEEN

If reference be made to the previous section, it will be seen that this organ only returned to normal size in a small percentage of cases. Its response to treatment was so variable as to be no help to us in our quest.

LIVER

The same remarks apply to the liver, as to the spleen, and more particularly so as this organ, in some cases, was not enlarged at any time.

BLOOD

We place great reliance on the blood condition as an indication of cure, but not however as a test of it. The number of red cells and proportion of haemoglobin we regard as evidence of the condition of the patient, the number of white cells and the proportional count as an indication of this also, but in addition an evidence of recovery from the particular disease, viz. kala-azar. The two factors, that is, the number of cells, and the evidence of return to normal proportions of the various types of cell should be taken together. The requisite number given by Brahmachari viz. 7500 we regard as far too high a requirement, and that given by Napier and Muir, viz 6000, is a desirable but not an absolutely necessary one.

There were in the series three cases in which on discharge the white cell count was over 4000 and less than 5000 and in which the polymorph cells varied from 64-67 per cent. These cases had all the appearance of being cured. There were also eight cases in which the cell count was over 5000 and less than 6000 in which the polymorph cells varied from 57-75%. Of these cases we had reports after varying periods from one month (one case only) to fifteen months, to the effect that the patients were quite well, and in addition there were five cases similar to these which were almost certainly cured but of which we had no definite report.

From these facts we would deduce that a white cell count of 4000-5000 is consistent with cure if this evid-

ence is supported by other facts and moreover that there is good evidence of the continued health of cases with a count of less than 6000.

Here again we do not find any certain means of determining when treatment can be suspended.

HAEMOLYTIC TEST.

A glance at our results will indicate that we have not obtained help from the results of this, only two cases having given negative results. In one case after six months treatment and an administration of over 3 grams of Sodium Antimony Tartrate, we did obtain a negative result and in another case after seven months' treatment and the administration of over 2.14 grams of the salt the test was negative, but on the other hand in a case under treatment for eleven months, which had received over 3 grams of the salt the test was still slightly positive and remained so after periods of three and four months, at which times the health of the patient was excellent.

From this and the results given previously it is obvious that this test does not give the information we require.

This is in keeping with the findings of Struthers whose figures have been quoted.

FORMALIN TEST

Whilst we have obtained a percentage of negative results with the test after treatment, it too cannot be

(relied upon as a test of cure.

EXAMINATION OF PARASITES

It has not been our practice to do any liver or spleen punctures on completion of the treatment. We considered that we were not likely to find the parasites in the former organ and there was no justification for exposing the patient to ^{the}undoubted danger associated with puncture of latter. Moreover a negative finding from a film examination, would not be decisive. Cultivation of the material obtained with the object of searching for the flagellate stage has not been a possible procedure but it is obvious that those with great experience do not rely upon a negative result on culture of material from the spleen as sufficient evidence of cure apart from other data.

We are therefore driven to the conclusion that there is not any test that in itself can be taken as an indication of the cure of the disease, nor can we rely on any single fact as a positive guide to the duration of treatment required.

Apart from the general well being of the patient, we would place the greatest reliance on the improvement in the leucocyte count and progress towards normal of the differential count. It would be desirable to have over 5000 leucocytes per c.mm and a differential count showing 65% or more of polymorph. cells, with a proportionate decrease in the mononuclear cells. The temper-

ature having been practically normal for several weeks during the last stages of treatment would be an indication in favour of terminating the injections. As stated before, we should aim at a minimum total dosage of 2.5 grams of sodium or potassium antimony tartrate for an adult, but irrespective of this would continue the treatment for three months even if this amount were reached at an earlier stage. As to children we would not lay down any length of time or amount of drug as desirable but would suggest that probably three months would be insufficient in a greater proportion of patients than is the case with adults. The guiding factors would be the same.

OBSERVATIONS

Kala-azar as seen in North China has been considered in the light of experience gained during about six years. Research in the infected areas has not been possible. The evidence of others indicates that the disease is endemic over a large portion of the northern part of the country in an endemic form. There is no evidence of an epidemic form. Sporadic cases do occur.

There are no efforts being made in the country at the present time of a preventive nature. These will need to wait until the country is in a more peaceful state with a stable government, and the development of a medical profession trained on western lines, corresponding to the size of the country. At the present moment there are comparatively few men of this type, and none of them are engaged on preventive work.

We have found it necessary owing to local conditions to treat all cases in the hospital but it is desirable that centres should be established in all endemic areas for the treatment and investigation of the disease.

Our efforts have resulted in establishing a cure in 71% of cases, but the average can be increased by the treatment commencing earlier. This is a question which depends not only on the educating of the community to an appreciation of the advantages of early treatment but on the financial status of the patients and their families. Many are willing to come but the expense involved makes

it impossible. The funds of the hospitals do not admit of large numbers of cases being treated free of charge the said hospitals being almost entirely those belonging to Missionary Societies.

No new facts have been brought to light in this review of cases. Our effort has been more to compare results with other observers with a view of confirming them or otherwise.

The treatment with Sodium or Potassium Antimony tartrate is very satisfactory. To avoid over-dosage and the resulting complications needs considerable clinical experience. Careful and watchful nursing is essential to good results if complications, such as pneumonia, are to be avoided.

It is very desirable that the compound styled "Van Heyden 471" should be tested further and its cost modified. It gives promise of results more than equalling those of the two salts of antimony that have been used without the disadvantages of the undoubted toxicity of those two salts and the irritating effect they have on the bronchial mucous membranes.

S U M M A R Y

Kala-azar exists in endemic form over the greater part of North China. The type corresponds to that found in India.

The patients mostly come from the rural population, and the disease does not seem to be found in the big cities.

Judging from the family history of the patients, it does not seem to be highly contagious.

The consideration of this series does not throw any light either on the origin of the disease or on the nature of its transmission to man.

The onset is usually in the cold weather and it is suggested that the majority of cases may have been infected outside the limits of the sandfly season, and possibly those of the mosquito season.

It is recommended that puncture of the Liver should be a routine method of procedure in the search for Leishman-donovan bodies, it having given a high percentage of positive results. There is very little danger associated with it.

Splenic puncture, whilst having an element of danger in it, is justifiable when following upon a puncture of the liver, which has given a negative result.

HAEMOLYTIC (GLOBULIN-PRECIPITATION) TEST

This was positive in every case of kala-azar in this series, in which it was carried out, and conversely every case giving a positive reaction proved to be kala-

azar.

The present evidence is in favour of its giving a positive result only in Kala-azar and Schistosomiasis.

ALDEHYDE TEST

When positive this test is diagnostic of kala-azar.

A negative test does not indicate that the case is not kala-azar.

TREATMENT

Tartar Emetic and Sodium Antimony Tartrate administered intravenously will cure kala-azar.

The period of treatment required is from 3-6 months with an average duration of 4.1 months. It is wise to regard 3 months as a minimum period.

A total dosage of 2.5 grams of either salt, should be given to an adult if possible. A cure may however be established with less than this amount.

No definite rules can be laid down as to the dosage or period of treatment for children.

UREA-STIBAMINE would appear to be as effective as the above named salts and to require a shorter period of treatment.

"VAN HEYDEN 471" is perhaps the most successful of all remedies. It is less toxic than Tartar Emetic or Sodium Antimony Tartrate, will establish a cure much more rapidly and is not irritating to the bronchial mucous membranes.

TEST OF CURE

There is no test available which will indicate

either when the patient is cured or the end-point of treatment.

The chief aids in this respect are the absence of fever, the increase in the number of leucocytes as compared with the number before treatment commenced, and the approximation to normal of the proportion of the various types of white cell.

CANCERUM ORIS Septic conditions of the mouth are extremely common in kala-azar and these predispose to the development of cancerum oris.

Prophylactic treatment by local applications is essential in these "pre-cancerum" conditions. Neo-salvarsan is also of value in such cases but this drug will not prevent the spread of the fully developed disease.

THE MEDICAL SUPPLY ASSOCIATION.

DISEASE.

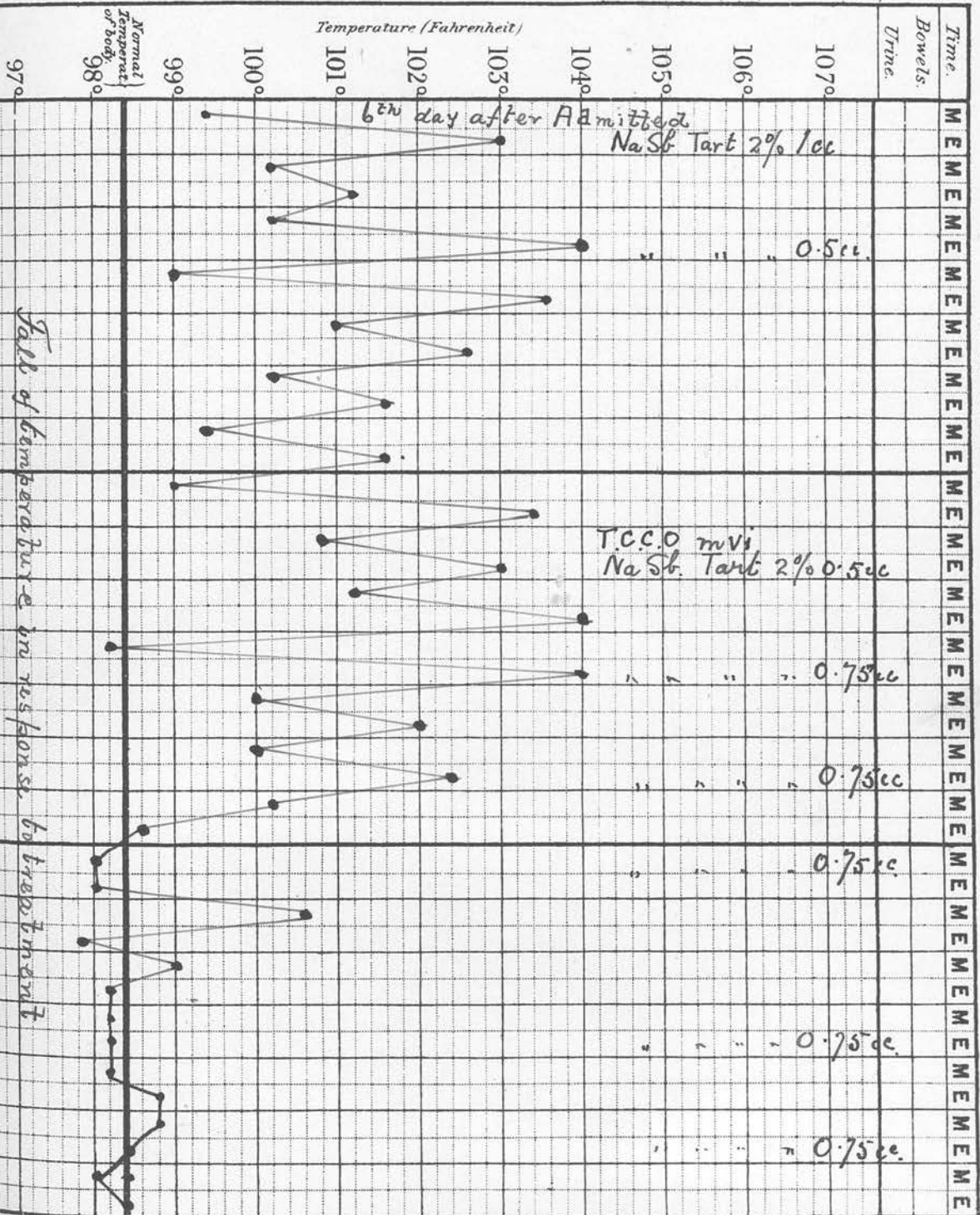
Notes of Case

Name { 9

Age {

Diet {

Case Book No. 11



Fall of temperature in response to treatment

DISEASE.

Notes of Case.

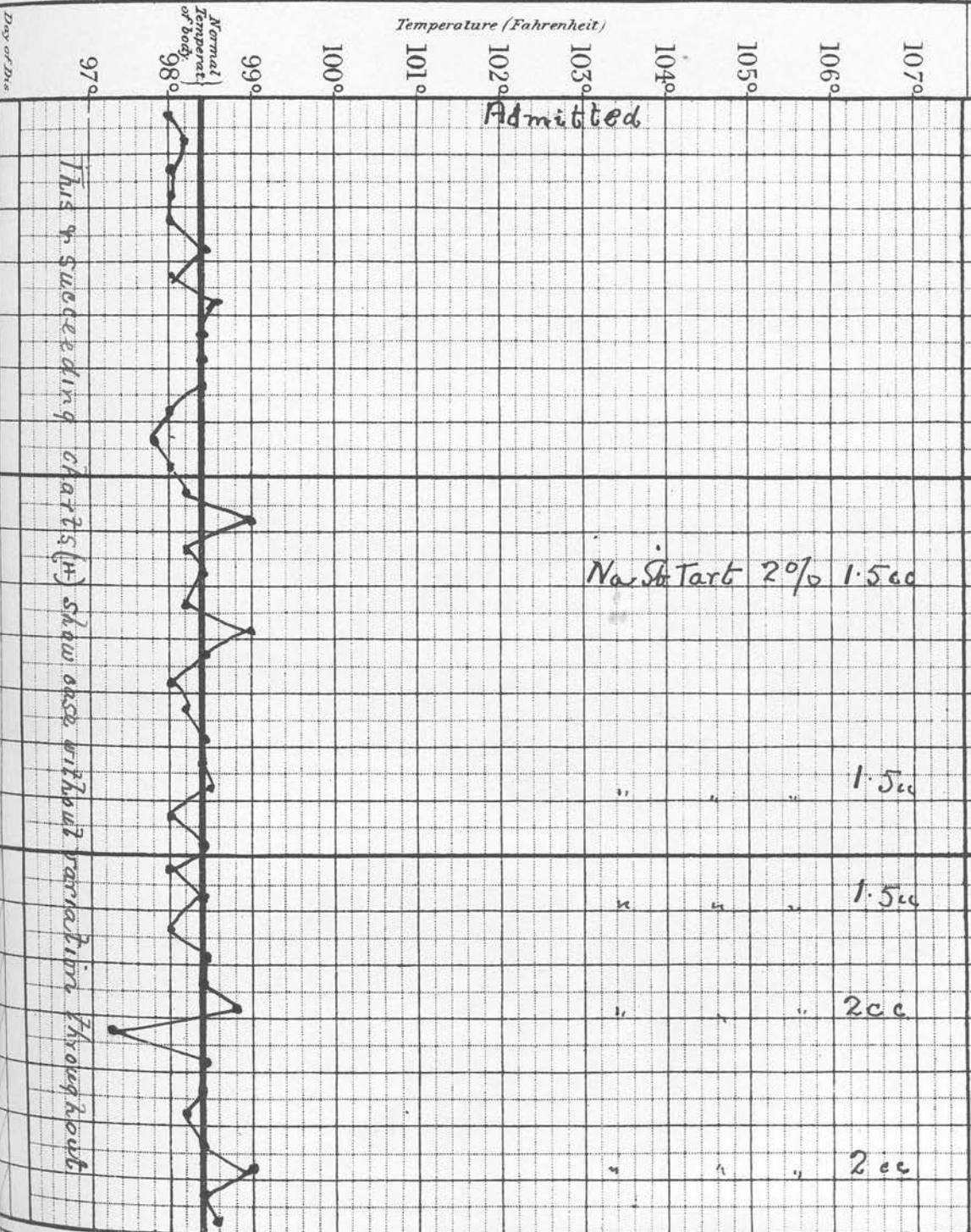
Name {

Age 21

Diet

Case Book No. 51 (1)

Time.	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M
Bowels.																			
Urine.																			



This succeeding charts (H) show case without variation throughout

Temperature (Centigrade) 42° 41° 40° 39° 38° 37° 36°

DISEASE.

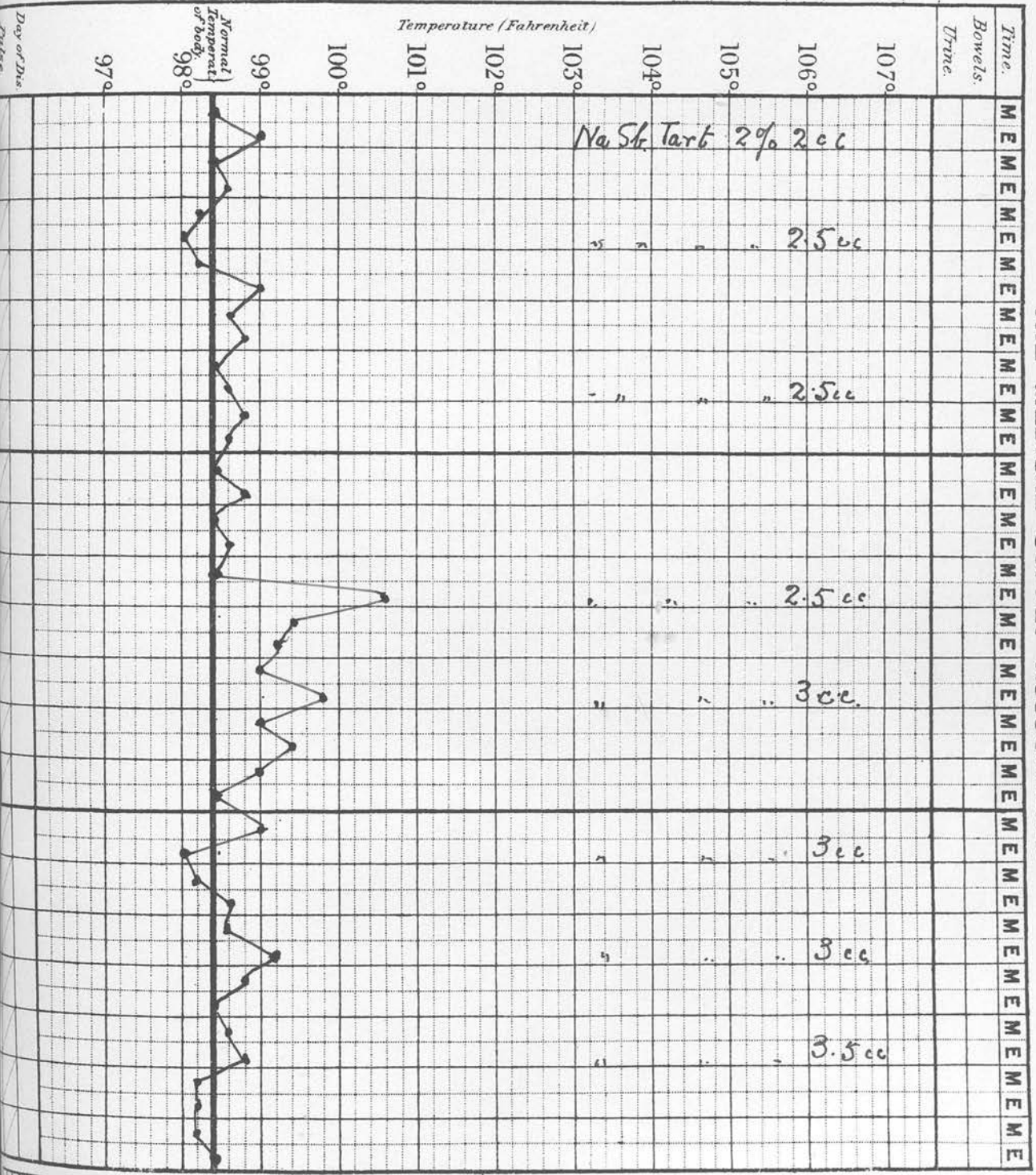
Notes of Case

Name {

Age 21

Diet

Case Book No. 51 (2)



Temperature (Centigrade) 36, 37, 38, 39, 40, 41, 42

DISEASE.

Notes of Case.

Name {

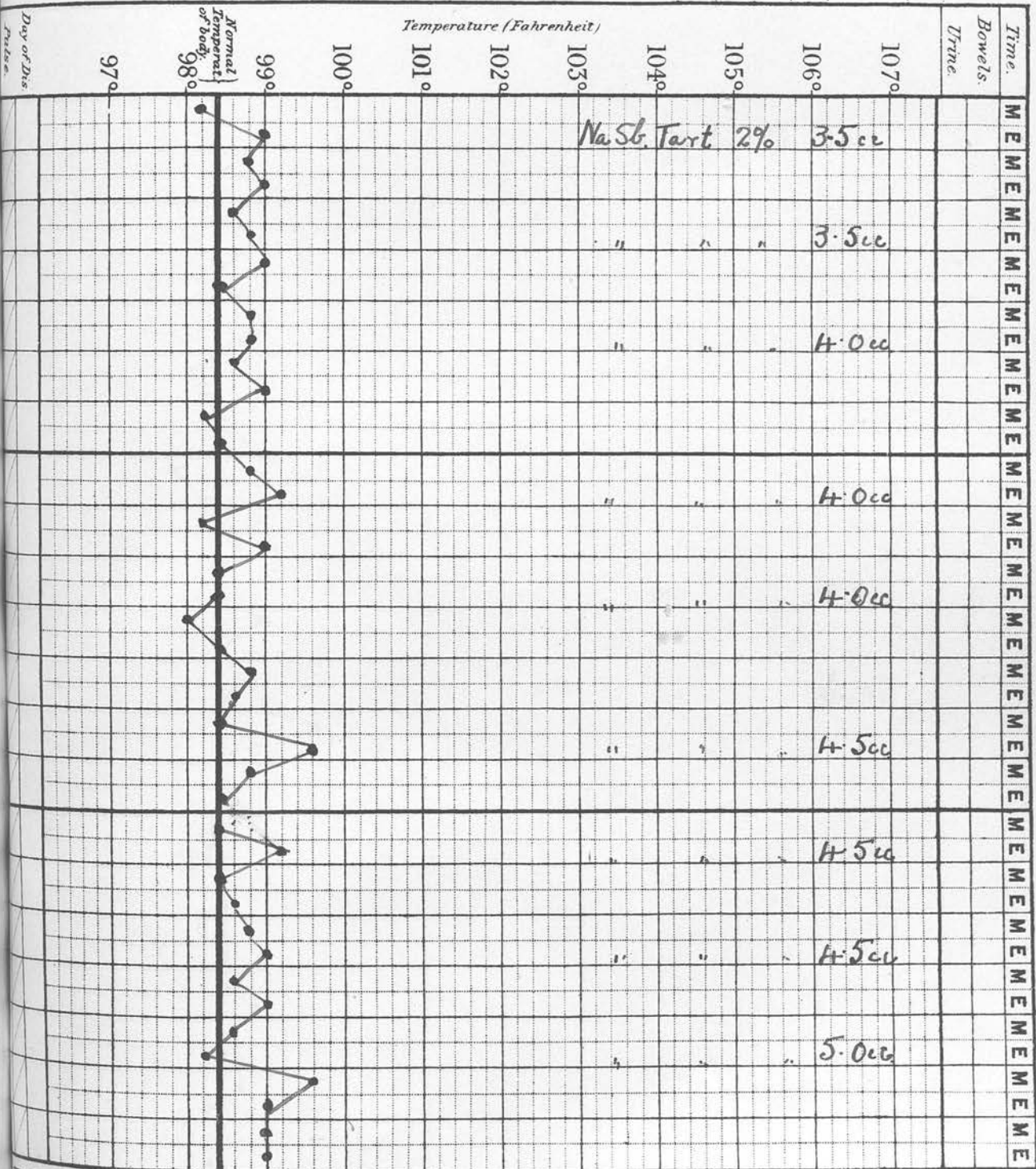
Age 21

Diet

Case Book No. 51

(3)

THE MEDICAL SUPPLY ASSOCIATION.



Date of admission.

Day of Dis

Time.

THE MEDICAL SUPPLY ASSOCIATION.

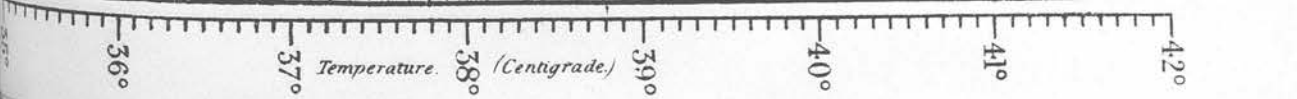
DISEASE.

Notes of Case.

Name { }
 Age 21
 Diet

Case Book No. 51
 (4)

Time.	Temperature (Fahrenheit)	Bowels.	Time
MEM	107°	MEM	MEM
MEM	106°	MEM	NaSt Tart 2% 5cc
MEM	105°	MEM	5cc
MEM	104°	MEM	5.5cc
MEM	103°	MEM	5.5cc
MEM	102°	MEM	5.5cc
MEM	101°	MEM	6.0cc
MEM	100°	MEM	5.5cc
MEM	99°	MEM	5.0cc
MEM	98°	MEM	5.0cc
MEM	97°	MEM	



Date of admission.

Day of Dis
 mise

DISEASE.

Notes of Case.

Name {
 Age 21
 Diet
 Case Book No 51 (6)

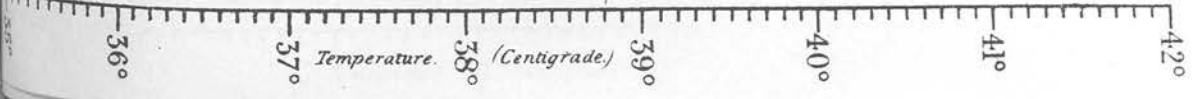
Date of admission.

Time.	Bowels.	Urine.	Temperature (Fahrenheit)
			Na. 56 Tart. 2% 5cc
			" " " " 5cc
			" " " " 5cc
			" " " " 5cc
			" " " " 4cc
			" " " " 4cc
			Discharged

Normal Temperature of body

97°

Day of Discharge



4 HOUR CHART.

DISEASE.

Name {

Age 8

Diet

Case Book No. 62

Notes of Case

Date of admission

Time	Bowels	Urine
2 AM		
6 AM		
10 AM		
2 PM		
6 PM		
10 PM		
2 AM		
6 AM		
10 AM		
2 PM		
6 PM		
10 PM		
2 AM		
6 AM		
10 AM		
2 PM		
6 PM		
10 PM		
2 AM		
6 AM		
10 AM		
2 PM		
6 PM		
10 PM		

Temperature (Fahrenheit)

5th day after Admitted

NaSB Tart. 0.5cc 2%

" " 0.75cc 2%

" " 0.75cc 2%

Normal Temperature of body

97°



Four-hourly Chart - typhical low pyrexia under treatment

Day of Dis.

Pulse



4 HOUR CHART.

DISEASE.

KALA AZAR.

Double Rise.

Name {

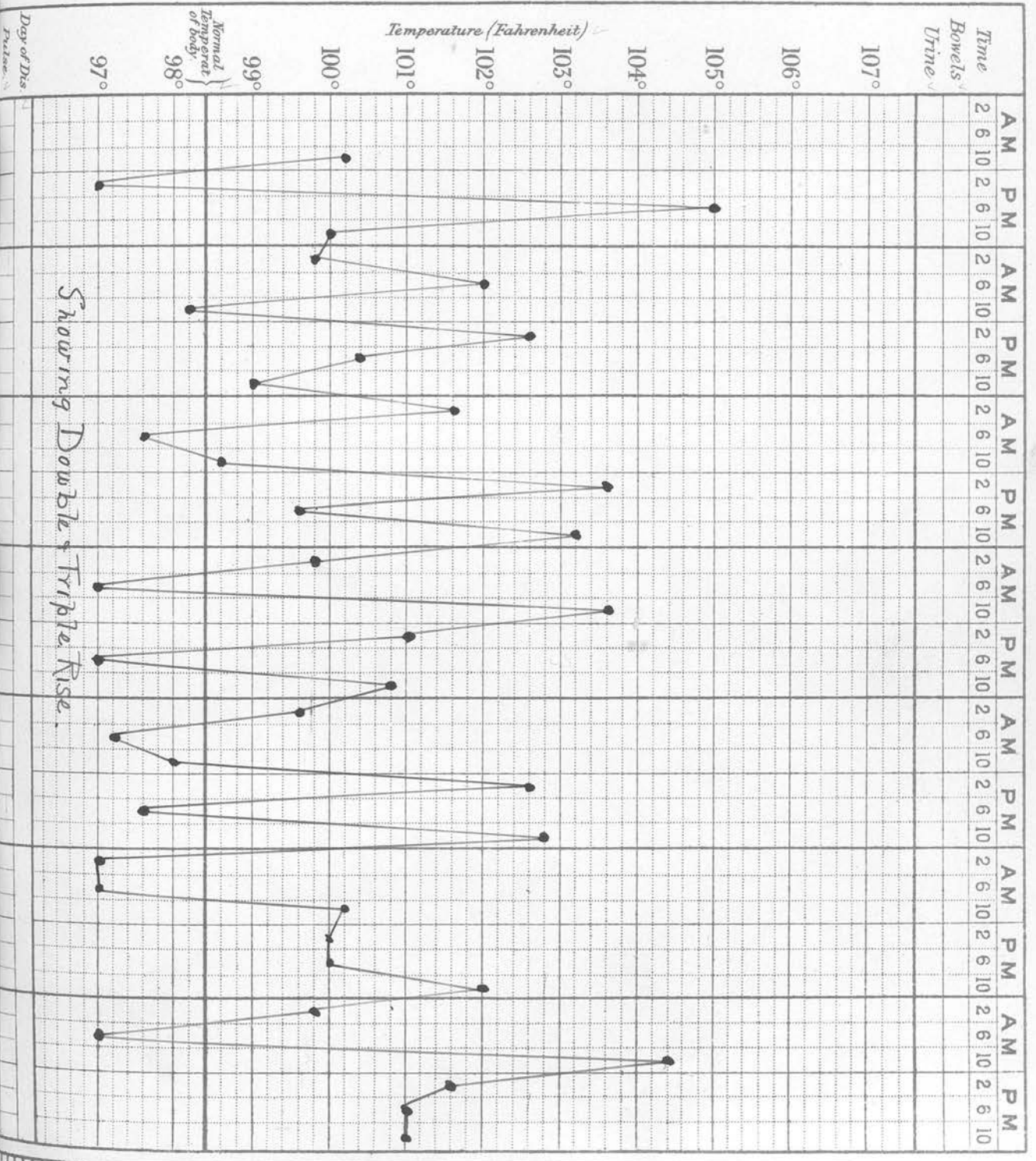
Age 7

Diet

Case Book No 9

Notes of Case

Date of admission



Showing Double & Triple Rise.



4 HOUR CHART.

DISEASE.

KALA AZAR.

Double Rise.

Name {

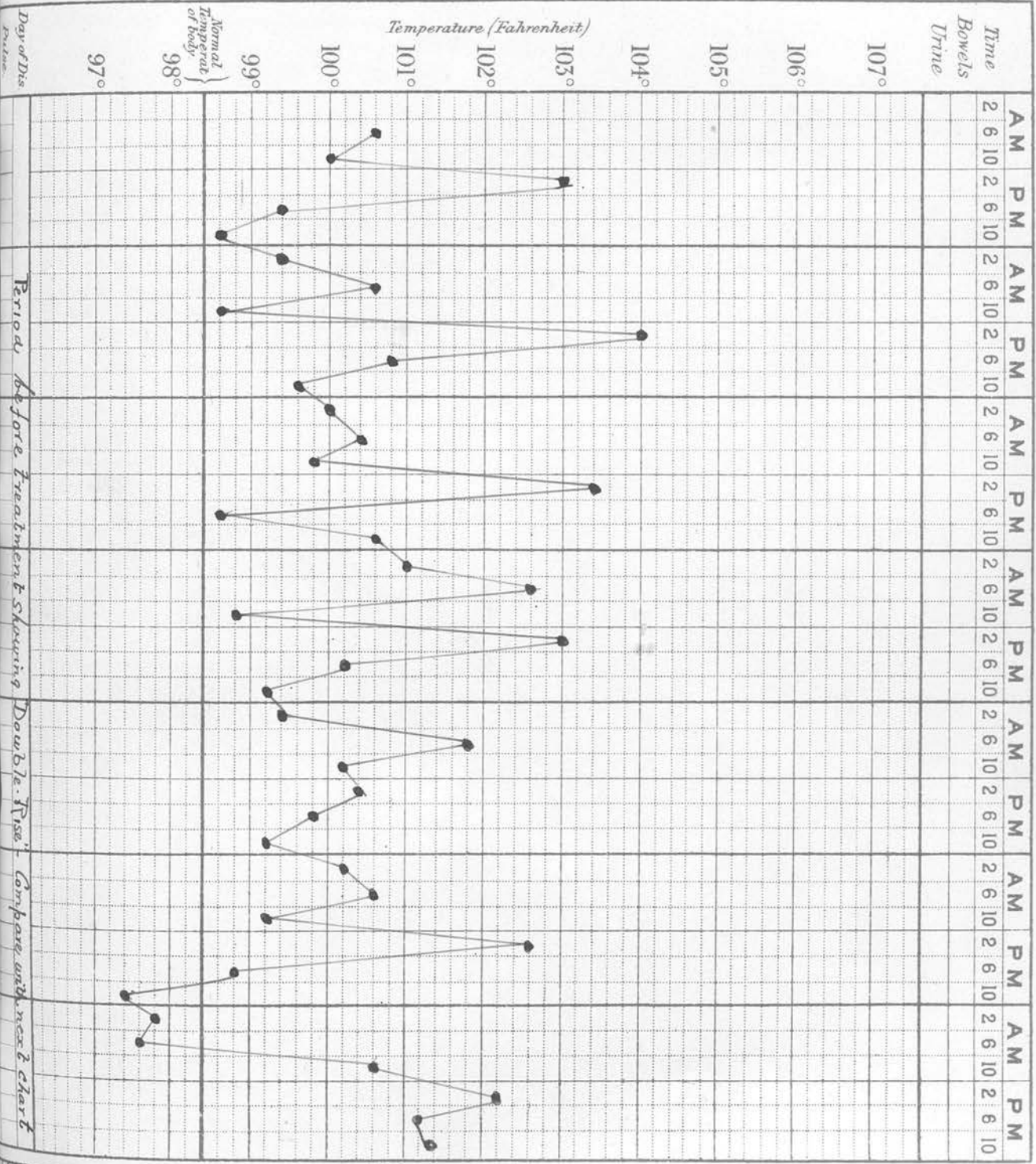
Age 19

Diet

Case ~~Book~~ No 50

Notes of Case

Date of admission.



Period before treatment showing Double Rise. Compare with next chart

DISEASE.

Kala Azar.

(Sodium Armony Tartrate)

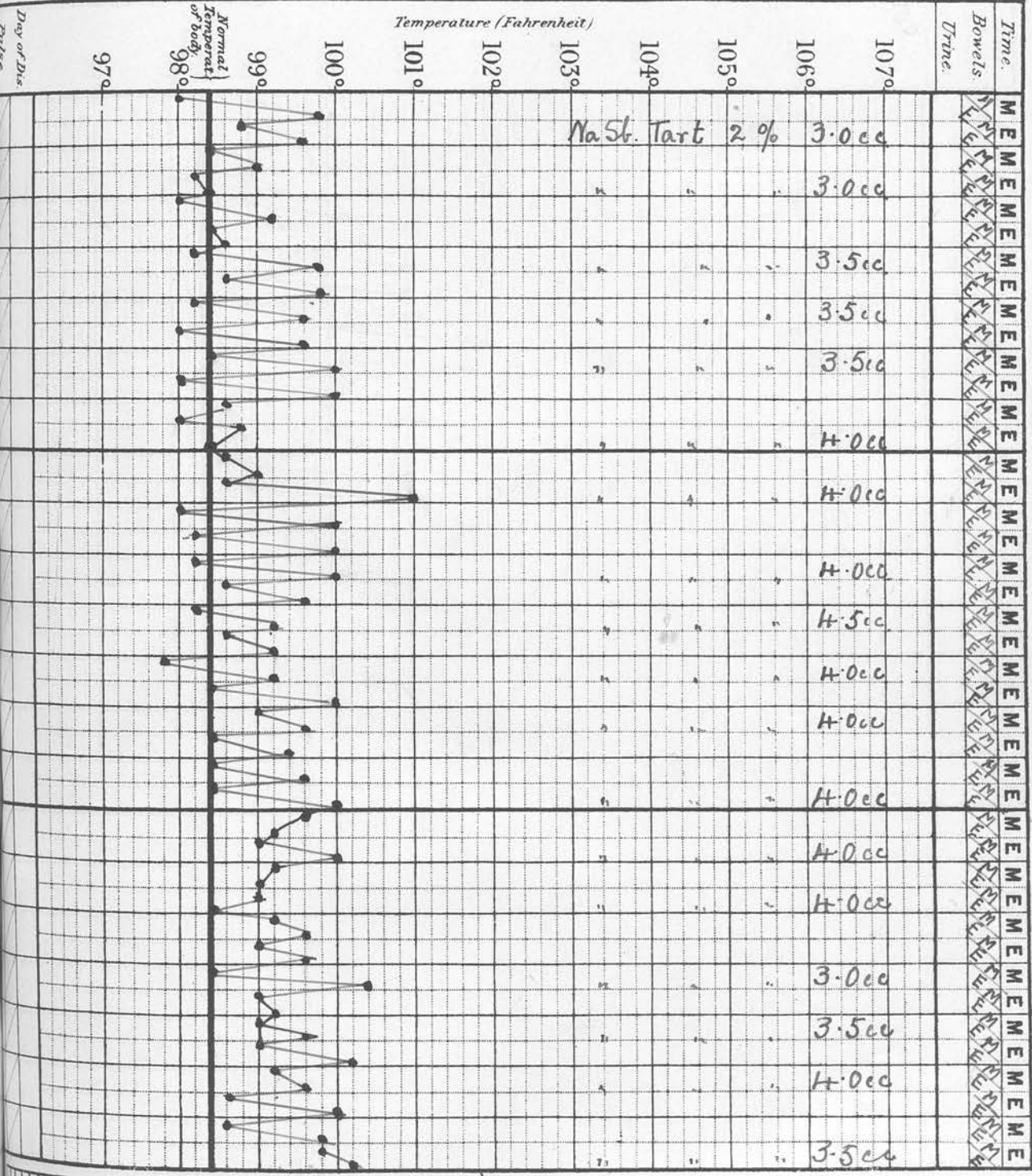
Notes of Case.

Name {

Age 32

Diet

Case Book No 89 (2)



Date of admission.

Day of Dis.

Temperature (Centigrade) 42° 41° 40° 39° 38° 37° 36°

DISEASE.

Kala Azar.

(Sodium Antimony Tartrate).

Notes of Case.

Name {

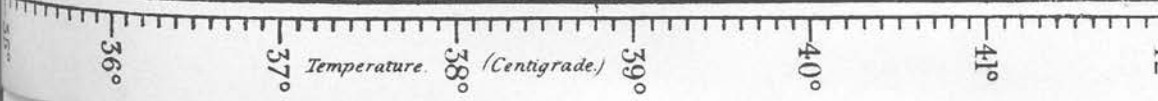
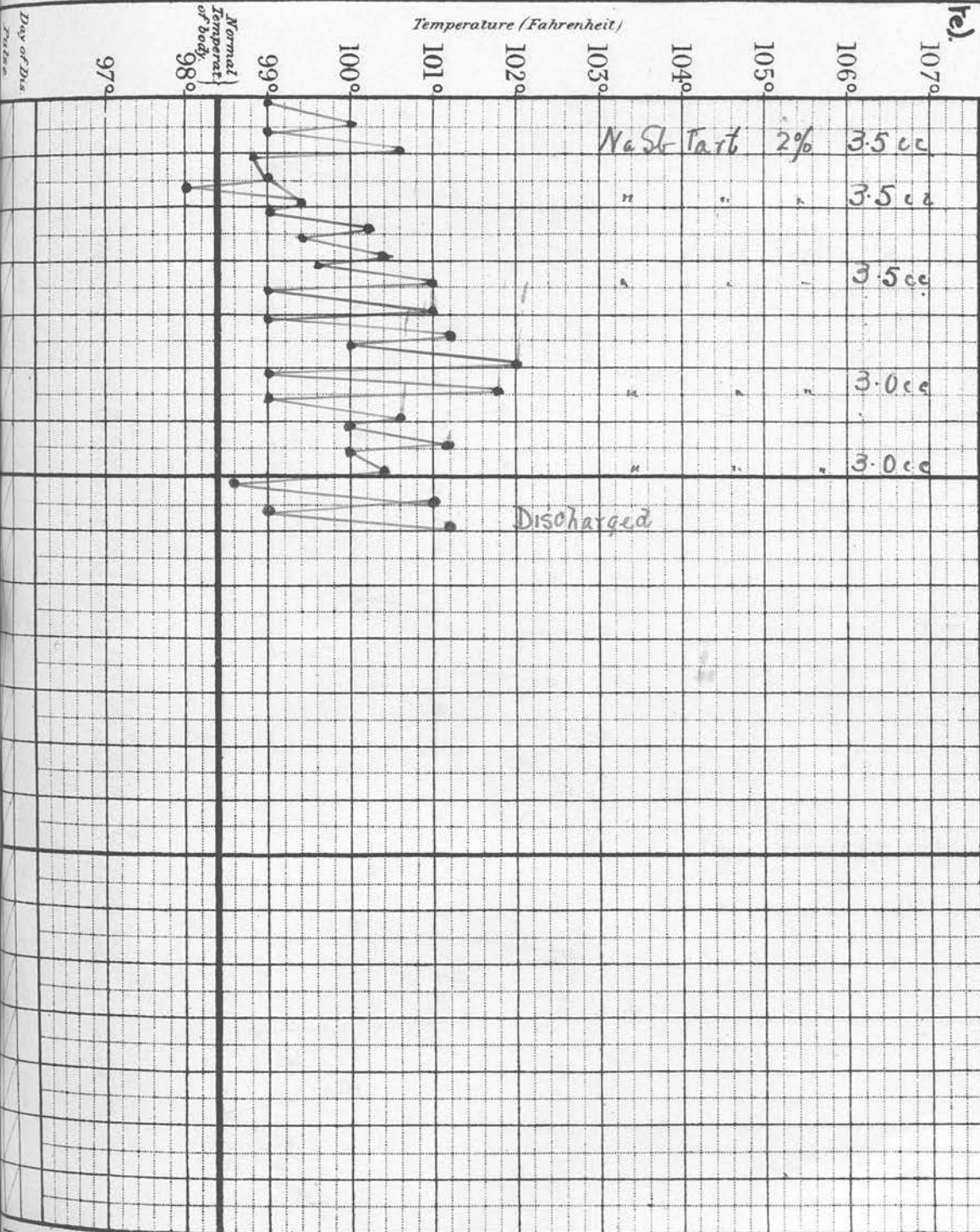
Age 32

Diet

Case Book No. 89 (3)

Date of admission.

Time.	Bowels.	Time.
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M
	M	M



THE MEDICAL SUPPLY ASSOCIATION.

DISEASE.

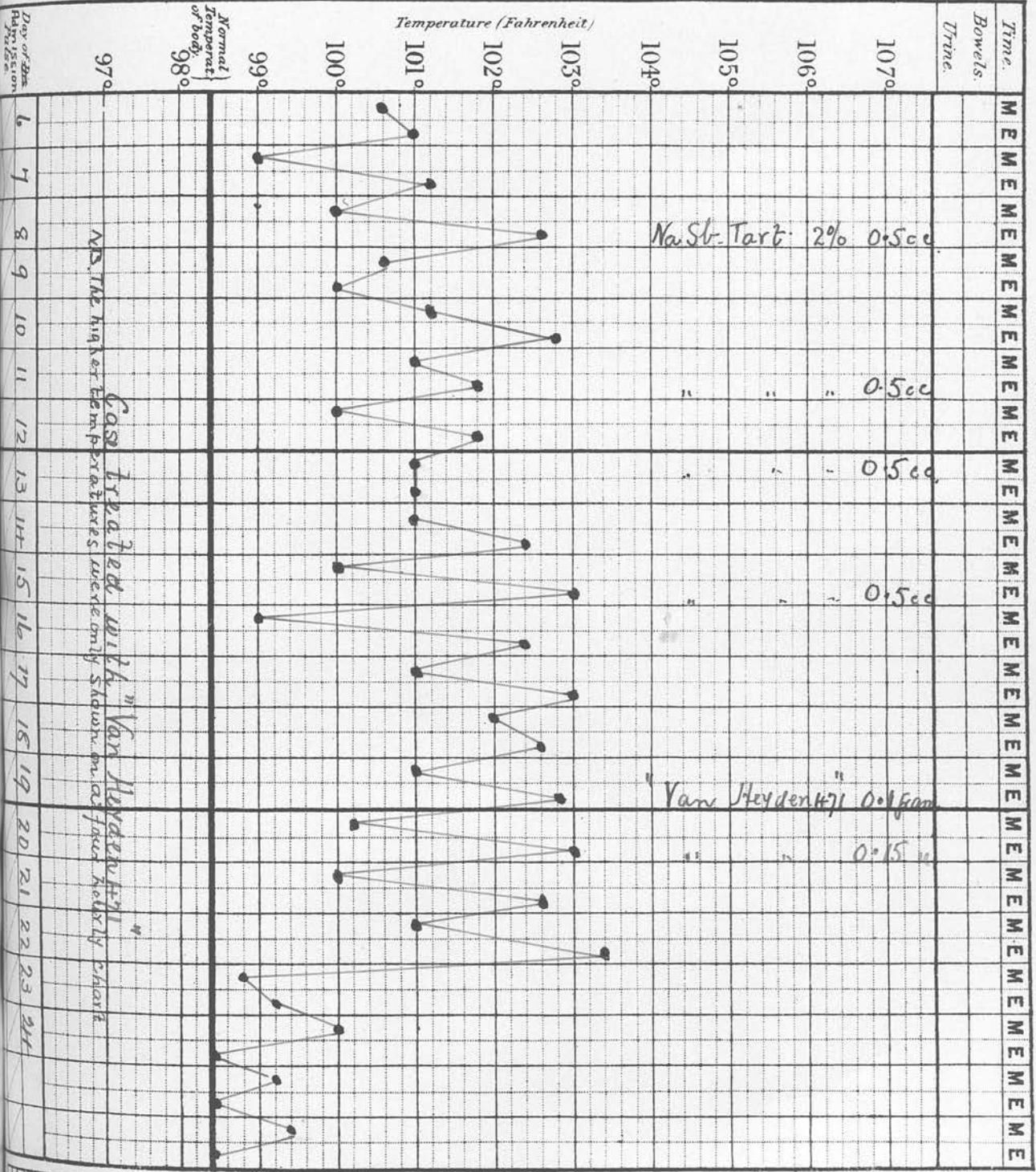
Notes of Case.

Name {

Age H-8

Diet

Case Book No. 84H-



Date of admission.

SUMMARY OF CASES

N.B. "o" means test in question not carried out.

CASE 1

Male, aged 5.

Duration of disease 14 months. Other cases in village, none in family

On admission emaciated gingivitis - fever - low remittent-double rise.

Spleen enlarged. Liver not recorded

Blood R.B.C. 2650000 Hb% 40-45 CI 0.87

W.B.C. 4609 Polymorphs 32%

Small Lymphocytes 36%

Mononuclears 21%

Eosinophils 3%

Proportion W.B.C. : R.B.C. :: 1-580

. Haemolytic Test + Formalin Test o

Liver Puncture not recorded

Heart nothing of note

Lungs bronchitis

Temperature low fever-shows double rise

Progress good

Duration of Treatment 21 days

Total amount of drug 0.58 grams

Result improved - not cured.

CASE 2

Male, aged 2

Duration of disease 6 mos. Numerous deaths in same village from this disease, no other cases in family.

On admission anaemic.

Spleen enlarged Liver not enlarged

Blood R.B.C. 2940000, Hb% 35 CI 0.63

W.B.C. 5312 Polymorphs 39

Small Lymphocytes 54

Mononuclears 7

W.B.C. : R.B.C. :: 1.578

Haemolytic and Formalin Tests not recorded

Liver Puncture L.D.+

Pyrexia high remittent with double rise

Heart dilated Lungs bronchitis

Progress not good.

Complications Ascites and pleurisy

Duration of treatment. 6 months

Total amount of drug used 0.95 grams

Result Prognosis not good

CASE 3

Male, aged 7.

Duration of disease 6 months. Many cases in same village, one death in family from kala-azar.

On admission Condition fair, high remittent fever with double and triple rise.

Spleen enlarged Liver not enlarged.

Blood 3340000 Hb% 60 CI 0.9
W.B.C. 3300 Polymorphs 48
Small Lymphocytes 40
Mononuclears 12

W.B.C. : R.B.C. :: 1.1011

Haemolytic Test + Formalin Test +

Liver Puncture LD +

Progress good no complications

Duration of treatment 8 months

Total of Drug used 2.54 grams

On discharge condition excellent - Fever 99^o-100^oF

Haemolytic Test slightly + Formalin -

Blood R.B.C. 4420,000 Hb% 90
W.B.C. 8500 Polymorphs 62
Small Lymphocytes 28
Mononuclears 9

Spleen just palpable Liver not enlarged

Result Cured - 3 months later quite well.

CASE 4

Male, aged 18.

Duration of disease - 3 months with fever.

Other cases in village, one brother same complaint.

On admission low fever

Spleen + Liver not enlarged.

Blood R.B.C. 3860,000 Hb% 80 CI 1+
W.B.C. 3160 Polymorphs 57
Small Lymphocytes 34
Mononuclears 5

W.B.C. : R.B.C. :: 1:1210

Haemolytic Test + Formalin Test o

Liver Puncture o

Progress uninterrupted

Complications Herpes Zoster, bronchitis

Duration of Treatment - 6 mos.

Total of Drug 3.04 grams

On discharge condition good -

Haemolytic Test - Formalin Test -

No fever for 1 month

Blood R.B.C. 4,230,000 Hb% 85
W.B.C. 8700 Polymorph 63
Small Lymphocytes 26
Large Mononuclears 11

Liver not enlarged Spleen just felt

Result cured

CASE 5

Male aged 20

Duration of disease 10 months - fever with enlarged Spleen.

Other cases in village, none in family

On admission thin, cyanosed, low fever,

Spleen + Liver not enlarged

Blood no record.

Haemolytic Test + Formalin Test o

Liver Puncture no record

Heart mitral incompetence

Lungs Bronchitis

Progress good. does not stand injections well

Complications Laryngitis and bronchitis

Duration of Treatment 7 months

Total of Drug 2.14 grams

On discharge condition excellent

Spleen and Liver not enlarged. Temp. 98°-99.2°F

Blood R.B.C. 4380,000 Hb% 68

W.B.C. 11000

Result Cured.

CASE 6

Male aged 9.

On admission Very thin, swinging temperature with double rise.

Spleen enlarged Liver enlarged

Haemolytic Test+ Formalin Test +

Liver Puncture L.D.+

Blood not recorded

Lungs slight bronchitis

Progress good, asthenic type.

Complications diarrhoea

Duration of Treatment 11 months total of drug 3.44 grs

On discharge condition good - apyrexial.

Blood R.B.C. 3750,000, Hb% 75

Result Cured

Four months later health excellent

Haemolytic test - slightly +

CASE 7

Male aged 15.

Duration of disease 1 year, enlarged Spleen

On admission General condition good. Slight gingivitis - slight fever

Spleen enlarged Liver enlarged.

Blood R.B.C. 3400,000, Hb% 80, CI 0.68

W.B.C. 4700, Polymorph 45

Small Lymphocytes 45

Mononuclears 10

W.B.C : R.B.C :: 1: 725

Liver Puncture L.D.+

Progress good - temperature for first few weeks occasionally above 100°F, afterwards practically apyrexial.

Complications diarrhoea

Duration of treatment, 5½ months

Total of drug 2.38 grams

On discharge condition good - no fever for 5 weeks

Blood R.B.C. 4,260,000 Hb% 85

W.B.C. 5700 Polymorphs 61

Small Lymphocytes 31

Mononuclears 8

Result cured- one month later condition maintained

CASE 8

Male aged 10

Duration of disease - 1 year, enlarged spleen

On admission general condition good

Spleen enlarged Liver not enlarged

Blood R.B.C. 3448,000 Hb% 65 CI 0.69

W.B.C. 3800 Polymorphs 34

Small Lymphocytes 58

Mononuclear 8

W.B.C. : R.B.C :: 1:900

Liver Puncture L.D.+

Progress good "dysentery" few days duration.

Duration of Treatment 5 mos.

Total of Drug 2.17 grams

On discharge condition excellent

Spleen still large

Liver not enlarged

Result cured

CASE 9

Male aged 7.

Duration of disease 6 months - fever and enlarged spleen

On admission condition fair

Spleen enlarged Liver enlarged
Blood R.B.C. 3340,000 Hb% 60 CI 0.9
W.B.C. 5000 Polymorphs 48
Small Lymphocytes 40
Mononuclears 11

W.B.C : R.B.C :: 1:668

Haemolytic Test + Formalin Test +

Liver Puncture LD +

Progress good

Complications Bronchitis

Duration of Treatment 7 months

Total of Drug 2.54 grams

On discharge R.B.C. 4420,000

W.B.C 8500 Polymorphs 62
Small Lymphocytes 28
Mononuclears 9

Spleen just palpable

Liver not enlarged

Haemolytic Test slightly + Formalin Test +

Result cured one year later condition maintained.

CASE 10

Male aged 12

Duration of disease 2 years +

No other cases in family or village

On admission ulcerated gums - moderate fever

Spleen enlarged Liver not enlarged

Blood R.B.C. 2270,000 Hb% 65 CI 1.5
W.B.C. 2800 Polymorphs 35
Small Lymphocytes 57
Mononuclear 8

W.B.C : R.B.C :: 1: 800

Liver Puncture L.D. +

Heart dilated - myocardial change

Progress marked double rise in temperature

No complications

Duration of Treatment 4 months

Total of drug 2.5 grams

On discharge condition good - no fever for three weeks

Blood R.B.C. 4540,000, Hb% 85

Spleen not enlarged Liver ^{not} enlarged

Result cured.

CASE 11

Male aged 9.
Duration of disease 2 years, with enlarged Spleen
No other cases in village or family
On admission anaemia otherwise good conditions
Spleen enlarged Liver enlarged
Pyrexia remittent with double rise
Blood R.B.C. 3420,000 Hb% 65 CI 0.95
W.B.C. 4200 Polymorphs 47
Small Lymphocytes 32
Mononuclears 21
W.B.C : R.B.C :: 1 : 800
Haemolytic Test + Formalin test not recorded
Liver Puncture L.D.+
Heart slight dilation with oedema legs
Progress temperature high remittent - normal in
three weeks, normal after
No complications
Duration of treatment 5 months
Total of drug 2.08 grams
On discharge Haemolytic Test + Formalin ?
Blood R.B.C. 6,120,000 Hb% 95
W.B.C. 10,900 Polymorphs 76
Small Lymphocytes 18
Mononuclears 8
Eosinophils 3
Spleen not enlarged
Liver not enlarged
Result cured.

CASE 12

Male aged 20
Duration of disease 21 months, fever and enlarged s
spleen.
Other cases in village, one other case in family
On admission health good - apyrexial
Spleen much enlarged Liver enlarged
Blood R.B.C 3350,000 Hb% 65 CI 0.9
W.B.C. 5625 Polymorphs 55
Small Lymphocytes 33
Mononuclears 12
W.B.C : R.B.C :: 1 : 600
Haemolytic Test + Formalin Test +
Liver Puncture L.D.+
Progress good - temperature practically on normal
throughout
No complications
Duration of treatment 5 months
Total of drug 2,88
On discharge Haemolytic Test + Formalin Test +
Temperature 99.2°F
Blood R.B.C. 3730,000 Hb% 70
W.B.C. 6875 Polymorphs 55
Small Lymphocytes 19
Mononuclears 25
Result cured. 12 months later condition good

CASE 13

Male aged 15

Duration of disease 20 months - fever for one month followed by enlargement of spleen

Other cases in village - one brother with kala-azar

On admission condition good - slight anaemia

Spleen enlarged Liver just palpable
apyrexial

Blood R.B.C. 3,150,000 Hb% 60 CI 0.95

W.B.C. 4315 Polymorphs 56

Small Lymphocytes 30

Mononuclears 13

W.B.C. : R.B.C. :: 1:730

Haemolytic Test + Formalin Test +

Liver Puncture L.D. +

Progress excellent

Complications epistaxis, glossitis

Temperature above 100°F on one or two days only

Duration of treatment 5 months

Total of drug 3.12 grams

(Temperature 98-99.2°F)

On discharge ^ Haemolytic test - slightly +

Formalin test -

Blood R.B.C. 4130,000 Hb% 80

W.B.C. 7500, Polymorphs 70

Small Lymphocytes 21

Mononuclear 8

Spleen slightly enlarged

Liver just felt

Result cured - 15 months later condition good

CASE 14

Male aged 7

Duration of disease 8 months - fever followed by enlarged spleen. Other cases in village and one in family

On admission marked anaemia, very thin, has abscess of neck, distended veins on abdomen

Spleen enlarged Liver not enlarged

Temperature sustained daily variation
2 degrees - 99° - 101°F

Blood R.B.C. 2,050,000 Hb% 45 CI 1.1

W.B.C. 1875 Polymorphs 51

Small lymphocytes 32

Mononuclears 17

W.B.C. : R.B.C. :: 1: 1090

Haemolytic test + formalin Test +

Liver Puncture L.D. not found

Heart slight dilatation.

Progress good - heart signs continued - occasional bronchitis

Duration of treatment 3 months

Total of drug 1.73 grams

Temperature 98.6° - 99.6°F

On discharge Haemolytic test + Formalin test -

Blood 3430,000 Hb% 70

W.B.C 5000, Polymorphs 57
Small lymphocytes 24
Mononuclears 18

(There is probably some error in this final differential count)

Spleen enlarged Liver just felt
Result cured Twelve months later
no relapse.

CASE 15

Male aged 16

Duration of illness 11 months - fever, spleen enlarged 8 months, liver enlarged 3 months

Other cases in village - none in family

On admission emaciated thin, distension veins on abdominal wall, looks ill, abdomen very distended, no ascites

Spleen enlarged Liver enlarged
relatively greater extent than spleen

Blood R.B.C. 3,850,000 Hb% 65 CI 0.85

W.B.C. 1st count

30.4.23 11,785 Polymorphs 73, small Lymphocytes 14, Mononuclears 11

2nd count 8. 5.23 13,750

3rd " 14. 5.23 15,625 Polymorphs 81 Small Lymphocytes 9, Mononuclears 10

W.B.C : R.B.C :: 1 : 275

Haemolytic test + 25.4.23, 4.5.23, 17.5.23

Formalin Test - (solid and opaque in 1½ hours)

Liver Puncture no L.D. found

Heart left ventricle dilated

Lungs probably tubercular at hilum - no activity

Temperature 99° - 102° for first week

Progress Temperature remained as above for first four weeks and then became remittent with marked double rise which continued until eleventh week during treatment. It came down to normal in three days before the patient left hospital

Complications Ascites which required tapping followed by discharge of fluid from umbilicus Albuminuria and nephritis

Jaundice - slight

Liver, Spleen not reduced in size during Treatment.

Duration of treatment 3½ months

Total of Drug 0.3 gram

On discharge Condition poor - ascites marked

Urine albumen + casts present

Haemolytic test +

W.B.C. 20,000 Polymorphs 81 Small Lymphocytes 9, Mononuclears 10

Result Condition worse than on admission. Twelve months' later reported quite well.

COMMENT : The only evidence in favour of the diagnosis of kala-azar was the marked double rise in temperature and the positive haemolytic test. It is remarkable that the patient recovered after very inadequate treatment. The diagnosis is doubtful.

CASE 16

Male, aged 55

Duration 8 months enlarged spleen and anaemia

No case of kala-azar in village or family

On admission fever 100° - 101° F in evening-anaemia

Spleen enlarged Liver enlarged

Blood R.B.C. 3420,000 Hb% 60 CI 0.88
poikilocytosis

W.B.C. 6250 Ploymorphs 63

Small Lymphocytes 14

Mononuclears 23

Haemolytic test ± Formalin test -

Liver puncture no LD found

Patient only remained 15 days and was not
considered as kala-azar.

CASE 17

Male aged 22

Duration of disease - 2 years

3 months fever and then spleen enlarged

Diarrhoea 6 months, sometimes "dysentery"

Other cases in village none in family

On admission general condition good

Spleen enlarged Liver enlarged

Apyrexial

Blood R.B.C. 3,800,000 Hb% 80 CI 1.05

W.B.C. 5000 Polymorphs 37

Small Lymphocytes 30

Mononuclears 28

Eosinophils 5

W.B.C : R.B.C : 1:760

Haemolytic Test +

Liver Puncture L.D.+

Progress temperature generally about 99°F.- good-
abdominal crisis referred to in thesis.

Duration of treatment 11 months

Total of drug 2.80 grams

On discharge condition good no fever for one month

Spleen reduced but still enlarged

Liver slightly +

Haemolytic test +

Blood test R.B.C. 3850,000 Hb% 75

W.B.C. 7500 Polymorphs 68

Small Lymphocytes 16

Mononuclear 12

Eosinophils 4

Result Cured - 17 months later still well

CASE 18

Male aged 15

Duration of disease 8 months Fever 4 months
then spleen enlarged

Other cases in village none in family

On admission condition good, temperature 98° - 100°F

Spleen + liver slightly enlarged

Blood R.B.C. 5,500,000 Hb% 55 CI 0.6

W.B.C. 4600

Haemolytic test +

Progress good fevers about 99°F throughout

Duration of treatment 7 months

Total of drug 2.33 grams

On discharge no fever for 1 months

Haemolytic slightly + Spleen + Liver just felt

Blood R.B.C. 3950,000 Hb% 75

W.B.C. 7500 Polymorphs 55

Small Lymphocytes 25

Mononuclears 19

Eosinophil 0.5

Result cured

CASE 19

Male aged 14

Duration of disease 4 years (?) with fever
spleen enlarged 14 months

Others in same village none in family

On admission condition good

Spleen enlarged Liver enlarged slightly

Temperature slight evening rise

Blood R.B.C 3420,000 Hb% 50 CI 0.7

W.B.C 3100 Polymorphs 54

Small Lymphocytes 34

Mononuclears 12

W.B.C : R.B.C :: 1:1103

Haemolytic Test +

Progress good slight fever throughout

Duration of treatment 4 months

Total of drug 1.4 grams

(No fever for 3 weeks),

On discharge / condition good, Haemolytic test faint turbidity

Spleen slightly enlarged Liver not enlarged

Blood R.B.C. 3560,000 Hb% 75

W.B.C. 8750 Polymorphs 66

Small Lymphocytes 14

Mononuclear 19

Eosinophil 1

Result cured

CASE 20Male aged 27Duration of illness 3 years (?)

fever 3 months and enlarged spleen

On admission thin - slight jaundiceOther cases same Village - younger brother has kala-azarSpleen enlarged Liver slightly enlargedTemperature 98-99.6°FBlood R.B.C. 3050000 Hb% 60 CI 1

W.B.C. 3750 Polymorphs 50

Small Lymphocytes 28.5

Mononuclear 21.5

W.B.C. : R.B.C. :: 1:811

Haemolytic Test + Formalin +Liver Puncture L.D. +Heart dilatedProgress low fever throughout - double rise on one day only did not do well - no strength - very thinComplications Glossitis "dysentery"Duration of treatment 4 mos.Total of drug 2.04 gramsOn discharge condition not good fever 99° - 100°F still thin and asthenicHaemolytic test + Formalin +Blood R.B.C. 3120,000 Hb% 55

W.B.C. 5000 Polymorphs 56

Small Lymphocytes 31

Mononuclears 13

Spleen still very big Liver not enlargedResults Cured (?) no further reports.CASE 21Male aged 29Duration of disease 3 months - fever-spleen enlarged one monthOn admission gingivitis, anaemia,Spleen enlarged Liver not enlarged

Temperature high - remittent with double rise

Blood R.B.C. 3,420,000 Hb% 65

W.B.C. 2500 Polymorphs 47

Small Lymphocytes 20.5

Mononuclears 31

Eosinophils 1.5

W.B.C. : R.B.C. :: 1 : 1370

Haemolytic test + Formalin test +Liver Puncture no recordProgress good no complications, temperature normal in three weeksDuration of treatment 2½ mos. Total of drug 1.54 grsOn discharge condition good, temperature 98.6°-99°F for last month.Spleen enlarged Liver not enlargedResult cured

CASE 22

Male aged 13

Ill 5 days with Cancrum Oris - Spleen enlarged

Liver not enlarged

Haemolytic test + fever 99° - 102°

Progress not good - severe diarrhoea - haemorrhagic
rash on legs

Duration of treatment 28 days

Total of drug 0.21 grams

Result died - Considerable improvement of Cancrum
Oris.

CASE 23

Male aged 24

Duration of disease 1 year Spleen enlarged and
daily fever

On admission very thin Spleen enlarged Liver
not enlarged

Temperature 99° - 101° F double rise
on one day only

Blood R.B.C. 4,050,000 Hb% 65 CI 0.8

W.B.C 3125 Polymorphs 49

Small Lymphocytes 20.5

Mononuclears 30.5

W.B.C : R.B.C :: 1:1300

Haemolytic Test + Formalin Test +

Progress good - complications "dysentery"

Duration of Treatment 3½ months

Total of drug 1.3 grams

On discharge good condition

Temperature 99° - 100° F

Haemolytic test + Formalin +

Spleen still enlarged

Liver not enlarged

Result cured (probably)

CASE 24

Male aged 2. Ill three days with Cancrum Oris

On admission seriously ill - temperature subnormal

Spleen not felt

Liver - not enlarged

Haemolytic test +

Remained in hospital one day only

Result not cured

CASE 25

Male aged 9

Duration of illness 2½ years - fever with enlarged Spleen

Other cases in village - none in family

On admission anaemia Spleen enlarged Liver not enlarged

(This case an example of enormous spleen without enlargement of liver) temperature remittent with double rise

Blood R.B.C.	2670,000	Hb%	55	CI	1-03
W.B.C.	3100	Polymorphs			46
		Small Lymphocytes			29
		Mononuclear			24

W.B.C : R.B.C :: 1:860

Haemolytic test + Formalin Test +

Liver Puncture L.D. Not found

Heart myocardial weakness, tic-tac rhythm

Progress good temperature down in three weeks

Duration of treatment 5 months

Total of drug 1.78 grams

On discharge temperature 99°F for 3 weeks

Haemolytic test + Formalin test -

Blood R.B.C. 4220,000 Hb% 80

W.B.C. 5000

Spleen) enlarged but much reduced

Liver)

Result Cured. 9 months later no relapse.

CASE 26

Male aged 9

Duration 4 months with spleen enlarged

Other cases in village - none in family

On admission anaemia - slight oedema legs
fever 98° - 100°

Spleen enlarged Liver not enlarged

Haemolytic test + Formalin +

Blood R.B.C. 2,320,000 Hb% 45 CI 0.97

W.B.C. 3125 Polymorphs 51.3

Small Lymphocytes 23

Mononuclear 25.5

W.B.C. : R.B.C : : 1:740

Progress good - fever low throughout

Duration of treatment 3 months

Total of drug 1.31 grams

On discharge temperature 99° - 100°F for last month

condition good - haemolytic test + Formalin +

Blood R.B.C. 3,730,000 Hb% 65

W.B.C. 5628

Spleen not enlarged Liver not enlarged

Result cured

CASE 27

Male aged 8

Duration of illness 1 year with enlarged spleen

Others in village none in family

On admission anaemic - emaciated - temperature
98° - 100°F

Blood Spleen enlarged Liver enlarged
R.B.C. 3150,000 Hb% 60 CI 0.95

W.B.C. 5000 Polymorphs 52.5

Small Lymphocytes 16.5

Mononuclears 30

Eosinophil 5

W.B.C. : R.B.C. :: 1:630

Haemolytic Test + Formalin Test +

Liver Puncture not done

Progress good no complications, evening temperature
99° - 100°F throughout

Duration of treatment 2½ months

Total of drug 1.42 grams

On discharge Temperature to 99.6°F in evening for
last month

Haemolytic test + Formalin +

Blood R.B.C. 4,020,000 Hb% 75

W.B.C. 6250 Polymorphs 58

Small Lymphocytes 25

Mononuclears 17

Result Spleen not enlarged Liver slightly
cured enlarged

CASE 28

Male 9

Duration of illness 1 year with initial fever,
spleen enlarged 6 months

Other cases in village none in family

On admission anaemic - Spleen enlarged

Liver enlarged

Temperature 98° - 100°F

Blood R.B.C. 3130,000 Hb% 60 CI 0.96

W.B.C. 3125 Polymorphs 47.5

Small Lymphocytes 14.5

Mononuclears 38

W.B.C. : R.B.C. :: 1:1000

Haemolytic test + Formalin +

Liver puncture L.D. +

Heart tic-tac rhythm, myocardial change

Progress good

Duration of treatment 3½ months

Total of drug 0.9 grams

On discharge temperature normal

Haemolytic test + Formalin -

Blood R.B.C. 5,000,000

W.B.C. 7800 Polymorphs 76

Small Lymphocytes 21

Mononuclears 9

Result Spleen just felt Liver not enlarged
cured

CASE 29

Male aged 24

Duration of illness 1 year onset with fever
spleen enlarged 12 months

No other cases in village or family- lived in kala-
azar area

On admission gingivitis Spleen enlarged
Liver enlarged

Temperature 98° - 100° F

Blood R.B.C. 2,630,000 Hb% 55 CI 1.03

W.B.C. 2188 Polymorphs 52

Small Lymphocytes 31.5

Mononuclear 16.5

W.B.C. : R.B.C. :: 1:1202

Haemolytic test + Formalin +

Liver Puncture LD +

Heart dilated - myocardial weakness

Progress good - complications Glossitis, bronchitis
influenza, temperature - double rise, during
treatment, generally 99° - 100° F

Duration of treatment 4 months

Total of drug 1.99 grams

On discharge condition good - temperature 99° F in
evening

Haemolytic test + formalin +

Blood R.B.C. 4,020,000 Hb% 75

W.B.C. 7500 Polymorphs 58

Small Lymphocytes 18

Mononuclears 24

Spleen enlarged Liver not enlarged

Result cured

3½ months later - spleen much less
haemolytic test +
complains of dyspnoea
diagnosis - myocarditis

CASE 30

Male aged 13

Duration of illness 1½ years

Other cases in village - none in family

On admission Spleen enlarged Liver not enlarged

Temperature 99° - 101° F

Blood R.B.C. 2850,000 Hb% 55 CI 1-

W.B.C. 1875 Polymorphs 46

Small Lymphocytes 31.5

Mononuclear 22.5

W.B.C.: R.B.C. :: 1:1520

Haemolytic test + Formalin +

Liver Puncture - no record

Progress not good - marked variability in temper-
ature.

Complications Jaundice, ascites, mastoid abscess,
orbital cellulitis with proptosis - severe per-
sistent pain over spleen.

Patient was in hospital 5 months. There were two attacks of jaundice. A conservative mastoid operation was done successfully in spite of poor condition of patient. Pus was evacuated from the orbit but sight was lost.

Only 0.95 grams of the tartrate was given. The constant pain over the spleen which was severe persisted until the patient left hospital without any cause being determined.

On discharge considerable ascites and patient very weak - the prognosis was bad.

CASE 31

Male aged 21

Duration of disease 22 months - fever, enlarged spleen, diarrhoea with blood and epistaxis.

Other cases in village - one in family

On admission anaemia - Spleen and Liver enlarged

Temperature 99° - 101°F

Blood R.B.C. 3320,000 Hb% 60 CI 0.9

W.B.C. 1250, Polymorphs 40

Small Lymphocytes 21

Mononuclears 33

W.B.C. : R.B.C. :: 1:2650 Haemolytic test +

Heart Slightly dilated Liver Formalin Test +

Progress good temperature in general below 101°F

Complications - swelling cervical glands

Duration of treatment 3 mos

Total of drug 2.15 grams

On discharge Temperature - slight evening rise

good condition - haemolytic test slightly +

Formalin test + Spleen + not greatly reduced

Liver not enlarged⁽⁴⁾

Blood R.B.C. 8,012,000 Hb% 75

W.B.C. 4160 Polymorphs 64

Small Lymphocytes 24

Mononuclear 10

Eosinophils 2

Result cured

CASE 32

Male aged 4

Duration of illness 8 months with fever

No other cases in village or family

On admission abscess over sternum - prolapse of rectum

Spleen enlarged Liver enlarged Temperature to 100°F

in evening Haemolytic test + Formalin +

Liver Puncture L.D. +

Blood R.B.C. 3640,000 Hb% 65 CI 0.90

W.B.C. 6250 Polymorphs 50.5

Small Lymphocytes 16

Mononuclears 33.5

W.B.C. : R.B.C. :: 1:580

Heart myocardial weakness

Lungs tubercular roots *during*

Progress low fever throughout except broncho-pneumonia

Duration of treatment 3 months Total of drug 0.49 grams

Result Patient left hospital with broncho-pneumonia

CASE 33

Male aged 26

Duration of illness 5 months with fever

No other cases in village or family

On admission anaemic - Spleen enlarged Liver enlarged
low fever 100°F in evening

Blood R.B.C. 3,800,000 Hb% 70 CI 0.92

W.B.C. 5000 Polymorphs 50.5

Small Lymphocytes 15

Mononuclear 34.5

W.B.C : R.B.C : :1:760

Haemolytic Test + Formalin+

Liver Puncture L.D. +

Progress good

Duration of Treatment 1½ months

Total of drug 0.93 grams

On discharge temperature normal two weeks

Haemolytic test +

Blood R.B.C. 4,120,000 W.B.C. 9400

Polymorphs 67 Small Lymphocytes 23

Mononuclear 8 Eosinophil 2

Result cured

CASE 34

Male aged 7.

On admission anaemia - swelling of left cheek with
ulceration, mucous membrane - appearance
of commencing cancrum oris

Spleen enlarged Liver enlarged

Blood R.B.C. 2350,000 Hb% 30 CI 0.64

W.B.C. 3125 Polymorphs 48.5

Small Lymphocytes 30

Mononuclear 21

W.B.C. : R.B.C : : 1: 750

Haemolytic Test + Formalin+

Liver Puncture L.D.+

Progress Haemorrhage from inside left cheek

Two doses of neo-salvarsan given with interval
of 13 days. Condition of cheek gradually improved
sloughs separated until healing ulcer on leaving
hospital - Mouth also treated with Peroxide

Duration of Treatment 4 months

Total of drug 0.935 grams

On discharge fairly good condition Temperature normal
1 week-mouth healing

Haemolytic Test +

Blood R.B.C. 4120,000 Hb% 70

W.B.C. 9400 Polymorphs 67

Small Lymphocytes 23

Mononuclear 8

Eosinophils 2

Result Cured

CASE 35

Male aged 9.

Duration 5 months with daily fever diarrhoea and ulceration of the cheek (1 days duration)Other cases same village family noneOn admission pyorrhoeae - ulceration with necrotic membrane on inside of cheek with considerable pain.Spleen enlarged Liver enlarged

Fever high, remittent - double rise

Blood R.B.C. 2850,000 Hb% 55 CI 0.9

W.B.C. 2500 Polymorphs 43.5

Small Lymphocytes 21

Mononuclear 35

W.B.C. : R.B.C. :: 1:1140

Haemolytic Test + Formalin +

Liver Puncture +Heart slight dilatationComplications recurrent laryngitis.Progress Good-remittent type of temperature terminated in 3 weeks - afterwards 99° -100° in eveningDuration of treatment 4½ monthsTotal of drug 1.99 gramsOn discharge condition good temperature 99°F in evening-no ulceration mouth

Haemolytic + (fine turbidity - deposit in 2 hours)

Formalin -

Blood R.B.C. 3,240,000 Hb% 60

W.B.C. 7200 Polymorphs 70

Small Lymphocytes 22

Mononuclear 18

Spleen not much reducedLiver slight reductionResult cured

CASE 36

Male aged 8

Duration of illness 2 months - spleen enlarged and feverOther cases same village, none in familyOn admission anaemic, spleen enlarged liver enlarged

Temperature low with variable remissions

Blood R.B.C. 3,010,000 Hb% 60 CI. 1

W.B.C. 3120 Polymorph 52

Small Lymphocytes 13

Mononuclears 35

W.B.C. : R.B.C. :: 1: 1000

Haemolytic Test + Formalin +

Liver Puncture L.D. +Progress good diarrhoea - temperature 1° - 1½° above normal throughoutDuration of treatment 4 months Total of drug 1.20 grs.Result cured - 5 months later no relapse.

CASE 37

Male aged 18

Duration of illness 7 months - fever with enlarged spleen.

No other cases in family or village

On admission anaemia - spleen enlarged liver not enlarged

temperature 99° - 100° F

Blood R.B.C. 3760,000 Hb% 65 CI 0.9

W.B.C. 4537 Polymorphs 45

Small Lymphocytes 16.5

Mononuclears 38.5

W.B.C. : R.B.C. :: 1: 850

Haemolytic test + Formalin +

Liver Puncture L.D. +

Progress good & temperature-practically apyrexial throughout

Duration of treatment 4 mos. Total drug 2.77 grams

On discharge haemolytic test + (sediment in 2 hours)

Formalin " -

Blood R.B.C. 4,830,000 Hb% 80

W.B.C. 5800 Polymorphs 67

Small Lymphocytes 22

Mononuclears 6

Eosinophil 5

Spleen and Liver not recorded

Result Cured - 5 months later condition good

CASE 38

Male aged 7

Duration of illness 6 months - fever and enlarged spleen

Other cases in village one other in family

On admission - spleen enlarged liver enlarged

Temperature 100° - 101° in evening

Blood R.B.C. 2630,000 Hb% 55 CI 1+

W.B.C. 3750 Polymorphs 42

Small Lymphocytes 16

Mononuclear 41.5

W.B.C : R.B.C. :: 1:610

Haemolytic test + formalin +

Liver puncture L.D. +

Complications nil evening temperature slightly above normal throughout

Duration of treatment 4 months

Total of drug 1. 26 grams

Result cured - 5 months later condition good

CASE 39

Male aged 10

Duration of illness 9 months, fever and enlarged spleen

Other cases in same village two others in family

On admission anaemia, slight cough, spleen enlarged
liver not enlarged

Temperature shows double rise on one day

Blood R.B.C. 3740,000 Hb% 75 CI 1
W.B.C. 6600 Polymorphs 70
Small Lymphocytes 19
Mononuclear 10
Eosinophils 1

W.B.C : R.B.C :: 1:560

Haemolytic test + Formalin +

Liver Puncture L.D. +

Progress good - acute bronchitis only complications

Duration of treatment 5 mos. temperature normal 3 mos.

Total of drug 1.48 grams

On discharge haemolytic test fine precipitate
spleen much reduced in size

Result cured

Comment The white cell count is not in keeping
with kala-azar.

CASE 40

Male aged 9

Duration of disease 10 months - fever with
enlarged spleen

No other cases in village or family

On admission cough - otorrhoea - oedema of feet

Spleen enlarged Liver enlarged

Fever remittent with double rise

Blood R.B.C. 2,892,000 Hb% 55 CI 1

W.B.C. 4200 Polymorph 49
Small Lymphocytes 23
Mononuclear 26
Eosinophil 2

Haemolytic Test + Formalin +

Spleen L.D. +

Progress - bad-progressive oedema
anasarca - no albuminuria

Duration of treatment - 13 days - no injections

Remittent temperature throughout

Result not improved

CASE 41

Male aged 18
Duration of disease 2 years
fever one month followed by enlarged spleen
Other cases in village - none in family
On admission Cyanosis malar region
Spleen enlarged Liver enlarged
Evening temperature 100-101°F
Blood R.B.C. 3145000 Hb% 60 CI 0.96
W.B.C. Polymorphs 49
Small Lymphocytes 33
Mononuclear 26
Eosinophil 2
Haemolytic test + Formalin +
Liver Puncture L.D. +
Heart sounds weak - myocardial change
Progress Eczema ear
Pneumonia
Duration of Treatment 18 days
Total of drug 0.02 gram
Result died Pneumonia

CASE 42

Male aged 12
Duration of disease 2 years - fever, epistaxis
and enlarged spleen
Other cases in village none in family
On admission - anaemic, spleen enlarged
Liver enlarged
Temperature remittent marked double rise
Blood R.B.C. 2,432,000 Hb% 45 CI 0.93
W.B.C. 3740 Polymorphs 42
Small Lymphocytes 25
Mononuclear 32
Eosinophil 1
W.B.C. : R.B.C. :: 1:670
Haemolytic test + Formalin +
Splenic Puncture L.D. +
Progress not good
Duration in hospital 17 days
Result died - Pneumonia -
Total of drug 0.02 gram

CASE 43

Male aged 11

Duration of disease 14 months - 4 months of fever
and then spleen enlarged

Other cases in village - none in family

On admission anaemic spleen enlarged liver enlarged

Low fever to 100°F

Blood R.B.C. 2,750,000 Hb% 55 CI 1
W.B.C. 3000 Polymorph. 49
Small Lymphocytes 24
Mononuclear 25
Eosinophil 2

W.B.C : R.B.C :: 1:900

Haemolytic test + Formalin +

Liver Puncture L.D. +

Heart dilatations right and left heart

Progress low fever to 101°F in evening - no
constant type of pyrexia

Complications albuminuria with casts - anasarca
petechial haemorrhages on legs

Duration of treatment 1½ months

Total of drug 0.62 grams

Result Died suddenly - cause unknown.

CASE 44.

Male aged 11

Duration of disease 14 months - enlarged spleen
and epistaxis no history of fever

Other cases in village - one brother died of kala-azar

On admission laryngitis - spleen enlarged

Liver not enlarged

Temperature to 99.6°F in evening

Blood R.B.C. 3814,000 Hb% 70 CI 0.92
W.B.C. 3600 Polymorphs 54
Small Lymphocytes 26
Mononuclear 18
Eosinophil 2

W.B.C : R.B.C :: 1:1060

Haemolytic test + Formalin +

Liver puncture L.D. +

Heart weak sounds - haemic murmurs

Blood pressure 120-60 m.m. Hg.

Progress good.

Complications Epistaxis - Temperature below 100°F
throughout except on one or two days when
double rise shown.

Duration of treatment 3 months

Total of drug 2.82 grams

On discharge condition good, temperature practic-
ally normal for one month, heart sounds
good.

Haemolytic test + Formalin test +

Liver Puncture L.D. -

Blood 4,100,000 Hb% 75

W.B.C. 5200 Polymorphs 71
Small Lymphocytes 21
Mononuclear 8

Spleen slight reduction in size but still large

Result Cured

Liver not enlarged

CASE 45

Female aged 9

Duration of disease 2 years, fever, enlarged spleen

Other cases in village - none in family

On admission gingivitis - spleen enlarged

liver enlarged Apyrexial

Blood R.B.C. 3210,000 Hb% 65 CI 1+
23.2.24 1st. W.B.C. 4300 Polymorphs 62 Small Lymphocytes 21
Mononuclear 15, Eosinophil 2
25.3.24 2nd W.B.C. 4400 Polymorphs 56, Small Lymphocytes 25
Mononuclear 19

W.B.C. : R.B.C. :: 1:745

Liver Puncture L.D.+

Lungs extensive bronchitis

Progress good for first three weeks evening rise
of temperature 1° - 1½° F

Developed Pneumonia in 4th week

Total drug 0.08 grams

Result Died

CASE 46

Male aged 27

Duration of disease - fever with enlarged spleen
and chronic laryngitis

No other cases in village or family

On admission good condition - has chronic laryngitis

Spleen enlarged Liver enlarged - apyrexial

Blood R.B.C. 3,850,000 Hb% 65 CI 0.84

W.B.C. 3750 Polymorph 51.5

Small Lympho-
cytes 26

Mononuclear 22.5

W.B.C. : R.B.C. :: 1:1000

Haemolytic + Formalin +

Liver Puncture L.D.+

Heart sounds weak

Progress good laryngitis not relived by Iodides
pyrexia 100° - 102° F continuously

Duration of treatment 1 month

Total of drug 0.61 grams

On discharge Condition good - still daily pyrexia
100° F

has laryngitis

Spleen and Liver diminished in size

Results Improved - probably not cured.

CASE 47

Male aged 26
Duration of illness 1½ years. fever, enlarged spleen
otorrhoea, epistaxis
On admission condition good - laryngitis
Spleen enlarged Liver not enlarged
Temperature 98° - 100° F
Blood R.B.C. 2740,000 Hb% 50 CI 0.9
W.B.C. 3000
W.B.C. : R.B.C. :: 1:900
Haemolytic test + Formalin test +
Liver Puncture L.D. -
Spleen " L.D. +
Heart mitral regurgitation
Lungs tubercular right apex
Progress temperature first two weeks not more than
100° afterwards normal except fever for five
days during treatment 103° - 105°
Complications keratitis - tonsillitis
Duration of treatment 3½ months
Total of drug 2.9 gram
On discharge laryngitis-no fever
Haemolytic test + formalin +
Blood R.B.C. 3914000 Hb% 70
W.B.C. 5740 Polymorphs 65
Small Lymphocytes 25
Mononuclear 10
Spleen reduced Liver not enlarged
Result - cured - 15 months later no relapse

CASE 48

Male aged 19
Duration 9 months - fever, and spleen enlarged
Other cases in village, one other in family
On admission anaemic, spleen enlarged, liver enlarged
Temperature 98° - 102° F double rise
Blood R.B.C. 2772,000 Hb% 55 CI 1
W.B.C. 4200, Polymorphs 50
Small Lymphocytes 24
Mononuclear 23
Eosinophil 3
W.B.C. : R.B.C. :: 1: 660
Haemolytic Test + Formalin not recorded
Liver Puncture L.D. +
Progress Pneumonia (Double) recovery
Cancrem Oris developed after 2 months + injec-
tions, treated with Neo-Salvarsan (one dose)
rapid spread of gangrene to cheek.
Duration of Treatment 2 months
Total of drug 0.47 grams
Result died - Cancrem Oris

CASE 49

Male aged 17

No history available.

On admission temperature 101° - 103°F

Blood R.B.C. 3,120,000 Hb% 55 CI 0.88

W.B.C. 4720 Polymorphs 52

Small Lymphocytes 23

Mononuclear 23

Eosinophil 2

W.B.C : R.B.C :: 1:660

Haemolytic test + Formalin +

Liver Puncture L.D. +

Progress temperature in evening 100° - 101°F
throughout, good progress, no complications

Result Died within a few hours of suddenly
becoming unconscious.

No cause for death discovered

Duration of treatment 2 months

Total of Drug 0.54 grams

CASE 50

Male aged 19

Duration of illness 5 months, fever, and spleen
enlarged

Other cases in town - large family, no other case

On admission Spleen enlarged Liver enlarged
complains of profuse sweating. high remittent
temperature, double rise.

Blood R.B.C. 3,124,000 Hb% 60 CI 0.9

W.B.C. 3800 Polymorphs 57

Small Lymphocytes 31

Mononuclear 12

W.B.C.: R.B.C :: 1:820

Haemolytic test + Formalin - (24 hours
slight viscosity)

Splenic Puncture L.D. +

Heart mitral regurgitation - dilatation
left heart

Progress good - fever high remittent with double
rise for six weeks, afterwards practically
normal - no complications

Duration of Treatment 3½ months

Total of drug 2.12 grams

On discharge R.B.C. 3740,000 Hb% 70

W.B.C. 5320 Polymorphs 69

Small Lymphocytes 24

Mononuclear 7

Haemolytic Test + Formalin -

Spleen just palpable

Liver not enlarged

Result cured - 8 months later condition good

CASE 51

Male aged 21

Duration of disease 1 1/4 years - fever and enlarged spleen.

Other cases in same village - two sisters have kala-azar

On admission anaemic spleen enlarged, liver not enlarged

Temperature normal

Blood R.B.C. 3,910,000 Hb% 75 CI 0.97

W.B.C. 5,000 Polymorphs 61

Small Lymphocytes 24

Mononuclears 15

W.B.C. : R.B.C. :: 1:780

Haemolytic test + Formalin - slight milkiness

Liver Puncture L.D. +

Heart slight dilatation

Progress good - no complications

temperature - practically normal throughout only beyond 100°F on one occasion

Duration of treatment 3 months

Total of drug 2.77 grams

On discharge condition good

Haemolytic test + Formalin +

Liver Puncture L.D. -

Blood R.B.C 4,273,000 Hb% 80

W.B.C. 6430 Polymorph 70

Small Lymphocytes 21

Mononuclear 9

Result cured

CASE 52

aged 9

Duration of disease 2 years - fever for 12 days and then spleen enlarged, since then no fever

No other cases in same town one sister has kala-azar

On admission oedema of legs and scrotum

Spleen enlarged Liver enlarged

temperature to 100°F in evening - old

scar with sinus right cheek.

Blood R.B.C 2460,000 Hb% 45 CI 0.9

W.B.C. 3400 Polymorphs 56

Small Lymphocytes 23

Mononuclear 19

Eosinophil 2

W.B.C : R.B.C :: 1:730

Haemolytic test + Formalin +

Liver Puncture L.D. +

Heart mitral regurgitation

Lungs dullness with diminished breath sounds right base

Progress temperature - low remittent, with double rise, progress not good, oedema increased in spite of treatment.

Necrotic sloughing area mucous membrane right cheek, ~~right cheek~~ treated with one dose neo-salvarsan, great improvement, process stayed,

oedema progressed to anasarca
Duration of treatment 2 months
Total of drug 0.1 gram
general condition prevented continuous
treatment
Result Died - anasarca - right cheek healing
previously
Comment Patient never recovered from oedema.
This was not considered of cardiac or
renal origin.

CASE 53

Male aged 22
Duration of illness 14 months - fever daily
Other cases in village, none in family
On admission condition good - apyrexial
Spleen enlarged Liver enlarged
Blood R.B.C. 3840,000 Hb% 65 CI 0.84
W.B.C. 3800 Polymorphs 53
Small Lymphocytes 23
Mononuclear 22
Eosinophils 2
R.B.C : W.B.C :: 1: 1000
Haemolytic test+ Formalin test+
Liver Puncture L.D.- Splenic Puncture
(1) -
(2) +

Progress good - temperature never at any time
beyond 99.6°F.
Duration of treatment 3 months
Total of drug 1.67 grams
Result died. Six days previous to death temperature
suddenly rose to 103°F.
Patient had severe laryngitis, oedema of
glottis, bronchitis and pleurisy. These
symptoms continued until the 6th day with
high fever when patient died. The patient
had arrived at the maximum dose of 5 c.cm.
on alternate days

CASE 54

Male aged 9

Duration of illness 3 years

1st year "malarial" since then, no fever

Spleen enlarged one year

Other cases in town none in family

On admission Temperature 101° in evening

anaemic, cough, spleen enlarged, liver not enlarged

Blood R.B.C. 2574,000 Hb% 50 CI 0.9

W.B.C. 3240 Polymorphs 49

Small Lymphocytes 21

Mononuclears 30

R.B.C : W.B.C :: 1:810

Haemolytic test + Formalin+

Spleen Puncture L.D.+

Heart Myocardial weakness

Chest bronchitis

Progress Temperature-Low-to 100°F in evening first

week. Remittent until end of 7th week - double

rise in 2nd week, generally 100 - 102°F in evening

slight evening rise - variable during last four

weeks.

Has slight albuminuria with oedema of feet

diarrhoea with blood - transient conjunctival

icterus.

Duration of treatment 2½ months

Total of drug 0.68

On discharge somewhat thin - occasional slight rise
of temperature

Result Cured(?)

CASE 55

Male aged 9

Duration of illness 14 months - fever for 2 months
and then spleen enlarged

Other cases in village - none in family

On admission evening temperature 100° which remained
at this level for first two weeks before treatment
commenced.

anaemic Spleen enlarged Liver enlarged

Blood R.B.C. 2,420,000 Hb% 50 CI 1

W.B.C 3200 Polymorphs 45

Small Lymphocytes 23

Mononuclears 32

W.B.C : R.B.C :: 1:756

Haemolytic test - Formalin - (24 hours slight

Liver Puncture L.D.+ (milky)

Heart myocardial change, sounds tic-tac

Lungs active tuberculosis right upper lobe

Progress Temperature sustained - in evening 100° -
102°F throughout - spleen reduced.

Ulceration mucous membrane of mouth with
sloughing - two doses "914" given with improve-
ment.

Slight oedema of feet - crepitations general over chest
On discharge Condition good, ulceration of mouth better, spleen reduced - evening rise of temperature to 99.6°F

Blood Haemolytic test positive (cf admission)

Formalin -
R.B.C. 3120,000 Hb% 50
W.B.C. 8140 Polymorphs 65
Small Lymphocytes 25
Mononuclear 9
Eosinophil 1

Duration of treatment 5 months

Total of drug 0.98 gram

Result cured

Comment cf. haemolytic test on admission and on discharge. Note that formalin test -. This was done in cold weather and onset of disease in cold weather. Great improvement in condition of mouth after "914"

CASE 56

Female aged 11

Duration of illness 1.10/12 years with fever, spleen enlarged for one year

Other cases in village - none in family

On admission - anaemic - evening temperature 100°F

Spleen & Liver enlarged

Blood R.B.C. 3420,000 Hb% 65 CI 0.8

W.B.C. 3400 Polymorphs 46

Small Lymphocytes 25

Mononuclears 35

W.B.C : R.B.C :: 1:1000

Haemolytic test + Formalin +

Splenic Puncture L.D. +

Heart sounds tic-tac

Progress not good - constant cough - lassitude abdominal pain.

Temperature maintained throughout - variable 101° - 103°F in evening - did not come down to normal-double rise shown

Diarrhoea constant

Result Died -

Duration of treatment 4 months

Total of drug 0.71 gram

Terminal phase, diarrhoea increased, with vomiting

Did not do well from beginning.

CASE 57

Male aged 6

Duration illness 14 months - daily fever, spleen enlarged 12 months

Village - other cases in family - one other child no kala-azar

On admission evening temperature 100°F

Spleen enlarged Liver enlarged

<u>Blood</u> R.B.C.	2,840,000	Hb%	50	CI	0.9
W.B.C.	3200	Polymorph		51	
		Small Lymphocytes		24	
		Mononuclear		25	

W.B.C : R.B.C :: 1:870

Haemolytic test + Formalin +

Liver Puncture L.D. +

Progress uninterrupted Temperature only above 100°F on one or two days

Duration of treatment 4 months

Total of drug 1.25 grams

On discharge Haemolytic test + Formalin -

Temperature 99° - 100°F

<u>Blood</u> R.B.C	3,641,000	Hb%	70
W.B.C :	4900	Polymorphs	67
		Small Lymphocytes	24
		Mononuclear	8
		Eosinophil	1

Spleen slightly enlarged

Liver not enlarged

Result cured

CASE 58

Female aged 9

Duration 8 months, fever with spleen enlarged two months

Other cases in village, none in family

On admission condition good, evening temperature

101° - 102°F Spleen and Liver enlarged

<u>Blood</u> R.B.C	3,124,000	Hb%	60	CI	1
W.B.C	3800	Polymorphs		65	
		Small Lymphocyte		20	
		Mononuclear		15	

W.B.C : R.B.C :: 1:820

Haemolytic test + Formalin +

Liver Puncture L.D. +

Progress good - no energy Temperature variable, never high 100 - 102°F practically normal for last six weeks peritostitis maxilla

Duration of Treatment 4 months Total of drug 1.18 grs.

On discharge Spleen slightly enlarged liver not enlarged

Haemolytic test + (1/2 hr incomplete sedimentation) Formalin test -

<u>Blood</u> R.B.C.	3,941,000	Hb%	75
W.B.C :	7200,	Polymorph	70
		Small Lymphocytes	19
		Mononuclear	19
		Eosinophils	2

Result cured

CASE 59

Male aged 7

Duration of illness 2½ years - fever for last 2½ months with enlarged spleen

No other cases in village or family

On admission - marked anaemia - abscess over lower jaw. Spleen very much enlarged liver not enlarged

Blood R.B.C. 3,120,000 Hb% 60 CI 1

W.B.C 3000 Polymorphs 50

Small Lymphocytes 21

Mononuclear 28

Eosinophil 1

W.B.C : R.B.C :: 1:1000

Haemolytic Test + Formalin test +

Liver Puncture LD +

Progress good - no energy

On discharge Haemolytic + Formalin -

Blood R.B.C 3,332,000 Hb% 65

W.B.C. 4000 Polymorph 64

Small Lymphocytes 22

Mononuclear 12

Eosinophil 2

Spleen slightly enlarged Liver not enlarged

Duration of treatment 4 months

Total of drug 0.58

Result cured (see No. 71)

CASE 71 (same patient as above No 59)

Returned 2½ months after discharge

History of fever for 12 days

On admission anaemic, pyorrhoea, temperature sustained 100 - 101°F, Spleen much larger than on discharge. Liver not enlarged.

Heart slight dilatation of left ventricle

Lungs bronchial breathing at apices

Haemolytic test + Formalin + (cf on discharge)

Blood Hb% 60

W.B.C 4200 Polymorphs 51

Small Lymphocytes 23

Mononuclear 25

Eosinophil 1

Progress good - bronchitis and pleurisy, very anaemic, great difficulty in increasing haemoglobin content of blood. Anaemia treated with "Collosol Ferrum" hypodermically with great improvement.

Duration of treatment 5 months

Total of drug 1.64 grams

On discharge general condition - greatly improved temperature sustained at 100°F. Spleen just palpable. Haemolytic test + Formalin test +

R.B.C. 3320,000 Hb% 70 W.B.C. 5200

Result cured

Comment Total duration of treatment 9 months Total of drug 2.62 grams. Formalin test was obviously unreliable as test of cure. It was negative on discharge on the first occasion and positive on discharge on the second time.

CASE 60

Male aged 25

Duration of disease 1 year - daily fever
spleen gradually enlarged

No other cases in village or family

On admission anaemic, spleen enlarged, liver not
apyrexial enlarged

Blood R.B.C. 2920,000 Hb% 55 CI 0.9

W.B.C : 4420 Polymorphs 54

Small Lymphocytes 24

Mononuclear 22

W.B.C : R.B.C :: 1:660

Haemolytic test + Formalin + Liver
Puncture L.D. +

Progress good - almost apyrexial throughout
temperature mostly below 100° - only once
above 100.6°F "dysentery" on one occasion

Duration of disease 4 months

Total of drug 2.58 grams

On discharge R.B.C. 4200,000 Hb% 80 no fever for
3 weeks, Polymorphs 71 Small Lympho-
cytes 21, Mononuclear 7, Eosinophil 1

Spleen enlarged Liver not enlarged

Result cured.

CASE 61

Male aged 8

Duration of illness 5 months- fever with enlarged spleen

Other cases in village - none in family

On admission Spleen enlarged Liver enlarged, fever remittent to 102°F in evening - double rise

Blood R.B.C. 2743,000 Hb% 55 CI 1
W.B.C 4000 Polymorphs 49
Small Lymphocytes 26
Mononuclear 19
Eosinophil 6 (?)

W.B.C : W.B.C :: 1: 680

Haemolytic test + Formalin test +

Liver Puncture L.D. +

Progress uninterrupted. Fever remittent for first two weeks afterwards above normal for remainder of time (100°F.) Spleen reduced

Duration of treatment 4 months Total of drug 0.98 Gzs.

On discharge condition excellent - spleen slightly enlarged liver not enlarged - fever 101° - 102°F last eight days (unexplained)

Blood R.B.C. 3340,000 Hb% 70 W.B.C 5100
Polymorph 75, Small Lymphocytes 21
Mononuclear 4,

Haemolytic test + (incomplete sedimentation in ½ hour) Formalin negative

Result cured - 9 months later condition good.

CASE 62

Female aged 8

Illness - 1 year

On admission anaemic - spleen enlarged - liver enlarged

Blood R.B.C. 3,200,000 Hb% 60 CI 0.9
W.B.C 3940 Polymorph 45
Small Lymphocytes 20
Mononuclear 32
Eosinophils 3

W.B.C. : R.B.C :: 1:820

Haemolytic test + Formalin +

Liver Puncture L.D. +

Temperature to 100°F in evening

Progress uninterrupted - temperature not above 100°F throughout.

Duration of treatment 3 months. Total of drug 1.23 grs.

On discharge Temperature 99° - 99.6°F.

Haemolytic test + (sedimentations in ½ hr)
Formalin Test +

Blood R.B.C. 4,120,000 Hb% 80
W.B.C. 6140 Polymorphs 69
Small Lymphocytes 30
Mononuclear 8
Eosinophil 3

Spleen and Liver slightly enlarged

Result cured

CASE 63

Female aged 9
Duration 1 year spleen enlarged after 12 days
fever
Other cases in town - three sisters had kala-azar-
-two died.
On admission fever to 100°F spleen enlarged
Liver enlarged
Blood R.B.C. 3124000 Hb% 60 CI 0.96
W.B.C. 4100 Polymorph 54
Small Lymphocytes 20
Mononuclear 26
W.B.C : R.B.C :: 1:780
Haemolytic test + Formalin +
Liver Puncture L.D. +
Progress good - temperature rarely above 100°F
Duration of disease 4 months Total of drug 1.21 grs.
On discharge good condition - temperature 99° - 99.6°F
Haemolytic test + (incomplete sedimentation
in ½ hr)
Formalin +
Blood R.B.C. 3,674,000 Hb% 70
W.B.C. 4800 Polymorph 65
Small Lymphocytes 23
Mononuclear 12
Duration of disease 4 months Total of drug 1.28 grs
Result cured

CASE 64

Male aged 8
Illness 14 months - spleen enlarged - fever at
intervals
No other cases in village or family
On admission general condition good - fever 99° -
100°F spleen enlarged liver enlarged
Blood R.B.C. 3214,000 Hb60 CI 0.9
W.B.C. 4170 Polymorphs 54
Small Lymphocytes 26
Mononuclear 20
W.B.C : R.B.C :: 1:800
Haemolytic test + Formalin test + Liver Puncture L.D. -
Splenic " L.D. +
Progress uninterrupted Temperature 100°F and below
except on one or two days. normal for last
two weeks.
On discharge condition good - temperature normal
for 2 weeks - haemolytic test + formalin -
Blood R.B.C. 3910 000 Hb% 75
W.B.C 5942 Polymorph 70
Small Lymphocytes 21
Mononuclear 9
Spleen and Liver not recorded
Duration of treatment 4 months Total drug 1.21 grs
Result cured

CASE 65

Male aged 6

Duration of disease 1 month

Spleen enlarged

On admission Spleen just felt - two fingers breadth below costal margin Liver not enlarged

Blood R.B.C. 3240,000 Hb% 70 CI 1+

W.B.C. 2400 Polymorph 60

Small Lymphocytes 26

Mononuclear 12

W.B.C. : R.B.C. :: 1: 1400

Haemolytic test + Formalin +

Liver L.D. +

Temperature low fever to 100°F on admission

Progress uninterrupted - fever throughout up to 100°F

Duration of treatment 3 months Total of drug 0.64 grs

On discharge spleen and liver not enlarged

No other records - except slight daily fever to 99°.6 F

CASE 86 (Same patient as No 65)

Returned 7 mos later.

States fever for last 4 mos and spleen increasing in size

Haemolytic test + Formalin + Liver Puncture L.D. +

R.B.C. 3210,000 Hb% 65 CI 1+

W.B.C. 4200 Polymorphs 46, Small Lymphocytes 22, Mononuclear 31 Eosinophil 1

W.B.C. : R.B.C. :: 1:800

The size of the spleen is not recorded on admission but after 2 months treatment the lower border was at the level of the umbilicus. Fever up to 100°F in evening - during treatment 100°-101°F

Progress uninterrupted

Duration of treatment 3½ months

Total of drug 1.28 grs

On discharge condition good - temperature 99° - 99.8°F

Spleen can be pushed up under costal margin when recumbent

Liver not enlarged Haemolytic test +

Result cured

Comment On first visit condition on discharge not fully reported.

N.B. admission W.B.C. 2400 2nd 4200

Compare also differential count. All tests positive on return. The low fever in both periods. Total period of treatment 6½ months

Total of drug 1.92 grams

The proportion of white cells to red on the two occasions.

CASE 66

Male aged 11

Duration 1 year fever with enlarged spleen

On admission - apyrexial spleen enlarged liver -
-enlarged

Blood R.B.C. 3,200,000 Hb% 65 CI 1
W.B.C. Polymorphs 57, Small
Small Lymphocytes 22 Mononuclear 19
Eosinophil 2

Haemolytic test + Formalin - Liver Puncture L.D.+

Progress uninterrupted - temperature varied
from 99 to 101°F - no complications

Duration of treatment 3 months Total of drug 1.29 grs

On discharge condition good. Temperature to 99°F
for two weeks previously

Haemolytic test o Formalin -

Spleen slightly enlarged

Result cured - 7 months later quite well

CASE 67

Male aged 25

Duration 11 months - no strength - oedema feet
occasionally fever-giddiness.

No other cases in family or village

On admission anaemic - gingivitis, spleen enlarged
liver not enlarged, temperature 99.8°F

Blood R.B.C. 3640,000 Hb% 70
W.B.C. 3000 Polymorph 66 Small Lympho-
cytes 21, Mononuclear 9, Eosinophil 4
W.B.C. : R.B.C. : : 1:1200

Haemolytic test + Formalin - (solidified 30 mins)

Liver Puncture - Splenic Puncture +

Lungs slight bronchitis

Progress good temperature not above 99°F

Duration of treatment 1 month - Total drug 0.16

On discharge condition good. temperature 99°F
spleen enlarged

Result improved

CASE 67a

Male aged 27

On admission spleen enlarged - liver not enlarged
temperature variable 100 - 103°F

Blood R.B.C. e Hb% 60
W.B.C. 7600 Polymorphs 46 Small Lympho-
-cytes 23, Mononuclear 29, Eosinophils 2

Haemolytic test + Formalin + Liver Puncture L.D.+

Result not treated only stayed 17 days

CASE 68

Male aged 43

Duration 15 months - daily fever

Spleen enlarged 12 months-had "dysentery"

Other cases in town, five children in family

no other case of kala-azar

On admission General condition good - has cough
Spleen and Liver enlarged temperature to 100°F

Blood R.B.C. 3294,000 Hb% 70

W.B.C. 3400 Polymorphs 42

Small Lymphocytes 20, Mononuclear 35

Eosinophils 3

W.B.C. : R.B.C. :: 1:970

Haemolytic Test + Formalin + Liver Puncture L.D. +

Heart sounds weak Lungs bronchitis

Progress good - temperature only to 100°F

exacerbations due to complications

1 Acute bronchitis

2 Erysipelas - face

Duration of treatment 2 months

Total of Drug 0.49 grams

On discharge condition good - spleen enlarged but
can be pushed up under ribs

Result improved - treatment not completed.

Case 69

Male aged 19

Duration 15 months, commenced with fever for 20 days and then spleen enlarged.

Other cases in same village - one other child with enlarged spleen in family of six.

On admission apyrexial - gingivitis,

Spleen enlarged Liver not enlarged.

Blood R. B. C. 3794,000 Hb% 75 Cl 1+

W. B. C. 3400 Polymorphs 49

Small Lymphocytes 19

Monuclears 28

Eosinophil 4

W. B. C. R.B.C. :: 1 :: 1100

Haemolytic test + Formalin + Liver Puncture o

Heart sounds weak.

Lungs at apices with scattered crepitations probably tubercular.

Progress good - temperature 99° - 101° F. no complications

Duration of treatment 2 months. Total of drug 0.57 grs

Result Improved - treatment not completed.

Case 70

Male aged 9

Duration 1 year - fever for few months followed by enlarged spleen - had diarrhoea and epistaxes.

No other cases in family or village.

On admission general condition poor - anaemic - oedema feet, albuminuria.

Spleen enlarged Liver not enlarged.

Temperature 104° F. Haemolytic test +

Progress two days after admission developed septic tonsillitis - bacilli from throat resembled diphtheria bacillus. Three doses of serum given.

Result Died on 5th day after admission Septic Tonsillitis (? diphtheria)

Case 71. (follows Case 59)

Case 72.

Male aged 19

Duration 1½ years.

Other cases in village - none in family

On admission fever 100° - 101° F

Spleen enlarged, Liver not enlarged

Blood R. B. C. 2494,000 Hb%54 Cl 1+

W.B.C. 4800 Polymorphs 45

Lymphocytes 20

Mononuclear 32

Eosinophil 3

W.B.C.: R.B.C.: 1:: 519

Haemolytic test + Formalin +

Liver Puncture L.D. +

Spleen Puncture L.D. +

Progress temperature shows occasional double rise variable to 102° throughout. Did not make good progress - continuous diarrhoea throughout the illness, often with blood in stools
Duration of treatment 2 months Total of drug 0.25 grams.

Result Died - For one week before death constant unexplained abdominal pain, dullness and plewial friction right base-cause of death uncertain.

Case 73

Male aged 27

Other cases in village - none in family

On admission temperature sustained 101° - 104° F with daily variation of 3 degrees

Spleen enlarged - Liver not enlarged

Blood Hb% 60

W.B.C. 4800 Polymorphs 55

Lymphocytes 19

Mononuclear 22

Eosinophil 4

Haemolytic test + Formalin -

Liver Puncture 0

Progress good temperature practically normal after first two weeks.

On discharge condition good - temperature normal for three weeks.

Haemolytic test 0 Formalin test - W.B.C. 6200

Duration of treatment 3 months. Total of drug 1.9 grams

Result Cured

Case 74

Male aged 13

This patient was in hospital the year previous with enlarged spleen. All the tests for Kala-azar were negative and the case was diagnosed as Splenic Anaemia. On this occasion that is 6 months later the following condition was found

History On returning home, condition as when left hospital - not well no marked pyrexia. For past 6 months fever at intervals of two weeks.

On admission high remittent fever with marked double rise and on one occasion at triple rise

Spleen and Liver enlarged

<u>Blood</u> W.B.C.	8800	Polymorphs	51
		Small Lymphocytes	32
		Mononuclear	16
		Eosinophil	6

Haemolytic test + Formalin test +

Liver Puncture L.D. +

Progress good - remittent temperature subsided in two weeks without treatment - gradually coming down with variations from 99° - 101° until discharge.

Duration of treatment 5 months Total of drug 2.14 grams

On Discharge evening temperature 99.2° F for one month

Haemolytic test Formalin - W.B.C. 8000

Result Cured.

Case 75

Male aged 20

Duration 16 months - fever for 4 months followed by enlarged Spleen

Other cases in village - 2 other cases of kala-azar out of eight in family

On admission - Anaemia - slight jaundice low fever to 101° F in evening

Spleen and Liver enlarged - albuminuria

<u>Blood</u> Hb%	60	R.B.C.	2974,000	Cl	1+
W.B.C.	2800	Polymorphs	50		
		Small Lymphocytes	21		
		Mononuclear	24		
		Eosinophil	5		

R.B.C. : W.B.C. :: 1 : 1060

Haemolytic test + Formalin +

Liver Puncture L.D. +

Lungs slight bronchitis

Progress fair - low fever ranging to 101° F

Complications Erysipelas

Jaundice persisted to a mild degree throughout treatment.

On discharge condition good - still slight jaundice no albuminuria temperature normal for one month

Duration of treatment 4 mths Total of drug 1.4. grams

Result Improved - possibly cured

CASE 76

Male aged 10

Duration 2 years - fever for 6 months followed
by enlarged Spleen

Other cases in village - none in family

On admission slight anaemia, cough, temperature
99°F - 101°F

Spleen and Liver enlarged

Blood R.B.C. 3240,000 Hb% 60 CI 0.9

W.B.C. 4000 Polymorphs 42

Small Lymphocytes 20

Mononuclear 37

Eosinophil 1

W.B.C : R.B.C :: 1:800

Haemolytic test + Formalin +

Liver Puncture L.D. +

Heart dilatations of left ventricle with
myocardial weakness

Lungs harsh breath sounds at hilum

Progress fair, temperature ranges to 99° - 101°F

Complications Cervical Adenitis

Herpes Zoster

Erysipelas and abscess of
eyelid

All these satisfactorily recovered
from.

On discharge condition good.

Haemolytic test o Formalin test o

Spleen just palpable Liver not enlarged

Temperature 99° - 100°F

Duration of treatment 6 months

Total of drug 2.21grams

Result improved - possibly cured

CASE 77

Male aged 5

Duration 12 months - fever 3 months and then Spleen
enlarged

Other cases in same village, none in family

On admission Fever 100°F double rise shown

Spleen enlarged Liver enlarged

Blood R.B.C. 3120,000 Hb% 60 CI 0.9

W.B.C. 4000, Polymorphs 42

Small Lymphocytes 20

Mononuclear 37

Eosinophils 1

W.B.C : R.B.C :: 1:800

Haemolytic test + Formalin +

Liver Puncture L.D. +

Progress not good - very septic condition of mouth regarded as pre-cancrum stage (914" one dose given some improvement) Developed orbital cellulitis with proptosis, offensive pus evacuated from orbit The patient died 6 days after this operation - probably from meningitis. The original focus of infection was the mouth and from there to the orbit.

Duration of treatment 6 weeks

Result died.

CASE 78

Male aged 23.

Duration 18 months - with enlarged spleen. Fever for one month at onset

Other cases in village, none in family

On admission weak anaemic - temperature variable 99° - 102° F.

Spleen enlarged Liver enlarged.

Blood R. B. C. 3710,000 Hb% 70 Cl 0.9.

W. B. C. 4000 Polymorphs 60

Small Lymphocytes 25

Mononuclear 15.

W. B. C. : R. B. C. : 1:930

Haemolytic Test + Formalin +

Liver Puncture L.D. +

Lungs marked broncho - vesicular breathing over both lungs - considered tubercular.

Progress not good - temperature chart showed marked variability.

Complications Erysipelas of face - attack severe but good recovery.

Diarrhoea constant and severe, continued throughout illness, considered tubercular.

Active Tuberculosis of Lungs signs of activity gradually developed with crepitations general over lungs.

On discharge temperature remittent 98° - 103° F.

Spleen not enlarged Liver not enlarged.

Haemolytic Test + Formalin +

Blood W. B. C. 6200 Hb% 70

Patient weak with constant cough

Duration of treatment 6 months Total of drug I. 34. grams.

Result Kala-azar considered cured.

Poor condition due to Tuberculosis of Lungs and Bowel.

CASE 79

Male aged 30

Duration 2 years, fever continuous with enlarged Spleen

Other cases in village - none in family.

On admission condition fair - laryngitis, gingivitis
Anaemia albuminuria.. Temperature high
remittent with double rise
Spleen enlarged Liver enlarged
Blood R. B. C. 3321, 000 Hb% 65 Cl 0.9.

W. B. C. 4100 Polymorphs 52
Small Lymphocytes 21
Mononuclear 27

W. B. C. :: R. B. C. :: 1: 810

Liver Puncture L. D.+

Lungs bronchitis.

Complications Developed erysipelas after
being in hospital 3 weeks.

Pneumonia developed four days later

The patient was removed from hospital
on the 3rd day of the disease in very
serious condition.

Result Not cured.

CASE 80 Male aged 5

Duration 2 years, cough, fever and gradual enlargement
of Spleen.

Other cases in village, none in family

On admission condition good - gingivitis, temperature
100° - 101° F in evening

Spleen and Liver enlarged.

Blood R. B. C. 2842,000 Hb% 60 Cl 1+

W. B. C. 3200 Polymorphs 45
Small Lymphocytes 24
Mononuclear 31

W. B. C.:R.B.C. : 1. 900

Haemolytic Test + Formalin +

Liver Puncture L. D.+

Heart tic-tac rythm, myocardial change

Progress excellent - temperature came below 100° F in
six weeks and remained about 99° F for remainder
of treatment.

On discharge condition excellent

Haemolytic Test + Formalin -

Blood R. B. C. 3040,000 Hb% 60

W. B. C. 5200, Polymorph 64
Small Lymphocytes 23
Mononuclear 13

Spleen slightly enlarged Liver palpable.

Duration of treatment 5 months Total of drug 1.56. grams

Result Cured.

CASE 81

Male aged 5

Duration 6 months, fever for 6 months and then Spleen enlarged.

No other cases in village, one other case in family.

On admission good condition, Anaemic, fever-low temperature to 100° F.

	Spleen enlarged	Liver enlarged	
<u>Blood</u>	R. B. C. 2872,000	Hb% 60	Cl 1+
	W. B. C. 2800	Polymorphs	46
		Small Lymphocytes	27
		Mononuclear	27
	W.B.C.:W.B.C. 1:1020		

Haemolytic Test + Formalin Test -

Liver Puncture L. D. +

Lungs slight bronchitis.

Progress Temperature shows marked variability, remissions alternating with remittent temperature, not controlled by injections,

Complications oedema feet and dilatation of heart

Jaundice - very marked - developed after a period of four months treatment.

This was accompanied by ascites.

The temperature became remittent during this attack 98° - 103° F.

This jaundice gradually got deeper until the 7th day of its onset when patient left hospital

Duration of treatment 5 months, Total of drug 1 gram

On discharge condition not good - Jaundice deep, high fever, slight albuminuria, ascites, Spleen somewhat smaller.

<u>Blood</u>	R. B. C. 3,100,000	Hb% 60	
	R. B. C. 4800,	Polymorphs	65
		Small Lymphocytes	23
		Mononuclear	10
		Eosinophil	2

Result Not cured.

CASE 82

Male aged 12

Duration 9 months, fever for 3 months and then spleen enlarged.

On admission Condition good - anaemic - temperature remittent to 102° F in evening, slight indication of double rise.

Spleen enlarged Liver not enlarged.

<u>Blood</u>	R. B. C. 3240,000	Hb% 70	Cl 1+
	W. B. C. 2900	Polymorphs	42
		Small Lymphocytes	19
		Mononuclear	36
		Eosinophil	3
	W.B.C. R. B. C. :1:1100,		

Haemolytic Test + Formalin + Liver Puncture L.D. +

Progress Good -

Complications Tonsillitis.

Temperature ceased to remittent in 10 days

Case 82

After first two weeks temperature remained below 100° F. except during tonsillitis
Duration of treatment 5 months, Total of drug 1.54 grams

On Discharge Good condition, temperature only to 99.2.0° F. for a month previous

Haemolytic Test + Formalin +
Blood R. B. C. 3425,000 Hb% 70
W. B. C. 7200 Polymorphs 74
Small Lymphocytes 19
Mononuclear 7

Spleen slightly enlarged Liver not enlarged.

Result Cured.

CASE 83.

Male aged 12

Duration 18 months, fever for 3 months, then Spleen enlarged - cough and epistaxis.

On admission Condition good - slight gingivitis swelling of cheek - temperature varies from 100° - 101° F. in evening, not remittent
Spleen enlarged, Liver not enlarged

Blood R. B. C. 3,124,000 Hb% 60 Cl 0.9
W. B. C. 4600 Polymorphs 49
Small Lymphocytes 25
Mononuclear 24
Eosinophil 2

W. B. C.: R.B.C: 1:700

Haemolytic Test + Formalin Test +

Liver Puncture L.D. +

Heart Dilatation of left ventricle with weak sounds

Lungs bronchitis

Progress good, condition of cheek treated with two doses of "914" on supposition that it was a pre-cancerum condition.

There was complete recovery

Duration of treatment 4 months Total of drug 1.15.grams

On Discharge Temperature 98° - 100° for three weeks.

Haemolytic Test + Formalin +
Blood R. B. C. 3,664,000 Hb% 70
W. B. C. 6200 Polymorphs 70
Small Lymphocytes 22
Mononuclear 6
Eosinophil 2

Spleen enlarged but greatly reduced

Liver not enlarged.

General condition excellent.

Result

Cured.

CASE 84

Female aged 48

Duration 10 months- fever for four months and then Spleen enlarged.Other cases in village - none in familyOn admission Anaemic,

Spleen and Liver not enlarged

Temperature sustained 100° - 101° F.

Blood R. B. C. 3332, 000 Hb% 20

W. B. C. 4000, Polymorphs 52

Small Lymphocytes 24

Mononuclear 22

Eosinophil 2

W. B. C. : R. B. C. :: 1:833

Haemolytic Test + Formalin Test +

Liverpuncture L.D. +

Temperature became remittent during second week, fever to 104° F with rigors on several occasions "Van Heyden 471" administered with result as previously described, the temperature falling. A double rise was marked during high fever

Progress was uninterrupted after 23rd day of treatment (Temperature 98° - 99.2° F. for one month)On discharge Spleen enlarged but greatly reduced Liver not enlarged.Blood Haemolytic Test + Formalin +

R. B. C. 3112, 000 Hb% 70

W. B. C. 5800, Polymorphs 70

Small Lymphocytes 20

Mononuclear 8

Eosinophil 2

Spleen just palpable

Liver not enlarged.

Duration of treatment 4 months Total drug 2-4 gramsResult Cured.CASE 85.

Male aged 11.

Duration 10 months fever with enlarged SpleenOn admission Anaemic - Spleen enlarged Liver not enlarged

Temperature low to 100° F. 65

Blood R. B. C. 3200, 000 Hb% Cl 1+

W. B. C. 3720, Polymorphs 50

Small Lymphocytes 21

Mononuclear 26

Eosinophil 3

W. B. C. : R. B. C. :: 1:887.

Haemolytic Test + Formalin +

Progress good- only complication abscess of neck

Temperature 100° - 101° F. during treatment

until last month when 98° - 99° 2. F.
Duration of treatment 4 months Total of drug 1.11 grams
On discharge, Temperature 98°-99.2.F
 Haemolytic Test + Formalin +
 R. B. C. 3220, 000 Hb% 65
 W. B. C. 6840 Polymorphs 75
 Small Lymphocytes 16
 Mononuclear 8
 Eosinophil 1
Spleen slightly enlarged, can be pushed
 up under costal margin
Liver not enlarged
Result Cured.

 CASE 86 follows Case 65.

CASE 87

Male aged 15
 No "History" available.
On admission Temperature 99° - 100° F in evening.
Spleen enlarged Liver enlarged
Blood R. B. C. 2740, 000 Hb% 55 Cl 1+
 W. B. C. 2800, Polymorph 40
 Small Lymphocytes 24
 Mononuclear 34
 Eosinophil 2
 Haemolytic Test + Formalin +
Liver Puncture L.D. +
Progress Good-acute bronchitis on one occasion
 Temperature 100°-101° F. with occasional
 exacerbations during greater part of period
 of treatment
Duration of treatment 4 months Total of drug 0.8 grams
On discharge Spleen not enlarged
Liver enlarged.
Blood R. B. C. 3274, 000 Hb% 65
 W. B. C. 8800 Polymorph, 70
 Small Lymphocytes 20
 Mononuclear 10
 Haemolytic Test + Formalin 0
Result Cured

CASE 88

Male aged 15

No History available

On admission fever, not remittent 100° - 101° F. in evening.

Spleen enlarged Liver enlarged

Blood R. B.C. 3110,000 Hb%60 Cl 1-

W.B.C. not recorded, Polymorph	42
Small Lymphocytes	23
Mononuclear	33
Eosinophil	2

Haemolytic Test + Formalin +

Liver Puncture L.D. +

Heart slight dilatation

Progress fair -

Complications Chronic Parenchymatous Nephritis with marked general Oedema.

Temperature remittent during second and third week 100° - 102° F gradually coming down until latter part of treatment 99° - 100° F.

Duration of treatment 4 months Total of drug 1.36.grams

On discharge temperature 98° - 100° F. general condition good - slight albuminuria

Spleen enlarged - but reduced in size

Liver slightly enlarged

<u>Blood</u> W.B.C. 6800, Polymorph.	77
Small Lymphocytes	18
Mononuclear	4
Eosinophil	1

Haemolytic Test + Formalin +

Result Cured.

CASE 89

Female aged 32

No history available

On admission ~~apycaxial~~ Spleen enlarged Liver enlarged

Blood R. B. C. 3120,000 Hb% 60 Cl 1-

W. B. C. 4600 Polymorph	48
Small Lymphocytes	20
Mononuclear	31
Eosinophil	1

W. B. C : R.B.C. 1-700

Haemolytic Test + Formalin +

Liver Puncture L. D. +

Progress excellent. Pyrexia persisted throughout treatment varying from 99° -100° and sometimes to 101° F. This continued throughout and may have been kept up by the injections.

On discharge Condition good

Spleen just palpable

Liver not enlarged

Haemolytic Test+ Formalin Test+

Temperature 100°-101° in evening

Duration of treatment 3 months. Total of drug 2.16.grams

Result Cured

(N.B. as the temperature about time of discharge was generally higher than earlier in the treatment, it was not considered as due to kala-azar)

CASE 90

Female aged 5

Duration 15 months - spleen enlarged for 12 months and this preceded by fever. Previously Otorrhoea "and dysentery"

Other Cases in village - none in family

On admission No Otorrhoea - condition good. temperature varies daily 98°-99° F. 99°-101° F

Spleen enlarged Liver enlarged

Blood R. B. C. 3100,000 Hb%60 C.I. 1

W. B. C. : R.B.C:: 1: 1100

Haemolytic Test + Formalin +

Liver Puncture L.D. +

Progress good - temperature remittent from second week (N.B. only after treatment commenced) and continued so until a few days before death. Double rise shown at intervals. After 11 weeks treatment developed Cancrum Oris and died on the 8th day of this disease. One dose of "914" (0.15) grams, and two doses of gentian violet 0.05 grams were given intravenously without effecting a cure.

Duration of treatment 12 weeks. Total of drug 0.25 grams.

Result Died - Cancrum Oris

CASE 91

Male aged 21.

Duration 9 months - fever for 4 months and then Spleen enlarged. Previously "dysentery" and epistaxis

On admission Anaemic - slight oedema-fever low to 100° F in evening.

Spleen enlarged Liver enlarged.

Blood R. B. C. 3,322,000 Hb%70 Cl 1+

W. B. C. 4000 Polymorphs 50
Small Lymphocytes 21
Mononuclear 29

W. B. C. : R. B. C. :: 1 :: 830

Haemolytic Test + Formalin +

Liver Puncture L.D. +

Progress excellent - no complications. temperature for first 4 weeks 98°-101° F. for remainder of treatment 98° - 100° F.

On Discharge condition very good - slight fever 99° F.

Spleen just palpable - Liver not enlarged.

Blood R. B. C. 3,400,000 Hb%75

W. B. C. 7000 Polymorph 72
Small Lymphocytes 20
Mononuclear 8

Duration of treatment 3 months Total of drug 2.43.grams

Result Cured.

CASE 92

Male aged 19

No History available

On admission Fever 102° F.

Spleen enlarged Liver not enlarged.

Blood Hb% 70 W. B. C. 3200.

Haemolytic Test + Formalin ± (24 minutes)

Liver Puncture L. D. +

Progress bad - continual diarrhoea, uncontralled by treatment 10 - 20 motions a day.

Albuminuria.

Temperature high remittent with double rise - a few days before death daily variation 98°-103° F. Impossible to proceed with treatment owing to condition of patient.

Duration of treatment 1 month.

Result Died - Kala Azar with severe diarrhoea as complication.

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The following abbreviations are used :-

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"Brahmachari"	Brahmachari Kala Azar 1920
"Young C.W."	C.W. Young - China Medical Journal Vol xxxvii No x.

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