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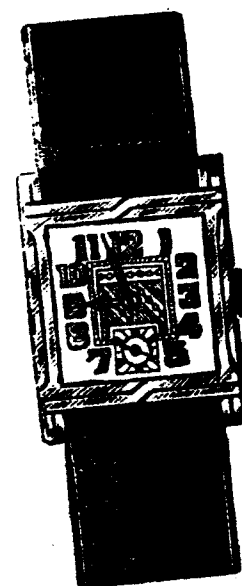
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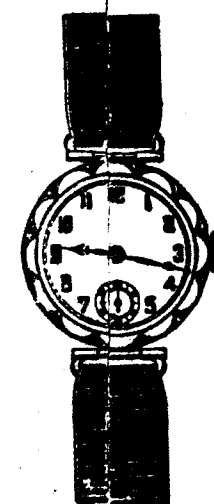
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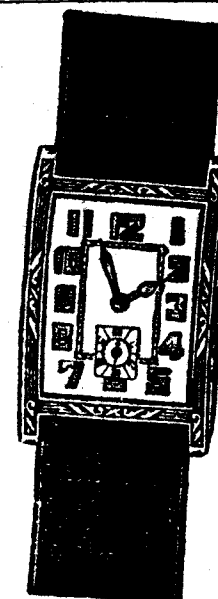
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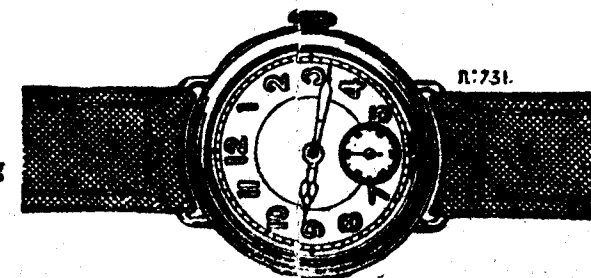


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THE
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Vol, XVI. DECEMBER 1931. No.

CONTENTS.

1. State in relation to Forestry.—By, J. ...
Senior Division student, M. F. C. ... 8
2. The Madras Forest College Athletic Sports,
1931—By, A. L. Griffith, I. F. S. ... 8
3. EXTRACTS ... 8
Roadside arboriculture—(continued) p. 85.—
Rules of botanical nomenclature p. 101.—
Control of Prickly Pear by the Cochineal
insect p. 105.—Wood in no danger p. 105.—
Forestry in Denmark p. 107—"Fal Kamesam"
a new wood-preservative p. 107,—Increasing
enquiries for Indian woods p. 108.—The pro-
blem of the choice of seeds in forestry p. 109.
—Forests and Floods p. 115.—Can the world
banish malaria? p. 117.— ...
4. The Madras Forest College Debating Society ... 11
5. Letter from Mrs. H. A. Gass ... 12
6. Forest College Encyclopædia ... 12
7. Tit-bits ... 12
8. Departmental Notifications ... 12
9. Indian Forester Prize, 1932, for *past* students... 12

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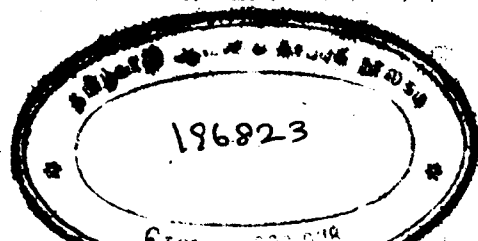
State in relation to Forestry.

The object of forestry is the production of a sustained yield of forest produce and the realization of certain other effects. Hence forestry is an industry based upon the productive power of the soil, the object of which is to satisfy certain requirements of the individuals of the earth. This industry differs from the others, because the process in this takes a comparatively longer time, than that required in other industries. The task of this industry is to increase steadily, and to the highest practicable degree the productiveness of all natural forests, and the capital invested on them. In other words its object is to do justice according to the true economic principles. The scientific treatment and the economic position which the forests occupy in the state come under forest policy. It deals with social aspect of forestry. Specially it considers the duties which the state has to fulfil, as regards forests, so that they may in the highest possible degree answer the demand, which is made on them in the interest of the community as a whole. Their duties vary according to the object for which forests are maintained.

Let us now consider the duties of a state with regard to forestry. Social intercourse is a means by which a man secures true human happiness. The former demands institutions of such a nature, that on one hand sufficient latitude is offered for personal development, and on the other hand, that an individual may not disturb or destroy the sphere of action of his neighbour. The logical consequence of such an arrangement is that all men should have equal chance of personal development, and that all should share the fruits of such institutions equally. But this has not always been an important factor in all social arrangements. Certain classes of people have always been in subordination to more powerful classes of people. With the development of culture people have begun to admit the demand of equality. They were created free citizens in all civilized states and were given to a certain extent equal rights.

The authorities of the state exercise supreme power within the limits of state territory. It has various duties to perform. In the first place it must make laws, in order to limit the action of an individual. It should remove the obstacles which obstruct the development of people, and should create institutions of such a nature, so that they may strengthen their working power. It should make permanent institutions, independent of personal fancies, in order to guarantee the action of a community in a given direction.

From the above remarks it is clear that there are certain matters of general interest, which can only be better kept under the management, and care of the state. Applying now what has been said above, it follows that a state should also look into the management of the forests whenever the interest of the community as a whole demands it. It should make means of communication to



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carry the forest produce at a reasonable rate to special localities.

It should maintain forests where they are necessary to be maintained for their indirect effects. Control of the state over forests should be regulated by laws. It should protect forests against unlawful acts, such as theft or damage, and should punish persons who commit these offences. It should determine the regulation and commutation of forest rights, and should also make the constitution of a staff of forest officers.

Protection of forests is also one of the duties of the state. In the present sense by protection of forests, it is understood that, they are maintained on account of their influence upon the community as a whole, and for their effect upon the climate. Forests should be maintained for the benefit of the public health, for the defence of the country, and for the prevention of avelanches. They should be maintained for the preservation of soil especially on hill sides, and where shifting occurs, so as to prevent land-slips, and the silting up of fertile lands at the foot of the hills, and river beds.

The state should impose restrictions on the management of forests. It should declare the method of working forests. The manner of cutting, the regulation or prohibition of cattle grazing, should be done by it. But it must at the same time see that the object to be realized by restrictions is of public importance, and that there is no other cheaper way available to realize that object. The state should also see that the advantages to be derived by restrictions are greater than the disadvantages caused thereby.

J. M. SINGH,
Senior Student.

The Madras Forest College Athletic Sports, 1931.

The athletic sports of the Madras Forest College were held on Saturday, the 24th October 1931. During the previous week rain had fallen almost every day, but fortunately it held off on the sports day until after the mile race, so that we were able to go through the full programme.

Three records (hurdles, quarter-mile, and half mile) were broken, with, in each case, a considerable margin. When the heavy state of the track is taken into consideration the performances of Moinuddin and Ismail were very creditable. They both thoroughly deserved their wins as they had trained conscientiously. Mandke put up a plucky performance after a week of fever and was unlucky not to do better.

The Richmond cup was won by Moinuddin with 20 points, Ismail being second with 17 points. Mrs. M. F. Bridge distributed the prizes.

Detailed results are as follows:—

100 Yards Race:

- | | |
|--------------|------------------|
| I. Moinuddin | 10 4/5 sec. |
| II. Mandke | |
| III. Mahmood | |

High Jump:

- | | |
|---------------|------------|
| I. Moinuddin | 5 ft. |
| II. Yellamale | |
| III. { Mandke | |
| { Sharangpani | |

120 Yards Hurdles:

- | | |
|--------------|------------------------|
| I. Moinuddin | 17 sec. (Record). |
| II. Mahmood | |
| III. Mandke | |

Throwing the Cricket Ball:

- | | |
|-------------|-------------------------|
| I. Naik | 81 yds., 1 1/2 ft. |
| II. Ismail | |
| III. Tiwari | |

Quarter Mile:

- | | |
|--------------|---------------------------|
| I. Moinuddin | 54 3/5 sec. (Record) |
| II. Ismail | |
| III. Mahmood | |

Shot-put:

- | | |
|-------------|--------------------|
| I. Sarawate | 21 ft., 3 in. |
| II. Tiwari | |
| III. Ismail | |

Invitation Half-mile:

- | | |
|--------------------------|---------------------|
| I. Syed Jemal (L. M. S.) | 2 min. 18 sec. |
| II. N. R. Venkatesam | |

Half-mile:

- | | |
|-------------|--------------------------|
| I. Ismail | 2 min. 17 sec. (Record.) |
| II. Mahmood | |
| III. Naik | |

Long-jump:

- | | |
|-----------------|-------------------|
| I. Mandke | 18 ft. 8 in. |
| II. Sharangpani | |
| III. Mahmood | |

Peons' Race:

- | | |
|---------------|--|
| I. Alivi | |
| II. Ali | |
| III. Ramasamy | |

Mile:

- | | |
|------------|--------------------|
| I. Ismail | 5 min. 27 2/5 sec. |
| II. Naik | |
| III. Sanap | |

Relay Race:

- | | |
|-----------------------|--|
| I. Bombay | |
| II. Central Provinces | |
| III. States. | |

A. L. GRIFFITH, I. F. S.

EXTRACTS.

I. Roadside Arboriculture:—(continued).

Extract from "P. W. D. Handbook."—Bombay, Vol. II.

VII. Nurseries, Seeds and Simple Insecticides.

35. *General*.—Although avenues may, in some instances, be formed by means of direct sowings, set direct *in situ*, it is nearly always more economical and satisfactory to plant out young trees which have been reared in nurseries. The first operation in carrying out scheme for the formation of avenue will be the selection of sites for the nurseries that are required to supply the plants.

36. *Selection of site*.—A good site for a nursery must fulfil several conditions. It must be conveniently situated, both in regard to areas it is to supply with seedlings and to the exercise of efficient supervision. It must be on good soil such as would be chosen for an ordinary garden and capable of being easily, cheaply and abundantly irrigated. This last consideration is of the first importance in a dry district.

It is often convenient to establish nurseries in the compounds of inspection bungalows and store-houses and to place the caretaker in charge. This works very well where the caretaker happens to be a careful gardener. Water is always to be had, the caretaker has plenty of leisure, and the nursery can be inspected by officers using the house. But everything depends on the skill of the caretaker.

37. *Size of nursery*.—Before selecting the site it will be well to determine, at least roughly, the size of the nursery required. This depends of course on the work it will have to do, that is, the number and the age of the

seedlings to be supplied annually. Space must be provided in accordance with the number of years it is intended to keep the young plants in the nursery. For instance, if the seedlings are not to be planted out until they are three years old, space must be provided for a three years' stock of seedlings. Provision must be made for the space required for the roads, which occupy a relatively large area in a well planned nursery, for trenches and paths between the beds, and also for allowing a portion, one-third or one-fourth of the whole area to lie fallow in rotation every year.

The calculation of the areas required can best be made on the form given, which also enables a record to be made of the work to be done. This should always be laid down from the commencement.

38. *Laying out the nursery*.—The site being settled the next thing will be to clear the ground, fence, manure, work up and lay out the ground for work and make the requisite water channels. In all cases a nursery should be regular in shape, and rectangular, if possible. This facilitates laying out the beds and trenches and calculating the areas to be sown etc.

In preparing the ground all stumps and roots of trees and large stones should be removed, the surface made fairly level and the whole ground well and deeply cultivated (at least one foot) so as to give the seedlings a thoroughly permeable soil in which to develop their roots. This cultivation should be commenced after the rains and repeated several times before the sowing season. Moderately deep cultivation is sufficient, as for transplanting it is better that the roots should develop near the surface.

39. *Manuring the soil*.—In preparing the soil of a nursery for the first time it will generally be necessary

to improve it by adding leaf mould or prepared soil according to its requirements. Stiff clay soil may be improved by the addition of sand or silt from a canal or of charcoal or brick-dust. Sandy soils will be improved by the addition of fine clay or silt from the bottom of a tank or stagnant pool. Lime may be added with advantage to broken-up grass land; both stiff clays and loose sands are improved by lime, but it must be used in small quantities and as old as possible. The best general addition to the nursery soil is, however, vegetable mould obtained from leaves and weeds which have been well decayed. Such mould should be prepared in every nursery, in pits two or three feet deep, situated in a shady place. One or more of these pits should be filled from time to time with leaves, weeds, etc., which should be kept damp by occasional slight waterings, and so allowed to decay slowly until ready for being mixed with the soil of the seed beds. No other manure should be used for young seedlings.

After the nursery has been some time in use and crops of seedlings have been removed, the soil will become exhausted unless its fertility is maintained by the addition of some strong manure. The manure which can be most easily procured is cow or sheep-manure obtained by rotting the droppings of the animals in pits similar to those used for preparing leaf mould. The manure should never be used fresh, but should be very thoroughly rotted, as otherwise, the grubs contained in it will attack the roots of plants. The dung as it is collected in the pit should be covered with a thin layer of earth to prevent the escape of valuable gases which are held together by the earth. Urine also should be collected and added to the common stock of cow-dung manure. It should never be used as manure unless it is diluted about four times with water. If possible, the manure should be at least

two years old. From 300 to 400 maunds of such manure should be used per acre.

40. *Laying out the nursery beds*:— The ground must then be formed into beds for sowing. The paths and trenches between the beds should be from nine inches to one foot deep. The beds ought not to be more than three feet broad, so that the coolies can reach half way across them from either side when weeding. But it will frequently be better to sow on parallel ridges. Seedlings will grow with greater rapidity on ridges than in beds and will be more easily transplanted. The roads and paths should be laid out so as to meet local requirements, and should divide the nursery into more or less equal rectangular divisions.

41. *Collection and preparation of seed*:— Trees for planting avenues may be obtained from seed, cuttings or root suckers. Seeds should not be collected until they are ripe. As a rule sound seeds are moist, of full weight, and of a healthy colour, and appearance when fit to gather. Many trees shed their seed as soon as it is ripe and it is often easier to gather the seed while still on the tree. In other cases such as Sissu, Babul, etc., the seed remains on the trees for a long time and keeps well. The seeds should be collected on dry days, and when gathered, should be spread out to dry in the shade. Well dried seed should be kept in the house for some time in a cool but dry place and then stored in a convenient place. The bag containing the seed should have a little of naphthalene powder added to it. The bag may be kept in a tin box. The most important thing to be remembered is that if it be kept in moist condition, it becomes mouldy and will not probably germinate or if it germinates at all, it will produce very sickly plants.

42. *Clearing seed and preparing it for sowing.*—

Where the seeds are contained in pods, the pods open naturally when dry and either shed their seed, or at most a little threshing or other manipulation will be required. Where the seeds are enclosed in a fleshy covering, as in the case of *Ber*, and edible stone-fruits, this covering can be rotted off by burrying the fruit in layers in moist earth or sand. Some seeds, such as those of the teak, have hard coverings, which can only be removed by prolonged treatment, by being soaked in water and frequently stirred for a considerable time, or by being buried in moist manure, where they will get both warmth and moisture, and kept there until they are about to germinate. Seeds of the *Ficus* species germinate best if sown on the top of a layer of half decomposed cowdung in a shady place. Babul seed gathered from goat yards germinate more freely than fresh seed.

43. *Testing seed.*—A rough practical test to ensure soundness is by placing some of the seed on an iron plate nearly red hot, when all the sound seeds will burst before burning, and the proportion of sound seed can then be judged.

44. *Sowing of seed.*—Seed should not be thickly sown, otherwise many of the seedlings will be crowded and will have to be removed. Seed must not be sown too deep, otherwise it will have to be removed for want of air and again the young shoot which is coming out of the seed, will not be able to push its way out of a deep and hard layer of soil. When young seedlings are about 4" to 6" in height they should be transplanted elsewhere. The seed, when dropped on ground, assumes a position which is generally the best for it to germinate.

Seed beds in the open should be watered twice daily. Here it must be remembered that the soil is kept suffi-

ciently moistened, for moist soil with a dry sub-soil is a source of trouble in germinating seeds. Beds should be protected from the heat of the sun between 10 A. M. and 4 P. M. An even temperature for a seed bed is essential.

Seed may be sown either in shallow boxes or pots. The pots must be well cleaned; and with a hole at the bottom. In boxes holes may be made or chinks left. The holes and chinks are intended for thorough drainage. The bottom of the pots and boxes should be covered with broken pieces of pots and over this a layer of dry leaves should be placed. The remaining part should be filled with a compost of equal parts of river earth, sand and leaf mould, each of which is passed through a $1\frac{1}{2}$ " mesh. Boxes and pots should be kept in a semi-shady position and should be watered once or twice every day according to necessity.

Very small seed should be mixed with sand and then sown to ensure even sowing; over this a thin layer of fine earth should be spread. Old or young seed should not be watered heavily. Otherwise it is liable to decay. Robust hard coated, and fresh seed may be watered copiously. When seed is germinated, water should be reduced, lest the young seedlings are likely to suffer from damping off, which results in browning of the lower part of the stem or drying of the tip. Drying of the tip may also be due to want of water.

45. *Transplantation.*—Seedlings when four to six inches high may be transferred to a bed or to pots. For some time they should be protected from the hot sun and should not be watered heavily. By repeated transplanting the root system is kept under control till the seedling is 5 feet high; as far as possible small "kundies" should be used, for they are very easy to manage, besides watering expenses are reduced. They should have a

hole which is covered with pot shreds and dry leaves and then filled with river earth and manure in the proportion of 2 to 1. They should be kept in the shade for some time. Each pot may be given two handfuls of manure in two months or so according to the health of the plants. Healthy plants may be given more manure, and sickly plants less or none. Sheep manure should be avoided or if it is to be given it should be given in very small quantities and it must be well decayed. Pots must be changed from place to place occasionally lest roots come out of the pot. Roots require good aeration and for this, the soil of the pot should be stirred from time to time. This reduces watering and damping effect of the soil. If the pots are buried in loose soil, watering can still be reduced and watering twice a week is sufficient. But when watering is to be given it should be given thoroughly and copiously. Scanty watering at short intervals is very injurious.

The best time for transplanting is when the plant is in resting condition. When the ball of earth is removed from a pot some roots are necessarily injured, or they often cling close to the sides of pots. The roots which are injured, when removing should be cut off to healthy parts, and decayed roots, if any, may also be cut off. A small portion of the crown may be trimmed according to the injury of roots. There should be a sort of balance between the roots and the leaves. After placing the plant in the pot, the roots should be firmly pressed with soil, and thoroughly watered. Watering should be carried out daily and for some time the plant kept in shade.

Plants may also be raised on a corrugated sheet which may be kept in trench three feet deep; on this sheet spread pieces of broken pots, dry leaves and 6" of soil, and seed may be sown over this. On

this sheet plants may be kept for a long time, say for three years; the advantage of this method is that roots spread along the surface of the sheet and the plants may be removed at any time. The danger of over-watering is also minimised to a great extent for the excess runs off along the channel into the trench down below.

46. *Sickness of plants.*— The health of plants can be ascertained by the general appearance of the leaves. If anything is wrong with the plants the leaves are the first to indicate ill-health of plant, and it can be recognised by the general examination of the plants.

(1) If the leaves are cut or show any holes, insect disease may be suspected. (2) If the leaves show any mouldy spots which may be coloured in various ways, then fungus disease may be suspected. (3) If the internodes are large and the leaves too broad, then over watering may be suspected. (4) The drying of tips of branches, internodes short and leaves short, then scanty watering is suspected. (5) The dropping of one side of branch with the remaining branches healthy, then injury to a particular root is suspected.

I. For the first the insects should be traced and destroyed.

II. Fungus disease often indicates over-watering and moist conditions; if only a few leaves are affected they should be cut off and burnt or Bordeaux mixture (insecticide) should be tried.

III. If the plant is sick owing to a cause other than the first, then the plant should be repotted in a small pot using a greater proportion of sand and very little or no manure. While taking out the plant, examine the roots, and see if there are any earth worms or any decayed parts which should be cut off to healthy ones, and, the

the crowns if possible, should be proportionately pruned; and if it is not possible to cut the crown, some of the lower leaves should be removed, and the plant should be kept in a cool shady place, and a very small quantity of water should be given. The soil of the pot should be stirred occasionally when the new leaves make their appearance; the plant may be given a handful of well rotted cow-dung, and should be gradually removed to the open.

47. *Staff*.— There must be at least one competent mali in every nursery, and more if the size of the nursery requires it. Coolies will be employed under the mali for sowing, watering and transplanting. These coolies must be trained, as the success of the planting operations depends on skilled transplanting, and on regulating the distribution of water in accordance with the needs of of plants. It would be advisable if practicable, to shift the trained coolies to other nurseries in preference to dismissing them or employing them on other work.

48. *Simple insecticides*.—1. *Kerosine emulsion*.—Mix two 'chataks' of hard or soft soap in half a gallon (2½ seers) of boiling water. Stir till the soap is well dissolved. Then add at once one gallon of kerosine oil. This forms a stock solution. For use, add eight parts of water to one part of this stock solution.

2. *Copper sulphate solution*.— Take two 'chataks' of copper sulphate which may be purchased in any bazaar. Dissolve in half a gallon (2½ seers) of boiling water. Add two gallons of cold water for use.

3. *Tobacco water*.— Boil four 'chataks' of dried tobacco leaves in half a gallon of water for about half an hour. Dissolve in this one 'chatak' of hard soap. Add three gallons of cold water for use.

49. *Treatment of established trees*.— Established trees should not be neglected. If they are well looked after, their life is extended. They are subject to decay, exposure of roots, and bark being removed; and to prevent this their stems should be coal tarred 2' high at least every alternate year, well pruned and wounds, if there be any, should be attended to. No excavation should be allowed near established trees which is likely to damage the roots.

VIII. LIST OF TREES.

50. List of trees which are more or less suitable for avenues.

Latin Name.	Vernacular names or common names.	Number of seeds in a seer (80 tolas); or in an oz.	Distance apart for avenues in feet.
<i>Albizia Lebbek</i>	Siris (H), Chichola (M)	72420 (140-350 per oz.)	30
<i>Albizia procera</i>	Safed or Dun Siris (H)	900-1000 per seer	30
<i>Aleurites moluccana</i>	Candle nut tree (Belgaum walnut).	250-300 "	30
<i>Artocarpus integrifolia</i>	Jack. phanas (M), halasu (K)	150-200 "	30
<i>Azadirachta indica</i>	Nim.	300-400 "	30
<i>Caesalpinia coriaria</i>	Divi Divi tree	800-1000 "	30
<i>Calophyllum inophyllum</i>	Undi (M).	150 per seer, 6 fruits an oz.	30
<i>Cedrela Toona</i>	Tuna (H), Todu (M), Tundu (K)	365 500 a seer (8000-12000 [an oz].)	30
<i>Dalbergia Sissoo</i>	Shisham, Sissu, Tali.	23,000 a seer	30
<i>Dillenia indica</i>	Motha Karmal (M), Kanagah (K).	46,000 a seer	30
<i>Eucalyptus tereticornis</i>	Grey gum : forest red gum.	2000 a seer	20
<i>Eugenia Jambolana</i>	Jammu (L) Jambul (M) Nerale (K)	200 a seer.	30
<i>Ficus bengalensis</i>	Banyan (H), Wad (M), Alada (K)	1500 a seer, cuttings also;	40
<i>Ficus religiosa</i>	Pipal (H), Ashvatha (M) Arali (K)	20000 a seer (Cuttings also)	30
		Not so good as F. B.	
<i>Ficus mysorensis</i>	Bhurwar (M), Goni (K)	15000 a seer.	40
<i>Ficus Tsiela</i>	Pipri (M), Bili Basri (K)	...	30
<i>Ficus retusa</i>	Nandruk (M), Pilala	1400 a seer; (cuttings also).	40
<i>Ficus Benjamina</i>	...	12000 "	40
<i>Ficus glomerata</i>	Umbar (M), Guler	10000 "	30

95

<i>Kigelia pinnata</i>	Sausage tree	450 a seer; (cuttings also)	25
<i>Mangifera indica</i>	Mango, Am,	42 "	30
<i>Mesua ferrea</i>	Nagachampa (M), Naga Sambigai	5800 " (150-200 per oz.)	20
<i>Michelia Champaca</i>	Champa (M), Sampighi (K) [(K)	500 a seer	25
<i>Millingtonia hortensis</i>	Indian cork tree, Akas nim (H)	...	20
<i>Mimusops Elengi</i>	Mulsari (H), Wovali (M), Bakul Pagade (K)	300 a seer.	30
<i>Mimusops hexandra</i>	Khirmi (H), Rayan (M)	5450	40
<i>Parkia biglandulosa</i>	...	500 a seer.	40
<i>Peltophorum ferrugineum</i>	...	1000	25
<i>Pithecolobium saman</i>	Rain tree	1200 a seer (seeds & cuttings).	30 in dry climates 50 in moist.
<i>Poinciana elata</i>	White gold mohur	...	25
<i>Polyalthia longifolia</i>	Asok (H), Asupal Davidari (G) Putranii (K)	400	30
<i>Pongamia glabra</i>	Karanj (M), Honge (K), Kanai (G)	200 a seer, 12-30 an oz.	30
<i>Pterocarpus indicus</i>	Padouk (Burma). Malay Padauk.	1000 a seer	30
<i>Pterospermum acerifolium</i>	...	5000 "	30
<i>Pterospermum suberifolium</i>	...	6000 "	30
" <i>Heyneanum</i>	...	...	30
<i>Swietenia macrophylla</i>	Large leaved mahogany	1000 a seer, 45 an oz.	30
<i>Tamarindus indica</i>	Imli (H), Chinch (M) Hunase (K)	500 a seer.	40
<i>Terminalia belerica</i>	Behera (H), Balra, Beheda (M), Jare (K), The Belleric Myrobalan.	250 a seer.	50
<i>Terminalia Arjuna</i>	Arjuna Kawa (H) Daula Sadar (G)	300 a seer.	50
<i>Thespesia populnea</i>	Bhendi (M) Huvarasi (K)	800 a seer.	30
<i>Vateria indica</i>	Dhupada Gugli (K)	500 a seer.	30
<i>Casuarina equisetifolia</i>	The beef wood tree.	20000 a seer.	25

96

51. *Avenues in Sind.*—The trees commonly grown on roads in Sind are:—bar (banyan), pipal, siris, nim, tali (or sinji), bahan, tun, lesuri, babul, jammu, pakria or pipri (*Ficus tsiela*), and ber.

For instance to drought and excess of water the babul is the best and ber the next best. The only other tree which approaches them is the bahan. In rice lands or very dry places it is best to grow nothing but babul with a few other kinds at the canal bridges for the sake of variety. For resistance to frost tali and bahan are the best, while the babul is about the worst in this respect. The mulbery and the Persian nim also resist frost, but are difficult to grow on the road-side in Sind. The babul and the ber are the only trees in this list which will grow in real kalar. In sandy places the nim is the best and the tali and the bahan the next best. For shade all the trees in the list are good except the bahan, tun, babul and ber. The first two give fair shade from August to March, but not during the rest of the year when shade is most wanted.

Rate Abstracts.

Sholapur District.

(a) *Cost of watering for various leads.*—One cart at Rs. 1-8-0 per day and two coolies at 5 annas per day will water 50 plants a day for an average lead of one mile and so the cost per plant per watering come to be 34/50—Re. 0-0-8. Generally water is given, in the first year at an interval of eight days, in the second year at an interval of ten days, in the third year at an interval of twelve days and in the fourth year at an interval of fifteen days. Watering is to be given from 15th January to 15th June of any year in normal conditions. The detailed expenditure required for this work will be seen from the following statement:—

Lead of water in miles.	Year of plantation.	No. of days for which watering is given.	No. of waterings required.	Rate per watering per plant.	Rate per plant per year.	Remarks.
				Rs. a. p.	Rs. a. p.	
1	1st	150	150-8	0 0 8	0 12 6	(a)
	2nd	150	150-10	0 0 8	0 10 0	
	3rd	150	150-12	0 0 8	0 8 4	
	4th	150	150-15	0 0 8	0 6 8	
2	1st	150	150-8	0 1 4	1 9 0	(b)
	2nd	150	150-10	0 1 4	1 4 0	
	3rd	150	150-12	0 1 4	1 0 8	
	4th	150	150-15	0 1 4	0 13 4	
3	1st	150	150-8	0 2 0	2 5 6	(c)
	2nd	150	150-10	0 2 0	1 14 0	
	3rd	150	150-12	0 2 0	1 12 4	
	4th	150	150-15	0 2 0	1 4 0	
4	1st	150	150-8	0 2 8	3 2 0	*
	2nd	150	150-10	0 2 8	2 8 0	
	3rd	150	150-12	0 2 8	2 1 4	
	4th	150	150-15	0 2 8	1 10 8	
5 to 8	1st	150	150-8	0 2 8	3 2 0	
	2nd	150	150-10	0 2 8	2 8 0	ditto.
	3rd	150	150-12	0 2 8	2 1 4	
	4th	140	150-15	0 2 8	1 10 8	

Over eight miles it is inconvenient at all to water trees.
 * Rate per watering per plant:—No. of plants watered per day=13; rate per plant=34/13 annas=Rs. 0-2-8.

REMARKS :—

(a) Rate per plant per watering :—Number of plants watered per day = 50; and rate per plant = annas 34/50 = Rs. 0-0-8.

(b) Rate per watering per plant :—Number of plants watered per day = 25; rate per plant = annas 35/25 = Rs. 0-1-4.

(c) Rate per watering per plant :—Number of plants watered per day = 17; rate per plant = annas 34/17 = Rs. 0-2-0.

(b) General Rate Abstract.

(1) For maintenance in a nursery.

Description.	Quantity.	Rate.	Per.	Amount.	Remarks.
		Rs. a. p.		Rs. a. p.	
Kundas at site ...	105 No.	12 0 0	100	12 9 7	5 per cent for breakage.
Earth in kundas ...	52 c. ft.	1 0 0	100	0 8 4	
Manure do. ...	10 c. ft.	2 0 0	20	1 0 0	
Watering in the nursery for 3 years every alternate day 1/6th of a coolie — 365 1 3x — x — 2 6	91 No.	0 6 0	1 No.	34 2 0	
Sundries such as supervision charges etc. ...	Lot			1 12 1	
Total for 100 plants ...				50 0 0	
Rate per one plant				0 0 8	

(2) The carriage of the plants for plantation depends upon the lead. One cart generally takes about 30 plants and the cost per mile is Rs. 0-3-0; so the cost per plant per mile = 1/10 anna only.

(3) Maintenance of the plants on roadside including planting and watering, distance of latter being one mile average :—

Description.	Quantity.	Rate.	Per.	Amount.	Remarks.
		Rs. a. p.		Rs. a. p.	
Making pits 4' x 4' in soil ...	100	0 8 0	1 No.	50 0 0	
Filling same with made earth (Earth 5 to 1 manure) ...	100	1 5 0	1 No.	131 4 0	
Planting trees including 10% for deaths ...	110	0 0 6	1 No.	3 7 0	
New fences including thorn ...	100	0 8 0	1 No.	50 0 0	
Repairing fences 1st to 5th year ...	500	0 2 0	1 No.	62 8 0	
Weeding plants, twice a year from 1st to 5th year, 2x5x100 ...	1009	...	1 No.	31 4 0	
Renewing fences 2nd to 5th year ..	400	0 6 0	1 No.	150 0 0	
Watering charges— 1st year ...	100	0 12 0	1 No.	78 0 0	
2nd year ...	100	0 10 0	1 No.	63 8 0	
3rd year ...	100	0 8 4	1 No.	52 1 0	
4th year ...	100	0 6 8	1 No.	41 11 0	
Sundries such as supervision charges etc. ...	...	Lot.	...	12 3 0	
Total for 100 trees or cost per tree...				725 0 0 7 4 0	

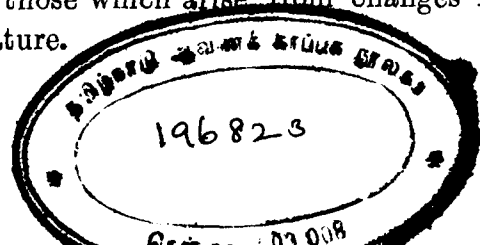
2. Rules of botanical nomenclature :

By, M. L. Green, B.A., F.L.S. Botanist, Royal Botanic Gardens, Kew.

I. Introduction.

Our modern "binary" system of nomenclature for plants dates from 1753 with the publication of Linnaeus' *Species Plantarum*, ed. I. The first word is the generic name, and the second the specific "epithet." Prior to that plants received names which sometimes amounted to short descriptions, or diagnostic phrases. As the number of plants known increased, a great need was felt for an index of plant names. Without it there was grave danger of the same plant being inadvertently named and described more than once. The need was met by the compilation of the *Index Kewensis*, which not only listed all the *names* of Flowering Plants published during the period 1753-1885, but supplied references to their places of publication.

On examination of the Index it will be noticed that some of the names of species are printed in italics as compared with others printed in Roman characters. These latter represent those which in the judgment of leading botanists of the day were "good" or "accepted" species otherwise those species that were "kept up," whereas those printed in italics represent synonyms or other names considered at the time as incorrect. These names in italics are followed by the accepted names (where such exist), to which they are "reduced." Differences of opinion as to whether a particular name is "correct" or not may arise from a variety of causes such as (1) a marked tendency nowadays to accept smaller units as genera. (2) A similar tendency to accept smaller units in the case of species, and (3) Differences of a nomenclatural nature, i.e., those which arise from changes in the rules of nomenclature.



Seven 'supplements' to the *Index Kewensis* have appeared quinquennially and an eighth, carrying on the work to the end of 1930 is now being prepared for the press. Throughout the various Supplements attempts have been made to make the work increasingly useful to botanists. The present custom is always to include after each reference, the date, which is an enormous help to the systematist since priority of date plays an important role in the rules of nomenclature.

II. The International Rules.

Nowadays, an elaborate system of nomenclature is required in order to clear up the confusion of names which is the direct result of the non-observance of rules in the past.

(i) *Valid publication*: No name is accepted unless it is "validly published." In order that the publication of a name may be effective it must appear in a work accessible to botanists, either by being placed on sale to the general public or by general distribution amongst representative botanical institutions. It must also be accompanied by a description of the group (genus, species etc.) concerned, or by a reference to a former description under another name, so that botanists may be able to identify it.

(ii) *Principles of priority*: The principle of "priority of publication" should be observed. This means that preference is given to names in the chronological order in which they appeared, the starting point being 1753. Priority also applies to *specific* and other *epithets*..... In order to find out the correct name of a species, all the binary names which it may have received from 1753 onwards are arranged in chronological order, and the earliest *specific epithet* available under the present generic name is retained.

(iii) *Avoidance of unnecessary name changes*: The same species came to be known by different botanists under two or more different names, some retaining the first one given to it and others adopting later ones. In time it was realised that the stability of a name was far more important than its appropriateness, and the first validly published name is now retained, unless there is some obstacle to its acceptance under the rules. [See section (ix)]

(iv) *Retention of a specific epithet on transference of a species to another genus*: It sometimes happens that a species may be placed successively in two or more genera, and in that case the retention of the original specific epithet affords a valuable clue in identifying the successive names with one another.

(v) *Change of rank*: Each of the categories, variety, sub-species, species, section, sub-genus, genus, family etc., is treated as a different "rank." Priority of names and epithets applies only in the particular rank accepted for the group concerned.

(vi) *Division of genera and species*: When a genus is divided into two or more genera, the generic name must be kept for part of the original genus. The same rule applies to the division of a species—the original specific epithet is kept for the element which the author seems to have regarded as "typical" or which agrees best with the original description; the other element receives a new name.

(vii) *The type-method of applying names*: In order to secure uniformity and continuity in the use of names of plants when division of a group occurs it is necessary that each name should be associated with a particular "type" or standard. Thus when a botanist describes a new species the specimen on which he based

his description becomes the "type-specimen," or standard to which the name of the species is permanently attached.

(viii) *Homonyms*: It sometimes happens that the same name is published independently for two different genera or for two different species. Such identical names for different groups are called *homonyms*. Here again the principle of priority is invoked and only the first of two or more such identical names may be used, even if it is not an accepted name.

(ix) *Rejection of names*: Names which are not in accordance with the rules of nomenclature must be rejected. Such names are said to be *illegitimate*. A name may be illegitimate for the following reasons. (a) If it was superfluous when published. (b) If it is a binary combination in which the earliest available specific epithet was not adopted. (c) If it is a later homonym. (d) If it is a binary combination in which the specific epithet exactly repeated the generic.

(x) *Spelling of names*: The original spelling of a name must be retained unless it is clear that there has been a printer's error or an unintentional slip on the part of the author.

(xi) *Citation of Author's names*: The author's name after the name of a plant is essentially an abbreviated reference to the place of publication, and it is especially useful to give it where the plant is relatively little known, as it indicates approximately the date of publication of the latter. A name published by Linnaeus would date from the period 1753–1778 and one published by Bentham from 1831–84. In all publications where completeness and precision of citation is required the authors' names should be given after the scientific names.

(xii) *Latin as an international language*: In order that a description may be intelligible to botanists

generally, it must obviously be written in a very widely known language and Latin has been selected as the most suitable for the publication of diagnosis of new genera and species. Most of the earlier descriptions of plants were written in Latin, so that a properly trained systematic botanist is bound to know it. The main description of the plant may be in any language, but from 1932 onwards a short Latin diagnosis is required in order to validate the name.

—*Extract from Empire Forestry Journal,*
Vol. 10 No. 1, 1931.

3. Control of Prickly Pear by the cochineal insect :

" * * * * The commencement of attack by a colony is slow. For about two months in a shady clump, or perhaps twice as long in an exposed clump, no effects are generally visible. A few weeks after the attacks become visible the insects have overtaken the vegetable growth, and this is symptomised by heroic efforts of the plant to produce fruit; collapse quickly follows, and the insects then appear to concentrate upon producing winged males. It almost seems as if this were a consequence of starvation or the changed composition of the decaying juices. A good sign of the extreme sensitiveness of the *Dactylopius tomentosus* is the fact that grass and weeds spring up untouched immediately a cactus clump collapses. Further evidence of this habit was also obtained when the *D. indicus* destroyed *Opuntia monacantha* without touching the adjacent *O. dillenii*, in South India....."

—*Nature*, July 18, 1931.

4 Wood in no danger :

The need for wood, and especially forests will last as long as the human race on this planet. Countries like Sweden and Finland, whose very existence depends upon

the products of the forest, are not worrying that there may be too much forest but are continuously improving the old forest and planting new.

If one would believe our cellulose chemists, the age of lumber is passing, and its place is being taken by wood fibre and cellulose. In spite of all these predictions, pulpwood still constitute only 6 or 7 per cent of our total annual cut. It may be that, in the distant future, their predictions may come true, but for generations yet lumber will be the most highly prized product of the forest.

* * * * Wood is the most elastic organic matter, and can be moulded in a thousand different shapes and forms. Human civilization, more and more, depends on organic matter. The pronouncements of chemists, at times bombastic, that eventually everything will be produced synthetically, overlooked the fact that even for synthetic products organic matter is necessary as raw material. They may produce artificial silk, but they need the fibre of wood for that purpose. They may produce generator gas, but they need the carbon of organic matter stored by plants either in past geological epochs or in modern times.

How much carbon do you think chemists could extract directly from the air, without the help of growing green plants, for the synthetic manufacture of all the carbohydrates? Mighty little. Organic matter, whether synthetically produced from other raw organic materials or derived directly from the plant itself is the basis of our civilization. All that the chemists can do is to modify one organic material into another organic product of a more finished, useful form. As a matter of fact the future looks to the chlorophyll engineers,.....to foresters, and to other growers of plants for the substance

of life.....The greatest moving force in the entire world is energy, and it must come eventually from the green plants and above all from the forest as the highest expression of plant life.

—Extract from address delivered by Raphael Zon at the 30th annual meeting of the society of American Foresters in Washington, December 30, 1930.

—*From Journal of Forestry*, March 1931.

5. Forestry in Denmark.

The total area of Denmark is 17,000 square miles, of which 8.5 per cent., or 918,300 acres are forest. This percentage has doubled during the last century. Of the forest acreage, 18 per cent. is public property, 7 per cent. belongs to the Dune Inspectorate, 2 or 3 per cent. to the municipalities, 3 per cent. to the various institutions, 2 per cent. to the Danish Heath Society, and the rest is private and official property. About $\frac{1}{3}$ of all the private woods are estates of less than 150 acres. The trees of the country are beech (41 per cent. of the area), oak (5 per cent.), other hardwoods (5.6 per cent.), spruce (26.9 per cent.), pine and larch (2 per cent.), maritime pine (16.5 per cent.), nurseries etc. (3 per cent.). Beech is thus the chief forest tree.....

Seventy years ago the heaths and uncultivated lands of Jutland covered 2,320 square miles. Two-thirds of this area have now been converted into satisfactory agricultural crops and flourishing wood lands.

—*The Timber Trades Journal*—August 8, 1931.

6. Preservation of Wood :

More about new process. Indian's achievement in Germany :

A discovery by an Indian forest research official, which is characterised as a landmark in the history of

wood preservation, is announced by the German Professor, R. Falck who writing to the High Commissioner for India, says :

"It is with great pleasure that I take this opportunity of announcing to you, a very important and useful discovery which Mr. Kamesam's experimental work in my laboratory has led to deduce. Since he came to my laboratory, his aim has been to discover wood preserving material as good as or better than Creosote, but much cheaper than the latter. In this connection I have given him all facilities, and have had numerous discussions with him. He concentrated on the fixation of arsenic in wood, and after three months of hard, systematic and thorough research, combined with a rich knowledge of this subject and an intellect of a very high order, he has been successful in his experiments. We think this process is the cheapest and best for the whole world. The discovery we have made in my laboratory is one I consider to be a landmark in the history of wood preservation, and Mr. Kamesam has carved a name for himself. I have taken action to apply for a patent for the new process which we have chosen to call "Fal Kamesam" process in our joint names. It is needless for us to say that your Government can use the process without payment of any royalty."

—*The Hindu*, October 23, 1931.

7. Increasing enquiries for Indian Woods :

Apropos the universal depression in trade, it is satisfactory to record, states the Timber Adviser to the High Commissioner for India in his report to the end of March, that there was an increase in the number of enquiries for Indian timber. Apart from those which resulted in sales, 25 enquiries were received for some 2,900 tons and eight for unspecified quantities, as against 19 enquiries during the the previous year.

At the instance of one of the British railways, the Timber Adviser addressed Madras and Burma with a view to the possibility of supplying timber suitable for railway keys. Samples were recently received from Madras and have been handed over to the railway for experiment.

An enquiry was received from Italy regarding the possibility of obtaining timbers as substitutes for those at present imported into Central Europe; this enquiry is still the subject of correspondence. In addition, 35 general enquiries were received for information on the following matters: Timber for development work at Hull; markets for and merchants interested in Indian timbers; woods suitable for pencils and tobacco pipes; teak sales in Burma; timber for rod guides for American oil wells; decorative Indian woods generally; the possible effects of termites on roofs constructed in India of European timber; Indian firms manufacturing veneers; the possibility of making a film on Indian forests; various minor forest products; and timber samples.

Heads of the Forest Departments in the various Indian provinces were addressed with a view to their sending on consignment small quantities of teak and other cores which there is reason to believe might command a sale. No action, however, has yet been taken.

—*Timber Trades Journal*, September 19, 1931.

9. The Problem of the Choice of Seeds in Forestry :

In agriculture and horticulture the best results of selection and improvement of seeds have already been obtained and new types and varieties of plants are yearly produced which are more profitable to the grower. The great importance also of the origin of seeds for forest crops is now generally understood, but as yet world

forestry is only beginning to make practical applications of this knowledge.

Why then is silviculture so backward? The explanation lies in the difference between agriculture and silviculture. In agriculture with annually recurring seed times and harvests it is easy to ascertain fairly quickly the different results of the use of seeds of various origins. But the longevity of forest trees prevents the forester from making personally similar observations, the duration of which may sometimes even exceed that of human life. It is often not even within the power of silviculture to modify radically the constitution of the forest. Forest species however, like other plants, obey genetic laws, and experiments hitherto made prove this fact. Whereas formerly with an extensive sylviculture, this new science of forestry might be considered superfluous, this is not so now, when the question is one of modifying at times even very extensive forests, of re-afforesting bare ground and of introducing on all forest lands the plant types which will yield the product best in quantity and quality. In such works as these genetics must accordingly occupy an important place.

Forestry writers of various countries all agree in dwelling on the deplorable results due to the fact that in former days no attention was paid to the origin of the seeds used. They point out also the efforts made in all these countries to remedy mistakes of this kind in the past. In Sweden towards the middle of the nineteenth century as there was a shortage of home-grown seeds, afforestation was largely carried out with seeds of uncontrolled origin, and with large quantities of imported seeds, mainly from Germany. The forest trees springing from these southern seeds had ordinarily in their youth a more rapid growth than the trees of indigenous origin, but they

soon began to degenerate. This degeneration, generally, assumed the aspect of a catastrophe when the trees had reached the age of about 30 years and most of these forests never lived to 40 years, and produced only wood of inferior quality, scarcely fit for anything but firewood. In the Netherlands foreign seeds were also used, especially at the time when the importance of the origin of seeds had not yet been recognised. Researches made later have shown that forest stands which had done badly in different localities had been mostly planted in special years when the crop of forest seeds of the country had been sufficient and when seeds of unknown origin, bought from foreign seedsmen, had been sown.

M. GALLOT (Belgium) gives an account of results of experiments made in Belgium with seeds (mainly of Scots pine) obtained in various countries and shows that seeds of ascertained indigenous origin gave the best results, while trees grown from seeds of foreign origin were the most backward growth. Many further examples could be mentioned all proving that the result of neglecting to take the origin of seeds into consideration is not only a diminution in the yield of the trees but also that they are less resistant to damage from snow, frost and diseases.

Besides the right choice of seeds the experience of foresters is that the employment, of really suitable varieties is among the most important elements in a sound sylviculture. Messrs. GUINIER and KOLESSNIKOFF recommend the production, by crossing, of varieties; (1) most resistant to frost; (2) to disease; (3) able to stand drought; (4) adaptable to the various strongly saline soils; (5) distinguished by good morphological qualities; (6) by abundant resin content; (7) by tannin content; (8) by more rapid growth etc.

All the experiments made show that in the extension habitat of a single species of tree there exist a more or less large number of local varieties. The detailed study of these is of great sylvicultural importance, showing which are the advantageous properties that can be developed in various hybrids resulting from spontaneous and artificial crossing of various species of trees. Before science can obtain new and valuable results in this field, all foresters must at least regard it as a first principle only to sow well known and approved seeds in nurseries or on areas to be afforested. The persistence of earlier customs is still very strong and the struggle against them is a difficult matter. Nothing is learnt from the many failures, the fine results of research or of experiment count for little, and most foresters, especially in years of poor local production of seeds, continue, in accordance with old habits, to buy the seeds they require from unknown seedsmen and from distant countries. Another difficulty, mainly administrative is that the sums set aside yearly by foresters for seed collection do not usually vary in amount. Variations of fertility of trees however make it necessary to provide for larger expenditure on collection and a larger supply of labour in good seed years. Moreover even when the surplus seed is collected, the collectors are usually seedsmen who frequently despatch it to countries for which the seeds are not best suited. To cheapen collection, seeds from diseased seed-bearers many even be included.

To remedy this state of affairs it is the general desire of experts to create organisations in the various countries and districts, and even international arrangements for guaranteeing the crop, the preparation and distribution of seeds, with vigorous supervision of their origin.

Experts of various countries are almost all agreed in saying that the State should take the initiative in this organisation. M. CABIANCA is of opinion that the State should encourage the initiative or private individuals, while M. GUINIER considers that the best solution would be to place these organisations under forest administrations or research stations.

M. VINCENT holds that such an organisation, controlled by the State, cannot do without the collaboration of private enterprise. He does not wish to oppose the activity of commercial firms, but he explains that silviculture has not only the right but also the duty of requiring that these firms guarantee, on their own responsibility, the origin and quality of seeds which they have issued. He thinks that this guarantee can only be assured by a system of certificates issued under State control by research stations to seedsmen enabling them to prove to purchasers of forest seeds that their goods have the required qualities. There are already many countries where this procedure is followed. In Sweden for example the research station which since 1885 has controlled the origin of seeds of all districts of the kingdom has marked the seed-bearers from which the seeds are taken. Later on observations were made not only of the young plantations but also of the seed-bearers from which they had sprung and the results were shown in a number of statistical tables. From these data it is clear that seeds coming from neighbouring countries have great cultural advantages.

The systematic delimitation of zones within which seeds may be considered as the same and transferred without objection, is a question of very great practical importance. Certain authorities consider that the boundary of these zones should be the line of isotherms;

others consider the average summer temperature as giving the correct boundary. The most definite pronouncement made from this point of view, is that in any case seeds should be employed which come from countries where the climatic conditions are identical or at least very similar to those of the place of afforestation. Legislative measures have even been taken in some countries to prevent the importation of undesirable foreign seeds. There are laws which prohibit the importation of certain seeds while very high protective duties sometimes make importation difficult.

The desire for an international agreement on the subject is increasingly expressed. The resolutions of the 1st International Forestry Congress, Rome 1926 had already drawn the attention of the world's foresters to the international importance of applications of silvicultural genetics. Researches made since the Congress have subsequently been reported. M. VINCENT has communicated the results of his observations relating to the effect of keeping seeds for several years on the persistence of their germinative capacity. He has also examined the cones of various conifers and he has found that the proportion of sound seeds of the lower central and upper thirds of cones of spruce and Scots pine is equal to 80 : 100 : 53 and that the number of empty seeds is minimum in the central third and maximum in the upper third. The absolute weight of seeds is also maximum in the central third.

M. SCHMIDT is endeavouring to find a method by which the origin of seeds can be determined by simple examination. The starting point of the researches is that the reaction of seeds to frost, light and temperature differs according to their various origins. He draws conclusions regarding origin by examining the external

form, the size and the chemical composition of seeds and cones.

The various investigations are not yet complete and must be continued for some time still. It was however pointed out by M. GUINIER, on the occasion of the International Congress of Forest Research Stations held at Stockholm in 1929, that national organisation in each country as well as the international organisation of exchange of these seeds could be effected without waiting indefinitely for the result of researches. To effect such organisation it is, in his opinion, necessary that in each country a list should be made of seeds which could be made available for the exchanges, such list to give precise information regarding the species of tree, the variety, the origin, the germinative capacity of the seeds and also to indicate the quantities and the prices. The lists so compiled with be sent to forest administrations and research stations in other countries, Each would then make its desiderata known and the exchanges would be effected, being adjusted payments by offset of costs. According to this proposal the International Union of Research Stations should establish the bases of that organisation, and assure its working. World forestry progress requires such collaboration, not only between European countries, but also between all countries in the world.

—*International Review of Agriculture*, Jan. 1931.

10. Forests and Floods :

Recent press despatches report that several millions of pesos worth of property and crops were destroyed and thousands of people perished due to floods along the Yangtze River. Floods have always been an annual calamity in China for which the Chinese people themselves are to blame. Ruthless forest destruction for

centuries left the headwaters of this big river devoid of forest vegetation. The people of the Philippine Islands ought to be thankful that we can draw object lesson in China even if we are blind enough to see our own folly and refuse to realise that the annual floods with its consequent loss of property, life and destruction of crops, are due to a great extent to the treeless watersheds of some of our rivers, particularly the Agno. Advanced countries, like the United States, France, Germany, Switzerland and Japan have long recognized the beneficial effects of forests in regulating stream flow and checking erosion that they have established, by legislation protection forests at the watersheds of their important streams. Japan, small as she is, has over 350,000 parcels of protection forest with a total area of over two million hectares.

We do not claim that forests alone can control the behavior of streams. Neither do we claim that forests can prevent flood, for this depends on several factors like excessive rainfall, kinds of soil and topography. We do claim, however, that forests help a great deal in regulating floods. According to accurate observation conducted for many years in various parts of the world, it has been proved that forests break the violence of rain, reduce surface run-off, increase the absorptive capacity of soil, tend to maintain steady flow of water in streams, increase under-ground seepage, bind the soil in place better than any form of vegetation and reduce the silt burden carried by rivers.

The reforestation of watersheds and headwaters of our principal streams is, therefore, an undertaking of tremendous national importance. It will not only forestall the occurrence of national catastrophe, as China is experiencing today, with its consequent loss of lives and

property and destruction of crops, but it will also offer many public benefits in the form of future timber supply preservation of wild life, and proper utilization of our land.

II "Can the World Banish Malaria?"

Thousands of lives and pesos have been lost because of Malaria. Other countries like ours are also faced by the Malaria menace. One of the dreadful and world-wide diseases, it has always been a baffling problem to Science. Although many were the methods tried by scientists and medical men in their fight against it, still Malaria remains ever mocking, their sisyphian efforts.

But one of the most interesting articles "Can the World Banish Malaria?", published in the "Scientific American" in April, 1930 which suggests some practical methods of fighting malaria may prove of "tremendous worth to the world", according to Professor David Starr Jordan, former head of Stanford University. Director Arthur F. Fischer of the Bureau of Forestry believes that the suggested methods in the article are worthwhile trying in Los Banos, where conditions are suitable. Dr. Theo. Krysto, the author, of the article, says in part:

"It is known that mosquitoes feed on the juice of plants; the males feed exclusively thus, and the females feed partly on the juice of plants and partly on the blood of animals and men. I found that when *Anopheles*, the malarial fever mosquito, feeds on leguminous plants their juice neutralizes the noxiousness of the mosquito. It can no longer spread malarial fever.

But I had occasion to travel widely in both Americas Europe, and Asia, and everywhere I found striking evidence that legumes—alfalfa, clover, beans—prevent malaria. These plants have in common a substance called cou-

marine, and this substance seems to play a role in the insects comparable to that which quinine plays in man.

The prominent Yale scientist d'Herelle says in his book, "Immunity in Natural Infectious Disease," "The greater portion of the Argentine Republic is completely free of malaria, in spite of the fact that the *anopheline* carriers abound in these regions....." Further, Dr. d'Herelle states, "We have seen that in all the free regions there is a wild plant called by the natives *trebol de olor* (scented clover), Flowering takes place during the critical period of malaria, that is, from the beginning of summer to the end of autumn. The highly scented blossoms are continually frequented by insects of many kinds, and particularly by *Anophelines*, which feed upon the juice which, like all plants of the genus, contains a glucoside, coumarine. This plant is not present in malarial districts.

Again I find in a pamphlet of Sir William Willcocks, engineer of Cairo, Egypt: "Cultivated Egypt is mainly immune to malaria, and cultivated Egypt means Egypt with all its wealth of clovers, leguminous plants, wild melilotus, and trigonella. But where tracts have been planted with fruits or other crops instead of clover, there malaria devastates the population as it does in Palestine and Greece, where there are few leguminous crops and in those parts of India where gram, a kind of thick-pea, is not cultivated."

You see that all three of us came independently to the same conclusion. In all these cases the measures against malaria were applied unconsciously. We can now do it consciously, in introducing leguminous plants with the intention of disinfecting the malarial mosquito.

M. Lengendre transported eggs of Breton Culex to a place where swarms of another mosquito annoyed the

people. A year later he found only Breton culex in that locality, which did not sting human beings. Mr. Lengendre continued his observations five years later and found that Breton culex had held its own, and continued to be "man-hating."

Again a proprietor of a firm asked M. Legendre to free him from annoying mosquitoes. M. Legendre introduced his Breton culex, and in one month they crowded out the aboriginal mosquitoes.

Here then is our plan. The first part of it—the use of leguminous plants—is a novelty, but the second part is simply an adaptation of the well-known procedure of using one insect to fight another.

So let us take leguminous plants and friendly mosquitoes and start our work of liberation. We may start our work on the island of Cuba. I choose it for many reasons, the main one having to do with the acclimatization of the mosquitoes themselves.

—*The Makiling Echo*, October 1931.

The Madras Forest College Debating Society.

The new session of the Madras Forest College Debating Society was opened this year on the 4th September 1931 by student R. C. Parikh, who read a paper on "Progress of forest conservancy in British India." The subject was logically dealt with, taking all the main points into consideration. In the next debate on 11th September 1931, the subject "Conversion of virgin forests is not beneficial to future generation" was discussed. A good many arguments were put forward on both sides. The motion was lost by 2 votes, 17 in favour and 19 against it. In the third meeting on 16th October 1931, a paper on "Effects of War on forests" was read. The fourth meeting was held on 23rd October

1931. The subject of debate was "Knowledge of botany is essential to a Range Officer." It was carried by 5 votes; 18 in favour and 13 against.

Taking the present atmosphere into consideration it is hoped that the Debating Society will attain a magnificent success this year in the Madras Forest College. The enthusiastic co-operation rendered by all the students and staff, has created a bright future for the Society. The competitive debate to be held in 3rd week of March 1932 is another factor which will shape the present ardent zeal into successful achievement.

J. M. SINGH,

Hon. Secretary Debating, Society.

Letter from Mrs. H. A. Gass.

The following extract from a letter addressed to the Principal of the Madras Forest College, by Mrs. H. A. Gass should be of some interest:

".....Thank you very much indeed for the nice photos of "The Gass Museum" you so kindly sent me; also your letter. I have fully appreciated both, and feel very gratified to think that my husband's forest museum is still looked after so well, and is going on developing and increasing.

The new building is an imposing one. The exhibits ought to show up well in such a large and roomy place.

I should so much like to visit Coimbatore again, which was my home for 13 years, to see the museum. How the place has grown!

G. GASS,

Forest College Encyclopaedia.

- A is the Accountant, I ween,
so endeared to our hearts—you know what I mean.
- B is the Blazer our College life-mate,
it must be with us whether in city or in debate.
- C is for clerk a curious creature,
A mechanical brain in his salient feature.
- D is for Daniel our College class-mate
we are sorry to leave him and the same to intimate.
- E is the Engineering a subject of study,
ram, ram, consolidate, till a road is ready.
- F is for Forest College to which we belong
the institution we will never forget lifelong.
- G is the Games so pleasant and interesting,
compulsory to all and always very contesting.
- H is for Hate which we hand out at dawn
as we turn out of bed with an oath and a yawn.
- I is for instruments like Dumpy and chain,
go on setting and chaining without a brain.
- J is for journals our daily record of work.
Date, Camp, subject we cannot burk.
- K is the Klap-trap, I spell it that way
Resolutions and minutes allow its free play.
- L is for Lessee who makes fifty per cent,
and fools us all round to the top of the bent.
- M is the Milcage we seldom get at
oh! ye martial police man what you think of that?
- N is the Nursery where seeds we germinate,
which by treatment previous we do accelerate.
- O is for Orders Principal's standing
full of rules and all sorts of binding.
- P is our Pay so pitiful and small,
It's a wonder to me we get any at all.
- Q is for Questions that examiners ask
though easy to them, to us a difficult task.
- R is for Reserves that college captain keeps
all his favourite when an outside match peeps.
- S is the Shaving which makes us neat and clean
compulsory to all and Instructors too keen.
- T is the Initial I have written below
my own I am afraid to append, don't you know?
- U is for Utilization—a branch of Forestry
which teaches us how to get more from our property.
- V is the Value our services render
which in general receive recognition so slender.
- W is our Worry in which we students sink,
as of the June week ordeal we think.
- X is the mark our answers often receive,
O! our shrewd examiners, in vain we try to deceive.

Y is a symbol which haunts one and all
y the duece did I come from C. P. at all.
Z is the Zero, or nothing or less
which in some people's mind denotes our success.
—*T(iidari)*.

Tit-Bits.

Hostess:— (To precious young man). The others are off
to tennis and golf. I understand you don't
care for games, so will you help me spray
aphis?

Y. M.— Sorry, I don't shoot. —*Punch*.

"Two small boys" says the *Southern Lumberman*,
were out hunting in the woods, and one of them stopped
and picked up a chestnut burr. "Tommy!" he called
excitedly, "come here, I've found a porcupine egg!"

Betty:— "Poor old professor, isn't he absent-minded?"

Fetty:— "Yes, they'll never be able to erect a monu-
ment to his memory."

Mother:—"Did you like your first morning at school, Toby?"

Toby:—"Yes, Mum, it was great fun in the class; but
an old lady wiv a blackboard kept on interrupt-
ing us."

Clerk:—"Will you raise my salary next week, Sir?"

Boss:—"My dear fellow, I shall be jolly lucky if I am
able to raise it this week!" —*Strand Magazine*.

"Your tooth aches? If I were you I would have it out."
"So would I if I were you."

"Did you do elephant-hunting in Africa?"
"Not much. It is so uncomfortable as the bag is
full so quickly."

—*Scientific American*.

Departmental Notifications.

- 31—10—31. *With effect from 27th November 1930 upto 11th November 1931 in the temporary vacancy caused by the reduction of G. G. Sankaran Nayar, from the Third to the Fourth Grade.*
M.R.Ry. P. Dhanajaya Rao, from Fourth Grade permanent to Third Grade *sub protem*.
2. *With effect from 27th November 1930 upto 30th June 1931 in the temporary vacancy caused by the reduction of G. Rama Rao from the Fourth to Fifth Grade.*
M.R.Ry. S. Rangaswami Ayyangar from Fifth Grade permanent to Fourth Grade *sub protem*.
- 5—11—31. In partial modification of the promotion ordered in item I of this office Reference No. 7626/31-B-2, dated 31st October 1931, M.R.Ry. P. Dhanajaya Rao, will be temporarily promoted from the Fourth Grade to Third Grade S. P. T. as shown below:—From 27-11-1930 to 25-7-1931. From 26-11-1931 to 12-3-1932.

First Circle.

- 13—9—31. The leave for 8 months granted to M. R. Ry. C. G. Krishna, Ranger Third Grade is extended by leave on half average pay for two months from 8-9-1931.
- 22—9—31. M.R.Ry. V. N. Leapingwell, Supernumerary Ranger Seventh Grade will be considered to be acting as Ranger Seventh Grade vice Ranger P. Doraiswami Ayyar on leave for 3 months and 23 days from 29-6-1931 to 21-10-1931.
- 3—10—31. 1. M.R.Ry. V. N. Leapingwell, Supernumerary Ranger Seventh Grade will be considered to be acting as Ranger Seventh Grade from 9-9-1931 *vice* Ranger B. Chenchurama Naidu on leave for 4 months from 9-9-1931 to 8-1-1932. 2. M. R. Ry. P. Gopalakrishna Rao, Forester M. R. H. is promoted to act as Ranger Seventh Grade from 9-9-1931 *vice* Ranger P. Doraiswami Ayyar on leave. 3. Mr. Abdul Razack, Forester M.R.H. is promoted to act as Ranger Seventh Grade from 8-9-1931 to 8-11-1931 *vice* Ranger C. G. Krishna on leave.
- 5—10—31. M.R.Ry. P. Doraiswami Ayyar, Ranger Third Grade is, on return from leave on 22-13-1931, posted to Palnad Range, Guntur Division. 2. M.R.Ry. V. N. Leapingwell, acting Ranger Seventh Grade is, on relief by No. 1, posted to Balliguda in relief of acting Ranger P. Gopalakrishna Rao. 3. M.R.Ry. K. Venkatesam Naidu, Sixth Grade is, on return from leave on 22-10-1931 posted to Buguda Range, Ganjam Division.
- 14—10—31. Under Rule 81 of the Fundamental Rules M.R.Ry. A. Subrahmanyam acting Ranger Seventh Grade is granted leave on average pay for two months with effect from date of relief.
- 28—10—31. M.R.Ry. P. Dhanajaya Rao, Ranger Fourth Grade, Golconda Agency, granted leave on average pay for two months with effect from date of relief.

- 1—11—31. The posting of acting Ranger V. N. Leapingwell to Balliguda Range is cancelled.
- 3—11—31. M.R.Ry. C. G. Krishna, Ranger Third Grade granted extension of leave on half average pay for 15 days from 8-11-'31 in continuation of the leave granted. On return from leave on 24-11-1931, he is posted to Palagonda Range Vizagapatam District, *vice* Ranger K. R. Krishna Ayyar granted leave. The posting of Ranger C. G. Krishna to Chendragiri Range of Parlakimidi is hereby cancelled.
- The leave on average pay granted to M.R.Ry. P. Doraiswami Ayyar Ranger Third Grade, is extended by leave on average pay on medical certificate for 4 months from 22-19-'31.
- M.R.Ry. K. R. Krishna Ayyar, Ranger Fifth Grade granted leave on average pay for 4 months with effect from date of relief.

Second Circle.

- 25—9—31. 1. M.R.Ry. A. Rangunayakalu Nayudu Second Grade (Cuddapah south division) on return from leave on 28th October 1931, posted to Gundlabrahmeswaram Range, Kurnool West Division.
2. M.R.Ry. B. H. Anandathirtha Rao Ranger Fifth Grade Gundlabrahmeswaram Range Kurnool West Division, is on relief by No. 1 to be Assistant Chenchu Officer Dornal as ordered in Kurnool Collector's Memorandum.
- 8—10—31. Mr. V. T. Staggs Ranger First Grade is, on relief of charge of Assistant Chenchu Officer's duties to charge of Dornal Range, Kurnool East Division. (This cancels the posting of Ranger K. R. Viswnatha Ayyar to Dornal Range).
- 14—10—31. 1. M.R.Ry. G. V. Subba Rao, Ranger Sixth Grade, in charge of Sanipaya Range granted leave on average pay for 4 months and 8 months on half average pay in continuation thereof from the date of relief in the first week of November 1931. 2. M.R.Ry. T. K. Ramaswami Ayyar Ranger Second Grade on expiry of his leave on 29th October 1931 posted to Sanipaya Range Cuddapah South Division *vice* No. 1.
1. M.R.Ry. P. V. Krishna Rao Nayudu Ranger Sixth Grade (Cuddappah South) on expiry of leave on 9th November 1931, posted to Gundlakamma Range, Kurnool South Division.
2. M.R.Ry. V. Nagarathnam, M. R. H. in charge of Gundlakamma Range Kurnool South Division on relief by No. 1, posted to Chelama Range in the same Division. (3) M.R.Ry., Y. Subrahmanyam, M.R.H. in charge of Chelama Range, Kurnool South Division on relief by No. 2 posted to special duty in the same range partly for lay-out and survey of coupes of 1932-33.
- 23—10—31. Ranger Ranganayakulu Nayudu on return from leave, will be kept attached to the Gundlabrahmeswaram Range until the 1st of December 1931 when he will take charge of the Range from Ranger Anandatheettha Rao and relieve him to take charge of the duties of Assistant Chenchu Officer from Mr. Staggs.

- 6—11—31. M.R.Ry., K. R. Viswanatha Ayyar Ranger Third Grade on leave, Kurnool South Division on expiry of his leave on 23rd November 1931 posted for special duty under Range Officer Dornal, Kurnool East Division with headquarters at Dornal.
- 6—11—31. M.R.Ry. B. Gulab Singh M. R. H. on special duty in Gundlabrahmeswaram Range, Kurnool West Division, posted to Chitvel Range, Cuddapah South Division. He should hand over his duties to forester T. Sreeramulu Nayudu immediately and join in Chitveli on 20-11-1931 morning.

2. M.R.Ry. S. M. Krishnaswami Ayyar, Ranger Third Grade, Chitveli Range, Cuddapah South Division, on relief by No. 1 posted to Kodur Range of the Same Division. To join on 22-11-1931 morning:

3. M.R.Ry. S. Sankaran Ranger Fourth Grade, Kodur Range, Cuddapah South Division on relief by No. 2 posted to Gundlabrahmeswaram Range, Kurnool West Division. To join on 30-11-1931 afternoon. This cancels the posting of Ranger A. Ranganayakulu Nayudu to Gundlabrahmeswaram.

Third Circle.

- 21—9—31. A. Muhammed Akbar Saheb, Forester First Grade, Working Plans North Coimbatore is granted leave on average pay with medical certificate for two months from 19-8-1931 to 18-10-1931 (both days inclusive). On the expiry of the leave, he is posted to do office work in Ootacamund.

Fourth Circle.

- 27—8—31. The transfer of Rangers M. S. Krishnaswami Ayyar Seventh Grade and C. N. Narasimhachariar Fifth Grade to Third circle is cancelled.
- 27—9—31. T. E. Varadachari, Ranger Third Grade, granted further extension of leave on medical certificate for 4 months on half average salary in continuation of the leave granted.
- 30—9—31. M.R.Ry., A. Sidda Pillai, Ranger Third Grade, Vellore division granted extension of leave on half average salary on medical certificate for 4 months in continuation of the leave granted to him.
- 6—10—31. M.R.Ry., K. P. Chathu Nayar, Ranger Fourth Grade, Central Salem division, granted further extension of leave on half average salary on medical certificate for 3 months in continuation of the leave already granted to him.
1. M.R.Ry. R. Manickam Pillai, Ranger Third Grade from Polur Range, Vellore division to Harur Range, Central Salem division. 2. M. R. Ry., R. Thangavelu Pillai, Ranger Sixth Grade, Harur Range on relief by No. 1 to Polur Range, Vellore division.
- 12—10—31. M. B. Kalappa trained Forester I grade in charge of Santhavasal range, is posted to be in additional charge of Polur range, till he is relieved by M. R. Ry., R. Thangavelu Pillai, Ranger VI grade, transferred to this division.

- 24—10—31. M.R.Ry., M. S. Krishnaswami Ayyar, Ranger VII grade, on return from leave, posted to Polur Range, Vellore division, Vice M.R.Ry., R. Manickam Pillai, Ranger III grade relieved on 17-10-1931 afternoon.

2. M.R.Ry., T. S. Sankaranarayana Ayyar, Ranger VII grade, *sub-protem*, on special duty, North Salem division, transferred to Chittoor division and posted to the charge of Chandragiri Range Vice M.R.Ry., S. Doraiswami Ayyar, Ranger III grade, granted leave for four months.

Fifth Circle.

- 14—9—31. M. R. Ry., S. Sundaravaradachari, Ranger III Grade, Mettupalayam Range granted leave on average pay for 3 months with effect from 5th September 1931 F. N.
- 14—10—31. Mr. H. Myers, Ranger III grade, on expiry of his leave, posted to Ramapuram Range. 2. M.R.Ry., S. Nagalingam Pillai, Ranger VI grade, will, on relief by No. (1), take charge of Srivilliputtur Range, Tinnevely District. 3. A. Sitharama Sarma, Forester III grade and Acting Ranger VII grade, on relief by No. 2, will revert as Forester and work in the Tinnevely District. The transfers of Nos. 1 and 2 being at their own request will carry no claim for Travelling Allowance on transfer.
- 27—10—31. M. R. Ry., S. Rengamannar Doss, Acting Forester I grade and Acting Ranger VII grade, South Coimbatore Dt. will revert as acting Forester I grade from 1—11—1931.
- 1—11—31. M. R. Ry. S. Sundaravaradachari, Ranger III grade, is, on expiry of his leave, posted to charge of Kannikatty Range, Tinnevely District.
- M. R. Ry. P. Sankunni Nair, Ranger VI grade, on expiry of his leave, is posted as Assistant Ranger. Tunacadavu South Coimbatore Division.

Sixth Circle.

- 29—8—31. 1. Mr. A. Joseph, Ranger VI grade from Nilambur Division to III (Working Plans) Circle. 2. M. R. Ry. P. Madhavan Nair, Ranger seventh grade, from Nilambur Division to III (Working Plans) Circle.
- 2—9—31. M.R.Ry., K. R. Krishnan Nair, Ranger II grade, on the expiry of his leave on 12th September 1931, posted to South Mangalore division for posting according to the requirements of the District Forest Officer.
- 10—9—31. M.R.Ry., S. V. Doraiawamy Ayyar, Ranger VI grade, on the expiry of his leave on 4th September 1931, posted to hold charge of Mangalore division.
- This office Service order No. 55 of 31 dated 2nd September 1931 posting M. R. Ry. K. R. Krishnan Nair to South Mangalore division is cancelled.
- 5—10—31. M.R.Ry., K. R. Krishnan Nair, Ranger II grade, granted extension of leave on average pay, on medical certificate for four months from 12th September 1931.

27—10—31. M.R.Ry., K. Shankaranarayana Rao, Ranger IV grade sub-protem in charge of Kasaragode Range, South Mangalore Division, on relief by Mr. P. Govinda Menon, Extra Assistant Conservator on 1st November 1931, will be attached to the South Mangalore Division for special duty until further orders.

Indian Forester Prize, 1932, for past students.

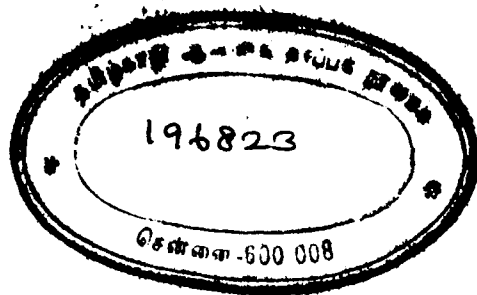
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"DISCUSS THE FUTURE OF INDIAN SOFT WOODS."

A prize valued about Rs. 25 will be awarded for the best essay for past students.

No award will be made unless a satisfactory standard is reached. The essay should be clearly written or typed on one side of the paper only and should not exceed 2000 words. It should be submitted to reach the Principal in May 1932. Essays received later will not be considered. The essay must be the unaided work of the competitor.

J. C. WRENCH,
Principal.



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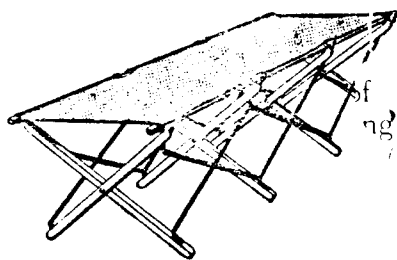
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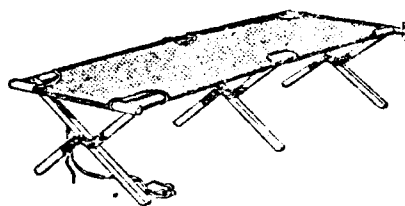
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