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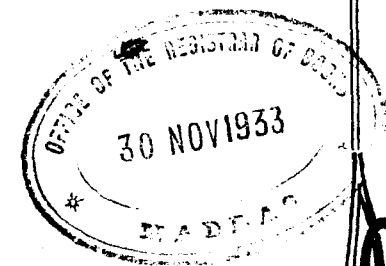
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SEPTEMBER, 1933.

No. 1.

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Forest College Magazine.



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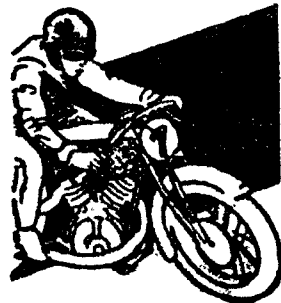
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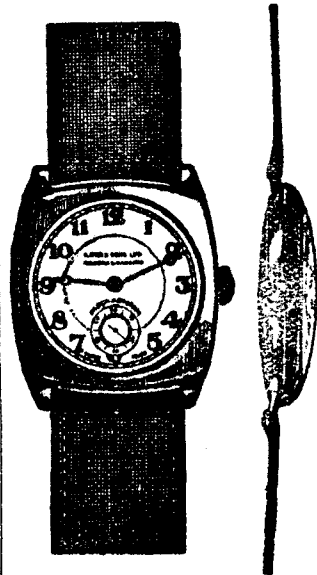


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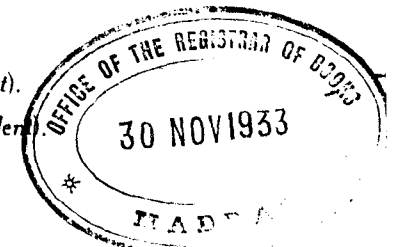
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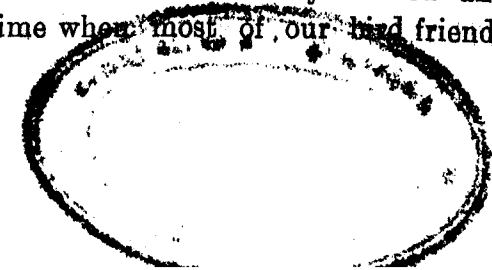
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*The Managing Committee do not hold themselves
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by contributors.*

Acridotheres Tristis—or An Averted Tragedy.
By, E. K. Krishnan, B.A., M.F.S.

There is a nice patch of green in front of my room in the Research Institute where I work. It has two corridors on either side, a bare wall in front and the glass windows of my room on the rear. One cold morning, about a fortnight before the time of this narrative, two newly wedded mynas came to the roof of the corridor and eyed it with a view to making it their abode for spending their honeymoon in. At about the same time another pair of mynas, who looked like a newly married couple too, came on the other roof to investigate what their whylom friends were doing.

The time of this narrative is early spring in North India, about the 15th of March, when the rigours of the wintry cold have subsided for good and the leafless trees and vegetation generally around are preparing with their green mantle to ward off the terrors of the scorching heat to come, the time when electric heaters are discarded and one's warm suits are sent to be dry cleaned and pressed; also the time when most of our bird friends

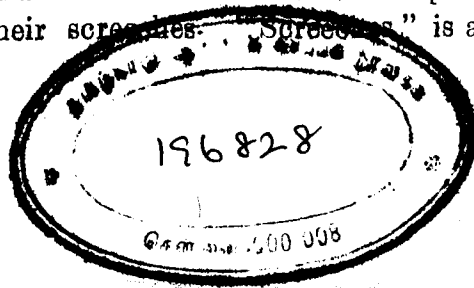


break out into song of the glories of the early morning and the longer days they have to feed and frolic and flirt; in fact the time when most animal and bird life are at their best and merriest mood.

I watched these two couple through the glass windows of my room. In fact sitting at my laboratory table directly overlooking this patch of green well trimmed lawn, I could hardly avoid watching their manoeuvres even if I attempted to; and so it came to pass that six hours of their daily life were spent under my very nose without the little birds being aware of the profanity of my gaze; for I sat behind the glass pane of a room which was comparatively darker than the sun lit open space they chose as their happy courting ground.

And, as I was saying, it came to pass that these two couples came under my observation at about the same time that they fell into each other's company. Now this grassy lawn is wide enough to hold two couple of mynas, big enough, in fact, to hold and house two hundred couples if they were all amicable and friendly; for there are comfortable niches where they might all have sat and chatted in friendly fashion, and long and convenient eaves—gutter and drain pipes where for the next two or three months they might safely have built their nest and reared up their young. But these silly birds believed evidently that two is company and three—or four for that matter—none. For I could see the earlier couple looking askance at the intrusion on their privacy by the later couple and it did not take long for this aversion to find tongue: and mynas, you all know, are nothing if not voluble.

Have you ever seen two mynas in courting season and not been warned of their presence ages earlier by their screeches. "Screeches" is a mild word to use to



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describe their cry and much as I like to spare the feelings of these two interesting couple, by such a harsh term, I feel I can find no other milder epithet. Even at the best of times I am not particularly enamoured of their cry, nor of their character and deportment and in this view I am not alone for even such an ardent bird lover as Hugh Whistler has not a good word to say about these birds in general or their vocal abilities.

If there is one bird whose harsh notes I dislike more than the usual vocal efforts of the mynah, it is perhaps the Blue Jay during its mating season, but its pleasing plumage somewhat compensates the lack of melody in Blue Jay's kaw-kaw's. The mynah has not even that redeeming feature. It is a minor edition, in character at least, of that super-roogue, the crow, and if it has not inherited all the perfidy of its distant cousin it has at least all its arrogance and a good deal of its conceit.

That the mynah is allowed to propagate itself in such large numbers is perhaps an accident of its creation. Even the local Gurkah shikari—that sportsman to whom no bird flesh ever comes amiss, be its owner roosting on its eggs in my garden mango tree or rearing a brood of chicks in the comparative seclusion of a closed reserved forest during close season—even that honourable shikari despises its flesh. As for the whining school boy with his pellets and catapult, even he would rather shoot at my car's disappearing peep glass than take a pot shot at so tame a target as a herd of mynas grazing on the institute lawns, and with good reason. I still remember the dismay that I felt years and years ago when as a schoolboy newly come in possession of a brand new Daisy air gun as a birthday present I inadvertantly let my eagerness try the gun get the better of my discretion and committed a cold blooded murder on an innocent mynah.

that was perched within 10 yards of me. The remorse I felt when the deed was done was only aggravated when I remembered the strict injunction we had from the pater not to molest any of his garden friends, and much as I persuaded my brothers—and associates in this crime—to hide the fact of murder and save me from parental reproof they would hear none of my entreaties but triumphantly carried the poor little Dick to the pater. His wrath knew no bounds. He was to teach me never to commit such deeds again and a novel idea too it was the way the punishment was meted out. I was, in those days, a vegetarian. By way of atonement for my sin I was to eat that mynah cooked. Now if you can imagine the aversion I had to meat, then it will not tax you much to picture poor me seated at the lunch table, a cynosure of all eyes, particularly of those of my brothers who gloated over my discomfiture, apparently because the gun belonged exclusively to me and I had persistantly refused their requests to handle it. I have no recollection how much of that poor bird I actually contrived to swallow, but the horror of that task and the taste it left in my mouth is still vivid in my memory and even if I am marooned on one of the Solomon islands without food and meat for whole weeks and there are swarms of mynahs hopping over my cooking pot, I would not venture to kill a poor bird amongst them to allay the worst pangs of my hunger.

Perhaps this aversion to mynah meat is universal, how otherwise to account for the birds' escape from wholesale slaughter at the hands of the local shikaris who break out like rash wherever game is to be had in Dehra. And do they lack knowledge of the habits of the birds? Who does not know the particular bush where a mynah colony roosts for the night? I am fortunate it

is not a stone's throw distance of my sleeping apartments, otherwise I might long ago have fallen a victim to insomnia.

You may be sure therefore, to get back to my narrative, that it was not with any enthusiasm that my gaze fell upon the two visitors of that pleasant morning; and, for all I cared, they might have lived there and brought up a brood of five generations of mynahs without my bestowing a second thought of them. But the tragedy that I promised to recount happened soon after the events of that eventful morning when the two newly wedded mynahs eyed each other with disfavour.

Both alighted on the ground within ten yards of my table and the very moment they did so I felt an atmosphere of tense excitement all around that shady green patch. This pervaded the whole open area and even penetrated through the half inch panes of my glass window into my room. Was it their bottled up anger or their vile recriminations at each other that so rudely shook the serenity of that peaceful cool morning that work or concentration in any form became impossible? At least I felt the task beyond me and stared with eyes revetted on the mighty opponents who were even then forming themselves in battle array for the test of strength which was to decide the ownership of that plot of green between them.

With ruffled feathers the first pair challenged the new comers to dare advance a step beyond their first halting ground. The second pair showered vile abuse in return and took, not one, but two steps forward. The first pair closed up their ranks the better to ward off a flank attack. The second pair hopped 2 steps nearer towards them. Both opponents were, I could see, equally matched and the no-man's land between them was barely

3 feet wide. One pair wobbled their heads, as though dropping a courtesy as much to say "prepare yourself for death". The other pair wobbled theirs longer and deeper and ruffled their feathers to make themselves appear twice their usual bulk. This went on for quite two minutes and before I knew what was happening, the pair had flown at each other's throat and were engaged in the most deadly combat, it has been my privilege to witness amongst the feathered kind. At first each individually tackled an opponent. He clawed and kicked and brought him flat on his back with the wings spread out helplessly on the lawn. He held him vice-like in that grip and plied his beak mercilessly all over the throat, breast and eye of the fallen foe. This however was only a momentary advantage. In another second the adversary was up on his pins and had dealt the victor almost the identical blows in retaliation. Meanwhile the other two were at death's grips in lordlier combat. The battle swayed this side and that. At one time the combatants were at each other singly, soon they would join in an united assault, one moment the two would single out a particular individual and ply their weapons on him collectively; at this the freed bird would go to the rescue of his mate and tumble headlong into the melee pouring vituperation and blasphemy that almost broke the glass of pane in front of me.

I was so engrossed in this lordly combat before me, and the birds were all in so hopeless a tangle flying at each other's throat that we neither of us were prepared for what was a veritable bolt from the blue which took shape in the form of a falcon which sweeping down from the roof on the left dropped plumb into the bunch of combatants rolling on the ground. Everything had happened in the twinkling of an eye and the birds, before

they even realised what they were in for, were scrambling for dear life from the somewhat awkward situation in which they were then placed. One of the birds beat a hasty retreat through the opening which the arch provided. Another flew straight into my window pane and, if it did not succumb to a compound fracture of the skull must at least have perished of cerebral hemorrhage later. The third was too dazed to fly at all and rolled into the ground gutter and hid there the best part of the rest of the hour. The fourth was inextricably pinioned under the talons of the murderous falcon. I could see the bird struggling to free itself of its clutches but there was no escape from the vice like grip. I was powerless, sitting inside my room, to reach the scene and avert, what was in all probability, certain death of a newly wedded bride. Just then, providentially for the bird, one of the office chaprasses happened to pass the corridor and seeing a bird in the sorry plight, hastened to its rescue and waved off the falcon. Whether from injuries received at the hands of the falcon or from sheer fright, I knew not, when I reached the scene of the tragedy half a minute later the falcon had flown, and the poor mynah was dragging a limping leg along the gutter into which it had now taken shelter. The injured bird was soon joined by its hiding mate and both took refuge under the steps of the culvert whence they flew off after a mile.

Foolish birds, thought I, to thus jeopardize their lives and incidentally to mar the beauty of their otherwise happy honeymoon. To this day the victim of that morning drags a limping toeless leg to remind me of the tragedy which was providentially averted.

**Our experience with the woody ornamental plants
tried on the Forest College estate, Coimbatore.**

By, G. Viswanatham, B.A.

In continuation of my article * on the hedge and border plants tried on the Forest College estate, Coimbatore, the following note on our experience with the woody ornamental plants experimented on, should be of some interest, particularly to those in Coimbatore or its environs, wishing to stock their gardens with hardy ornamental woody plants.

The soil of the College estate is stiff black-cotton all over, to an average depth of about two feet, with a *kankar* † bed of varying thickness and consistency, occurring usually at a depth of about two and a half feet from the ground level. In many of the places dug, it was found that the *kankar* went about two feet deep, and the soil further down was micaceous gravel. The consistency of the *kankar* was found to vary from a hard mass or sheet, to small pieces or nodules imbedded in or mixed with clay, with all gradations between. Added to the poverty of such a soil is the meagre rainfall, the average annual precipitation being not more than about 25 inches.

These unfavourable factors considerably restricted our choice of species, and made our experiments costly. In order to give the plants a good start, pits about 2½ ft. cube had to be dug and aerated for a few months, and filled, with a compost of red earth (brought from a

* Published in the December 1932 issue, Madras Forest College Magazine.

† "Pans of concretionary lime, often mixed with clay, known as *kankar* are of common occurrence in India, and are particularly unfavourable to forest growth, the lime forming a hard solid mass resembling masonry, and by its physical condition preventing the free development of the roots of trees....." Troup.

neighbouring place at a great cost) and sand, in the proportion of about 3 to 1. A small quantity of leaf mould was added to each pit. Fairly well established seedlings were preferred to seeds, and were obtained from various sources, chiefly the Agrihorticultural gardens, Madras. Owing to a precarious water supply of the estate we had to avail ourselves of the monsoons, particularly the north-east, and concentrate our planting operations during the period. There were years when, to tide over long periods of drought the estate water supply had to be supplemented by water from a neighbouring tank supplied us in bullock carts by a contractor, whom we paid for the imported water and soil. Of course air and sunlight did not figure in his bills! Nature was kind enough to supply them free.

No pains were spared to nurse and establish what were thought suitable and worth a trial, in the best way possible under the conditions obtaining on the estate. The espacement in the college arboretum was usually about 9 ft. x 9 ft. Hoeing was done on alternate days, and watering was through long earthenware pipes buried slantwise into each pit. Of the seedlings planted about a dozen years ago, it is found that though the growth was satisfactory during the earlier stages, it tended to get slower and slower later on, till it became almost nil in many cases, resulting even in the death of the trees. In some at least, the 'dying back' must, I think, be traced to the rootsystem striking against the inevitable *kankar* sheet underlying, which prevents the roots from developing further and tapping what little water that may be present in the soil below the *kankar*. In such cases, digging each pit sufficiently *deep* and completely removing the *kankar* sheet in it before planting, should save the tree from death, or at least a premature death,

but this is a costly operation unless the *kankar* bed crops up at a level not more than about three feet from the ground and is not itself very thick. In other localities, and with limited funds, one must rest content with superficially rooted species, that thrive in the smaller sized pits with imported red soil and a sprinkling of manure.

With certain species like *Jacaranda mimosæfolia*, which produce a striking colour effect, repeated trials were made, as they were thought worth making, though they were said to thrive only at elevations higher than Coimbatore. They were finally given up as the pits we dug for them proved their graves, and the placards, their tombstones!

The following are among the more important indigenous tree species doing well or fairly so on the estate:

Acacia arabica, Willd (Babul) ranks first, but only upto an age of about fifteen years, after which there is a tendency for it to die back, the death being probably hastened in cases where a thick hard *kankar* sheet crops up very near the ground level,* and where in addition the tree is haustorised by Sandal which has been recently introduced on the estate.

Azadirachta indica. A Juss. (The Neem), *Ailanthus excelsa*, Roxb., *Balanites roxburghii*, Pl., *Feronia elephantum*, Corr., *Morinda tinctoria* Roxb., *Dichrostachys cinerea*, W. & A., *Capparis stylosa*, D.C., *Acacia leucophlœa*, Willd.

A list with short descriptive notes, of the more successful species among those tried is given below more or

* An experiment has recently been started on a ten acre plot on the estate, to see if this dying back could not be averted or at least could not be postponed to a much maturer age of the tree, by thoroughly ploughing the soil and raising a crop of Babul on an agri-silvicultural system. (*Taungya* or *Ponam*).

less in the order of success. (A few are also included, that are not "ornamental" in the strict sense, but are anyway more attractive than the indigenous *Babul*):—

1. *Peltophorum inerme* (Roxb), Llanos.
(= *P. ferrugineum*, Benth)—(Caesalpinioideae).
English; The Rusty shield-bearer. Tamil: *Iyavakai*.

A native of Ceylon, the Andamans, the Malay Peninsula, and N. Australia.

A large handsome evergreen tree, perhaps the hardiest and most attractive avenue tree for a poor soil. Bark smooth, grey. Leaves abruptly bipinnate, with 6-20 pairs of pinnae with opposite obliquely oblong leaflets $\frac{1}{2}$ to $\frac{3}{4}$ in. long. Flowering season March to June. (Sometimes there is a second flowering from September to November).

The flowers are bright yellow, fragrant, and on erect rusty tomentose panicles. The trees are prolific in their pods which are 2-4 in. by $\frac{1}{2}$ -1 in., flat, indehiscent, reddish brown, with a firm broad wing along each margin; 1-3 seeded. Easily propagated from seed. Cuttings give less success.

In one of the avenues of the College estate this tree is planted alternately† with 'Gul Mohr.'—*Delonix regia*. During the period April to June, its dense masses of golden yellow flowers contrast vividly with the blaze of crimson colour of the copious corymbs of the Gul Mohr.

It is to be preferred to *Delonix* for many reasons: It is more hardy; it is an evergreen and quicker growing; its flowers while being no less attractive than those of the inodorous Gul Mohr, are very delightfully fragrant.

2. *Cassia siamea*, Lamk. (*C. florida*, Vahl.)
(Caesalpinioideae)—Tamil: *Manja-Konrai*.

† A scheme which coincides with that on Hughes Road, Bombay.

A quick growing moderate sized evergreen tree probably indigenous in Burma and the southern parts of the presidency; often used as a hedge plant, and sometimes in avenues. Leaflets 6-12 pair, $1\frac{1}{2}$ -3 in. long, with a minute mucro. Flowers yellow, in bracteate corymbs forming a large terminal panicle. Pods flat, 6-10 in. by $\frac{1}{2}$ in., with thickened sutures, and very thin flat brown seeds.

The tree is very easily propagated by seeds. The adult tree is not quite ornamental, but a well pruned hedge of it is attractive. Though it is said to thrive on a moist well drained soil, its fast growth on the College estate seems to show that it is not exacting as regards moisture and drainage.

3. *Cassia grandis*, Linn. (Caesalpinioideae).

English: The horse-cassia. Pink-shower.

A tropical American tree, 40-50 ft. high, with twigs, petioles, and inflorescence with a grey-white pubescence. Leaves pinnate, 6-9 in. long, leaf stalk without glands. Leaflets 8 to 18 pairs, pubescent, oblong. Flowers rose-pink in lateral racemes 4-8 in. long. Pods cylindric, 10-20 in long.

4. *Cassia marginata*, Roxb.

English: The Red Cassia. Tamil: *Senkonrai*. Malayalam: *Kada-Konna*. Telugu: *Urimidi*.

A very pretty and small deciduous tree of Carnatic, from S. Arcot to Travancore. Leaf 6-11 in. long. Leaflets 9-18 pair, oblong, obtuse, $1-1\frac{1}{2}$ in. long, slightly inequilateral. Flowers rose to pink in short axillary racemes. Pods: 8-12 in. long, * cylindric.

* Gamble in his Flora of Madras Pcy., (p. 398) describes the pod as under 6 in. long. This seems to be incorrect. One foot pods of *C. marginata* are common on the Forest College estate.

This seems to be more exacting than *C. siamea*, regarding soil. Plants put in smaller sized pits (about $1\frac{1}{2}$ ft. cube) show very stunted growth, whereas those given more of the imported red soil (as in pits $2\frac{1}{2}$ ft. cube) respond remarkably well.

5. *Mitragyna parvifolia*, Korth. (*Stephegyne parvifolia*, Korth).—(Rubiaceae).

Tamil and Telugu: *Nir-Kadambu*. Mal: *Vimba*. Kan: *Kongu*. Hind: *Kadam*.

A large deciduous tree with a bole often short, fluted and buttressed, common in dry deciduous forests. Leaves 2-7 in. by $1\frac{1}{2}$ -3 in., variable, and with large interpetiolar stipules. Tree leafless in April—May. Flowers creamy white, fragrant, in heads 1 in. diameter.

6. *Citharaxylum subserratum*.—(Verbenaceae).

English: Fiddle-wood tree?

A small unarmed, quick-growing, much-branched tree with quadrangular branchlets, red-petioled decussate leaves 4-10 in. by 2-4 in., and axillary and terminal racemes (6-10 in. long), of fragrant white tiny *Duranta*-like subsessile flowers. Very easily propagated by cuttings.

7. * *Thevetia nerifolia*, Juss.

English: Tree oleander. Tamil: *Pon-arali*. Excellent as a hedge. Takes kindly to black soil.

8. * *Pithecolobium dulce*, Benth.

English: Manilla tamarind. Madras thorn. Tamil: *Korukapuli*. Hind: *Vilayati-imbli*. As a hedge, more exacting than No. 7.

9. * *Caesalpinia pulcherrima*.

English: The peacock flower. Tamil: *Mayil-Konrai*.

* Already described in my previous article.

18. *Enterolobium saman*, Prain. *Pithecolobium saman*, Benth.)—Mimosoideae.

English: The Rain tree. Tam: *Mazhai-maram*; *Toongumoonji*.

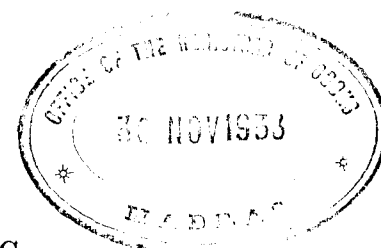
A quick growing S. American deciduous tree, with a broad spreading crown, and very brittle branches. This should prove an ideal avenue tree for our locality, but for the fact that by the time the tree is about 20 years old it tends to get stagheaded, and show signs of dying back. In fact the avenue of this species planted about 1910, and leading to the Agricultural College hard by, left nothing to be desired for the first two decades of its life; A couple of years ago as many of the trees were seen dying back, a fresh avenue of a different and better species (*Peltophorum*) had to be started. Healthy Rain trees of more than 30—40 years of age have, however, been found to occur outside our estate and in more favourable localities.

Leaves 6—11 in. long, lyrate bipinnate, pinnae 6—8 pair, leaflets 4—8 pair, obliquely oblong, upto $1\frac{1}{2}$ in. by 1 in. Flowers in heads, with long pink filaments. Pods fleshy, septate, with seeds in subacid pulp.

19. *Melia azedarach*, L. (Meliaceae).

English: The Persian lilac; bead tree. Tamil: *Turukkuvembu*. Tel: *Taraka-vepa*. Kan: *Bevu*. Hind: *Bakain*.

A medium sized deciduous tree, (indigenous possibly in Baluchistan and Kashmir) with branches more brittle than those of No. 18, and a growth much quicker—3 to 4 rings per inch of radius! A strong wind often breaks large branches of this tree. The leaves are bipinnate (in certain branchlets tripinnate). Flowers lilac, and very handsome, in large panicles.



20. *Stereospermum tetragonum*, DC.

(*Stereospermum chelonoides*, C. B. Clarke).—Bignoniaceae. Tam: *Poombathiri*. Tel: *Pisyl*. Mal: *Karingkura*. Hind: *Padri*.

A large deciduous tree of the deciduous forests of the presidency upto about 3000 ft. Twigs lenticellate. Leaves odd-pinnate, rachis 6—8 in. long, leaflets 5—11, upto $4\frac{1}{2}$ in. by $1\frac{1}{2}$ in., acuminate, purple when young. Flowers $\frac{3}{4}$ in., yellow, veined with red; Capsule 1—2 ft. by $\frac{1}{2}$ in., somewhat spirally twisted, 4-angled.

21. *Millingtonia hortensis*, L. (Bignoniaceae).

Eng: The Indian Cork tree. Tam: *Maramalli*.

A handsome Burmese tree with corky bark, a tall straight bole with a conical crown, and bi- or tri-pinnate leaves 1—2 ft. long. The tree is no doubt ugly for about a month in the hot weather, when quite bare of leaves, but this is more than compensated by the dense masses of drooping white fragrant flowers that appear not long after the new flush of leaves. The tree is easily propagated by the root-suckers which appear in great profusion in November—December: In gardens the suckers are a nuisance as they hinder the growth of other trees near them, due to their wide spread.

22. *Filicium decipiens*, Thw. (Sapindaceae).

Tam: *Nir-kongu*. Mal: *Val-muriacha*; *nirali*.

A handsome evergreen tree of the W. Ghats in the drier localities upto 5000 ft. Planted in gardens for the elegant fern-like leaves. The latter are odd-pinnate, leaflets 13—17, articulate with the broadly winged rachis. This is one of the few hardy trees which by a copious output of handsome foliage that ever adorns them afford a welcome relief to the eye in the hot months, when

10. * *Duranta plumieri*, Jacq. (White and lilac varieties).

English: Pigeon-berry.

11. * *Bougainvillea glabra*, Choisy. (Nyctaginaceae).

A large thorny Brazilian shrub with small flowers enclosed in conspicuous magenta or brick-red bracts, usually three together, the flower stalks adnate to the mid-vein of the bracts.

This has not been successful as a hedge plant, its use having been confined to such purposes as for porches or centres for 'carpet-bedding' in gardens.

12. *Gliricidia sepium*, Steud (*G. maculata*, Steud) (Papilionatae).

A small deciduous tree from central America and Colombia, with odd pinnate leaves 6-10 in. long, leaflets 11 to 17 ($1\frac{1}{2}$ — $2\frac{1}{2}$ " by $\frac{1}{4}$ — $1\frac{1}{2}$ "), underside glaucous; papilionaceous pink and white flowers in dense racemes blooming profusely in February-April, often after the leaves drop: and pods linear, compressed, with a slightly thickened margin. A row of this tree planted in front of the College about a decade back, now affords a splendid sight in the flowering season. (Seedlings were obtained from the Agri-horticultural gardens, Madras).

13. *Albizia lebbek*, Benth. (Mimosoideae).

English: The Siris tree. Tamil: *Vagai*. Telugu: *Dirasan*.

A large Tropical Asian deciduous tree largely cultivated and run wild; with abruptly bipinnate leaves, flowers with a rather sickly scent and long greenish exserted filaments, and thin straw coloured pods rattling with every puff of wind.

* Already described in my previous article.

14. *Crescentia alata*, L. (Bignoniaceae).

English: Mexican Calabash?

A small evergreen tree, readily distinguished by its habit, as it bears long stiff whip-like, scarcely divided branches, with oblanceolate leaves in tufts of 3 to 10, and green gourd-like fruits upto 12 in. by 9 in., hanging mostly from the short bole of the tree. Seedlings were obtained from Madras. Propagation by cuttings gave encouraging results.

15. *Berrya ammonilla*, Roxb. (Tiliaceae).

English: The Trincomale-wood. A deciduous exotic from Ceylon, with broadly ovate stipulate leaves, 4 to 6 in. by $2\frac{1}{2}$ to 4 in. borne on lenticellate twigs with prominent leaf scars, the leaves turning a bright copper red as they wither. This tree seems to promise well.

16. *Pterospermum suberifolium*, Lam. (Sterculiaceae).

Tamil: *Cempolavu*; *Tada*. Telugu: *Lolagu*.

A middle sized tree with branchlets, and inflorescence densely clothed with fine ferrugineous or tawny stellate hairs, and leaves distichous, 2-4 in. by $1\frac{1}{2}$ to 3 in., subcordate at base, and silvery white beneath. The contrast in the colour of the top and bottom sides of the foliage is emphasised with every gust of wind, when the tree suddenly 'turns pale,' changing to green when the storm is followed by a calm.

17. *Guazuma tomentosa*, Kunth. (Sterculiaceae).

English: The bastard Cedar. Tamil: *Kattu-uth-raksham*.

A small tropical American deciduous tree with rather inequilateral serrulate ovate-oblong leaves 4-6 in. by $2\frac{1}{2}$ to $3\frac{1}{2}$ in., flowers small and in axillary cymes, the petals with concave claws, and fruits woody, black, and mulberry-like.

many of the trees like Gul Mohr, prized for their flowers stare us in their skeleton attire.

23. *Nerium odorum*, Sol. (Apocynaceae).

The Indian oleander (Tam: Arali). This handsome evergreen shrub is very hardy and has done well here. It is easily propagated by cuttings or layering, and requires little watering and care. Leaves simple, upto 8 in. by 1½ in., coriaceous, usually in whorls of three. Flowers white or pink, upto 3 in. across, often double, the doubling being more common in the pink variety.

24. *Bignonia megapatalamica*. (Bignoniaceae).

A middle sized evergreen tree, with decussate, pinnately trifoliate, and very glossy leaves, the leaflets upto 6 in. by 2½ in., and elliptic oblong. The flowers are showy, about 3½ in. long and nearly 3 in. across, with a yellow tube and pinkish white lobes.

25. *Bauhinias*. (Caesalpinoideae).

Leaves: of 2 leaflets, free or more usually united into one entire leaf more or less deeply cleft at the apex and palmately veined.

Of the species of Bauhinia (Tamil: Mantharai) cultivated for their handsome flowers, *B. racemosa*, (petals white, about ½ in. long, unequal, pod falcate), *B. malabarica* (leaves acid, flowers in cream-coloured corymbs, petals nearly equal, pod nearly straight), *B. variegata* (flowers showy, white or pink, the uppermost petal variegated), and *B. purpurea*, (flowers purple or rose in short terminal panicles, all the petals uniformly coloured), were tried. The first three have done better than the last.

26. *Swietenia macrophylla*, King. (Meliaceae)

The large leaved mahogany—a species from Honduras, more hardy than the true mahogany, being much

less exacting as regards both soil and climate. This is doing fairly well here, planted in pits about 2½ ft. cube, filled with imported red soil and sand. The leaves, capsules, seeds etc. are much larger than those of *S. Mahagoni*, L.

27. *Swietenia mahagoni*, L. (Meliaceae).

The Mahogany. A handsome evergreen tree from Central America and Jamaica. Growth on the estate is very stunted, but cannot be described as a failure. Leaves even-pinnate, rachis upto 8 in. long, leaflets 8 to 10, upto 2½ in. by 1 in., entire, obliquely and broadly lanceolate, upper side dark green and often convex; twigs lenticellate, the leaf-buds protected by brownish scales. Flowers small, in axillary and terminal panicles. Fruit: Septicidally septifragal, upto 4½ by 3 in., Seeds winged, upto about 2½ in. long, including the wing.

28. *Adenanthera pavonina*, L. (Mimosoideae).

Tam: Anai-kundumani. Tel: Bandi-gurivenda. Mal: Manjadi. Kan: Manjuti.

A deciduous unarmed tree with bipinnate leaves, the leaflets each upto 1 in. long, and alternate. Flowers yellow, fragrant, in racemes. Pod 4-9 in. long, twisting while opening and exposing the scarlet seeds. The tree can be grown from large sized cuttings planted early in November, or from the seeds which must be treated by immersion in boiling water which is allowed to cool before the seeds are taken out.

29. *Syzygium jambolanum*, DC.

(*Eugenia jambolana*, Lam.)—Myrtaceae.

Engl: The Black plum. Tam: Naval. Tel: Neredu. Mal: Naga. Kan: Narala. Hind: Jaman.

A large evergreen tree usually affecting river banks, exhibiting a wide range of variation in the size and shape

of leaves, flowers, and fruits. Leaves simple, 3-6 in. by $1\frac{1}{2}$ - $2\frac{1}{2}$ in., elliptic lanceolate, secondary nerves very close, fine, and parallel, with an intramarginal vein. Flowers sessile, greenish white in trichotomous cymes. Fruit $\frac{1}{2}$ to $1\frac{1}{2}$ in. long, purplish black when ripe.

30. *Terminalia catappa*, L. (Combretaceae).

The Indian almond. Tam: *Nattu-vadam*.

A tall deciduous fast growing tree from Malaya, with *whorled* branches. Leaves simple, 6-8 in. by $2\frac{1}{2}$ to 6 in., turning bright red before falling. Fruit 2 in. long, compressed, keeled allround. Trees put in smaller sized pits (filled with red soid) show very poor growth. Given a better drainage and more of red soil, the tree responds admirably.

31. *Dodonaea viscosa*, L. (Sapindaceae).

Tam: *Virali*. Tel. and Kan: *Bhandaru*. Mal: *Vrali*. Hind: *Sanatta*.

A gregarious evergreen shrub of W. Ghats in shola forests upto 8000 ft. Branchlets angular, young shoots more or less viscid and shining with yellowish resin. Leaves oblanceolate, upto 4 in. long. Fruit a membranous capsule with 2-3 wings. This is a fairly hardy shrub, well suited for hedges.

32. *Tecoma stans*, Juss. (Bignoniaceae).

Yellow-Elder. Tamil: *Ponnarali*. A large deciduous S. American shrub, with decussate odd-pinnate leaves with 5-7 serrate sessile leaflets, and large terminal racemes of yellow campanulate flowers, the corolla upto 2 in. long. Dense masses of yellow flowers adorn the tree in November to February.

33. *Heretophragma adenophyllum*, Seem.

A deciduous Burmese tree with opposite odd-pinnate leaves, rachis about 6-12 in. long, large brownish yellow

flowers in brown tomentose panicles,—the corolla densely brown-tomentose outside, and fruit a ribbed capsule 1-3 ft. long.

34. *Kigelia pinnata*, DC.—(Bignoniaceae).

A deciduous tree and a native of Tropical Africa, with alternate odd-pinnate leaves crowded at the end of branches, pendulous panicles of large dark-maroon flowers, and long gourd-like fruits on long stalks.

35. *Plumeria acutifolia*, Poir.—(Apocynaceae).

The Pagoda Tree. Tamil: *Navilla-arali*. Kan: *Gangala*.

A small deciduous Mexican tree growing upto 20 ft. high, with stout fleshy branchlets (the leaf scars prominent), bearing glabrous oblong leaves upto 16 in. by 3 in. with an intramarginal vein, and large fragrant white flowers with a yellowish centre.

36. *Plumeria alba*, L.

The Frangipani. A large shrub of West Indies similar to No. 35, the leaves smaller, the margins revolute, and underside pubescent.

37. *Cassia fistula*, L. (Caesalpinioideae).

The Indian Laburnum. Tam: *Sarakkonrai*. Tel: *Rela*. Mal: *Konna*. Kan: *Kakke*. Hind: *Amaltas*.

A middle sized deciduous tree, with young shoots silky. Leaves pinnate, about 1 ft. long, leaflets 4-8 pair, ovate, 2-6 in. by $\frac{1}{2}$ -2 in. Flowers large, bright yellow, $1\frac{1}{2}$ -2 in. across in lax long pendulous racemes. Fruit, cylindrical, black, 1-3 ft. long, $\frac{1}{2}$ in. diam., with transverse partitions. Seeds 25-100, in pulp; orange brown ovoid, $\frac{1}{2}$ in. broad.

38. *Lawsomia inermis*, Linn. (Lythraceae).

(= *L. alba*, Lamk). The Henna. Tam: *Maruthonri*. Tel: *Gorinta*. Kan: *Gorantku*. Hind: *Mehndi*.

A glabrous deciduous shrub of Arabia and Persia, cultivated and naturalised throughout India, chiefly as a hedge plant. Leaves opposite, 1-1½ in. long. Flowers greenish yellow, very fragrant, ¼ in. across, 4-merous, in large paniced cymes. Fruit bursting irregularly. Seeds pyramidal.

39. *Odina wodier*, Roxb. (Anacardiaceae).

Tam: *Uthian*. Tel: *Gumpini*. Mal: *Kalasan*. Kan: *Godda*.

A large deciduous tree with stout branchlets and prominent leaf scars. Leaves 12-18 in. long, odd-pinnate. Leaflets 7-9, opposite, 3-6 in. by 1½-2 in., clustered at ends of branchlets. Flowers small, greenish. Fruit red, ½ in. long. Easily propagated by cuttings.

40. *Heloptelea integrifolia*, Planch. (Ulmaceae).
(= *Ulmus integrifolia*, Roxb).

A large deciduous tree. The leaves and twigs when crushed give an offensive smell. The tiny flowers appear in great profusion and when the tree is completely bare of leaves. Leaves 3-5 in. by 1-2 in., distichous, entire, penninerved, base cordate. Flowers greenish purple, minute, (1/5 in.) in corymbose fascicles. Fruit an orbicular membranous greenish samara.

41. *Ficus bengalensis*, L. (Moraceae).

The Banyan. This tree is too well known to need a description. A seedling from Madras planted in our arboretum, a decade ago has grown up to a tree about 18 ft. high with a dense and healthy foliage. Big-sized cuttings tried for an avenue proved a complete failure. A more extensive planting of well-established *seedlings* is, I think, worth a trial.

42. *Dalbergia sissoo*, Roxb. (Papilionatae).

Hind: Shisham; Sissoo. A large deciduous tree with a light crown and often a crooked bole, indigenous in the sub-Himalayan belt. Leaflets 3-5, acuminate, the rachis very slender and often zig-zag. Pods membranous, with 1-3 light brown seeds. Growth on the estate is very stunted.

43. *Erythrina indica*, Lam. (Papilionatae),

The Indian Coral Tree. Tam: *Mullu-murungai*. Tel: *Modugu*. Mal: *Murukku*. Kan: *Halivara*. Hind: *Pangra*.

A small quick growing deciduous tree, the branches with black prickles which fall after a few years. Leaf pinnately 3-foliate, leaflets broadly deltoid, the terminal 4-5" long. Flowers bright red, in dense racemes. Fruit a torulose pod.

44. *Delonix regia*, Raf. (= *Poinciana regia*, Bojer)
—(Caesalpinioideae).

The Gold Mohur; Gul Mohr; Flamboyant tree. (Sometimes wrongly called "Flame of the Forest" which is really *Butea frondosa*).

A gorgeous deciduous tree from Madagascar with very graceful foliage and magnificent trusses of crimson flowers. Leaves abruptly bipinnate upto 22" long, with pectinate (comb-like) deciduous stipules, pinnae upto 24 pair, leaflets upto 28 pair each upto ½" by ⅓". Flowers red, about 5" across, the posterior petal white, streaked with red and yellow. Pod 1-2' by 2". Seeds ¾" by ¼", with a very hard coat. Germination is much delayed unless the seeds are soaked in boiling water for 10 minutes.

The tree is no doubt very unsightly for a short period in the hot weather when it is quite bare of leaves, but it makes amends for this to a considerable degree

during the rest of the year, by putting up a fine display of dense feathery fern-like foliage or large masses of bright crimson flowers or of both. If *Butea frondosa* is the "flame of the forest" I would christen this the "flame of the plains"!

Unfortunately the tree is found to be very exacting as regards both soil and water, and can therefore be planted only on a limited scale on the college estate.

An avenue of this on the north west portion of the estate is very miserable looking. This is, I think, to be attributed to the much higher level of this part of the estate than the rest. True, this species has a superficial root system, the development of which is not materially affected by the depth at which *kankar* occurs. But this victory of the root system over the *kankar* is really the reverse in its relation to the low water table in such high localities. Where, in the latter cases, the *kankar* occurs not as an impenetrable sheet but in nodule form imbedded in soft earth, a deeper root system would be a distinct advantage as the roots can then reach the water table and tap more water. *Gul Mohr* trees planted the same year on the south east corner of the estate which is practically the lowest level here, shine by contrast, many of them showing a fairly luxuriant growth.

45. *Tamarindus indica*, L.—(Caesalpinoideae).

The Tamarind. This large evergreen tree largely planted in avenues is well known. Its growth on the estate is rather stunted. A poor growth likewise characterises all the species numbered 46 to 53, below.

46. *Pongamia glabra*, Vent.—(Papilionatae).

Tam: and Mal: *Punga*. Tel: *Kanuga*. Kan: *Hungay*.

A moderate sized nearly evergreen tree, with odd-pinnate leaves 5 in. long, leaflets opposite, 5-7, bright green, 2-5 in. by 1-2 in., flowers purple and white in lax axillary racemes, and slightly falcate 1-seeded woody pods.

47. *Polyalthia longifolia*, Hook.—(Anonaceae).

The Mast tree. Tam: **Asoka*; *Nettilingam*. Tel: *Asoka*. Mal: *Choruna*. Hind: *Asok*.

This handsome evergreen tree has a straight bole and conical crown (as *Millingtonia*) and makes beautiful vistas and avenues elsewhere as in Madras. Its growth here on the estate is however very stunted.

Leaves simple, 6-9 in., lanceolate, undulate. Flowers greenish, in fascicles or umbels.

48. *Cordia obliqua*, Willd.—(Boraginaceae).

(*Cordia myxa*, Roxb), Tam: *Mooku-chali*. Tel: *Iriki*. This moderate sized deciduous tree shows a poor growth here. The leaves are variable; simple, often repand-crenate, sub-orbicular, upto 5 in. diameter, base often cordate. Flowers white, fragrant.

49. *Acacia auriculaeformis*—(Mimosoidae).

A middlesized evergreen tree with a short bole and a rather spreading crown, and coriaceous oblong falcate phyllodes upto 4 in. by 1 in. Growth very slow here.

50. *Spathodea campanulata*, Beauv.—(Bignoniaceae).

Scarlet Bell tree; Fountain tree; Squirt tree (referring to the flower buds which on pressure squirt their liquid contents).

A nearly evergreen Tropical African tree with odd pinnate leaves, leaflets 9-19, oval, abruptly pointed.

* The *Asoka* tree of the epic *Ramayana* is said to be *Saraca indica*, Linn.

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Flowers with a wide bell shaped corolla, orange, deepening into brilliant crimson, in big panicles. Growth very stunted here. Easily propagated from root-suckers.

51. *Hardwickia binata*, Roxb.—(Caesalpinioideae).

Tam: *Acha*. Tel: *Yepi*. Kan: *Kamara*. Hind: *Anjan*.

A middle sized to large, nearly evergreen, gregarious tree with graceful drooping slender branchlets, and *Bauhinia*-like leaves. Leaflets 2 with a minute bristle between, obliquely ovate, greyish green; young foliage red. Flowers minute. Fruit a flat samaroid pod 2-3 in. by ½ in., with the seed at the tip. Growth here indifferent.

52. *Thespesia populnea*, Cav.—(Malvaceae).

The Portia tree. The Indian Tulip. Tam: *Poo-varasu*. Tel: *Gangareni*. Mal: *Porassu*. Kan: *Huvarasi*. Mar: *Bhendi*.

A quick growing evergreen littoral tree grown easily from cuttings. Leaves simple, cordate, entire. Flowers axillary, sulphur-yellow, fading to purplish pink. Growth on the estate very stunted.

53. *Delonix elata*, Gam.—(Caesalpinioideae).

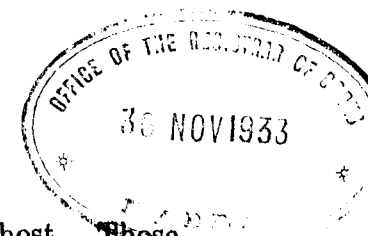
Poinciana elata, Linn.

Tam: *Vadenarayanan*. Tel: *Sankasulu*. Kan: *Niranji*. This unarmed nearly evergreen medium sized tree is yet another species showing poor growth here. Leaves bipinnate, pinnae 3-8 pair, leaflets 10-20 pair, ½-1 in. long. Flowers 3-4 in. across, with clawed whitish petals turning orange when fading. Pod 6-8 in. by 1 in. Easily propagated by cuttings.

54. *Santalum album*, L. The Sandal tree.

This well-known and very valuable evergreen tree has been introduced on the estate on a large scale about

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ten years ago, with Babul as the chief host. Those haustorising on the *maturer* Babul trees are generally not very healthy, as such hosts are themselves dying back, but the condition of the sandal trees on the whole is good. It is perhaps too early now to predict its future, but the prospects cannot, I think, be very bright unless alternate hosts like Neem (which seems to show no signs of dying back and is longer lived) are preferred to Babul in future planting of Sandal, or provision is made for a stock of babul of different ages functioning as hosts. A dying back, in Babul, after the age of about twenty seems to be fairly common, on the estate.

The following species proved failures or nearly so:—

Nyctanthes arbor-tristis, L. (Tam: *Parijatham*),

Parkia biglandulosa, (Tam: *Mavookai*),

Butea frondosa, (The Bengal Kino),

Jacaranda mimosaeifolia,

Thuya orientalis, L. (*Biota orientalis*, Endl.),

—the Chinese Arbor-vitae,

Cycas circinalis, L.,

Achras sapota, L. (Sapodilla plum),

Bassia longifolia, L. (Tam: *Iluppai*),

Dalbergia latifolia, Roxb. (Rosewood),

Calophyllum inophyllum, L. (The Alexandrian

Laurel),

Elaeodendron glaucum, Pers., (Cilupai),

Couroupita guinensis, (Tam: *Nagalingam*),

Ficus benjamina, L. (The Java fig),

Mimusops kauki,

Mimusops hexandra, Roxb. (Olakkai-palai),

Adansonia digitata, L. (The Baobab),

Schleichera trijuga, Willd. (Tam: *Poovan*),

Careya arborea, Roxb. (Tam: *Aiyima*).

Species more recently introduced, and under observation will be reported on in due course. The following species have not yet been tried on the estate and will also be reported on if and when they are given a trial:—

Soymida febrifuga, A. Juss,
Dolichandrone crispera, Seem,
Cassia renigera, Wall. (The Burmese Pink Cassia),
Cordia sebestiana, L. (The Scarlet Cordia),
Cassia javanica, L. (The Java Cassia),
Cassia multijuga, Rich.,
Guetarda speciosa, (Tam: Pannir-maram),
Pisonia morindifolia, (The Tree lettuce).

EXTRACTS.

1. Forestry in New Zealand:

As appears to be inevitable in times of economic stress, reductions were made in the research staff of the New Zealand State Forest Service as in other directions, and the Forest Biological Research Station at Nelson, New Zealand, was closed soon after its official opening. It is pleasing, however, to be able to read that research work was continued on a restricted basis.

The total area of new plantations under the afforestation campaign exceeded 40,000 acres, the total area of State plantations being now approximately 348,000 acres, in addition to which there is a very large area of commercially-formed plantations in New Zealand. The milling industry naturally suffered from the depression and the volume cut was not more than half that exploited two years previously. The most interesting and important event in the local market was the increased domestic demand for exotic locally grown timber for use in the various box-making factories. With the large and increasing area now under exotic coniferous plantations in New Zealand, it is scarcely surprising that the important question of disposing of the thinnings which it would be necessary to make in them has been receiving the most serious attention; and investigations have been carried out by utilisation research officers.

Apparently it is now hoped that the manufacture of the thinnings into boxes and crates will prove a promising industry. In this connexion, it is pointed out that whereas during the past year saw-mills operating in native bush were, on the average, cutting only up to 40 per cent of their normal output, mills working in exotic plantations were reported to be cutting beyond 60 per cent of their normal capacity. The saw-milling industry is also recognising the value of dry kilns, two new units being established during the year, one for drying box timber, whilst another for the same purpose was under construction. Timber trade-extension efforts inaugurated during the year for Southland silver-beech were so satisfactory that it was decided to send representatives to Great Britain to continue negotiations. Both in Australia and Great Britain this timber has been shown as promising for rifle stocks.

It was estimated that the area planted in trees by private companies approached 250,000 acres, an increase for the year

of 50,000 acres, whilst local bodies planted 6,500 acres, making the total under corporate control of approximately 27,500 acres. Thus the total area of commercial tree-plantations other than those established by the State Forest Service (which amount to 348,000 acres) is in the vicinity of 277,500 acres.

The area planted by the State fell off during the year, and says the report, "will probably decline still further for some years to come in accordance with Government policy to taper off the afforestation operations of the State". In view of the great commercial activity in this direction, the decision of the Government must be regarded as the correct one; since the policy of a Government should ever be avoidance of direct competition with commercial projects.

The first laboratory study undertaken by the Forest Service—an investigation into the fundamental physical and chemical properties of the indigenous timbers—has been completed after ten years' work. The results will be published shortly, and structural grades, together with working-stresses, developed for the principal species.

The most significant information in the report under review is to be found in the remarks on the exotic plantations. New Zealand has now 625,500 acres of these and the area increases yearly. It is difficult to estimate the important influence these will exert on the commercial development of the country in the future. Already they are being used extensively in the box-making industry for the export of New Zealand produce; "during the year over a million apple-cases were manufactured from insignis pine (*Pinus radiata*), several hundred thousand fruit-boxes for the Pacific Islands fruit trade, over one hundred thousand benzine-cases, and several hundred thousand cheese-crates, besides numerous other containers".

There is much in this annual report which merits study by officers in other parts of the Empire. The research work and experience gained in the utilisation of the thinnings from the exotic coniferous areas should prove invaluable to other growers of this type of plantation.

—*Nature*, July 1, 1933.

2. Wooden or Iron Posts in Railway Electrification :

It is proposed within the next few years to electrify the railway system in Sweden. Hence a writer in *Skogen* discusses the question, so important from the point of view of forestry in its industrial aspects, of the relative advantages of using wood or iron in the construction of the posts required.

In Sweden iron posts are employed to hold the cable for transmitting electric power where it is at present used, while in Norway, which has had a more extensive experience of railway electrification, wooden posts are frequently utilised. In Sweden however extensive use has been made of wood in the construction of lines conveying electric power in other connections and even when the current has been very powerful, wood has always proved its superiority as compared with metal and reinforced concrete. Here of course reference is made to wood treated with creosote and in the proportion of 100 kg. per cubic metre.

Using the estimates prepared by the State railways, the writer gives a table to show the difference in the price of wood as compared with the price of iron for the construction of these posts.....

As it is necessary to renew the painting of the iron posts every 6 years, which increases the price in the above estimate the price of wood as compared with the price of iron is in the relation of 1 to 8.

Naturally these figures will require modification, if it is necessary to arrange the wooden posts nearer together than the iron. As to respective durability, the writer says that it is difficult to make any safe statement, but he quotes examples of posts of creosoted wood which were none the worse for service, after a life of 30 years and more, without any special care, while on the other hand in certain cases iron posts were affected by rust after a similar period, possibly as the result of lack of proper attention.

In the light of the above estimate, it would appear that, as a material, iron is only to be preferred when, apart from motives of economy, there are special reasons for its use. It is necessary however that the matter should receive very careful attention from the representatives of the forest industry, who have important interests to safeguard in view of the development of railway electrification.

—*International Review of Agriculture*, May 1933.

3. Cinchona and its origin :

Romantic discovery of curative virtue of Cinchona.

Few persons who had been sick with malaria know the source of the quinine that had been invariably recommended by physicians to cure them, yet this remedy had been in use approximately for the last 300 years. There are several species of Cinchona trees, from the bark of which quinine, besides a

number of other useful derivatives, is taken. The quinine is obtained through chemical process. The bark of these trees is known as Cinchona, Peruvian, Quinine or Jesuits' bark. These trees are native in the mountains of Bolivia, Peru and other parts of South America.

The discovery of the curative virtues of Cinchona bark for malarial fevers was romantic. In the year 1639, the Countess of Chinchona, Lady Ana de Osorio, wife of the then Viceroy of Peru was suffering from malaria in the wilds of Peru. This Countess had shown kind interest to the Peru Indians and when the latter learned of the condition of the lady they decided to reciprocate the kindness by preparing a decoction of the bark of Cinchona, and selected a delegate from their tribe to present it to the Countess. There were then learned doctors attending who protested against using the medicine, but because the Count was desperate about the condition of his wife, he consented to try it. And to their amazement the Countess became well. To perpetuate the romance of the historical discovery of the virtues of the plant, it was named after the Countess of Chinchona by the famous Linneaus about the year 1742. By mistake, he omitted the first "h" and died without learning of his error. The Peru Indians call the plant "quinaquina."

How the Cinchona Industry Came About in Java.

The discovery of the curative effects of this wonderful plant spread in Europe and as a result several of the countries of the Old World sent expeditions composed of wise men to South America to locate the precious plant and collect plants and seeds with the idea of growing them in a nearer place. They did not realize that the plant is of tropical habitat. Finally the Dutch became the virtual winner to succeed in the enterprise. She is now controlling about 98 per cent of the world's supply in quinine from her plantations in Java.

The first consideration towards the importation of the Cinchona plant from South America into Java was in 1830. But it was only some 20 years later, under the direction of the Minister for the colonies, Pahud, that first measures in this respect were taken. At about the end of the year, 1852, Justus Carl Hasskarl sailed from Holland for South America to gather seeds and plants of Cinchona. In the same year, the plants and seeds gathered by Hasskarl arrived at Buitenzorg, Java. The first successful trials to grow Cinchona were made at Tjibodas, and, at the special instructions of Junghuhn, the trials were continued at Tjinjircean. Here by the end of 1853, a nursery was laid out. Unfortunately, the barks obtained from

the species collected by Hasskarl were found to contain only a small amount of quinine and the plant was worthless for cultivation. In 1865, Charles Ledger, with the help of one Manuel, a bark collector to whom the chief credit of the enterprise appear to be due, gathered seeds of the valuable variety (*Cinchona calisaya*) which has since borne his name (*C. calisaya var. ledgeriana*). This stock of seed became the foundation for the Cinchona industry in Java. The plants thrive between elevations of from 2,000 feet to 6,000 feet, but the best cultivations are found between 3,000 to 5,000 feet. Java is at about 7° south latitude.

—*The Makiling Echo, April 1933.*

4. Forest Fires in Relation to Soil Fertility:

(By Prof. F. P. Worley, Auckland University College, New Zealand).

When the early colonists arrived in New Zealand, the greater part of the present cultivated land of the North Island and much of that of the South Island were covered with dense forests, which have since been removed by burning, the general practice being to remove millable timber, fell the remainder, burn out as completely as possible and sow with grass. Much of the Forest was, however, burned without felling, sometimes by accident but often intentionally.

Although large areas of native forest still remain, the bush in the South Island is largely confined to mountainous regions. In the North Island, although the greater part of the remaining bush is on mountain ranges, there is still a large area of bush land that will gradually be brought into cultivation. The method of forest removal is not far removed from the primitive methods employed by some African native tribes.

Although it may be conceded that burning is the only practicable method of bringing bush land into cultivation, far too little consideration appears to have been given to the influence of forests on soil fertility and to the possible damage to the soil by the methods of burning employed. It is very obvious in numerous cases that areas formerly covered by luxuriant bush frequently have surprisingly low fertility. It has only to be recalled that the poor 'gum lands' of the North Auckland peninsula were once covered by dense kauri forests full of rich undergrowth. In other parts of the country, hillsides formerly covered by good bush, such, for example, as the coastal districts North of Wellington, have a fertility sadly below that to be expected from the luxuriance of the former bush.

It is necessary to inquire whether this apparent deterioration of fertility may be due to the method of forest removal and, for this purpose, consideration must be given to certain aspects of the part played by the forest in bringing virgin rocky land into a condition of fertility. The process can be observed on the volcanic island of Rangitoto at Auckland, where a formerly barren island of rough basalt is in process of being converted by the bush into rich, fertile land. It is not known how many hundreds of years it has taken for the island to reach its present degree of fertility, or how long it will be before the rocks are covered with fertile soil, but the process of humus formation is plainly obvious. What is not obvious, however, is the process of bringing to the surface and making available for plant growth the mineral constituents of the rocks.

The only artificial fertilisers intentionally applied to the land for agricultural purposes, apart from lime, are those supplying potassium, phosphorus and nitrogen. It is now recognised, however, that most of the other common elements occur in plants, though generally only in minute amounts, and that some of these minor constituents are essential to plants and to animals. Some may be present only fortuitously, but it is impossible to deny that they may have specific functions. Manganese and copper, for example, have been found in all plants investigated and are associated with rapidly growing parts, such as buds and leaves, and probably have a functional importance.

The small amounts of such elements in the soil are extracted by the roots of trees and transported to the growing parts, being eventually shed in the falling leaves, thus enriching the surface soil. This enrichment of the surface soil at the expense of the deeper soil by trees was clearly shown in the case of manganese by Bishop, and further investigations of a similar nature are desirable. Maquenne and Demoussy examined the distribution of copper in a number of cultivated trees and shrubs and found the copper concentrated in the actively growing parts. Analyses of various parts of the native karaka tree have shown that the copper is concentrated in the leaves and seeds of this tree, and the same will probably be found in the case of other native trees. Copper is present normally only in minute amounts in the soil, but is gradually brought to the surface, like manganese, by tree growth. It is obvious that forests, besides building up a surface layer of humus, exercise the very important function of bringing to the surface various chemical elements extracted from the deeper soil. This process is cumulative and may extend over many hundreds of years.

In view of these considerations, it is possible to appreciate the damage that may be done by forest fires. Not infrequently the burning is sufficiently thorough to burn away the humus. On hilly ground the ash may be almost entirely washed away by rain, with the result that the beneficial cumulative work of the forest carried on over vast periods may be destroyed in a day. Unless the ash and the humus can be retained, the work of the forest has been not only in vain, but even actually detrimental, in that the soil to the depth of the tree roots will have been impoverished in minor mineral constituents essential to healthy growth of plants and animals.

On flat land the floor of the forest is usually damp. Here there is less likelihood of complete destruction of humus by fire and of ashes being washed away either mechanically or in solution, except on very porous soil, but on hill and mountain-side the destructive effects of bush fires may be disastrous.

The comparative infertility of the gum lands North of Auckland is probably due very largely to the destruction of the forests and the surface soil of the hills by great fires. In the low-lying and swampy gum lands a layer of ashes, covered often by many feet of black peat, overlies the remains of a kauri forest. Frequently, at a lower level there is another layer of ashes above the roots of a still earlier kauri forest. The prehistoric fires that destroyed these forests doubtless destroyed the forest on the hilly ground, where kauri gum occurs very near the surface. The humus on the sloping ground was apparently destroyed and the ashes washed down into the sea. In recent years the scrub has been burnt off by gum diggers and others and further damage done to the fertility of the soil.

On very porous soil the mineral constituents of ash derived from forest fires may be washed down through the soil. Should there be a tendency towards any mineral deficiency in such soil, this deficiency may be greatly intensified by leaching. On soil of this nature it would appear desirable to grow deep-rooting crops to bring to the surface the small amounts of essential minerals, and to produce a retentive layer of humus. Much working, with consequent drainage and leaching of the surface soil, should be avoided.

It appears probable that humus may have mineral as well as biological importance and more analyses are desirable of its mineral content, particularly for those elements that occur only in minute amounts in underlying soil or rock. It is obvious that if the normal soil and rock is in any way deficient in minor mineral constituents essential to the full health of plants or

animals, this deficiency will become serious if the humus in which such constituents have become concentrated is destroyed & the ashes removed.

animals, this deficiency will become serious if the humus in which such constituents have become concentrated is destroyed and the ashes removed.

—*Nature*, 3-6-33.

5. Wild Life in Southern India :

(Contributed.)

Amongst the many and great changes which have been taking place in India during recent years there is one which is not commonly known and which, if it were realized, would excite the sympathy of all rightminded people. The change referred to is that which has taken place with regard to the destruction of wild animals, chiefly in order that their meat may be sold to enrich people who have no consideration for the lives of any living creatures in the wild state. No doubt Providence provided many of the wild animals for the use of Man and until recently in India, Man used this gift wisely. Nowadays, however, the march of civilization which has brought the motor car, electric torches and cheap fire arms has made the destruction of Wild Life so much more easy than it used to be that unless public opinion is stirred up to put a stop to the ruthless destruction that is going on, a time will arrive at no distant date when many species will cease to exist. What is happening in Southern India is also happening in other parts of the world. In several countries the public have become alive to what is going on and have decided that unscrupulous people must not be allowed to make money by going about at night with electric lights or in cars, shooting any wild animals that they may see, including females and young ones. In these countries Societies have been formed in order to take steps to put a stop to the indiscriminate destruction of Wild Life and to help the Government in enforcing the existing laws. There is no doubt that Southern India should not be backward in following so admirable an example and it is understood that His Excellency the Governor of Madras intends shortly to invite all those interested in preventing the wholesale slaughter of our wild animals to attend a public meeting in Madras, over which he will preside, with the object of forming a Society for the Preservation of Wild Life in Southern India. It is sincerely to be hoped that all those who read this will make a point of discussing this new and very interesting subject with their friends and that as many as possible will attend the meeting and join the Society.

* * * *

An Appeal to Landowners.

(Contributed.)

In almost all countries of the world there has in recent years been an awakening of public interest as to the urgent need of adequately protecting Wild Life in all its aspects.

India has up to the present time been backward in this matter, for outside the Government forests birds and beasts of the field have been looked upon as fair game to all those who have been able to shoot or snare for sport or for profit. Neither sex nor age has been spared, and breeding seasons have been entirely disregarded.

Within Government forests shooting has for the past fifty years or so been restricted by licence; but there are many who carry on the slaughter in these areas also, for it is not easy to detect offenders.

Now is the Time.

The time has now come when, if the present generation does not speedily realize—or realizing ignores—the fact that the heritage of Wild Life received from previous generations is being woefully squandered, many species of birds and animals will become extinct. Once the number of any species has been reduced to a certain low ebb the end is at hand; for Nature has been interfered with, and a greatly diminished species cannot survive against the many natural enemies—the tigers and the cats, the eagles and the hawks devour them; the mongooses, the lizards and the snake prey upon the eggs and the young.

The Landowner is responsible.

Who are the men of the countryside of fifty years of age who can say that Wild Life in their own neighbourhood has not greatly diminished since the days of their youth? And whose is the blame?

All the world over, the Wild Life on the land is the property of the owner of the land, and he is the responsibility. He cannot say that it is his to do what he likes with, for he is responsible to The Creator of all things to preserve that which has been created. He must not allow Wild Life to be persecuted to extinction.

A man will not suffer his flocks and his herds, his fowls and his pigeons to be raided and destroyed. There is greater reason to safeguard and protect the wild animals and birds, for

his cattle and sheep he can replace but Wild Life once gone can never be replaced.

So let us hope that this appeal to Landowners great and small will cause them to take thought to the future, realize the danger that is here plainly before their eyes beyond any question or dispute, and bestir themselves to take action before it is too late to preserve the Wild Life for which they are responsible.

A Society for the Preservation of Wild Life.

In the United Provinces of India a Society has been formed for the Preservation of Wild Life, and it is understood that His Excellency the Governor of Madras intends shortly to invite all those interested to attend a Public Meeting in Madras, over which he will preside, with the object of forming a Society for the Preservation of Wild Life in Southern India.

All Owners of Land are interested.

What owner of land is there who, having read the above, can say he is not interested? All ought to endeavour to attend, or be represented, and all should now take action; for every day of delay means the lives of animals and birds which should be preserved.

* * * *

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We extend our enthusiastic support to the proposals for the establishment of an association for the preservation of wild life in South India. It seems to us that the adoption of measures for the protection of fish is equally imperative. With the exception of the United Provinces the other parts of India do not have a central organization commanding sufficient prestige to impose restraints on the indiscriminate slaughter of wild animals, some of which have been brought to the verge of extinction. As an instance of the grievous loss which science has sustained through the uninstructed zeal of sportsmen, we may mention the case of the Dutch settlers in Mauritius, who taking unchivalrous advantage of the half-fledged wings and short legs of Dodo (*Didus ineptus*), succeeded within a comparatively short time in clearing the island of this extremely interesting and rare pigeon. In the interests of science and wider humanity, enlightened Governments have recognized the need of imposing restrictions, by the promulgation of game laws and other protective regulations, on the excess of sports-

men and native shikaris. Wherever there is abundance of sylvan fauna the temptation for the free use of fire arms becomes irresistible and epidemic and in the excitement, it is not uncommon for men to forget all the commandments both divine and human. The unassisted efforts of Government are not adequate to meet the exigencies of the case, and they have to be supported by private associations whose influential position in public life ought to invest them with authority for exerting control on the destructive proclivities of sportsmen and ignorant native shikaris.

From Helen of Troy down to butterflies, the wearer of beauty has always been subjected to persecution and for the gratification of human vanity or pleasurable excitement or under pretexts of protection of human life and crops, large number of animals are annually killed, which in minds not sportively inclined evoke feelings of kindness, sympathy and admiration. Attributes such as strength, courage and dignified independence which embellish man's character confer no immunity upon lower animals possessing them. Departure from doctrine of *Ahimsa* and the impact of historical influences have diminished in India reverence for animal life and in the next phase of human progress it is hoped that our concept of the sanctity of life, occurring in the Amoeba or the Archbishop of Canterbury will receive a new orientation. But the urgent need is a complete revision of the ethics of sport as pursued at present. We cannot discover heroism, much less righteousness and fairplay, in enticing animals by playing cruelly on the most fundamental and universal appetite, paralysing them with the dazzling brilliance of torchlight and shattering their shoulder blades by firing with magazine rifles from an elevated place of concealment. Compared with this the mode of hunting the offending lion practised by the African tribes has all the good qualities of sport giving, as it does, the hunted beast all reasonable chances to escape and making the hunters oppose skill, strength and daring to the fury of the animal in a battle royal. In a sport it is unmanly to evade the risk and secure the spoils in a manner other than by courage. We have to humanise sport. We should not countenance slaughter without provocation.

The principal offence for which the wild animals are hunted down is that they become dangerous to man and the cattle in his service and to the crops that he raises. Some of them destroy valuable forest produce and a few are reported to increase in population periodically endangering the safety of villages. A few more have the misfortune to possess bright

plumage, soft fur, bright skins and succulent meat. Frequently, however, not for any of these provoking causes, wild animals incur the fatal displeasure of man because they provide him with recreation and excitement. To a large extent man is directly responsible for the homicidal tendencies of the more ferocious animals and for the depredations of others on cultivated lands. The former have to be outlawed. But the produce of the land is amply protected from elephants and boars, when the area is surrounded by a deep moat. The population of animals is under the operation of inexorable physical laws of nature which maintains a balance of power among them, and reports of overpopulation are based on casual observations of herds which driven from their natural haunts by drought or flies, appear in the vicinity of villages. Human pleasure need not necessarily depend on the painful death of lower animals but may be derived from contests offering opportunities for displaying skill, strength and endurance. Occasions might arise when the wild animals, after becoming a source of danger to man and all his belongings, refuse to be dislodged from the positions they have taken up and in such cases they have to be captured alive and added to the zoo. It seems to us that forests are to be treated as fertile recruiting grounds for periodic enrichment of the zoos, parks, museums and other public places of amusement and instruction, instead of being used as a field of infernal carnage.

The Association, when it is formed, will be confronted with a very difficult and delicate task, and without anticipating its functions, we may point out that if it is to serve the high purpose for which it is founded, its activities ought to be continuous and widespread. Through a great deal of propaganda work, the Association will have to acquaint the people in general and the shikari section in particular that the interests of science and the cause of deeper humanity forbid the indiscriminate slaughter of animals however ferocious, and irrespective of the amusement their death may provide. The game laws and protective regulations have to be popularised and the Association should publish periodically complete and correct accounts of the life habits and the distribution of the larger denizens of the forest and the economic uses of conserving animal life. A beginning is to be made in the rural schools where infants ought to be encouraged to tend pet animals and grown-up children should be taken out on excursions for observational studies. The habits of animals in our immediate surroundings exercise a great fascination on our mind and the sympathies early contracted restrain the development of destructive tenden-

cies. Children in the urban areas ought to be taken out periodically to the zoos which, if stocked with a representative and rich collection of animals, must provide, under competent guidance, many a useful and intelligent lesson on animal colour, classification, bionomics, ecology and geographical distribution. Frequent visits consolidate the early sympathies formed in the elementary schools and tend to keep the heart warm for the animals. More important perhaps than all this is the education of the villagers. They should be made to realize that the safety of their cattle depends on the keeping them in a perfect phalanx on the grazing ground and that the cattle and goats entering the reserve sections of the forests attract the tigers and panthers which, emboldened with the success of their adventure, will realise that it is easier to strike down the domestic animals than chase the deer. In trying to rescue his cattle from the clutches of their enemies, the villager succeeds in injuring them and the result of all this is to convert a forest dweller into a prowling village thief. Elephants, pigs, bisons, deer and antelopes can be successfully kept out of the cultivated grounds by a trench which, besides serving as a barrier, will help to conserve the moisture in the subsoil that is so essential for the prosperity and fertility of the lands. This is an expensive and laborious task and the slack season in agriculture will provide the necessary time, and labour may be secured on a co-operative basis. Even if it were desirable, it would be impracticable to suggest that wild animals should not be killed for their flesh, but energetic measures will have to be taken by the Association that all such activities are limited to a single definite purpose and that in no case the permission granted is abused. The administration of game laws is always fraught with difficulty and in some cases even with danger. The active co-operation of the planters and native shikaries will have to be enlisted by the Association in the enforcement of the Government regulations and the powers of forest officers should be enlarged to deal with cases of violation of the rules.

It must not be forgotten that the present age delights in sensational thrills and excesses, and measures the merit of things by their advertisement. People have a more touching faith in the "sancity of broken records" than in the enduring value of work done in solitude and tranquillity. Hunting either for obtaining pleasure or for establishing new records must be deprecated. It will have to be resorted to only for the removal of evil. The aim of the Association should be to encourage the study of the habits of animals in their native haunts, their interdependence in the economy of nature, their adaptive modifi-

cations, their evolutionary history, their jealousies, affections and antipathies, their social instincts and crude forms of patriarchal Government among gregarious forms and all those features of unsophisticated wild life which instruct the human mind and ennoble its sympathies.

The Association will have to treat this task as a humanitarian mission, the reward for its successful and satisfactory accomplishment is the gratification that its members have restrained the reckless waste of animal life whose closer and sympathetic study might furnish clues to an illuminating interpretation of some of the obscure and puzzling psychological and sociological problems of man. In the supreme interest of science, elephants and the South Indian ibex which possess a historical importance should receive special consideration and the Association should regard their protection as its sacred duty. We fully realise the magnitude and the importance of the task which will be assigned to the association and we hope that its formation will not be unduly delayed. The generous support and enthusiasm which His Excellency the Governor of Madras has accorded to the movement and the co-operation which the Association expects from the enlightened Governments of South Indian States offer hopes of success

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Throughout Southern India much interest is being taken in the proposal to form a Society for the Preservation of Wild Life which His Excellency the Governor of Madras hopes to inaugurate at a public meeting to be held in Madras early in the coming cold weather.

Many of those most interested in this admirable proposal are anxious to do all in their power to help but are faced with the question as to what active part they personally can take towards preserving Wild Life. In endeavouring to find an answer to this question it is necessary to bear in mind the fact that the creation of a Public Opinion which will not tolerate the destruction of wild animals and birds by unfair means is the most important essential. There are various undesirable practices such as cheating at cards or at field games which people normally refrain from, not because of their illegality but because they have been brought up to consider them unsporting and also because they know that the strong Public Opinion which exists against such practices would result in their being looked down upon by their acquaintances if they were to be thought guilty of them. What we want to do is to add the destruction of Wild Life by unsporting methods to the list of undesirable

practices which Public Opinion will not tolerate. Now there is a characteristic of human nature which makes some people who have achieved success in shikar wish to talk about it and to have it talked about amongst their acquaintances. In the old days before motor cars and electric torches were so common these successful shikar achievements usually resulted from long tramps over difficult country involving great physical exertion, and when, as often happened, the resulting trophy was obtained at some personal risk and often after days of disappointment, when only females or immature males had been seen and spared, the sportsman had something to be proud of and his achievement was a welcome subject of conversation amongst his friends, who admired him for his manly prowess. I wonder how many of my readers to-day have heard modern shikar incidents discussed recently and how many of these incidents related to success achieved after great personal exertion and perhaps some danger and after exercising great self-restraint in refraining from shooting at several females or immature males which may have presented easy and tempting target—very few I fear! Is it not the case that a motor car, or a flash-light or a machan over a salt lick or water hole enters prominently into most shikar incidents of the present day? The man who has achieved success with the help of such devices or who has shot a female or immature male is, surely, the antithesis of a true sportsman.

To those, therefore, who are in doubt as to how they can help in the preservation of Wild Life I would say—

“*Firstly*, refrain from displaying any interest or admiration in the exploits of those who have achieved success by unsportsmanlike means and when such matters are discussed in clubs and elsewhere endeavour to lead the conversation round to the unsporting aspect of the case; assuredly the man who has shot a female deer from his motor car in the light of his head-lamps and who offers you a haunch of venison for your dinner is no sportsman but a mere killer who ought to be despised.

“*Secondly*, when you hear of authenticated instances of illicit shikar trips into Government forest, tell the local forest official about the locality and details. Success breeds the desire to try again and if your information leads to a poacher being detected and convicted you will indeed have helped materially in the preservation of Wild Life.

“*Thirdly and lastly*, bring up your children and all young people with whom you come in contact to have interest in wild

animals and birds and inculcate in them a love of true sportsmanship and a hatred of destruction of Wild Life by unfair and cowardly means."

6. Summer Plankton and the Colour of the Sea :

Dinoflagellates in the plankton are most abundant during the summer months, and the larger forms, such as *Ceratium* and *Peridinium*, usually attain their maximum numbers in the Clyde sea area in August. Certain peridinians can multiply very rapidly and occasionally become so numerous as to give rise to a 'water-bloom'. The sea is coloured, usually reddish, a strong smell is given off and eventually, if such conditions last, fish, and even shore-living animals, are killed off. Such phenomena are commoner in warm and tropical seas than in British seas, although on one occasion (June 1925) patches of 'red water' were reported from Loch Long and were found to contain enormous numbers (about $2\frac{1}{2}$ million per litre) of *Peridinium triquetra*.

Off the coast of South Africa. 'red water' or 'flower water' may be seen several times during the course of the summer, caused by multitudes of *Noctiluca*. In Japan also a 'red tide', said to be highly destructive to pearl-oyster beds, was found to be caused by the peridinian *Gonyaulax polygramma*. Although the discoloration of the water is usually caused by dinoflagellates, the regular occurrence of 'red water' off the coast of Malabar during the late summer and autumn, is due to swarms of a small euglenid flagellate (Hornell, *Madras Fisheries Bull.*, 11, Rep. 2, 1917). This 'red water' appears every year after the passing of the rainy season if there are a few days of fine sunny weather, and it kills off quantities of fish and crabs. It furnishes the explanation for a curious incident in the siege of Cannanore in 1507. After a long siege the Portuguese garrison were reduced to great straits: "On the 15th August however, a miraculous event occurred, seemingly in answer to the prayers of the besieged to the Queen of Heaven whose feast day it chanced to be, for the sea sent forth shoals of crabs and prawns and the garrison again lived in plenty."

'Red water' off the coast of California has been seen to extend so far as 10 miles from shore. When caused by *Prorocentrum micans* (also a peridinian) it was not harmful to fish, but other outbreaks, due to *Gonyaulax polyedra*, were destructive to life.

—*Nature*, 12-8-33.

7. Insect ideas we copy :

By L. Elgar Pike, F. Z. S.

[There are few articles of common household use which have not their prototype in Nature. In the insect world, brushes and combs are provided for toilet use; pottery for the storeroom; saws, pliers, and cement for the workshop. In fact insect civilization is so complete that it has provided man with many a bright idea which he has adapted and added to his own sum of home comforts.]

There is a world of wisdom in that ancient injunction to "Go to the ant ... consider her ways, and be wise"; for, Nature, especially in the realm of insects, holds up a startling mirror to the life of mankind; and if we care to gaze into it, we behold, embodied in the lives of these varied, and often tiny creatures, the most astonishing parallels to our own customs, utensils, and even to many of our most carefully guarded patents. In fact we can often discover that one of our very latest inventions has been in constant use by some animal or insect for countless ages. There are too numerous instances of man having copied his patents direct from Nature's own. * *

Nearly every article we use now-a-days has its prototype in Nature. Ants and spiders are provided with wee combs with which they clean and smooth their hair whenever it has become soiled or disarrayed. Ants especially are very particular about their appearance. They also have brushes on their feet of which they make good use when they are at their toilet.

The diving bell, which is not so much needed now that men are enabled to work under water in specially constructed suits, must have been inspired by the nest of the familiar water-spider. It is a marvellous fairy palace which the female weaves of silken thread. Rather like an inverted thimble in shape, it is anchored firmly to the stems of the water plants. Then its owner climbs up to the surface, and entangling a bubble of air in her furry attire, she takes it carefully down, and releases it into the nest. This is repeated until the nest is quite full of fresh air which will, of course, remain in it until the structure is accidentally tilted.

The principle is the same as when one lowers an inverted tumbler into a bowl of water. So long as its mouth is kept level the water cannot enter, but the least tilt brings disaster. Having constructed this little home, the spider, an air-breathing creature, is enabled to stay quite comfortably under the surface of the pond for days on end. She hatches out her babies here;

but the male spider hardly ever dares to venture down to see how his family is progressing, as his affectionate wife would in all probability make a meal of him.

The housewife will be surprised to find that when she takes her basket on her arm and hurries down to the shops she is only doing what the bees have done for thousands of years. These industrious insects carry a tiny basket on their knee—which they apparently find the most convenient place. While they are collecting their supply of honey they fill this with pollen. Thus when they arrive back home they set to work with some of the honey and actually knead up the pollen into little cakes which we call "bee-bread." And now here is a tip from the bumble-bee's kitchen. She takes the empty cocoons of her offspring, varnishes them neatly inside and out, and puts the little pots up on the shelf to hold next season's store of nectar.

The froghopper is possessed of another familiar device which is so handy in the kitchen, when there are eggs to be beaten up. This small insect, having attached himself to a nice juicy plant stem, pierces it to make the sap flow out, and then whisks this up with an admixture of air until he has covered himself completely with the lather which we know as "cuckoo-spit."

Spoons, saws, shears, pliers, cement, are all ancient and well-tried inventions of Nature. The mole cricket, which is so named because of his spade-like forelimbs, which resemble those of that little animal who works so vigorously under our lawns, is a burrowing insect possessed of a miniature pair of shears. These are used to sever any roots which may be in his way as he digs along through the soil. Saws are carried by a number of flies. They are normally two in number, and are used for the very delicate operation of leaf-cutting. Into the slits so made the fly places its eggs. These saws are kept in strong sheaths when not in use, so that the teeth shall not be broken.

The spoon one of mankind's oldest devices is copied from the sensitive end of a bee's tongue, which ladles up the honey from the depths of the flowers. Perhaps the most perfect pair of pliers in existence is to be found in the possession, not of the world's best carpenter, but of the common crab. These pincers are lined with nodules and rasping surfaces to afford a surer hold (if such could be needed!) just as the gripping parts of our own pliers are roughened to ensure a better grip.

Both cement and gum are extensively used in the insect world. One of the daintiest jobs is the way in which the lacewing fly gums her eggs on long stalks upon the leaves of the

food plant so that they shall be out of reach of any enemies. Cement is used by the female gnat to hold all her eggs firmly together so that they form a minute raft floating on the surface of the pond. A similar product is used by certain caterpillars which make cocoons for themselves on the trunks of trees, and cement pieces of bark all over them. The resultant fortress is of so strong a composition that it will break the blade of any small penknife which may be used against it. But the most marvellous part of the story is that, when the moth is ready to emerge it is provided with a special acid juice which softens the hard cement at one end sufficient for the insect to break through easily and dry itself off in the sunshine.

The mason wasp is yet another worker with cement. This insect is a first class builder. First it cuts and shapes blocks, or bricks, from a bed of stiff soil. With these, when they have been baked in the sun, it builds cells in which its grubs are to grow up. The specially prepared cement is used to bind the various blocks together.

Insects breathe by means of a large number of tubes, or spiracles, which are situated all over the surface of the body. Each of these conducts the fresh air in through a wonderfully designed valve which prevents the ingress of any harmful matter. In order that these tubes shall be kept fully opened all the time they are lined with spiral wires of chitin, which is the insect equivalent for man's bony parts. This device has been copied by the makers of rubber gas piping, who fit a spiral wire through the flexible pipes to prevent their subsequent collapse.

Another very simple example of a principle which man has applied to his own use from Nature's model is that of the clasp-knife. The origin of this is to be found in the limb of a water-bug, the first joint of which hinges and folds back into a groove on the wide paddle-joint above, so that it is safely out of its owner's way when not required. Another interesting aquatic insect, well named the water-boatman, has a pair of long rowing legs. These make perfect oars by virtue of their sweep and the edging of fine stiff hairs upon them. This insect rows as capably as any Varsity Blue, with its strong backward stroke and smooth feathering to the next pull, all in perfect rhythm.

Poison gas and smoke-screen had been in use many, many years before the Great War. An insect called the bombardier beetle, being so very tiny and being also much sought-after by his large, carnivorous brethren, manufactures in a special chamber a most virulent form of gas. This is made solely from the food he eats. Having first thrown out a dense smoke-screen,

he ejects his gas into the face of his confused pursuer, and then runs off as fast as his little legs will carry him. By the time the larger beetle has recovered his senses, the bombardier is well out of reach, already busily manufacturing a further supply of his unique defence materials.

We believe that the discovery of electricity is new; yet at least three different kinds of fish know better. The electric eel, catfish and ray are possessed of faultlessly-working wet batteries which are capable of giving a shock of about 450 volts. This is sufficient to kill many animals and to prostrate a human being. How many thousands of pounds we should be saving every year if we could only discover their secret process, and be able to scrap all our expensive plant and manufacture our current from a few scraps of food and a little water!

There is that never-ending source of fascination to small boys, the pneumatic road drill. Would they be just as enthralled if they were able to see a certain species of ichneumon fly at work? This clever parasitic insect is provided with an instrument which differs from man's own in one very important respect—it is perfectly *silent*. Another little insect called the horntail deposits its eggs under the bark of trees. The grubs hatch out and burrow about through the wood for a number of months before reaching maturity. Now, the ichneumon fly comes along to the tree armed with its wonderful drill. With unerring accuracy—for the propagation of the species depends upon its skill—it bores down through the hard wood at the exact spot where one of the baby horntails is eating its way busily along, and lays an egg right into its fat little body. The drill with which the fly accomplishes its difficult operation is an inch and a half in length. Locusts also possess a pneumatic drill of a similar construction with which they bore down into the depths of the sand or soil to make a safe hiding place for their eggs.

Amongst other inventions and patents of mankind it is interesting to note that your wireless aerial, often in a very elaborate form, is carried by gnats, grasshoppers, moths and many other insects. The suction pump which plays a large part in modern hygiene, is used by the blowfly everytime it takes nourishment, as well as by butterflies. Also by suction discs upon their feet, flies and a number of lizards are enabled to defy the law of gravity and walk upside down across the ceiling. We make use of the idea in those sticks with a rubber disc attached to the end which when shot out of a toy gun, adhere by the suction disc to the object at which they are aimed.

Many flies of the so-called stinging varieties are armed with what is virtually a hypodermic syringe, only it is reversed in its action. It is carried at the mouth and is connected to a suction chamber in the head. The blood of the unfortunate person who is bitten is by this means drawn into the insect's stomach. It is small consolation, when one feels oneself bitten, to know that the gnat which we hastily 'swat at' is always the *female* of the species.

The midge, another too-friendly little insect, is armed with a complete surgical outfit, barring an anaesthetic; and for this it usually substitutes a strong poison. Lancets, saws, and a tempered blade are all kept in readiness. Although the midge does not trouble to sterilise its instruments (hence our painful swellings) it oils them very carefully, and keeps them sheathed when not in use. The bee's sting is also a rather marvellous piece of mechanism. It runs in grooves as truly as a piston rod. It is kept well oiled and is barbed at the tip. It is said that a bee dies after it has used its sting; but there is not necessarily the result. In the case of a deep wound, where the barb has penetrated fully the sting is left in, and the insect may suffer fatal harm, but in most instances the sting is not a deep one. * * *

Perhaps, of all Nature's children, the ant family can provide us with some of the most astonishing parallels to our own actions and lives. It is well known that ants keep cows (we call them greenfly), which are herded and tended, and milked of their sweet juices regularly by their owners; but it is rather astonishing to find that American ants go a step farther and carry out an intelligent agricultural policy. They cultivate large plots of their especial plant, called ant-rice, weed these carefully and build arterial roads back to the nest down which to carry the harvest. * * *

The parasol ant, when returning to its nest, always carries a piece of leaf over its head, which protects it from the sun's rays. But it also has a much more interesting use; for this species is adept at the cultivation of mushrooms. In underground-chambers quantities of leaves are stored until they rot and ferment. Then the fungus is propagated upon these beds by special workers who are experts at their job. It is said that to retain the correct amount of moisture in these vaults, the ants have evolved a form of ventilation by shafts and holes which can be regulated at will by the workers. * * *

Ants have a very efficient fire brigade. If a lighted match be set to the nest they will rush up, encircle the affected area,

and commence to advance upon it, squirting their small supply of formic acid into the flames one after the other. Many of them will be scorched and burnt to death while they work, but others are always there to take their places till at last the conflagration has been overcome. * * *

For the oldest firm of paper makers we have to go again to the insects. Wasps by means of specially adapted mouth parts, masticate wood into paper pulp for the building of their nests just as we mash and beat it at the present day, with this one difference, that the best paper is now made from rags for preference. Strangely enough there is also a water beetle which always ties up its eggs in little paper bags before attaching them to the plant stems. There is too an insect called the carder bee, which produces a perfectly waterproof paper material with which to line its nest.

In the arts again we are not so very far ahead. Perfectly sound well shaped pots or vases are made out of clay by the aptly called potter wasp. These are dried in the sunshine and then used in the home. Then, too, in basket making who can deny the thoroughly capable workmanship of the weaver birds? * * *

Perhaps the most striking example of the way in which human invention has been evolved directly from Nature is to be found in a certain type of aircraft. Here we have the very latest ideas in flying actually copied from the very earliest. This weird aeroplane which has been born at University College, in London, and which has no tail or rudder, and is seemingly all upside down and back-to-frontish has been built up by some aery ghost from the skeleton of that huge prehistoric flying lizard the pterodactyl.

Professor Watson who has a deep knowledge of these extinct creatures, and Captain Hill, who originated the design of this strange aeroplane, spent many days studying the fossilised remains of the pterodactyl. Then gradually they succeeded in evolving from their unusual co-operation of knowledge this machine, the recent trials of which have shown, once again, what a great debt man still owes to Nature.

— *Pearson's Magazine*, Aug. 1933,

8. Range of Variation in the Leopard.

Those interested in the study of variation, in regard to the size and coloration displayed by animals having a wide geographical distribution, will be glad to learn that a pair of Indian leopards, from Hyderabad, has just been added to the

collection in the Gardens of the Zoological Society of London. The range of the leopard is greater than that of any other of the larger carnivores, since it inhabits the whole of Asia, and is found almost throughout Africa; and everywhere it shows a tendency to split up into groups, such as, were they isolated for a sufficiently long period, would give rise to distinct species. The Indian leopard, for example, may range in length between five to so much as eight feet; while the tail may measure from a half to three-quarters of the length of the body. In the Persian leopard the length of the hair, and the bushiness of the tail approaches the snow-leopard, a nearly related species. The Manchurian leopard is still more distinct. The African leopard shows an even greater range of variation in these particulars, and we have yet to find an explanation of the curious fact that individuals from East Africa have large 'rosettes' like those of Persian and Indian leopards, while those from West Africa are characterised by the small size and great number of their spots which nowhere form the rings or 'rosettes' of the typical leopard. The same is true of the Albany district of South Africa. We have this much as a basis for further study; that such as are found in open country have a light golden-tawny ground colour, while those from damp, tropical forests are darker. The smallest of all the tribe are leopards from Somaliland, where, it may be noted, lions are also smaller. They have, indeed, been described as pigmy-leopards. That these differences are associated in some subtle way with the nature of their haunts and habits seems a justifiable inference. But how, or precisely why, they occur is a matter which demands a more intensive study than it has yet received.

— *Nature*, 79-8-1933.

9. "Katha" industry in the Central Provinces:

By, Tara Singh, I.F.S.

Acacia catechu (*Khair*) provides a local industry in several divisions of the Central Provinces where *Katha* is manufactured from the heartwood of this species generally by local contractors who organise small camps in suitable localities.....

Logs of about 1½ to 2 ft. girth are preferred as they are easy to handle. *Khair* possessing whitish streaks (easily visible when blazed) in the heartwood is credited with yielding the best *Katha* both in quality and quantity.....

The hewed *Khair* log is placed on a thick wooden block, generally made of a cross section of any big tree, and is rested on the forked wooden posts at such an angle as to allow its

automatic sliding when the chipping, carried out with the help of a sharp axe, is in progress.....

The chips so obtained are placed in a *hundi* (pot) and boiled with water over an open fire for a long time. The liquid is then carefully poured out into another pot to carry out further concentration. The chips are again boiled with a supply of fresh water and the process repeated in all, 2 to 3 and occasionally 4 repeated boilings are carried out in order to effect thorough leaching. After the last boiling, the chips are dried and burnt in the furnace. The liquid as obtained above is boiled to the desired concentration over a slow fire. It is then poured out on a cloth spread on the floor of a small 2' x 3' sink full of cold water, for cooling and setting in shade while fully exposed to the atmosphere. Cold water is frequently applied for washing off the liquid in the sink; a large quantity of cutch and a fair amount of catechin (*Katha*) are thus drained off and are collected in an adjoining pit, invariably dug outside the hut enclosure. When *Katha* has thus been rid of the bulk of cutch and is partially dry, it is scraped from the cloth and made into lumps of irregular shape and arranged over closely woven bamboo frames placed on wooden racks with a free circulation of air to help further drying. The product so obtained is commercial *Katha*

From the crude liquid that has drained off and collected in the pit flat cakes of a brownish black colour are obtained (often with some slaked lime added to it); these yield an inferior *Katha*

[Note by Mr. S. Ramasami, of the Minor Forest Products Section :— The method of cooling the hot liquid extract from the chips by pouring it into a sink full of cold water is curious and is not followed by the *Katha* boilers in other places. The more usual practice is to concentrate the extract to the desired consistency and allow the liquid to cool for about 24 hours or more when the *Katha*, which is easily soluble in hot water, but only sparingly so in cold water, separates out and sinks to the bottom of the vessel. To facilitate this crystallization of *Katha* some crystals of *Katha* are sprinkled on the cooled solution for "seeding." When all the *Katha* has crystallized out, the vessel containing it and the solution of catechu-tannic acid is emptied into a sanded pit. The sand absorbs all the solution of catechu-tannic acid, leaving a layer of *Katha* which is removed when it has grown to sufficient thickness.

— The Indian Forester, August, 1933.

College Notes.

1. Welcome to the new students :

We extend our welcome to the students of the 1933-35 Division. Of the 25 admitted, 18 are from the Madras Presidency including two private students. Seven are graduates and they all hail from this Presidency.

Serial Number.	Name of student.	Division or State to whom attached.
1.	Ahmed Sheriff, B.A.	L. Godavari.
2.	M. Ansar Badsha, B.A.	W. Cuddapah.
3.	C. P. Bhimayya, B.A.	Wynaad.
4.	V. Govinda Menon, B.A.	Nilambur.
5.	J. B. Lobo.	Nilgiris.
6.	P. Narayana Nair.	S. Coimbatore.
7.	G. Natarajan.	Tinnevely.
8.	M. M. Ponnappa.	W. P. S. Coimbatore.
9.	V. Madhava Menon, B.A.	Do.
10.	M. Ramajayam.	Chittoor.
11.	K. Subbanna, B.A.	Ganjam.
12.	S. Sirajuddin.	Palghat.
13.	C. S. Sivagnanam.	Guntur.
14.	M. R. Tiruvankatachari.	Madura.
15.	T. M. Vijaya Raghavan.	S. Salem.
16.	A. Yegnaswami, B.A.	N. Salem.
17.	N. V. A. Robeiro.	Bombay.
18.	N. H. Naik.	Do.
19.	Mir Mohammad Ali.	Hyderabad.
20.	Sakaram.	Do.
21.	S. D. Apte.	Indore (private).
22.	R. D. Kale.	Vishalgad State.
23.	M. L. Mathur.	Mewar State.
24.	A. Piravi Perumal Pillai.	Private (Travancore).
25.	C. M. John.	Private (Madras).

2. *Change of staff :*

The year began with no less than three changes in the staff of the College. Mr. J. C. Wrench, B.A., I.F.S., the Principal, proceeded on leave in July last and was succeeded by Mr. P. W. Davis, B.A., I.F.S.; Mr. M. Kesavanunni Nair, B.A., I.F.S., was relieved by Mr. Abdul Ali Khan, I.F.S., and Mr. E. B. Ramachandra Rao, B.A., M.F.S., by Rao Sahib Mr. K. G. Belliappa, B.A., M.F.S.

3. *Opening of a Badminton court :*

On the eve of his departure from the College, Mr. J. C. Wrench was kind enough to donate liberally for the formation of a badminton court at the west end of the estate for the benefit of the subordinate staff of the College, and their boys. The thanks of the players are due to him, as also to the present Principal, and other officers who have likewise made liberal contributions. The court was opened in July last and is being very regularly used.

4. *South boundary of the state :*

The wire fence to the south of the Cowley Brown Road which formed the south boundary of the estate is being shifted to the north of the road. To reinforce the fence a live fence of *Commiphora berryi* has already been started before the North east monsoon broke.

5. *Electrical installation :*

The installation of electricity for the buildings and roads on the estate has been taken on hand and it is hoped to be completed before Christmas.

6. *Camp-fire, Madras Forest College camp, Walayar :*

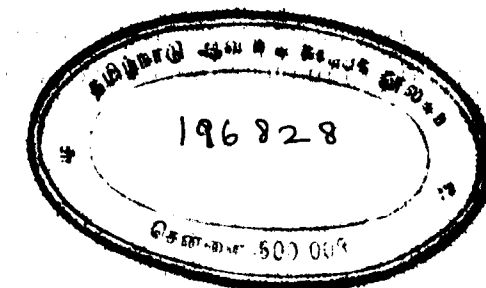
A unique feature of the Walayar camp of the College this year was the inauguration of a 'camp-fire.' An even sheet of rock lying between the students' sheds and

the Instructors' quarters was chosen as the site, and the concluding day of the camp, the 20th September last, was fixed for the purpose. The night was pleasant and rainless though it had rained heavily the previous nights.

The function commenced at 8 P.M., under the presidency of Rao Sahib K. G. Belliappa, Senior Instructor. The secretary of the Students' club assisted by a few other students lighted the fuel stack, and when the flames began to spread, the President declared the function open. The following interesting programme was gone through :—

Student Panchapagesan gave a melodious opening song in Tamil. This was followed by a Hindu *Bajana* (devotional song) by D'Souza who appeared in the guise of a brahmin devotee, and did his part very well. Chirukandan after narrating "his experiences in America" acted as a *Kathakale-baghavathar*—exponent of the epics, and held the audience in laughter. C. J. Muthanna appeared as a fortune-teller. Raza Khan entertained the audience with his urdu songs. The concluding item was a merry dance by a gang of *Jen Kurumbers* consisting of K. S. Muthanna, N. C. Madappa, M. B. Madappa, and K. A. Muddayya headed by K. M. Atchayya. The function came to a close at 11-30 P.M.

—M. D'SOUZA,



Athletic Notes.

7. *Madras Forest College Cricket Club* :—

We began the season this year by playing the Municipal High School in our first match of the Y. M. C. A. Tournament. Going in first to bat we made 138 runs in the first innings, the chief contributors being K. Krishnamoorthy, Mir. Md. Ali, and T. R. Vijayaraghavan with 28, 27 and 23 runs each. The school boys in there turn made 82 runs out of which Venkatachalam made a creditable 49. For the College K. Krishnamoorthy capturing 6 wickets for 43 runs. In the second inning we made 106 for 4 and put in the school who made 28 for the loss of 2 wickets when stumps were drawn for the day. Thus our College won by 56 runs.

Our second encounter was against the Coimbatore Government College. Again, we scored a second victory this season by winning them by a wide margin of 122 runs. Our College made 178 and they replying with a meagre 56.

The third match was against the Mysore Sports Club and we now suffered a defeat by 64 runs. We were here unfortunate in having lost Mr. Krishnamoorthy at the beginning for a duck. But however he struck his usual form in the second innings by scoring a brilliant 66 not out, which was in vain. The College made 57 runs in the first innings and 121 in the second innings. The visitors scored 121 in the first inning and 26 for one in the second innings, thus winning the match.

But anyway we are glad to note that the Mysore Sports Club our winners have won the tournament.

The long expected fight between the Seniors and Juniors had not yet come off and the Juniors are eagerly waiting to give them a fight. Let us await the results in the next issue.

— T. R. V.

8. *Foot ball* :—

This year the football team is far better than that of last year, as the juniors have amongst them some good players. The first match the College played was a friendly one against the Agricultural College on 1-9-1933; and though two good players could not take part, yet the match was won by one goal to nil.

The team entered the National Health and Baby Week Tournament, and even in the 1st round, on 23-10-33, the team was pitted against one of the strongest teams of Coimbatore—The Coimbatore Athletic Club—and the match was lost by 4 goals. A better combination and team work would have surely led it to success.

Nevertheless it is expected that some regular practice and encouragement will bring the team to a higher standard and thus make itself a really strong opponent to any of the local teams.

— WILLIAM VORRES.

9. *Madras Forest College. Hockey* :—

During this half year we played four Hockey matches, with outside teams. Particulars of matches with results are given below :—

- 30-8-33. Agricultural College 2 to 1. Defeat.
- 17-10-33. Mysore Sports Club. Draw-game.
- 24-10-33. Coorg Eleven 3 to 1. A win.
- 26-10-33. Agricultural College. Y. M. C. A. tournament 2 to nil. Defeat.

K. B. AIYAPA.

Departmental Notifications.

16—6—33. *With effect from the 25th December 1932, vice Ranger A. K. Anantharama Ayyar reduced to the I grade of Foresters :*

(1) Mr. T. N. Vedantaramanujam, from Seventh grade S. P. T. to Seventh grade permanent (His promotion will, however, take effect from the 29th January 1933). (2) Mr. V. Veeraswami Nayudu, from Seventh grade temporary to Seventh grade S. P. T. (3) Mr. P. Halasyanatha Ayyar, Forester First grade, to be Ranger Seventh Grade temporary. (As he was already a temporary Ranger until the 28th February 1933, the present promotion will take effect from the 1st March 1933).

Waltair Circle.

14—7—33. Mr. P. S. Varadakrishnamachari, Ranger Third grade, granted an extension of leave for 5 months in continuation of the leave for one month granted.

16—7—33. Mr. D. Krishnaswamiah, Ranger Sixth grade granted leave on average pay for 4 months.

25—7—33. The leave for 4 months granted to Mr. M. Narasinga rao Naidu, Ranger Fifth grade, extended by 4 months.

7—8—33. (1) Mr. I John, Ranger Sixth grade Rapur Range transferred to Guntur District to Palnad Range. (2) Mr. D. E. Lewin, Ranger Fourth Grade, in charge of Udayagiri Range will relieve No. 1 and hold additional charge of Rapur Range until further orders.

12—8—33. (1) On return from leave Mr. K. R. Krishna Iyer, Ranger Fourth grade posted to Bezvada Range, Guntur District (2) On relief by No. 1. Mr. C. S. Ganapathi, Ranger Seventh grade, posted to Udayagiri Range, Nellore District.

18—8—33. The leave for 8 months from 17—11—1932 granted to Mr. B. V. Nagarajan, Ranger, Second grade, extended by 2 months.

22—8—33. Mr. Y. Vydyanathan, Ranger, Seventh grade on return from leave, posted to Repalli Range, Guntur District. (2) Mr. I. Sambasivarao Naidu, Ranger Fifth grade posted to Lakkavaram Range to relieve Ranger Krishnaswamiah who has fallen sick.

28—8—33. On expiry of leave Mr. M. Umapathi Mudaliar, Ranger Fifth Grade, posted to Palakonda Range, Vizagapatam division.

10—9—33. V. Rangachari, Forester First grade S. P. T. Rajahmundry Range, appointed to act as Ranger Seventh grade with effect from the date he reported to duty as Assistant Instructor, V. T. S. vice Ranger Mr. P. S. Varadakrishnamachari on leave or until further orders.

Bellary Circle.

10—7—33. Mr. T. K. Ramaswami Ayyar, Ranger Second grade, Kurnool West, on return from leave (14th July 1933) posted to

Dornal Range of Kurnool East division reverting S. Varadarajulu Reddy Ag. Ranger Seventh grade to his permanent post as Forester. (2) Mr. T. Sreeramulu Nayudu Ranger Seventh grade Sivapuram Range to continue in charge of the same range until further orders.

1—8—33. Mr. Abdul Rahim Khan, Ranger Fifth grade on special duty, Cuddappah North Division posted to Vontimitta Range in the same division.

2—8—33. 1. Mr. S. Sankaran, Ranger Fourth grade, on special duty in Cuddappah South division posted to Yerragondapalem Range, Kurnool East division. 2. Mr. B. Gulab Singh, acting Ranger Seventh grade, on relief by No. (1), posted for special duty in Kurnool South division.

2—8—33. Mr. A. Vyasalu, Ranger Sixth grade on special duty Cuddappah South division posted back to Markapur Range, Kurnool East division on completion of his special duty.

29—8—33. Mr. T. G. Seetharama Mudaliar, Ranger Sixth grade of Ganjivaripally Range, Kurnool East division granted leave on average pay for 4 months. 2. Mr. P. Gulab Singh, acting Ranger Seventh grade posted to Ganjivaripally Range, Kurnool East division to relieve No. 1.

1—9—33. Mr. K. Thiruvengkatachari Ranger Fourth grade Sanipaya Range, South Cuddappah division granted leave for 2 months from 15th September 1933. 2. Mr. A. Ranganayakulu Nayudu Ranger Second grade, Kurnool West division on the expiry of his leave (i.e., 13th September 1933) posted to Sanipaya Range, and relieve No. 1.

17—9—33. Mr. T. M. Krishnamachari, Ranger Seventh grade, of Anantapur division on the expiry of his leave posted to Sanipaya Range, South Cuddappah division to relieve Mr. K. Thiruvengkatachari granted leave.

Working Plans Circle.

In continuation of the leave for four months granted, Mr. K. Poovappa, Ranger Seventh grade, Tinnevely Working Plans division granted an extension of leave for four months from 16—9—1933.

Salem Circle.

30—7—33. Mr. J. S. Vedanayagam, Ranger Seventh grade, on return from leave, posted to Shevaroy's North Range, Central Salem division.

14—8—33. Ranger C. N. Narasimbachari transferred to the Mamundur Range, Chittoor division. 2. Ranger Shanmugasundaram Pillai transferred from Mamundur Range to Kalroyans Range, Central Salem division, in place of No. 1.

20—8—33. Mr. M. S. Krishnaswami Ayyar, Ranger Sixth grade, granted extension of leave for one month from 27—8—1933, in continuation of the leave granted.

- 23—8—33. Mr. S. A. Dawson, Ranger Fourth grade, Waltair Circle posted to Shevaroy's South Range, Salem, Central Salem division.
- 23—8—33. Mr. Syed Munavar Saheb, Ranger Fifth grade, West Vellore division, to Turaiyur Range, Vice Ranger Saiyid Yahia proceeding on leave.
- 26—8—33. Mr. K. M. Gopalachari, Ranger Fourth grade, Shevaroy's South Range, granted leave for four months from date of relief.
2. Mr. R. Thangavelu Pillai, Ranger Seventh grade, Cauveri Range to be in additional charge of Shevaroy's South Range until relieved by Ranger S. A. Dawson.
- 23—9—33. Mr. P. Shanmugasundaram Pillai, Ranger, Mamandur Range, granted leave for 2 months from date of relief, i. e., 11—9—1933 forenoon.
- 29—9—33. Mr. M. S. Krishnaswami Ayyar, Ranger Sixth grade, granted further extension of leave for two months from 27—9—1933.

Coimbatore Circle.

- 26—6—33. Mr. B. M. Coates, Ranger Fifth grade, posted to South Coimbatore division.
- 4—7—33. The posting of Mr. R. Alagiriswami Naidu, Ranger Fourth grade, to Sholavandan Range, is cancelled.
- 12—7—33. Mr. A. R. Manuals, Ranger Sixth grade, South Coimbatore division, granted extension of leave for 4 months from 14—7—1933 in continuation of the leave for one month from 14—6—1933 granted.
- 1—8—33. 1. Mr. T. D. Ponniah, Ranger Third grade, to Courtallam Range. 2. Mr. K. Venkataramana Rao, Ranger Third grade, to Tunacadavu Range.
- 13—8—33. 1. Mr. I. Z. Robert Paul, Ranger Fifth grade, transferred from Ooty Circle, posted to Sholavandan Range (Head Quarters Andipatti—3 miles from Sholavandan Railway Station). 2. Mr. S. Narayanaswamy Ayyar, Ranger Sixth grade, on relief by No. 1 will report himself for duty before the Working Plans Officer at Hosur.
- 23—8—33. Mr. R. Alagiriswami Naidu, Ranger Fourth grade, now on leave for 4 months from 1—6—1933 is posted, on expiry of the leave, as Assistant Ranger in Tunacadavu Range.
- 7—9—33. Mr. S. Venkatarama Ayyar, will hand over charge of Kodamady Range to Range Officer Kannikatty on 1-10-1933 and report himself for duty at Ulandy, South Coimbatore division, by 10-10-1933. He will be attached to Ulandy Range till 20-10-1933 when he will take charge of the Ulandy Range. (2) Mr. U. Vridachallam Pillai, on relief No. 1, transferred to Talamalai Range. (3) Mr. A. B. Fenn, Ranger Fifth, on relief by No. 2 to Ambasamudram Range, Tinnevely division, expeditiously after relief of Talamalai Range charge. (4) Mr. A.

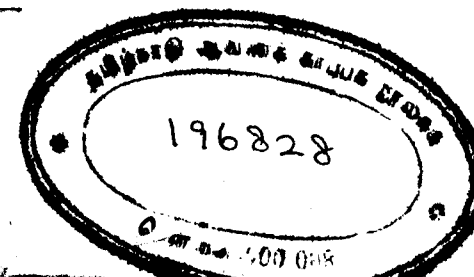
Culas, Ranger Second (Temporary) will be in charge of the New Ambasamudram Range from 1-10-1933 till he is relieved by No. 3. Orders regarding his posting after relief by No. 3 will issue later on.

- 21—9—33. U. Vridachallam Pillai, on relief in Ulandy Range by Mr. S. Venkatarama Ayyar, attached to Tunacadavu Range. (2) The transfer of Mr. U. Vridachallam Pillai, to Talamalai Range and of Mr. A. B. Fenn, to Ambasamudram Range is cancelled. (3) Mr. S. Sundaravaradachari, on the abolition of the Srivaikuntam Range from 1-10-1933, will continue in the Tinnevely division as an attached Ranger. (4) Mr. A. Culas, to New Ambasamudram Range from 1-10-1933.
- 26—9—33. (1) Mr. A. B. Fenn, Forest Ranger, Fifth grade, from Talamalai Range, to the new Ambasamudram Range. (2) Mr. A. Culas, Ranger Second grade, on relief by No. 1, posted to Cumbum Range in the Madura division. (3) Mr. K. C. Joseph, Ranger Third grade, on relief by No. 2 to Ayyalur Range in the Madura division. (4) Mr. P. Velayudhan Nayar, Ranger First grade on relief by No. 3, to Talamalai Range. (5) V. Maruthavelu, Forester First grade in the North Coimbatore division, will relieve No. 1 at once, and be in charge of the Talamalai Range until he is relieved by No. 4 or until further orders.

Ootacamund Circle.

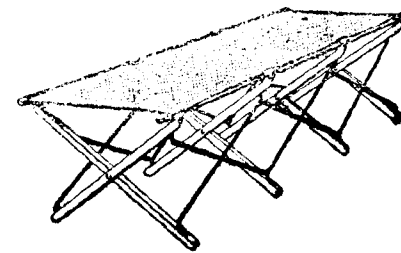
- 20—6—33. Mr. P. Ramunni Menon, Ranger First grade in charge of Palghat Range, on relief by Mr. M. S. Rangaswamy, Extra Assistant Conservator, posted to Kasaragod Range, South Mangalore division. (ii) Mr. K. Shankaranarayana Rao, Ranger Fourth grade, Kasaragod Range, on relief by No. (i) posted to Kannothe Range, Wynad division.
- 13—7—33. Mr. S. V. Doraiswamy Ayyar, Ranger Fifth grade now in charge of Mangalore Range posted to Kannothe Range, Wynad division. (ii) Mr. K. Shankaranarayana Rao, Ranger Fourth grade (Temporary) Kasaragod Range, on relief by Ranger P. Ramunni Menon, posted to Coondapur Range, North Mangalore division.
- 1—8—33. Mr. B. Coates, Ranger Fifth grade, transferred from the Coimbatore Circle to Ooty Circle, posted to Wynad division, for work as assistant Ranger.
- 17—8—33. Mr. V. N. Parthasarathy, Acting Ranger, Seventh grade posted to Nilambur division as Special Duty Ranger. *To join as quickly as possible by cutting short his leave by 15 days.*
- 29—8—33. Mr. K. G. Monnappa, Ranger Fifth grade attached to South Coimbatore Working Plan Division granted leave for two months and 9 days from 24-7-33.
- 7—10—33. Mr. K. K. Appayya, Ranger Fifth grade, transferred to Ootacamund Circle, is attached to Mannarghat Range, Palghat division.

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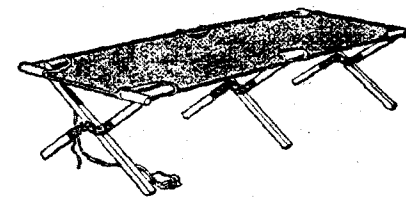
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