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CONTENTS.

THE

Madras Forest College Magazine.

(PUBLISHED QUARTERLY).

Vol. XVIII. MARCH 1934. No. 3.

The Managing Committee do not hold themselves responsible for opinions expressed by contributors.

My Observations on Sandal.

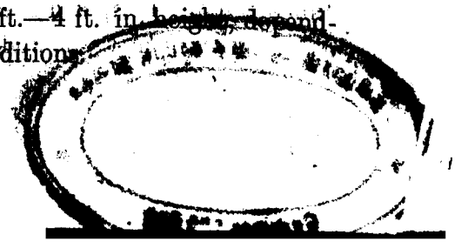
By N. C., Madappa, Student, M. F. C., 1932–34 Dn.

—.o.—

In continuation of the article under the above title, by Mr. R. C. Parikh, published in March 1932 number, Madras Forest College Magazine, the following obervations of mine on certain aspects of Sandal in Aiyur will be of interest, as a supplement to it. Only facts not already recorded therein, or not recorded in sufficient detail are given below, — particularly certain experiments carried out in Denkanikota, Jowalagiri etc., which are not so well known.

Growth :—

The growth of seedings in the *first season* is slow I examined a seedling raised in a pot by the Research Ranger at Denkanikota and found that the height was only 4″, and the root measured about 6″. In early stages the plant sends its roots deep in search of nutrition, developing a large number of haustoria. During the second season the seedlings attain 1 ft.—4 ft. in height, depending upon soil and climatic conditions.



Root parasitsim :—

In Denkanikota, trees isolated by trenches 10 ft. to 12 ft. deep died when deprived of host plants. In the absence of host plants, self parasitisation takes place if there are two sandal trees close by. In support of this, the Research Ranger showed two big sandal trees having one common root. A big tree can live for about 3 years without a host and a seedling for 6 months.

In the experiments that have been carried out to see whether sandal required hosts or not, it was observed that hosts frequently died and had to be replaced or supplemented almost once in every six months. The rapidity of the death of the hosts depended on the amount of haustorisation and nature of the hosts. This may have some bearing upon the observed death and unhealthiness of *Acacia arabica* on the Madras Forest College estate. Babul was thriving fairly well on the estate before. A decade after the introduction of sandal on a large scale, the estate Babul trees that served as hosts showed signs of ill health. I think Babul cannot thrive on this estate (which has a poor soil and rainfall) unless the sandal is provided with alternate hosts, and unless the number of sandal trees planted is restricted.

To study the ecology of sandal, profile pits were dug in Aiyur reserve, in non sandal areas, sandal areas, and spiked sandal areas, and the root systems observed and recorded in each area. It was found that in the non-sandal areas the number of roots were four times that in sandal areas and in spiked areas it was half that of sandal areas. The smaller number in the sandal area is due to the fact that sandal roots have parasitised other roots and killed them. In spiked areas the number is still less due to the spike disease.

Hosts :—

Leguminous plants are highly parasitised and non leguminous hosts only moderately so. There are a few plants which Sandal does not parasitise, viz., *Phyllanthus emblica*. *P. pollyphyllus*, *Grevillia robusta*, and *Cedrela toona*. *Lantana* is a good nurse but not a good host. *Lantana* protects the seedlings from browsing but the plants which haustorise them are susceptible to spike disease. If a speedy growth is desired dhall is perhaps the best host.

Influence of hosts :—

1. Hosts influence the growth of sandal to a great extent. The greater the number of hosts and the more suitable they are, the faster the growth of sandal. There is no appreciable growth of sandal when it is deprived of hosts.

2. Sandal with plenty of hosts seeds profusely and twice a year. Sandal deprived of hosts does not seed at all, or seeds poorly, such seeds being mostly unfertile.

3. The quantity of heartwood formation also depends on the nature of the hosts. It is found that Sandal trees associated with *Semecarpus anacardium*, *Erythroxylon monogynum*, and *Dendrocalamus strictus* contain a larger quantity of heartwood. This is still under investigation by the Research staff.

4. Sandal associated with certain species showed an absence of the characteristic insect fauna of Sandal.

5. Sandal associated with such hosts as *Cassia siamea*, *Ruta graveolens*, *Erythroxylon monogynum*, *Semecarpus anacardium*, *Strychnos nuxvomica*, and *Zizyphus jujuba*, possesses a very high power of resistance to spike disease, whereas Sandal associated with leguminous plants in general, Lantana and *Terminalia arjuna* is easily susceptible.

6. The quantity of the sap also depends on the nature of the hosts. A plant which is associated with *Strychnos nuxvomica* has bitter leaves and bark, and parts of a plant associated with dhall have a sweet taste. In Aiyur, I tasted the leaves of a Sandal with *Strychnos nuxvomica* as host, and found them bitter.

7. The habit of growth, or appearance of Sandal also at times is influenced by the host plants. In Naganur a sandal had parasitised on *Haloptelea*, and appeared to be in a lanky degenerate condition, that is, the leaves were long, narrow and pointed, and the internodes were too long.

Regular method of artificial regeneration :—

The species can be regenerated by (i) sowing in beds (dumps and transplanting), (ii) direct sowing, (iii) stump planting, (iv) planting pieces of roots—best results in October—and (v) Root suckers.

1. *Direct sowing* :— The seeds are thrown into bushes without taking any care till the seedlings come up 2 to 3' high. The seeds germinate after a certain period (21 days) and come up amidst bushes like natural seedlings. This method is the easiest and cheapest.

2. ***Sowing in beds or dumps and transplanting*** :— Unlike teak seeds the sandal seeds are not heaped above ground and allowed to germinate, but the earth is dug to a depth of 6″ or so, and shaped into a saucer like form having 2 to 3″ depression. The seeds are then put in the depression and covered with light earth, and over the earth grass or straw is put. Small twigs are also placed over the grass just to prevent it from being blown off by wind and to keep the temperature constant. Occasionally the seeds are watered, and when the radicle and plumule emerge out of the cotyledous they are transplanted in nursery line.

According to the local Research Ranger, seeds in dumps germinated within 21 days and seedings were fit for transplanting after 6 weeks from the date of dumping.

3. ***Stump plantnig*** :— Stumps from 1 to 3 year old seedlings have proved successful.

4. ***Planting pieces of roots*** :— Planting pieces of secondary root of sandal 9″ long and ½ to 1″ girth has been found successful. The method is still in the experimental stage.

5. ***Root suckers*** :— This method might be useful to propagate the species wherever isolated trees exist. It was noticed that the Research Ranger was experimenting with the method of "layering." A branch is wounded slightly and the wounded part is buried in the earth. After a few days the branch sends roots through the wounded parts, and then these branches are cut just above the point of rooting and planted.

Precautions while regenerating sandal :—

(a) In open blanks hosts should be raised 1 or 2 years in advance of sowing sandal.

(b) In scrub jungle it is necessary to plant up host plants first and sow sandal close to bushes.

(c) In deciduous dry forests, as host trees will be plentiful, it is enough to sow sandal under bushes.

(d) Never sow or plant too close to the host. The distance should be at least 3 to 6 feet from the host.

Method of raising seedlings under parent trees :—

Seedlings can be raised easily in nursery beds. The Researeh Ranger has found out a very easy method. Soil under parent trees is forked to a depth of 6 to 9″ just after seed fall. The seeds then get merged in the soil and lie dormant until the next showers. Soon after the

rain the seeds germinate profusely. He has thus succeeded in raising seedlings for 3 or 4 years. He showed us (students) a few of such groups aud we noticed that all the plants were coming up well, healthy and promising. Some of the plants though 3 years old had not commenced flowering because perhaps, the soil was favourable for rank vegetative growth. This is really a good method and deserves encouragement.

Tending the Sandal :—

Tending must be done very carefully to sandal. It is foolish to weed sandal areas as the superficial roots will be exposed to sun and the seedlings, will have no hosts. As far as possible soil aeration should be curtailed. Tending operations consist of

i. maintenance of good host plants and their tending,

ii. avoiding severe damage to hosts.

iii. provoiding for free and natural expansion of the crown,

iv. gradual freeing of suppressed plants,

v. providing a light shade to avoid sun scorch,

vi. free head over light,

vii. replacement of undesirable species,

viii. avoiding heavy growth of grass or herbaceous plants to prevent root competition, scarcity of water supply and bad aeration,

xi. cutting of creepers,

x. thinning of sandal if the hosts be insufficient in number or size.

xi. paying little attention to the tending of younger seedlings (below 2′ in height). If exposed there is the evil effect of browsing.

Sandal trees need very careful and regular tending for a yield of heartwood in quantity. Unless trees are tended they grow very poorly and produce very little fruit, hence less propagation. Till the seedings attain 2′ height they require shade. Till then no tending need be done. Between 2 to 9′ (beyond the browser's height) leave all the bushes round the seedlings and expose the crown alone. The covering keeps off browsing and affords protection from scorching.

If the plant is above 9′ it is ideal to expose it to the sun. In doing so do not destroy the host. If the host suppresses sandal, pollard or coppice the host. (In brief, young seedlings need no attentiou, little seedlings a little attention, and bigger ones a little more). If prickly pear exists in sandal area do not put cochineal insects to kill the prickly pear, as they are good hosts.

Spike disease :—

This disease, the origin and nature of which is yet obscure, has for years past been the cause of immense mortality among Sandal trees.

History of the disease :—

The disease was noticed first in Coorg by Mr. Macarthy in 1898. Mr. Coleman found the disease in Salem district in Jawalagiri reserve in 1913 or thereabouts. Since then various experiments are being carried out to find out the origin of the disease, and the method of its spread. In 1913 only a tree was seen attacked; now after 20 years time the disease has spread all over the Denkanikota East Range (about 40,000 acres) and parts of many ranges in the North Salem District. Various experiments are being carried out in Denkenikota (and elsewhere in Bangalore) both in the pot culture and field. There are three or four field centres for the

experiments. It is worth the trouble of visiting some of the research plots.

Experiments :—

1. In the early years it was believed that the disease spread through roots. Experiments were carried out both in the field and in pot culture, by isolating diseased trees by means of trenches of 6 to 8′ deep in the case of field experiments, subsequently it was found that the disease did spread to neighbouring trees, showing that roots do not communicate it.

2. Next it was thought the spreading may be due to undergrowth, shrubs etc. So spiked area and non spiked area was separated by a cleared line of 100 ft. wide. All the vegetation excepting the grass was cleared and the nonspiked area was kept in observation. The disease was seen in the healthy area within 4 years of time of observation. So this belief also was incorrect.

3. The next thing that struck the departmental authorities was that the spreading or the incidence of the disease might be due to physiological causes. *i.e.*, disturbance in the growth, or the circulation of sap may be unbalanced on account of fire. Based on this, experiments were carried out in the following manner.

Two plots of equal area were selected, one in a spiked area and another in a healty area. The plots were burnt for 6 years continuously. There were also two control plots, one for each type of area and kept under observation during 6 years. The result was that the disease did not appear at all in the burnt plot of the unspiked area and the disease was stimulated in the spiked area, *i.e.*, served as a pruning to the trees. The healthy trees were masked with the disease later on.

4. Another experiment also was carried out in Aiyur reserve to find out whether the disease was due to physiological causes.

In the midst of a spiked area a plot of 10 acres was selected and was divided into 34 subplots; of which 4 were kept as control plots. The whole area of 10·0 acres contained dense growth of lantana. The remaining 30 plots were treated with 10 different kinds of treatments, *viz.*, weeding, lantana clearing, soil aerating, removing of woody species and treating with manure and lime. For each kind of treatment 3 sub plots were selected at random in the area.

The result was that the incidence of spike was highest in control plots and lowest in soil aerated plots as well as lime treated plots. The same experiments carried out in Jawalagiri gave the reverse result, *i.e.*, lime treated plots gave highest percentage of incidence of spike and soil aerated plots the least. So it was concluded that the disease is not due to physiological condition.

5. Next it was believed that the disease was due to the presence of lantana in the area.

In 1925 four plots containing dense growth of lantana were selected. Two of them were kept as control and in the rest all lantana and diseased trees were cleared. Subsequently a fifth plot was added to the above four plots and in this all the undergrowth was cleared, retaining all the diseased trees. The plots were kept for a certain number of years under observation. The result was that the incidence of spike was more in lantana areas; and effect of removing lantana and spiked trees was identical.

6. The next attempt was to find out whether the disease gradually spread to adjoining localities, or skipped over.

For this an area of 2 acres was selected at extreme boundary of the diseased area, and cleared of all lantana

and shrubby growth. All the woody species and sandal were retained. The area was then kept under observation. The result was that the cleared area too got spiked, thus indicating that the disease does not skip over but spreads gradually.

7. By constant observation, the Conservator, Salem Circle, found that young seedlings below 6′ in height were not susceptible to the disease, whereas almost all seedlings above that height were. Therefore he wanted to find out whether the transmitting of the disease is done above ground or undergound.

To verify this some seedlings from the pot culture were kept on the ground and some on a platform above the surface of the undergrowth. The seedlings were being replaced every two months and the experiment was carried out nearly for two years. The result of the experiment was that the seedlings on the platform got the disease whereas the lower ones did not; thereby proving the carrier of the disease may be some insects; Also the experiment showed that the incidence of spike was more in the dry weather and none at all in the monsoons.

8. After this the cage experiment was thought of and is still in progress. The meshes of the gauzes at present are very small, I think, 20 per sq. inch. So it is settled that the transmitter is a very very small creature.

9. Another experiment is also in progress. A few seedlings are sprayed with some chunam water. The seedlings are not masked with the disease for the last eight months. The result is watched.

10. Some of the trees do not get attacked by the disease because of their autogenic power of resistance. In the pot culture the Research Ranger casually found out that sandal plants from seeds of four veins possess

this power, because such plants have a good root system. At present only seedlings from three veined, four veined and six veined seeds have been tried. We have yet to find out whether this autogenic power continues when the seedlings grow to big trees. To verify this, experiments are being carried out in different localities. If it is definitely proved that disease resistant seedlings can be obtained from the 4 veined seeds it is a great boon to the Forest Department, because we can raise sandal from such seeds alone, and thus combat the disease.

***Artificial method of inducing the disease in a healthy plant*:—**

The disease can be induced by grafting. A piece of bark or a part of a leaf of the diseased tree is inserted on an incision made on the bark of a healty tree such that a portion of the cut piece projects. Then the whole thing is tied air and water tight with a piece of wax cloth and left for itself to act. Virus takes 55 days to 9 months to act on the new atmosphere. If the grafting proves successful the cut pieces will fuse or else will dry and fall when the wax cloth is removed. Leaf is said to be the best part for grafting.

***Control method*:—**

Though it is long since attempts are being made to trace the origin of the disease so far no definite conclusion has been arrived at. Experiments are now being made to control the disease. At present there are two methods by which the spread of the disease is controlled. (1) To cut and remove all the diseased trees as the disease appears. This method is of course an effective one but if continued for long there will be very few trees left. (2) To segregate spiked areas with cleared lines all round and then prune the diseased trees. It is found that pruning has reduced the incidence and has cured many cases.

COLLEGE NOTES.

1. Junior Students' Swimming Race at Kargudi:

On 4-2-34, a six chain swimming race was conducted by Mr. A. A. Khan I. F. S., the 1st Senior Instructor, assisted by Rao Sahib V. N. Seshagiri Rao the 1st Junior Instructor, in the Moyar River at Kargudi. The course was laid out in a pool of deep, more or less still, waters just below the Teppakadu bridge. Mr. A. A. Khan was the starter and Mr. Seshagiri Rao, the judge.

Nine students in all competed for the race. Student V. Madhava Menon won the race easily in 2 minutes, 10 seconds. There was a keen competition for the second place between Mir Md. Ali and Subbanna. They finished the race breast to breast in 2 minutes, 28 seconds. Student Narayanan Nair came fourth, the time taken being 2 minutes, 45 seconds. The remaining five finished the course.

Shorter swimming races were also held the same day, and the following students were declared passed :—

¼ chain test :—
1. M. H. Naik.
2. Ramajayam.
3. M. M. Ponnappa.
4. Sivagnanam.
5. Bhimiah.
6. V. Govinda Menon.

½ chain test :—
1. Sirajuddin.
2. Mathur.

1 chain test :—
1. Thiruvenkatachari.
2. Apte.
3. Vijayaraghavan.

2 chain test :—
Natarajan.

3 chain test :—
C. M. John.

Three students did not compete in any of the races, two owing to ill health, and the other being on leave.

2. The Second Olympic Sports 1934 :

The Second Olympic Sports conducted by the Coimbatore Athletic Association were held on 9th and 10th February last.

On the day of finals there was a "March past" of all the competitors and judges to give the Olympic salute which was received by Col. Fraser I. M. S.

We took part in various events, and got only 3 second prizes (the events being 1 Mile, 3 Miles and Tug-of-war).

Most of our competitors had gone to Madras to witness the final cricket test match between M. C. C. and India and hence we were not able to capture more prizes.

3. The Cross Country Race 1934 :

The Annual Cross Country Race was run this year on the 10th March, the heats being held on 3rd March. All the students were examined by the Medical Officer before they took part in the race. All except students C. S. Mannadiar, M. D. Pitchia Pillai, B. H. Patil and A. S. Kaunds (for reasons of health) and M. Narayanan Nambiar, P. K. Sankara Menon and C. M. John (on quarantine leave) took part in the race.

The course was seven miles long. The race was started exactly at 6-30 a. m. on both days and both the mornings were fairly cool.

On the heats day the following students captured the 1st five places.

N. C. Madappa.	I (Senior)
K. M. Achayya	II do.
Ahmed Sheriff.	III (Junior)
P. Narayanan Nair.	IV do.
Thiruvenkatachari.	V do.

The results in the finals are as follows :—

1.	N. C. Madappa,	I	Time :	45 min., 25 sec.
2.	K. M. Atchayya.	II	„	48 min., 15 sec.
3.	Ahmed Sheriff	III	„	49 min., 15 sec.
4.	K. A. Muddayya	IV	„	50 min., 15 sec.
5.	C. B. Pemiah	V	„	50 min., 30 sec.

The rest finished the course within the prescribed time.

The Principal and the three Instructors have very kindly decided to award four extra prizes this year, considering the strain and effort of the students. As usual the "Mannarghat Moopil Nayar Cup" will be awarded to the winner, on the College day in June, and the additional four prizes some time before that.

C. S. MANNADIAR,
Athletic Captain.

4. Hockey :

During the past quarter one match was played against the Coimbatore Club team in which we faced a defeat due to a lack of team work in us. This could not be avoided as the players were distributed in camps during the whole of the last quarter. However we expect to gain the same during this Head quarter term.

The annual Sixes tournament was played during this quarter, and commenced on the 5th March. There were in all seven teams headed by the Captains selected from the 1st eleven. The finals was played on the 20th March between C. & G. teams under the Captainship of Messrs. K. S. Muthanna and Mamood Ali. After a contested and interesting struggle, victory favoured G. team.

K. B. AIYAPPA,
Hockey Captain.

5. Foot-ball :

After returning from camp much progress was made in Foot-ball. A keen interest was taken by our Principal who gave invaluable hints and instructions regarding the systematic side of the game. Under his personal guidance we practised (1) Obstacle Dribbling Relay (2) Ball and Rope Relay (3) Dribbling Relay in pairs and (4) Circular Shooting. The main objects of the above games are to have perfect control over the ball and to have aim in shooting. We would have gladly practised a few more games had we the time.

We played a friendly match with London Mission High School and though we lost it by 4 : 2 it is no discredit to us, for, four of our team players could not take part in the match.

The most important activity of this term was the Sixes Tournament in which 7 teams competed in which Ahmed Sheriff's team won. I take this opportunity of congratulating the winners of the Sixes Tournament.

The winners are :—

1. Ahmed Sheriff (*Captain of the team*).
2. S. Sirajuddin.
3. G. Natarajan.
4. N. V. A. Rebeiro.
5. M. Razakhan.
6. A. Yagnaswami.

WILLIAM VORES,
Foot-ball Captain.

6. Cricket and Tennis :

The College suffered an unexpected reverse at the hands of the 'Combined Schools' in the only cricket match played during this term.

The College won the toss and elected to bat. The opening pair Lobo and Mohamed Ali put in 20 runs on board playing rather restrained cricket. Following their dismissal a rot set in and the whole side was out for a meagre 70 runs. The batsmen seemed to suffer from inferiority complex and not only threw their wickets away but made no attempt to score off even rank long hops and full tosses. Venkatraman the captain of the combined schools XI bowled slow leg breaks which brought him 8 wickets at a trifling cost.

The combined schools in their turn scored 120 runs Krishnasamy of the Government College playing a sound though slow game for his 40 runs. Natarajan and Krishnamoorthy took 5 and 4 wickets respectively.

In their second venture the College scored 80 for 3 wickets (a distinct improvement), Kale scoring 20 and Krishnamoorthy remaining not out with 50. Kale showed distinct promise as a wicket keeper, and performed excellently well in his maiden efforts.

The Fischer Cup Tennis Tournament did not attract many entries this year. There were only 6 competitors and no very thirsty matches were witnessed. The following are the scores :

1st round : Govinda Menon beat W. Vores 6–0, —6–3. Krishnamoorthy beat Vijayaraghavan 7–5, 6–4. Rebeiro beat Mathur 6–1, 6–2.

Semifinals : Krishnamoorthy beat Govinda Menon 6–1, 6–4.

Finals : Krishnamoorthy beat Rebeiro 6–1, 6–4.

K. KRISHNAMOORTHY.

7. The College Magazine :

Elsewhere, we publish an important notice and an appeal, by the President of the Managing Committee of the magazine, and by the Chief Conservator of Forests, Madras, in the hope that readers, particularly Range Officers, will not only contribute matter or more matter, but induce others to become subscribers, — should they not already be such, besides assisting by articles. A separate appeal will also be made to the 43 gazetted, and the 109 non-gazetted, officers (of this presidency) who are at present non-subscribers. The reduction of the money contribution in the *initial year* from Rs. 4/- to 2–4–0, in the case of the non-gazetted officers, and the fixing of a *uniform rate* of Rs. 7-8-0 for the first year for gazetted officers (irrespective of rank), has been decided on with a view to obtain more subscribers, but eventually, when the situation warrants it, to bring down the annual subscription, and if possible to the earlier figure. Should there be a liberal response, it will be possible to enliven the numbers by pictures, and even increase the bulk.

It is further hoped that the extra four or eight annas payable annually from 1934–35 onwards by present subscribers will not act as a deterrent. This slight increase has been found to be unavoidable.

8. Examiners for the Final Examination, June 1934 :

The following is a list of the examiners for the final examination in June 1934, at the Madras Forest College :–

Messrs :

M. V. Laurie, I.F.S.	....	(Forest management).
A. R. Brand, M.F.S.	....	(Survey & Drawing).
J. A. Wilson, I.F.S.	....	(Range administration).
T. V. Venkateswarier, M.F.S.		(Botany).
H. P. Ward, I.F.S.	....	(Utilization).

Messrs :

E. S. Dawson, I.F.E.S.	....	(Engineering),
A. L. Griffith, I.F.S.	....	(Physical Science).
J. M. Sweet, I.F.S.	....	(Silviculture).
K. Gopala Menon	....	(First Aid).

[redacted] Kots

9. Botanical specimens for Flora of Madras :

Mr. C. E. C. Fischer, a retired Madras Forest Officer who now works at the Royal Botanical Gardens, Kew, Surrey, England and who is preparing a Flora for Madras writes to the Chief Conservator of Forests:— " I am sure there are still many species to be discovered in Madras, especially in the remoter shola forests. If you can interest any forest officer to collect in out-of-the-way places I shall be glad to deal with them (the collections) and send out lists of identification."

— Ed.

EXTRACTS.

1. Mimicry in Animals :

On November 24, Prof. G. D. H. Carpenter, Hope professor of zoology in the University of Oxford, delivered the Maand part of his inaugural lecture. Dealing with the imitation [redacted] edible or distasteful by edible species (Batesian mimicry), and the resemblances between inedible models (Mullerian mimicry or synaposematism), he laid stress on the fact that edibility and the reverse are not absolute but relative. The results of experiment accord well with theory, as is shown by Prof. Carpenter's own observations with monkeys, Moreton-Jones's with birds and Cott's with frogs. The fact of preferential feeding is well established. The polymorphism often shown by mimetic species is also in accordance with theory. It is evident that while models would gain, on the principle laid down by Muller, by diminishing diversity between their appearances, mimics on the other hand would find advantage by increasing it. Mimicry cannot be simply the result of coincidence due to a limited range of colour, nor can it be accounted for by supposing a parallel drift of variation. Mimicry might deceive an artist, not an anatomist. The only available key to [redacted] diverse phenomena of mimicry is the principle of natural [redacted] tion.

—Nature, 2-12-33.

2. Kiln-Seasoning of Timber :

The Forest Products Research Laboratory at Princes Risborough has issued a second report on the principles of kiln-seasoning. The first report dealt with the types of kilns in commercial use. The present one is entitled "Practical Kiln-drying" by W. A. Stevens. In the past, the drying kiln, with its potentialities for the improvement or deterioration of large quantities of timber, has not always been regarded in the same way as a wood-working machine of the same cost and importance : it has received neither the thought, care nor attention that such a piece of plant merits. With the enormous and ever-increasing demand for wood material of all types at the present day, the prolongation of the life of the article into which it is converted is of primary importance. This is the aim of the seasoning kiln. The method in use for centuries was to leave the material, stacked or otherwise, to season in the open for varying periods. The few valuable timbers in use in different parts of the world for so many centuries were seasoned in this fashion and, in the minds of some, it is doubtful whether the

kiln can better this natural seasoning of large-sized timbers of valuable species. But for practical purposes this is not the object aimed at. It is the smaller sized commercial material, so largely in demand, which is chiefly the subject of experiment and tests. Mr. Stevens deals with seasoning; the general principles and factors concerned in drying kilns and types of kilns; kiln design and kiln-drying routine; and test of kiln conditions with an appendix of drying schedules.

—*Nature, 2-12-33.*

3. Cinchona & Civilization :

When the British army from Bulgaria landed in the Crimea in 1857, the troops were so weak from the effects of malaria that they were scarcely able to carry their equipment. Presumably in 1857, quinine was regularly administered by army doctors to malaria patients, but Mr. Howard maintains that it is almost certain that there was no systematic method of prophylaxis at that time. From an examination of the records of his firm, he finds that the output for 1857 shows an increase of 27 per cent over the 1856 figure, while the post-Crimean War year, 1858, shows a decrease of 22 per cent. He assumes that a good proportion of the 1857 increase must have gone to the army, and that the fact that there was any army at all to be landed in the Crimea was due to the use of quinine. The first cinchona trees known to be grown in Great Britain were in the garden of the Society of Apothecaries in London, maintained to this day as the Chelsea Physic Garden. There is a record in Evelyn's Diary of his seeing cinchona trees there. At a site in Tottenham, which is now an arterial road, the Howard family grew cinchona in the early nineteenth century, and quinine was extracted experimentally from these trees. So early as 1823 it was being manufactured on a large scale in Great Britain although from imported bark.

—*Nature, 16-12-33.*

4. Modern System of Metallic Joints in Wood Construction :

According to Mr. Axel Oxholm, writing in the *American Forests* (Washington D. C, April 1933), in consequence of the increasing use of other and cheaper materials, the consumption of timber per inhabitant of United States has now become too small for forestry to be any longer profitable, as it is obviously not to the interest of owners to develop their properties, if there is an insufficient market for forest products. The writer is however of opinion that the modern system of using metal connectors in wood construction, which he saw for

the first time during the War, whereby it is possible to build large wooden structures at a low price, might revolutionise present condition. The system consists in the utilisation of metal rings fitted into grooves in two wooden members to be joined and held together by bolts.

Since 1920 the writer visited in many of the countries of Europe the inventors of these connector systems and also the construction houses by which they are used and he brought back to the United States, where the method is at present unknown and timber construction work was beginning to fall into disuse, upwards of sixty different types, together with much illustrative material. This consisted of photographs of modern towers up to 525 feet in height for radio-telegraphy as well as buildings, hangars for aeroplanes, etc. on a large scale.

The Forest Products Laboratory at Madison, Wisconsin, belonging to the Forestry Service of the United States, undertook to make trials of the principal types of these connectors for use in wood construction while at the same time the Bureau of Standards of the United States Department of Commerce made metallographic tests of the metals employed. A report, containing the results of these experiments, was published by the National Committee on Wood Utilisation under the title of Modern Connectors for Timber construction. This report brings out the numerous advantages of these modern jointing systems and fully recognises that they have proved both effective and economical in hundreds of structures that have been built in Europe in recent years.

The American timber industry is fully alive to the possibilities of this new construction method and the National Lumber Manufacturers' Association has already organised an engineering service for putting the system into immediate operation. The interest, aroused among engineers, builders, architects, designers and manufacturers in the United States by the report on the results obtained by the Forest Products Laboratory, has been so great that within a few weeks of publication, no less than 65,000 copies were ordered by those concerned.

R. W.

International Review of Agriculture, November 1933.

5. Entry of Water into the Germinating Seed :

A study of the brief communication on this subject by Alexander Nelson and Jas. C. Macsween will dispel certain popular illusions. The least study of the broad bean would

show that the micropyle is far from being a hole permitting access of water to the interior of the seed, and careful measurements with beans floating in a 'life belt' of paraffin wax show that intake of water is about the same whether the half immersed includes the micropyle or not. Reasons are given for concluding that two factors are at work in facilitating water entrance: (1) the hydration of the colloids of the testa, (2) an osmotic action through the semipermeable coat due to the release of carbohydrates in the inner lining of the testa. Emphasis is laid in this paper upon the great variation in the behaviour of individual seeds.

6. Growth of Evergreens:

According to the Soience Service, Washington, D.C., Prof. Ansel F. Hemenway, of the University of Arizona, has recordod evidence concerning the growth of the great evergreen trees of the Pacific north-west. Prof Hemenway points out that the cambium, and also certain elongated cells, the function of which is considered by botanists to be the transportation of dissolved food substances, appear to be in active condition from early autumn until the commencement of the summer drought of this region. In other words, that these species continue their growth throughout the winter. Similar structures in deciduous or board-leaved species in the same region, and also in coniters and board-leaved trees in Kentucky, do not appear to be functioning in specimens collected during the winter. The Oregon broad-leaved trees also appear to have a period of little or no growth during the midsummer drought of the region. It is thus apparent that there are two long periods in the year during which the broad-leaved trees do not grow; whereas the evergreens are able to grow continuously through nine or ten months of the mild, moist autumn, winter and spring. The author holds that the broad-leaved species have lost the race for supremacy in the north-west coast region. For this reason the forest of this region now consists almost entirely of Douglas spruce, grand fir, coast cedar and yellow pine.

—*Nature, 20–1–'33,*

7. Charcoal Briquettes:

The use of these briquettes in place of coal for the warming of houses is increasing steadily with the constant improvement in the methods of their manufacture.

Since 1931 F. AUBERT, a Swiss forestry officer has had briquettes of powdered charcoal manufactured in France, which

have been found more satisfactory than broken charcoal alike for gas engines and for house warming. In Austria there has been recently a marked development in the production of briquettes of this kind. Following on experimental work carried on over a period of years, an Austrian firm has succeeded in producing, with the aid of a special adhesive substance, charcoal with a specific gravity of 0.8, a heating power of 800 calories and a pressure resistance of 80-100 kg. per square centi-metre. A Viennese factory converts daily into charcoal 20 cubic metres of beech and oak waste for making briquettes by a patent process requiriug the services of two workmen only.

In Sweden steps are being taken to convert into charcoal 400,000–500,000 cubic metres of wood, being the debris of trees blown down by the great storm which occured in Uppland in 1932 and to make briquettes of this charcoal.

(*International Review of Agriculture Dec. 1933.*)

8. Government Review on Administration Report of Madras Forest Department for 1932—33:

Mr. R. D. Richmond, C.I.E., handed over charge of the office of Chief Conservator of Forests during the year under review and was succeeded by Mr. A. Wimbush. During the year orders were passed sanctioning the reorganization of the controlling staff of the Forest Department and fixing the future strength of the cadre of the superior staff. The transfer of the control of the clerical staff in District Forest offices from Collectors to District Forest Officers and the bifurcation of the Vellore division are other important administrative features of the year.

The area of reserved forests was increased during the year under review by 38 square miles, while that of reserved land was increased by 112 square miles. There was an increase in the quantity of fuel extracted from reserved and leased forests, and in the value of bamboos removed. The quantity of sandalwood sold during the year fell from 672 tons to 648 tons but there was an improvement in the price realized for the product. There was a reduction in the quantity of timber felled during the year, while the quantity departmentally collected but undisposed of increased by about 100 per cent, as a result of the slump in the market. The revenue from minor forest produce has been on the decline during the last three years mainly, it is stated, on account of the low rates realized for tangedu bark during the general depression and the increasing imports of wattle bark.

The number of cattle allowed to graze in forests under departmental management rose from 1,409,175 to 1,452,292, while the number grazed in panchayat forests showed a decrease of 12½ per cent as compared with the previous year. The increase in the former is attributed to greater efforts made by District Forest Officers to prevent illicit grazing. The average incidence of grazing in the forests controlled by the department was 5·7 acres a head against 5·9 in 1931–32. Grazing revenue increased from Rs. 5,58,800 to Rs. 5,86,179. These figures exclude the revenue foregone in the case of animals allowed to graze free, which amounted to Rs. 46,014 and Rs. 54,776 respectively. Grazing permits are now available for a whole division, instead of only for a range.

Owing to financial stringency the expenditure on roads and communications and on construction and repair of buildings was limited to cases of absolute necessity. A sum of Rs. 6,738 was spent on the construction and repair of wells and on the improvement of water-supply in grazing grounds.

There was generally an increase in the number of offences under the Forest Act and consequently in the amount of compounding fees realized from the offenders. The percentage of cases which ended in conviction also showed an increase.

Section III of the Chief Conservator's report records the activities of the department under the head of 'Silviculture' and records the results of very interesting work done; in particular, the recent developments in the artificial regeneration of dry fuel forests are of great promise. Progress continued in the preparation of working plans and more than two-thirds of the total area of reserved forests will very shortly be covered by sanctioned working plans.

The forest village system was in operation during the year in the North Mangalore division where there were three panchayats. The Government understand that only one of them has since renewed its agreement with the department and that the others are not functioning.

In a year of continued trade depression it was hardly to be expected that the operations of the department could be extensive or profitable. It is the more gratifying to observe that the working of the department for the year resulted in a surplus of 9.49 lakhs against 0.08 lakhs in the previous year.

—Forest Administration Report, Madras, 1932—33.

9. On the Fixation of Atmospheric Nitrogen by Bacteria Living Symbiotically in the Root Nodules of Casuarina Equisetifolia:

By R. N. Aldrich-Blake, M.A., Imperial Forestry Institute, Oxford.

The presence of root nodules on species of Casuarina has been known since 1896, but the exact role which these nudules play in the life of the plant has been somwhat obscure. To Mr. R. N. Aldrich-Blake we are indebted for definite information based on critical experimental work regarding the function of the organisms forming the nodules in species of Casuarina. His experiments prove that Casuarina obtains atmospheric nitrogen through bacteria which are symbiotic on their roots or it may be their leaves. Trees of this genus are therefore of the greatest value as soil improvers on sandy soils of the tropics. Where introduced. however, into new sites, the proper bacteria must be introduced with them, otherwise the tree will fail to develop properly. The bacteria may be brought in in the form of a crushed mixture of soil and nodules, which may be forked into the seed bed or mixed with the seed.

—Empire Forestry Journal, Vol. 12, No. 2, 1933.

10. The Wild Animals of the Indian Empire and the Problem of their Preservation:

* * * *The Main Peninsula.*

While the drainage areas of its intersecting rivers are covered with green woods and cultivation, the greater part of the tableland, which forms the main Peninsula of India, presents a scene of wide undulating plains separated by ranges of flat-topped hills. A portion of the plateau, comprising the eastern parts of Central India, Gujerat and the Deccan is sheltered from the monsoon by the great wall of the Western Ghats. It is a dry region of moderate rainfall. This dry zone extends to the low lands of the Carnatic and stretches south to the plains of southern India. These are again cut off from the monsoon by the southern hill ranges. The dry zone of the tableland has its characteristic vegetation due to climate and to soil. From the Bombay coast to the neighbourhood of Nagpur, from below Belgaum to Goona in Central India, over some 200,000 sq. miles of country, black cotton soil predominates. It is derived here from the underlying volcanic rocks known as Deccan Trap which forms the unbroken substratum throughout this area.

Black soil produces its characteristic wild and cultivated vegetation. The wide grass-covered plains and the bases of the flat-topped hills in the Trap country are scattered with clumps of thorny acacias, species of *Zizyphus*, small trees and shrubs which are either leafless or burnt up in the hot weather. Forests, where they exist, are mainly deciduous and composed of stunted teak, bamboos and sundry small trees. In the open grasslands and scrub jungle, herds of gazelle and antelopes are again common. Other typical animals of the open country in the Peninsula are the Jungle Cat, the Common Fox, the Mongoose, the Indian Wolf, palm squirrels, hares and a variety of field rats and mice. Gaur, sambhar, spotted deer, sloth bear and wild dogs are found in its open deciduous hill forests. As one leaves the Trap country and penetrates the humid region lying north and east of Nagpur, one enters a zone where the climate is somewhat similar to the plains of Bengal, the character of the soil and of the vegetation changes. Teak ceases to be the dominant tree of the forests. It gives place gradually to Sal, while the familiar crops of the Trap country millet, pulses, and cotton yield to watery rice and cane fields. The wild life of the forests of this humid zone is enriched by the presence of wild elephants, buffalo and swamp-deer, which occur in this area.

The Malabar Coast.

The Western Ghats, in sharp contrast to the adjoining dry zone of the Deccan, presents a region of great humidity and heavy rainfall. The forests covering the western slopes are at times very dense and composed of lofty trees, festooned with numerous perennial creepers. Bamboos form a luxuriant undergrowth. In parts of the range, the forests are more open and the banks of clear streams running through them are covered with spice and betel groves.

The Nilgiris, an off-shoot of the Western Ghats, rise precipitously to form extensive grassy downs and tablelands seamed with densely forested gorges or *sholas*. They are composed of tall ever-green trees with a dense undergrowth. Sholas, similar to those of the Nilgiris, occur in the Annamallai, Pulni Hills and other South Indian ranges. They provide the main shelter to wild elephants, gaur and other large animals of these hills. The most interesting feature of the higher level forests of the Nilgiris is their affinity to the higher forests of the Assam hill ranges. Many of the trees found in these high sholas and some of the forms of animal life are common to both areas. The forests of the Western Ghats and South Indian hill ranges have a richer fauna than the remaining areas of the Peninsula

Region. Among the species limited to these forests are the Nilgiri Langur, the Lion-tailed Macaque, the Nilgiri Brown Mongoose and the Striped-necked Mongoose, the Malabar Civet and the Spiny Mouse. In the higher levels of the Nilgiris and the Annamallais are found such characteristically Himalayan animals as the Thar and the Pine-Marten.

From this general description of the composition and distribution of the mammals of the Indian Empire and of the varied conditions under which they live, it will be seen that they share with all other living things the strong natural tendency to increase their sphere of action, to extend their territory. We find animals which have originated in countries beyond our frontiers or in our northern mountain ranges extending their range and colonising the Peninsula. When a species thus spreads into a new territory, where the climate, the vegetation and the enemies it has to face are differnt from its original home, it must either adapt itself to these changed conditions or it will fail to establish itself. These different conditions may produce differences in its appearance and habits, in other words, produce a variation from the typical parent form. If these colonists are subsequently isolated from the parent stock by impassable barriers, produced as a result of geological and other changes, they will tend in the course centuries to differ more and more from the parent stock. Glacial condition which obtained in the Himalayas during the Ice Age are believed to have driven the Thar with other animals to colonise the Indian Peninsula, which is assumed to have enjoyed a more temperate climate during this epoch. The return of tropical conditions in India is believed to have resulted in the extermination of the Thar in the Peninsular Region. But those which were able to obtain a refuge in the temperate climate of the higher altitudes of the Nilgiris and Annamallai Hill ranges survived. Isolation from the parent Himalayan stock, different conditions of life, produced in the course of centuries those differences in colouring and texture of coat, shape of horn and other characters which now distinguish the Nilgiri from the Himalayan Thar. In other words, a new and distinct species was evolved. But if no impassable barriers are created, the new varieties evolved in different connected areas remain more or less alike. There is interbreeding and consequently an intergradation of characters between these varied geographical races linking them with the parent form. Thus, among many widespread species of animals, we find more or less easily distinguishable geographical races, evolved as a result of the different conditions under which they live in different areas of their range. In the case of the

Gaur or Indian Bison, which extends from India through Burma and the Malay countries, there are well marked differences in the shape of the skull which enable us to differentiate between the Indian Gaur and the gaur living in the forests of the Malay Peninsula. While the Gaur of Burma and Assam intergrade between these two extreme types.

In the past naturalists were content to classify animals in accordance with the salient characters or marked differences between species. In recent years it has been recognised that it is not only necessary to classify species but it is equally or more important to systematically record geographical variations where they exist in a species. This data, when sufficiently multiplied, will in future furnish information for the investigation of problems connected with the variation and distribution of species. Therefore, in more recent publications dealing with Indian animal life, we find due attention paid to the description of geographical races wherever these occur. * * *

—*Journal, Bombay Natural History Society, Vol. XXXVI, No. 4.*

11. Chlorate of Soda as a weed-killer :

"For keeping paths, hard tennis courts, and similar places clear of small weeds a 2 to 5 per cent solution of chlorate of soda in water applied at the rate of a litre per square metre, or roughly a quart per square yard, seems to work most satisfactorily; but for perennial weeds and the total destruction of all vegetation, percentages upto 15 are necessary"

—*Empire Forestry Journal, Vol. 12, No. 2, 1933.*

12. Resistance of timbers to damage by marine borers :

(—By, R. C. Fisher, & B. J. Rendle.)

A serious disadvantage to the use of timber for structures (piers, piles, groynes, etc,) in sea water is its susceptibility to extensive damage by marine boring animals of which the Shipworms (Teredinidae) are the most important. Attempts to discover methods of preventing such injury show that some woods are more resistant to attack than others..... It appears that in the past, the reputation of a timber as resistant to marine borer damage was founded upon service trials of numbers of species, but few attempts have been made to explain the cause of a high degree of resistance.....

An examination of the properties and structure of a highly resistant wood seemed to show that its resistance is due

primarily to the abundance of silica particles in the tissues combined with a high enough density to render the wood hard and compact..... The silica particles occur in the form of grains or more or less oblong bodies usually in the rays or wood parenchyma cells..... From the results of an investigation a number of genera are recommended as being likely subjects for practical trial. The chief Indian genera are: *Artocarpus, Beilschmiedia, Gluta, Heritiera, Mimusops, Protium, Stereospermum, Tectona* and *Vitex*. The possibilities for marine construction of some of these genera have not hitherto beeen realised.

The presence of silica is not, however, the only factor which can render a timber resistant to this type of damage. The occurrence of poisonous or other extractives in timbers in which silica is entirely absent may under some conditions impart to these woods, powers of resistance equal to those of species with a high silica content.....

—*Empire Forestry Journal, Vol. XII, No. 2, 1933.*

13. The Cauvery Metur Dam :

The Cauvery Metur project is the largest work being carried out in India at the present time and has attracted the interest of engineers all over the world in the building of the great dam at Metur where many problems have been faced and successfully overcome by the band of engineers who are in charge of this great work.

The site of the dam is close to the village of Metur and the dam stretches across the river Cauvery at this point. The area of water spread thus formed will be 59.25 square miles, while the effective capacity will be 93,500 million cubic feet. The minimnm flow in the river is 800 cusecs while the maximum flow in July 1924 was 456,000 cusecs. The following particulars also give an idea ot the size of the dam :— Height of dam above average bed level of river, 175 ft. Maximum height of dam above deepest foundations, 220 ft. Quantity of masonry in dam 50,000,000 cubic feet.

The dam is of the gravity type and is being built of rough stone masonry and cement concrete. In order to speed up construction the cement concrete is placed by means of two large towers, designed for an output of 3,000 tons per day of 12 hours.

The water for irrigation will be controlled through the dam by two sets of sluices, called the high level and low level sluices.

The former comprise 8 vents $10\frac{1}{2}$ ft. wide and 16 ft. high, and the latter 5 vents 7 ft. wide and 14 ft. high. The sluices work on the free roller principle and are balanced and operated by electric motors driving through suitable gear reduction, chains and rods connecting the gates to the counter balance weights.........

On the left flank of the dam the surplus flood water will be discharged over the Ellis Saddle......... The gearing platform is placed on a high level steel latticed bridge $59\frac{1}{2}$ ft. above the cill, which is carried away by masonry columns, extensions of the piers. These piers also carry a road bridge 18 ft. wide and 1,131 ft. long on the down stream side. This road bridge will eventually form part of the Madras–Calicut Grand Trunk Road which by this new route will be 16 miles shorter, cutting out Salem.

—*The Commercial & Technical Journal, B. N. R., January 1933.*

14. Stain and Discoloration in timber. Its Prevention and control in the log and when converted:

By K. St. G. Cartwright, M.A., F.L.S., (Forest Products Research Laboratory).

Stain and discoloration are a common cause of degrade in timber, which principally affects the sapwood, in severe cases the whole of sapwood becoming discoloured, thus rendering the timber unsuitable for purposes where appearance is of importance. The blue stain of softwoods often known as "log blue," is an example of such staining, familiar to all who handle timber; but staining is not confined to the softwoods, for it occurs also in hardwoods, as for instance, the yellow stain of oak, the dark stain of ash, and the blue stain of willow and poplar.

Although such timber will show little or no loss in mechanical strength, nevertheless considerable financial loss is incurred annually through discoloration, this being due partly to suspicion on the part of certain buyers that it represents an early stage of dote, and partly to the fact that such timber cannot be used where colour is one of the assets. Although such suspicion is not warranted by the facts, and probably much timber is unnecessarily condemned through this cause, yet greater care should undoubtedly be exercised in the inspection of timber containing stain, as its presence shows that conditions have been favourable for fungus growth, and, moreover, the stain may make

it more difficult to detect discolorations due to the more destructive fungi causing decay.

Discoloration and stain fall into two main classes; (1) Stain caused by improper kilnseasoning (kiln burning, etc,) or by chemicals; (2) stain caused by fungi. Disclorations coming under the first heading may be very varied, but they can easily be distinguished from fungus stains, as, apart from their showing no fungus threads when seen under the microscope, they can be recognised by their distribution. The loss from such causes is slight compared with that caused by fungi, and it is exclusively with the latter class that this article deals.

Appearance and Effect of Sap-stain.

The stains caused by fungi may be blue-grey, olive, yellow, or pink, while the fungi which cause decay bring about brownish, yellow, or pinkish discolorations, but are rarely responsible for those of a blue or grey tint.

One of the most common fungi which causes blue stain in the sapwood of Scots pine and other softwoods in *Ceratostomella pini.* The discoloration in softwoods caused by this fungus is due to the minute brown coloured threads of the fungus, seen through the semitransparent cell walls. At a later stage in the development of the fungus the sapwood surface may become covered with blackish pin-head-like structures, accompanied by dark bristles or hair-like growths. At the top of these growths under moist conditions a glistening drop of liquid may often be seen.

The dark spots, if examined under a lens or microscope, are seen to be flask shaped with a neck, each one approximating in shape to a pear wfth its stalk in the air. These are the fruit bodies of the fungus in which the spores are produced. These spores are exuded through the neck of the fruit body in a drop of liquid, and constitute one of the principal means by which the fungus is spread, although other forms of spores are produced on the fungus threads.

The spores are distributed by currents of air, by water, and by insects, wood-boring beetles playing a part in infecting fresh timber by carrying the spores, which stick to their legs and bodies. The fungi feed solely on the cell contents, and therefore do not appreciably lower the mechanical strength of the wood, thus differing from those causing dote, which feed [illegible] the substance of the cell wall. It is probable that starch and sugars form their pricipal food material, and for this reason this type

of fungus is confined mainly to the sapwood, as it is the sapwood that is most rich in such materials. This is further exemplified by the fact that the hyphæ are usually most numerous in the medullary ray cells, where supplies of starch and sugars are abundant, and it also explains the almost complete immunity of the heartwood of most species to fungus stain.

Conditions for Growth.

Like most living organisms, in addition to food material, the presence of a certain amount of moisture and oxygen combined with a suitable temperature is necessary for growth.

1. *Moisture.*— No appreciable growth will take place in or on timher with a moisture content below 20 to 25 per cent of the oven-dry weight of the timber. On the other hand, a high moisture content will encourage growth provided there is sufficient oxygen available.

2. *Oxygen.*–Oxygen is required for the fungus to "breathe" and therefore in water logged timber the absence of oxygen will effectually prevent any growth. It is for this reason that timber totally submerged in a log pond will not be develop fungus stain.

3. *Temperature.*— Up to a certain point, which varies according to the particular species of fungus, a rise in temperature greatly increases the rate of growth of the fungi, and in consequence the development of stain, provided the timber remains moist. In this country the temperature never becomes too high for their growth. Low temperatures, on the other hand, although they do not kill the fungus, check growth, although some development of stain may take place only a few degrees above freezing-point.

As a general rule, the timber of vigorous, standing, growing trees is free of fungal sapstain or discoloration. Exceptions occur where air (oxygen) has access to the timber, such as at pruned surfaces, and at other places where the covering bark has been removed. But when once a tree has been felled and the oxygen and drying action of the air have play, timber becomes liable to infection by fungi and consequent stain.

Sap-staining under optimum conditions may develop with great rapidity, and considerable degrade from staining can take place in the course of a week or two, so that any measures for control to be really effective must be carried out promptly. It is essential, if staining is to be prevented, that all those through whose hands the timber passes should co-operate in seeing that

as far as possible the timber is kept in a condition unfavourable to the development of stain fungi.

In certain cases, where immediate conversion on the felling site is not carried out, and where the bark is left intact, the practice of end-coating will prevent infection, provided that no exposed wood is left uncovered, such as branch stubs and wood exposed through bark injury. The coating used for the purpose should be of such a nature that it affords a complete mechanical barrier to the entry of any fungus. and one that will not easily crack through shrinkage of the timber. Failing this, a coating of a substance toxic to the fungi should be employed, great care being taken to work the preservative into all crevices so that no untreated wood will become exposed to infection. The logs thus treated should remain free from stain up to the time of conversion.

Many different substances are used for end-coatings, the most common being probably paint and tar, which act mainly as mechanical barriers to the entrance of the fungus. Creosote is sometimes used, but it discolours the wood for a short way in. End-coatings are usually applied more to prevent checking than stain. The United States Forest Products Laboratory, Madison, recommend as a preservative for end-coating the following :—Hardened gloss oil, 10 parts to cresylic acid 1 part. The formula for hardened gloss oil given is as follows :—100 parts rosin, 8 parts quicklime, 57.5 parts Naphtha ; and filled hardened gloss oil : 25 parts asbestine, 25 parts barytes, 100 parts hardened gloss oil.

Reducing Moisture Content.

Control by reducing the moisture content.—On conversion, a large surface of timber is at once exposed, and becomes liable to infection, and, therefore, any mechanical method of prevention is ruled out ; mothods of control which render conditions unfavourable for the growth of these fungi must be adopted, (a) by seasoning, (b) by chemical treatment.

Since these fungi can only grow on wet wood, and as infection in the first place takes place on the surface, any means which hastens the drying of the surface lessens the period during which the timber is liable to stain. The seasoning of timber is carried out by means either of the slow process of air-seasoning or by the shorter process of kiln-seasoning ; in the case of the first, rapidity of drying can be increased by building the timber into narrow stacks and by the use of thick piling sticks to separate the rows. Experiments on softwoods have

shown that piles 6 ft. in width remain much clearer than those 12 ft. wide. Considerable staining can occur if stickers only ½ in. in thickness are employed, whereas those of 1 in. much reduce the tendency to stain, and there appears to be no further appreciable gain by increasing the dimension to 1½ in.

The air-seasoning of certain refractory hardwoods presents greater difficulties, for, if drying is too rapid, surface checking will result. Here, again, piles much over 6 ft. in width cannot be recommended, for the small air movement in the centre retards drying unnecessarily and disproportionately.

Much can be done to prevent infection by keeping the yard clear of timber waste, particularly beneath the piles themselves.

When timber is seasoned in a kiln, the temperature is normally high enough to kill any fungus growth present. The use of a good high circulation-rate kiln will reduce almost to zero the risk of fungal staining in green softwoods and in many hardwoods. With a few species of hardwoods, however, initial temperatures must be kept low to avoid damaging the timber, and in such cases the fungus may spread rapidly. It is usually possible to kill fungus growth by steaming the timber for a few hours at a temperature of at least 65 deg. C., but it is not yet known if this is always safe in so far as the green timber itself is concerned.

Dip Treatment.

Where it is not possible to dry the surface of the timber rapidly, or where the timber is likely to regain moisture, the wood can be rendered unpalatable to the fungus by poisoning it, and this mothod of control—by chemical treatment—is one which promises to give the best results, and is already used extensively. All such surface treatments with chemicals, to be effective, should be carried out directly on conversion, before any fungus has penetrated into the timber.

Application of a chemical by spraying the timber will prevent stain, but it is not easy in practice to ensure that the liquid covers the whole surface and gains entry into every crevice; whilst this process is somewhat wasteful of chemical, and, therefore, on the grounds both of economy and efficiency a dip treatment is to be preferred.

In a dipping treatment the converted timber is submerged under the liquid for a matter of ten to fifteen seconds and allowed to drain, thus ensuring the complete coating of the timber with a minimum loss of liquid. The most practicable

method of carrying out such treatment is by means of a chain conveyor which carries the timber under the liquid in the tank as it comes off the saw; the length of the tank and the speed of travel are arranged so that the timber remains under the liquid for the requisite time. Many chemicals for the prevention of sap-stain have been tried with varying success, and extensive trials are being carried out in America on various substances.

The following well-known substances have been found to give fair control of sap-stain:—Borax at a strength of 8 oz. to the gallon of water for hardwoods, sodium bicarbonate 12 oz. to the gallon of water for softwoods, and sodium fluoride 4 oz. to the gallon for both hardwoods and softwoods. The strength should be varied slightly according to weather conditions. Under dry conditions, for instance, borax at a strength of 6 oz. to the gallon would probably prove effective.

Recent work in America has shown that the organic mercurial salts give good results in the control of sap-stain, and some of these have been marketed under proprietary names; but, owing to their poisonous nature, great care should be exercised in their use. Chlorinated phenols are now under test, and these are said to be yielding very promising results, and have the advantage of being more permanent than the mercurial salts.

Before using any of these chemical treatments on a commercial scale, however, the precaution should be taken to test their effect on small samples of the species of timber it is intended to treat, as in some cases a chemical that is perfectly satisfactory for one species may cause chemical discoloration in another species.

Co-operation to Reduce Losses.

The fact that the fungi causing sap-stain feed on the cell contents of the wood suggests another possible means of control namely, the removal of the cell contents, and methods for achieving this are now under investigation.

The subject of control of sap-stain is a large one, and it is impossible to deal fully here with the many aspects of the subject; but I hope that sufficient has been said to indicate that, with close co-operation by all concerned in the handling of timber, the losses from this source, which are at present high, could be greatly reduced.

In conclusion, it would be a great step in the prevention of deterioration in timber both from stain and decay if the specification for timber to be shipped air-dried contained some

reference to the actual moisture-content at the time of shipment rather than a stipulation that the timber has been air-dried for so many weeks. Such a specification would at least ensure that the timber at time of shipment was not liable to stain. It would not, however, render it immune from danger if at some future date it became re-exposed to moisture, and, therefore, all reasonable precautions to prevent this should be taken.

—Timber Trades Journal, 11–11–33.

15. Mineralized Cell Treating Process:

A departure from the customary method of treating poles and piling in retorts and tanks, is being followed by Mineralized Cell Wood Preserving Co., of Portland, Oregon, which has been conducting full scale field experiments at the pole yard of the Portland General Electric Co., in Portland. The Mineralized cell process impregnates the sapwood of the pole or piling with a toxic agent, introduced by pressure from the butt end, through a rubber cap tightly fitted to the pole. The chemical is forced into the wood at a pressure of 12 to 15 pounds per square inch. For this process, green timber is preferred, since the cell walls of the sapwood are still in a live condition and the penetration of the toxic agent is rapid. In the preservative are precipitating agents which combine with the sugars and acids of the wood to form solids in the cell walls. Only the sapwood is impregnated.

In actual practice 50 poles may be treated at one time, each served by a separate hose connection from the chemical supply. A 40-foot pole may be treated in 8 hours. With 50 individual connections, and working three shifts, the capacity of the present plant is 150 poles in 24 hours. The treating fluid consists of a mixture of copper, arsenic and zinc salts, to which are added the precipitating agents above mentioned.

The rubber caps are of heavy construction, equipped with relief valves to permit the escape of trapped air. The caps are secured around the butt of the pole by means of steel straps and dogs, and the rim of the cap is fitted tightly to the pole by means of a cable cinch.

The Mineralized cell process requires no heavy permanent plant equipment, according to Mr. Houghtaling. The present apparatus is portable, with the tanks and mixing facilities all mounted on a motor truck chassis. A steam plant for supplying hot water for mixing chemicals is also carried on the truck. All the piping, tubing and caps are stored in lockers on the truck when not in use.

The truck chassis carries four copper tanks, holding about 300 gallons of treating fluid. A small air compressor is used to maintain pressure on the tanks.

Considerable interest in the Mineralized cell process is being shown by representatives of public service companies, engineers and building contractors.

—The Timberman, Oct. 1933.

16. Sunlight and Death of Snakes.

Several notices have appeared of well-authenticated reports that rattlesnakes are killed by short periods (about 10 minutes) of exposure to direct sunlight, and popular belief attributes similar susceptibility to the sidewinder. As a consequence, several observers have tested the reaction af snakes to sunlight with a variety of species, and the general result has been that, in full sunlight on sandy ground, the desert snakes have rapidly become uncomfortable, lost the power of co-ordinating movements and have died in 6–20 minutes. To discover the lethal factor, H. F. Blum and C. R. Spealman tested the light rays and came to the conclusion that no definite part of the spectrum was injurious to the rattlesnake, but that death was due to rise in body temperature owing to the combined effect of the absorption of solar radiation and conduction of heat from the ground surface. That this supposition came near the truth was shown by testing the reactions of snakes in a hot-air bath. Death resulted when the bath had reached a temperature of 49° C. It is significant that Walter Mosauer and E. L. Lazier found that in all the specimens they tested the body temporature at death was almost identical and was 46·5–47° C.

— Nature 27–1–34,

17. Reptile Skins in Commerce.

A few years ago the use of the skins of reptiles in the manufacture of shoes was regarded as a whim of the moment, but now the view is strongly held by the leather trade and by technical experts in the industry that the skins are established as a raw material for leather production on as permanent a basis as goat, calf and sheep skins. This is the view expressed by the sub-committee appointed by the Imperial Institute Advisory Committee on Hides and Skins. The change in outlook has taken place since 1926, when reptile skins were employed only in the making of luxury articles; now they are

used for the mass production types of shoes, as well as for bag and fancy leathers. Some of the advantages of reptile leather are that it is hard-wearing, stronger than sheep, goat or even calf skins; it shows great variety of pattern and design; and it takes colour readily. But the demand has been telling upon reptile populations in various tropical countries. In 1932, India exported 2½ million reptile skins; in 1931, more than two million came from the Dutch East Indies; and serious depletion has occurred in the stock of the North American alligator, the edible terrapins of the United States, and the green turtle, the last being valued as food.

— *Nature, 10–2–34,*

18. Absorption of Calcium by *Terminalia glabra*, W. and A.

Mr. T. de Silva, of the Department of Botany, Colombo, in a communication to the Editor, directs attention to the remarkable manner in which *Terminalia gabra*, W. and A., accumulates calcium from the soils of the Miocene limestone of northern Ceylon. The water is usually softer in this area from wells near these trees, and the villagers in the dry zone burn the bark of the tree as a source of lime. In this region the ash of the leaf was 57–61 per cent CaO, of the bark 83–91 per cent. *Terminalia glabra* is a deep-rooted tree and may thus remove calcium from the deeper layers of soils whilst its leaves, rotting in the surface layer, may make this layer richer in lime than the leached surface soil out of the range of these falling leaves. Mr. de Silva cites figures of analyses of surface soils in support of this conclution.

— *Nature, 10–2–34,*

19. Nothing like Wood :

In view of the inroads made in recent years by wood substitutes into what were at one time regarded as the special domains of timber, it is highly gratifying to learn that in one sphere of national activity substitutes have been beaten literally and practically all along the line. The Post Office is a great user of timber, particularly poles; their standards and specifications being very rigid; but in spite of the fact that the Post Office officials have received between 40 and 50 propositions regarding the use of poles constructed of other materials, such as steel and concrete—and even glass!—the Scots pine telegraph pole, which was adopted as standard in 1870, though other timbers had been used for many years previously, still reigns

supreme. Timber poles are much more tough and durable, and much less expensive than substitutes. Many poles which became casualties proved on examination merely to have turned in the ground, the latter having given way, and not the poles.

— *Timber Trades Journal, 9–12–33.*

20. End Surface Treatment :

A New Departure in Malaya.

The practice of end protection of sawn material and logs is a new departure in Malaya. The loss of timber from end splitting of logs during the period between felling and conversion, and also of converted material during seasoning, is very high indeed, according to *The Malaya Forester*, local climatic conditions being the main contributory cause.

Mr. W. F. Chipp describes preparations for treatment of end surfaces which have proved successful under Malayan conditions. For planks and boards the best preparation consists of equal quantities of damar and dry brick clay, both ground to a fine dust powder and mixed with kerosine oil into a thick liquid about the consistency of glue. A thick coating is applied to the plank or board immediately the end has been cut, and a second coating should be given 24 hours afterwards. Both coatings should extend for about ½ in. along the faces and edges of the piece treated. The "dope" is best applied with a stiff flat ("sash tool") brush. If for any reason the end has subsequently to be cross cut to eliminate defects, the newly cut surface should be given the same treatment.

For logs a mixture of cow or buffalo-dung and clay, in approximately equal quantities, well mixed to a paste about the consistency of potters' clay, is recommended. This should be applied over the entire end surface of the log to a thickness of about 1 in. in the centre tapering to ½ in. at the edges. Before applying the mixture, the end of the log should be cleaned of any mud or slime adhering to it. This mixture, it is stated, has been used very successfully to prevent end splitting of billets extracted for plywood and match manufacture.

— *Timber Trades Journal 25–11–33.*

Notifications relating to Rangers.

Waltair Circle.

10—1—34. Y. V. Anjaneyulu, Forester, First grade (M. R. H.) will continue to act as Ranger Seventh grade from 5-12-1933 to 28-1-1934 *vice* Mr. P. S. Varadakrishnamachari, Ranger on leave. 2. V. Rangachari, Forester First grade (M. R. H.) will continue to act as Ranger Seventh grade till 17-1-1934 in the vacancy caused by the grant of leave to Mr. B. V. Nagaraja Iyer, Ranger Second grade. 3. Abdul Razak promoted to act as Ranger Sixth grade will revert to his permanent appointment as Forester First grade from 5-11-1933, the date on which he proceeded on leave.

13—1—34. Mr. V. Rangachari, Trained Forester, First grade, S. P, T. transferred from Lower Godavari to Guntur for Bezwada Range.

16—1—34. Mr. C. S. Ganapati, Ranger, granted leave for 2 months from 15—2—1934 or date of relief.

24—2—34. The leave for 2 months granted to Mr. I. John extended by two months on average pay from 3-3-1934. 2. Mr. V. Rangachari, Forester First grade, M.R.H., will continue to act as Ranger Seventh grade from 18—1—1934 to 2—5—1934 *vice* No. 1 on leave.

13—4—34. The leave for 8 months granted to Mr. P. S. Varadakrishnamachari, Ranger Third grade, temporary extended upto 30—11—1934 preparatory to retirement.

Bellary Circle.

14—12—33. Mr. T. Venkatasubbier Vonipenta Range, Cuddapah North Division granted leave for 4 months from date of relief. 2. Mr. S. Varadarajulu Reddy, Forester First grade, Kurnool East posted as Range Officer Vonipenta to relieve No. 1.

19—1—34. Mr. T. M. Krishnamachari Anantapur division on expiry of his leave on 23rd January 1934 posted for special duty in Kurnool South Division.

19—1—34. Mr. T. G. Seetharama Mudaliar, Ranger Sixth grade, Kurnool East Division on expiry of his leave on 22nd January 1934 posted to special duty in Cuddapah South Division.

30—1—34. Mr. T. M. Krishnamachari, on Special duty in Kurnool South Division, posted to Dhone Range Kurnool West, *vice* Mr, B. T. Seetharama Ayyar, reported suffering from small-pox.

31—1—34. Mr, T. G. Seetharama Mudaliar, on special duty in Cuddapah South Division posted to Rajampet Range in the same Division. Mr, G. Devanayagam Nayudu Ranger Fourth grade on relief by No. 1 granted leave on average pay for 2 months from the date of relief.

15—2—34. Mr. T, G. Seetharama Mudaliar, Ranger Sixth grade on special duty in Cuddaph South division posted to Cnddapah Range, in the same division. 2. Mr. Y. Peddalakshmayya Nayudu, Cuddapah Range on relief by No. 1 granted leave on average pay for 2 months and 7 days.

24—2—34. Mr. B. T. Seetharama Ayyar Ranger Fifth grade Dhone Range, Kurnool West Division granted leave for 6 weeks from 24th January 1834.

28—2—34. Mr. N. C. Mahadevan Pillai Cuddapah North Division on expiry of leave posted for special duty under the District Forest Officer, Cuddapah South.

3—3—34. Mr. B. T. Seetharama Ayyar, Ranger Fifth grade, Kurnool West Division on expiry of his leave posted to Dhone Range in the same Division. Mr. T. M, Krishnamachari, Ranger Seventh grade, on relief by No. 1 posted back to special duty in Kurnool South Division.

3—3—34. Mr. N. C. Mahadevan Pillai, Ranger Second grade on special duty in Cuddapah South Division posted to Rajampet Range, *vice* Mr. G. Devanayagam Nayudu Ranger Fourth grade granted leave.

28—3—34. Mr. K. Purushothama Rao Kurnool East Division on expiry of his leave on 3rd April 1934 posted to Kadiri Range, Anantapur Division in relief of Mr. N. Sundaresa Ayyar, Range Officer, Madanapalle who is in additional charge Kadiri.

15—4—34. Mr. A. Rahim Khan, Vontimitta Range, Cuddapah North Division granted leave for two months from 20th April 1934 or date of relief. 2. Mr. S. Ramachandra Ayyar Vempalli Range, Cuddapah North Division posted to Vontimitta Range. 3. Mr. Y. Peddalakshmiah Nayudu (on leave) Cuddapah Range, posted to Vempalli Range, of Cuddapah North Dn.

Salem Circle.

15—12—33. Ranger P. S. Syed Yahia Saheb, on special duty in West Vellore division, posted to Valappadi Range, Central Salem division, *vice* Ranger M. Gulam Dastagiri Saheb, transferred to Coimbatore Circle,

5—2—34. Mr. M. Muthuswami Ayyar, Ranger, Second grade, on return from leave on 10-2-1934, is posted to Harur Range, Central Salem division, *vice* B. S. Ramaswami Ayyar granted leave for 2 months from date of relief.

14—2—34 Mr. P. Shunmugasundaram Pillai, Trained Forester, First grade, and Acting Ranger Seventh grade, Atur Range, South Salem division, will continue to act as Ranger Seventh grade from 7-1-1934, *vice* Ranger Mr. E. W. Fernandez, Fourth grade, on leave.

14—2—34. Mr. B. S. Ramaswami Ayyar, Harur Range, Central Salem division, granted leave for two months from date of relief by Ranger M. Muthuswami Ayyar, posted to Harur Range. 2. Mr. M. B. Kalappa, Trained Forester First grade, and Acting Ranger Seventh grade, South Salem division, will continue to act as Ranger Seventh grade, *vice* No. I granted leave.

3—3—34. The following postings of Rangers are ordered :—
1. Mr. P. B. Syed Yahia Saheb, Ranger Fifth grade, attached to the Central Salem division, posted to Valapadi Range, Central Salem division. 2. Mr. B. Gulam Dastagiri Saheb, Ranger, Sixth grade, Valapadi Range, Central Salem division, on relief by No. 1, transferred to West Vellore division and posted to Alangayam Range. 3. Mr. P. K. Subbaranarayanan, Ranger Seventh grade, Alangayam Range, West Vellore division, on relief by No. 2, posted for special duty in North Salem division.

6—4—34. Mr. H. E. MacBride, Denkanikotta East Range, Salem North Division, granted leave for four months from date of relief by Mr. P. A. Krishnaswami Mudaliar, posted to Denkanikotta.

6—4—34. P. A. Krishnaswami Mudaliar, on return from leave on 9-4-1934, posted to Denkanikota East Range, Salem North Dn. *vice* Mr. H. E. MacBride, granted leave from date of relief.

Coimbatore Circle.

22—1—34. Mr. M. Gopalaswamy Naidu, Forester First grade S. P. T. holding charge of Mettupalayam Range will be considered to have acted as Ranger Seventh grade, from 20-12-1933 to 2-1-1934 in the vacancy caused by the grant of leave to Ranger Mr. S, Sundaravaradachariar.

2—2—34. Mr. S. Sundaravaradachary, Tinnevelly Division transferred to Kodaikanal Range.

19—2—34. K. C. Joseph, transferred to Ambasamudram Range in Tinnevelly Division. 2. Mr. A. Culas Ranger Second grade tranferred to Cumbum Range in Madura Division.

20—2—34. Ranger Mr. A. R. Manuals posted to Tinnevelly Division for special duty, on the expiry of his leave on 14-2-34.

20—2—34. Mr. S. Sundaravaradachariar, Ranger Third grade on special duty in Tinnevelly Division, granted leave for 4 months with effect from 15—1—1934.

11—2—34. Mr. R. Alagiriswamy Naidu, Ranger Fourth grade posted to Kodaikanal Range, on his return from leave on 18-2-1934.

13—3—34. Mr. V. Maragathavelu Forester First grade holding charge of Kollegal Range, Kollegal Division to act as Ranger Seventh grade from 3-3-1934 *vice* Mr. R. Rama Ayyar.

1—4—34. Mr. A. Culas Ambasamudram Range, posted to Ayyalur Range, Madura Division. He should hand over charge to Mr. T. D. Ponniah in charge Kuttalam Range and move first, 2. On relief by No. 1, Mr. P. Velayudhan Nair, Ranger First grade Ayyalur Range, posted to Cumbum Range. 3. On relief by No. 2, Mr. K C. Joseph, Cumbum Range, posted to Ambasamudram Range.

Ootacamund Circle.

9—1—34. Mr. R. Subramania Ayyar, Ranger, Wynaad division Timber depot at Mysore, granted leave for 1 month from 3-1-1934. 2. Mr. B. Coates, Assistant Range Officer, Begur Range, posted to Mysore depot, *vice* No. (1).

9—2—34. 1. Mr. T. G. Sankaran Nair, Kollegal Range, on return from leave posted to Bargur Range in relief of Ranger Rama Ayyar. 2. Mr. R. Rama Ayyar. Ranger Seventh grade, Bargur Range transferred to Kollegal Range in relief of Mr. V. Maragathavelu, Forester First grade and Acting Ranger Seventh grade.

21—2—34. Mr. S. Nageswara Ayyar, Ranger Sixth grade, on expiry of his leave transferred to Palghat division. 2. He will be assistant to the Extra Assistant Conservator in charge of Palghat Range and will resume charge of the Range when the latter is moved out of the division.

22—2—34. Mr. Thomas Thachil, granted extension of leave for four months.

10—3—34. Mr. M. M. Mandanna, Ranger Sixth grade (Temporary) Ootacamund Range, granted leave for four months from 8th April 1934 or the date of relief. 2. Mr. K. Dooma Shetty, Ranger Fifth grade, on expiry of his leave posted to Ootacamund Range, (*vice* No. 1).

15—3—34. Mr. K. Shankarnarayana Rao, Mangalore North Division, posted to be Senior instructor, Vernacular Training School, for 1934 session to be held in Mangalore North Division, to join duty on or about 15th April 1934. 2. Mr. A. Rama Hebbar, on leave recalled to duty cancelling the unexpired portion of his leave and posted to Coondapur Range (*vice* No. 1) to return to duty being compulsory. He should report himself for duty sufficiently early so as to enable Ranger Shankarnarayana Rao to take charge of his new post on or about 15th April 1934.

1—4—34. Mr. C. Vasu, Udipi Range, transferred to Palghat Division and posted to the charge of Mannarghat Range, *vice* Mr. Hamid Khan to be granted leave—to join on or before 10th April 1934. 2. Mr. J. S. Rowland, posted to Udipi Range, *vice* No. 1.

Dhar State.

30—3—34. Mr. P. N. Mulay, M.R.H., (1931—33 batch), appointed as the Superintendent of Working Plans and Silviculture, Dhar State.

Important Notice and an Appeal.

The management has recently found cause for disquiet in the not very flourishing financial position of this Magazine, which is now in the eighteenth year of its existence. Originally published for the small annual price of Re. 1/- the Magazine resulted in an annually recurring deficit, which in 1921 necessitated an increase in the subscription to Rs 2/-. Since then the Magazine has been produced at that price to subscribers, who however were first mulcted of an "entrance donation" which was fixed at Rs. 2/- for Rangers and Foresters, Rs. 5/- for Assistant and Extra Assistant Conservators, and Rs. 10/- for other Officers of higher rank. In order to make good the gradual loss of existing subscribers from one cause and another, and maintain our business head above water, appeals for fresh subscribers have been sent forth at different times. The last appeal was made in 1930. The result of this appeal was a fresh crop of "entrance donations" from new subscribers which helped temporarily to swell our credit balance and make us feel wealthy. But it was a spurious satisfaction, for the response came chiefly from the gazetted ranks, and their numbers were too few to maintain the magazine permanently on its feet by annual subscriptions. At present there are about 110 Range Officers and 40 officers of gazetted rank in the Madras Presidency, who do not subscribe. To these a separate appeal is about to be addressed. We have found it necessary to modify the terms of subscription, which from the ensuing year will be as follows :—

I. Initial subscription :— Rs. 5/- for Gazetted Officers only.

II. Annual subscription:— Rs. 2-8-0 for Gazetted Officers.
Rs. 2-4-0 for Rangers and Foresters.

The Management regrets the necessity, as it thinks, for having to continue imposing an initial subscription (or "Entrance Donation") which in these days of expenditure cut to the bone might well be a deterrent to

new subcribers. Nevertheless, it is hoped that this will not altogether discourage the well-disposed! We want the Magazine, however, to be ***primarily*** the Range Officers' Magazine which we think has been its intention throughout, and we trust that the discontinuance of any initial financial contribution from Rangers will offer sufficient inducement to non-subscribers to find the small sum hereafter. It is possible that a substantial increase in the number of subscribers will enable us to reduce the price of the Magazine to its earlier figure.

Now, it is recognised that the survival of any publication should rest solely upon its merits in providing matter both of utility and interest for its readers and that periodical "floggings" are indicative merely of a moribund or none too vigorous a constitution. One of the advertised objects of this publication is "To enable readers to keep abreast of the times by collecting and publishing extracts from various journals, Indian and Foreign, bearing on the progress of the Science of Forestry." We believe our "Scissors and Paste" Miscellany of extracts from various journals fulfils this object to a large extent. But devotion to this aim imparts no character to the Magazine, and should not be our major task. We think this magazine has a definite function to fulfil, but in order that it should do so we require the active cooperation of our readers. In short, we want contributors. Hereunder we are glad to publish both an appeal and a *suggestion* by the Chief Conservator of Forests. At the Madras Forest College there is an active corporate life and we keep our tails up pretty well. When students leave the College to assume their several posts in ranges scattered throughout the Peninsula, they are apt in time to forget the '*esprit-de-corps*' which we are sure the College engenders. For those Forest Officers in the Madras Presidency at least, the College remains the sole nucleus or centre whereby touch is maintained with present and past alumni of its precincts and for that purpose the Magazine contains a list of postings of Rangers with each number. Let us assert here however that this is no organ for keeping in touch with the "departed spirits"! We hope that past students will remind us of their corporeal existence

while they may with random notes of interest, articles, or occasional "jottings" (be they only a paragraph or two); if lyrically inclined they may even break into verse (but we would discourage such bourgeonings unless our other readers have reasonable prospect of capturing those fine raptures which gave them birth!). We aspire to no critique of literary excellence, nor do we aspire to displace our august Contemporary the "Indian Forester," with erudition to astound you. But some of us would like sometimes to know what goes on for instance in the Ganjam Agency Tracts, and in the backwoods of Tinnevelly, or of what passes among the leeches and sholas of Palghat, and in the '*ultima thule*' of Kurnool, and under the enchanted vapours of *Kerala*. In fact we are open to receive accounts of odd jobs, personal experiences, technical sidelights and opinions, natural history and shikar notes from no less than some 270 Forest Officers engaged in the care and patrolling of some 18,993 square miles of forest territory! Those subscribers and past students of the College who are not in the Madras Presidency number nearly one half of our total non-gazetted subscriber list, and these we certainly do not wish to forget. We extend a special invitation to them to give us their experiences, and contribute to the wider interest of these columns, and all postings, promotions, leave etc. relating to them if communicated to the Editor will be published along with the Madras notifications To Gazetted Officers also we tender this appeal, for, we feel sure they can give the benefit of their experiences and opinions which cannot fail to be of value. With such wealth of possibility to draw upon, we look forward confidently to the abondonment by Forest Officers of their traditional taciturnity upon the very matters which most lend zest and colour to our profession, but which unfortunately are too often thought unworthy of record. May we expect a greatly augmented post-bag for the future?

P. W. DAVIS,
President.

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The Principal, Madras Forest College, has brought to my notice the unhappy financial circumstances of the M. F. C. magazine, and I take this opportunity of writing a few words on the general subject of the magazine. I should like the magazine to be primarily a paper written by Rangers for Rangers. Interesting incidents connected with our life in the forests happen very frequently and all of as who take in the magazine would be refreshed and interested in camp by reading brief accounts of some of these incidents. It is by no means necessary that all articles should deal soleby with professional matters. Why, only the other day a Ranger found some 14 wild elephants lying dead or, dying in a field of "Varagu;" what could be more interesting to readers of the magazine than an article describing an occurrence such as that!

Now for the more serious financial aspect:— The magazine cannot be continued unless more people take it in. It strikes me as unusual to expect a new subscriber to a magazine to pay a sort of entrance subscription and the management and myself wondered whether we cannot abolish this practice. We have decided that from sheer financial necessity we must continue to be unusual in the case of gazetted officers, but the new initial subscription for them has been fixed at Rs. 5/- We have decided to abolish the initial subscription altogether in the case of non-gazetted officers but in view of this, it will be necessary to increase the annual subscription by 4 annas. Now then, every body, and especially past and present students of the college, make a point of taking in the magazine and do let the Editor have a steady flow of articles.

A. WIMBUSH,
Chief Conservator of Forests.

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