The cases, however, which on the whole have benefited most by potassium iodide here, have been those which previously by oil treatment had had their resistance raised to the maximum.

Influence of hydnocarpus preparations on the sedimentation rate.

By the sedimentation test the hydnocarpus preparations reveal their two-fold therapeutic action, namely, that of autovaccination and their tonic effect. The former is shown by a rise in the sedimentation rate and may be accompanied by skin symptoms and temperature—all of which pass off in the usual way. It is almost needless to say that so long as this reaction is produced by the oil, it is hardly necessary to add potassium iodide to the treatment although, among the 120 cases dealt with in these notes, there is one patient who shows distinct idiosyncracy to oil and takes potassum iodide very well.

As resistance increases this reaction effect of the oils passes off and their tonic effect only is manifested. At this stage the oil is a valuable agent in helping to bring down the sedimentation rate when it has been raised by iodide or by any other cause. It may require several doses to attain this, but the non-reaction index will ultimately be resumed—always excepting complicating factors which must be dealt with separately.

Other influence on the sedimentation rate.

Bile—present in the blood of 5 per cent. of these cases, so retarded the rate of sedimentation that the indices were lowered by 20 to 25 points. In such cases iodism may occur whereas ordinarily this is a condition about which few complaints are made.

Starvation accelerates the sedimentation rate and is accompanied by marked leucocytosis. A small boy with a leprotic nerve only had a rate of 44 on admission. He was very wasted and came to us from famine conditions. The same thing was evidenced in a Brahmin patient who had fasted for two years after he found he was suffering from leprosy.

Malaria raises the sedimentation rate so much that a nerve leprosy will leap up from 16 to 64 or more and continue high for some time after the temperature has gone. When resistance is lowered to this extent one can understand how readily malaria provides the conditions in which the *Mycobacterium lepræ* can best flourish. In a patient whose resistance is already poor the effects of malaria constitute a serious problem, especially if the temperature is allowed to remain high for any length of time.

Syphilis and the sedimentation rate.

The sedimentation rate in leprosy when this disease is complicated by syphilis cannot be fully dealt with in these notes. As we know, syphilis reduces resistance and is possibly one of the most important factors in the etiology of leprosy. As a rule mercury when administered by the mouth aggravates the disease and further raises a sedimentation rate which is already high. This is especially so in skin cases who have had no treatment. Among those who have had specific anti-leprotic treatment as well as courses of Hg. 33 and N.A.B. one finds a certain percentage who benefit by mercury when given by the mouth. Among my 120 cases, in eighteen the Kahn test was highly positive. Two of these, who had just been admitted and had had no previous treatment of any kind, could not take mercury orally at all. Their leprosy flared up immediately. As to the others, the sedimentation rate was taken and mercury given orally to the point of mercurialism. This was treated and the patients left for 14 days, when the rate was again checked. In 10 there was no improvement evidenced by the sedimentation rate. In fact in some of them it had risen and when it fell later the former non-reaction index was maintained. The remaining 6, however, showed improvement. The rate had fallen in each.

Case A	previous to	Hg.	S.R.	27	fell to	22
Case B	"	"	"	36	"	28.5
Case C	"	"	"	55	"	37
Case D	"	"	"	36	"	26
Case E	"	"	"	33	"	27.5
Case F	"	"	"	52	"	35.5

This would show that in syphilis complicating leprosy, one might give mercury by the mouth provided a close watch was kept on the sedimentation rate from day to day—deleting those patients who show a rise and pushing the dose in those who improve. No risks are run and the patients have a chance of receiving all possible help.

Conclusion.

From the above notes it should be evident that in the sedimentation test we have a means of controlling treatment hitherto unavailable; and we have learned that in anti-leprous treatment there are limitations which this test reveals and which cannot be ignored. It repays one to study the relative resistance of each individual patient, and even if our treatment appears slow, on no account must this resistance be impinged upon.

NOTES FOR STAFF ENGAGED ON ANTI-MALARIAL WORK.

By W. D. SPEEDY, M.B., B.Ch. (T.C.D.),
Medical Officer, Raipur-Vizianagram Construction, Bengal Nagpur Railway.

His experience of some twelve months as Medical Officer on the Raipur-Vizianagram Construction of the Bengal Nagpur Railway, has led the writer to publish these short notes, written for the benefit of his staff, in the hope that they may prove of help to others, who like himself are engaged on anti-malarial work.

He has been impressed more than ever by the havoc which malaria, uncontrolled by modern "protection" and medicine, makes with the inhabitants of a hyperendemic area, and feels that no propaganda on the subject is wasted. The circular, a reproduction of which is seen below, has for this reason been distributed in addition to the Engineering Officers on the Construction, who have always given the greatest help and without whose co-operation the work would be impossible.

It is obviously desirable that the closest liaison between engineering and medical staffs be observed in the construction of important lines, more especially when these lead through country where malaria and other diseases exact a heavy toll from the labour employed. The medical man learns much from the engineer which is of practical value in this work, and is in turn able to assist the latter to avoid particularly deadly places when labour camps have to be selected, and it is hoped influences him to leave less of a legacy of malaria to the district in which he works.

No claim to originality is made. The system of "protected camps" is that devised by the malariologist of the line, R. Senior White, F.R.S.E., while the sketches accompanying the notes* are adapted from those issued at a very pleasant and instructive malaria class held at Saharanpur in October 1926, under Major G. Covell, M.D., I.M.S., of the Central Malaria Bureau.

Technical terms have been avoided as far as possible as the object of the notes is to provide an efficacious working minimum for the Assistant Malarial Inspectors or Sub-Assistant Surgeons employed who may have little or no special training when taking up the work.

In advising the weekly oiling of camps, the advice of an eminent orthopædic surgeon has been recalled. "Gentlemen, always overcorrect for deformities."

A somewhat egoistical reference to the railway to which I have the honour to belong, may be pardoned. Its inclusion has at heart the fostering of "esprit de corps" without which no unit, military or civil, may hope for any achievement worthy of note.

The "C. M. I." referred to in the text is the Chief Malarial Inspector, a trained man, whose duty it is to inspect and advise regarding the practical side of the work, cutting of drains, oiling, etc.

My thanks are due to J. A. Parker, B.SC., A.M.I.C.E., District Engineer of Jeypore Plateau Survey, and Dr. A. Adhikari, my assistant, for helpful criticism.

Notes for Staff engaged on Anti-Malarial Work.

What is protection? It is a very definite and valuable kind of 'Preventive medical work.'

What is its value? It enables us to prevent malaria and other diseases carried by mosquitoes, by striking at these insects in their vulnerable stage.

It directly prevents much sickness, and in so doing saves for the Railway many hours and days which would otherwise be lost.

How is it carried out? Firstly by choosing camps in as healthy a place as possible, taking into consideration the work for which the camp is needed.

* Not published.—(EDITOR, *I. M. G.*).

Secondly by preparing the ground in and around this camp within the half-mile radius so that all dangerous water is either drained away, or when this is not possible, treated with oil, etc., to render the breeding of mosquitoes impossible.

How does the mosquito grow? Starting life as an egg laid on the water, in favourable circumstances it hatches out as a larva in from two to four days. It lives as this 'wriggler' for a week or so before changing into a comma-shaped 'pupa,' from which within 24 to 48 hours the perfect insect emerges and flies away.

How does this life history affect your work? If the mosquito passes the pupal stage and gets on the wing, your work has been for nothing. *It must be destroyed before it grows its wings*, and remember that in various places this whole cycle may take place within a week, so that if you fail to treat *every collection of water shown on your plan every seventh day*, you are responsible for a flight of mosquitoes which may cause an outbreak of fever in the camp, for which *you* are responsible.

How will you protect a camp? 1. First walk all round it in gradually increasing circles from the centre until you reach the half-mile circle. *Learn every inch of the ground.* A small missed spring or collection of water may breed enough dangerous mosquitoes to wreck your whole work.

2. Your 'protection plan' will show as far as possible all dangerous places requiring treatment, but every camp is in a constant state of change as a result of rain, diversion of nullahs, etc., and *you must use initiative* in dealing with new breeding places. The C.M.I. will give you advice and directions on his inspections but always *act at once*. You will learn gradually the best measures to adopt in each case.

3. From 1 and 2 above you will have learned where mosquitoes are breeding, and your work is now to prevent this by drainage and treatment of water.

What types of water are dangerous?

Always.	Grassy edged streams. Streams in ravines. Hill foot seepages. Running swamps. Cracks and holes in black cotton soil. Springs among rocks.	Hoof marks. Wells. Borrow-pits. Tanks.	*Sometimes.*

Large streams and rivers may need treatment, and rice fields at times breed malarial mosquitoes but cannot be treated without special permission.

You will learn from the C.M.I. on the ground the best type of drain for each kind of water.

How will you treat water that cannot be drained?

1. In streams, pits, ravines, etc., by first having all grass, branches, leaves, etc., cleared from the edges and spraying with crude oil in which a small proportion of kerosine and cresol is generally mixed, or by fixing swabs soaked in oil upstream.

2. In ponds and standing water you will sometimes use cresol, mixed with the water in sufficient quantities to produce a milky tinge. (Do not use unless directed by the C.M.I.)

3. In swamps, paddy, etc., you will use Paris green mixed with dust.

How does oil kill larvæ and pupæ? By clogging up the breathing pores in the insect's body. If you leave grass, branches, etc., in the water you break the oil film and leave 'breathing holes' in the water, so that many larvæ, etc., escape destruction.

What about cresol? This is a definite poison and kills not only larvæ and pupæ but animals and man if used in sufficient strength; hence, the necessity for its careful use.

And Paris green? It is a form of arsenic, does not dissolve in the water but is swallowed by the *larvæ only* to whom it appears as food. It is useless for killing pupæ as they do not feed at this stage of their life.

Note.—Your work will chiefly consist in seeing that the coolies with whom you are provided do the cleaning and oiling work, *every week without fail.*

If you have on occasions to get into a swamp, *do so.* Better men have been there before you.

Learn all you can about the work. Anti-malarial work is just beginning in India and vacancies will exist for men with experience in this Department.

The Bengal Nagpur Railway as usual is first away, and many other railways will follow.

Only men who are keen and conscientious are of any use in the Department. If you are not prepared to work to really stop malaria, you are not required.

A NOTE ON THE ANOPHELINE FAUNA OF A SMALL TANK THROUGHOUT THE YEAR.

By E. S. FEEGRADE,

Military Assistant Surgeon,

The Harcourt Butler Institute of Public Health, Rangoon.

OBSERVATIONS on the tank immediately west of the Harcourt Butler Institute of Public Health for the determination of the species of anopheline mosquitoes breeding therein were spread over a period from January to December in 1927.

The tank is a small one, roughly about 50 yards square, with banks sloped at 45°,—well covered with grass and lined with large trees on all sides,—those on the west being close to the water's edge with overhanging branches which shade the water in the afternoon.

The character of the edges and surface of the water are different at different periods of the year. From January to May (practically the dry months of the year) the edges were free from grass encroachment and the surface was covered with red and green algæ which appeared late in January and gradually invaded the whole surface, thereby producing a mixed colouring of red and green. This growth moved about with the wind, leaving parts of the water-surface clear. At the onset of the monsoon in May the film thus formed by algæ broke up, and after a few showers disappeared entirely. Soon after the first fall of rain, grass invaded the edges of the tank and remained thus throughout the monsoon period and until the end of the year. Besides this grass invasion, three or four species of aquatic plants appeared and flourished concurrently providing suitable protection for the breeding of anopheline mosquitoes.

In the hot dry months of March and April, the water diminished considerably and a noticeable feature associated with this decrease was the abundance of prawns;—these crustaceæ are present throughout the year but not in such numbers as are found in the coldest and hottest seasons. Anopheline larvæ were not destroyed by these prawns experimentally and I assume that neither are they in nature. In addition to the presence of prawns, tadpoles and fish abounded, though the former existed in this form for only a short while before they metamorphosed into frogs; thus they were found in large numbers at the edges of the tank in the latter half of May, but by June forsook the edges of the water for the grassy parts nearby. Prawns were found throughout the year and consisted of the following species:—

1. *Esomus ahli* Hora.
2. *Barbus puntius sophore* (H. B.).
3. *Ctenogobius alcocki* (Annan).
4. *Macrones gulio* (H. B.).

The first three species were collected in the deeper parts and the fourth near the edges. All four species were found to destroy larvæ under laboratory conditions.

The pH value of the water varied from 7.2 to 7.8. The alkalinity increased from January, rising gradually until 7.8 was recorded in May before the first heavy fall of rain. The pH value dropped to 7.2 with the first big fall of rain and alternated between 7.2 and 7.4 throughout the wet season, whereas a long interval without rain occasioned a higher alkalinity.

The anopheline fauna consisted of:—

A. fuliginosus Giles.
A. hyrcanus var. *nigerrimus* Giles.
A. barbirostris Van der Wulp.
A. vagus Donitz.

A. fuliginosus.—This is an interesting species, because of its reputation as a common carrier in the plains of Burma, and in this case it was found breeding in small numbers along the grassy edges of the tank in January. As the water decreased there was no corresponding grassy encroachment, and with the appearance of the red and green algæ, the larvæ of this species also had decreased considerably by the end of the month until none were obtainable. They were not seen again until early in June when they were collected in large numbers where grass and other aquatic plants were invading the edges and when the pH of the water fluctuated between 7.2 and 7.4. Throughout the wet season from June to October, and also from November to January they were found breeding in the tank,—the former period being that in which they were most prevalent.

A. hyrcanus var. *nigerrimus* and *A. barbirostris* bred in the same season as *A. fuliginosus,* but in much smaller numbers in the early and middle parts of the rains and in larger numbers at the end of the monsoon. These species decreased in January and later were not obtainable.

The finding of *A. vagus* in a tank is an unusual feature, but they were found on only a single occasion.

A. fuliginosus is a known transmitter of malaria both in India and Burma, in which latter country it is common, but although it bred in such large numbers it is an interesting fact that there was no evidence of its producing malaria in this neighbourhood. What are the reasons for this? The chief one is, I think, that they have not become infected by feeding on human carriers, for the majority of residents in the vicinity of the tank are more or less permanent inhabitants and have not been exposed