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VOL. XLIII. 1 MAY, 1935. PART 5

Event and Comment.

Anzac.

WITH Australians, the Story of Anzac has grown into a great tradition, and the twentieth anniversary of the Gallipoli Landing (25th April) was commemorated with fitting ceremony throughout the Commonwealth. It is a great and inspiring story, and who has told it like John Masefield?

> "On Friday, the 23rd of April, the weather cleared so that the work could be begun. In fine weather in Mudros a haze of beauty comes upon the hills and water till their loveliness is unearthly, it is so rare. Then the bay is like a blue jewel, and the hills lose their savagery, and glow, and are gentle, and the sun comes up from Troy, and the peaks of Samothrace change colour, and all the marvellous ships in the harbour are transfigured. The land of Lemnos was beautiful with flowers at that season, in the brief Ægean spring, and to seawards always, in the bay, were the ships, more ships, perhaps, than any port in modern times has known; they seemed like half the ships of the world. . . .
>
> "Ship after ship, crammed with soldiers, moved slowly out of harbour in the lovely day, and felt again the heave of the sea. No such gathering of fine ships has ever been seen upon this earth, and the beauty and the exultation of the youth upon them

made them like sacred things as they moved away. All the thousands of men aboard them gathered on deck to see, till each rail was thronged. These men had come from all parts of the British world—from Africa, Australia, Canada, India, the Mother Country, New Zealand, and remote islands in the sea. They had said good-bye to home that they might offer their lives in the cause we stand for. In a few hours at most, as they well knew, perhaps a tenth of them would have looked their last on the sun, and be a part of foreign earth or dumb things that the tides push. Many of them would have disappeared forever from the knowledge of man, blotted from the book of life none would know how—by a fall or chance shot in the darkness, in the blast of a shell, or alone, like a hurt beast, in some scrub or gully, far from comrades and the English speech and the English singing. And perhaps a third of them would be mangled, blinded or broken, lamed, made imbecile or disfigured, with the colour and the taste of life taken from them, so that they would never more move with comrades nor exult in the sun. And those not taken thus would be under the ground, sweating in the trench, carrying sandbags up the sap, dodging death and danger, without rest or food or drink, in the blazing sun or the frost of the Gallipoli night, till death seemed relaxation and a wound a luxury. But as they moved out these things were but the end they asked, the reward they had come for, the unseen cross upon the breast. All that they felt was a gladness of exultation that their young courage was to be used. They went like kings in a pageant to the imminent death. As they passed from moorings to the man-of-war anchorage on their way to the sea, their feeling that they had done with life and were going out to something new welled up in those battalions; they cheered and cheered till the harbour rang with cheering. As each ship crammed with soldiers drew near the battleships, the men swung their caps and cheered again, and the sailors answered, and the noise of cheering swelled, and the men in the ships not yet moving joined in, and the men ashore, till all the life in the harbour was giving thanks that it could go to death rejoicing. All was beautiful in that gladness of men about to die, but the most moving thing was the greatness of their generous hearts.

". . . . They left the harbour very, very slowly; the tumult of cheering lasted a long time; no one who heard it will ever forget it, or think of it unshaken. It broke the hearts of all there with pity and with pride; it went beyond the guard of the English heart. Presently all were out, and the fleet stood across for Tenedos, and the sun went down with marvellous colour, lighting island after island and the Asian peaks, and those left behind in Mudros trimmed their lamps, knowing that they had been for a little time brought near to the heart of things."

To-day the pilgrim's eyes are on the dimly purple peaks of Samothrace and his thoughts are with Rupert Brooke, and those who fought and died with him:

. . . These laid their world away; poured out the red
Sweet wine of youth; gave up the years to be,
Of work and joy, and that unhoped serene
That men call age; and those who would have been
Their sons, they gave their immortality.

Certificated Milk.

OPENING a certificated dairy near Brisbane in the course of the month, the Minister for Agriculture and Stock, Hon. Frank W. Bulcock, said that the certification of a dairy meant that there must be continuous attention to details of dairy hygiene and a considerable amount of expenditure in time, money, and labour.

Milk, remarked the Minister, was greatly depreciated in value if it contained foreign bodies, and certification placed milk beyond suspicion. In America certificated milk allowed of a bacterial count of 10,000 organisms to the cubic centimetre, but the milk supplied by the dairy he was opening officially contained only 4,000 organisms to the cubic centimetre. One of the major pathological problems associated with milk supply was tuberculosis, and, though the medical profession declared that cases of bovine tuberculosis in adults was rare, 5 per cent. of tuberculosis amongst children was bovine in origin. The solution of that problem was the exclusion of tubercular cows from herds supplying milk for domestic purposes. In a certificated dairy every cow must measure up to the health standard laid down by his department; every animal was certified to be free from major disease.

"I hope," said the Minister, "that the time is not far distant when we shall see many certificated milk carts on the streets of Brisbane. Certificated milk is guaranteed above suspicion by the State and the medical services of the State. It is a scheme that should appeal to parents, and particularly to parents of delicate children. There is no food that can take the place of milk with its admirable food balance and vitamin content."

That afternoon's ceremony was an occasion to which he had looked forward for three years, declared Dr. D. Gifford Croll, a member of the State Animal Health Board. Mr. Bulcock was to be congratulated on being the Minister to inaugurate the scheme. It had been demonstrated that pure milk could be sold at no higher a price than that ruling for other milk and at no great capital outlay.

A Model Dairy.

THE white bails of the model dairy opened by Mr. Bulcock have sloping concrete floors that are kept scrupulously clean throughout the time that the cows are being milked. Surrounding this building are lawns and sweeping gravelled drives. When the cows are driven into the bails a boy, who does none of the milking, wipes the flanks and the udder of each cow with a dry cloth, and then wipes each udder with a damp cloth suitably disinfected. The milk, after being drawn, is cooled to a temperature of 45 degrees, claimed to be the ideal temperature for delivery. To preserve the temperature special insulated cans —constructed on the principle of a thermos bottle—are used on the carts to ensure the delivery of the milk at a temperature not higher than 50 degrees, thus preserving quality. These carts, to which special attention was drawn by the Minister, are painted white, with a broad blue band—the badge of a certificated milk cart. Each of them is fitted with a special metal covering over the taps to prevent dust contamination. Night and day the members of the dairy staff wear special washing uniforms, and they are compelled to wash their hands in disinfectant after each cow has been milked, and the roller towel which they use must be changed after every twelve cows.

The Brown Vegetable Weevil.

By ROBERT VEITCH, B.Sc. Agr., B.Sc. For., F.R.E.S., Chief Entomologist.

THE brown vegetable weevil is a comparatively recent arrival in Australia, but in the last few years it has become firmly established in Queensland, each year witnessing a steady increase in the infested territory. It has a very wide range of host plants, those most favoured being potatoes and tomatoes, although it also shows a marked partiality for tobacco seedlings, carrots, beans, lettuce, turnips, parsnips, cabbages, and cucumbers. Flowering plants such as the chrysanthemum and the cineraria are also attacked, while cape weed is one of the favourite weed host plants. The destructive activities of this species are manifested mainly in the winter and spring months in this State, both the larvæ and the adults feeding on the selected host plants, the attack by the beetles being more serious than the larval infestation.

Life History and Habits.

The weevil (Plate 166, figs. 4 and 5) is one-third of an inch in length and is a greyish-brown beetle possessing two obliquely placed greyish white patches on the back which form a distinct V-shaped mark. The eggs laid by the beetles in autumn and early winter hatch into legless larvæ, which at first feed only on one surface of the foliage, generally the under surface. As they grow, however, irregularly shaped holes are eaten in the leaves (Plate 166, fig. 6). A feature of the infestation is that the larvæ which shelter during the day characteristically feed at night, although a few may be seen feeding in sheltered spots on plants in the daytime. The full grown larva (Plate 166, fig. 1) is pale green with a brown head and measures roughly one-third of an inch in length, an important feature being the presence on the head of short dotted darker lines which serve to distinguish this larva from that of another somewhat similar species. The full grown larva pupates in the soil in an earthen cell (Plate 166, fig. 2), wherein it transforms to a pale green pupa (Plate 166, fig. 3), which eventually gives rise to a typical weevil possessing a long downwardly protruding snout. The beetles shelter in the soil by day and feed voraciously by night on the foliage, generally leaving only the leaf stalks when they are at all numerous, although even these may be destroyed. The bulbs of carrots and turnips (Plate 166, fig. 7) may also be attacked.

Control.

When infestation occurs on potatoes spraying or dusting with arsenate of lead will be found effective against this pest. However, the arsenate of lead sprays or dusts generally cannot be directly applied for the control of the brown vegetable weevil because most of its host plants would then carry undesirable spray residues on the parts to be used for food. Furthermore, in the case of tobacco seedlings many of the young plants would have so much foliage destroyed before the larvæ or beetles obtained a lethal dose of the arsenical that they would be severely weakened or even succumb to the attack; hence for the control of brown vegetable weevil the general practice is to employ a type of baiting by using foliage of cape weed or tops cut from tomatoes or other attractive plants that have passed the productive stage. These

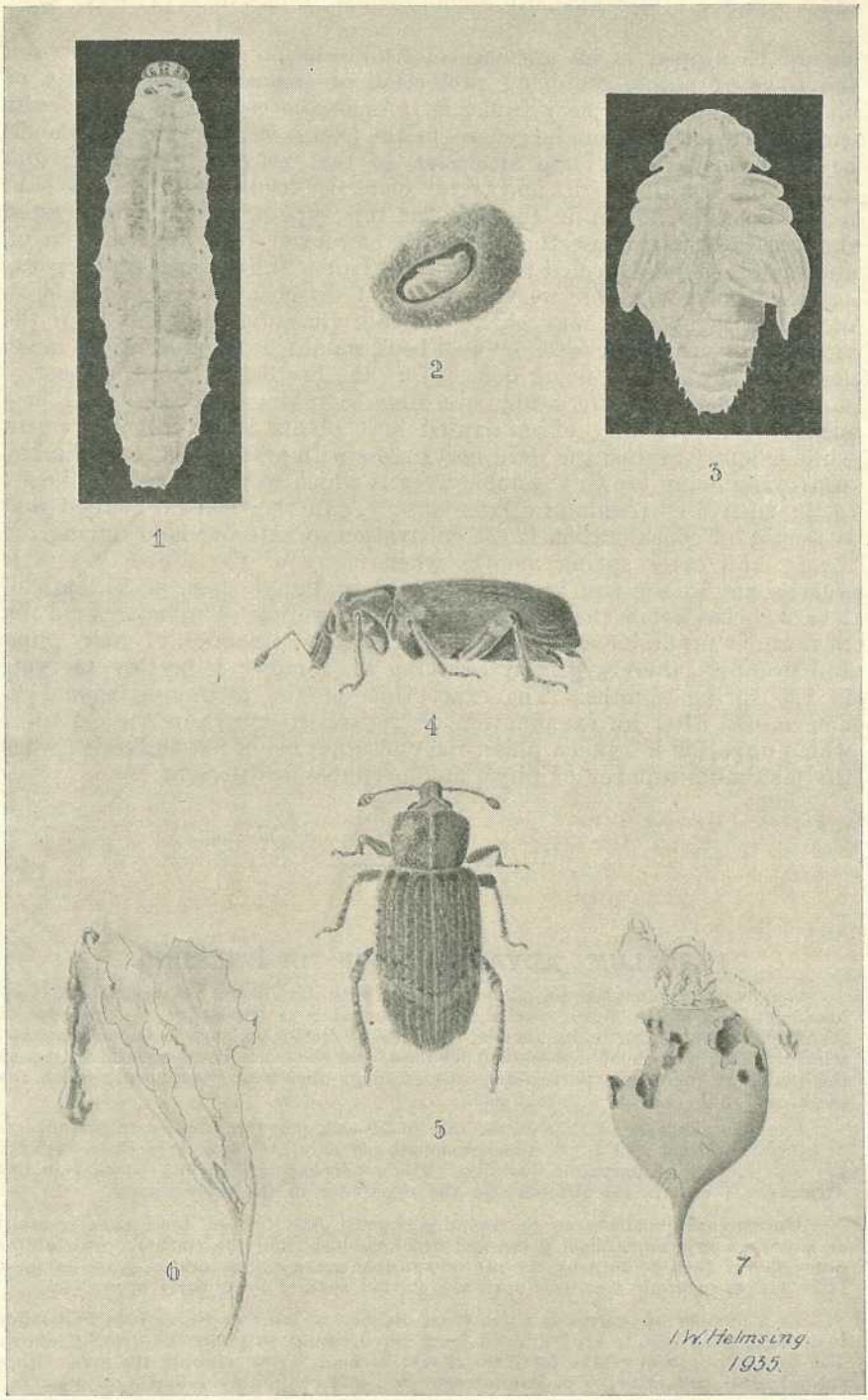


PLATE 166.

BROWN VEGETABLE WEEVIL.

Fig. 1.—Larva × 4½.
Fig. 2.—Pupa in earthen cell, natural size.
Fig. 3.—Pupa × 4½.
Fig. 4.—Adult, lateral view, × 4½.
Fig. 5.—Adult, dorsal view, × 4½.
Fig. 6.—Damage to young lettuce plant by larvæ, half natural size.
Fig. 7.—Damage to white turnip by adults, half natural size.

should be dipped in an arsenate of lead solution and placed between the rows of plants requiring protection or placed in the vicinity of seed-beds suffering from infestation. As in the case of cutworm baits these succulent tops for the control of the brown vegetable weevil should be distributed in the late afternoon so that they will be fresh and attractive when the beetles and larvæ commence feeding at night. Should it be impossible to obtain the tops for this type of bait it is suggested that growers might use the bran bait employed for cutworm control, although it is not expected that the bran bait will give such good results against brown vegetable weevil. The destruction of weeds and rubbish in which the beetles may shelter during the summer months in the vicinity of cultivated areas or seed-beds should be productive of much good, the cleaning-up being done before the beetles go into the inactive summer stage. Should heavy breeding be taking place on weed host plants in the vicinity of cultivated host plants it is probably worth while to spray or dust the weed host plants with arsenate of lead, thereby destroying many brown vegetable weevils which would probably migrate to the cultivated plants at a later date. A further control method that is worthy of consideration is the cultivation of infested land during the winter and early spring months when many of the brown vegetable weevils are in the soil in the prepupal or pupal stage at a depth of 1 or 2 inches below the surface. Such cultivation of infested land not then under profitable crops should lead to the destruction of many pupæ and prepupæ, thereby greatly reducing the number of beetles emerging in the spring months. The exact time of the ploughing should be determined after an examination of the soil to ascertain the extent to which pupation has taken place, the operation being most effective when the maximum number of pupæ and prepupæ are present.

PASPALUM—ADVANTAGES OF TOP-DRESSING.

Top-dressing ploughed paspalum pastures with fertilizers has been found very beneficial, and is also recommended where ploughing is impossible, but the use of the paspalum cultivator is practicable. The use of fertilizers, such as superphosphate, stimulates the growth of grasses and legumes, and the amount of mineral matter in the plants is increased, particularly the elements lime and phosphorus, which are essential for the animal's development.

Ground carbonate of lime at the rate of 10 cwt. per acre applied in the autumn of every third year and 2 cwt. superphosphate per acre each year is recommended for the top-dressing of paspalum pastures. The superphosphate should be used in two dressings—1 cwt. in the autumn and the remainder in the early spring.

Unploughed paddocks to be top-dressed must first be fed down closely, raked or harrowed to remove dead grass and other rubbish, and the matted crown of the grass should then be torn by the use of suitable grass cultivators or grass harrows. It is useless to apply fertilizer until the matted surface is properly opened up.

At a number of centres in north coast district, on country where it is impossible to plough, good results are obtained from top-dressing paspalum as detailed above. The first application of the fertilizer should be made after working the area with a special grass cultivator, or paspalum renovator, and preferably following a good fall of rain.

A harrow, preferably a tripod and chain harrow of good penetrative power, should be used frequently on the pasture to break up and spread the animal droppings, and also create a mulch on the surface soil.—A. and P. Notes, N.S.W. Dept. Agric.

The Pinhole Borer of North Queensland Cabinet Woods.

By J. HAROLD SMITH, M.Sc., N.D.A., Entomologist.

DURING the past thirty years the rain-forest timbers of North Queensland have been spasmodically felled and used chiefly for ordinary structural building work. Their real value is now better appreciated both in Australia and overseas, and many commercial species with an attractive pattern are to-day chiefly used in the manufacture of veneer or as important elements in the indoor panelling favoured by modern tastes. Suitable woods for these purposes are not common, and the steady demand for some species has forced prices up to a level at which wastage of any kind is a significant loss to the manufacturer. This is particularly true of mills which cut veneer, for heavy overhead expenses are incurred by the installation of elaborate machinery and the additional handling charges essential to its operation. Much of this wastage can normally be ascribed to wood-boring insects. Those species which only penetrate the sap wood may not be of any great importance, for the heart wood in a log invariably yields the most valuable veneer. The Platypodid beetle, *Crossotarsus grevilleæ* Lea, may, however, tunnel through both sap and heart woods to completely destroy logs which would otherwise be valuable for veneer purposes. This insect has therefore been studied in some detail. A progress report has already been published (Smith, 1932), and the present paper discusses the problem in the light of recently acquired information.

SYSTEMATIC POSITION, MORPHOLOGY, AND DEVELOPMENT.

Though the genus Crossotarsus is an important element in the family Platypodidæ, insects in it are less familiar than those of the type genus Platypus, representatives of which are much larger and more conspicuous. For the most part, Crossotarsan insects are small, all the known Australian species being less than 4 mm. in length. Their habits have been little studied. Froggatt (1927) mentions four species, *C. armipennis* Lea, *C. sub-pellusidis* Lea, *C. mniszechi* Chap., and *C. cavifrons* Blndf., the last two being originally described from the Malay Archipelago. With the exception of *C. armipennis* all these have been recorded from Queensland localities, and together with *C. grevilleæ* comprise the four known species in the State.

The genus has not attracted much attention from economic entomologists and few details are available for individual species. *C. armipennis* is said to be frequent on logs of the spotted irongum, *Eucalyptus maculata*, in New South Wales, but its recorded habits differ from those of *C. grevilleæ*. In North Queensland rain forests, *C. grevilleæ* is the only species in the genus of any importance, and it does not stray far from the peculiar conditions associated with the rain-forest environment.

Crossotarsus grevilleæ Lea (Plate 167, figs. 8-10) was originally described in 1914, and the description is reproduced (Proc. Roy. Soc. Vict. XXVI., p. 226, 1914) below:—

"Flavous, in part dark brown or castaneous. Head, tips of elytra and legs with rather long, sparse, pale hairs."

"Head flattened in front with some small punctures and a feeble median carina. Prothorax slightly longer than wide, sides rather strongly curved near the apex and thence gently inflated to near the base with few small but rather clearly defined punctures about the base. Interstices with small punctures, suture triangularly notched about the apex, extreme apex irregularly vertical and with several small conical-tipped projections. Length 2 mm.

"Distinguished from other Platypodids by the small size. Of two specimens examined, one has head, except mouthparts and pronotum, black. Its elytra from about the middle are castaneous but about the apex become almost black. The others have the dark parts much paler. In both, the club is infuscate.

"Host—Silky oak, *Grevilleæ robusta.*

"Locality—Queensland, C. French, junr."

In a subsequent communication after examining material from North Queensland, Lea wrote—"He (*i.e.*, French), obtained many from logs of the silky oak from Queensland, but only females" and "The male has a long process on each side of the head (Plate 167, fig. 8), and I think that the species will have to be transferred on that account to Diapus." Lea's untimely death in 1932 has prevented the complete elucidation of the systematic aspects of the problem, but the further study of the insect as an important factor in forestry losses has yielded some relevant information.

In the first place the disposition of the sexes assumed by the original description follows Chapius (1866) and is erroneous. In common with most Platypodids, the sexes (Plate 167, figs. 8-10) are morphologically distinct, being distinguishable by differences in size, in elytral pattern, and the structure of the head. Outside the log, these can be separated as follows:—

(*a*) Size, 2 mm.; apex of the elytra ornate; elytra with a castaneous tinge merging into black at the margins;

(*b*) Size, 2·5 mm.; apex of the elytra simple; elytra uniformly black in colour; mandible with a large sickle-shaped appendage projecting forwards.

These two forms subsequently share the one burrow, and field evidence indicates that the former of these is the male and not the female as hitherto supposed. This conclusion is inferred from various data, the chief contributing points being:—

(*a*) In the Platypodidæ, morphological distinctions between the two sexes are usually very marked. In most of the better known species, the larger form with simple elytra is the female, while the smaller with ornate elytra is the male. In the two comparatively large species, *Platypus australis* Chap. and *P. omnivorous* Lea, such is very definitely the case. Similar considerations should therefore apply to *C. grevilleæ.*

(*b*) The elaboration of the burrow system is discussed later in this paper. The smaller insect initiates the burrow, but is later joined by the larger form, the joint tenancy being preceded by a change in position outside the burrow. The larger insect subsequently occupies the interior

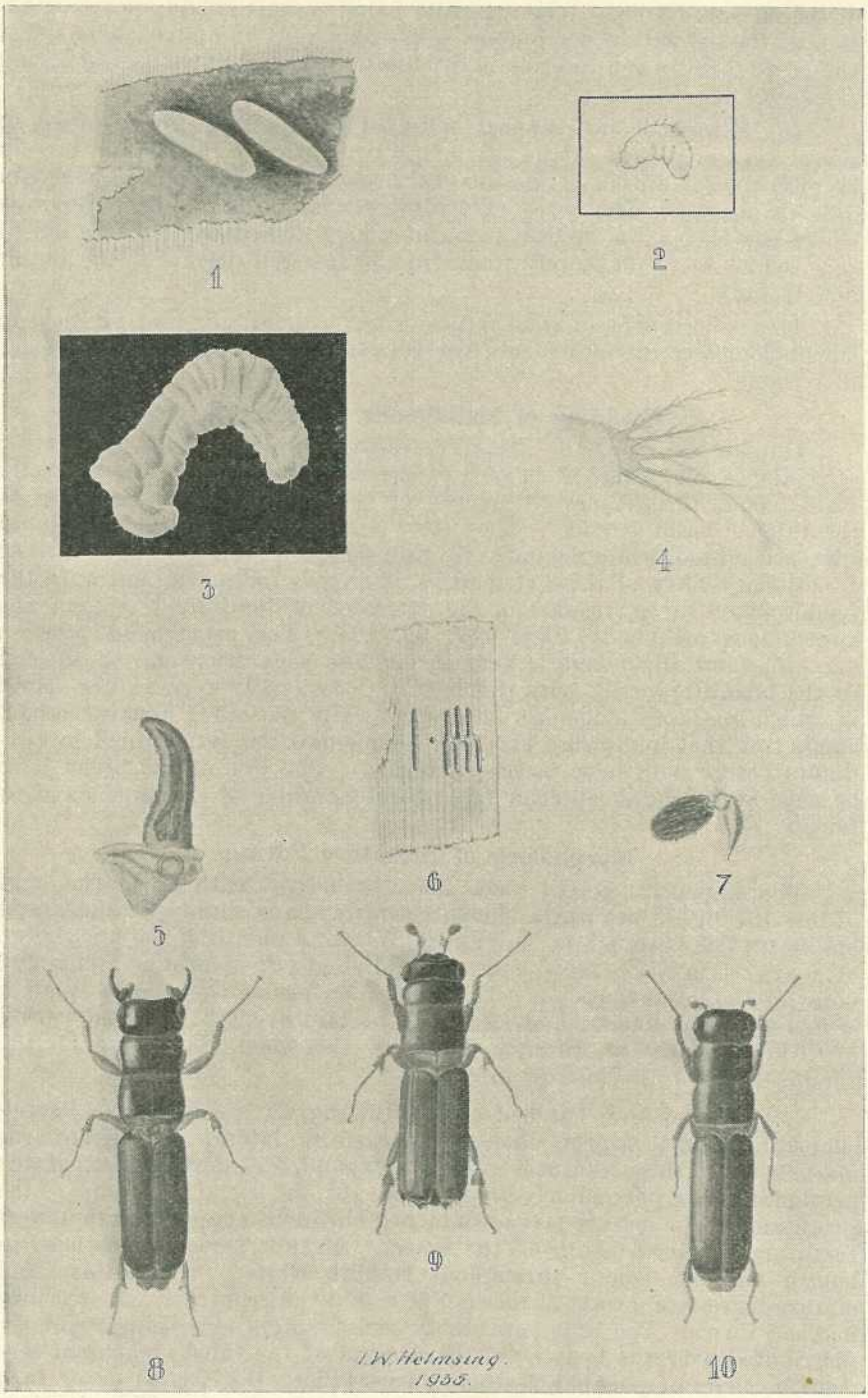


PLATE 167.

PIN HOLE BORER (*Crossotarsus grevilleæ* Lea.).

Fig. 1.—Eggs × 34.
Fig. 2.—First larval instar × 15.
Fig. 3.—Larva × 15.
Fig. 4.—Feathered setæ × 120.
Fig. 5.—Mandibular appendage × 60.
Fig. 6.—Pupal chambers, natural size.
Fig. 7.—Antenna × 60.
Fig. 8.—Adult female before boring × 15.
Fig. 9.—Adult male × 15.
Fig. 10.—Adult female after boring × 15.

of the burrow system. When the first batch of eggs is laid, no transposition of insects within the burrow is possible, and one must assume that the large form in the interior is the female on account of its egg-laying capacity.

(*c*) Miscellaneous material collected in the rain forest failed to reveal eggs or details of the sex in the two forms on dissection, largely because the separation of the internal organs of such a small insect is a difficult matter. The more careful selection of adults from burrows where egg-laying was known to be imminent facilitated the location of eggs, which were ultimately found in the internal organs of the larger insects only.

The biological data thus indicates quite definitely that of the two morphologically distinct forms, the smaller is the male and the larger the female.

Shedding of Mandibular Appendages.

Outside the log, the female possesses two forwardly projecting appendages, one attached to each of the mandibles. They are perfectly rigid, about three times the length of the mandibles and attached to the thicker basal portion. They have a sickle contour, and the inner edge is serrated, while the outer is quite smooth (Plate 167, fig. 5). The functional utility of these structures, if any, is unknown, and once the female takes an active part in the extension of the burrow system, the appendages are shed (Plate 167, fig. 10). The attachment between mandible and appendage is very secure and separation can be effected in the laboratory only with difficulty. Occasionally females are found in which one appendage has been shed while the other remains intact, suggesting that burrowing has been commenced but interrupted by predators before both have become detached. The line of the break is to be seen on the rugose anterior face of the mandible of the appendageless female.

Morphology of Immature Forms.

The immature stages have few distinctive features. The eggs (Plate 167, fig. 1) are white, elongate oval in shape, and taper slightly at one end. They are ·4 mm. in length. Within a month of the association of the sexes in the burrow, eggs are laid singly or in groups at the end point of the burrow system. The incubation period during the summer is less than one month, and eggs may be laid over an observed period of twelve months at different levels of the wood, depending on the ramifications of the burrow system.

Larvæ when first hatched (Plate 167, fig. 2) are somewhat barrel-shaped in dorsal aspect, though recurved in lateral view. Towards maturity, the three thoracic segments expand, the development of the prothorax being particularly great (Plate 167, fig. 3). The dorsum of the prothorax in the mature larva has looped chitinous areas which doubtless facilitate the movements of the insect. Mature larvæ are 4 mm. in length and the colour throughout is milk white. Semi-mature and mature larvæ are devoid of distinct setæ and thus contrast with recently hatched forms. The latter are richly setose, single setæ being regularly distributed over the body. On the dorsum of the third abdominal segment, a series of peculiar feathered setæ (Plate 167, fig. 4) occur in a transverse line, each being mounted on a small tubercle. These setæ in common with the rest clothing the body may be absent in older larvæ on which setæ persist, if at all, in truncated form.

The number of instars is largely conjectural as the larvæ cannot be observed during successive moults. Head capsule measurements, however, fall into two groups with mean widths of ·26 mm. and ·52 mm. The first group includes all the smaller forms examined, but in the second the larval lengths may vary from 1·5 mm. to 4 mm. If Dyar's hypothesis concerning the geometrical increase in head capsule size from instar to instar is applicable to this insect, two instars will be represented. Possibly an earlier instar with head capsule measurements consonant with the width of the egg can be built into the series, making a three instar development of the larvæ. This conjectural first instar has not been observed, and its duration, should it exist, must be very short.

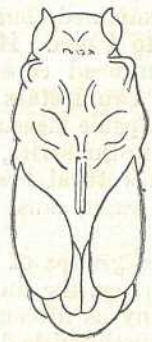
Pupæ (Plate 168, figs. 1-4) are to be found in groups of parallel chambers (Plate 167, fig. 6) on both sides of a burrow, the number of chambers in any group varying from one to as many as fifteen. Each chamber holds a single pupa. The sexes can be distinguished at this stage by their respective lengths and the presence or absence of mandible appendages. The body colour is at first white, but the more heavily chitinized portions darken at an early stage, long before transformation to the adult is complete. Pupal movements are possible owing to the flexibility of the abdominal segments.

INJURY BY AND ECONOMIC SIGNIFICANCE OF THE INSECT.

The pinhole borer, *Crossotarsus grevilleæ* Lea, is a common rain-forest species, and during the summer months the free-living adult population is relatively high. Consequently few logs reach the mill without at least some burrows initiated by the insect. Unlike the majority of allied species, the burrow system is carried right through the heart wood, and the whole of the wood tissue may ultimately be riddled by the insect. While the injury may be of no great importance for many structural purposes, it is quite otherwise in timbers used for fine work in which a flawless finish is essential. Curiously enough, the majority of the timbers attacked are particularly suited to fine work in which veneer is worked on to a plywood base. Veneer cut from pinhole borer-riddled logs has invariably to be discarded. In the preparation of veneer, the logs are usually flitched—*i.e.*, cut into sections before treatment by the veneer knife—but borer defects may not be apparent on the rough surface left by the circular saw; hence it is not uncommon for a flitch to reach the knife before its defects are noticed. The expense of special handling for veneer purposes has then to be added to the loss already involved when logs purchased as veneer quality are cut for structural purposes.

A considerable volume of timber suitable for veneer is exported in the log to overseas destinations. If the timber cuts to specifications, the expense entailed in freight and handling charges is comparatively small. On the other hand, should the logs be infested with *C. grevilleæ*, the net loss is greater than if the logs had been milled in this country. Faulty logs are thus of greater significance to the overseas than the domestic market, and importers now insist on a rigid inspection before shipment as a reasonable guarantee that only sound timber will be forwarded.

In most mills handling North Queensland cabinet woods, the yards are at times strewn with logs rejected for veneer purposes. These will ultimately be cut up and sold in less profitable ways. A number



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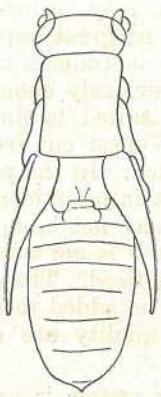

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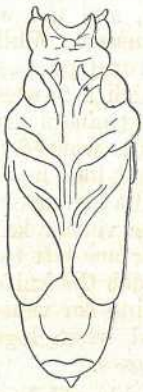

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I.W.Helmsing(after Smith)
1935.

PLATE 168.

PINHOLE BORER (*Crossotarsus grevilleæ* Lea).

Fig. 1.—Male pupa, ventral view.
Fig. 2.—Male pupa, dorsal view.
Fig. 3.—Female pupa, dorsal view.
Fig. 4.—Female pupa, ventral view.

of causes may have prompted their rejection, but pinhole infestation is a common trouble and the loss from this source is much greater than is generally supposed, particularly when the interval between felling and milling is extensive.

HOST PLANT RANGE.

The range of host plants of *C. grevilleæ* is a particularly wide one, for no commercial rain-forest species in North Queensland has been found to escape attack if placed under conditions suitable for mass infestation. The greater part of these are, of course, Angiosperms, but at least two of the millable Gymnosperms—kauri pine and brown pine—are susceptible to attack. Though timbers vary in hardness, the relative infestation of both soft and hard woods is very similar, largely because the bulk of the insects initiate burrows in the sapwood and work from thence into the heart wood. Though burrows are initiated and eggs laid by the female, the immature forms may not reach the pupal stage and the life cycle remains incomplete. Pupal chambers are the only satisfactory proof that reproduction has reached its end point in the production of adult progeny. Judged by this criterion, it must be concluded that burrow initiation, though invariably followed by egg deposition, commonly fails in its main purpose—*i.e.*, the propagation of the species. In spite of this, the prodigal distribution of suitable breeding material under conditions favourable to mass infestation is such that the Crossotarsan population is maintained at a comparatively high level.

The following Angiosperms are host plants of this pinhole borer:—Black bean (*Castanospermum australe*), canary ash (*Beilschmiedia Bancroftii*), canary sassafras (*Daphnandra micrantha*), maple silkwood (*Flindersia Brayleyana*), northern silky oak (*Cardwellia sublimis*), nutmeg (*Meristica indica*), penda (*Xanthostemon pubescens*), red cedar (*Cedrela australis*), red tulip oak (*Tarrietia perilata*), rose butternut (*Blepharocarya involucigera*), satin sycamore (*Ceratopetalum Virchowii*), scrub turpentine (*Canarium Muelleri*), silver ash (*Flindersia Bourjotiana*), spur mahogany (*Dysoxylon Pettigrewianum*), silver basswood (*Panax Murrayi*), walnut bean (*Endiandra Palmerstonii*), water gum (*Eugenia gustavioides*), white cheesewood (*Alstonia scholaris*), white quandong (*Elæocarpus grandis*), white silkwood (*Flindersia acuminata*).

The only Gymnosperms so far recorded as host plants are:—Kauri pine (*Agathis Palmerstonii*), brown pine (*Podocarpus amara*).

[TO BE CONTINUED.]

An Introduction to Beekeeping.

By HENRY HACKER, F.R.E.S., Entomologist.

[*Continued from p. 367, April Issue.*]

SECTION V.—GENERAL MANAGEMENT OF BEES.

Stings.

THERE would probably be many more people keeping bees than at present, were it not for the natural fear of stings, but as their habits become better understood this fear disappears almost entirely. A bee-sting is constructed with minute barbs on its spear-like tip, which prevent the bee from withdrawing its sting rapidly, with the result that the poison bag is torn out and left attached to the sting. The mutilated bee flies away but always dies after a few hours. The sting with the attached poison bag should be withdrawn by a scratch with the finger nail, and a puff of smoke on the place will disguise the smell of the sting poison which irritates the bees. The first sting, which is a warning of others to follow, should be carefully avoided. Quick movements tend to irritate bees, and novices on approaching a hive should avoid striking at the insects which happen to fly towards them, or making other quick movements of the head or hand to avoid the dreaded sting. This rapid movement alone will attract other bees, and stings are very likely to follow.

Handling Bees.

When working with a hive of bees, the beekeeper should stand at one side and not in front of the entrance, for in the latter position the flight of the bees is interrupted. Before opening the hive, blow a little smoke into the entrance and then wait quietly for a minute. This smoke disarms the entrance guards, drives them in, and occasions a sound of alarm throughout the hive, which causes the bees to fill their stomachs with honey. In this condition they are much more agreeable and, therefore, easier to handle. Next quietly lever up the cover and puff a little smoke under it to drive the bees down between the frames. The cover now being lifted, the frame nearest the operator may be loosened and taken out at will, the others being crowded together to give more room for its removal. Do not jar the frame or drop it, but lean it on end against the back of the hive out of the way, to avoid kicking it, and at the same time to prevent crawling bees from getting up one's trouser legs. The frame on which the queen is found should not be placed down outside, because of the danger of losing her. The frames should be replaced in the hive in exactly the same position from which they were taken, in order to minimise the amount of disturbance.

The best time to handle bees is during the middle of a warm sunny day when flowers are about. Never handle them at night or on cold, wet days unless in absolutely necessary preparation for moving or other operations. Bees should, indeed, not be handled unnecessarily at any time, for such disturbances always interfere with their normal activities. The use of too much smoke troubles them so greatly that they will cease work for several hours.

Clipping Queen's Wings.

Clipping the wings of each queen after she has commenced laying has several advantages. By keeping a note-book, as previously mentioned, a record of this operation may be entered and her age will be known. It is a great advantage at swarming time, as the queen is unable to accompany the swarm which will always return, and if suitable preparations have been made for its reception, it may be successfully hived.

Clipping is best effected with a pair of fine-pointed scissors. The queen should be gently lifted from the comb by grasping her wings with the finger and thumb of the right hand, which leaves her head and thorax free to be held with the finger and thumb of the left hand. The wings are then released, thus freeing the right hand for clipping the wings. Avoid handling or squeezing her abdomen, as it contains the ovaries which are sensitive to the slightest injury. Before attempting to clip a queen some practice could be obtained on a few drones until confidence is gained. The stumps of the wings should be about one-eighth of an inch long after cutting, which should be done on one side only. It is better to make the cut in a diagonal direction, leaving the thickened nervure on the front of the wing a little longer, to avoid bleeding, which may temporarily weaken the queen.

Tiering.

When the bees begin to swell the brood-combs near the top bar of the frames with new comb, or when a honey flow is just beginning it is time to put on an extracting super. This is a hive body exactly similar to a brood chamber, and is provided with drawn-out combs, or failing these, with frames containing full sheets of foundation. Most beekeepers put only nine frames in a ten-frame hive body when used as a super, because the extra space between the combs allows the bees to make thicker and more even combs, which are much easier to uncap.

If the colony is strong enough the bees will immediately take possession of the super, but should they be disinclined to go up, a frame of brood may be taken from the brood chamber and placed above, exchanging it for an empty comb, and this will usually induce the bees to commence storing honey in the super.

Many beekeepers work with a single super, but it is not the best method, as during a good flow honey is sometimes lost for lack of storage room, while if the unripe honey is removed in order to make room, trouble will occur later on through this watery honey becoming sour and fermenting.

In order to ensure that only thoroughly ripe honey is extracted, and at the same time to take full advantage of a sudden honey flow, several spare supers containing drawn-out combs are necessary. These are tiered up one above the other as they are required. When adding an additional super to the tier it should always be placed next to the brood chamber, and the others containing partly-filled or unsealed comb placed above these two.

The thorough ripening of honey cannot be too strongly recommended, and tiering should be practised, especially in the moist coastal districts, as the honey is improved both in density and aroma the longer it is kept in contact with the bees.

Strong Colonies.

One of the chief aims in manipulating bees is to build up strong colonies and endeavour to have them at their maximum strength at the time of the chief honey or nectar-flow. Observation of the local flora with a careful note of the buds showing on the various eucalypts or other trees, together with a record of the rainfalls and climatic conditions generally, are good guides in this respect. If the chief flow occurs early in the season, preparations should have been made during the previous autumn to see that each colony possessed a young queen, and that they had sufficient stores.

If two full-depth bodies packed with bees can be built up just before a nectar-flow, the bees will fill two or even three honey supers, as a young well-bred queen will easily keep two bodies filled with brood during an average season. As the consumption of stores by weaker colonies is just as great as by strong ones, and as they give less surplus honey, it is evident that a moderate number of strong colonies is a better business proposition than a larger number of weaker ones, besides requiring less work.

Feeding Bees.

It is occasionally necessary to feed bees to keep them alive sometimes after a severe winter if they have run out of stores before the spring flowers arrive, and sometimes during a drought. At other times it is advisable to feed them, perhaps not to keep them alive, but in order to procure a maximum honey crop.

Feeding is not done to make honey from the syrup fed, but to induce brood-rearing in a season of dearth, so that a vigorous colony will be available when nectar becomes abundant; otherwise brood-rearing will be so greatly reduced that the colonies will lack strength to gather a profitable crop of honey. It is often possible and cheaper, however, to move the bees into a good temporary locality to avoid feeding. After eggs are laid, six weeks must pass before the bees are old enough to gather nectar, and if a colony is short of food, few eggs will be laid. When a nectar flow begins, egg laying will suddenly increase, but the bees reared from these eggs will ordinarily not be old enough to gather much nectar before the flow stops.

When honey is not available, stimulative feeding should be done with a thin sugar syrup of a consistency similar to that of fresh nectar. The best possible artificial bee feed is made from pure white sugar dissolved in water. Two parts by volume of sugar to one of water make a satisfactory thin syrup for stimulation.

There are several types of feeders, probably the most suitable for all purposes being the Alexander feeder (Plate 144, fig. 5). To use it the hive is moved back about 2½ inches on the bottom board, and the feeder, which is the full width of the hive, is placed outside and underneath the hive at the rear. The bees consume the sugar from inside the hive, and if the feeder is fitted close to the hive the bees are protected from the attacks of robber bees. Another pattern called the simplicity feeder is used in an empty super over the brood chamber. A third type is the division board feeder which hangs in the hive like a frame, while the Boardman feeder is placed in front of the entrance to the hive.

Wintering Bees.

Owing to the genial winter climate of Queensland the beekeeper may dispense with elaborate precautions such as winter packing, chaff hives, or underground cellars, required in colder countries. Here the bees can remain on their summer stands although the spare supers should be removed, and the hive entrances contracted to about half that of the summer width. At least 30 lb. of honey should be left in each hive, and many beekeepers leave a super filled with sealed honey above the brood. This ensures an ample supply of winter stores, and any that is not consumed may be extracted in the spring when the new honey begins to come in. In a district liable to frosts a few thicknesses of newspaper folded over the top of the frames and down the outside of the combs will keep the bees snug and warm and reduce the amount of stores that would otherwise be consumed in maintaining the temperature of the colony.

Spring Cleaning.

As soon as the spring really sets in no time should be lost in going through all the hives and getting the colonies into good shape for the coming honey flow. A good practice among some experienced beekeepers, and one which may be recommended, is to commence with a clean spare hive and then transfer to it all the frames from the first hive actually in use. The hive thus emptied is then thoroughly cleaned, all the burr-comb, propolis, wax-moth cocoons, and other debris removed, after which it is ready to accommodate the frames and bees from the second colony. This change into a fresh hive is continued through the entire apiary, taking care that the original stands occupied by the colonies are not altered. The operation has a stimulative effect on the bees, to which they respond by exhibiting greater energy in carrying on their various activities. When the colonies are being overhauled any hives that are leaning should be levelled up, as this will result in straighter combs being built. The queens should also be looked for, as they are more easily found at this time than later on when the hives are more populous. Note their age, and if too old, enter the hive numbers in the note book as being among those which require requeening. A beginner will be able to distinguish an aged queen by the corrugated appearance of the outline of her abdomen, whilst in a young queen the outline of the abdominal segments presents an almost straight line.

This is the best time for clipping the queen's wings. Faulty combs, or those with a large proportion of drone cells, may be replaced with other combs or full sheets of foundation. The quantity of winter stores remaining in the hives should be noted, and where the supply is nearly exhausted feeding should be commenced, as it is essential that at this time the hives should have ample stores so that no obstacle exists to brood-rearing.

Uniting Colonies of Bees.

Sometimes the best plan is to unite weak, hungry colonies with stronger ones. Perhaps the beekeeper has on hand several weak swarms that issued late in the season, or colonies that have gone back through queenlessness or other causes. Much may be gained and nothing lost by uniting these weak colonies. The bees' knowledge of the exact position of their hives makes it necessary that colonies to be united during the active season should stand within a few feet of one another,

otherwise bees will become lost. If it is desired to unite colonies situated further apart, they may be gradually moved towards each other at the rate of 2 feet each day until they stand side by side. Each colony has its own odour which the bees recognise, so that it is necessary to guard against fighting and, perhaps, robbing. To avoid this, uniting is best performed late in the day. Both colonies are well smoked, and the combs are arranged in the new hive with a view to mixing the bees as much as possible. The brood-combs from each colony should be placed alternatively, commencing in the centre of the hive and working outwards, and the heavier combs of honey placed at the sides to fill the hive, the light or faulty ones being left out, and from these the bees may be shaken on to a large board leaning against the entrance. The bees usually take good care of the queen, but as a precaution she may be caged in the hive for forty-eight hours. If both colonies have queens it is advisable to keep the poorer one caged in the hive until it is ascertained whether the other has been accepted or not.

A more modern and simple method of uniting is as follows:—The queen of the weak colony is destroyed and the cover is removed and a double thickness of newspaper put in its place. The bottom is taken from under the other colony, which is then set on top of the newspaper cover. Thus two colonies are housed on the same stand separated only by the newspaper. The bees on both sides of the paper will immediately begin to gnaw it away, and by the time they have cut through and carried it out of the entrance, which generally occupies twenty-four to forty-eight hours, they will have acquired the same odour, and will not fight.

They need not be assisted in removing the barrier, but during hot weather it may be necessary to provide for ventilation of the colony above the newspaper. This may easily be done by pushing wooden matches in between the paper and the edge of the upper hive body, thus leaving a narrow air crack too small for bees to pass through.

Robber Bees.

Where the flow of nectar is constant throughout the working season the beekeeper will experience little or no trouble with robber bees, but should the trees which have been yielding nectar suddenly cease to do so, the bees will require careful handling. The last extracting for the season is usually marked by more or less robbing, especially if any honey has been dropped or left exposed. As bees in a natural state never see honey outside a hive, they immediately become excited and commence to fight and rob each other's hives until sometimes the whole apiary is in an uproar. The weaker colonies are the greatest sufferers, sometimes being completely robbed of their stored honey by the stronger colonies.

The avoidance of this source of loss, which is often caused by carelessness on the part of the beekeeper, lies firstly in never leaving honey, pieces of comb, or, in fact, anything that bees will rob, exposed about the apiary, and secondly, in never attempting to extract or even open the hives when the conditions are such that the bees exhibit a tendency to rob.

Swarming.

Bees swarm when the hive is full of brood and adult bees and the incoming nectar is abundant. At such times they are apt to hang out on the front of the hive for several days before swarming. The swarming

season in Queensland is long, extending from September until March, but most swarming takes place during the months of October and November. When the swarm, consisting of practically all adults in a hive, comes forth, a great deal of confusion apparently occurs. The bees fly rapidly about in an unorganised fashion, but after a few minutes, if the queen is accompanying them, the swarm becomes quieter and flies with a definite system. Before long a great mass of bees will settle of its own accord on some convenient place for further organisation. They will move again after an indefinite time, ranging from a few minutes to several hours, and will now go, perhaps to a great distance, to a hive, a house, a tree, or other suitable shelter previously located by the scouts.

Capturing Swarms.

Two methods of capturing and hiving swarms are given here; the first method is suitable for ordinary swarms where the queen bee accompanies the other bees, while the second method is the most suitable where clipping the queen's wings is practised.

When the swarm has clustered for the first time the swarming box is brought into use. This box is simply made and is a great convenience. A 3-inch ventilation hole is bored through each of two opposite sides and covered on the inside with wire gauze, and a tin slide is fitted on the outside to cover the hole and darken the box. Hold the box close under the cluster of bees, with the sliding lid pulled wide open, then jar or cut off the cluster from the object on which it is supported so that it falls into the box. Close the lid except for a space of about an inch, and stand the box down on end, with the opening at the bottom so that the remaining bees may enter. The lid is then tightly shut and the box of bees is placed in a cool place until the evening, when the bees may be transferred to their permanent quarters.

The hive is made ready to receive the swarm by placing one frame of unsealed brood in the centre and filling the hive body with frames of foundation.

When transferring the bees from the box to their new home prop up the body about an inch from the floor board, and lay a piece of bagging in front on a level with the entrance. Then give the swarm box one or two sharp jerks, open the lid, and pour the bees out on the bagging.

The surplus brood-combs from the colony which has given off the swarm may now be disposed of, for it is generally considered unprofitable, in the case of apiaries carrying their full complement of hives, to attempt to once more build up the parent colony except in the case of very early swarms. The combs will have a number of queen cells attached, and if the bees are of a good Italian strain it is desirable to save them. The combs containing these queen cells are simply placed on top of the parent colony, over a queen excluder, until the cells are ripe. These ripe or sealed queen-cells may then be detached and used in the apiary. If there are any weak colonies in the apiary, the body of brood-combs, after the removal of the queen-cells, should be given to one of them as a super, and it will strengthen it wonderfully.

As previously mentioned, it is a good plan to clip the queen's wings in order to prevent the possibility of the swarm flying away; this should be done during an examination of the colonies in the early spring before

the bees become numerous enough to make it difficult to find the queen. When clipping is practised the grass around and for some distance in front of the hives should be kept short during the swarming season, and someone should be present in the apiary to attend to the swarm when it emerges, and to pick up and cage the queen before the ants find her. She will probably be seen in the grass in front of the hive entrance, and when caged should be placed in a shaded and safe place—the pocket for convenience. The apiarist should get quickly to work and select a frame of brood containing some eggs and larvæ. This is then put in the prepared hive, in the centre of frames containing full sheets of comb foundation. If desired, this brood can be taken from the parent colony, providing there are no queen-cells on the comb. Next remove the parent colony and place the newly prepared hive on the stand that was occupid by the parent colony, with the caged queen at the entrance. The flying swarm will soon discover that their queen is not among them, and will return to what is now the prepared hive. The queen can be liberated when the bees settle down, which will be about one hour later. The surplus brood-combs from the parent colony may be disposed of as previously mentioned.

Swarm Control.

Swarming is a natural instinct brought on by the surrounding conditions, which may be controlled to some extent by the beekeeper. The following manipulations tend to reduce swarming:—(1) The introduction of young queens, preferably the progeny of queens whose colonies are not disposed to swarm. (2) The prevention of crowding in the brood-chamber previous to the honey-flow by the use of good worker-combs, to reduce the number of cells unavailable for worker eggs, also by the removal of combs of brood, which are replaced by empty combs or sheets of foundation to relieve the congestion. (3) The removal of queen cells soon after they are started, since, if queen-cells are well advanced, their removal is not so effective in preventing swarming. This usually requires an examination of the brood-chamber once in seven to ten days. (4) Excessive heat within the colony, another potent factor in swarming, may be reduced by using a shade board and increasing the opening for better ventilation.

Requeening.

The queen, being the mother of the colony, is by far the most important bee in the hive. Should she die, leaving no young worker larvæ from which another queen can be raised, the colony will dwindle away unless another queen be given to it. A queen may prove unsatisfactory and require replacing for several reasons. She may be a worthless drone breeder, or she may be unprolific. Furthermore, the prolificness of a queen usually diminishes rapidly after her second year, and she then fails to maintain the large population necessary for harvesting a maximum honey yield. Another common reason for requeening is a desired change in the race of the colony from black or hybrid bees to Italians. If the Italian queen has been mated with a pure Italian drone all the bees in the colony will be pure Italians as long as the queen remains alive.

Before requeening, the first thing to do is to catch and kill the old queen, otherwise the fresh one will undoubtedly be killed. The usual practise is to lift out the combs one by one and examine them until

the queen is found. It is handy to have a spare body near the hive so that the frames, as they are examined, may be placed therein; otherwise while one comb is being examined the queen may pass from an unexamined comb to one that has been examined and replaced, and she will be missed. If all combs have been examined and the queen not found, carefully examine the floor board and sides of the hive, then re-examine the combs as they are replaced.

The old queen having been disposed of, the usual method is to leave the hive queenless for a day. The following day the queen is introduced to the hive from the mailing cage (Plate 144, fig. 3) in which she was received through the post or in a similarly shaped wire gauze cage called an introducing cage (Plate 144, fig. 1). The cork or corks in the cage and one frame from the hive are removed and the mailing cage is then wedged in the centre between the remaining frames. In the course of a few days the bees in the cage and those outside eat away the candy and the queen is released. By this time she will have the scent of the hive, and will be accepted.

Another method which has been recommended by those who have used it with complete success is the paper bag method. Take a small, thin paper bag, such as is used for lollies, place the queen to be introduced therein, without any of her attendant bees, then catch half-a-dozen bees from the hive and place them in the bag with her. These bees should, if possible, be young, and filling themselves with honey from the cells when caught. Although the queen is strange to them, they will be so busy trying to get out that they will not take any notice of her, and in the meantime they will all acquire the same scent. Remove one frame and place the bag in the hive between the frames, and in the course of a few hours the queen will have been released and accepted. The advantage of this method is that there is no need to leave the hive queenless for a day. One may open the hive, destroy the old queen, and introduce a new one in a paper bag straight away with considerable success. Whichever method is adopted, the hive should not be disturbed for about three days, after which time it should be opened to see that the queen is all right.

Supersedure.

Bees generally supersede queens in their third year, or those which are failing during their second. The latter may still be fairly prolific, but by some means the bees know that they would not live through the coming winter, and that it is necessary to raise successors while drones are still flying. The queen cells which bees construct when superseding are few, rarely more than one or two. They are generally built on the face of one of the outer combs, often a brood comb, as in the case of swarm queen cells. Supersedure cells must not be mistaken for swarm cells and destroyed, or the hive may eventually become queenless.

Artificial Increase.

In remarks on swarming the well-established beekeeper was advised to break up the parent colony after the issue of a swarm. The reader may thus perhaps wonder how a beekeeper can increase his apiary should he desire to do so. A strong colony can, of course, be divided into three or four nuclei, but doing this probably destroys all chances of securing a crop of honey, and at the same time is almost sure to cause some brood to die.

The following plan, known as the Alexander method, avoids all loss of brood through chilling, and at the same time enables one to make a moderate increase as well as to secure a honey crop.

When a colony is nearly full enough to swarm naturally, and the beekeeper wishes to make two from it, he lifts it from its stand and puts in its place a hive containing frames of comb or foundation just as he would prepare a hive for a swarm. The centre comb is removed from this new hive, being replaced by a frame of brood from the old hive. It is important to see that no queen cells are present in the comb, the next step being the liberation of the queen from the old hive on this brood comb. Then a queen-excluding honey-board is placed on top of the new hive which now contains the queen, a frame of brood and empty combs. The full queenless old colony is then placed over the excluder, and, after filling the space left by the removal of the brood comb with the comb previously taken from the new hive, the upper hive should be closed except for the entrance the bees have through the excluder into the hive below. They may be left in this way for about five days, then the frames should be carefully looked over, and if any larvæ are found in queen cells, the two hives had better be separated at once. This premature separation will give two colonies, but a certain amount of brood will be chilled. If, however, the bees have not started any queen-cells above the hives may be left together for ten or eleven days, during which time the queen will have a good amount of brood started in the lower hive, and every egg and larva that was in the old hive on top will be capped over and saved. The two hives may then be separated, the old hive being placed on a new stand. It will then be full of young bees and capped brood, and in about twenty-four hours they will accept a ripe cell, a virgin queen, or a laying queen, as they will then realise that they are hopelessly queenless. If possible a laying queen should be given, as full colonies should not be without a laying queen a day longer than is necessary.

By this method two strong colonies may be obtained from one without losing any brood or checking the laying of the queen, and these colonies are not likely to swarm during the remainder of the season.

The few failures with this method have been due to dividing colonies that had already made some preparation for swarming by having eggs or larvæ in their queen-cells. In some cases the colonies have actually been divided when they had capped queen-cells in their hives at the time the queen was put in the new hive, and, of course, they swarmed in a day or two, which illustrates the need for observing the state of the colony to be manipulated.

Rearing of Queens.

At the end of the first section of this article it was pointed out that queens lay more eggs during the first year than in any other, after which the number of eggs laid gradually diminishes until the queen is replaced. Every beekeeper knows that, other things being equal, the greatest amount of surplus honey is produced by the numerically strongest colony. It follows, therefore, that in order to maintain a colony at its maximum strength the queen should be replaced by a younger one at least every two years.

Writers on this subject have made various estimates regarding the number of colonies a beekeeper should possess before he attempts queen rearing. One authority mentions fifty colonies, another one hundred

colonies, while a third recommends a commercial beekeeper not to attempt to rear his own queens, but to concentrate all his efforts on honey production. Very good untested queens can be purchased in this State for five shillings, but this charge, although small for one or two colonies, reaches a formidable total when multiplied by a few score.

It will, of course, be necessary for the average beekeeper to buy some queens in order to obtain good breeding stock. Furthermore the beginner can scarcely expect to rear good queens during the first year, and no one can hope to do so until he becomes well acquainted with the habits of bees.

The three impulses under which a colony will rear a queen under natural conditions are swarming, supersedure, and queenlessness, and in rearing queens by the so-called artificial methods it is necessary to follow rather closely one of these three. In practice the beekeeper can take queens from normally constructed queen-cells. By making the colony queenless a considerable number of these will be reared, and by very careful watching almost all of them may be captured and caged before they kill each other or destroy the other cells. To do this, however, it is necessary to look over the entire colony frequently each day for several days. This plan is not to be recommended except where it is impossible to use some of the better methods.

Saving Natural Queen-Cells.

During the swarming season the beekeeper can often obtain a number of fine queen-cells by taking queen-cells from colonies preparing to swarm, provided the parent queens are of satisfactory stock. By placing these in colonies to be requeened, after the removal of the condemned queens, requeening takes place naturally without further manipulation. Making a colony queenless early in a honey-flow costs less, perhaps, than a period of queenlessness at any other time, in that the eggs laid are not of value as future honey-gatherers. Furthermore, this may often be done in connection with dequeening to control swarming. By keeping a watch for opportunities to utilise good, natural queen-cells, time may be saved by reducing the amount of artificial queen-rearing.

Building Natural Queen-Cells.

For convenience the alley method of queen-rearing has much to commend it. A strip of comb is cut out just wide enough to contain one complete row of cells containing eggs. This is then cut down by removing about two-thirds of the walls on one side. With a match or small stick two in every three eggs are destroyed, leaving the cells empty. This strip of comb is now fastened to the lower edge of a 2 or 3-inch strip of empty comb attached to the upper part of a frame, the eggs remaining being pointed downwards. This prepared frame is now given to a queenless colony from which all young unsealed brood has been removed. The workers remodel the cells which contain the eggs, making them into queen-cells.

Queen-Cells on Artificial Bases.

To have the queen-cells in more convenient shape for handling, Doolittle artificial cell-cups are prepared by dipping a smooth stick with rounded end into melted wax and removing the adhering wax.

Another and more popular method is to use wooden cell-bases. A short cylinder of wood is hollowed out on one end and lined with wax, the cavity being the size of a queen-cell base. These wooden cell-bases are fastened to the underside of moveable wooden bars in the cell-raising frame.

Transferring Larvæ.

Having made the necessary cups or bases they are inverted, and the usual practice is to wipe the inside of the cell with a little royal jelly procured from another queen-cell. Young larvæ are now carefully lifted from the worker-cells and placed in the artificial cell-cups, being taken, of course, from the colony of the queen selected as best for breeding. The supplied cells are hung in a normal colony prepared for cell-building. The larvæ chosen should be as young as they can be obtained, preferably not more than one day from the egg. Older larvæ may be used but the resulting queens will probably be less valuable.

After cells have been accepted, *i.e.*, the worker bees have commenced to draw them out, they should be transferred to a second strong colony and placed in the upper story which is protected by perforated zinc to keep the queen from destroying the cells. If there is no honey flow it is necessary to give the colony some sugar syrup or honey daily to keep it in prime condition. The cells will be well cared for in strong, queenless colonies, but to keep colonies queenless for long is expensive. It is a well-recognised fact that if a colony is divided by perforated zinc the portion away from the queen is in a condition to build and care for queen-cells and may be considered as virtually queenless.

Nursery Cages.

Before the queens are ready to emerge, about ten days from the time of transferring the larvæ, each cell may be put in some sort of nursery cage (Plate 144, fig. 2) so that as the queens emerge they will not kill each other or destroy other cells. As a rule individual cages for each queen-cell are best. If colonies are ready to receive them, the best method is to put each queen-cell in a colony so that there will be no necessity for introducing adult queens. In case it is desired to have the queens mated before introducing them to full colonies, the queen-cells or virgin queens may be put in small colonies usually known as nuclei. These are miniature hives built to hold about three frames. The queens may safely be kept in them, one in each nucleus, during the active season or until it is convenient to introduce them to full colonies.

SECTION VI.—INSECT ENEMIES AND DISEASES OF THE HIVE BEE.

The insects responsible for causing the greatest damage to bees are the wax moths, but where the combs are properly stored and fumigated and strong colonies of bees are maintained these cease to be a menace. Ants are sometimes very troublesome, and the beekeeper is well advised to destroy every nest within 200 yards of his apiary, but the other insect pests to be mentioned are of minor importance. As a queen bee in the height of the season lays from 1,500 to 2,000 eggs a day it will be realised that the small toll of bees taken by predatory bugs and flies is almost negligible.

FIG 1.

FIG 1a.

FIG 2.

FIG 2a.

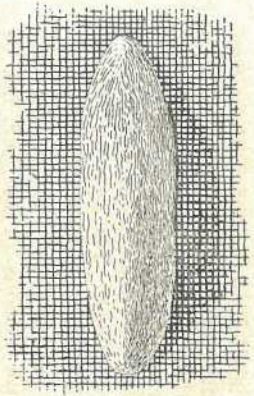

FIG 3.

FIG. 4.

FIG 4a.

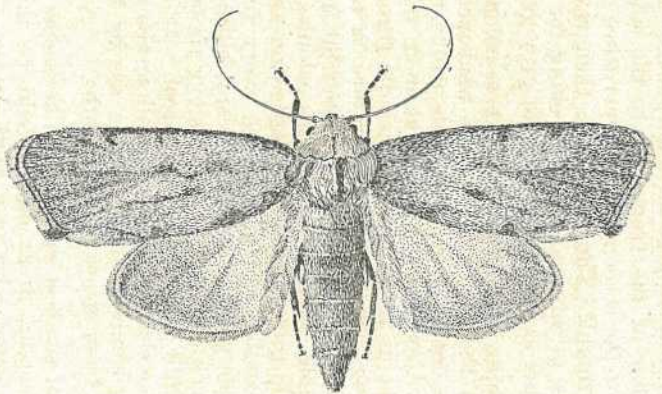

FIG. 5.

FIG. 6.

PLATE 169. LARGER WAX MOTH.

Fig. 1, Egg x 30.
Fig. 1a, Surface of egg x 210.
Fig. 2, Larva, dorsal view x 2.
Fig. 2a, Larva, lateral view x 2.
Fig. 3, Cocoon x 2.
Fig. 4, Pupa, ventral view x 2.
Fig. 4a, Pupa, dorsal view x 2.
Fig. 5, Adult female x 2½.
Fig. 6, Adult male x 2½.

Wax Moths.

Every beekeeper is familiar with the grey grubs which are responsible for the destruction of many of his combs. They are the larvæ of two different cosmopolitan species of moths, the larger wax moth, *Galleria mellonella* L. (Plate 169, figs. 5 and 6), and the lesser wax moth *Achroia grisella* Fab. Their habits are very similar, indeed, they may occur together in the same hive, but the former species is usually the more abundant and consequently the more destructive.

The popular name wax moths was doubtless given on the supposition that the food of the larva was chiefly wax, but attempts to rear them on chemically pure wax were unsuccessful. It was also noticed that they neglected nice, white super combs, and always attacked combs that had been used for brood-rearing which contained the larval skins left by developing bees or those containing brood or pollen. It is now known that these substances furnish the vitamins necessary for the full development of the moths.

The wax moths enter the hives at nightfall and deposit their eggs (Plate 169, fig. 1) about the combs into which the newly hatched larvæ tunnel. They line the sides of the tunnels with silk through which they can rapidly wriggle in order to escape from the bees. If the comb is held between the observer and the sun the movements of the larvæ within their tunnels are plainly visible. The typical appearance of an infested frame is shown in Plate 170.

When the larvæ (Plate 169, figs. 2 and 2A) are full grown they leave the comb and construct tough, white cocoons (Plate 169, fig. 3) of silk in which to undergo metamorphosis. These are generally attached to the top bar of the frames or to the sides of the hive. From the completion of the cocoons to the emergence of the adult moths occupies about a fortnight. The moths are then ready to fly about the hives, stored combs, or any wax refuse, seeking for places in which to oviposit and so produce another generation of grey grubs.

Wax moths invariably attack those colonies which are below normal strength, as the guard bees in a weakened colony are less alert in resisting the entrance of the female moths which are able to slip past, enter the hive, and scatter their eggs about the combs. In some instances the moths get in after the bees dwindle through queenlessness or excessive swarming. The remedy, therefore, is to maintain strong colonies, but unfortunately, in times of honey or pollen shortage this is not always possible. When some of his colonies become weakened the beekeeper should give them special attention and, if found to be infested, the combs should be gone through every few days, digging out moth larvæ with the point of a penknife and killing all moth grubs and pupæ enclosed in cocoons. By working along these lines the moth pest inside the hives would soon be under control. Additional precautions against infestation consist in cleaning up all scraps of comb found lying about, and keeping combs that are not in use by the bees safely stored in a place secure from attack by wax moths.

As one of the best assets that a beekeeper can possess is a good stock of surplus combs, great care should be taken to protect them from becoming infected with wax moth larvæ. This may be effected with little labour and at small cost by means of carbon bisulphide fumigation. To obtain the best results the supers for holding the combs should have all wax and propolis scraped from the top and bottom edges to

ensure a tight fit. The supers filled with the surplus empty combs should then be tiered up to ten high, and the crevices between the boxes pasted over with strips of paper so that the whole stack will be air-tight, the top and bottom being made so by fastening a covering of board and newspapers securely to them to prevent the escape of the gas. The top covering is left open until the carbon bisulphide has been put on top of the uppermost set of combs. Some shallow holder is required for the carbon bisulphide, and the lever top of a 7-lb. honey tin will well answer the purpose. Such a tin-lid will hold quite enough of the liquid for a stack of ten supers, the quantity required for this number being about four tablespoonfuls. As soon as the carbon bisulphide has been inserted the top of the stack should be made airtight, and the stack is best left undisturbed until the combs are required.

When combs are to be put away until the following season carbon bisulphide should always be used although the combs may show no sign of moth grubs, as it is a cheap insurance of the safety of the combs. Care must be exercised in using carbon bisulphide which is both inflammable and explosive.

Ants.

Numerous species of ants disturb bees, and although they rarely attack them their presence irritates and excites the bees, resulting in the stinging of persons and animals near the hives. They may be conveniently divided into two classes, small and large, for the treatment recommended varies according to their size.

The small species consist of tiny black or red ants which overrun the combs and sometimes nest inside the hives. Where empty bags or pieces of hessian are used on top of the frames for mats these small ants take advantage of the warmth and shelter afforded and nest therein. Stands with various insulating devices have been recommended to protect the bees against such ants. While these may be useful to amateurs with only a few colonies, their adoption on a large scale where beekeeping is carried on commercially has been found impracticable.

The remedies likely to give satisfaction are:—Firstly, discard bag mats, for it is much better to have a bee space of ¼ inch between the top of the frames and the cover; secondly, mix 1 oz. of borax and ½ lb. sugar and boil for a few minutes in sufficient water to produce the consistency of thin honey, small quantities of this mixture being placed anywhere in the track of the ants, the mixture being covered in such a manner as to be accessible to the ants but not to the bees.

To the second class belong the meat ants, sugar ants, or other large species; these may readily be destroyed by means of carbon bisulphide. To destroy a meat ant's nest pour about an ounce of the liquid into each hole or crater in the mound and immediately cover it with bags. Then wait for three or four minutes, remove the bags, and apply a light attached to the end of a stick at least 5 feet long. The carbon bisulphide is highly inflammable, and no risks should be taken when applying the light to explode the fumigant.

Care must be taken not to explode the gas too soon. If the light be applied in less than the stated time it will be found that only a relatively quiet burning takes place, and there is no explosion causing the galleries to be shattered. The burning is, therefore, far less efficient than the exploding. The explosion is not completed for some minutes.

It is therefore advisable to wait about five minutes and then replace the bags over the nest. By again covering the nests the fumes are retained for a longer time, and many ants not killed outright during the explosion or before it will thus have less chance of recovering.

To obtain the best results it is advised that the work be carried out in the late afternoon, at which time there is the greatest number of ants present in the nests.

Other Insect Enemies.

Various other insect enemies have been reported by beekeepers from time to time. They are insects which have been found associated with the bees within their hives, and insects which are known to attack bees in the field. The former group includes such insects as cockroaches, plant bugs, beetles, and grasshoppers. Cockroaches are often found in even the strongest colonies, particularly on combs without bees; there does not appear to be any definite proof, however, that cockroaches injure the bees; indeed, one authority on beekeeping is of opinion that as the bees tolerate them in their hives they may be of use to the bee community. It has been observed that combs amongst which cockroaches are plentiful remained free from wax moth grubs, and it has been suggested that the cockroaches, which are omnivorous, eat the eggs of the moths.

The other insects mentioned have all been observed within the hives during the colder months, and as they were probably sheltering there temporarily, their presence may be disregarded.

The attacks made upon bees by insects in the field are of a more serious nature. Several species of predatory bugs have acquired the habit of hiding among flowers and seizing hive bees while they are engaged in gathering nectar. They have also been observed sitting on the tassels of maize cobs, catching and sucking the blood out of the bees as they come for the pollen. They are rather large and slow-moving bugs easily distinguished by the curved beak, which stands well away from the head basally, and by the very narrow head, always longer than broad. It is rather unnecessary to add that a beekeeper should destroy these bugs at every opportunity.

Dragonflies have occasionally been observed flying about apiaries and snapping up bees upon the wing. The natural food of even the largest species of dragonflies, however, consists mainly of mosquitoes, midges and other small flies. As complaints of this nature are not frequent, it is quite probable that the dragonflies invade apiaries only during periods when their natural food is scarce. When noticed hawking bees about an apiary, they may be captured with a butterfly net attached to a stick.

Large, active, robber flies capture other insects on the wing by spearing them with their hard beaklike proboscis. These flies do not discriminate in their prey, but will seize any other insect which they are strong enough to overcome. A proportion of their victims consists of hive bees, but remedial measures in this case are not practicable.

Termites.

In many localities termites, or white ants, cause much damage to hives. They do not attack bees, but quickly riddle the hive bottoms in direct contact with the earth. Colonies of termites have been observed

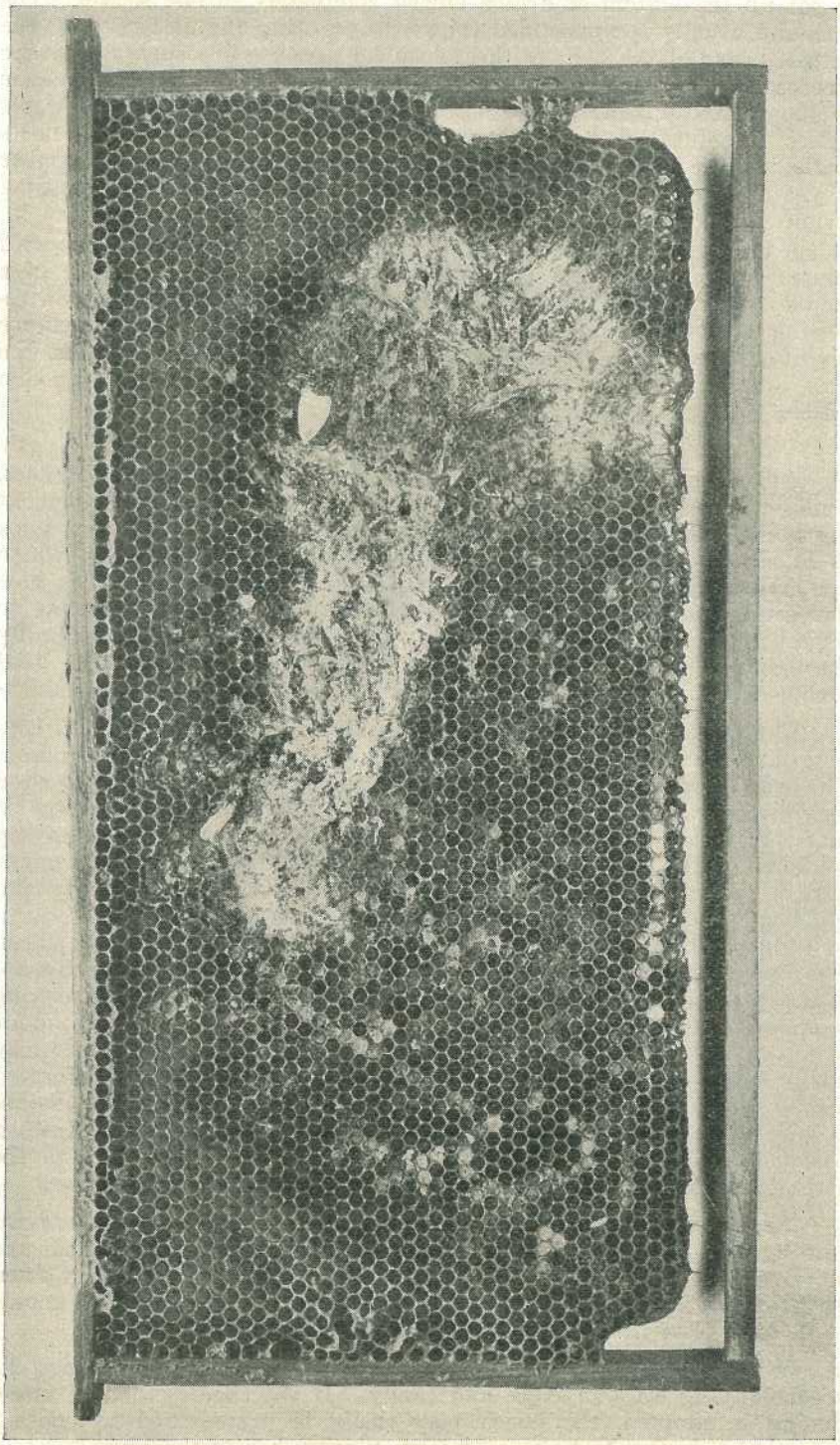

PLATE 170.
Frame of brood-comb showing damage caused by larvæ of the larger wax moth.

to eat up the bottom of a hive almost completely in one season. The remedies usually recommended consist in painting the underside of the bottom board of the hives with a chemical preservative such as coal-tar creosote, or with white arsenic at a strength of 2 lb. of the white arsenic to 10 gallons of water. The arsenic is not easily dissolved in water unless the solution is boiled vigorously, because the white powder floats to the surface and is difficult to wet. Experience over a large number of years has shown that white arsenic is a very effective poison against termites.

A local beekeeper has successfully overcome the termite trouble with cement bottom boards of his own construction. They are made in a mould and reinforced with cyclone wire-netting, as ordinary wire-netting is not quite strong enough. They are proof against weather conditions, as well as termite attacks. This beekeeper states that the bees winter in these hives quite as well as they do in the all-wooden article.

Foulbrood.

American foulbrood (Plate 171) is a disease of the brood of bees, which causes serious losses to beekeepers in many countries throughout the world. It is caused by a species of spore-bearing bacterium known as *Bacillus larvæ*. The brood becomes infected with the spores, which are invariably introduced into the hives in infected honey. The bees themselves spread the disease through the hive in their attempts to remove the diseased brood. When the disease has spread generally throughout the brood chamber, the bees cease trying to remove the dead brood, and the colony dies owing to the absence of emerging bees.

The disease may be recognised by the sunken and perforated cappings and the isolated sealed cells in the midst of recently emerged brood. The dead larvæ have a melted-down appearance and are usually extended lengthwise in the cells. Dead larvæ are slightly yellowish in colour at first, but become chocolate brown upon further decay. The decaying contents of the cell may, before they become too dry, be drawn out with a toothpick into fine silklike threads, which are quite ropy and gluelike. The dried-up brood, called scales, become tough and adhere so tightly to the floor of the cells that the bees cannot remove them. The bees usually make a small hole in the cappings when the disease is present and sometimes remove the cappings altogether, thus making it appear that the larvæ or pupæ died before being sealed. The odour is heavy and fœtid, rather resembling that of stale glue, this gluey odour being a marked symptom. Isolated sunken cells or perforated cells in the midst of healthy brood should be examined whenever disease is suspected. If in doubt, a piece of comb containing the suspected brood should be packed in a tin or small box and forwarded to the Department of Agriculture and Stock, Brisbane, for examination.

As previously mentioned, the only way the disease can be carried into a clean hive is with infected honey; it follows therefore that the chief precaution is not to allow the bees to obtain access to honey from an unknown source, and never to feed honey to bees unless it is known to be free from disease spores.

When queens are imported, it is a good precaution to destroy the accompanying workers, cage, and candy. If the cage method of introducing is adopted, the queen may easily be transferred to another cage that is known to be clean, before placing her in the hive.

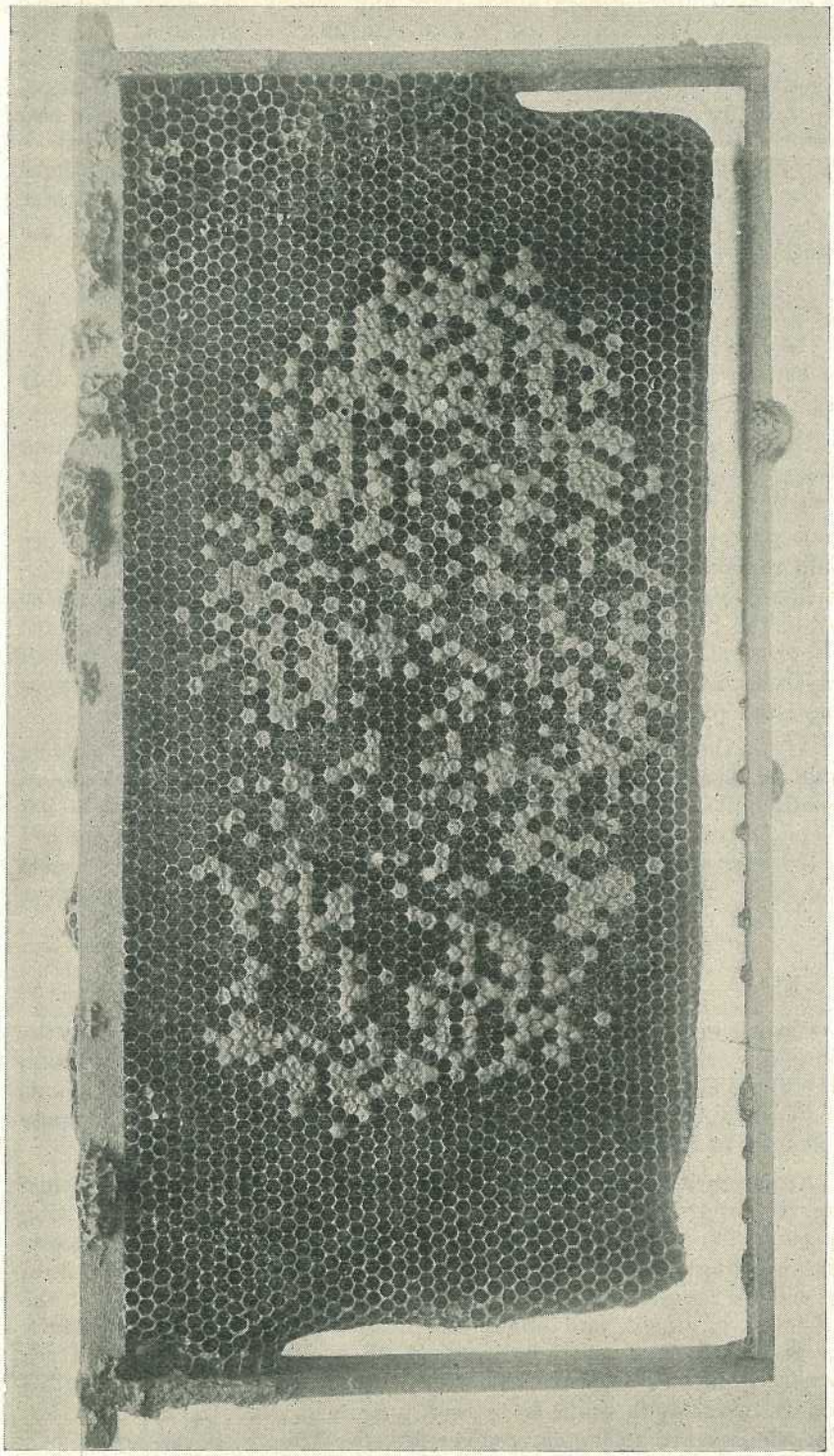

PLATE 171.
Frame of brood-comb showing infection by American foulbrood.

In the United States much time and money has been expended during recent years in trying to find remedies for foulbrood. At one period disinfecting solutions were recommended, and later the shaking method was considered to be a cure. According to a recent publication, both these measures are ineffective. The shaking treatment is not now recommended because the disease is rarely eradicated by that method, and a treated colony on disinfected combs cannot be pronounced clean for two years. After a number of years trial of the shaking method, it is admitted that the disease situation in the United States has not materially improved.

It is now commonly recognised that the safest and, in the end, the most economical means of stamping out American foulbrood is to burn the diseased colonies. While this procedure may seem wasteful to those who believe that less drastic measures afford protection, it is the only method that leaves no opportunity for the disease to recur.

Before burning, the bees should be killed by closing the entrance in the evening and sprinkling a pint of petrol over the top frames, after which the hive is closed tightly.

A pit 18 inches or more in depth should be dug and a good fire should then be kindled in order to thoroughly burn the brood and honey. The hives containing the dead bees should be carried intact close to the pit and the bees and frames fed to the fire. After they are consumed the top-soil surrounding the fire should be raked into the pit to prevent bees from healthy colonies from having access to any dead bees or honey; the pit should then be filled.

After the burning, the hive bodies, bottom boards, and covers should be taken into the honey house, thoroughly scraped to remove all propolis and wax, and then scrubbed both inside and out with a hot soap or lye solution and a stiff brush. The scrapings should be burned and the wash water disposed of in such a manner that it is not accessible to the bees. Washing with soap and water is also the best way to remove spores from the hands, clothing, tools, and extracting equipment.

Chilled Brood.

Chilled brood is brood which has been killed by cold, and may be produced by any cause which results in the temperature of any portion of the brood chamber being too low. It may be the result of injudicious brood-spreading, insufficient nurse bees, or faulty hives which expose the frames of brood to cold winds.

Although it is not really a disease, chilled brood is sometimes mistaken for foulbrood, but it differs from the latter in the following respects:—The odours peculiar to foulbrood are absent. Furthermore, if the capping of cells containing chilled brood is removed, the dead bees will be found in natural positions, slightly shrunken, black at the head in early stages, and finally becoming black all over. The larvæ turn greyish at first and afterwards become almost black. When the weather conditions improve the bees will rapidly remove the chilled brood from the cells which have been uncapped, whereas they will not under similar circumstances remove brood affected by foulbrood.

Pickled Brood.

A condition known as pickled brood may be distinguished from foulbrood by the following characteristics:—If the larvæ of pickled brood are pulled out of the cell with a pin or match, they have the appearance of liquid matter, and if the brood in capped cells are similarly withdrawn the abdomen will be found to contain liquid matter, and the head will probably be dark brown in colour instead of the almost black colour in the case of chilled brood; there is further a total absence of the stickiness and peculiar gluey odour which is characteristic of American foulbrood. Pickled brood is generally considered to be the result of overheating.

Sacbrood.

This disease has been considered by some authorities to be the same as pickled brood and both sealed and unsealed larvæ may be affected. Larvæ killed by sacbrood will usually be found stretched out along the lower wall of the cell and often with the anterior end turned up towards the upper wall. The colour changes from a pearly white and may vary from yellow to dark brown or grey. The skin of the larvæ becomes toughened so that the dead mass may be lifted out like a small sac, the contents of which are watery.

Sacbrood seldom causes any serious losses among bees. Colonies may become weakened, causing a reduction of the honey crop, but a colony is seldom killed outright by it. The disease usually appears during early summer, disappearing again with the commencement of a good honey flow.

Paralysis.

Beekeepers often designate practically all the diseases of adult bees which they observe as cases of paralysis. The first symptom noticed is that some bees are being dragged out of the hive by others. The former present an oily or greasy appearance and generally exhibit a trembling and jerky leg movement. Some writers have attributed this condition to hereditary weakness and recommend requeening as a cure. The disease is also said to be more prevalent in hot climates than in colder ones, and in this State it usually occurs during the summer months. Unfortunately similar symptoms are stated to develop in cases of poisoning caused by the use of chemical sprays on fruit and vegetable crops. It would appear, therefore, that these conditions are produced by more than one cause, and much more study will be necessary before it will be safe to give advice or recommend any particular treatment.

Spring Dwindling.

It also seems probable that more than one disease has been included under the term spring dwindling. To avoid confusion it should be applied only to the loss of bees in the spring, due to the fact that the adults have been weakened by poor wintering and die faster than they can be replaced by emerging brood. Poor quality honey for winter stores or lack of stores may be among the contributing causes.

Although it is rather alarming in early spring to see an accumulation of dead bees in front of the hive entrance, the writers experience is that the total loss of a colony is infrequent. Generally a mild change in the weather accompanied by some rain causes a small honey flow and

the trouble usually disappears. If a little stimulative feeding with sugar syrup has been previously given when the dead bees were first noticed, the colony will quickly build up to normal strength.

Acknowledgments.

Thanks are due to the Queensland Museum for the loan of the material for Plate 170 and to Messrs. Smith Bros., of Brisbane, who kindly loaned the apparatus illustrated in Plates 139 to 144. The photographs are the work of Mr. W. J. Sanderson, Departmental Photographer, and the illustration of the life history of the larger wax moth was prepared by the Branch Illustrator, Mr. I. W. Helmsing. The writer is also indebted to Mr. J. A. Weddell for co-operation in assembling the plates, and finally desires to thank Mr. Robert Veitch, Chief Entomologist, for advice and assistance in the preparation of this paper.

DEMOCRACY AND LAUGHTER.

Happiness is the true touchstone of Democracy. Where any considerable number of people find life "weary, stale, flat, and unprofitable," there is something wrong.

Are we really a happy nation? With every element of happiness within our grasp it would seem, sometimes, that we fail fully to realise the great desire. The eyes of the world are upon us, and if, as a nation, we fail to impress peoples elsewhere by that elation of spirit which speaks for joy and contentment, we are poorly meeting our responsibilities as children of Democracy.

We cannot make people happy any more than we can make them good by the multiplication of laws. Laws are conducive to happiness only as they promote justice, equality of opportunity, and comfortable conditions of life. An edict that, on a certain day, every man, woman, and child . . . must be happy would be ridiculous. It is worth remembering that the search for happiness begins and ends in our own hearts.

Many years ago, Matthew Arnold complained that we . . . lacked intellectual seriousness. To-day, there is greater reason to fear that we have lost our capacity for laughter. We are solemnly warned that mighty problems cry for attention, but these will be solved much more quickly if we approach them buoyantly. We may be as earnest as we please, but we must keep smiling. The darkest prospect is not so black as it appears. When I pass a crippled machine in the highway and the owner peers out from under his vehicle and greets me with a grin, I know that he is master of the situation, and will soon be on his way rejoicing.

Pleasant it is on starry nights to hear the laughter of children at play in the street or the jazzy twang where light-ankled youth trip gaily and know life to be good.

The loud laugh that speaks the vacant mind is one thing; honest mirth, testifying to courage, poise, and serenity of temper, is another. Humour is an efficacious antiseptic—a powerful tonic. So long as we can laugh, we are immune from defeat; there is still some heart in us for the great business of noble living.—MEREDITH NICHOLSON, in an American Exchange.

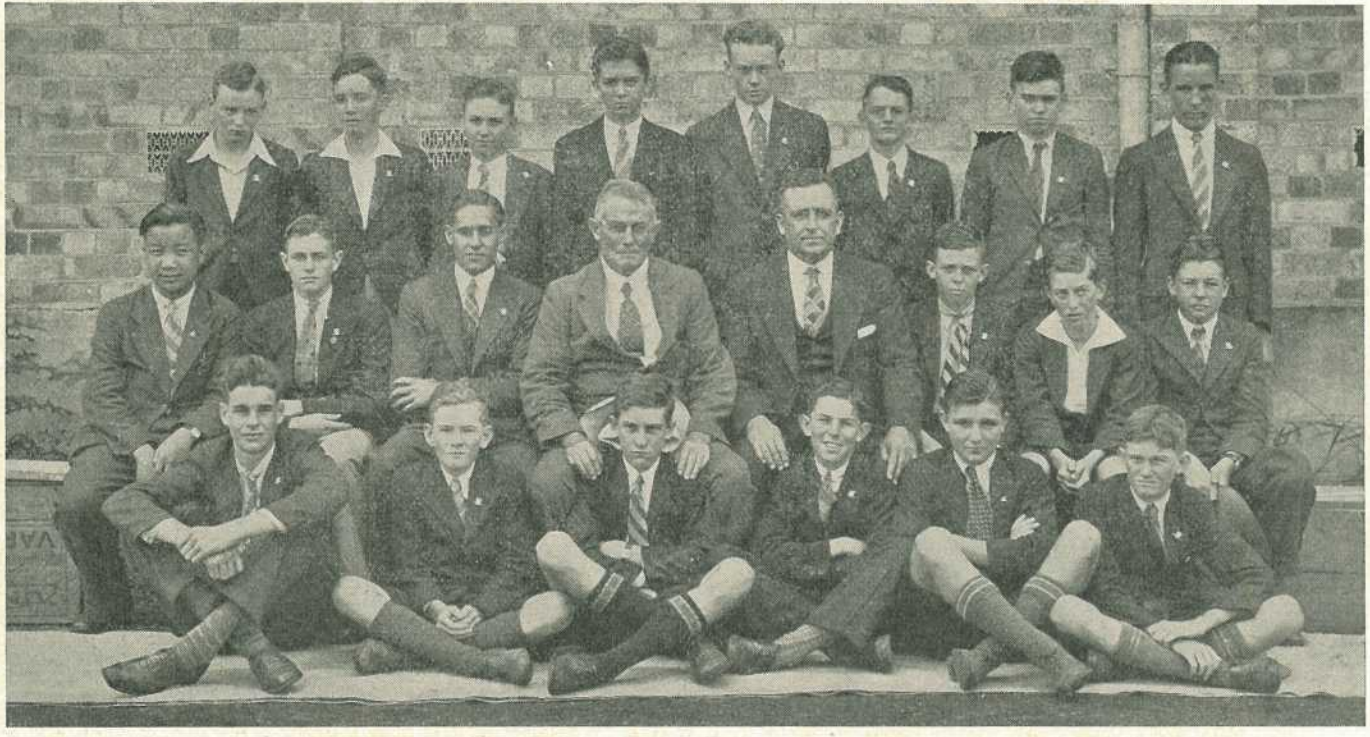

PLATE 172.—BRISBANE GRAMMAR SCHOOL GROUP.

On the occasion of an instructional visit to the laboratories of the Department of Agriculture and Stock. Seated in the centre are Messrs. Boyle (Agricultural Branch), Dakin (Teacher in Charge), and Kilmartin (Interviewing Officer).

Chloris Grasses in Queensland.

By S. L. EVERIST, Assistant to Botanist.

PART I.

THE genus *Chloris* includes a number of grasses of considerable economic importance. Perhaps the best known of these is Rhodes Grass (*Chloris Gayana*), but several native species are also useful pasture grasses.

Chloris grasses are easily distinguished by their seed heads. These usually consist of a number of spikes spreading out from the top of the seed stalk. Upon the lower side of each of these spikes are borne a number of spikelets or "seeds." These are arranged in two rows and consist of two outer empty glumes, thin in texture, with between them two or more "flowers" or florets. The florets break away above the glumes and fall, leaving the glume attached to the seed spike. The lemma or outer husk of the lower, or fertile floret bears a long awn. Above the fertile floret are one or more empty glumes, each of which also bears an awn.

Botanical Name.—Chloris, the goddess of flowers.

Common Names.—Most of the *Chloris* grasses are known as Star Grasses, Windmill Grasses, or Umbrella Grasses. These names, however, are applied to a number of different grasses with spreading seed spikes and are not confined to *Chloris* grasses. The name *Chloris* is short and euphonious, and should be quite a good common name for members of the genus. This would also eliminate the chance of confusing them with other grasses known by the above vernaculars.

Botanical Description.—Spikelets with one perfect floret and one or more male florets or empty lemmas above it. Spikelets sessile, crowded in two rows on one side of slender, solitary or digitate spikes. Glumes two, persistent. Rachilla disarticulating above the glumes. Lower floret hermaphrodite, lemma narrow, 3-nerved, apex usually 2-lobed and bearing an awn from the sinus; palea almost as long as the lemma, membranous, 2-keeled. Lodicules two, glabrous. Stamens three. Ovary glabrous, styles short, distinct; stigmas laterally exserted. Second floret male or barren. Lemma as in the fertile floret, but smaller. Palea, if present, membranous. Sometimes there is an empty lemma above the second floret. Grain linear or oblong, triquetrous, flattened, or concavo-convex.

Annual or perennial grasses, often with a creeping habit.

THE DIFFERENT KINDS OF CHLORIS GRASSES.

There are about eleven native species of *Chloris* grasses at present known in Queensland, and most of these are of some importance in the native pasture.

Two closely allied species are *Chloris divaricata* and *Chloris acicularis*. These, however, may be easily distinguished. *C. divaricata* is a small, fine-leaved plant which creeps along close to the ground. The young leaves are folded and the young shoots flattened. The spikes of the seed heads, too, are slender, weak, and somewhat flexuous. *Chloris acicularis,* on the other hand, has rigid, upright stems, and only

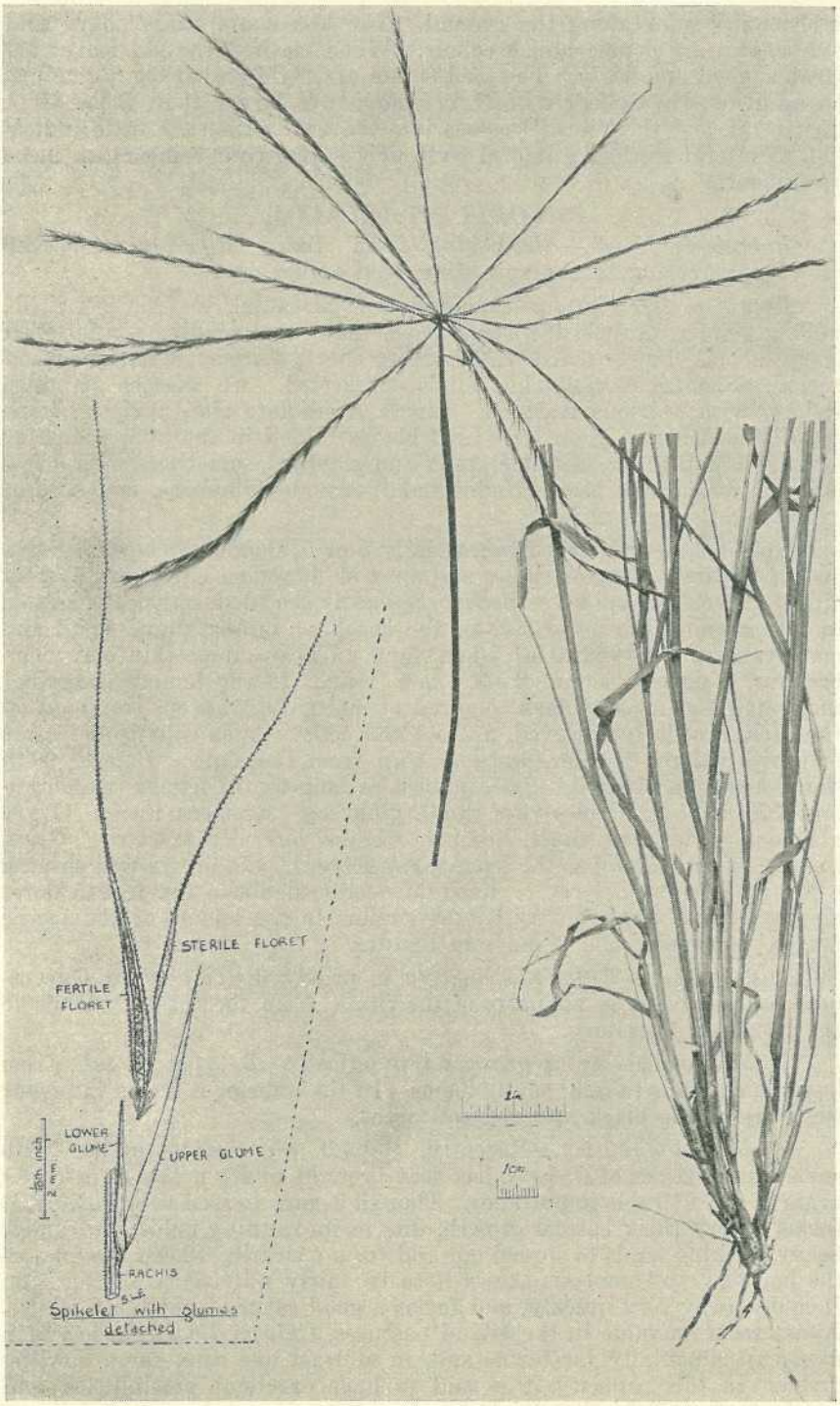

PLATE 173.
Chloris acicularis.

occasionally runs along the ground. The leaves are rather hard and coarse, and are a pale bluish colour. When mature, the old leaves are strap-shaped and curly. The seed spikes are rigid and stiffly spreading. In addition, the spikelets of *C. acicularis* are larger than those of *C. divaricata,* and the "husk" passes into the awn with very little indication of lateral teeth, the lateral teeth of *C. divaricata* being much more prominent.

CHLORIS DIVARICATA.

Botanical Name.—divaricata, from Latin *divaricatus*—spread asunder, referring to the spreading seed spikes.

Botanical Description.—Stoloniferous perennial, sometimes tufted; stolons slender, branched, rooting at the nodes and sending up flattened leafy shoots. Lower leaf sheaths rather short, distichous, flattened and keeled. Sheaths of flowering culms not keeled. All sheaths glabrous, striate, with scarious margins. Ligule a ciliolate rim, auricles short, bearded, sometimes glabrous. Leaf blades folded in the bud, folded or flat when mature, mostly pale green and glabrous, sometimes with a few long hairs near the base. Nodes and internodes glabrous, leaf sheaths exceeding the internodes.

Spikes 3-10 or rarely more, usually 5 or 6, slender, somewhat flexuous, spreading. Base of spikes and apex of flowering culm very shortly ciliate. Rachis of spikes scabrous. Spikelets crowded, imbricate, sessile, in two rows on the lower side of the rhachis. Lower glume small and membranous, 1-nerved, 0.5-1.5 mm. long. Upper glume thin and membranous, 1-nerved, acute, 2.5-3.5 mm. long. Lower lemma somewhat indurated and usually dark coloured at maturity, scabrous, rounded on the back, obscurely 3-nerved, up to 4 mm. long. Apex usually bidentate and with a long, slender, scabrous awn from the sinus. Lateral teeth short, acute, not awned. Palea almost as long as the lemma, membranous, 2-keeled. Lodicules two, small, glabrous. Stamens three. Ovary glabrous, styles two, short, distinct, stigmas laterally exserted. Grain linear, almost as long as the lemma, triquetrous, pale brown and shining when ripe; embryo large. Rachilla produced above the fertile floret and bearing a single empty lemma similar to the lemma of the fertile floret, but smaller and thinner in texture.

Distribution.—Chloris divaricata is widely distributed in Queensland and is found in all parts of the State, from the coastal islands to the Northern Territory.

Habitat.—This grass grows on practically all types of soil, from heavy black soils to light sandy loams. In the interior it seems to favour the edge of the black and red soil areas.

Fodder Value, &c.—Recently, *Chloris divaricata,* togther with some other species of *Chloris,* has been brought under notice as a fodder grass of considerable importance. Though it runs to seed very quickly, it forms a very thick bottom growth, due to its running habit, and under heavy stocking tends to spread out and form a sward. Sheep are fond of the herbage, and analysis shows it to be fairly nutritious. After rain it comes away very quickly, and forms a good cover of palatable fodder. Apart from its value in the inland pastures, *Chloris divaricata* has been used experimentally for lawns and, in at least one case, for a bowling green. In this capacity it is said to have excellent possibilities, and seems worthy of further trial.

Reference.—Chloris divaricata R. Br., Prod. i, 186 (1810).

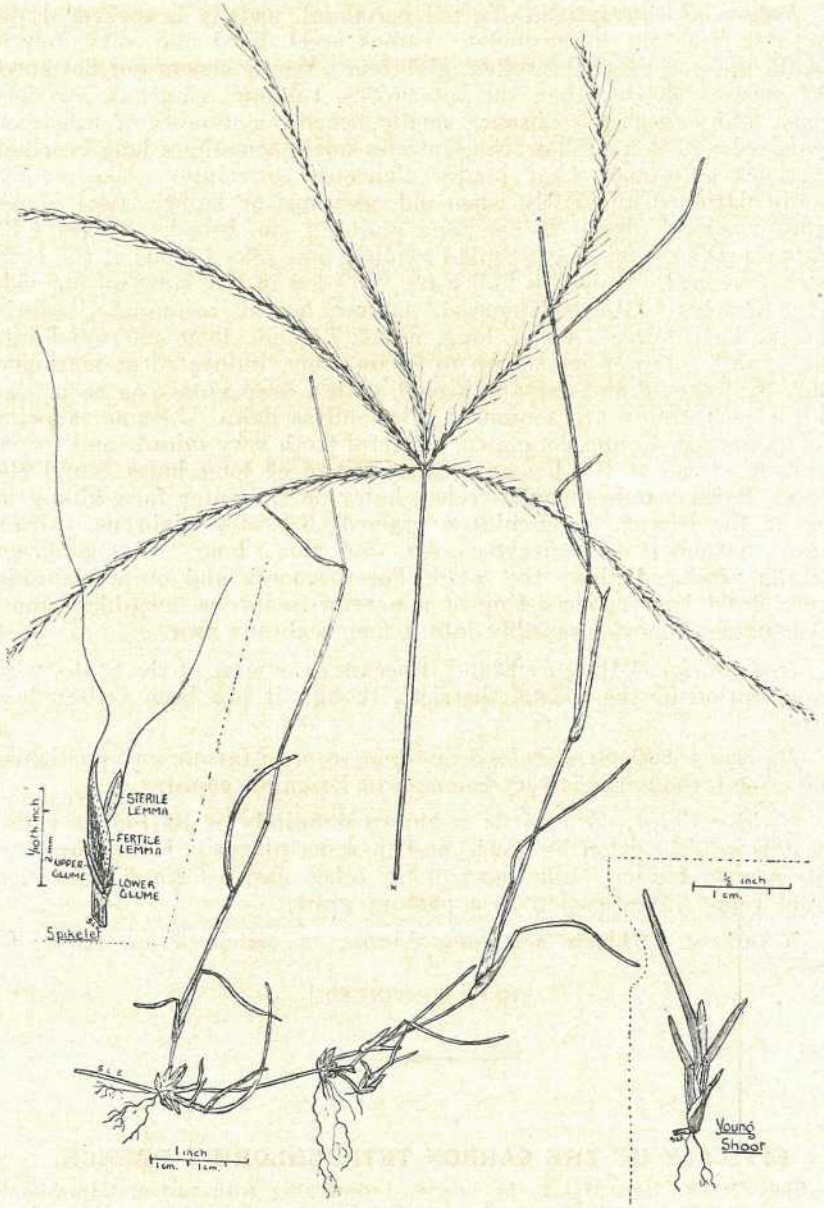

PLATE 174.
Chloris divaricata.

CHLORIS ACICULARIS.

Botanical Name.—acicularis, from Latin *acus*—a needle, referring to the needle-like lemma of the fertile floret ("seed").

Botanical Description.—Tufted perennial, usually branched at the base and from the lower nodes. Culms erect, hard and wiry, terete, smooth, nodes somewhat swollen, glabrous. Young shoots not flattened. Leaf sheaths shorter than the internodes, tubular, glaucous, strongly striate, and somewhat scabrous, usually bearing a number of tubercles. Ligule reduced to a ciliolate rim, auricles small, sometimes long bearded, sometimes glabrous. Leaf blades glaucous, convolute when young, usually flattened and curly when old, glabrous or hairy. Leaf blades strongly nerved, up to 20 cm. long and 0·4 cm. broad. Spikes 4-12, rigid and stiffly spreading. Spikes swollen, and silky villous at the base. Rhachis scabrid. Spikelets imbricate, crowded in two rows on one side of the rhachis. Glumes 1-nerved, narrow, keeled, acuminate, scabrid near the keel, lower 3-4 mm. long, upper 7-8 mm. long, narrowed into a fine point. Lower lemma up to 6 mm. long, indurated at maturity, scabrous, 3-nerved and dorsally keeled, with a deep groove on each face. Within each groove are a number of spinulose hairs. Lemma tapering into a scabrous, 15 mm. long awn. Lateral teeth very minute and inconspicuous. Base of the lemma with a fringe of long hairs round the callus. Palea membranous, 2-keeled, hairy on the outer face, almost as long as the lemma. Lodicules 2, stamens 3, ovary glabrous. Grain linear, flattened or concavo-convex, 5-6 mm. long, embryo large. Rachilla produced above the fertile floret, smooth and quite glabrous. Upper floret barren, consisting of a narrow, scabrous, awn-like lemma which passes almost insensibly into a fine, scabrous awn.

Distribution.—In Queensland it occurs over most of the State, with the exception of the coastal districts, though it has been collected at Gatton.

Habitat.—Chloris acicularis does not seem to favour any particular type of soil, though it is very common in Brigalow country.

Fodder Value, &c.—Little is known definitely of its fodder value, but it is readily eaten by stock, and in some places is looked upon as quite a good fodder. Like most of the other native *Chloris* grasses, it should repay investigation as a pasture grass.

Reference.—Chloris acicularis Lindl., in Mitch. Trop. Aust., 33 (1848).

[TO BE CONTINUED.]

EFFICACY OF THE CARBON TETRACHLORIDE DRENCH.

Since it has been stated that repeated drenching with carbon tetrachloride exerts an ill effect on the livers of sheep, the Director of Veterinary Research of the New South Wales Department of Agriculture recently conducted a field trial in collaboration with the Inspector of Stock at Glen Innes to determine the point. This trial showed that, even when drenched fortnightly with 2 c.c. of carbon tetrachloride, the sheep suffered no ill effects; in fact, they improved in condition. At the termination of the trial these sheep were sold for mutton, and there was no evidence of permanent damage to the liver.

Snapping Cotton.

By W. G. WELLS, Director of Cotton Culture.

THE term "snapping cotton" refers to the operation whereby the cotton crop is harvested by snapping off the entire cotton boll rather than by picking only the seed cotton out of the open boll. The custom originated in the north-western portion of the main cotton belt in the United States of America during periods of scarcity of labour. Only a small percentage of the crop usually opens before the first killing frosts are experienced in this district, and generally the temperatures are sufficiently low to kill the plant so that the bolls are brittle and come off easily with a snapping motion. Considerable difficulty was at first encountered in cleaning and ginning such cotton, but the cotton gin manufacturers, realising the probability of the custom becoming established, eventually devised machinery which cleans snapped cotton in a remarkable manner. This has resulted in snapping being used extensively in the United States wherever labour is scarce or the cost of picking is excessively high.

Snapping in Queensland.

No facilities for treating snapped cotton were available in Queensland until following on the purchasing of the ginneries and oil mill by the growers from the proprietary company which first established them, when modern cleaning machinery was installed at the end of the 1931-32 season in the Glenmore Ginnery, Rockhampton. Special arrangements were made with several growers to send in consignments of snapped cotton to test out the machinery, and the results obtained indicated that snapping could be practised to advantage. Accordingly, growers in the Upper Burnett and the Callide and Wowan districts were allowed to snap in the 1932-33 season, which was marked by very low rainfall—exceptionally light yields mostly being the rule. Much of the crop in these distrcts was snapped, and the results obtained indicated that the

method was entirely suitable for such dry conditions. The Whinstanes Ginnery was therefore equipped in the 1933-34 season in order that all the cotton-growers could snap their crops if desired.

Snapping Results in the 1933-34 Season.

The harvesting period of that season, however, experienced the wettest conditions over the whole of the cotton belt of any in recent years. Showery, cloudy weather interspersed with cool nights and heavy fogs made the plants so tough and leathery that they were unsuitable for harvesting the crop by the snapping method. The showery conditions also delayed the gathering of the harvest, and many growers made only one fairly heavy first picking and then snapped the rest. The result was most unsatisfactory. Not only was the cotton often damp, but the toughened leaf and burr—as the outer part of the opened boll is named—became so matted in the fibres that it was impossible for the machinery to clean the latter in a proper manner. When dry, properly snapped cotton was sent in, however, an excellent cleaning of the fibres was effected.

Snapping Suitable in Queensland.

Snapping undoubtedly has a place in the harvesting operations of the Queensland cotton-grower, but should he practised only when the conditions are suitable. These conditions are that the burrs must be dead and brittle, most of the leaf should have fallen off, and the burr and cotton must be dry. Snapping from green plants not only tears off pieces of the fruiting branches and strips of the green bark, but also green leaf is gathered with the cotton. Such material contains moisture, and when pressed tightly into a wool pack undergoes a "sweat" which tends to make the fibres stick to it so tightly that it is difficult to remove anything but the largest particles, such as the burrs and branches, during the cleaning operations. Another argument against snapping when the plants are green is that the grower pays for picking heavier foreign material, and the Cotton Board pays more freight charges than if the contents of the containers are all thoroughly dry. These are important economic factors, especially for growers with large acreages, for it must be remembered that the ginneries are equipped with driers, and where cotton is damp it is dried before it is weighed for payment.

In respect of picking and freight charges, growers should pay more attention to the quality of the snapping. During the 1933-34 season some consignments of snapped cotton came in which were of such low grade that they were not accepted. Such cotton contained not only an excessive amount of leaf, but a high percentage of empty burrs, the cotton of which had obviously been hand-picked earlier in the season. A large number of completely diseased bolls and hard worm-eaten dried-up bolls—or "hickory nuts," as they have been named—were also included. Growers allowing such snapping are simply paying excessive net harvesting costs for their cotton, and, in addition, the quality of the already low-grade lint is further lessened through the fibres becoming so badly mixed with the foreign matter that the cleaning machinery can remove only a small proportion of it.

What to Snap.

In normal seasons it is recommended that only the top crop be snapped. Usually the plants do not die sufficiently prior to the maturing of the top crop to make them suitable for snapping. Some growers follow the practice of leaving the crop open until a heavy first picking can be made and then waiting until frosts open the top crop, when everything on the plants is snapped. Unless only a very light second picking can be made, it is not recommended that this method be followed. In any variety of cotton the fibres in the top bolls are shorter than on the rest of the plant, and generally softer and weaker. Usually in Queensland the lint of the top crop also contains considerable yellow spot, caused by bacterial diseases entering punctures made in the green bolls by sucking insects. Where the late middle and top crop is snapped together, the grower undoubtedly loses the value of considerable cotton of much higher quality than that of the top crop. This was noticed in many consignments received at the ginneries in the 1933-34 season. Owing to the late, showery conditions a large percentage of the top crop was badly spotted. Growers who sent in dry cotton composed of the upper middle and top crops were disappointed with the grades they received, for much of the bolls had contained excellent cotton. The mixing with the spotted top crop, however, made the resultant lint so badly discoloured and of such wasty nature that only low grades and staples could be given it, although it was obvious that a high percentage of the fibres were of superior quality.

Varieties Suitable for Snapping.

It has been found in the U.S.A. that some varieties are much more suitable for snapping than others. Investigations are being carried out in Queensland by the Department of Agriculture and Stock to ascertain if similar differences occur here. Growers with more than one variety should study this point as well, to ascertain the effect of their own soils, and report their observations to the Department.

The ideal boll for snapping is one in which the burr comes away freely from the stem, by which it is attached to the fruiting branch. Such a boll if snapped after the leaves have fallen not only gives the minimum quantity of trash in the containers forwarded to the ginnery, but owing to the divisions breaking apart is easily separated from the seed cotton in the cleaning machinery. The grade of cotton snapped in such condition is generally practically equal to the grade that would have been obtained had the cotton been hand-picked. Spinning tests carried out in the U.S.A. have shown that the lint obtained from properly snapped cotton which has been treated with modern cleaning apparatus compares favourably with hand-picked cotton.

It is believed, therefore, that if growers pay greater attention to the points which have been touched upon, more satisfactory results will be obtained with the snapping method of harvesting. Most of the snapped cotton will naturally be of low grade in Queensland on account of the spotted condition of the lint of the top crop, which is the only part of the crop that should be snapped under ordinary conditions. This is well worth harvesting, however, especially where a grower has a large acreage, for the net value obtained will often be a substantial contribution, especially in seasons of late frosts.

Snapping may delay Preparation of New Seed-Bed.

It is pointed out, however, that growers should guard against snapping so late in the season as to delay the preparation of the seed-bed for the next crop. Rains generally occur during the first half of June in all the main cotton-growing districts, and every effort should be made to use this moisture to the fullest advantage in preparing the new seed-bed. July and August are mostly dry months, and on the older cultivations of the heavier clay loam or clay types growers frequently experience great difficulty in completing their ploughing if the start of the operation is delayed too long, especially men with large acreages. Experiments and the experiences of growers have demonstrated clearly the advisability of growing cotton in rotations with grass and fodder crops, and it is recommended strongly that where a grower with a large acreage practises snapping, a portion of the acreage for the next season should follow some crop that will allow of preparation of the seed-bed ahead of the June rains. This will allow of ample time to plough the portion following cotton, and will also reduce the effects of any delay in snapping the crop due to unfavourable climatic conditions, shortage of pickers, or any other detrimental circumstances.

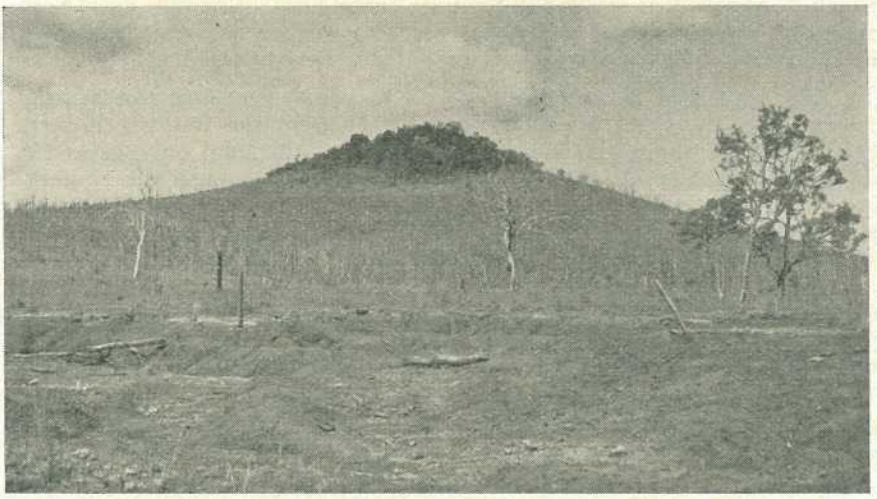

PLATE 175.

Erosion on a Queensland Farm.—Note deep gullies in course of formation on what was formerly level alluvial land.

Classing Cotton.

By R. W. PETERS, Cotton Experimentalist.

Historical.

What is the value of my cotton? is a query that has always concerned cotton growers the world over, when, having harvested the crop, they have forwarded it to the ginnery. In the early periods of cotton growing no attempt was made to evolve any standards which would allow of some rough estimate being placed on the value of any particular cotton. The crop was sold on a basis of bargaining, or in the case of fancy cottons, by contract between the grower and manufacturer. The rapid development of both the cotton growing and spinning industries became of such importance, however, that obviously some system of standards to assist in the selling of such an important commodity had to be developed.

The earliest records of cotton classing extend back to 1800, when cotton arriving at Liverpool, which was the centre of the cotton manufacturing world at that time, was identified by various terms which designated its quality and source of origin. Gradually this custom extended with modifications to other centres—especially the United States of America, where the bulk of the world's crop was produced. As cotton spinning was introduced into other countries new sets of terms originated, with the result that a large series of standards were operating at the various consuming centres.

It was realised eventually that some general uniform system should prevail, and accordingly the Department of Agriculture of the United States of America prepared a set of World's Universal Standards for American Upland cotton which were finally accepted by the Cotton Exchanges throughout the world. Approximately every two years the Officers of that Department prepare new sets of standards, which are passed upon by representatives of the various cotton exchanges, who meet in conference at the main classing rooms of the Department of Agriculture at Washington, D.C. Hundreds of copies of the sets finally agreed upon are then prepared for sale as reference types to purchasers of American Upland cottons.

These standards have greatly simplified the selling of American Upland Cotton and have also made it possible for the purchaser to buy cotton on description without the examination of actual type samples. Daily quotations of American cottons of the range of the World's Universal Standard Grades and of the various staple lengths are made in the main cotton exchanges throughout the World. It is thus possible to form a reasonably accurate estimate of the value of any American types of cotton as soon as the grades and lengths of fibres are known. This fact is of great importance to the Queensland cotton growers as only varieties of American cottons are grown here in any quantity.

Cotton Classing in Queensland.

As the cotton being grown in Queensland at the commencement of the present industry was of the American Upland type, the World's Universal Standards were adopted as a basis for the preparation and marketing of the crop, so that the grower could obtain the full value for

his produce. This method has been found suitable for Queensland cotton and is now used in grading it. The Queensland crop, being handled through a Commodity Pool, makes it necessary to class each container of seed cotton as it arrives at the ginnery, in order that an estimate of its quality may be made and an initial payment of around 80 per cent. of its value may be sent to the grower. This system of classing is carried out by a staff employed by the Queensland Government. The graders are mostly former qualified wool classers trained for several years by an experienced cotton classer, who had classed types of cotton similar to those grown in Queensland, not only in Liverpool but also in the United States of America.

PLATE 176.
Ripe for the Harvest.—A Field of Cotton, Mundubbera.

When the container of seed cotton arrives at the ginnery the contents are examined by a grader, who first determines the grade and then the length of the fibres, or staples it, as the operation is termed. Each container is then weighed, check weighed and checked against the amount of cotton the grower states on his advice note that he is sending to the ginnery, after which it is segregated into the proper stack for ginning according to the grade, staple, and variety. When the cotton is being ginned two samples are drawn from each 500 lb. bale of lint in such a way as to represent the average contents. These samples are sent to the classing room, where they are graded and stapled under an even light. Every bale is classified against a set of lint standards of Queensland cotton which is based on the key set of Universal Standards for American cotton that are obtained from the United States Department of Agriculture every time new reference sets are made. The average contents of each bale of lint are thus known, and also the grade and staple of each container of seed cotton from which the bale of lint was obtained. This enables the grader of the seed cotton to check on his classifications throughout the season, and thus ascertain if the seed cotton is producing lint of the quality he has estimated.

When the system of grading the Queensland crop was first started it was believed that it would be more equitable for all concerned if rather broad grades of seed cotton were used rather than try to class exactly to the lint grades of the Universal Standards. The resultant bales of lint were classed according to these Standards, though, with fairly satisfactory results. Certain weaknesses in the system have become apparent, however, with the expansion of the industry. Accordingly, as the new Commonwealth Bounty Scheme, which came into force with the harvesting of the 1934-35 crop, necessitates the establishment of a set of grades for lint cotton, a new system has been inaugurated whereby the lint of each container of seed cotton arriving at the ginnery will be classed in terms of the grades used in the

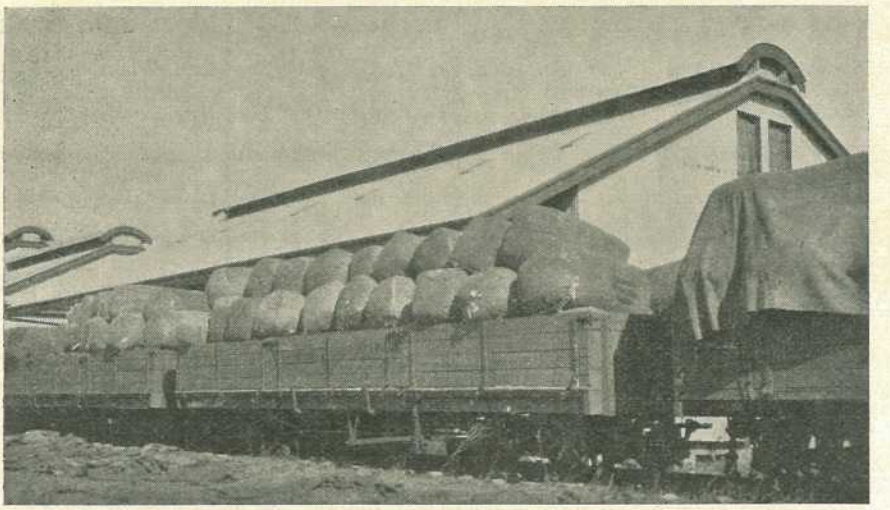

PLATE 177.

Queensland cotton arriving at the ginnery. Second-hand wool packs are used for sending in the bulk of the crop. On an average 500 to 550 lb. of seed cotton is packed in each bale.

Universal Standards. This will be a decided improvement over the old system, for in some of the grades of seed cotton previously used cottons of a wide range of quality were paid for at the same rate. Under the new system the grower will receive a price for his cotton which will be directly commensurate with that realised from the ginned consignment. There will thus be every inducement to produce cotton of good quality.

Queensland Grades.

Although the World's Universal Standards for American Upland cottons are the basis for the classing of Queensland cotton, it has been found necessary to deviate from them somewhat on account of the tendency for a considerable proportion of the Queensland crop to contain more spot than the Universal Standards will allow in the white grades. Accordingly the Queensland crop is classed into white, light spotted, and yellow spotted grades, the white grades being equivalent to the Universal Standards in all respects, with the light spotted having the same amount of colour, trash, or foreign matter as the white

grade but containing more spot. The yellow spotted grades also contain the same amount of trash as their comparable white grades but have a decided yellow tinge and may also be of softer cotton than allowable in the mature white grades. The following grades are used in classing the Queensland crop—Middling Fair being the highest and Ordinary the lowest grades:—

White Grades.	Light Spotted.	Yellow Spotted.
Middling Fair	..	..
Strict Good Middling	S. G. M. light spotted	..
Good Middling	G. M. light spotted	G. M. yellow spotted
Strict Middling	S. M. light spotted	S. M. yellow spotted
Middling	M. light spotted ..	M. yellow spotted
Strict Low Middling	S. L. M. light spotted	S. L. M. yellow spotted
Low Middling	L. M. light spotted	L. M. yellow spotted
Strict Good Ordinary	..	..
Ordinary	..	..

Factors Determining Grades.

The factors determining the grade of a sample of cotton may be roughly described as—colour, amount and nature of foreign matter contained, and in lint cotton, the condition in which the ginning has left the fibres. All of the grades higher than Strict Middling must be of good colour and have a decided "bloom" or freshness of appearance. Each successively lower grade than Strict Middling becomes progressively duller of colour until the lowest is of a greyish appearance. There is a comparable scaling down in the amount of trash, leaf, etc., in the different grades, the Middling Fair carrying practically no foreign matter, while the Ordinary is well mixed with both large and small pieces of leaf, burrs and bits of seed. All of the grades above Strict Middling can carry but very little fine spec or "pepper leaf" as it is called. The ginning effect on the fibres is most important for the different lengths of fibres have to be ginned at different rates of feeding of the seed cotton to the gin-saws. Where this is not carried out properly much cutting of the fibres occurs, especially if the fibres are of a softish character or are damp either from rains or from being "green" as cotton is called, that has been picked too soon after the bolls have opened. Gin cutting or ginning when the cotton is damp gives a very wasty, uneven appearance to the lint and a bale of such quality is penalised, for in the spinning operations a high percentage of loss is obtained.

Character of Cotton Fibres.

Another factor taken into consideration when grading or valuing cotton is the character of the fibres. This term, broadly speaking, is based on the strength, body, drag, or twist of the fibres and the degree of neppiness of them. The fibres of a cotton of "good character" are

of good strength and body, have a decided drag when a sample is broken apart and contain very few "neps." The latter term is used to describe small bunches of fibres which tend to roll up and mat together so tightly that the spinning machinery cannot straighten them out. Generally speaking, a cotton of good character gins and spins well. A cotton of poor character, on the other hand, does not gin well, for it generally becomes of a very wasty appearance, with many gin cut, shortened fibres and a large amount of neps. Such cottons usually are the result of either growing unsuitable varieties or of adverse environments, such as lack of proper cultural methods and exceptionally dry hot conditions.

Stapling Cotton.

Stapling cotton means to obtain the average length of the bulk of the fibres. This is an operation which requires years of practice for one to become thoroughly proficient in it. An experienced classer can usually form a very close estimate of the working length of the fibres and in the course of making the determination also notices the amount of waste, neps, short fibres and uniformity of the bulk of the fibres. Generally cottons are measured in 1/16th of an inch gradations although in very uniform cottons it is possible to staple to 1/32 of an inch.

Points for Growers to Observe.

Much depends upon the individual grower, especially during the process of harvesting, as to what his cotton will be worth and every factor adversely affecting the quality of the lint should be guarded against. When packing a container every care should be taken to have only one grade and staple in it. A bale of lint is sold on the basis that it is of a uniform content. If there is decided variation of quality encountered it is purchased on the value of the lowest grade and shortest staple contained. Many large growers allow pickers to empty their picking sacks directly into the wool pack, and where this is done layers of markedly different grades often result, owing to the variation in quality of picking. It is recommended that a grower should grade his crop into at least three grades, such as clean, leafy, and stained, with a wool pack for each. As each picker brings his cotton forward for weighing, it should be graded and then emptied into the proper container. If such a system was practised generally the grower would often obtain a better value for his cotton, and more regular cotton would be fed to the gins, which would assist in the greater production of uniform bales of lint. In the United States of America the custom is to empty picker's bags into a waggon, distributing the contents over the whole surface, thereby obtaining an even blend. On arrival at the ginnery the seed cotton is taken out of the waggon by means of a movable suction spout, which results in an additional blending. It can be seen, therefore, that more attention should be paid here to sending in containers of uniform content.

Some growers seem to think it desirable to pack their bales as heavily as possible, especially when transport charges are high. It is pointed out, however, that when the bale is packed so tightly a certain amount of sweating occurs with the result that not only does the cotton open up in a hard cake-like mass which is difficult to blend, but the fibres are so embedded into any foreign matter that it is difficult to free them of it in the ginning process.

Undoubtedly growers should pay close attention to the points which have been touched upon. The present carry-over of large stocks of cotton in various parts of the world, and the intense competition which is going to take place between cotton producers in the future, make it imperative to produce the best possible cotton and prepare the finished product in the most satisfactory manner, in order to compete profitably on the world's market. Countries failing to do this will be marketing at a disadvantage. This is especially true regarding Queensland cotton, with the high transportation charges and the amount of the crop that will normally be exported.

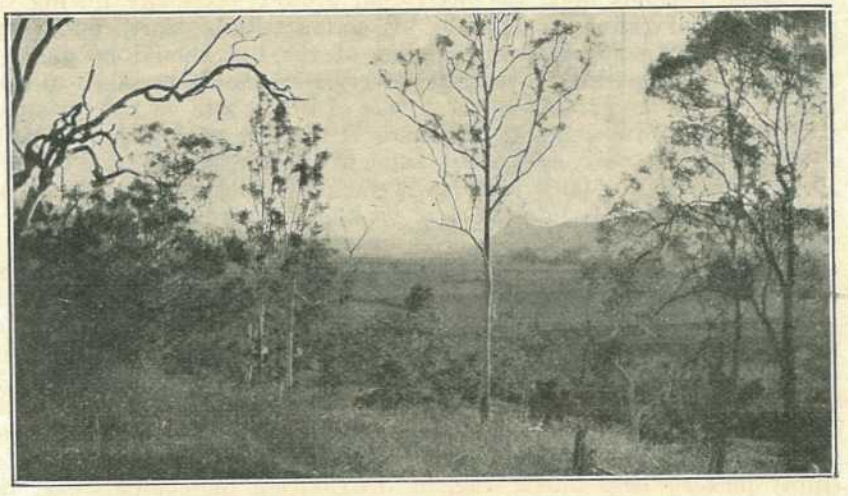

PLATE 178.
Amid the Farmlands of Fassifern.

THE dry conditions obtaining throughout the agricultural districts during March have continued and, at the time of writing, rain is urgently required to freshen the pastures and permit the cultivation and sowing of land for winter crops. The absence of any normal wet season rains has caused the usual seasonal decline in dairy production to become more pronounced. Lucerne cuttings have been light, and as a result of the demand for fodder occasioned by the serious drought in the western pastoral districts prices have risen considerably.

Maize.

Some good crops are being harvested in the Mary Valley and similar favoured areas, but elsewhere yields will be below normal. Many crops failed for grain purposes, and were therefore utilised for fodder. Excellent prices are being received, and growers who were able to store the grain in tanks are now reaping the benefit.

Fodder Conservation.

This subject crops up periodically during periods of scarcity, to be again allowed to lapse with the return of good seasons. It is quite impossible to ensure a continuity of nourishing feed without conserving fodder, or, in the more favoured districts, by laying down improved pastures. High quality wool, mutton, and beef can be produced if stock are not allowed to suffer periodical setbacks in their condition. Experienced western partoralists consider it impracticable to conserve bush hay during good seasons, owing to the sparseness of the native grasses, the large areas and numbers of stock to be dealt with, and the difficulty of obtaining labour. Consideration, however, could be given to the purchase of commodities such as lucerne hay and maize during normal years when prices are not unduly high, and to their storage at the point of consumption, or, alternately, to the purchase of rich farm lands by the pastoral organisations, who could then engage in the regular production of their requirements. This should be preferable to buying grain and fodder at exorbitant rates during drought periods.

Wheat.

Land is now receiving the final preparation prior to sowing when weather conditions permit. Cultural operations have been considerably retarded, owing to the dry conditions making the land too difficult. Fortunately the sowing of suitable varieties may be extended to July, the chief difficulty at present being the sowing of crops for winter feed. The sowing of winter grasses and clovers has been similarly retarded, which is unfortunate in view of the increasing attention now being given to this practice.

The census of wheat varieties grown during the 1934-35 season shows that Florence has retained its position as first favourite, the five chief varieties being as follows:—

Variety.	Acres.	Percentage of Total Crop.
Florence	46,682	16·27
Three Seas	44,924	15·67
Flora	33,951	11·84
Gluyas	24,392	8·51
Pusa	23,388	8·15

Three Seas has increased its area and will probably exceed Florence in the near future owing to its comparative freedom from rust and ability to yield heavily on a variety of soils. However, the quality of the grain is inferior to Florence or Flora.

Sugar.

With the exception of the Burdekin, weather conditions throughout the sugar areas during April were showery and cool. While soil moisture was generally satisfactory, the reduced temperatures were not conducive to vigorous crop growth. This month, preliminary crop estimates will be prepared; on the present prospect it is probable that the total tonnage for the coming harvest will be substantially less than that of the 1934 season.

Tobacco.

Most of the crops in the Texas, Inglewood, Miriam Vale, and Bundaberg districts have been harvested, and many of the growers are commencing grading operations. In the northern areas where adverse conditions were experienced with early plantings, crops now give promise of returning good yields. Splendid rains received in most of the districts at the end of February entirely altered the position, the early planted crops which were either dying off or prematurely ripening, filled out and the resultant cures are turning out satisfactorily. The late planted crops have made excellent growth and given fair conditions from now on will give excellent yields provided an early winter does not intervene and with it the usual curing difficulties. The long period of dry weather experienced in the early part of the season has been very beneficial in checking disease.

Cotton.

Dry and rather warm weather has mostly ruled throughout the main cotton-growing district during the past three months. Such conditions have greatly curtailed the crop prospects which appeared likely to be realised at the end of January. The plants were then generally

so very heavily laden that good rainfall was required for the rest of the season to develop the crop. The dry conditions which prevailed, however, caused a general loss of top crop and hastened the maturing of the bolls developed. Picking started in mid-February and has continued practically unabated through weather conditions very favourable for obtaining high grades. The picking tallies have generally been good, particularly in the big-boll medium staple varieties which have been distributed in increased quantities this season. Although the average yield per acre will probably be less than that of last season, when a record crop was produced, it is anticipated that a total yield approaching the previous one will be obtained as a greater acreage has been reported by the growers at mid-season as having prospects of producing yields.

The seasonal conditions have again demonstrated what an important part cotton should play in the cropping system of most of the agricultural districts away from the immediate coastal conditions. In most of these areas, particularly in the more inland ones in the Burnett and Central Districts, all fodder and grain crops have suffered most severely from the adverse conditions, while cotton crops, although checked, have yielded well enough generally to produce returns covering the costs of production or better. With one soaking rain at mid-January the average cotton yields would have been most appreciably increased while only moderate improvement would have been effected in other crops.

Crossbred Lambs.

Approximately 2,000 lambs raised under the Departmental scheme and sold in the open market, brought 4s. per head more than merino lambs of the same age. The average price of crossbred lambs four and a-half months old drawn from thirty farms was 17s. 8d; Border Leicester, Southdown Lincoln, Romney Marsh, Dorset Horn, and Shropshire rams were utilised, mostly from Southern Studs. These results are encouraging and farmers will be keen to experiment further with the various crosses with the merino.

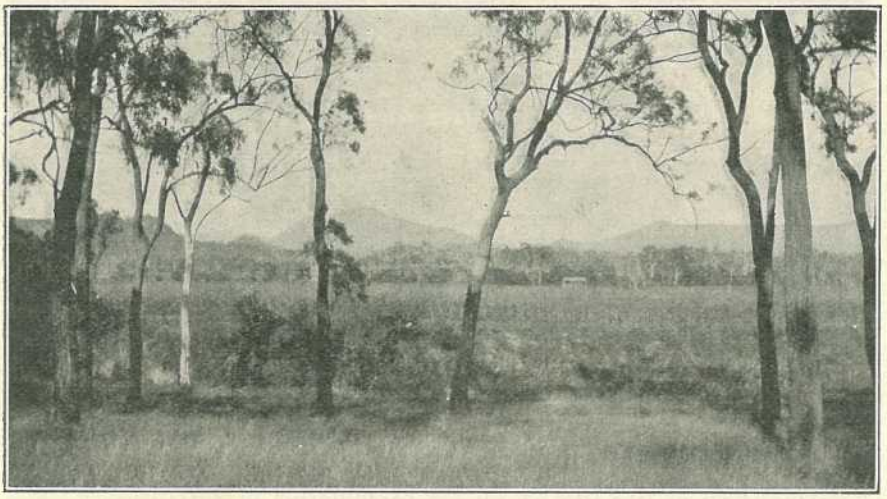

PLATE 179.
A Field of Maize below the Range.

Ulcerative Spirochætosis of Pigs.

By K. S. McINTOSH, H.D.A., B.V.Sc.

RECENTLY several cases of the above disease have been brought to the notice of this Station. Apparently it is the first time that the condition has been definitely diagnosed in Queensland and the object of this article is to supply pig owners with all the available information concerning the disease.

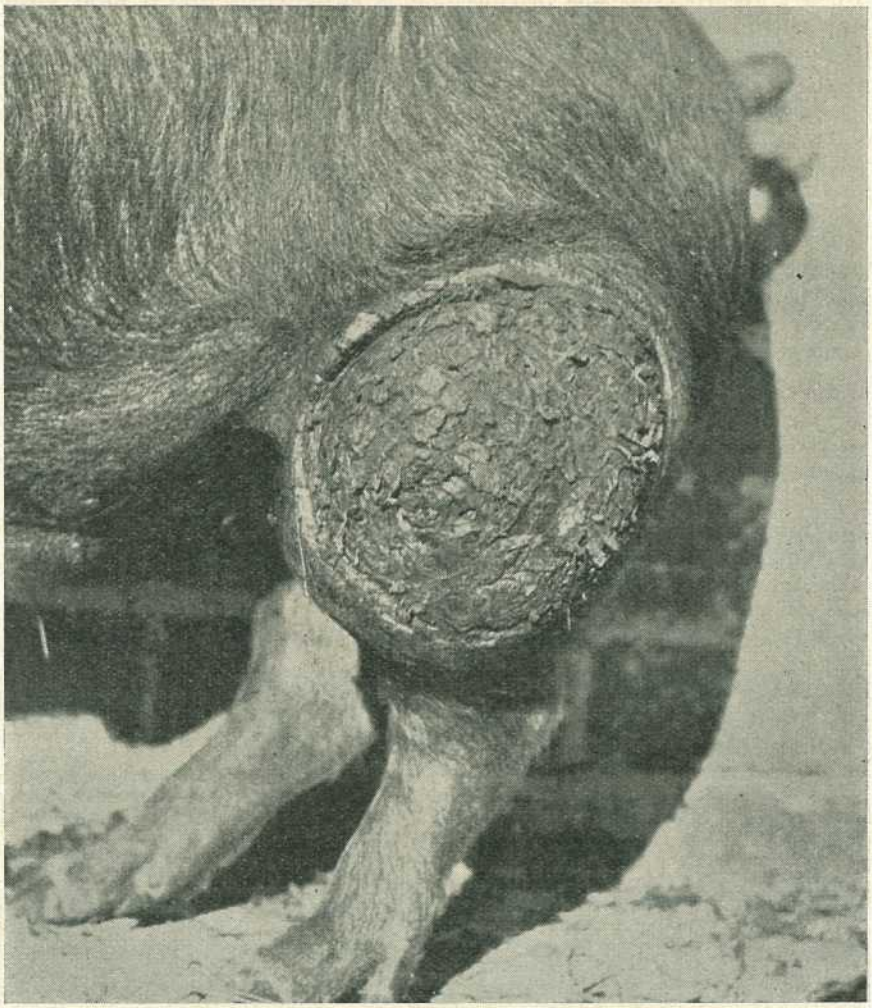

PLATE 180.
A typical skin lesion of Ulcerative Spirochætosis.

Mr. A. L. Clay, B.V.Sc., District Veterinary Officer at Cairns, was the first to make a tentative field diagnosis of the condition, which was confirmed at this Station on the examination of specimens.

The disease has also been diagnosed in material forwarded from Boonah.

Following this, a live pig affected with ulcerative spirochætosis was forwarded from the Maleny district and Mr. J. C. J. Maunder, B.V.Sc., Veterinary Officer, reported that fifteen pigs on a property in the Gayndah district were affected.

It is impossible to estimate the extent to which spirochætosis is present in Queensland at the present juncture. In New South Wales the condition is not at all uncommon.

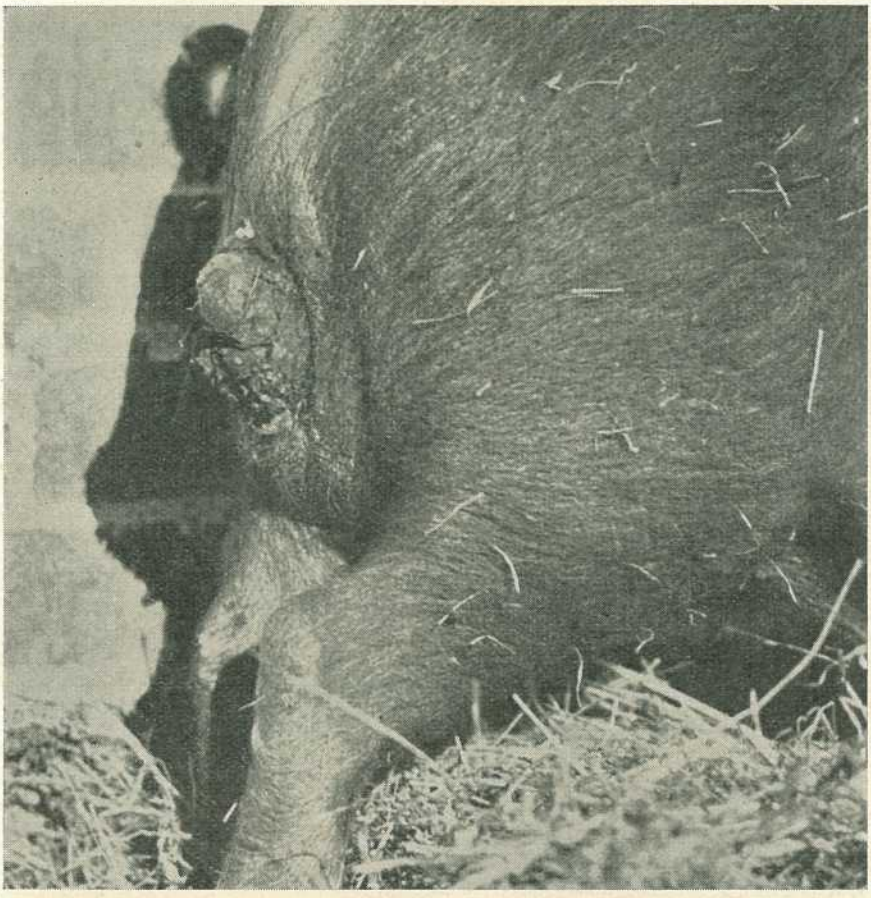

PLATE 181.
Ulcerative Spirochætosis of castration wound. Note the protruding mass of "proud flesh."

Cause of Ulcerative Spirochætosis.

As the name denotes, the disease is caused by a spirochæte or spiral-shaped germ.

Apparently the germs gain entrance to the body through wounds and scratches of the skin or deeper structures. It is not uncommon to find the sockets of the teeth affected when the milk teeth are being shed, and it is frequently seen causing large abscesses following castration.

Other organisms are also present but are regarded as secondary invaders and not the primary cause.

Symptoms and Lesions.

When the spirochæte gains entrance to the tissues it seems to remain more or less localised. A swelling which appears in the skin and underlying tissues gradually enlarges, finally bursts, and a dirty

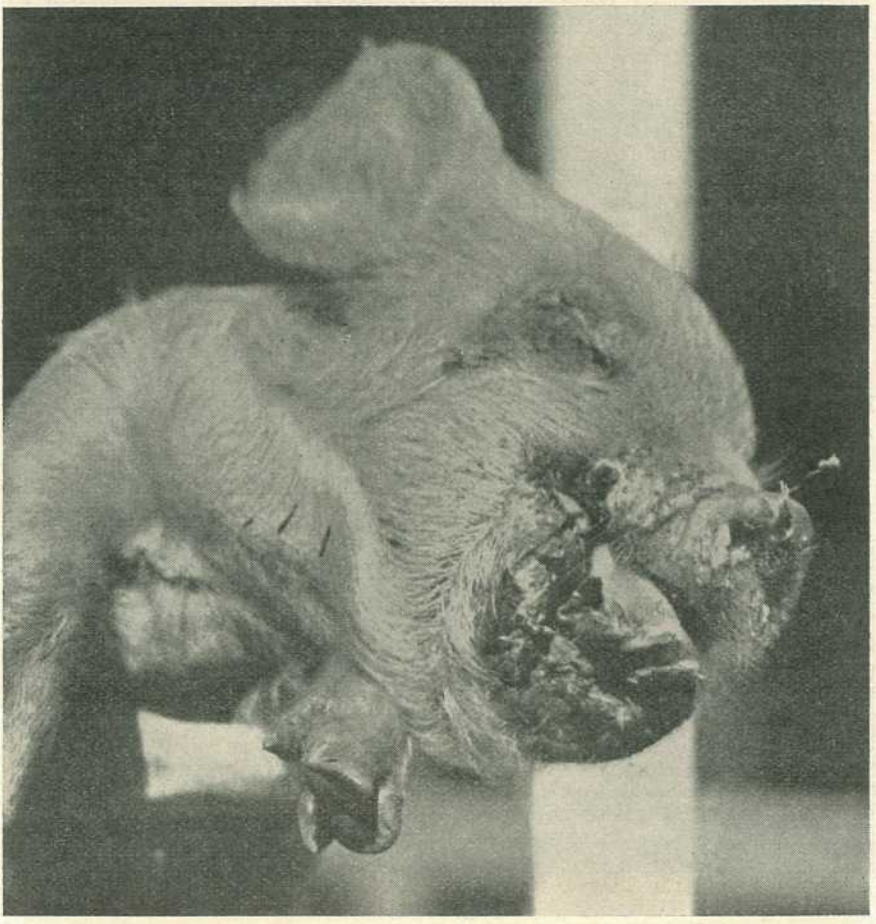

PLATE 182.
Sucker with mouthparts affected with Ulcerative Spirochætosis.

greyish pus is exuded. The ulcer so formed does not heal but gradually extends and becomes covered with a dark granular scab, usually adhering fairly firmly and having under it the pus already described. This lesion may be anything up to 6 to 9 inches in diameter. There is considerable new tissue, fibrous tissue, and dead flesh formation as a result of the chronic inflammation and the base of the ulcer is often fairly firm, but sometimes the pus extends inwards and affects the deeper structures also.

In the case of infection of the jaws during the shedding of teeth, the jawbone is attacked, resulting in channels of pus, dead bone, and loosening of teeth. The tongue often becomes ulcerated and large pieces of it may slough off altogether.

In the case of young pigs the disease is often fatal, but the older ones usually recover.

Control.

At the present time it is difficult to recommend any efficient method of treatment or control. Howarth, of the Californian Agricultural Experiment Station, recommends the incision of the castration swelling, or removal of the masses of dead flesh from the skin lesions; then dusting the cavity or skin lesions with a substance called tartar emetic. The inside of the cavity or the surface of the skin lesions should be covered with powder, but care should be taken in the case of castration wounds not to leave an excess of the powder in the cavity, lest absorption and poisoning should occur.

The disease is generally though not always associated with dirty, unhygienic, and badly managed piggeries.

In view of this and the fact that the disease is caused by a specific germ, the following control measures should be adopted:—

1. Isolate all pigs affected with the disease.

2. Clean and disinfect the yards, houses, troughs, &c., and keep them clean.

3. Do not use wallows or badly drained sties. Suckling sows and litters more especially should not be allowed access to mud and filth as the disease is particularly serious in young pigs.

4. Be particularly clean in the operation of castrating and keep the castrated pigs in a scrupulously clean place until the wounds have healed.

5. Discontinue the use of barbed wire about the yards, as this often produces wounds through which the germs may enter.

6. If lice are present apply crude oil to the skin of the pigs to destroy these parasites.

TO SUBSCRIBERS—IMPORTANT.

Several subscriptions have been received recently under cover of unsigned letters. Obviously, in the circumstances, it is impossible to send the journal to the subscribers concerned.

It is most important that every subscriber's name and address should be written plainly, preferably in block letters, in order to avoid mistakes in addresses and delay in despatch.

Litter Recording of Pigs.

SOME pig raisers are now carrying out litter recording and the results obtained are considered most valuable. The records of two litters, which were officially checked by officers of the Department recently, are so good that they should be interesting to all pig raisers.

Litter Record.

Owner—Hibberd Bros., "Grenier Park," Gold Creek, Indooroopilly.
Dam of Litter—"Gatton Pet,"—Large White.
Sire of Litter—"Norfolk Barron 2nd,"—Large White.
Litter Born on 21st February, 1935.

Tattoos.	40	41	42	43	44	45	46	47	48	49	50	51	52	53	Total.	Average.
Sexes.	B	B	B	B	S	S	S	S	S	S	S	S	S	S		
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Weight at birth ..	3	3	2	2	1½	1½	2	2	2½	3	2½	3	3	3	34	2·4
Weight at 1 week	8	6½	4	4½	*	*	4½	3½	5	6	5	7	6½	6½	67	5·5
Weight at 2 weeks	14	10½	6	10	..	..	7	8½	9	9	8	10	9½	12	113½	9·4
Weight at 3 weeks	16½	13½	9½	10½	..	..	10½	8½	10½	13½	11½	13½	13½	13½	145	12·0
Weight at 4 weeks	19½	17½	12	14½	..	..	14	10½	13½	15½	13½	18½	16½	18	183½	15·3
Weight at 5 weeks	28	23	15½	20	..	..	17	14	17½	21	19	21	22	24½	242½	20·2
Weight at 6 weeks	34	28	17	26	..	..	21	18	21½	26	23	26	26½	29	296	24·6
Weight at 7 weeks	45½	39½	24½	33½	..	..	27	24½	30	32½	28	34½	32½	37½	389½	32·5
Weight at 8 weeks	53	47	29	41	..	..	34	29	37	38	36	42	41	46	473	39·4

* These pigs died on 22nd February, 1935.

Total Litter Weight at 8 weeks:—473 lb.
Average weight per pig at 8 weeks:—38·6 lb.
This was the sow's second litter, she having reared 10 pigs in her first litter.

Litter Record.

Owner—H. O. Rees, "Cethor" Stud, Maleny.
Dam of Litter—(Unnamed)—Middle White.
Sire of Litter—"Gladesville Prince"—Middle White.
Litter born on 21st February, 1935.

Tattoos.	19	20	21	22	23	24	25	26	27	28	Total.	Average.
Sexes.	B	B	B	B	B	B	B	S	S	S		
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Weight at birth	3	3	2½	3	2½	2	1½	3	3	3	26½	2·6
Weight at 1 week	6	7	5	6	5	5	4½	6	6	6½	57	5·7
Weight at 2 weeks ..	8	10½	7½	9	8	7	6½	9½	8½	9	83½	8·3
Weight at 3 weeks ..	10	14	11	13	11	10	9	13	12	12	115	11·5
Weight at 4 weeks ..	15	20	17	19	16	14	14	19½	16½	18	169	16·9
Weight at 5 weeks ..	20½	26	24½	21½	21½	17½	19½	26½	21½	21	220	22·0
Weight at 6 weeks ..	26	31	31	29	27½	23	23½	32½	28	26½	278	27·8
Weight at 7 weeks ..	31	36	38	34	33½	28	28	38	31	33	330½	33·0
Weight at 8 weeks ..	37	42	42	43	39	33	32	44	36	38	386	38·6

Total Litter weight at 8 weeks:—386 lb.
Average weight per pig at 8 weeks:—38·6 lb.
This was the sow's first litter.

Field Day for Dairy Farmers

Gathering at Glencoe.

THE initial field day for dairy farmers of the Darling Downs was organised by the Glenorie Local Producers' Association under the Dairy Committee Scheme of the Dairy Cattle Improvement Act on the 16th April, at the farm of Mr. W. F. Kajewski, at Glencoe.

Among the fifty farmers present were representatives of the Glenorie, Kingsthorpe, Yalangur, and Boodua Dairy Committees.

A feature of the day was the parade of Mr. Kajewski's well-known A.I.S. herd. It included the head sire of his stud, the cows which were champions at Toowoomba Shows for 1934 and 1935, heifers which have been prize-winners at Downs Shows, and a number of splendid young stock. Not only are the animals prize-winners, but they have shown their worth in production by their entry into the advanced register of the A.I.S. Society.

Mr. C. F. McGrath, Supervisor of Dairying, outlined the objects of the Dairy Cattle Improvement Board in instituting field days and the lessons that can be learned from them.

He also ably demonstrated the points that a judge considers when cows are in the show ring, and by using several cows from the herd showed where they differed and how they would be placed if in competition.

Mr. O. St. J. Kent, Dairy Science Officer, gave an address on dairy hygiene. He dealt principally with the importance of cleanliness in the production of milk, and the care of cream on the farm in relation to quality in butter.

Demonstrations with the microscope revealed various organisms which have a harmful effect on dairy products.

Mr. G. B. Gallwey, Inspector of Accounts, spoke on marketing and allied subjects. Special attention was given to over-run and the factors which govern it. The operations of the Commonwealth Stabilisation Scheme were outlined.

Diagrams showing the imports of the various countries to Great Britain and the production and sales of the Australian States were explained.

Mr. C. R. Mulhearn, Veterinary Officer, gave an address on Mammitis and held a post-mortem examination on a cow. He explained the functions of the organs of the animal, pointing out where and what to look for in the common diseases of dairy stock. Many questions were asked and satisfactorily answered.

At the conclusion of the day Mr. W. Dearling, on behalf of the Glenorie L.P.A., thanked the officers of the Department for their attendance and the valuable and interesting information which they had imparted to those present. He also thanked Mr. Kajewski for allowing the L.P.A. to use his farm.

Mr. J. C. Brimblecombe, on behalf of the other L.P.A.'s, expressed appreciation of the fact that the Department had officers who were not only versed in the theory of their subjects but could carry out the practical work as well.

Mr. McGrath returned thanks and said that the Department was always willing at any time to render assistance to the farmer.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Book of the Australian Illawarra Shorthorn Society, the Jersey Cattle Society, production charts for which were compiled for the month of March, 1935 (273 days period unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORNS.				
MATURE COW (OVER 5 YEARS), STANDARD 350 LB.				
Lucky 2nd of Wendella (365 days)	J. Phillips, Wondai	16,930·34	711·712	Daisy's Westbridge of Glenthorn
Glenlee Moreen	R. Martin, Coalstoun Lakes	12,948·00	614·484	Perfection of Springdale
Upton Pidgeon 16th	H. F. Marquardt, Wondai	14,253·87	518·695	Kinsman of Greyleigh
Ada II. of Rockleigh	T. S. Strain, Wondai	11,043·94	451·099	King of Sunnyside
Happy Valley Myrtle 3rd	R. R. Radel, Coalstoun Lakes	9,631·00	394·767	Chief of Hillview
Valencia Dahlia	W. Turner, Riverleigh	9,633·5	390·5	Young Challenger of Blacklands
Rhodesview Nancy 5th	W. Gierke & Sons, Helidon	9,555·32	389·00	Birdwood of Blacklands
SENIOR, 4 YEARS OLD (OVER 4½ YEARS), STANDARD 330 LB.				
Alfavale Model II.	W. H. Thompson, Nanango	12,229·6	561·433	Reward of Fairfield
JUNIOR, 4 YEARS OLD (UNDER 4½ YEARS), STANDARD 310 LB.				
Wandegong Daisy	G. D. Lindenmayer, Mundubbera	11,552·75	396·337	Emperor of Spurfield
Aurora Johnny	Mrs. L. J. McCauley, Mundubbera	8,486·25	341·201	Jeans Reflex of Blacklands
SENIOR 3 YEARS (OVER 3½ YEARS), STANDARD 290 LB.				
Sunnyview Evelyn II.	J. Phillips, Wondai	12,994·29	483·603	Lovely's Commodire of Burradale
Rocklyn Daphne	T. S. Strain, Wondai	10,196·61	398·877	King of Sunnyside
JUNIOR, 3 YEARS OLD (UNDER 3½ YEARS), STANDARD 270 LB.				
Ruby VII. of Lemon Grove	J. Phillips, Wondai	11,677·03	528·63	Don of Greyleigh
Morden Favourite 6th	R. Mears, Toogoolawah	10,751·3	442·476	George of Nestles
Miss Jean 7th of Blacklands	A. Pickels, Wondai	9,415·89	324·903	Major of Blacklands

SENIOR, 2 YEARS OLD (OVER 2½ YEARS), STANDARD 250 LB.

Rhodesview Fanny 20th	W. Gierke & Sons, Helidon	8,342·85	331·669	Blackland's Prospector
Trevor Hill Snowball	G. Gwynne, Umbiram	6,532·1	262·065	Viceroy of Wilga Vale

JUNIOR, 2 YEARS OLD (UNDER 2½ YEARS), STANDARD 230 LB.

Rhodesview Kitty 7th	W. Gierke & Sons, Helidon	8,360·53	354·243	Blacklands Prospector
Trevor Hill Marigold	G. Gwynne, Umbiram	7,945·6	332·149	Viceroy of Wilga Vale
Chelmer Dahlia	H. F. Marquardt, Wondai	8,428·94	322·303	Gordon of Swanlea
Ettie 8th of Blacklands	A. Pickels, Wondai	9,046·34	319·122	Major of Blacklands
Hillfield Dulcie 3rd	S. J. Lester, Roadside	6,543·01	272·497	Mountain Home Royalist
Rocklyn Pearl	J. Reeves, Kingaroy	6,302·4	251·819	Oakvilla Don
Springland's Rosebud 4th	J. Reeves, Kingaroy	6,653·9	249·852	The Hill Hollywood

JERSEY.

MATURE COWS (OVER 5 YEARS), STANDARD 350 LB.

Bellefaire Claire de Lune (365 days)	J. B. Keys, Gowrie Little Plains	11,537·16	630·086	Masterpiece Yeribee of Bruce Vale
Petal of Linwood	F. W. Kath, Ellesmere	7,020·5	436·809	Aerofoil of Banyule

SENIOR, 2 YEARS (OVER 2½ YEARS), STANDARD 250 LB.

Glenview Starlight	F. P. Fowler & Sons, Biggenden	6,115·00	364·496	Trinity Officer
Inasfayl Fancy Larkspur 2nd	McGeehan Bros., Kairi	5,860·05	322·277	Werribee Starbright's Masterpiece 2nd

JUNIOR, 2 YEARS (UNDER 2½ YEARS), STANDARD 230 LB.

Woodside Volunteers Countess	J. & R. Williams, Crawford	8,923·45	425·467	Rochette's Volunteer
Inasfayl Golden Maid	McGeehan Brothers, Kairi	6,482·95	296·819	Inasfayl Wyandotte's Noble
Kathleigh Pearl	D. Young, Kingaroy	5,757·55	291·604	Aerofoil of Banyule
Rosette of Curramore	R. M. Burnett, Maleny	5,178·45	281·546	Mannie of Curramore
Wyreene Ria	J. B. Keys, Gowrie Little Plains	4,299·6	253·199	Lyndhurst Majesty
Oxford June	W. Spresser & Son, Redbank	4,044·55	242·32	Oxford Ginger Boy
Carnation Fairy Lass (267 days)	W. Spresser & Son, Redbank	3,984·75	235·848	Vencheley Golden Victory (imp.)

AGRICULTURE ON THE AIR.

Radio Lectures on Rural Subjects.

Arrangements have been completed with the Australian Broadcasting Commission for the regular delivery of further radio lectures from Station 4QG, Brisbane, by officers of the Department of Agriculture and Stock.

On Tuesday and Thursday of each week, as from the 2nd April, 1935, a fifteen minutes' talk, commencing at 7.15 p.m., will be given on subjects of especial interest to farmers.

Following is the list of lectures for April, May, and June, 1935:—

SCHEDULE OF LECTURES.

BY OFFICERS OF THE DEPARTMENT OF AGRICULTURE AND STOCK, RADIO STATION 4QG, BRISBANE (AUSTRALIAN BROADCASTING COMMISSION).

Tuesday, 14th May, 1935—"The Farmers' S.O.S.—'Save Our Soil,'" by J. F. F. Reid, Editor of Publications.

Thursday, 16th May, 1935—"General Problems in Plant Breeding in Queensland," by L. G. Miles, B.Sc., Ph.D., Plant Breeder.

Tuesday, 21st May, 1935—"Recording Pig Production," by L. A. Downey, H.D.A., Instructor in Pig Raising.

Thursday, 23rd May, 1935—"Housing and Management of Pigs," by L. A. Downey, H.D.A., Instructor in Pig Raising.

Tuesday, 28th May, 1935—"The Prospects of Success with English Type Sheep in Queensland," by J. L. Hodge, Instructor in Sheep and Wool.

Thursday, 30th May, 1935—"Frost Prevention by Orchard Heating," by H. Barnes, Director of Fruit Culture.

Tuesday, 4th June, 1935—"Grading Pig Products," by E. J. Shelton, H.D.A., Senior Instructor in Pig Raising.

Thursday, 6th June, 1935—"Tropical Fodders—No. 1 Grasses," by C. T. White, Government Botanist.

Tuesday, 11th June, 1935—"Tropical Fodders—No. 2 Herbage," by C. T. White, Government Botanist.

Thursday, 13th June, 1935—"Shade Trees," by W. D. Francis, Assistant Botanist.

Tuesday, 18th June, 1935—"Some Native Grasses," by S. L. Everist.

Thursday, 20th June, 1935—"Artificial Incubation," by P. Rumball, Poultry Expert.

Tuesday, 25th June, 1935—"Queensland Nut Growing," by H. Barnes, Director of Fruit Culture.

Thursday, 27th June, 1935—"Citrus Culture," by H. Barnes, Director of Fruit Culture.

CAUSE OF CREAM CONTAMINATION.

Many a dairy farmer has been at a complete loss to understand the cause of a drop in the quality of his cream until he has brought the matter under the notice of the local dairy instructor.

A supplier to the Bellinger River Co-operative Factory (N.S.W.) was at a loss to know why his cream was being graded down. He had investigated the usual causes of cream contamination, but none of these provided a reason for the trouble. The matter was then investigated by the local dairy instructor, who found a very small crack in the separator milk float. This was so small as to go unnoticed, but it had allowed the milk to enter and putrify in the interior of the float. As a matter of fact, the float was almost full of a wet putrid mass, which, of course, was a fruitful source of contamination of the cream.

And the moral of this story is not so much to invite every dairy farmer to break open his separator milk float, as to invite them to seek the aid of the district dairy instructor when experiencing trouble in the maintenance of cream quality.

Answers to Correspondents.

BOTANY.

Replies selected from the outward mail of the Government Botanist, Mr. Cyril White, F.L.S.

Grease Nut.

J.E.S. (Muan, Gayndah Line)—

Your specimen represents the Grease Nut (*Hernandia bivalvis*), a native of the scrubs of Southern Queensland. The tree apparently is not abundant anywhere, but seems to be most common in the scrubs about Biggenden. The seeds contain nearly 50 per cent. of a bitter oil. This oil has been examined chemically, but is not known to possess any commercial possibilities. The tree is well worth growing on account of its ornamental character.

Blue Grass, Barley Grass, and Small Flinders Grass.

V.W. (Macalister)—

1. *Dichanthium sericeum* (Queensland Blue Grass).—One of our best native grasses. The principal grass of the Leichhardt district.
2. *Panicum decompositum* (Barley Grass).—Regarded as good fodder only when very young. It soon becomes dry and unpalatable. The seed heads break off and blow away, hence one of its local names—Blow-away Grass. This name, however, is applied to a number of different grasses whose seed heads show the same tendency.
3. *Bothriochloa erianthoides* (Satin Top).
4. *Iseilema membranacea* (Small Flinders Grass).—An annual grass which comes away quickly after rain. Relished by stock even when quite dry.
5. Better material required for identification.

Wheel-O'-Fire.

H.F.M. (Dayboro')—

Your specimen represents *Stenocarpus sinuatus*, the Wheel-of-Fire, a native of the Northern Rivers of New South Wales and coastal Queensland. In this State it stretches from the Tweed River to the Cairns timber district. It is one of the most handsome of our native flowering trees, and is especially valuable as the flowers lend themselves so well to design. It belongs to the Silky Oak family (*Proteaceæ*) and has a silky-oak grain but paler than that timber.

Tie Bush.

W.T.M. (Nudgee)—

Your specimen is the Tie Bush (*Wickstroemia indica*), a plant with a very evil reputation in Queensland. Feeding experiments were carried out with it some years ago at the Animal Health Station, Yeerongpilly, but the animals experimented with (heifers), although very emaciated and passing bloody scours, recovered when put on to ordinary feed. A few years ago, however, specimens of the berries were received from Nambour with the report that they had fatally poisoned a child in the neighbourhood. Feeding experiments with the berries were conducted on guinea pigs, and proved that they were highly poisonous. We remember in the first experiment the plant was in flower only, so probably it is the berries that are the poisonous part of the plant. The eradication of the plant is certainly recommended.

Black Wattle. Quinine Berry.

J.D. (Chinchilla)—

The specimens represent—

1. *Acacia Cunninghamii*, the Broad-leaved Wattle or Black Wattle;
2. *Petalostigma quadriloculare*, Wild Quinine or Quinine Berry.

These two trees are very common over a very extensive range in Queensland, both on the coast and inland, and we never saw them eaten by stock—that is, in any quantity. One might see an occasional sucker of wattle eaten down. Neither of them are known to possess any harmful properties. Both, particularly the wattle, could be used as an emergency food.

Russell River Grass. Mat Grass.

A.O. (Peachester)—

The grass with the small dark seed heads is *Paspalum paniculatum* (Russell River Grass), widely spread over most tropical countries. It is very common in North Queensland, but is rarely seen down south. It was boomed a good many years ago as a fodder, particularly for dairy cattle, but has since gone quite out of favour. It has a very poor reputation in North Queensland, but it is very abundant in some parts, and during the season horses greedily eat the seed heads, and are said to do remarkably well on them, being just like corn-fed animals.

The other grass is *Axonopus compressus* (Narrow-leaved Carpet Grass or Mat Grass), a common tropical grass of some value on second-class country. It has a great disadvantage, however, of invading better class paspalum pastures, very much reducing their value for dairying purposes.

Waddy Wood.

C.J.G. (Mapleton)—

The specimen of wood represents *Trochocarpa laurina*, a small tree fairly common in coastal Queensland and with a wide distribution. The only local name we have heard applied to it is waddy wood. It is rather an anomalous member of the Australian heath family (*Epacridaceæ*), and we have never noticed the peculiar lime or citrus smell mentioned by you. It is quite distinct from *Backhousia citriodora*, though this latter probably grows in your district. We have seen it in moderate abundance at Candle Mountain, west of Beerwah, and in less abundance in coastal, sandy, rather thick forest towards Noosa. *Backhousia* also grows very often on the coast on rather muddy flats.

T.T. (Birkdale)—

Your specimen has been determined as *Capillipedium parviflorum*, (Scented Beard or Scented Top), a very common grass in forest country in Queensland. It is quite a good grazing grass.

Russian Thistle. Creeping Saltbush.

C.E.E. (Killarney)—

1. *Salsola Kali* (Russian Thistle), a species of Roly-Poly. Eaten by stock in the very young stages, but, generally speaking, rejected by them when older. When the plant is in seed, however, horses are very fond of the seed heads. We have no records of the effects of this plant on milk and cream.
2. *Atriplex semibaccata* (Saltweed or Creeping Saltbush), one of the best of the saltbushes. Very abundant on the Darling Downs and Western Queensland generally. We have had no experience of its effect on milk and cream, but think it would give it rather a strong weedy flavour.

   We do not known if either of these plants would cause milk to ferment quickly.

Rib Grass. Crowsfoot Grass.

J.S. (Chinchilla)—

1. *Plantago lanceolata* (''Rib Grass''). Mostly found in Queensland as a weed of cultivation, or where the ground has been disturbed, rather than as a herb in the ordinary pasture. It is sometimes recommended for sowing in pasture mixtures. Personally, we have not seen stock eat it to any great extent.
2. *Eleusine indica* (Crowsfoot Grass). Not to be confused, of course, with the herbage called Crowsfoot that is very common on parts of the Darling Downs and in the Maranoa district. Analysis shows this grass to be very nutritious but, like young sorghums, it contains a prussic-acid-yielding glucoside, and if eaten in any quantity by hungry stock on an empty stomach trouble may ensue. Very little trouble has been experienced with the plant in Queensland, and, on the whole, ordinary paddock stock feed on it with impunity. It mostly occurs as a weed of cultivation or in places where the ground has been disturbed rather than as a grass of the ordinary pasture.

Broad-leaved Carpet Grass.

B. (Brisbane)—

The grass is *Axonopus compressus* (Broad-leaved Carpet Grass). This grass is common in most warm countries and occurs in Queensland in two forms—a narrow-leaved form and a broad-leaved form. The latter—the one you send—is generally regarded as the better of the two. It has quite a good value as a grass for second-class country, but has the disadvantage that it may invade paspalum pastures in scrub country, and almost ruin them from the point of view of a dairy pasture. In America this grass is spoken very highly of as a fodder, but our experience with it here is that it is of only very moderate quality.

Paspalum Urvillei.

W.J.C. (Childers)—

The specimen represents *Paspalum Urvillei*. This grass was boomed as a fodder some years ago under the name of *Paspalum virgatum*, but has now gone entirely out of favour. It is a native of South America, but is now quite common in some parts of Queensland, particularly on some of the second-class country along the North Coast Line between Brisbane and Gympie. So far as our experience goes, however, although it is a luscious-looking grass, stock do not take readily to it. In fact, we have heard of cases where almost starving cattle would hardly look at the grass. The class of country on which it grows, of course, might affect its feeding value, and it might be somewhat more palatable on your country than on the coast.

Grasses from Central Burnett Identified.

F.A.S. (Mundubbera)—

1. *Bothriochloa intermedia* (Forest blue grass).—In Central Queensland this is looked upon as an excellent fodder grass.
2. *Alloteropsis semiolata* (Cockatoo grass), with a few specimens of *Digitaria* sp.
3. *Panicum decompositum*, sometimes known as barley grass.
4. *Sporobolus elongatus* (Rat's tail grass).—An inferior species.
5. *Chloris divaricata.*—A native grass which has possibilities as a pasture grass, and also for lawns.
6. *Eriochloa* sp.—Most of the *Eriochloa* grasses are good fodder grasses.
7. *Aristida glumaris.*—A three-pronged or three-awned spear grass.
8. *Cymbopogon refractus* (Barbed-wire grass).
9. *Themeda australis* (Kangaroo grass).—Eaten by stock when young, but becomes rather coarse and unpalatable when mature.
10. *Dichanthium sericeum* (Blue grass).—A number of forms of this grass are found in Queensland. They are all excellent pasture grasses.
11. *Bothriochloa decipiens.*—Bitter or pitted blue grass or red leg. This is a very inferior grass which has considerably reduced the carrying capacity of some coastal pastures in Queensland and New South Wales.
12. *Eragrostis parviflora* (Weeping love grass).
13. *Rhynchelytrum repens* (Red Natal grass). Of little use for fodder, except when cut up and made into "chop-chop."
14. *Chloris ventricosa.*
15. *Capillipedium parviflorum* (Scented top or scented golden beard).—In the Rockhampton district this is looked upon as an excellent pasture grass.
16. *Arundinella nepalensis.*
17. *Aristida ramosa.*—A three-pronged or three-awned spear grass.
18. *Heteropogon contortus* (Bunch spear grass).—This is quite good fodder when young, but the sharp seeds are dangerous when the grass is mature.
19. *Imperata cylindrica*, var. *Koenigii* (Blady grass).
20. *Eragrostis cilianensis* (Stink grass).—Usually found as a weed of cultivation, along roadsides, &c. It is not usually looked upon as of any value, although working horses have been said to eat it.
21. *Setaria surgens.*
22. *Leersia hexandra* (Rice grass).
23. *Eragrostis* sp.—A species of love grass.

24. *Eragrostis leptostachya* (Paddock love grass). A useful grass in the average native mixed pasture.
25. *Tragus racemosus* (Small burr grass).—Regarded by sheepmen in the West as quite a good fodder, though the burrs are a nuisance in wool.
26. *Eleusine indica* (Crowsfoot grass), usually met with as a weed of cultivation, along roadsides, &c. Stock seem fond of it, and its food value is high. However, it contains a prussic-acid-yielding glucoside, and if eaten in quantity by hungry stock would probably cause trouble.
27. *Digitaria marginata* (Summer grass).—A weed of cultivation.
28. *Chloris virgata* (Feather top grass), also known as feather top Rhodes grass, a grass closely allied to Rhodes grass, but much inferior to it as a fodder. Stock seldom touch it, except when it is made into hay.
29. *Echinochloa colona* (Barnyard millet).—Usually found in damp situations, or as a weed of cultivation. It is closely allied to the cultivated fodders Japanese millet and white panicum, and should be quite a good fodder.
30. *Cyperus gracilis.*—A sedge, not a true grass.
31. *Cyperus iria.*—A sedge, not a true grass.
32. *Fimbristylis diphylla.*—A sedge, not a true grass.
33. *Fuirena glomerata.*—A sedge, not a true grass.
34. *Cyperus polystachyus.*—A sedge, not a true grass.
35. *Juncus communis.*—Not a grass, but a rush.
36. *Eriochloa* sp.
37. *Eragrostis Brownii* (Love grass).
38. *Cleistochloa* sp.
39. *Cleistochloa subjuncea.*
40. *Dichanthium sericeum* (Blue grass).—One of the best of our native grasses.
41. *Eulalia fulva* (Brown top grass).—Has a fairly good reputation as a fodder.
42. *Cymbopogon* sp.
43. *Stipa verticellata* (Cane grass or bamboo grass).—A coarse grass of little value as a fodder.
44. *Eriachne* sp.
45. *Eriachne* sp.

The genus *Eriachne* is under revision by Mr. C. E. Hubbard, of the Royal Botanic Gardens, Kew, England, so that we cannot give you specific names for these.

46. *Schizachyrium obliqueberbis.*
47. *Eragrostis parviflora* (Weeping love grass).—A native grass about whose fodder value little is known. It should prove quite useful however.
48. *Pappophorum Lindleyanum.*
49. *Pappophorum nigricans* (White heads).—Not regarded as of much consequence from the point of view of pasture.
50. *Triraphis mollis.*—Common in sandy situations. Not regarded as a very good fodder.
51. *Perotis rara* (Comet grass).—A native grass common in sandy situations. It is not looked upon as of much value as a fodder.
52. *Digitaria Brownei.*
53. *Digitaria* sp.
54. *Digitaria* sp.
55. *Stenophyllus barbatus.*—A sedge, not a true grass.
56. *Fimbristylis vaginata.*—A sedge, not a true grass.
57. *Sorghum halepense* (Johnson grass).—A serious pest in cultivation. Its long underground rhizomes make it very difficult to eradicate.
58. *Echinochloa Walteri.*—A grass usually found in damp situations. It is closely allied to the cultivated fodders Japanese millet and white panicum, and should be quite good fodder.

Pigweed.

J.G. (Fernlees)—

Pigweed has several times been accused of poisoning stock in Queensland, but it is not known to possess any poisonous properties, and we think in all cases death can be attributed to bloat or hoven.

Identification of Grasses.

F.W. (Wandoan)—

We have no complete publication dealing with the grasses of Queensland. "The Grasses and Forage Plants of New South Wales," by E. Brakewell, price 6s. 6d. posted, obtainable from the Government Printer, Sydney, New South Wales, you may find useful. Although it deals principally with New South Wales grasses, most of those described in the book occur in Queensland. We would be pleased, however, to identify, and report on, any specimens of grasses or other plants you care to forward. Of grasses, a few seed-heads and a stalk, doubled up so as to be rolled comfortably in a small piece of newspaper, should be sufficient. When more than one specimen is sent, each specimen should be numbered and a duplicate retained, when names and reports corresponding to the numbers will be returned. If desirous of a quick reply, it is not advisable to send, say, more than ten specimens at one time.

General Notes.

Sugar Experiment Stations Acts.

All existing regulations under the Sugar Experiment Stations Acts have been rescinded, and new regulations, embodying many of the provisions of the old regulations, together with provision for meetings of the Sugar Experiment Stations Advisory Board and the conduct of business thereat have received executive approval.

Plywood and Veneer Board.

Notice of intention to extend the operations of the Plywood and Veneer Board for the period from 3rd May, 1935, to 2nd May, 1936, was published in the "Government Gazette" of the 19th January. No petition was received up to 15th February last on the question of the extension of the Board, and an Order in Council formally extending it for the period abovementioned has been issued. The Board applies to that portion of the State south of the twenty-third degree of south latitude.

QUEENSLAND SHOW DATES, 1935.

May.

Barcaldine, cancelled.
Kilkivan, 20 and 21.
Roma, 21 to 23.
Ipswich, 21 to 24.
Biggenden, 23 and 24.
Gympie, 24 and 25.
Toogoolawah, 24 and 25.
Dirranbandi, 24 and 25.
Kalbar, 25.
Maryborough, 28 to 30.
Biloela, 30 May to 1 June.

June.

Gin Gin, 1 to 3.
Marburg, 1 to 3.
Childers, 3 and 4.
Emerald, 5 and 6.
Wowan, 6 and 7.
Bundaberg, 6 to 8.
Lowood, 7 and 8.
Warrillview, 8.
Boonah, 12 and 13.
Gladstone, 12 and 13.
Gayndah, 12 and 13.
Esk, 14 and 15.
Rockhampton, 18 to 22.
Mackay, 25 to 27.
Laidley, 26 and 27.
Proserpine, 28 and 29.

July.

Bowen, 3 and 4.
Ayr, 5 and 6.
Townsville, 9 to 11.
Kilcoy, 11 and 12.
Cleveland, 12 and 13.
Rosewood, 12 and 13.
Charters Towers, 16 to 18.
Nambour, 18 to 20. Campdraft.
Cairns, 23, 24, 25.
Atherton, 30 and 31.
Gatton, 31 July and 1 August.

August.

Gatton, 31 July and 1st August.
Caboolture, 2 and 3.
Pine Rivers, 9 and 10.
Royal National, 19 to 24.
Home Hill, 30 and 31.

September.

Imbil, 6 and 7.
Esk Carnival and Campdraft, 6 and 7.
Pomona, 13 and 14.
Tully, 13 and 14.
Innisfail, 20 and 21.
Beenleigh, 20 and 21.
Rocklea, 14.
Kenilworth, 28.

October.

Malanda, 2 and 3.

Rural Topics.

Milk Distribution in New Zealand.

Discussing at the Southern District conference of the Agricultural Bureau of New South Wales some impressions of dairying in New Zealand gathered during a recent visit with a party of New South Wales farmers, the senior departmental dairy instructor located at Wagga gave some interesting facts concerning the Wellington municipal milk depot.

The central distributing plant, it was stated, was housed in a prominent brick building, the main dairy room being 195 by 98 feet and elaborately tiled in white. In this were the bottle-washing and bottling sections, surrounded by an elevated inspection gallery on which also were situated the milk-holding vats and pasteuriser. The milk was pumped to the chilled holding tanks from where it was fed to the pasteuriser and heated to 145 to 150 degrees Fahr., being held at that temperature in a special holding vat for thirty minutes. From there it gravitated over a brine cooler situated in a dust-proof room and then by gravity was fed to the bottling machines of which there were four, each pair capable of bottling 130 bottles per minute. Bottles were washed and sterilised in a machine capable of handling 8,000 bottles an hour.

The operatives, who changed into clean uniforms daily, had their own mess room, recreation room, and superannuation scheme.

The temperature of Wellington was rarely over 80 deg. Fahr., and deliveries were made in open carts, which were fed by motor lorries, under which system each man could deliver about 90 gallons daily.

The milk was subjected to rigorous tests for quality, and payment was made according to quality and fat content, and was based on one-quarter of London parity for butter, one-quarter of local price for butter, and one-half London parity for cheese. To this basic price was added a premium of about 2d. a gallon to cover the cost of licensing, upkeep, loss of by-products, &c. In the winter a premium of 85 per cent. of the summer price was paid. The average return to the farmers was approximately 11d. per gallon, while the average retail selling price was 1s. 10½d. per gallon. Second-grade milk was paid for at 1d. less than first grade and without premium. The average quantity graded down was about 5 per cent.; 5,000 gallons were treated daily, and a profit of some £7,000 a year was made.

A token system of payment was used with great success. Small metal tokens distributed by agencies were bought in numbers at a discount by householders, and these tokens were left out with the milk jug, thus eliminating bad debts.

Wellington had certainly set a standard in milk supply that was a model for any city.

Laying Out an Orchard—Contour Planting.

When laying out a new orchard on sloping ground serious consideration should be given to the prevention of soil erosion, and the plan which offers the best solution of this problem is to plant on the contour with a slight fall in one direction. When this is done the ploughing and cultivation can follow the contour, and each plough and cultivator track will act as a minature contour drain, thus, to a great extent, keeping the water spread—not allowing it to concentrate at any point. A slight bank can be thrown up along the line of trees, also acting as a contour drain of larger capacity.

And as an added precaution should an extraordinary downpour occur, a bigger bank at intervals is advocated—the frequency of these depending on the fall of the slope being planted. A wider space between the lines of trees would be necessary where these larger banks are located to allow for their formation.

Contour planting is quite suited to commercial orchards. It offers no difficulties to carrying out the ordinary orchard operations, except to a very slight extent when ploughing. The trees along the contour lines can be planted at the required regular distance, but the contour lines may not be parallel, so that when ploughing, the distance between the rows of trees will be slightly wider in some places than in others. An experienced ploughman would quite easily overcome this difficulty, and the slight inconvenience is insignificant when compared with the damage to the trees from the loss of soil.

As a matter of fact, on a fairly even slope it is possible, by modifying the grade of the contour lines to a slight extent and by some banking, to keep groups of lines of trees very little out of parallel.—A. and P. Notes, New South Wales Department of Agriculture.

Points in Dairy Practice.

Maize or sorghum silage is best fed to dairy cows with lucerne hay at the daily rate of 3 lb. silage and 1 lb. lucerne hay for each 100 lb. body weight of the cow. Concentrates may be added to the ration, a mixture being preferable to a single concentrate. Cracked or crushed grain, bran, pollard, linseed meal, and copra cake are suitable for this purpose.

A concentrate mixture may be fed according to the yield of the cow and the amount of pasture available. Under bad winter conditions, a full daily ration would be completed by adding to the silage and hay 1 lb. of a concentrate for each—

3 lb. of Jersey milk produced per day.
3½ lb. of Shorthorn milk produced per day.
4 lb. of Holstein milk produced per day.
1 lb. of butter-fat produced per week.

Thus a full ration for a Shorthorn cow weighing 1,100 lb. and producing 21 lb. of milk per day would be—

33 lb. silage.
11 lb. lucerne hay.
6 lb. concentrates.

At Hawkesbury Agricultural College it is found that the following make good mixtures:—

For Winter.	lb.
Maize silage	25
Green barley	25
Lucerne chaff	6
Cocoanut oil cake	2
Linseed meal	1½
Bran	3

If green barley is not available, 30 lb. of maize silage and 10 lb. of lucerne hay may be given—

For Summer.	lb.
Maize silage	25
Green maize	25
Lucerne hay	10
Bran	2
Linseed meal	2

Oaten and wheaten chaff can also be fed in conjunction with silage, but more concentrates should be used.

The average quantity of silage consumed per cow at the College during the winter months is 30 lb. per day.

The only care to be taken in feeding silage is not to overfeed bulls. The maximum amount that a bull should receive is 15 lb. a day.

Cows and Sheep—An Unusual Combination.

The Government Sheep and Wool Expert (New South Wales) is of opinion that fat lamb raising could be made a profitable sideline to dairying on some of the lighter undulating country on the North Coast (N.S.W.). He was referring in particular to the Wingham district, which he inspected quite recently. Anyone launching out in this sideline in that locality would be considerably advantaged by the fact that the Wingham bacon factory has facilities for killing and handling the carcasses, and consequently there would be no loss of weight or bloom.

A conservative estimate of returns per year from a flock of fifty ewes was as follows:—Wool (6½ lb. per head) at 10d. lb., £13 10s. 10d.; lambs, 40 at 15s. per head, £30, making a total of £43 10s. 10d. per year.

A certain amount of disease, particularly worms, would be experienced, and those running the sheep would have to be prepared to drench systematically.

The lambing would have to be arranged to take place at the best season of the year, when up to five months good feed conditions could be expected. Furthermore, the lambing must be restricted to a reasonably short period. This would mean keeping the rams away from the flock, except for, say, a two-months mating period. Only pure bred rams should be used.

Trees on the Farm.

Where trees are to be planted together, such as for windbreaks or avenues, the land should be first ploughed. New land should be broken up before winter and allowed to lie until planting time. A plan which has its advantages is to make the first ploughing only deep enough to cover the grass and herbage. Shortly before planting the ground should be cross-ploughed deeply, and then harrowed. Ground previously under crops would probably contain many weed seeds, and to enable the young trees to become established before the weed growth becomes unduly aggressive such land should be ploughed and harrowed, and planted immediately afterwards with the trees. Where hillside planting is being carried out, the ploughing should follow the contour of the hills as far as possible.

Ordinary hole planting is attended with some risks, especially where the subsoil is impervious. In such cases the hole tends to become merely a pool of stagnant water and a grave for tree life. Where trees must be planted in holes, such as in the case of isolated shade, shelter, and ornamental trees, the holes should be made as large as possible. A hole 3 feet by 3 feet and 2 feet deep is the smallest size allowable, and larger holes, where possible, should be made.

Where deep digging carries the hole into an impervious subsoil, it is better to make the hole wide and shallow, the depth not exceeding that of the soil. On wet, poorly-drained soil, ridges or mounds may be formed as sites for planting. Ploughing two adjoining furrows so as to throw the sods together achieves this end in a minor way. Irrespective of what method is adopted, the preparation of the land should be completed before stock for planting is obtained.

The best time for planting is when the plant is at its resting period, and when moist, cool conditions prevail. Generally speaking, May to August are the best months. The effects of frosts must be studied, and spring planting is often necessary in some localities, except for deciduous species. Where the rainfall is heavy and conditions generally are cool, the planting period may be considerably extended. A cool, cloudy day and a fairly moist soil provide ideal conditions.

Maize as Stock Feed.

It is extraordinary how often the disposal of the grain on the open market is regarded as the only source of income from maize. Its utility on the farm is not sufficiently realised. In the United States, the greatest maize-producing country in the world, over 85 per cent. of the crop is fed to live stock in some form or another, and growers constantly keep in mind the fact that live stock will probably be the ultimate market for the crop. The American maizegrower, therefore, is chiefly concerned in producing the highest number of pounds of live stock per acre at the least cost of human labour, and in the development of the maize industry in New South Wales, this will be a problem of first importance.

While conditions in the U.S.A., with its millions of population, may not be wholly comparable with our own, the fact remains that maize should be utilised much more extensively as feed for pigs and dairy cows, particularly the latter, to maintain the milk flow in winter months. A South Coast dairyman recently recorded an increase of 22½ per cent. in the quantity of milk produced by adding 2 lb. crushed maize per day to a ration of lucerne and silage, giving a market value to the maize of approximately 6s. per bushel.

Although in total food production per acre, and as a fattening agent maize has no superior, the grain is somewhat low in protein, and deficient in vitamin A, and it is necessary at all times to supplement rations with feeds which will make up for these deficiencies. This is readily available on the farm in some form of green fodder, leguminous for preference. Fortunately, the value of green maize as fodder is well known, and its conversion into ensilage is becoming every year more popular on coastal dairy farms.

For pig fattening maize is invaluable, and with pork selling at a reasonable figure the return per bushel is invariably better than the open market price for grain; for example, it has been estimated that with pork at 4½d. per lb., maize grain fed with other suitable feeds has a value of 4s. 2d. per bushel, on the basis of approximately 9 bushels of grain producing 100 lb. of pork.—"Agricultural Gazette" of New South Wales.

Evolution of Hornless Cattle.

In the *New Zealand Farmer* for April, Primrose McConnell discusses under the caption "How Breeds of Purebred Hornless Cattle are Bred Up from the Horned," a subject of great interest to Queensland stockowners. A farmer correspondent had written to him as follows:—"I have had an argument with a friend over the dehorning of cattle, and I shall be very glad to have your opinion on the matter through the columns of the *Farmer*. My friend maintains that if cattle are regularly dehorned, year after year, they will eventually become hornless, naturally. I feel sure that this is not correct, and we have its incorrectness well demonstrated in the docking of lambs, an operation that has been carried out for a great many years without any shortening of the newly-born lambs' tails. Will you also kindly state how the hornless breed of Shorthorns and Herefords were originated."

Primrose McConnell gave the following reply:—

"At a superficial glance these queries may not seem of great importance, but I am of the opinion that dehorning is of great value to all breeders and fatteners of cattle, and to the dairy farmer; hence, I am glad to take the chance of once more ventilating the matter.

"ORIGIN OF THE POLLED SHORTHORN.

"It was natural that the breeding of hornless cattle from the horned should originate in the United States of America, because in the days when the Longhorn held almost complete possession of the American cattle ranches, and very long journeys by rail had to be undertaken to the meat packers, the damage done by horns was very great. The packers found a much higher percentage of loss in bruised meat on the carcasses of horned cattle, and they make a difference of from five to ten cents per 100 lb. in favour of polled cattle.

"At rare intervals a hornless calf is born in a horned herd, and such have proved to be very prepotent in imparting the hornless feature to their progeny. How these sudden variations come about has never been explained, but it is a fact that a hornless bull will nearly always produce hornless calves. There was, and may still be, a strain of hornless wild white cattle at Somerford Park in Cheshire, whose origin is unknown, but it has been kept pure for at least 250 years. There are other polled breeds in Britain: The polled Angus, the Black Galloway, and the Red Polls of Norfolk and Suffolk.

"The Polled Durhams (Shorthorns) originated in America about the year 1870, and they contained two strains: The Single Standard and the Double Standard. The Single Standard Polled Durhams are high-grade Shorthorns; the Double Standard Polled Durhams are purebred Shorthorns, but the Single Standard has almost gone out of existence. Both strains resemble very closely the purebred Shorthorns.

"The Polled Durham Association was established in 1889, with a membership of eight breeders. As far back as 1908 the membership had been increased to 2,200 breeders of Polled Durhams, and the membership goes on increasing. The breed was developed mainly in the States of Ohio, Indiana, Illinois, Iowa, and Minnesota.

"The history of the Single Standard strain is fully known. About 1870, several breeders, working independently, undertook to produce hornless Shorthorns by putting horned Shorthorn bulls on hornless or 'mulley' cows of unknown breeding. There is said to be no doubt that those cows were descended from polled European stock.

"The produce resulting from this cross were carefully selected, all bulls being sent to market, and the hornless heifers bred to horned Shorthorn bulls, which process was continued for four or five generations. Polled bulls of this high-grade stock were then used on the polled heifers for a generation or two, when Shorthorn bulls were again resorted to. The progress was slow, but the hornless characteristics proved very persistent, and by the year 1899 animals were required to carry 96 per cent. of Shorthorn blood to be eligible for registration.

"Apart from the injury that is often done with horns, hornless cattle thrive better than the horned, because they are more content, having lost the fear of their herd mates. The damage done to the carcasses of fat cattle in transit to the freezing works is well known, and it is not uncommon to see a fine carcass in the freezing works so badly damaged with horns that it is only fit for turning into manure.

"A strain of purebred hornless cattle cannot be developed by constant dehorning, just as a tailless sheep flock cannot be developed by constant docking; but, if a ram lamb were born minus a tail in a purebred tailed flock, the chances are that he would produce tailless lambs, but I have no record of this being tested.

"In 1905 a rule was passed requiring all animals to trace to recorded stock, thus closing the books and preventing the introduction of any more up-graded cattle. This development served to arouse general interest in hornless cattle, and paved the way for the development of the Double Standard strain.

"The rapid increase of the purebred Polled Shorthorns is due to the fact that the breeders had an unlimited field to draw upon for females. Purchases of cows and heifers were made from the very best Shorthorn herds, and breeders have a keen demand for their hornless bulls. There is no doubt that there is a great future before the breed, which is eligible for both the Polled Durham and Shorthorn Herd Book. So far as we in New Zealand are concerned, hornless breeds have become more precious since meat-chilling was perfected.

"THE POLLED HEREFORD.

"This breed originated in America since 1889. As in the case of the Polled Shorthorns, there are two strains: double and single standard. The pure hornless cattle, and are so-called because they are eligible for entry in both the Polled Hereford Herd Book and the American Hereford Herd Book. The Single Standard Polled Herefords are eligible for entry only in the Polled Hereford Herd Book.

"Mr. Guthrie, of Atchison, Kansas, discovered in the autumn of 1889 a polled bull calf with perfect Hereford markings. The dam was three-quarters Hereford and one-quarter Shorthorn in blood. The sire was one of two Hereford bulls which ran with the herd. These were Grateful 3rd and Treasurer. The calf was named Discovery, was a good type, and at three years of age, without special feeding, weighed 1,986 lb. By using this bull on horned Hereford cows, Mr. Guthrie secured a number of polled cattle of true Hereford type. It is stated that all the calves sired by Discovery from horned cows were polled. Some of the best individuals were bred together, and by 1898 a small herd of very high-grade Polled Herefords had been built up. From them work was started, looking to the production of Double Standard Polled Herefords.

"Another line of Single Standard Polled Herefords was established by crossing and up-grading by Mossom Boyd, of Bobcaygeon, Ontario, Canada. In 1893 he bred two purebred Angus bulls to five purebred Hereford cows each. Most of the nine calves resulting were black with white face, and polled. Only one calf was retained for use. This was a bull calf, black, with the white markings of a perfect Hereford type, and polled. Twenty-three calves resulted from the two years' breeding. Nine were black, with white faces, and more or less of other Hereford markings. Fourteen were red, with white face, and more or less of other Hereford markings. Five of the lot were retained—two bulls and three cows. All were red with perfect Hereford markings. One bull and the three cows were purchased by the Embar Ranch in Wyoming, and were used there for some years. The progeny retains the Hereford marking, and many of them are polled. They are simply high-grade hornless Herefords, and not as prepotent as purebreds, but are excellent as individuals.

"The Double Standard Polled Herefords, like the Double Standard Polled Durhams, owe their origin to 'sports.' In 1900, Warren Gammon and Sons, of Des Moines, Iowa, undertook to locate any Polled Herefords that might exist. They wrote to all the American Hereford breeders, and located fourteen animals that were minus horns, due to imcomplete transmission of hereditary resemblance. About the same time Mossom Boyd purchased two polled bull sports, purebred and very prepotent dehorners. Development has come by breeding together the polled stock, and by using the polled bulls on Polled Hereford cows.

"The Polled Herefords have made great strides in recent years, and many of them are really very fine beef cattle—a number quite excellent for the chilled meat trade.

"Dehorning of the dairy herd is very easy by operating on the young calves with caustic potash, but on the runs where many beef cattle are bred dehorning them in this manner would be considerable trouble, and the best plan is to turn to the pure breeds that are naturally hornless, or to those that have been built up by judicious selection.

"A hornless breed of Milking Shorthorns could be produced by crossing the cows with a good bull from a milking strain of the Red Polls. This might affect the milk yield for a time, but some of the Red Polls are good milkers."

The Value of Reading—A Working Farmer's Thoughts.

In a paper read at a district farmers' conference, Mr. H. Queale, of the Boor's Plains (Yorke Peninsula) Branch of the South Australian Bureau of Agriculture, had this to say on the value of reading to the man on the land:—

Reading ranks with travel and intercourse with one's fellow men as a means of acquiring knowledge, and for the rank and file of farmers is the most accessible. The average farmer is blessed with a fair amount of commonsense, and has his own ideas about matters pertaining to his daily life. Left unexpressed, they are of small account. But passed on to his fellow men, the ideas become vitalised and of greater importance. Even the wrong idea is best expressed, because one is given the chance to help and correct his fellow man. Of infinitely greater importance is the good idea when it is passed on.

Many men cannot always evolve an expression from a thought. He is not good at telling the other fellow, with any marked degree of lucidity, what he has in mind. This applies in a peculiar manner to the man on the land, because he lives, to a point, unto himself. Resulting from this quasi-lone life is an embarrassment at hearing his own voice, with the consequent difficulty of expression. Herein lies the value of reading. The man who reads and takes notice of what he reads, unconsciously absorbs words, terms, phrases, and paraphrases, and modes of expression. These are stored away in his subconscious mind, and at the most unexpected times, very often, these expressions flash across his mind and help him out of a difficulty. He acquires an ease of manner and a freedom of speech from his reading which, without travel and intercourse, would be denied him. With a little reference to a good dictionary he will also acquire correct pronunciation and enunciation of the language of the day.

In his daily life he has the practical experience of his work, and if he couples this with studying suitable books he is undoubtedly the gainer. The bogey word "theory" would certainly lose a vast amount of valueless meaning to the conservative-thinking farmer, and he may become a Bureau member and a reader of the "Journal of Agriculture," the value of which is very great.

To accumulate knowledge and obtain ideas of current topics the constant use of the daily paper is unsurpassed. Reading widens one's outlook and extends the vision to realms of thought and feeling otherwise unattainable. Australia, by reason of its great distance from other countries, is apt to foster ideas of insularity. Although wireless and aerial progress have minimised distance, the man on the land, by his isolation, still labours under many disadvantages. Travel is too expensive to be indulged in extensively.

The desire for and value of co-operative thought and action have been evidenced times without number. The danger of thinking and acting alone threatens to become political retrogression and industrial stagnation. The value of reading to the man on the land cannot be too greatly stressed. For as he reads so he thinks, and as he thinks so does he act. The value of acting upon the result of co-operative thought brings its own reward.

As a pleasure and a hobby the book lover finds nothing so entrancing or enchanting as a good book. R. L. Stevenson's lines, "What are my books? My friends, my church, my tavern, and my wealth," readily come to one's mind. To-day the value of recreation to the man on the land has a definite place. It is a time of serious thought and grim struggle. Unless he spends his leisure hours—few enough though they be—in pleasant ways, his mind will not be refreshed when he again takes up his daily duties.

The choice of literature is of very great importance. There are many dangers as well as benefits to be had from reading. It is well worth a man's while studying carefully the works of the day before accepting all and sundry alike, and when Australia has a better informed farmer who has the ability to put his "case," then, and then only, will she have a rural population who can defend the man on the land and lend a dignity to his calling.

Reading is one of the surest, safest, and most accessible means of acquiring a sense of expression, a knowledge of matters requiring understanding, and a real and lasting pleasure to the man on the land.

Australia's Great Trees.

In Volume LI., No. 11, the March issue of the "Victorian Naturalist," Mr. A. D. Hardy has written a most informative article on "Australia's Great Trees." He says that so many reported excessive heights of Australian trees half a century ago were found, on official investigation, to be exaggerations; that in recent years, when eucalypts 300 feet in height had become rare, all records of such exceedingly tall trees met with incredulity or were quoted with much caution by responsible writers. On the other hand, reckless or misinformed persons have shown little hesitation in reviving and perpetuating erroneous figures, which then have been repeated in British and foreign publications. In these prints it is not always obvious that what is recently quoted as for living trees is really based on information in old and discarded records of trees that have long since vanished, or that a statement in some recent number of a periodical has been corrected or withdrawn in the following number. Reliable figures can be quoted to-day for the height of existing tall trees. They have been carefully measured by officials, and the results officially recorded. In Victoria the largest trees are found in the Central South divisions of the State, in the Dandenong Ranges, the South Gippsland Ranges, the Great Dividing Range, and the Otway Ranges. In 1896, in the Cumberland Valley, Mr. D. Ingle, then a local forester (later one of the Forest Commissioners of Victoria) directed attention to a tree which measured 301½ feet. A belt of trees in the Cumberland River or Tyers River Valley covering an acre of ground was cleared of undergrowth to admit of the measurement of the tree. The total number of trees was twenty-seven. Height measured with Abney level (or clinometer) average 266 feet; tallest of the group, 293 feet; girth at 10 feet—average, 13.5 feet; largest girth, 17 feet 4 inches. The Monda tree on the southern slope of the Great Dividing Range measures to the forked and broken top 287 feet by Abney level measurement. This big tree must have been over 300 feet. Now it shows signs of decay, and recent storms have reduced its height still further. In the Otway region there is a tall mountain ash forest approximating 300 feet; Forests Commission clinometer measurements making several over 290 feet.

Odd Jobs for the Orchardist.

This period of the year is frequently regarded by many orchardists as being the most convenient in which to undertake the many odd jobs that accumulate during the busier periods. To delay too long in carrying out such needed work as overhaul of fencing and gates, painting and repairs to machinery, &c., results in much quicker depreciation, and finally the much heavier expense of replacement long before it would have otherwise been found necessary.

Protection of the woodwork and iron roofs of buildings by painting, or even by coating the woodwork with preserving oil, is a job that is not always attended to as frequently as it might be. Consideration should also be given to the desirability of painting the wooden portions, and some of the metal parts as well, of farm machinery.

This is also a good time of the year to attend to repairs to ploughs, cultivators, spray pumps, and the rest of the working plant. There is little time to do these jobs while the season's work is in full swing. Furthermore, to have the machinery and plant in the best working order means both greater efficiency and economy of operation.

Similarly, a thorough overhaul of the packing shed and its equipment at the present time is well worth while.

TO SUBSCRIBERS—IMPORTANT.

Several subscriptions have been received recently under cover of unsigned letters. Obviously, in the circumstances, it is impossible to send the Journal to the subscribers concerned.

It is most important that every subscriber's name and address should be written plainly, preferably in block letters, in order to avoid mistakes in addresses and delay in despatch.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staffs of the Queensland Baby Clinics, dealing with the care and general welfare of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable deaths.

Rickets in Queensland.

THE other day one of our Baby Clinics was visited by a healthy woman with a healthy breast-fed baby a few months old. There was nothing wrong with either of them; but the mother was anxious, because she had been told by a doctor that her two older children were suffering from rickets. We asked to see these older children. Their father, who was waiting outside, brought in a boy aged four and a little girl not yet two years old. The boy was big for his age and apparently well-nourished, but had had knock-knees. He will probably need two operations and prolonged treatment to straighten his legs. The little girl had bad bow-legs. She may be cured without operation, but will also need prolonged treatment.

Rickets and Diet.

Here was a lamentable fact; two healthy parents with two deformed children, who should have been perfectly straight and healthy. The parents were well-intentioned and affectionate, and the condition of their children was not due to poverty. It was due entirely to want of knowledge. Rickets is an easily preventable disease, and should never occur in Queensland. It is a condition in which the young growing bones are ill-developed. In extreme cases their growing ends are visibly enlarged and their development is slow. In less severe cases the bones grow, but they are soft, the leg bones gradually bend with the child's weight, and the straightening of them is no easy matter. Unfortunately, in Queensland this latter condition is not rare. Rickets occurs only in children whose diet is defective. For the making of bone three things are necessary—lime, phosphate, and vitamin D. Without the vitamin, lime, however abundant in the diet, cannot be absorbed, and is consequently useless. All three are present in cow's milk, and good milk taken in sufficient quantity is an absolute preventative. A partial deficiency in the supply of milk may be compensated by cod liver oil. When healthy breast-fed babies are weaned at nine to twelve months, their diet should consist mainly of cow's milk and they should be given at least one pint daily. Failing this, rickets may be expected. According to Dr. Harvey Sutton no less than 25 per cent., that is one in four, of the children entering school in New South Wales show definite evidence of mild rickets. If the children are poorly nourished and grow slowly, softening of the bones may be slight. If, however, they are healthy in other respects and grow fast, the softening is worse, for the rapidly growing bones of these children need a larger supply of lime, phosphate, and vitamin D. Together with bad bones these children develop faulty teeth.

Rickets is not merely a disease of the bones and teeth. Want of the vitamin causes a defective supply of lime to the whole body, and lime is a necessity to all living tissue. Rickety children suffer from unstable nervous systems, and easily go into convulsions. They are retarded mentally just as much as bodily. Indeed the mental inferiority may be more important than the physical. All deficiency diseases affect the nerve tissues. This is true of scurvy, it is evident in the neuritis of beri-beri, and the dreadful results of pellagra. We need to realise the importance of an adequate vitamin-rich diet for the growth of a healthy, stable, active mind.

Rickets and Sunlight.

We depend mainly on our diet for a sufficient supply of vitamin D, but it may also be obtained from the effects of sunlight on the human skin. The little brown and black babies, who sprawl in the sunshine, never suffer from rickets. In Australia the sun gives us this vitamin for nothing—nothing at all. Unfortunately, our babies and toddlers are kept out of the sun, or so covered with clothing, that the sun's gift is of no use to us. Certainly care is needed in protecting their heads and eyes, and in gradually exposing their skins to the sun's rays, for otherwise they may suffer from sunburn. For this there are rules with which our clinic nurses are familiar.

One fine warm afternoon lately I paid a visit to a lady whose two small children were playing happily on the grass in very scanty bathing suits. Their mother explained that their skins had been gradually hardened to sunlight from babyhood, and they had never had sunburn. How much happier our children might be, if other mothers did the same! Social custom may compel us to over-clothe our children in the streets, but surely in our own gardens and backyards bathing costumes are as healthy for them as on the sea beaches.

IN THE FARM KITCHEN.

Pickles.

On a commercial scale cauliflowers, cucumbers, and onions are held for long periods in brine, and a large proportion of the pickles purchased in the stores are prepared from such brined vegetables. They are put down in large barrels or tanks and covered with a brine containing approximately 1 lb. of salt per gallon of water. The salt draws water and carbohydrates from the tissues of the vegetables and also toughens them somewhat. It also prevents the growth of many kinds of bacteria, but certain types which produce lactic acid can tolerate salt, and these organisms slowly ferment the carbohydrates. This is known as the curing process, and cured vegetables have a darker colour than the fresh ones. Cucumbers change from a bright green to a deep olive green colour, and the flesh becomes more transparent. Cured vegetables are seldom used until they have been brined from six to twelve months. In making pickles in the home this long brining is unnecessary. The vegetables are generally covered with salt or placed in a brine for only one or two days. The salt or brine withdraws some of the water from the vegetables and makes them more crisp.

General Method for Home Pickling.

In pickling, as in any other methods of preservation, it is important that the vegetables should be in a thoroughly fresh condition. After the preliminary preparation, such as removing outer leaves of cabbage or cauliflower and cutting the larger vegetables into suitable pieces, the vegetables should be either placed in a brine made from 1 lb. salt and 1 gallon water or sprinkled liberally with salt and

left from 12 to 48 hours. If the vegetables are placed in brine they should be kept under the liquid as much as possible by weighing them down. If dry salt is used the vegetables should be placed in a large porcelain basin in layers, with a good sprinkling of salt between each layer. The time necessary for soaking in brine is given in the recipes at the end of the chapter. The vegetables should be removed from the brine and rinsed thoroughly in cold water to remove traces of salt. They should then be allowed to drain to remove as much water as possible and packed into clean jars to within 1 inch of the top. If any water has settled at the bottom of the jar during packing it should be drained off before the jars are filled with vinegar. Sufficient cold, spiced vinegar should be poured over the vegetables to cover them completely; in fact, there should be a layer of vinegar on top of the vegetables of at least ½-inch. During storage there is a certain amount of evaporation of the vinegar, and if the vegetables are not well covered with vinegar at the outset the vegetables at the top of the jar are left uncovered after some weeks and become very badly discoloured. When the vinegar has been poured over, the jars should be sealed as tightly as possible. If metal caps are used, care should be taken to see that the vinegar does not come into contact with the metal.

Vinegar.

The best vinegar should be used for pickling, and it should have an acetic acid content of about 5 per cent. White vinegar gives a better appearance to the pickles, but malt vinegar is preferable because it gives the pickles a better flavour. Spices are generally added to the vingar before it is poured over the vegetables. To make spiced vinegar, the following ingredients should be added to each quart of vinegar:—

¼ oz. cinnamon bark
¼ oz. cloves
¼ oz. mace
¼ oz. whole allspice
A few peppercorns or a pinch of cayenne pepper.

The spices tied in a muslin bag should be added to the vinegar and brought just to boiling point. It is important to have the lid on the saucepan during this process, otherwise much of the flavour is lost. The vinegar should then be removed from the stove and allowed to stand for two hours. The spice bag should be removed, and the vinegar is ready for use. There is a certain amount of controversy as to whether the vinegar should be used hot or cold, but experience has shown that cold vinegar gives the better result when pickling vegetables such as cabbage, onion, &c., which should be crisp when ready to eat, while hot vinegar proves better for the softer type of pickles such as walnuts, plums, &c.

RECIPES.

Pickled Cauliflower.

Sound cauliflower should be selected and the outer leaves removed. The flowers should be broken into small pieces, washed thoroughly in salt and water, placed in a large basin, and covered with brine made from 1 lb. salt to 1 gallon of water, and allowed to stand for 24 hours. They should then be rinsed in cold water, drained thoroughly, and placed in bottles or jars. The spiced vinegar should be poured over, and the bottles sealed with corks or tied down with a piece of bladder.

Pickled Onions.

Small, even-sized onions should be selected and placed with their skins on in a brine made from 1 lb. salt to 1 gallon water. They should be left for 12 hours, and then peeled, laid in a fresh brine, and left for 24 or 36 hours. They should then be removed from the brine, washed thoroughly in cold water, and allowed to drain thoroughly. The onions should then be filled into jars or bottles, covered with cold spiced vinegar, and kept for three or four months before being used.

Pickled Red Cabbage.

The cabbages should be firm and of a good colour. They should be washed and any discoloured outer leaves removed, and the cabbage cut into shreds. The shreds should be placed in a large basin, each layer being sprinkled with salt, left for 24 hours, the shreds allowed to drain thoroughly, and then packed into jars or bottles and covered with cold spiced vinegar.

Pickled Beetroot.

The beets should be washed, care being taken not to break the skin. They should be placed in boiling salted water, and simmered gently for 1½ hours. When cold, they should be peeled and sliced into rounds ¼-inch thick, packed into bottles, and covered with cold spiced vinegar. They should not be used for at least a week.

Pickled Gherkins.

The gherkins should be placed in a brine made from 1 lb. salt to 1 gallon of water, left for three days, drained well, and packed into jars. Hot spiced vinegar should then be poured over them, and they should be covered tightly and left for 24 hours in a warm place. The vinegar should be drained off, boiled up, and poured over the gherkins, which should be covered tightly, and left for another 24 hours, this process being repeated until the gherkins are a good green. After the final process, a little more vinegar should be added if necessary, and the jars corked and stored.

Pickled Vegetable Marrow.

2 lb. marrow (after peeling)
4 oz. sugar
¼ oz. ground ginger
¾ oz. mustard
¼ oz. curry powder
6 peppercorns
3 gills vinegar.

The marrow should be cut up, sprinkled with salt, and allowed to stand overnight. The other ingredients should be added to the vinegar, boiled for five minutes, and then the marrow added and cooked until tender. The pickle should be packed into jars and sealed.

Pickled Green Tomatoes.

5 lb. green tomatoes
1 lb. small onions
1 lb. Demerara sugar
1 quart spiced vinegar.

The tomatoes and onions should be sliced, sprinkled with salt, left overnight, and drained thoroughly. The sugar and vinegar should be boiled, the tomatoes and onions added and cooked until tender. They should then be put into jars and sealed.

Mixed Pickle.

Cauliflowers, onions, cucumbers, and French beans may be put up as a mixed pickle. If small cucumbers can be obtained they are preferable. The vegetables should be cut into suitable sized pieces, salt sprinkled over them, and allowed to stand for 48 hours. They should then be washed, drained thoroughly, packed into bottles, the vegetables being arranged neatly, covered with spiced vinegar, and sealed.

Pickled Damsons or Pears.

7 lb. fruit
4 lb. sugar
3 pints vinegar
½ oz. whole cloves
½ oz. allspice
1 piece ginger root
1 stick cinnamon
The rind of half a lemon.

Damsons should be washed and stalked; pears should be peeled, cored, and cut into eighths or quarters according to the size of the pears. The sugar should be dissolved in the vinegar, the spices crushed, tied loosely in a muslin bag and added to the vinegar. The fruit should be simmered in the spiced, sweetened vinegar until quite tender. Then the liquid should be drained from the fruit, which should be packed neatly into jars. The vinegar should be boiled gently until slightly thick, and each jar filled with enough hot vinegar syrup to cover the fruit. The pickle should be tied down with bladder, or corked securely. It is better if it is kept some months before being used.

IN THE FARM GARDEN.

Green Manure in the Vegetable Garden.

Where it is intended to commence the cultivation of vegetables during the spring this is the most important time of the year to make the preliminary preparations. As advised in earlier issues the laying out of the ground, digging and trenching are important operations which may be undertaken now. Green manuring is a most important and useful practice for bringing soil into good condition for sowing and planting in the spring, when almost any variety of vegetable may be grown. Green manuring offers a ready means of increasing the organic matter in the soil, and also of adding to the soil fertility. It is also the most useful means of suppressing weed growth and cleaning land for future cropping. It is generally recognised that legume-bearing plants are the most useful for green manuring. Field peas are very largely used. When plants belonging to the legume-bearing family are grown under suitable conditions, and the roots are attacked by bacteria in the soil which produce nodules upon the roots of the peas, the plants are capable of absorbing a considerable amount of nitrogen from the air, and thus the soil is enriched by this valuable plant food which is expensive to purchase in manures. But unless the nodule-forming bacteria are present in the soil the legume-bearing plants will draw from the soil the nitrogen they require for their growth, and the soil will be no richer in this element for their use.

If the land has not grown peas successfully before, it will pay to take a bushel or two of soil from a garden patch or field where peas have thrived, and sprinkle a small quantity of this soil along the drills where the peas are being sown. Another very useful legume for green manuring is the tick or horse bean. This plant resembles the broad bean, but the seeds are much smaller and are not used as a vegetable. The main object of a green manure crop is to obtain as much organic matter as possible for digging into the soil in the early spring. In this regard the horse bean is more valuable than the field pea. If it is necessary to inoculate land with nodule-forming bacteria for this crop, soil should be taken from a garden patch where broad beans have been grown successfully. There are different species of organism which produce nodules upon the roots of legume plants, and the bacteria which produce the nodules on the roots of peas will not similarly act upon the roots of beans. For general purposes a crop of Algerian oats or Cape barley is very satisfactory as a green manure crop. These cereals may be depended upon to give a good strong growth, providing ample bulk for digging into the soil. They also have the advantage that, not being related to any of the plants commonly grown in the garden, they are not subject to diseases which may be transferred to the vegetable crops to be grown later on. When sowing green-manure crops superphosphate should be used with the crop at the rate of 1½ to 2 oz. to the square yard. The use of the fertilizers will produce a greater bulk of green manure, and where the crop is dug into the ground the phosphates which have been absorbed by the crop will be liberated in the soil as the plants decay, and be made available in time for other plants to use.—"The Australasian."

Nitrogen for the Garden.

The most important and at the same time the most expensive element of plant food in garden soils is nitrogen. It is obtained in various forms, and the pea and clover family have the power of absorbing and assimilating to their own use the nitrogen of the atmosphere. It is for this reason that nitrogenous manures should not be applied, except in extreme cases, to beans or culinary or sweet peas. The four principal nitrogenous manures are sulphate of ammonia, nitrate of soda, nitrate of lime, and calcium cyanide of nitrolim. All are highly concentrated, and need to be used with the utmost care.

Nitrogen always stimulates the development of stem and foliage at the expense of flower and fruit or seed. If after excessive wet, or from some other cause, a plant appears to stand still, a small dose of nitrogenous manure will often stimulate it, and have a wonderful effect. On the other hand, a dose of a nitrogenous manure given when the plants are in flower or seed will often cause them to shed their flowers and fruit or seeds by causing an exuberance of growth of a soft, sappy nature.—"New Zealand Farmer."

Kitchen Garden.

Cabbage, cauliflower, and lettuce may be planted out as they become large enough. Plant asparagus and rhubarb in well-prepared beds in rows. In planting rhubarb it will probably be found more profitable to buy the crowns than to grow them from seed, and the same remark applies to asparagus.

Sow cabbage, red cabbage, peas, lettuce, broad beans, carrots, radish, turnip, beet, leeks, and herbs of various kinds, such as sage, thyme, mint, &c. Eschalots, if ready, may be transplanted; and in cool districts horse radish can be set out.

The earlier sowings of all root crops should now be ready to thin out, if this has not been already attended to.

Keep down the weeds among the growing crops by a free use of the hoe and cultivator.

The weather is generally dry at this time of the year, so the more thorough the cultivation the better for the crops.

Tomatoes intended to be planted out when the weather gets warmer may be sown towards the end of the month in a frame where the young plants will be protected from frost.

A Reminder to Onion Growers.

Onion seed growers should, by this, have gone through their selected onions with the object of picking out the best keepers for the production of seed. The bulk of these onions should have been selected, previous to storing, for early maturity and variety characteristics. At the final selection bulbs that are soft or prematurely shooting, or those showing any indication of being bad keepers, or that are diseased, should be discarded.

The bulbs should be planted in rows at least 3 feet apart and spaced 2 feet apart in the rows. A handy position well protected from the boisterous winter winds should be selected for the growing of onion seed.

The Farm Vegetable Garden.

The question of drainage should be considered in relation to all classes of soil, but especially in relation to those that are at all heavy. Neglect to make the necessary provision on such soils explains many failures to get good results from them during the winter months. Now is the time to think of the question of treatment.

Briefly, the objects of drainage are (1) to enable as much water as possible to percolate through the soil, and (2) to prevent the lodgment and stagnation of water on the soil surface by enabling excess quantities of water to be carried away with ease. It is especially necessary, of course, to drain clay soils. If water is allowed to remain on these for long they tend to "puddle," but if the water is drained away the soil does not become so compacted, retaining, instead, a more friable (crumbly) and porous condition.

Drainage may be of two kinds—surface or underground; the latter is the more effective, but it entails more labour and expense. A simple surface drainage scheme consists of shallow trenches running between plot and pathway, and connected up to an outlet at a suitable point. A modified form of surface drainage is expressed in a system of raised beds. Where some form of drainage is necessary, and the installation of the underground system is impossible, either of these methods is to be commended.

Underground drainage necessitates a considerable amount of trench digging. On what plan it is advisable to set out the drains will depend upon the size and contour of the area. In some cases a herring-bone design may be applicable, the main trench forming the backbone, so to speak, and running through the lowest portion of the land and the smaller contributory trenches spreading upwards from this. In other cases it may only be necessary to feed the main trench from one side, while in others again main trenches may best to laid at the edges of the area and fed from the centre. These trenches may then be partially filled with broken stones, and the surface of the filling protected with a layer of tin or brushwood, so that the earth with which it is subsequently overlaid may not drop through and destroy the porous character of the filling.

A drain provided with this rubble filling is usually the most convenient to make, and is quite effective; but a roughly-built conduit or channel may take the place of the broken stones, if desired. This may be made of flat stones or bricks, or (failing either of these) of boards. Only the sides and top need be formed of these materials, the trench floor serving for the bottom. The stones or bricks, or whatever is used, should only be loosely laid together, so that water may fall into the trench through them and be carried off. In country gardens, where saplings are easily available, these may be used effectively in the bottom of the trench (say a foot deep), covered by a 6-inch layer of brushwood.

The depth at which the drain should lie will depend upon the class of soil, but, needless to say, it should be sufficiently deep to allow of cultivation above it. If there is difficulty in arranging this the scheme should be so adjusted that the drain runs underneath the garden pathways, and not under the beds proper; 2 ft. 6 in. to 3 ft. is usually a satisfactory depth at which to lay a drain in the ordinary household plot.

There is little necessity for drainage on sandy soils, but gardeners working on land of a heavier character should set to work now to repair any deficiency in this direction. If the contour of the plot is regular it is not necessary to do the work all at once. As a section of the plot becomes vacant opportunity may be taken to carry out drainage work on it prior to preparing it for another planting. Then, when each section of the garden has been dealt with, the scheme can be connected up.—A. and P. Notes, N.S.W. Department of Agriculture.

Farm Notes for June.

FIELD.—Winter has set in, and frosts will already have been experienced in some of the more exposed districts of the Maranoa and Darling Downs. Hence insect pests will to a great extent cease from troubling, and weeds will also be no serious drawback to cultivation. Wheat sowing should now be in full swing, and in connection with this important operation should be emphasised the necessity of at all times treating seed wheat by means of fungicides prior to sowing. Full directions for "pickling" wheat by copper carbonate treatment are available on application to the Department of Agriculture, Brisbane. Land intended for the production of early summer crops may now receive its preliminary preparation, and every opportunity taken advantage of to conserve moisture in the form of rainfall where experienced; more particularly so where it is intended to plant potatoes or early maize. Where frosts are not to be feared the planting of potatoes may take place in mid-July; but August is the recognised month for this operation. Arrow-root will be nearly ready for digging, but we would not advise taking up the bulbs until the frosts of July have occurred. Take up sweet potatoes, yams, and ginger. Should there be a heavy crop, and consequently a glut in the market, sweet potatoes may be kept by storing them under cover and in a cool place in dry sand, taking care that they are thoroughly ripe before digging. The ripeness may be known by the milky juice of a broken tuber remaining white when dry. Should the juice turn dark, the potato is unripe and will rot or dry up and shrivel in the sand pit. Before pitting, spread the tubers out in a dry barn, or in the open if the weather be fine. In pitting them or storing them in hills, lay them on a thick layer of sand; then pour dry sand over them till all the crevices are filled and a layer of sand is formed above them; then put down another layer of tubers, and repeat the process until the hill is of the requisite size, and finally cover with either straw or fresh hay. The sand excludes the air, and the potatoes will keep right through the winter. In tropical Queensland the bulk of the coffee crop should be off by the end of July. Yams may be unearthed. Sugar-cane cutting may be commenced. Keep the cultivator moving amongst the pineapples. Gather all ripe bananas.

Cotton crops are now fast approaching the final stage of harvesting. Growers are advised that all bales and bags should be legibly branded with the owners' initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus address labels.

Orchard Notes for June.

THE COASTAL DISTRICTS.

THE remarks that have appeared in these notes for the past two months apply in a great measure to June as well, as the advice that has been given regarding the handling, grading, packing, and marketing of the citrus crop still holds good. As the weather gets cooler the losses due to the ravages of fruit flies decrease, as these insects cannot stand cold weather, and consequently there is only an odd one about. The absence of flies does not, however, permit of any relaxation in the care that must be taken with the fruit, even though there may be many less injured

fruit, owing to the absence of fruit-fly punctures, as there is always a percentage of damaged fruit which is liable to blue mould infection, which must be picked out from all consignments before they are sent to the Southern States if a satisfactory return is to be expected. If the weather is dry, citrus orchards must be kept in a good state of tilth, otherwise the trees may get a setback. Old worn-out trees can be dug out and burnt; be sure, however, to see that they *are* worn out, as many an old and apparently useless tree can be brought round and made to bear good crops, provided the trunk and main roots are still sound, even though the top of the tree is more or less dead. The whole of the top of the tree should be cut off and only the trunk and such sound main limbs left as are required to make a new head. The earth should be taken away from around the collar of the tree, and the main roots exposed, any dead roots being cut away and removed. The whole of the tree above ground and the main roots should then be dressed with a strong lime sulphur wash or Bordeaux paste. The main roots should be exposed for some time, not opened up and filled in at once. Young orchards can be set out now, provided the ground is in good order. Don't make the mistake of planting the trees in improperly prepared land—it is far better to wait till the land is ready, and you can rest assured it will pay to do so in the long run.

When planting, see that the centre of the hole is slightly higher than the sides, so that the roots, when spread out, will have a downward, not an upward, tendency; set the tree at as nearly as possible the same depth as it was when growing in the nursery, cut off all broken or bruised roots, and spread those that remain evenly, and cover them with fine top soil. If the land is dry the tree should then be given a good watering, and when the water has soaked in the hole can be filled up with dry soil. This is far better than watering the tree after the soil has been placed round it and the hole filled up. Custard apples will be ripening more slowly as the nights get colder. If the weather becomes unduly cold, or if immature fruit is sent South, the fruit is apt to turn black and be of no value. This can easily be overcome by subjecting the fruit to artificial heat, as is done in the case of bananas, during the cooler part of the year, when it will ripen up properly and develop its flavour. Grade custard apples carefully, and pack in cases holding a single layer of fruit only for the Southern markets.

Pineapples, when at all likely to be injured by frost, should be protected by a thin covering of bush hay or similar material. The plantation should be kept well worked and free from weeds, and slow-acting manure, such as bonedust or island phosphates, can be applied now. Lime can also be applied when necessary. The fruit takes longer to mature at this time of the year; consequently it can be allowed to remain on the plant till partly coloured before gathering for the Southern markets, or can be fully coloured for local use.

Banana plantations must be kept worked and free from weeds, especially if the weather is dry, as a severe check to the plants now means small fruit later on. Bananas should be allowed to become full before the fruit is cut, as they will carry all right at this time of the year; in fact there is more danger of their being injured by cold when passing through New England by train than there is of their ripening up too quickly.

Bear in mind the advice given with regard to the handling, grading, and packing of the fruit. It will pay you to do so. Land intended for planting with bananas or pineapples during the spring should be got ready now.

Strawberries require constant attention, and, unless there is a regular and abundant rainfall, they should be watered regularly. In fact, in normal seasons an adequate supply of water is essential, as the plants soon suffer from dry weather or strong, cold westerly winds. Where not already done, vineyards should be cleaned up ready for pruning—it is, however, too early to prune or to plant out new vineyards.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

ALL kinds of deciduous fruit trees are now ready for pruning, and this is the principal work of the month in the orchards of the Granite Belt area. Don't be frightened to thin out young trees properly, or to cut back hard—many good trees are ruined by insufficient or bad pruning during the first three years. If you do not know how to prune, do not touch your trees, but get practical advice and instructions from one or other of the Departmental officers stationed in the district. In old orchards do not have too much bearing wood; cut out severely, especially in the case of peaches, or you are likely to get a quantity of small unsaleable fruit. There are far too many useless and unprofitable fruit trees in the Granite Belt area, which are nothing more or less than breeding-grounds for pests, such as fruit-fly, and are a menace to the district. Now is the time to get rid of them. If such

trees are old and worn-out, take them out and burn them, but if they are still vigorous, cut all the tops off and work them over with better varieties in the coming season—apples by grafting in spring and peaches and other stone fruits by budding on to young growth in summer. Planting can start now where the land is ready and the trees are to hand, as early-planted trees become well established before spring, and thus get a good start. Be very careful what you plant. Stick to varieties of proved merit, and few at that, and give so-called novelties and inferior sorts a wide berth. Take the advice of old growers, and do not waste time experimenting with sorts that have probably been tested in the district and turned down years ago. When land is intended for planting this season, see that it is well prepared and well sweetened before the trees are put in, as young trees seldom make a good start when planted in sour and badly prepared land.

Slowly acting manures—such as bonedust, meatworks manure, or island phosphates—can be applied now, as they are not liable to be washed out of the soil, and they will be available for the use of the trees when they start growth in spring. Lime can also be applied where required. Badly drained land should be attended to, as no fruit trees will thrive with stagnant water lying round their roots.

On the Downs and Tableland all kinds of fruit trees can be prunded now, and vines can be pruned also in any district where there is no danger from late frosts, and where this can be done the prunings should be gathered and burnt, and the vineyards ploughed up and well worked to reduce the soil to a good state of tilth, so that should rain come it will absorb all that falls and the moisture can be kept in the soil by cultivation subsequently.

Citrus fruits will be at their best in the Western districts. The trees should be watered if they show signs of distress; otherwise all that is necessary is to keep the surface of the land well worked. All main-crop lemons should be cut by this time, as if allowed to remain longer on the tree, they only become overgrown and are more suitable for the manufacture of peel, whreas if cut and ased now they will keep in good order so that they can be used during the hot weather.

TO NEW SUBSCRIBERS.

New subscribers to the Journal are asked to write their names legibly on their order forms. The best way is to print your surname and full christian names in block letters, so that there shall be no possibility of mistake.

When names are not written plainly it involves much tedious labour and loss of valuable time in checking electoral rolls, directories, and other references. This should be quite unnecessary.

Some new subscribers write their surname only, and this lack of thought leads often to confusion, especially when there are other subscribers of the same surname in the same district.

Everything possible is done to ensure delivery of the Journal, and new subscribers would help us greatly by observing the simple rule suggested, and thus reduce the risk of error in names and postal addresses to a minimum.

In Memoriam.

F. F. COLEMAN.

We regret to record the passing at the age of sixty-six years of Mr. F. F. Coleman, Officer in Charge of the Pure Seeds, Stock Foods, Fertilizers, Pest Destroyers, and Veterinary Medicines Branch of the Department of Agriculture and Stock, which occurred on 24th April.

The late Mr. Coleman was born in Sandwich, England, and received his early education in England and France. Later, he specialised in the study of seeds and plant life and took out an extension course under the auspices of the Cambridge University. In 1903 he obtained an award of merit from the Royal Horticultural Society, London. He was afterwards engaged in the supervision of extensive variety trials, and the inspection and selection of crops for seed purposes in both England and France. Interested in military matters, he joined the British Volunteer Garrison Artillery. After coming to Australia he entered the Queensland Department of Agriculture and Stock in December, 1914, in the capacity of seed expert, and organised the Queensland seed testing station. To the work of the station, other activities were added from time to time. He made grasses his hobby, and pasture improvement was added to the more important activities of his branch. He planned a comprehensive series of experiments, which he developed indefatigably. He was the first secretary of the Pasture Improvement Committee, through which experiments on a larger scale was possible. He was a capable administrator, maintaining a high standard of efficiency in his branch. In legislation governing pure seeds, fertilizers, stock foods, and pest destroyers, Queensland is regarded as a pioneer, and in his administration of the several Acts of Parliament respecting those agricultural essentials, and veterinary medicines also, Mr. Coleman did good work for the man on the land, whose interests within the scope of the activities of his branch he was assiduous in protecting. In some of those measures he had a shaping hand, assisting in the drafting of them with an eye to their effective application when passed into law. Method, thoroughness, and dependability characterised all his work, never losing sight of the practical end in view.

He was a frequent contributor to the "Queensland Agricultural Journal" on technical subjects, and among his recent contributions were "Pasture Improvement," "Intensive Pasture Improvement," "Subdivision, Renovation, and Top Dressing to Produce Better Grass," "The Cultivation of Grasses," "Some Factors that Determine the Keeping Qualities of Stored Maize," and "Wild White Clover," and "Comparative Analyses of Grasses, Clovers, and Other Fodder Crops."

The late Mr. Coleman's first wife died in 1932. Later he married Miss L. Brundritt, who survives him; also two sons, Messrs. Bert and Leslie Coleman. His second son, Lieut. E. L. Coleman, was killed in action in France while serving with the Australian Field Artillery (A.I.F.). The interment took place at the Lutwyche Cemetery in the presence of many of his former colleagues and representatives of the commercial life of the city. The Minister for Agriculture and Stock (Hon. Frank W. Bulcock) was represented by the Under Secretary and Director of Marketing (Mr. E. Graham). To the late Mr. Coleman's sorrowing relatives our deep sympathy is extended.

In Memoriam.

J. F. McCAFFREY.

After a short illness, the Registrar of the University (Mr. J. F. McCaffrey), passed away on 4th April, at the Mater Misericordiae Private Hospital. His death came as a shock to all sections of the University, as well as to the general community, where he was loved as a man, and esteemed as an administrator.

The late Mr. McCaffrey would have attained his fifty-third birthday on 25th November this year. He was born at St. Lucia and received his primary education at what is now known as the Ironside State School, winning an open schoolarship under the head teachership of Mr. J. Loney, to the Christian Brothers' College, Gregory terrace. It is a significant fact that his nom-de-plume in one section of the scholarship examination was "Industry," a word which has virtually been his motto through life, and which is in some measure responsible for his comparatively early demise.

Having won his scholarship, he passed the New South Wales junior public examination, and the qualifying examination, entitling him to entry into the Queensland Public Service, in 1898. He was given some banking experience in the State Savings Bank before being transferred to the Harbours and Rivers Department. In 1904, he was transferred to the Department of Public Instruction. It was here that the young man began to show the sterling qualities as an administrator and organiser.

His industry and his organising ability soon brought him under the notice of Mr. J. D. Story, I.S.O., who was then Under Secretary, and Mr. McCaffrey was seconded for duty to the University of Queensland on its foundation in 1910 as chief clerk and accountant. Mr. Story had been very much involved in the early work of the University organisation, and he chose Mr. McCaffrey for his industry and his administrative ability to fulfil this important post in the early history of the institution. His services were first made available to the Senate in April, 1910, and soon afterwards he resigned his position with the Queensland Public Service, and in October, 1910, assumed to full responsibility of his new post at the University.

As chief clerk his advice was invaluable. He was secretary also to the Administrative and Finance Committees of the University. When in 1925 Dr. F. W. S. Cumbrae Stewart was appointed to the Garrick Professorship of Law Mr. McCaffrey was his logical successor to the post of Registrar.

How well he has filled this post during the past ten years no one but those most closely associated with him fully realise. He was an ideal Registrar, combining a rare business acumen with a most kindly heart. He met the students on the friendliest possible footing. Indeed, many a graduate to-day can thank the tolerance and help of Mr. McCaffrey which made it possible for him to finish his degree course. He was the

perfect link between the undergraduate body, the Senate, and the University staff, all of whom loved him as a man and respected him as an administrator. His loss to the University is beyond compute, not only for his personal qualities but also because of the manner in which he had centralised every administrative aspect of University activity. He worked like a slave in the service of the University, never sparing himself. It is a tragic coincidence that he passes on the eve of the University's celebration of its twenty-fifth birthday. Actually in January Mr. McCaffrey completed twenty-five years of service with the University. Keenly interested in land industries, the late Mr. McCaffrey assisted in the organisation of the Council of Agriculture, for which for a term he acted as secretary. The Faculty of Agriculture also claimed his close interest, and rural economics had in him an earnest student. He assisted in founding the St. Lucia Farm Boys' School, which is situated on University property.

He leaves a widow and one son and one daughter to whom deep sympathy is extended.

When the Chancellor (Sir James Blair) heard the sad news he was deeply affected. He said that Mr. McCaffrey had been a highly efficient and painstaking officer who had displayed great capacity for work and much enthusiasm in his efforts on behalf of education and the University. He was ever ready to offer sympathetic and sound advice to the students, by whom he was greatly beloved. Mr. McCaffrey was tactful and courteous in his dealings with people, and was trusted and respected by the members of the Senate and the staff. He would be remembered kindly and gratefully by all those with whom he came in contact—privately or officially.

On behalf of the Senate and himself, said the Chancellor, he would like to extend to Mrs. McCaffrey, her son and daughter, and relatives, an expression of deepest sympathy.

WALTER HIGHET.

Mr. Walter Highet, one of the senior slaughtering inspectors of the Department of Agriculture and Stock, died with tragic suddenness while on duty at the Cannon Hill Saleyards on Thursday, 4th April. For two days previously, Mr. Highet had been slightly ill, but did not worry much about it. At the saleyards he complained that he was not feeling well, and returned from the yards to his office. There while making out a stock permit he collapsed and died soon after the arrival of a doctor who had been summoned immediately.

Mr. Highet, who was known widely and esteemed highly in stock circles, was born in Garlieston, Scotland, sixty-three years ago, and came to Queensland at the age of twenty. He went to Western Queensland for colonial experience, and was engaged in the pastoral industry, with cattle mainly, for a considerable time. This experience, added to veterinary knowledge gained in Scotland, qualified him for appointment to the Department of Agriculture and Stock. He was appointed subsequently a slaughtering inspector, a position which he had held for nearly forty years. On Friday, 5th April, he was laid to rest at the Lutwyche Cemetery in the presence of a large assembly representative of the stock industry and the business life of the city, and which included many old departmental colleagues. The Minister for Agriculture and Stock (Hon. Frank W. Bulcock) was represented by the Under Secretary and Director of Marketing (Mr. E. Graham).

The late Mr. Highet is survived by his widow and two sons (Messrs. J. S. and R. Highet), two daughters (Mrs. W. A. Lovegrove and Miss B. Highet), and two grandsons, all of Brisbane; and to them the deepest sympathy is extended.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MARCH, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1935, AND 1934, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	March.	No. of Years' Records.	March. 1935.	March. 1934.		March.	No. of Years' Records.	March. 1935.	March. 1934.
North Coast.	In.		In.	In.	*Central Highlands.*	In.		In.	In.
Atherton	8·48	34	16·56	14·36	Clermont	3·00	64	1·15	0·03
Cairns	17·89	53	34·36	19·11	Gindie	2·55	35	0·05	0·07
Cardwell	15·51	63	16·97	8·87	Springsure ..	2·87	66	0·48	..
Cooktown	14·94	59	34·57	9·81					
Herberton	7·62	49	11·24	12·80					
Ingham	15·34	43	17·79	8·49					
Innisfail	25·99	54	46·46	32·38					
Mossman Mill ..	17·07	21	28·74	27·16	*Darling Downs.*				
Townsville	7·19	64	2·78	0·85					
					Dalby	2·63	65	0·16	0·01
Central Coast.					Emu Vale ..	2·28	39	0·55	..
					Hermitage ..	2·10	28	0·40	..
Ayr	6·36	48	3·10	0·22	Jimbour	2·47	47	0·62	..
Bowen	5·49	64	2·62	1·62	Miles	2·60	50	0·46	0·05
Charters Towers ..	3·68	53	1·35	0·59	Stanthorpe	2·59	62	0·19	1·03
Mackay	11·73	64	5·20	6·47	Toowoomba ..	3·67	63	0·80	0·23
Proserpine	11·71	32	2·60	10·33	Warwick	2·45	70	0·49	..
St. Lawrence ..	5·15	64	2·62	0·46					
South Coast.									
					Maranoa.				
Biggenden	3·69	36	1·66	0·95					
Bundaberg	4·97	52	1·11	1·85	Roma	2·53	61	..	0·23
Brisbane	5·59	84	1·06	0·82					
Caboolture	7·48	48	2·21	4·30					
Childers	4·36	40	1·14	1·35					
Crohamhurst ..	11·05	41	4·42	4·79					
Esk	4·64	48	1·88	0·78					
Gayndah	2·99	64	1·41	0·65					
Gympie	6·05	65	2·57	2·38	*State Farms, &c.*				
Kilkivan	3·79	56	0·60	0·41					
Maryborough ..	5·83	64	1·52	2·53	Bungeworgorai ..	1·51	20	..	0·40
Nambour	8·97	39	4·65	3·97	Gatton College ..	3·08	35	4.09	0·32
Nanango	3·33	53	..	0·54	Kairi	7·43	20	..	16·90
Rockhampton ..	4·34	64	1·49	0·23	Mackay Sugar Experiment Station	10·57	37	3·78	5·30
Woodford	7·71	48	1·96	3·40					

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—MARCH, 1935.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·79	85	71	91	16	68	24, 25, 26	3457	16
Herberton	..	80	63	90	15	55	24, 25	1124	12
Rockhampton	29·94	88	68	101	15	59	17	149	10
Brisbane	30·02	82	65	91	23	55	17	106	10
Darling Downs.									
Dalby	29.98	86	58	98	15	46	18	16	1
Stanthorpe	..	79	52	90	22	34	18	19	7
Toowoomba	..	79	59	90	23	48	17, 18	80	4
Mid-Interior.									
Georgetown	29·81	92	71	97	11, 13, 15, 28	65	9, 10, 30	475	9
Longreach	29·88	97	69	108	14	56	17	17	1
Mitchell	29·96	90	62	102	14	48	17, 18	13	1
Western.									
Burketown	29·80	92	76	100	26	72	30	333	9
Boulia	29·81	98	72	109	14	60	17, 18	..	..
Thargomindah	29·93	92	64	106	14, 21	54	16, 18	..	..

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	May. 1935.		June. 1935.		MOONRISE. May., 1935.	June. 1935.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	6·18	5·20	6·37	5·1	4·11	6·16
2	6·18	5·19	6·37	5·1	5·17	7·15
3	6·19	5·18	6·38	5·1	6·22	8·10
4	6·20	5·17	6·38	5·1	7·27	8·59
5	6·20	5·17	6·39	5·1	8·29	9·40
6	6·21	5·16	6·39	5·1	9·27	10·16
7	6·21	5·15	6·39	5·1	10·19	10·49
8	6·22	5·14	6·40	5·2	11·5	11·16
9	6·23	5·14	6·40	5·2	11·45	11·48
					p.m.	p.m.
10	6·23	5·13	6·40	5·2	12·20	12·17
11	6·24	5·12	6·41	5·2	12·51	12·47
12	6·24	5·11	6·41	5·2	1·19	1·19
13	6·25	5·11	6·41	5·2	1·48	1·54
14	6·26	5·10	6·42	5·2	2·17	2·34
15	6·26	5·10	6·42	5·1	2·9	3·23
16	6·27	5·9	6·42	5·1	3·22	4·18
17	6·27	5·9	6·43	5·1	3·59	5·20
18	6·28	5·8	6·43	5·1	4·43	6·26
19	6·29	5·8	6·43	5·1	5·37	7·35
20	6·29	5 7	6·44	5·1	6·33	8·44
21	6·30	5·7	6·44	5·1	7·35	9·48
22	6·30	5·6	6·44	5·2	8·38	10·52
23	6·31	5·6	6·44	5·2	9·45	11·55
24	6·32	5·5	6·44	5·2	10·51	a.m.
25	6·33	5·5	6·45	5·2	11·55	12·56
26	6·33	5·4	6·45	5·3	a.m.	2·0
27	6·34	5·4	6·45	5·3	12·58	3·4
28	6·34	5·3	6·45	5·3	2·0	4·6
29	6·35	5·3	6·45	5·4	3·2	5·5
30	6·35	5·2	6·45	5·4	4.7	6·1
31	6·36	5·2			5·14	

Phases of the Moon, Occultations, &c.

3 May	●	New Moon	7 36 a.m.
10 ,,	☾	First Quarter	9 54 p.m.
18 ,,	○	Full Moon	7 57 p.m.
25 ,,	☽	Last Quarter	7 44 p.m.

Apogee, 12th May, at 12.18 a.m.
Perigee, 26th May, at 2.30 a.m.

Mars, which on 2nd February, was 5 degrees north of Spica, and on 4th March had advanced to a little north-east of it, apparently turned backwards till on 18th May it will have receded 18 degrees. It will then apparently change its course, and resume a normal eastward direction. A loop will thus be formed in the constellation Virgo, and Mars will be found a useful beacon to point out that constellation. Spica represents the left hand of the Virgin, which is holding an ear of corn; it is also remarkable as one of the two stars of the first magnitude on the elliptic; this year the Sun will pass 2 degrees north of it on 16th October. Spica will reach the Meridian about half-past nine p.m. on 18th May.

The nearness of the full Moon to Antares, the principal star of the Scorpion, will be noticeable early in the evening of the 19th, but an occultation of the star will occur only in the northern hemisphere. The Moon will rise at Warwick at 5.37 p.m.

Mercury, on the 26th, though not nearly at its greatest brilliancy, will be fairly discernable, being nearly 23 degrees above the horizon when the Sun sets. It will be apparently amongst the small stars where Taurus and Gemini meet.

Mercury, quite invisible, will set 13 minutes after the Sun on the 1st; on the 15th it sets at 6.14 p.m., 1 hour 4 minutes after the Sun.

Venus sets at 7.33 p.m., 2 hours 31 minutes after the Sun, on the 1st; on the 15th it sets at 7.48 p.m., 2 hours 38 minutes after the Sun.

Mars rises at 3.50 p.m. and sets at 3.54 a.m. on the 1st; on the 15th it rises at 2.46 p.m., and sets at 2.52 a.m.

Jupiter rises at 5.53 p.m. and sets at 7.9 a.m. on the 1st; on the 15th it rises at 4.53 p.m., and sets at 6.3 a.m.

Saturn rises at 1.39 a.m. and sets at 2.23 p.m. on the 1st; on the 15th it rises at 12.49 a.m., and sets at 1.31 p.m.

The Cross will be upright at its highest position, XII., on the southern Meridian at 10 p.m. on the 1st, and 9 p.m. on the 16th, to an observer at Brisbane, where the Cross will be 57½ degrees above the horizon; at Townsville the elevation will be 49 degrees, and the time 24 minutes later.

1 June	●	New Moon	5 52 p.m.
9 ,,	☾	First Quarter	3 49 p.m.
17 ,,	○	Full Moon	6 20 a.m.
24 ,,	☽	Last Quarter	12 21 a.m.

Apogee, 8th June, at 7.12 p.m.
Perigee, 21st June, at 6.6 a.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.