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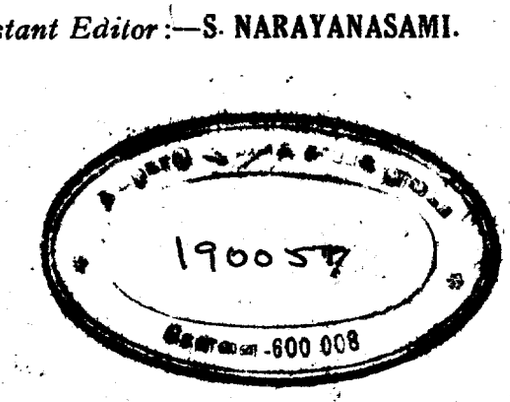

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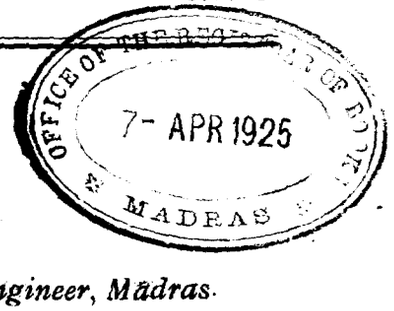

Lectures on

Logging Engineering.

(Continued.)

By, J. Kenneth Pearce, B. S. F. Logging Engineer, Madras.

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II

RECONNAISSANCE.

The first, and I venture to assert, the most important step in any forest project is the reconnaissance, or the art of correctly determining location or details of development of the project by ocular examination. This applies whether the reconnaissance is for a trail, road or railroad, for a bridge site, for working plans, or for planning field work for baseline surveys and mapping, cruising and enumerations. I say the reconnaissance is most important because, if carried out in a systematic manner, it enables the best location to be found and minimises the

chance of a poorer or more costly selection, and because the actual cost of surveying or carrying out the project is decreased. It is almost axiomatic that money spent on reconnaissance saves money on operation.

I have seen so many cases of money wasted, and the best locations missed, because some-one jumped at conclusions, and didn't take the trouble to get over the country thoroughly and see whether his original choice could be improved upon, that I feel the importance of reconnaissance cannot be too strongly emphasized.

It is sometimes supposed that the ability to look at a forested area and correctly interpret what you see is a natural gift. It is undeniably true that many men "look but don't see". But your powers of observation can be developed by exercising them, just as your muscles are developed by exercise. There is no habit more beneficial professionally to a forest man then the "habit of observation". Cultivate it.

There are certain general rules or methods which may be laid down for different types of reconnaissance. Using them as guide insures systematic work and lessens the possibility of missing anything. One common reconnaissance which many of you will probably be called upon to make is for a road or trail. The first and obvious step in your determining the most feasible and economical route is to obtain all the maps available of the country. Then jot down the factors to be considered and continually borne in mind. These will usually be (1) Terminals---you want to start from somewhere and get to some place. (2) The use to which it is to put, i. e. the traffic to pass over it and the possibilities of future improvement of a trail to a road, and

forest road to a highway. A cart road to day may be wanted to convey automotive traffic tomorrow. (3) Location of controlling points, which will usually be streams, crossways, passes, ridges, rock outcrops and other natural or artificial features. (4) Maximum grade and, if a road or railroad, curvature. (5) The materials encountered in construction, and their effect on maintenance; or upkeep. (6) Approximate cost per unit and total cost.

In going over the route in the field you will call to your assistance such portable aids as are available, such as an Abney or Hand Level, a compass, and perhaps an Aneroid Barometer and Binoculars. You will start from one terminal, and walk over your route, bearing in mind the factors outlined above and following this general rule as a foundation; "Never diverge from the straight line or shortest line unless you can show good reason for doing so". There is an old saying among railroad location engineers that "distance cost and directness has value". Remembering this keeps you from aimless wandering about

When the first obstacle is encountered determine the best place to pass it, and correct your line back to the initial terminal. Then follow a new straight line from this controlling point towards your objective terminal, until another obstacle is encountered. Here follow the same procedure as before—determine best crossing, correct back to previous controlling point, and go ahead on a new straight line. By following such a system there is slight chance of missing anything.

In making a reconnaissance for a line to overcome elevations by increased distance a different problem is involved. In this case not the

straightest line and shortest distance, but the best line following you adopted gradient is the objective. The rule to follow is: "Work down from the top". Follow down from each controlling point keeping under your maximum gradient, By following down from the top the country is opening out before you, while going up from the bottom it is closing in on you. In starting from the bottom if you make any mistake in selecting your starting point you may find that the distance is insufficient and your grade line hits below your objective or below some controlling point. Going down from the point itself obviates that dificulty.

In making any sort of a reconnaissance get a thorough knowledge of the *drainage* of the country into your head. The flow of water makes the topography what it is, cutting down valleys and leaving ridges between. The direction and location of the drainage is the framework on which to hang your knowledge of the country.

When you are satisfied that you have found the best route, and have proved it by walking over other possible alternative lines, then, and only then, are you justified in going ahead and making a location survey for construction.

Another type of reconnaissance with which you may be concerned is the determination of the location of baselines from which to make enumerations, cruises, stock maps or detailed large scale topographic maps, and the planning of those operations themselves.

In any sort of mapping you must have primary control, which is the backbone on which the whole is fastened, and secondary control by which the details are obtained.

There are three general methods used in "breaking up the country" into workable units:

1. *The Random Shot Method.*—Plane table mapping is of this type, as well as running enumeration strips at random through the forest or taking occasional small areas here and there which appear to contain an average stand of the whole forest. While random shot methods are of undoubted value in special cases, they are too likely to be misused,—men are too apt to follow the line of least resistance, to be recommended in general.

2. *The Gridiron method.*—The area is divided up into squares irrespective of the topography, parallel baselines being run North and South or East and West usually at intervals of a mile, the secondary control being obtained by running perpendicular strip lines from one baseline to the other at frequent intervals. This method gives the most accurate results, but running baselines is more difficult and costly. Where you wish to obtain a general idea of the character of timber growth on an area without making a regular enumeration, a modification of the Gridiron method by which you run a few parallel strips at wide intervals so as to cross all characteristic topographic features of the country,—valleys, ridges and side slopes, with their variable types of timber growth,—obtains better average results than any other and at less cost, although requiring more energy on your part.

3. *The Ridge and Valley Method*:—Baselines are run along the bottom of the valleys or along the crest of the ridges, in general

paralling each other. This is the most advantageous method for forest mapping here, as it combines the accuracy of the Gridiron Method with the greater freedom of selecting location of baselines where they are easiest to run. The Ridge and Valley Method really makes the drainage farmework I spoke of the farmework of your map. The strip lines are run *across* the contours from one baseline to another, an added advantage in mapping.

The following general principles should be borne in mind in making your reconnaissance for the location of baselines, and planning your work; 1. Baselines should be at such a distance apart that a strip can be run from one to the other in a day, and a tie thus made. The length of a strip line which can be run in a day depends upon the density of the ground cover and the difficulty of the country, but will usually average from 6 furlongs up to a mile. 2. They should in general parallel with the contours, if mapping is to be done from them, in order that the perpendicular mapping strip will cross the contours. For enumerations the baselines should lie at right angles to the lay of the timber so as to get the best average if a percentage strip system is used. (This will be taken up later in the discussion of Cruising) 3. The baselines should serve as accessible routes to get to work. 4. In general locate them where easiest to run, i. e. along old roads or trails or firelines on the crests of ridges or the bottom of valleys if such exist.

Having tentatively decided on their location, walk over the route of your baselines before you spend any money in surveying them,

and see if any improvement could be effected or a better location found.

Remember, and keep in mind in any reconnaissance you may do, that there was never a route selected or a location made which could not be improved upon in some respect. Never consider that any selection is the best, but endeavour to find a better one. Never be easily satisfied in your own mind. Don't give up too easily in your quest. And above all don't be afraid of walking. Whatever your forest work, get a thorough personal knowledge of the area with which you have to deal by using your own legs to get over the country and your powers of observation to record accurately what is there to be seen.

III

RUNNNIG BASELINES OR TOPOGRAPHIC AND STOCK MAPS.

Knowing that the baselines are the farmework or backbone on which you build your topographic maps and cruising or stock maps, you can readily appreciate the great necessity for accurate baselines.

The larger the project the more important they become While a compass line may suffice for a small tract, the preparation of accurate operation plan maps for an area of any size demands baselines run with a transit or theodolite. The forest man who is connected with any development project will have to know the principles of transit survey.

The best results are obtained with the "Transit Traverse-Dumpy Level method." Alignment or "horizontal control" is obtained by a

theodolite traverse run along the routes previously selected by reconnaissance for your baselines No attempt is made to run an absolutely straight line as this is impracticable in the forest. Angles are turned as necessary to avoid trees and other obstacles. A wooden peg or hub is driven flush with the ground wherever a change in direction necessitates a transit station, and the transit set up over a tack in the centre of the hub The angle is taken from the preceding transit station to the next hub ahead on line. Distances between hubs are horizontally chained with a 100 ft. tape, the station numbers being marked on a "Guard stake" besides each hub. Sometimes intermediate stakes are set on line between transit stations at every even 100 ft. Elevations or "vertical control" (required if topographic mapping is to be done) is obtained by following along the line with a Dumpy level or Wye level and rod, with which you are already familiar.

A modification of the above method which is very useful in steep slopes where dumpy levelling is very slow and horizontal chaining difficult, is found in the "Transit Traverse—Trigonometrical Levelling Method." Vertical angles are read at the same time that horizontal angles are taken, and distances are chained along the slope Difference in elevations and horizontal distances are calculated in the office by trigonometry (Diff. Elev=Slope Dist × Sine Vertical Angle; Hor. Dist=Slope Dist × Cosine Vertical Angle). While not as accurate as the "Transit Traverse—Dumpy Level" Method, this is faster and cheaper in steep country.

A third method which has not to my knowledge been used in Southern India as yet is Stadia Survey. In the hands of a good transit operator it is the fastest and least expensive of the transit methods. A transit equipped with stadia cross hairs in the telescope tube is required. These are set a fixed distance apart so that when sighting on a Level Rod they intercept on the rod an amount equal to the distance between the transit and the rod. For instance, at 100 feet distance the stadia hairs intercept one foot on the rod, at 200 feet distance 2 ft., and so on. A reading of 2. 47 intercepted on the rod would mean that the rod was 247 feet away. Horizontal and vertical angles are taken as in the previous method. "Stadia arcs" are also obtainable for fastening on the vertical arc of the transit which gives directly vertical and horizontal distances, eliminating trigonometrical calculations in the office. The stadia method requires only a transitman and a rodman, and chainmen are dispensed with.

The fourth method, "Prismatic Compass Traverse Dumpy Levelling" needs no explanation.

A modification of this gives the cheapest but correspondingly least accurate method - "Compass Traverse - Double Abney Levelling". Elevations are obtained with the Improved Abney level which we use in topographic mapping, two men, each equipped with an Abney sighting at each other, which insures additional accuracy. Where time and cost are more important factors than precise results, this method may be recommended.

On any transit party the field organization will be substantially as follows, given in the order of their position along the line:

(1) Chief of party. He goes ahead selecting the transit station as to get the longest shots, and keeping the crew working toward him. He sets the pace and sees that everybody keeps moving. He is followed by (2) the swampers who cut brush and clear the line sufficiently for the transitman to sight from one station to the next, and the chainman to measure unimpeded. (3) The head flagman sets a hub in the spot indicated by the Chief of the Party and holds plumb bob over the tack, giving the transit man a sight on the plumb bob string. Where very long shots are obtainable a sighting pole may be used, but a plumb bob is ordinarily most satisfactory. (4) The Head Chairman and Rear Chairman or, as I believe you are accustomed to call them, the Leader and Follower, chain the distance, using pumbs bobs so that the chain can be held horizontally when going up or down hill They mark station numbers on the stakes. I use a plus system of marking, the even 100 stations being maked 0+00 (the starting point) 1+00, 2+00, etc. The transit stations which will usually be odd numbers are marked in a similar fashion, i. e., a station 259 feet from the origin would be marked 2+59, if 1477.3 feet, the guard stake would be marked 14+77$\frac{3}{10}$. This system has many practical advantages. Experience has demonstrated time and again that more errors are made in chaining than in any other part of a survey. The chainmen must be first class men. (5) The transitman operates the transit turning the angle from the station behind to the one ahead, records angle and distances in a note book, and keeps the chainmen on line. (6) The last man of the party,

the Rear Flag man, always stands at the station just behind the one on which the transit is set up and in the same manner as the Head Flagman holds a plumb bob over the tack in the hub for the transitman to sight at. In a small crew one man may do two jobs, as a Rear Chainman and Rear Flagman, Head Chainman and Head Flagman, or Chief of Party and Head Flagman combined.

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Mode of nutrition and digestion in a higher mammal and a higher plant compared.

The manner of food-taking and digestion by a higher mammal, say man, and that by a higher plant, are interesting when compared. In the former the food is chewed or masticated in the mouth, and mixed with the secretion of the salivary glands. The mixed food is then transferred to the stomach, where further secretions from the glands in the stomach walls are poured into it. After a certain period the food passes into the intestines where it is absorbed in its altered form by minute vessels in the intestinal wall, which directly or indirectly distribute it to the protoplasmic cells which require nourishment.

The plant on the other hand has a very hard time of it. It has to build up its food from very elementary substances. It has to make use of millions of mouths some underground, (root-hairs), and some aerial (stomata). Through these it absorbs its food, which it can take only in a liquid or gaseous form. It cannot *eat* or *masticate* like the animal, but can only drink! The leaves form a sort of laboratory where the green parts

Carbon.

utilise the sun's light as fuel, and are active in building up the most complex substances from the very elements in the air. An examination of a piece of charcoal would reveal how uniformly the element *carbon* is distributed in the plant and how largely the substance of the plant is made up of it. It has been found that carbon constitutes about one-half of the dry weight of the plant. The amount of carbon-di-oxide present in the air is so meagre that for every 10,000 parts of air there are only about 3 parts of carbon-di-oxide; and yet all the carbon of the plant has to be gathered from such a dilute medium around it. No carbon could be abstracted from the soil. In order for a single tree having a dry weight of 5,000 kilos to acquire its 2,500,000 grammes of carbon, it must deprive 12 million cubic metres of air of their carbonic acid gas! In this laborious task the plant is not selfish by benefitting itself, but confers a boon to the animal kingdom by a thorough purifying of the air which is being continually vitiated by carbonic acid gas given out by respiration of animals and by other means. It builds one of its chief food materials from the refuse of the animal kingdom. In fact the plant world is unique in that the green plant not only manufactures its own organic compounds, but does so for all the world. The animal kingdom is dependent on the plant kingdom for all its organic food supply, and for the purification of the air they breathe "If one considers how many square metres of leaf surface are actively assimilating day after day on the surface of the earth, a conception of the huge production of organic material in this largest of all chemical works will be obtained. The German wheat harvest alone contained in the year

1900 about 23,000 million kilogrammes of assimilates."

Nitrogen.

From the large percentage of *nitrogen* present in the air, one might easily suppose that the plant could feast with avidity on this another important food material; but strangely enough the *plant which could abstract all its carbon from the extremely small quantity of carbon-di-oxide in the air, is utterly incapable of utilizing even the smallest amount of this gas—nitrogen—by means of its aerial mouths. (stomata) It can as well exclaim "Nitrogen, Nitrogen, everywhere, not an atom to drink!" For getting this element the plant can only make use of its subterranean mouths.

The process of digestion is fundamentally the same in plants and animals. There is a similar breaking up of the food material by hydrolysis or otherwise, and a similar use of enzymes formed by the plant. In both there are enzymes which act on the carbohydrates, enzymes which break up fats into their constituents, fatty acids, etc.

Carnivorous Plants.

Special modes of nutrition are also met with in the higher forms of plant life. Some plants have acquired a *carnivorous* habit, probably as an easy means of obtaining nitrogen. They all have the green pigment (chlorophyll) and can assimilate carbon. They are provided with arrangements for the capture and retention of small animals, especially insects, and for the subsequent solution, digestion, and absorption of the juices of the

*[With the exception of members of the Leguminosæ, some genera of Rubiaceae, etc.]

captured animals by means of enzymes. They are more or less "indifferent non-vegetarians." They can succeed without animal food, but it has been found that the moderate supply of an animal substance has a distinctly beneficial effect as shown in an increased production of fruits and seeds-

Parasites (flowering)

Again, there are plants which have taken to robbery. Those like *Viscum, Loranthus*, etc., attach themselves to *branches* of trees by special sucking organs (haustoria) by means of which they obtain the water and salts necessary for their growth. The Sandal and *Ximenia* produce haustoria which attack the *roots* of other plants. The root parasite *Rafflesia* has so far specialised in robbery that the plant has practically dispensed with all its shoot-system and consists mainly of a gigantic flower measuring nearly a yard across. The flowering plant *Cassytha filiformis* has likewise dispensed with its leaves and occurs as tangled masses of yellowish green threads infesting *Engenias, Acacias*, *Buchanania*, etc.

It will thus be seen that, with a few exceptions, plants have a harder lot in that they have to manufacture their food and that from very elementary substances—before taking it in. —[*Editor.*]

"An interesting night in a Machan."

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A hot day in the month of May, and it can get exceedingly warm in Upper Godavari—the thermometer rising well over 120° in the shade—when one feels like nothing on earth. It was on such a day that "Khubber" was brought me about 3. p. m. that a tiger had killed a cow and its calf the previous night quite close to the main D. P. W. road and about a mile from the rest house. This was exactly what I was wishing for—a night in a machan was much more pleasant and interesting than tossing about on a hot bed—and I sent off my shikarie peon to erect a machan, with my heavy rifle and electric-light paraphernalia. I started about 4/30 and in half-an-hour's time reached the spot where the operations of erecting the machan were almost completed. I invariably see to the erection of my machans, but just because I did not do so on this occasion every possible mistake imaginable had been committed. The worst was that the machan was fully 25 yards from the kill, which was under a fairly dense bush and there was nothing closer than 25' on to which to tie up my electric-light. However, there was no time to remedy matters, so let things be and hoped for the best Before climbing up I had the calf, which was hidden in another bush, pulled towards where the carcase of the cow was, and then removed.

Nothing happened till 1 A. m. when I heard the carcase of the cow being tugged most viciously and on switching on the electric

light made out the faint form of a tiger. I brought up my rifle, but on trying to aim, the tiger and the carcase seemed to blend into one—the cow was also of tawny colour—and it was impossible to say whether I was aiming at the tiger or at the cow! The trouble was that the electric-light was too far off and in addition my machan was not close enough to the kill. I brought up my rifle at least a dozen times, but did not fire, as I was not sure of hitting the tiger, let alone hitting him in the right place. Well, the tiger fed nearly half-an-hour in the full blaze of my electric lamp and then went off and I thought that was the end of him—but no, he evidently went to have a drink and returned at 4 a m. Again I must have brought up my rifle a dozen times, but refrained from firing and after the tiger had another twenty minutes' feed—the electric light burning the whole time—he went off roaring for quite a long distance.

In the morning I told the peon that his lack of judgement had lost me a tiger and directed him to build a Machan on a tree just 30 feet from the kill. I took up my position quite early in the evening and at about 7. 30 I heard the tiger coming along—he did not come to the kill at once, but lay down on the further side of the bush for fully an hour and only then approached the kill when he thought that the course was clear.

As soon as he pulled the carcase, I switched on and could see the tiger quite clearly half facing me, and aiming at his chest, fired. He let out an awful roar, rushed mad for about twenty feet,

then fell over and there he lay rolling about and groaning. It was pitch dark and I could not see him to fire again nor was I able to be helped down from the Machan. By about 10 o'clock I had pretty well got accustomed to the fact of there being a wounded tiger quite close by, which reminded me of its presence by his deep breathing and occasional groans, and feeling hungry I began to have something to eat. I had scarcely started when there was an awful noise behind me, but soon guessed that it was a hyena that had scented the kill and was in a bad humour because he could not find it quick enough for his liking. His nose played him false for some time, for he kept on trotting about in every direction unable to locate the spot and when he did do so he came close to the kill and instead of starting on it kept running up and down alongside the kill and complaining most bitterly in his hideous language. At first I thought he was afraid of the tiger's presence, for "Stripes" would now and then let out a growl, but you can imagine my feelings when I heard the carcase being tugged at again, though the hyena was nowhere near it. I really thought that I had missed the tiger and he was shamming all this time and had come back to have his feed—but that was impossible, for I heard the tiger growl that very second far away from the kill, and it must be some other animal of whom the hyena was afraid. It was so, for when I switched on I was agreeably surprised to see a fair-sized panther squatted down like a huge cat and having a feed most unconcernedly. It was interesting—but comic too—there was the wounded tiger growling

away, 'spots' having a feed as if he did not mind a hoot for the tiger's presence, and there was the old hyena trotting up and down near the kill in a very surly mood and abusing the panther for having deprived him of a hearty dinner.

Needless to say, I did not waste a second in trying to get a shot at the panther. I was using a H. V—.470 D. B. hammer rifle and after I had had a shot at the tiger, I inserted a first round in the right brush and lowered the hammers prior to having a meal and in the hurry to fire at the panther I forgot to wipe my hands and my thumb being rather greasy the right hammer slipped and there was an awful bang—the rifle almost being jerked out of my hands. Well, I thought that was the end of the panther, but he was only startled and jumped up and after a second or two started feeding again. I aimed at him carefully and let him have the left barrel, but he just hopped to one side, looked in the direction of the hyena suspecting him as the culprit for all this disturbance and started on his interrupted dinner. I had one more cartridge and loading up quickly had another deliberate shot at "spots"—but bless my soul, if I did not miss him again! this time he did not even take the trouble to jump!! I did feel annoyed and at one time felt like flinging my water-bottle at the beast. I could not call my men to come to the place, for there was the wounded tiger near, so all I could do was to sit tight and watch the forest drama enacted below me. The panther after having a good feed would go off for a drink evidently, roaring as he went, pleased with himself and life—the hyena would during such

intervals sneak in and have his share. Once he was careless and was caught in the act by the panther and there was quite a stand up fight. The panther and the hyena were at the carcase alternately till 5 A. M., but the latter was at first shy of the electric light and ran off as soon as I switched on; he got used to it, however, in time and I was able to see him feed quite distinctly. He was a huge brute and quite a match, with his powerful shoulders and jaws, for the small panther. After three shots in quick succession the tiger seemed to have dragged himself, for I could not hear him.

My peon and others came to help me down early in the morning and the peon, with his sharp eyes, spotted the tiger stretched out quite in the open as soon as he got up to the machan. It was strange that I did not see the tiger, though I started looking for him as soon as it began getting light and am sure that I looked in that very direction more than once. The tiger must have died quite early during the night, for he was quite stiff when picked up: he measured 8'-10".

How I missed the panther twice at such close quarters is quite a long story—but the fault was not due to bad shooting or the inaccuracy of my rifle—and I very nearly missed the tiger from the same cause.

I daresay I could have bagged the panther in the evening if I sat up for him, but I was too tired after two sleepless nights and besides I had a long, hot walk of 20 miles before me the next morning to get to my next camp.

R. H. M.

Notes on the identification of some of the more common Madras Timbers.

In continuation of my article "Aids to the identification of some timbers" which appeared on page 222 of Volume 1 of this magazine, the following further notes will, it is hoped, be useful and interesting.

In judging timber specimens with the naked (unaided) eye it is easy to mistake one for another, but an ordinary hand lens, and a pocket knife will reveal important differences of the component parts of each timber in kind and degree. There are groups of Madras timbers which look more or less alike, and unless one is very cautious and examines the *structure* of the timber, one is apt to be defrauded in many cases such as that of a contract for the supply of a specified timber species, especially when the contractor who supplies the timber is shrewd enough to *select* pieces of timber of an inferior species which make a near approach to the specified one, or otherwise 'doctor' them.

The following are some of the more important groups:—

Group I:—(*a*) *Dalbergia latifolia*

(*b*) *Terminalia tomentosa*:—

In the case of Rose wood and Terminalia tomentosa, for instance, there is a great deal of *variation in colour*. A weathered, (i. e. exposed to the action of air etc.) or light coloured variety of Rosewood looks not unlike a dark coloured one of Terminalia tomentosa. Though

the value of the latter has considerably increased as a result of the advertisement of that species in European markets, it is inferior to Rosewood, especially in India, and as such one has to be cautious in passing off a timber as Rosewood.

Though the appearance of the two surfaces may be alike to the naked eye, examination with a lens would show differences: (1) The *pores* (botanically known as *vessels*) in Rose-wood—examine a *transverse* section—are somewhat *smaller* and practically *without* any substance inside them, whereas those in Terminalia tomentosa are *larger*, and usually *filled* with a *brownish* substance (2) The streaks on a longitudinal surface of Rose wood are *straighter* than those on the other species. (3) A *pinkish* stain is produced when a wet handkerchief is rubbed on a fresh-cut surface of Rose wood, whereas a different (*brownish*) one is produced in the other case. Other and minor differences can also be noticed.

Group II:—(*a*) *Tectona grandis* (Teak).

(*b*) *Lagerstroemia lanceolata* (Venteak).

(*c*) *Artocarpus hirsuta*. (Wild jack.)—a weathered piece of it.

(*d*) *Butea frondosa*:—(Bastard teak).

These four again are not very different from one another. In cabinet making it is possible to mix Venteak with Burma Teak with impunity. Indian Teak when fresh cut will show a characteristic smell and a greasy feel when touched, and Burma teak—because of

the practice of girdling in vogue there—will show it to a less degree. But Venteak will fail to show any. The growth, or annual, rings in teak are more prominent. Venteak has a peculiar pinkish colour which Teak has not. The fibres in Venteak are longer and coarser. By means of the above differences it is easy to recognize Teak and Venteak.

Artocarpus hirusta (Wild jack) is lighter than Teak—the weight per cubic foot of the former being 36 lbs and of the latter 45 lbs. The medullary rays in Wild jack are more clearly visible than in the other, especially on a radial section. The white deposit in the pores of wild jack is more abundant than in those of Teak. Teak has a characteristic scent when fresh cut, which wild jack has not.

Butea frondosa has no annual rings.

Group III:—(*a*) *Mesua ferrea* (a light coloured variety of it as the variety *Mesua speciosa* of Beddome.)

(*b*) *Pœciloneuron indicum* (a deep coloured sample of it.)

Of Mesua ferrea, Beddome recognises three distinct varieties:

M. '*ferrea*' (of Beddome); broad leaved, with small flowers and fruits; has the strongest timber of the three, and is of the deepest red colour.

M. '*coromandelina*' (of Beddome); small and narrow leaved, but with larger flowers and fruits.

M. '*speciosa*' (of Beddome); long leaved and with large showy flowers; timber the least strong of the three, and of the lightest shade of red.

The last mentioned variety will match fairly well with a deep coloured sample of *Pœciloneuron indicum* It is not uncommon in the Malabar Railway line now and then, for contractors to attempt to palm off select sleepers of Pœciloneuron as Mesua ferrea. The offence in this case is however not serious as Pœciloneuron indicum sleepers are only a trifle inferior to Mesua. The following points will help one to detect frauds of the kind:

(1) Even the deepest shade of red of Poeciloneuron is a *bit* lighter in colour than the palest variety of Mesua.

(2) The numerous fine wavy concentric lines of dark coloured tissue so regular and prominent in Mesua, occur but rarely in the other species, and if present are never so regular and uniform in it as in Mesua.

(3) The *yellow* deposit in pores is more abundant and common in Mesua than in the other. A *reddish* or yellowish red deposit is much more to be seen in the pores of Poeciloneuron. The pores in the latter are more completely blocked than in the other, and the number of pores per unit area in Poeciloneuron is greater.

(4) The *chains* of pores are *shorter* in Poeciloneuron.

(5) Owing to the generally lighter coloured back-ground in Poeciloneuron, the pores with their reddish contents stand out more prominently than in those of Mesua.

(6) Poeciloneuron indicum is lighter than Mesua. (Average weight per cubic foot is 59 lbs. and 70 lbs. respectively).

Group IV:—(*a*) *Hopea parviflora.*

(*b*) *Eugenia spp.*

Eugenia is very inferior to *Hopea* but is sometimes passed off as the other. Only a couple of years ago, an officer of the Public Works Department who was about to accept as Hopea parviflora a very large number of rafters supplied by a local contractor, suspecting the identity of the timber, sent me a sample of the same for examination and report. It was found that the timber was a species of Eugenia quite inferior to what it was purported to be, but the *appearance* of the sample and of the real Hopea was practically identical.

Eugenia is not as *hard* as Hopea and has a *pinkish* grey tinge which Hopea has not. A rough-and-ready test tried by me was to put shavings of a piece of Eugenia and Hopea in two separate test tubes of of water and note the colour imparted, after putting an iron nail in each tube. Owing to the large quantity of tannin present in Eugenia the water in which Eugenia shavings were put turned quite black in colour while the gum-resin of Hopea imparted a light brown tint to the water.

Hopea never gives a black reaction. This I was prompted to do as I once noticed a carpenter's hands stained quite black while planing a panel of Eugenia jambolana. The fine shavings of Eugenia, the perspiration of his hands and the iron of the plane together gave the black reaction! But I am not sure if *all* Eugenias or if Engenias *only* give this reaction This is, though not, a decisive test, a corroborative one. (The medullary rays are more prominent, and the pores much more numerous in Hopea than in Eugenia).

Sal is not unlike Hopea parviflora, but both are however, superior species The interlacing of the long prominent fibres so well marked on a longitudinal surface of sal is absent on a similar section of Hopea which unlike the other is not cross-grained, but quite even. (smooth)- The deposit inside the pores of Sal is much more abundant than in the case of the other

Group V:—(*a*) *Hardwickia pinnata* (Malabar mahogany.)

(*b*) *Calophyllum tomentosum* (Poonspar.)

Hardwickia pinnata, called 'Malabar mahogany' is largely used on the west coast for furniture. Calophyllum tomentosum which for this purpose is inferior to (and cheaper than) the Malabar mahogany is sometimes mixed with the other and the whole furniture is passed off as made of Malabar mahogany. At least I know of two cases in which this has been done.

Hardwickia is of a deeper red than Calophyllum, and very often shows on a longitidinal section a large number of dark-brown streaks due to the resin in which the tree abounds.

(2) The oblique *strings* or "*chains*" of pores so characteristic of Calophyllum (and Guttiferae in general) are totally absent in Hardwickia, and should furnish an important point of structural difference between the two. The straight fibres prominent on a longitudinal section of calophyllum are not so evident in the other case.

(3) Calophyllum is lighter.

Grade VI :—(a) Chloroxylon swietenia (Satin wood)

(b) Adina cordifolia.

(c) Artocarpus integrifolia. (Jack).

Satinwood is much *harder* and *heavier* than Jack and Adina. The medullary rays in Jack are *broader* than in the other two, and the *pores* are *bigger* and filled with a *whitish deposit* here and there.

If any difficulty is felt in distinguishing white cedar (Dysoxylum malabaricum) from this group, testing the smell, by a fresh cut will give the clue, as white cedar has a characteristic smell while the other three are nonscented.

There are other similar groups of Madras timbers, but they are not commercially very important.

—Editor.

CRICKET.—Forest College vs Palghat.

During the recent Dhoni camp, about the middle of January, a Cricket match in which the above elevens were concerned proved to be very interesting and resulted in a win for as by a narrow margin of 8 runs. Good fortune attended our cricketers though half of our best players could not be present, and raw hands had to be put in. The match was played at the Palghat Fort Maidan, where the sun shone in all its fury.

Batting first the Palghat put up 185 in 3½ hours. We replied by hitting out vigorously, the sum total of our efforts being 193 in 1 hour 50 minutes. Chief scores of the day were as follows.

J. A. Wilson Esq.	...	70.
R. D. Philips	...	47.
D. J. Tanpure	...	31.
Khan Mohamed	...	16.

T. S. SANKARAN,
Honorary Secretary, A. C.

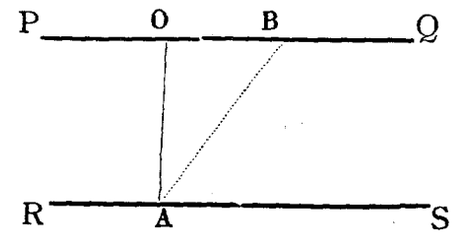
Glearing a straight path between two stations in a Forest.

The following is a practical method of clearing a straight path between two stations, in a forest each invisible from the other owing to forest-growth between them, when no survey-instruments such as a plane-table. compass map or tape are available, and even when it is inconvenient to locate the stations correctly by smoke. It may often happen that a Range Officer is placed in such a predicament viz, to connect two invisible stations in a thick forest without any instruments maps, etc., and, it is hoped, that the method about to be described will be useful.

Step I.—The first thing to do is to drive two straight rods into the ground quite perpendicular, one at each station; then lines are marked on the ground to run along the shadows cast by the rods. This marking of shadows at both stations must be done, as far as possible, simultaneonsly and the lines so marked lengthened to a considerable distance on either side of the stations. These lines we will call auxilliary lines, and in order to mark them on the ground it is unnecessary to remove any valuable growth along them, but all that is needed is to simply remove the brushwood and shrubs together with the driving in of pegs or blazing a few trees. Now these auxilliary lines at the stations will be either (a) in the same straight line or (b) parallel to one another.

Step II.—(a) In case they are in the same straight line our work is cut short and the lines will meet if lengthened in the required direction. This we can see by simply walking straight along one line towards the other station.

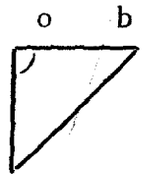
(b) If they are not in the same straight line then they must be parallel. In the sketch A and B are the stations to be joined and P Q and R S the auxillrary lines marked along the shadows cast by the rods.



From either of the stations, say A, a line A O perpendicular to the line R S is ranged till it meets P Q and its distance measured with a straight offset rod whose length can be taken as many cubits as is convenient. In measuring the distances the horizontal distances should be taken. The line A O will at last meet either station B when the point O will coincide with it, or the point O may be some distance off from B along P Q. The former will be the case when the two stations are perpendicularly opposite each other between the parallel lines and our required path A B in such a

case will coincide with the line A O. But in the latter case A O will will meet P Q at O as shown in the above sketch. Now the distance O B will be measured and the ratio between A O and O B deduced.

Step III.—We are now at the station B from which we are to decide the direction of the station A. To find it two straight rods should be cut whose lengths bear the same ratio as A O to O B. Suppose A O : O B :: 3 : 2, then we may use two rods of 3 & 2 or 6 & 4 cubits long and lash their ends together so as to make the angle between them a right angle. In the sketch below



a o = 3 cubits o b = 2 cubits and $< a\ o\ b = 90°$. a b is a rope tied to the remaining ends of the rods in order to have a complete right-angled $\triangle$ a o b. This triangle is quite similar to the $\triangle$ A O B on the ground. Now by laying the $\triangle$ a o b on the ground with its vertex b coinciding with the station B and the side b o along the line B O, we get the direction of our required path to A indicated by the rope b a and by ranging and clearing a line in that direction station A will be reached and joined up by a cleared path with station B.

J. Dwivedi, M F. C.
1923-25 Division.

EXTRACTS.

Pulp and paper, what they are, How they are made, and some of their uses.—By Ismar Ginsberg.

There are but few who have a concrete conception of the enormity of the paper industry, and of the great care and trouble that are entailed in the manufacture of paper The varieties of paper that are commonly used, everything from a thick manilla wrapping paper for wrapping heavy bundles to the thin, transparent colophane paper that is used to wrap candy boxes and that looks like a very thin celluloid rather than paper, are extremely large. And the conditions under which each grade of paper is made vary, the properties that the paper possesses vary, and the materials that are used in its manufacture vary. This gives a very complex series of manufacturing processes which will be merely touched upon in this article.

Most of the paper that is manufactured is made from wood. However, it is very enlightening to the average layman, who hears a great deal about the waste that the paper makers are creating in the forests of the country, to learn that of all the wood cut every year in the United States only four per cent goes into the paper plant. There are about nine million tons of paper consumed every year in this country which makes a per capita consumption of more than 150 pounds, or more than twice as much as in any other country in the world.

Of course it must be remembered that only certain kinds of wood are suitable for paper making and though the percentage of lumber cut employed in the paper process is small, nevertheless the supply of paper-making woods is being continually depleted. The paper companies have taken this condition into consideration and have instituted scientifically conducted reforestration projects on a large scale. Reforestration is a very necessary step in the conservation of the natural resources of country.

It is very interesting to learn that in spite of the great amount of wood that has been cut down for manufacture into paper since the paper industry started in this country, it has been estimated that this quantity of wood is only as great as that which is destroyed *each year* by the ravages of fire and insects. The fire hazard is being controlled to some extent, but the insect destruction goes on unabated.

There are a number of varieties of wood pulp that is employed in making newspaper. This is called mechanical wood pulp. The wood is ground. It may be steamed and bleached and is made into a pulp by beating and finally manufactured into paper on the paper-making machine. The rotogravure book paper and newsprint which is used much these days is made from bleached ground wood.

There are also various chemical ways in which the wood is treated whereby better grades of paper are obtained. In one process

sulfite liquor, which is made by absorbing sulfur dioxide in lime, is used to make sulfite pulp.

One of the most interesting facts regarding the sulfite process is the recovery of the waste liquors, which have been employed for a great variety of purposes. Processes have been developed for making adhesive compositions from it, tanning extracts, building materials, and the like. It has been subjected to fermentation to obtain an impure ethyl alcohol. New uses are being found for it every day.

Another kind of pulp is made by digesting the wood with caustic lye. This process was invented in England in 1854. The pulp obtained from this process is easily bleached and is employed in the manufacture of the finest grades of book papers, magazine and envelope papers, because of the soft texture of the pulp.

Sulfate pulp is made with the aid of a liquor which contains sodium sulfate and sodium sulfide. This is a comparatively new process, having been invented in 1884 and introduced into this country in 1907. It gives a very strong paper and in the unbleached condition and when the pulp is not cooked, it is known as Kraft paper. Kraft paper is very strong and is employed in the manufacture of strong wrapping paper and bags.

There are other processes for making chemical pulp, but so far these have not been developed to a commercial stage. One of the most

promising of the processes is the chlorine process wherein the wood is subjected to the action of chlorine gas.

Not all paper is made from wood. The finer grades of writing and printing paper are manufactured from cotton and linen rags. Very little paper is made that contains 100 per cent rag stock. The usual practice is to mix this high-grade pulp with wood pulp. Paper made in this way is very strong and can be bleached to perfect whiteness. It makes a very fine writing paper and is also employed in writing expensive books.

There are also other materials of inferior properties to wood that are gradually coming into use throughout the world for the manufacture of paper. This is due to the fact that the woods which are particularly well suited for paper making, such as poplar, fir, birch, spruce, pine, hemlock are becoming scarcer and scarcer each year, although reforestration, carried out on a broad, scientific basis, will provide supplies of these woods in the future.

Hence the tendency has been to experiment with all kinds of vegetable matter as possible sources of pulp. It must be remembered that theoretically any cellulose matter, such as common straw, the stalk of the corn plant, reeds, grasses, in fact anything that grows and contains cellulose, is potential paper stalk. The reasons why these cheap materials are not used is because they do not contain enough cellulose to make it worth while going to the considerable expense that is entailed

in removing the large amounts of impurities that they contain and which must be eliminated before paper can be made.

Nevertheless, paper has been made from straw, esparto grass, which is found in several European countries, bamboo fiber, sugar cane bagasse,—the remains after the sugar has been extracted from the cane—giant grass reeds that grow in certain localities in Florida, and other similar products. The papers that are made from such materials cannot be bleached without the consumption of considerable bleach and are generally coarse and of rather poor quality. However, the products are paper and take the place of more expensive papers made from wood. They are satisfactory for certain purposes such as wrapping bundles, making boxes, cartons, and similar products

Before considering the various uses to which pulp and paper can be used besides those that are commonly known, it will be well to review in a few words the paper-making process. When paper is made from wood, the wood is first ground up and chipped. ; when it is made from other materials, the first step is always to comminute the stock. Then the particles are treated with chemicals in digesters. After the impurities have been renderered soluble and removed, the digested stock is fed into beaters, which pulp the stock by subjecting it to a combined compression and shearing action between steel blades, fastened on a roller and imbedded and in a bed-plate in the bottom of the beater. The water in which the stock is beaten is caused to combine with the fiber, which becomes hydrated.

During the course of beating various substances, which are employed in changing the properties of the fiber so that various kiuds of paper can be made from one and the same stock, are added. Thus in making paper used for writing and printing and required to hold ink, rosin solution and sulphate of aluminia are added. Coloring matters of various kinds, fillers, such as clay, chalk, satin white, barytes, etc., are also added. In making white paper the pulp is bleached with ordinary bleaching powder or liquid chlorine in a special beater.

Then the pulp is ready to be made into paper, which is carried out on a cylinder or shaking wire—Foudrinier—machine. The paper is dried, calendered to give it differept finishes and then is ready for use.

The Gridiron method.—The area is divided up into squares irrespective of the topography, parallel baselines being run North and South or East and West usually at intervals of a mile, the secondary control being obtained by running perpendicular strip lines from one baseline to the other at frequent intervals. This method gives the most accurate results, but running baselines is more difficult and costly. Where you wish to obtain a general idea of the character of timber growth on an area without making a regular enumeration, a modification of the Gridiron method by which you run a few parallel strips at wide intervals so as to cross all characteristic topographic features of the country,—valleys, ridges and side slopes, with their variable types of timber growth,—obtains better average results than any other and at less cost, although requiring more energy on your part.

In Austria experiments have been made to make building stone from pulp and some success has been obtained along these lines. Composition flooring is also made from wood pulp. It makes a very fine flooring which can be colored in the mass in permanent shades.

Wood pulp is also used in the manufacture of toys and novelties of various sorts. It is the staring point for the manufacture of celluloid. Celluloid is nitrated cellulose and has commonly been manufactured from cotton linters. The nitrated product is mixed with camphor which gives this rather remarkable substance. Wood pulp can be used as a raw material in this process and a good grade of celluloid can be obtained.

Boxes, utensils of all sorts, different articles of every day use can and have been made from paper pulp. For this purpose the pulp must be waterprcofed to be able to withstand the action of liquids with which it comes in contact. Waterproofing can be accomplished in a variety of ways, as, for example, by impregnating the pulp with aluminum resinate or other substances.

There are even more uses for paper that are not commonly known than for woodpulp. One interesting use is in gardening. While this is not altogether new, especially to those gardeners and other individuals that follow up new developments closely, the advantages that are possible from its use are not generally known. Paper is a good heat insulator, and while it is naturally opaque, it can be made transparent by oiling. In this condition it has been employed in France and other countries in the place of glass in hot house frames. The oiled paper

stands up against the severest weather and gives as good results as the more expensive glass The soft diffused light which streams through the oiled paper is particularly advantageous to the growth of young seedlings. When glass frames are used, direct sunlight must be shaded off as it has been found to be injurious. Old newspapers have also been used to protect plants against the cold during the frosty nights of early spring.

It is not new that paper is employed in making clothing, but it may be news to most readers that an attempt has been made in this country to manufacture raincoats from paper. The paper is waterproofed and the raincoat made from it is supposed to sell for about 25 or 50 cents. The project sounds interesting but hardly practical; still it is possible that a paper raincoat may serve for one usage anyway. Carried in the pocket, it may enable the wearer to laugh at the rain when caught in a sudden shower.

Paper is used in the manucture of good as well as poor quality shoes. In cheap shoes it is not surprising to find the soles made from paper. In good shoes the box toes, the counters, heel boards, and other parts are made from paper.

The uses of paper are really too numerous to describe. It enters into our daily lives in so many different ways that it is no surprise to learn that the total quantity of paper made in the world in a year's time is as much as fourteen million tons.

Extracted from "The Scientific American", Sept. 1924.

Effect of Artificial Light on the Growth of Plants.
Extract from "Nature" for November 1924.

The effect of light on plant life has been the subject of many scientific investigations. So long ago as 1880 Siemens showed that continuous exposure to arc lamps promoted luxuriance of foliage, greater intensity of colouring, and more rapaid ripening of fruit. It is common knowledge that plants grown in partial shade are apt to be weakly, and that the flowers, if produced, have in general a fainter shade of colour. Other examples were mentioned by Schübeler in a communication to the British Association in 1881. The extraordinary rapid growth of vegetation in the Arctic regions during the period of uninterrupted daylight has been the subject of comment; likewise the rapid ripening of corn in regions of Norway and Sweden where the summer does not exceed two months, but where, during this period, the sun scarcely sets.

It therefore seems somewhat surprising that greater use has not hitherto been made of the use of artificial light in horticulture There have, in the past, been intermittent experiments, but results have been somewhat discouraging, and the probable reason is not far to seek. It is only within recent years, when convenient methods of measuring light have become general, that the great disparity between the intensity of full daylight and artificial light has come to be properly understood. The illumination derived from direct sunlight in summer may attain 10,000 foot-candles, and even with a cloudy sky a value of several thousand foot-candles is quite usual On the other hands the average illumination in an artificially lighted building is frequently less than three foot-

candles; a general illumination of ten foot-candles would be considered exceptionally bright. The marvellous power of adaptation of the eye enables it to utilise these extreme variations in illumination. But it can be readily appreciated that unless an artificial illumination of at least several hundreds of foot-candles can be provided, the effect on the growth of plants would not be marked.

Until a few years ago there were few sources of light that could be conveniently applied to produce such high intensities, and the cost was commercially prohibitive. But the advent of such sources as, the electric gas-filled lamp, furnishing 1000 c.p. or more, and capable of being equipped with suitable reflectors to concentrate the available light within a narrow area, has improved the position considerably. For some time experiments have been in progress at various agricultural experimental stations in the United States, and some results of these researches were recently summarised in a series of papers read before the American Illuminating Engineering Society.

The light was provided by electric gas-filled lamps, and values of illumination varying from 300 to 1500 foot-candles were furnished. The exposure to artificial light was supplementary to the natural lighting and had a material effect in hastening the growth of seedlings Provided that proper attention was paid to the conditions which are ordinarily observed in horticulture—for example the provision of sufficient space for normal development of each plant, proper soil, maintenance of correct conditions in regard to moisture and temperature etc—the more rapid growth was not attended by weakness. On the

country, the plants were exceptionally robust and, it is stated, less liable, to the ravages of fungus and other diseases

The most striking effect of the increased light, however, was in hastening the time of blooming. On the average, flowering plants came into bloom eight days earlier than when no artificial light was used.

Mr. R. B. Harvey, recording tests made at the Minnesota Experiment Station, mentions that the effect of continuous illumination is to cause the accumulation of large quantities of starch in the plants; thus buckwheat was so full of starch that the grains may be pulverised in the hand. Apparently the desirable illumination varies for different plants. Strawberries, for example, did not bloom at 500 foot-candles, but set fruits at intensities of more than 1500 foot-candles. Prof. H. Findlay, of Columbia University, reports similar experience. The development of bloom in most plants was accelerated by about eight days; marguerites came into bloom eighteen days after the lights were turned on, when similar plants, grown only under sunlight, were scarcely showing bud.

Another question, apart from effect of intensity, is the influence of *colour* of light. It would seem that light from the electric gas-filled lamp may, as regards its effect on vegetation, be regarded as broadly similar to daylight, and probably the same would apply to other

illuminants giving continuous spectra and approximately white light. Early experiments on the effect of colour seem to have been somewhat inconclusive, owing to uncertainty regarding the relative intensity. Thus, the effect of inserting a pane of blue glass is naturally to diminish the brightness of the light very considerably, besides restricting the rays to the blue end of the spectrum. Some remarkable results have, however, been recorded by M. Camile Flammarion, who attempted the culture of the sensitive mimosa plant under light of different colours. Plants placed in blue light scarcely gained in growth at all, and also appeared to be in a comatose states, showing none of the sensibility to touch characteristic of the mimosa. Plants grown under red light were, on the other hand, four times as big as those grown under white light, developed well-marked flower balls, and were in an extremely sensitive state. From these and other experiments the conclusion has been drawn that red, orange, and yellow rays, by building up complex organic chains of molecules, stimulate plant life, whereas blue rays have an arresting effect. Ultra-violet rays, when present in excess, undoubtedly may have a prejudicial effect, causing shrivelling of the leaves and ultimately the death of the plant. In judicious proportions, they may, however prove beneficial, as is believed to be the case in regard to the human body. Instances of their use to destroy greenfly and similar pests have been recorded.

Here, therefore, is a good field for experiment. We have still much to learn regarding the effects of sustained exposure to strong

white light, whilst the effect of light of specific wave-lenghts has been only very imperfectly studied. It would be very desirable for corroborative investigations, similar to those conducted at research stations in the United States, to be undertaken by leading horticulturists in Great Britain. At present it is not anticipated that artificial light could be economically applied to the production of common foodstuffs on a large scale; but it is believed that its use may prove extremely valuable for the purpose of raising scarce fruits and flowers out of season. It is even possible—though apparently this requires confirmation—that the work might be conducted entirely by artificial light in a well-heated and ventilated cellar in cases where no garden is available, thus bringing this field of investigation within the scope of the town-dweller in congested districts.

Additions to the Madras Forest College Library.

1. A note on the seasoning of Burmese timbers.—*By, Lawrence V. Teedsdale.*

2. Working plan for Delta Forest Division for the period 1924—25 to 1933—34—*By, A. W. Moodie M. A., B. Sc., O. B. E.* (Volume I with map.)

3. Administration report of the Forest Department of His Exalted Highness the Nizam's Dominions.

4. Ceylon Forest Administration Report for 1923.

5. Annual report on Working Plans and Silviculture in Burma for the year 1923—24.

6. Progress report of the Imperial Forest College Dehra Dun for year 1923—24.

7. The Indian Forest Records. "The Mangroves of South Tenasserim Volume X Part 10.—*By J. A. Pilgrim.*

8. The Indian Forest Records: Vol. X Part 8. The Constituents of some Indian Essential Oils,—*By, John Lionel Simonsen.*

9. Annual return of Statistics, relating to Forest Administration

10. The Indian Forest Records. Vol. X Part 5. Analysis of the Tanning properties of certain Burma Lagerstroemias.—*By, E. Pasupathi.*

11. Report of the Forest Department for the year ended 30th. June 1924.—*By, S. L. Kessell.*

12. Catalogue of maps published by the Survey of India, corrected up to 1st. January 1923.

13. The Fauna of British India including Ceylon and Burma. Vol. II—*By, E. C. Stuart Baker, O. B. E., F. Z. S.*

14. The Seasoning and Preservation of timber.—*By, Ernest G. Blake.*

15. A guide to Shikar on the Nilgiris—*By, Big Bore.*

16. The Principles of Insect Control.—*By, Wardle & Buckle.*

17. Working Plan for Zigon Forest Division for the period 1923—24 to 1932—33.—*By, E. F. A. Hay, B. A.*

18. General list of Rangers of the Madras Presidency corrected upto 1st. May 1924.

19. Transactions of the Royal Scottish Arboricultural society. Vol. XXXVIII Part II Oct. 1924.

20. Report of Forest Administration in the Andamans for the year 1922—23.—*J. W. Bradly.*

21. Annual return on Working Plans and Sylviculture in Burma for 1923—24.

22. "School of Forestry of Yale University" 1924—25.

23. The Universal Ready Reckoner.—*By, C. W. Dudani.*

24. Seeding and Planting.—*By, James W, Toumey D. Sc.*

25. Report on the operations of the Department of Agriculture, Madras Presidency 1923—24.

26. Roorke's Engineering.

Section I Building Materials.

„ II Masonry

„ III Carpentry

„ IV Earthwork

„ V Examples of Estimating

„ VI Roads.

Indian Forester Prize 1925.

(PAST STUDENTS).

A prize allotted from the "Indian Forester" Fund will be awarded to the past student of the Madras Forest College who submists the best essay on the following subject:—

Early Burning, versus
Complete Fire Protection.
Which do you consider to be the best for forest areas and why?"

No award will be made unless a satisfactory standard is reached.

Essays should be clearly written or typed on one side of the paper only, and should not exceed 2,000 words; they must reach the Principal, not later than the 10th, nor earlier than the 1st, May 1925.

Each essay must bear a *nom de plume;* which must also be written on the outside of a sealed envelope inside which is a paper containing the name of the competitor. The name of the competitor must not appear on the outside of the envelope, or on the essay. Each must be the unaided work of the competitor submitting it.

C. R. F. WILLIAMS,
Principal,
Madras Forest College, Coimbatore.

Gazette Notifications.

11—11—24.

Mr. B. K. Roy, Deputy Conservator of Forests, is granted extension of leave on average pay for one week in continuation of the six weeks' leave already granted to him.

M. R. Ry., V. N. Seshagiri Rao avergal, District Forest Officer, Lower Godaveri, will on relief by M. R. Ry., K. G. Belliappa avergal, be attached to the Lower Godaveri Division.

18—11—24.

Mr. A. A. F. Minchin, Deputy Conservator of Forests, Coorg, on return from leave, to be District Forest Officer, Nilambur.

Mr. D. F. Stileman, District Forest Officer, Nilambur, to be District Forest Officer, Palghat on relief by Mr. Minchin.

Saiyid-ud-din Ahmad Sahib Bahadur, District Forest Officer, Palghat, on relief by Mr. Stileman, to be District Forest Officer, East Kurnool.

Mr. R. B. Cornwell, Deputy Conservator of Forests and Divisional Forest Officer, North Andaman Division, has been transferred to Dehra Dun as Instructor at the Forest Research Institute and College, Dehra Dun, where he assumed charge of his duties on the afternoon of the 16th September 1924. The unexpired portion of the leave granted to him in this Department Notification No. 423, dated the 31st July 1924, is hereby cancelled.

Mr. K. T. Matthew who has been appointed by His Majesty's Secretary of State for India, to the Indian Forest Service on proba-

tion is posted to the Madras Presidency as Assistant Conservator of Forests, with effect from the forenoon of the 15th September 1924.

25—11—1924.

Mr. R. D. Richmond, Conservator of Forests, leave on average pay for eight months, and on half average pay for four months, with effect from or after 1st April 1925.

Mr. T. Clear, Deputy Conservator of Forests, an extension of leave on average pay for Seven days in continuation of the leave already granted to him.

2—12—1924.

Muhammad Abdul Hafiz Sahib Bahadur, E. A. C. of Forests, is granted an extension of leave on average pay for three days, in continuation of the one month's leave already granted to him.

M. R. Ry. B. A. Cariappa, Probationary Extra Assistant Conservator of Forests, in transferred from Ambasamudram to Olavakkode with effect from 20th October 1924.

16—12—1924.

Saiyid-ud-din Ahmed Sahib Bahadur, District Forest Officer Palghat, is on relief by Mr. D. F. Stileman, granted leave on average pay upto 23rd December 1924 (inclusive) with permission to affix the Christmas and New year holidays to the leave.

M. R. Ry. M. H. Krishnasami, Extra Assistant Conservator of Forests, Ambasamudram, is granted leave on average pay for sixteen days with effect from 8th December 1924 with permission to affix the Christmas and New year holidays.

The following postings of the Imperial Forest Service probationers are ordered :—

1.	Mr. J. Coode	...	Under the Chief Forest Engineer,
2.	,, V. S. Kuppusami Ayyar	...	,, Conservator II Circle, Bellary.
3.	,, B. Janakiram Singh	...	,, D. F. O. Tinnevelly.
4.	,, Tara Singh	...	,, N. Coimbatore.

23—12—1924.

Mr. F. D. Ardagh, Deputy Conservator of Forests has been granted by the High Commissioner for India an extension of leave for fourteen days.

Mr. S. R. Rao, Assistant Conservator of Forests, Guntur, is granted leave on average pay for seven days from 3rd January 1925 with permission to prefix the Christmas and New year holidays.

Mr. R. Ry. K. A. Chengappa Avergal, District Forest Officer, Nellore, is granted leave on average pay for two months from or after 6th January 1925.

Muhammed Abdul Haffiz Sahib Bahadur, E. A. C. of forests is on relief by Saiyid-ud-din Ahmed Sahib Bahadur, posted to be in charge of the Nellore Division during the absence of M. R. Ry. K. A. Chengappa Avergal on leave.

The notification dated 6th December 1924 granting leave to Saiyid-ud-din Ahmed Sahib Bahadur, District Forest Officer, Palghat, is cancelled.

Mr. K. T. Matthew, Assistant Conservator of Forests, tranferred from Sappal to Karkal in the North Mangalore Division with effect from 18th November 1924.

20—1—1925.

Mr. E. M. Crothers, District Forest Officer, West Kurnool, leave on average pay for four months with effect from or after 1st April 1925.

Mr. J. H. Longrigg, District Forest Officer, Ganjam, leave on average pay for four months and leave on half average pay for eight months in continuation thereof from or after 1st May 1925.

Mr. D. F. Stileman, District Forest Officer, Palghat, to be District Forest officer, Madura.

Mr. H. R. M. Law, District Forest Officer Madura, to be District Forest Officer, Palghat on relief by Mr. Stileman.

Mr. T. D. Ardagh, Deputy Conservator of Forests, on return from leave, to be District Forest Officer, East Salem.

27—1—1925.

Muhammad Abdul Hafiz Sahib Bahadur, Extra Assistant Conservator of Forests, will be considered to have been attached to the District Forest Office, Nellore, from 3rd January 1925 up to the date on which he took charge of the Division in relief of M. R.Ry. K. A. Chengappah going on leave.

10—2—1925.

Mr. M. C. Chandy, Extra Assistant Conservator of Forests, is granted leave on average pay for one month from date of relielf

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Notifications relating to Rangers.

H. Tireman Esq.,

Ag. Chief Conservator of Forests.

Subject:—Rangers—Promotions and *reversions*.

The following promotions of Rangers are ordered:—

I. **With effect from 25-4-1924-vice M. R. Ry., T. Subbarayalu Naidu, D. D. R. Ranger, I Grade, reduced to IV Grade.**

M. R. Ry. J. D. David D. D. R. from II Grade permanent to I Grade pe manent.

„ M. Subbarayalu Nayudu D. D. F. from II Grade *sub protem* to II Grade permanent.

„ B. V. Nagaraja Ayyar M. R. Hons. from III Grade permanent to II Grade *sub protem*.

„ M. Krishna Rao M. R. H. from III Grade *sub protem* to III Grade permanent.

„ H. Thammayya M. R. H. from IV Grade permanent to III Grade *sub protem*.

II. **With effect from 1—6—24 vice. M. R. Ry. M. Muthuswami Ayyar, D. D. R. Ranger II Grade, reduced to III Grade for one year.**

M. R. Ry. R. Manikkam Pillai D. D. R. from III Grade permanent to II Grade *sub protem*

Note. This supersedes the order passed in C. C. P. No. 441 Routine dated 1-9-24.

III. With effect from 1-6-24 vice. M. R. Ry., V. D. Ramalingam Pillai, M. R. H. Ranger VI Grade, reduced to VII Grade.

M. R. Ry. M. Narasinga Rao Nayudu M. R. L. from VII Grade permanent to VI Grade permanent.

IV. With effect from 6-6-24 vice. M. R. Ry. K. Rangasyai Nayudu, Ranger, III Grade, deceased.

M. R. Ry. S. M. Krishnaswami Ayyar D. D. R. from III Grade *sub protem* to III Grade permanent.

„ K. Kunhirayan M. R. H. from IV Grade permanent to III Grade, *sub protem.*

„ P. S. Varadakrishnama Acharya M. R. H. from IV Grade *sub protem* to IV Grade permanent.

„ K. Venkataramanan M. R. H. from V Grade permanent to IV Grade *sub protem.*

„ T. Venkatasubbayya, M. R. H, 1923, supernumerary ranger to V Grade permanent.

V. With effect from 22-7-24 vice. M. R. Ry. T. Subbarayalu Nayudu, D. D. R. Ranger, IV Grade, retired.

M. R. Ry. A. Manikka Mudaliyar M. R. H. from IV Grade *sub protem* to IV Grade permanent.

„ T. D. Ponnayya M. R. H. from IV Grade permanent to IV Grade *sub protem.*

„ P. K. Kuttappan Pillai, M R. H. 1923, supernumerary ranger to V Grade permanent.

VI. With effect from 29-7-1924 vice M. R. Ry. K. Venkatasubba Rao, II Grade, retired.

M. R. Ry. B. V. Nagaraja Ayyar M. R. Hons. from II Grade *sub protem* to II Grade permanent

„ A. Rama Hebbar D. D. R. from III Grade permanent to II Grade *sub protem.*

„ H. Thammayya M. R. H. from III Grade *sub protam* to III Grade permanent.

„ C. M. Naravanan D. D. R. from IV Grade permanent to III Grade *sub protam.*

„ K. Venkataramanan M. R. H. from IV Grade *sub protem,* to IV Grade permanent.

„ P. Sankunni Menon, M. R. Hons from V Grade permanent to IV Grade *sub protam.*

„ P. A. Venkataraman, M. R. Honours, 1923, supernumerary ranger to V Grade permanent.

VII. With effect from 9-10-1924 vice M. R. Ry. K. P. Krishna Ayyar, D. D. R Ranger I Grade, retired.

Mr. V. T. Staggs D. D. F. from II Grade permanent to I Grade permanent.

M. R. Ry. R. Manikkam Pillai D. D. R from II Grade *sub protem* to II Grade permanent.

„ P. Maduraimuthu Pillai D. D. R. from III Grade permanent to II Grade *sub protem.*

(This promotion takes effect only from 16th December 1924 as the Ranger was given a black mark on 16-9-1924.)

M. R. Ry. K. Kunhirayan M. R. H. from III Grade *sub protem* to III Grade permanent.

„ B. Chenchurama Nayudu from IV Grade permanent to III Grade *sub protem*.

„ T. D Ponnayya, M. R. Hons. from IV Grade *sub protem* to IV Grade permanent.

Mr. H. Myers M. R H. from V Grade permanent to IV Grade *sub proemt.*

M. R. Ry. B. H. Anandathirtha Rao, M. R. Honours, 1924, supernumerary Ranger to V Grade permanent.

2 The following reversions of Rangers are ordered :—

I. With effect from 4-10-24 consequent on the reinstatement of Mr. I. John, Ranger, VII Grade.

M. R. Ry. P. V. Krishna Rao Nayudu, M. R. L. Ranger VII Grade to revert as supernumerary ranger.

II. With effect from 18-11-1924 consequent on the restoration of M. R. Ry. R. Alagiriswamy Nayudu, M. R. H. Ranger, V Grade to the IV Grade.

M. R. Ry. T. D Ponnayya M. R. Hons. from IV Grade permanent to V Grade permanent and IV Grade *sub protem*.

Mr. H. Myers, M. R. H. from IV Grade *sub protem* to V Grade permanent

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19—1—1925.

Mr. K. P. Benjamin D. D. R. Ranger II Grade permanent, is promoted to I Grade *sub protem* with effect from 9-10-1924 *vice*. Mr. V. T. Staggs D. D. F. on other duty as Assistant to Special Chenchu Officer.

First Circle.

23—12—1924.

1. Under Rule 81 of the Fundamental Rules M. R. Ry. A. Subrahmanya Iyer, M. R. H. Forest Ranger, Godavari Lower, and under orders of transfer to Ganjam is granted leave on average pay for one month and 15 days with effect from date of relief in Godavari Lower.

25—12—1924.

2. 1. M. R. Ry. D. Ramakrishna Ayya, M.R H. Ranger V Grade is appointed to be Senior Instructor, and D. V. Krishna Rao Forester, II grade junior Instructor of the 1925 Session of the vernacular Training School.

2. Mr. J. D. David D. D. R. Ranger II Grade will hold charge of the Exploitation Range till the return of Ranger A. Subrahmaniya Ayyar M. R. H. from leave.

7—1—1925.

3. M. R. Ry. T. S. Ratnavelu Mudaliar, M. R. H. Ranger VI Grade on leave should take charge of Peddapur Range Lower Godavari immediately, *vice* Ranger K. Balakrishna Rao deceased. The unexpired portion of his leave will be cancelled.

Second Circle.

28—11—1924.

4. 1. M. R. Ry. V. N. Subramania Iyer, M. R. H. Ranger VI Grade, *sub protem* now on special duty at Rudracode is posted to be in charge of Nandyal Range. To relieve No. 2 expeditiously.

2. Mr. M. K. Nayar, Assistant Conservator of Forests in charge of Nandyal Range is posted to Kurnool to work under the District Forest Officer, West Kurnool as per programme to be drawn up for him by the District Forest Officer.

3. The Sivapuram Range Officer will supervise the Rudracode building and road work till No. 4 joins.

4. Mr. Gulam Dastagir M. R. L. will hand over charge of Madakasira Range to Range Officer, Bukkapatnam, and proceed forthwith and report to the District Forest Officer, West Kurnool for special duty on Rudracode Building and Road Work.

5. Mr. M. Krishna Rao, M. R. H. Range Officer, Bukkapatnam will hand over charge of Kadiri Range to Mr. Subrayalu Naidu D. D. R. Range Officer, Tadpatri.

5. 1. M. R. Ry. K. Purushothama Rao, M. R. H. Ranger VI Grade, Gundlakamma Range, South Kurnool Division is granted leave on average pay on Medical Certificate for 2 months from the afternoon of 1-11-24.

2. M. R. Ry. B. Krishna Rao, M. R. H. Supernumerary Ranger in charge of Gundlakamma Range on relief by Ranger Abdur Rahim Khan M. R. H. is posted to be in charge of Giddalore Range. To join *at once*.

6. 1. Mr. I. John Ranger VII Grade, Harpanahalli Range, Bellary Division transferred by Chief Conservator in his proceedings D. Dis. 5990/24 dated 13-11-24 to VI Circle is posted to Mannarghat Range. Palghat Division and hand over charge to No. 2 *at once*.

2. M. R. Ry. N. C. Mahadevam Pillay, D. D. R. Ranger III Grade, Kudligi Range to be in *additional* charge of the Harpanahalli Range. To relieve No. 1 *immediately*.

30—11—1924.

7. 1. M. R. Ry. R. Jagannadham Naidu, Ranger VII Grade. Giddalore Range, South Kurnool Division is transferred to Chelama Range vice M.R.Ry. K. Tatachari reported sick.

2. M. R. Ry. B. Kristna Rao, M. R. H. Supernumerary Ranger in charge of Gundlakamma Range is posted to be in charge of Giddalore Range till M. R. Ry. Tatachari returns from leave, when he will take charge of Giddalore Range.

6—12—1924.

8. In modification of this office S. O. No. 98 dated 28-11-24, the llowoing postings of Range Officers are ordered:—

1, Mr. B. Gulam Dastagiri Sahib, M.R.L. Ranger VI Grade will fhand over charge of Madakasira Range to Range Officer, Kalyandrug, proceed *forthwith* and report to District Forest Officer, West Kurnool for special duty on Rudracode Building, and Road work.

2. M. R. Ry. H. Rama Rao, D. D. R. Ranger II Grade, Kalyandrug Range will take over charge of Madakasira from Mr. Gulam Dastagiri Sahib M. R. L. and hold *full charge* of the two Ranges. Additional charge allowance will be given him.

3. M. R. Ry. M. Kistna Rao, M.R.H. Ranger III Grade S. P. T. will continue in full charge of Kadiri and Bukkapatnam Ranges

4. The order instructing M. R. Ry. M. Subbarayalu Naidu D. D. R. Ranger II Grade S. P. T. Tadpatri Range to take charge of Kadiri Range is cancelled. He will continue in charge of Tadpatri Range alone.

10—12—1924.

9. 1. M. R. Ry. B. Punniah Panthulu, M. R. H. Ranger IV Grade on return from leave is posted to be in charge of Dornal Range, East Kurnool Division. To relieve No. 2.

2. M. R. By. T. N. Krishnamachari, M. R. L. Supernumerary Ranger in charge of Dornal Range, on relief by No. 1 is to work in the same Division under the orders of the District Forest Officer East Kurnool.

12—12—1924.

10. M. R. Ry. K. Tatacharya, D. D. R. Ranger IV Grade, Chelama Range Kurnool South Division is granted leave on average pay on Medical certificate for 4 months from date of relief 24-11-24 afternoon.

23—12—24.

11. 1. M.R.Ry. Y. Pedda Lakshmiah Naidu M.R.H. Ranger VI Grade on return from leave is posted to Markapur Range, Kurnool East Division, subject to the production of a Medical Certificate of fitness to return to duty.

2. M. R. Ry. A. Vyasilu M. R. L. Ranger VII Grade, Markapur Range Kurnool East Division on relief by No. 1 is transferred

to Gundlakama Range, South Kurnool Division with *Isuka gundam* as his Head quarters. To work under the orders of the Range Officer Gundlakama in timber extraction and other important works.

5—1—1925.

12. M. R. Ry. N. C. Mahadevan Pillai, D. D. R. Ranger III Grade, under orders of transfer to Kudligi Range, is considered to have been on special duty in Kudligi Range on 27th and 28th October 1924, as he had to meet the Conservator at Gowripuram camp on 27th October.

8—1—1925.

13. M. R. Ry. M. Umapathi Mudaliar M. R. H. Ranger VI Grade, Guntur District is reduced to VII Grade temporarily for one year with effect from 31-12-24.

10—1—1925.

14. 1. M. R. Ry. O. Venkataramana Iyer, D.D.R. Ranger I Grade on return from leave, (18-1-1925) is posted to be in charge of *Cumbum Range*, Kurnool East Division.

2. M. R. Ry. P. V. Krishna Rao, M. R. H. Supernumerary Ranger in charge of Cumbum Range on relief by No. 1 is posted to be in charge of *Dhone Range*, Kurnool West Division.

3. Mr. J. B. Rodrigues, M. R. L. Supernumerary Ranger in charge of Dhone Range on relief by No. 2 to work under the orders of the District Forest Officer, Kurnool West.

10—1—1925,

15. Mr. M. Hussain Khan D. D. R. Ranger II Grade, is granted an extension of leave on average pay on medical certificate for 3 months and 19 days and *half* average pay for 11 days in continuation of 4 months' leave already granted to him.

19—1—1925.

16. M. R. Ry. A. Vyasalu M. R. L. Ranger VII Grade, Markapur Range, Kurnool East, is granted extension of leave on average pay from 11-11-24 to 19-12-24 in continuation of one month's leave sanctioned by the District Forest Officer, Kurnool East in his S. O. 190/24 dated 9-11-24.

22-1-1925.

17. Mr. J. B. Rodrigues M. R. L. Supernumerary Ranger in charge of Dhone Range on relief by M. R. Ry. Ranger P. V. Kristna Rao is posted to work under the Working Plan Officer in Kurnool South Division. To report himself for duty at Kurnool before the Working Plan Officer not later than 1st February 1925.

18. M. R. Ry. G. N. Subba Rao, D. D. R. Ranger VI Grade, Kurnool West Division is granted leave on loss of pay for 3 months from 10-2-25 (or date of discharge from the hospital whichever is earlier) in continuation of the leave already granted in this office S. O. Nos 45/28-7-24 and 82/1-11-24.

24—1—1925.

19. M. R. Ry. K. Purushothama Rao, M. R. H. Ranger VI Grade, is granted extention of leave for 3 months on Medical Certificate in continuation of two months' leave already granted to him

25—1—1925.

20. M. R. Ry. T. Sriramulu Naidu, M. R. L. Ranger VII Grade, Kurnool West Division is considered to have been on special duty in Kurnool Range on 7-11-24.

27—1—1925.

1. M. R. Ry. B. K. Kistna Rao, D. D. R. Ranger III Grade, Morricheruvu Range, Kurnool East Division is transferred to Bezwada Range, Guntur Division. To proceed at once and relieve No. (2), after handing over charge to Range Officer Rachakonda Range.

2. M. R. Ry. P. Dhananjaya Rao, M. R. H Ranger IV Grade, Bezwada Range, Guntur Division is transferred to Morricheruvu Range (Headquarters—Telugurayanicheruvu) Kurnool East Division.

30—1—1925.

22. Mr. Mir Abdul Hussain Kirmani, D. D. F. Ranger V Grade, Rachakonda Range, Kurnool East Division, is granted leave on average pay for 8 days from 12-11-24 to 19-11-24, both days inclusive.

10—2—1925.

23. M. R. Ry. G. N. Subba Rao, D. D. R. Ranger VI Grade, is granted an extension of leave for 6 months on Medical Certificate from 10-2-25.

10—2—1925.

24. M R. Ry. B. V. Jogeswara Rao, D. D. R. Ranger V Grade, Gooty Range is posted to be in full charge of Tadpatri Range in addition to his own, vice M. R. Ry. M. Subbarayalu Naidu D. D. F. reported sick.

He will be given additional charge allowance under rule 49 of Fundamental Rules.

15—2—1925.

25. M. R. Ry. M. Subrayalu Naidu, D. D. F. Ranger II Grade Tadpatri Range, Anantapur District is granted leave on half-average pay on Medical Certificate for six weeks from 16-1-25.

18—2—1925.

26. In modification of this office S. O. No. 8/1925 dated 10-1-25, Mr M. Hussain Khan, D. D. R. Ranger II Grade, is granted an extension of leave on *average pay* on Medical Certificate for 3 months and 19 days and on *half average* pay for 11 days (*leave not due*) in continuation of 4 months' leave already granted to him.

21—2—1925.

27. 1. Ranger B. V. Jogeswara Rao, D. D. R. in charge of Gooty and Tadpatri Ranges, Anantapur, has been invalided out of the Service.

3. He is to be relieved without any loss of time whatever by Ranger D. N. Subramani Iyer M. R. H. of Sivapuram Range, Kurnool West.

3. Ranger T. Sriramulu Naidu, M. R. L. Kurnool Range is to relieve No. (2) immediately and hold additional charge of Sivapuram Range.

Third Circle.

8—12—1924.

28. Mr. L. Govindasami Pillai Ranger V Grade. on leave is granted extention of leave on full average pay for 3 months in continuation of the leave ganted to him in this office S. O. No. 54 dated 17-7-24.

29. 1. Mr. K. Raghuraman M. R. H. Ranger, VI Grade, will relieve Mr. P. Chengal Reddi M. R. H. of Chitval Range, who has been granted leave, and hold charge of the Range in addition to his own duties, pending return of Mr. A. Ranganayakulu Naidu.

2. Mr. A Ranganayakulu Naidu on return from leave is posted to Kodur Range in relief of Ranger K. Raghuraman who will retain charge of Chitvel Range.

20—12—24.

30. M. R. Ry. N. Swaminatha Aiyar D. D. R. Ranger I grade on return from leave is posted to South Cuddapah District for special duty under the District Forest Officer South Cuddapah.

5—1—1925.

31. 1. M. R. Ry. B. H. Anandathirtha Rao, M. R. Hons., Cuddapah Range, is appointed to be the Junior Instructor of the Vernacular Training School. This supersedes this office Service

Order No 95/24 dated 19th November 1924 posting N. Rajagopal Chetty of Sanipaya Range as Junior Instructor.

2. M. R. Ry. S. Vasudeva Reddi, D. D. R. Ranger I grade on return from leave, is posted to Cuddapah Range charge. Pending his arrival, M. R. Ry. H. Thammayya M. R. H. Ranger Vontimitta, will hold charge of Cuddapah Range, in addition to his own.

This cancels the posting of M. R. Ry. S. Vasudeva Reddi to Sanipaya Range.

9—1—1925.

32. M. R. Ry. N. Swaminatha Ayyar, D. D. R. Ranger I Grade on leave, is granted extension of leave on Medical Certificate for 6 months, to date from 31st December 24, consisting of leave on average pay for 4 months, and half average pay for 2 months.

This office Service Order No. 102/24 dated 20th December 24 posting the Ranger to South Cuddapah for special duty is held in abeyance.

2—2—1925.

33. Mr. Saiyid Riazuddin Sahib, Extra Assistant Conservator of Forests attached to South Cuddapah District, is posted temporarily to the charge of Sanipaya Range of West Cuddapah District.

Supernumerary Ranger N. Rajagopal Chetty, M. R. H. of Sanipaya Range is attached to the West Cuddapah District Forest Office temporarily.

12—2—1925.

34. Mr. E. W. Fernandez M. R. H. Ranger V Grade on leave, is granted extension of leave on Medical Certificate on half average salary from 1st December 24 to 19th January 25, in continuation of the leave already granted to him in this office Service Order Nos. 63/24 dated 9-8-24 and 87/24 dated 11-11-24.

15—2—25.

35. 1. M. R. Ry., B. V. Vaideeswara Ayyar D. D. R. Range Officer, Kanigiri is placed under suspension from date of relief by Range Officer Kavali.

2. M. R. Ry., T. M. Doraiswamy Pillai M. R. Hons, Range officer, Kavali, will relieve No. 1 and hold dual charge of the Range until further orders.

16—2—1925.

36. In modification of para one of this office Service Order No. 3/25 dated 9th January 1925, M. R. Ry., N. Swaminatha Ayyar, D. D. R. Ranger I grade on leave is granted extension of leave for 6 months on Medical Certificate, consisting of leave on average pay for 4 months and 1/2 average pay for two months from 8th January 1925, the date on which his first leave expired.

23—2—25.

37. The posting of Ranger M.R.Ry., S. Vasudeva Reddi D. D. R. to Cuddapah Range ordered in this office Service Order No. 1/25 dated 5th January is cancelled.

M. R. Ry., H. Thammayya, M. R. H. Range Officer, Vontimitta Range will be in additional charge of Cuddapah Range until further orders.

28—2—1925.

38. M. R. Ry. L. Govindaswamy Pillay Ranger V Grade on leave is granted extension of leave (furlough) on half average pay for 2 months in continuation of the leave granted to him in this office Service Order Nos. 54/24 dated 17-7-24 and 99/24 dated 8-12-24.

Fourth Circle.

5—12—1924.

39. M. R. Ry. T. Perumal Goundar, M. R. H. Supernumerary Ranger East Salem Division, is granted leave on average salary for 3 months from 29-11-1924 subject to the production of certificate of eligibility for the leave by the District Forest Officer.

8—12—1924.

40. Ranger T. K. Parthasarathi Ayyangar, M. R. H. VI grade, on return from leave on 30-12-1924, is posted to East Salem Division for special duty, Viz., demarcation of class II Panchayat areas in Kallakurichi range.

2. Paragraph 2 of this office Service Order No. 84 of 1924, dated 27-11-1924, is cancelled.

11—12—1924.

41. The period from 3-10-1924. i. e., the date on which leave for 1 month granted to Ranger Syed Ibrahim Albeiz D. D. R.

by the District Forest officer, South Salem in his Service Order No. 213 of 1924, dated 12-8-1924 expired, to 18-10-1924. i. e. the date from which he was placed under suspension in this office Service Order No. 77, dated 2-11-1924, will be treated as extension of leave on medical certificate on average salary.

20—12—1924.

42. 1. Ranger P. Sithupathi Ayyar, M. R. Hons. V. Grade on special duty, Denkanikota Range, North Salem District is appointed Instructor, Vernacular Training School.

2. Supernumerary Ranger M. S. Krishnaswami Ayyar, M. R. H. on special duty, South Vellore Division is appointed as Assistant Instructor Vernacular Training School to be held in North Salem Division during the Session 1925.

15—1—25.

43. M. R. Ry. P. Mathuraimuthu Pillai, D. D. R. Ranger III grade, and II grade subprotem in charge of Chengam Range, West Vellore Division, is granted leave on average salary for 3 months from date of relief.

2. M. R. Ry. K. R. Subramanium M. R. L Ranger, VII grade is transferred from East Salem to West Vellore Division on return from leave and posted to the charge of Chengam Range.

25—1—1925.

44 M. R. Ry., J. S. Vedanayagam, M. R. H. Supernumerary

Ranger, is granted leave on average pay for 10 days from 21-1-1925.

31—1—1925.

45. M. R. Ry., T. V. Govinda Rao, Ranger V. grade, in charge of Anchetti Range, North Selem Division, is granted leave on average salary for 3 months from date of relief.

1—2—1925.

46. Supernumerary Ranger, T. Perumal Gonnden, M. R. H. on return from leave on 29-2-1925, is posted to North Salem Division for special duty.

4—2—1925.

47. M. R. Ry., J. S. Vedanayagam, M. R. H. supernumerary Ranger, Tirupatur is granted an extension of leave on average salary for 20 days in continuation of the leave granted in this office Service Order No. 24 of 25 dated 25-1-1925.

21—2—1925.

48. Supernumerary Ranger S. Rangaswami Ayyangar, M. M. Hons. North Salem Division on Spike Investigation duty, is posted to the charge of Anchetti Range, North Salem Division, as a temporary measure from 12—2—1925 afternoon, Vice Ranger T. V. Govinda Rao, V grade, granted leave.

He will attend to spike duty in addition to his ordinary duties.

25—2—1925.

49. In cancellation of this Office Service order No 14 of 1925, dated 1-2-1925, Supernumerary Ranger T. Perumal Gounden M. R. H.

on return from leave on 1-3-1925, is posted to the charge of Anchetti Range, North Salem Division, until further orders.

Fifth Circle.

3—12—1924.

50. The leave granted to M. R. Ry. Shanmukakumaran Pillai, D. D. F. Ranger II grade, Madura, in this office S. O. No. 81/24 dated 25th August 1924 is extended by three months, furlough on medical certificate on half average pay.

15—12—1924.

51. M. R. Ry. N. C. Mahadeva Iyer M. R. H. Ranger VI Grade, Tinnevely District, is dismissed from the service.

10—1—1925.

52. M. R. Ry. A. P. Sreenivasa Ayyengar, M. R. H. Ranger IV grade Kollegal, is granted leave for 3 months under the old leave rules from date of relief (Privilege Leave for the period for which he will be eligible on date of relief and leave on medical certificate on half pay for the remaining period).

10—1—1925.

53. Ranger Thayuman Mudaliar M. R. L. is transferred from the South Coimbatore District to the Kollegal District for charge of Ramapuram Range.

17—1—1925

54. 1. On expiry of the 2 months leave from January 3rd 1925

granted to Ranger K. Venkataramanan, M. R. H. he will be posted to Tinnevelly District for charge of Kodamadi Range.

2. On relief by Ranger K. Venkataramanan, Ranger P. Velayudhan Nayar D. D. R. will be transferred to South Coimbatore District for charge of Tunacadavu Range.

2—2—1925.

55. The leave on average pay for 3 months granted to M. R. Ry C. Tiruvengadam Pillai, M. R. Hons. Ranger V grade, South Coimbatore in this office S. O. No. 79 of 1924, dated 11-8-1924. is extended by 2 months on medical certificate.

27—2—1925.

56. M. R. Ry. B. S. Ramaswamy Ayyar, Ranger IV grade, Kollegal District is granted leave on average pay for 14 days from 11th February 1925.

Sixth Circle.

30—11—1924.

57. 1. Mr. I. John, Ranger VII grade, transferred from the II Circle to this Circle in Chief Conservator's L Dis. No. 5990/24 dated 13th November 1924, to the charge of the Mannarghat Range, Palghat Division.

2. M. R. Ry. S. Chidambra Ayyar M. R. H. Ranger V grade, in charge of Mannarghat Range, on relief by No. 1 to the charge of the Beltangadi Range in the South Mangalore Division.

3. M. R. Ry. A. Siddhan Pillai, M. R. H. Ranger IV grade,

transferred from the III Circle to this Circle in Chief Conservator's L. Dis. No. 5990 24 dated 13th November 1924, to the charge of the Shankaranarayana Range, in North Mangalore Division.

This cancels the posting of Ranger M. N. Raman Pillai, M. R. H. Ranger IV grade to the charge of the Shankaranarayana Range, ordered in this office S. O. No. 87/24 dated 26th October 1924.

25—12—1924.

58. 1. The postings of Rangers I John and S. Chidambara Ayyar M. R. H. to the Mannarghat Range and the Beltangadi Range respectively, ordered in this office S. O. No. 94/24 dated 30th November 1924, are cancelled.

2. The following revised postings are ordered:—

M. R. Ry. S. Chidambara Ayyar, M. R. H. Ranger V grade, will continue to be in charge of the Mannarghat Range.

Mr. J. John, Ranger VII grade, on relief from the Mannarghat Range is posted for special duty in the Nilambur Division. To join on 28th December 1924.

3. Mr I. John, Ranger VII grade, on relief in the Nilambur Division, is posted to the charge of the Beltangadi Range in the South Mangalore Division.

29—12—1924.

59. M. R. Ry., R. N. Raman Pillai M. R. H. Ranger IV grade, is granted an extension of leave on average pay on medical certificate for 2 months and 9 days from 1st November 1924 in

continuation of the leave already granted in this office S. O. No 74/1924 dated 23rd September, 1924.

30—12—1924.

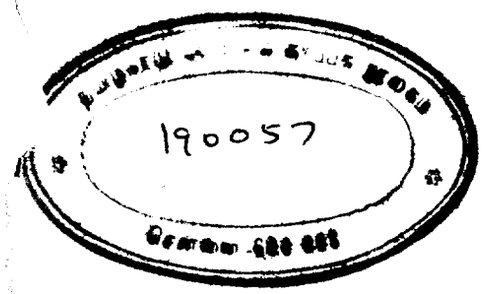
60. M. R. Ry. R. N. Raman Pillai M. R. H. Ranger IV grade is. on the expiry of the leave, posted to the charge of Beypore depot. Nilambur Division.

3—1—1925.

61. In continuation of this office S. O. No. 83/1924 dated 21st October. 1924 Ranger Nicholas M. R. H. is granted an extension of leave on medical certificate for 4 months from 9th December 1924 made up of leave on average pay for 22 days and leave on half average pay for the remaining period.

13—1—1925.

62. M. R. Ry. N. Gopalan Nair, Ranger, VII grade, is granted leave on average pay for 6 weeks from 10th February 1925.



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