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# THE WEEDS

OF

## NEW SOUTH WALES.

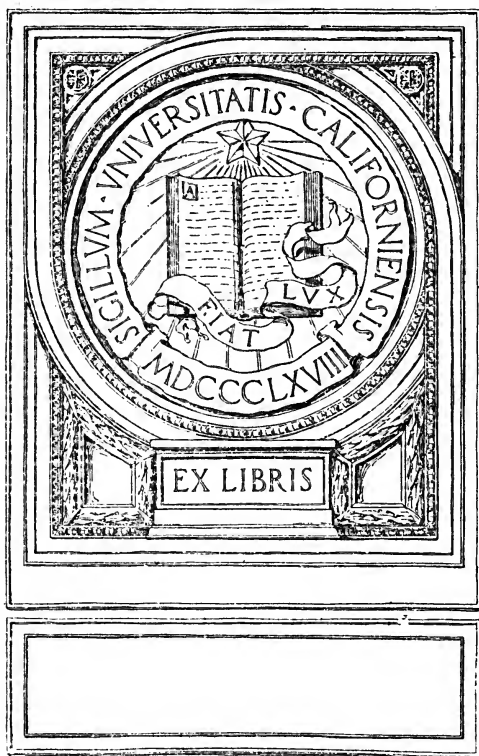
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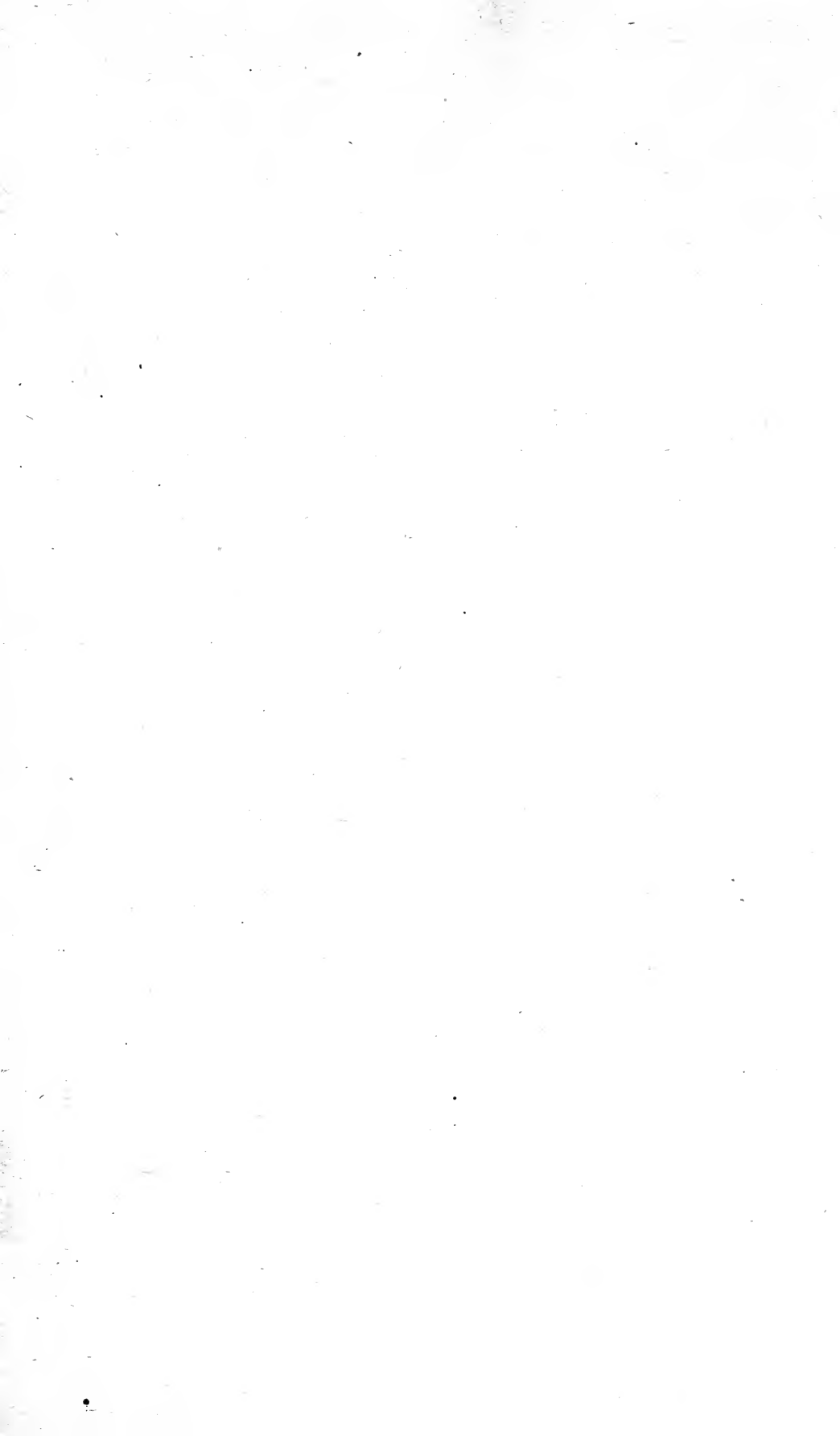
BY

J. H. MAIDEN, I.S.O., F.R.S., F.L.S.

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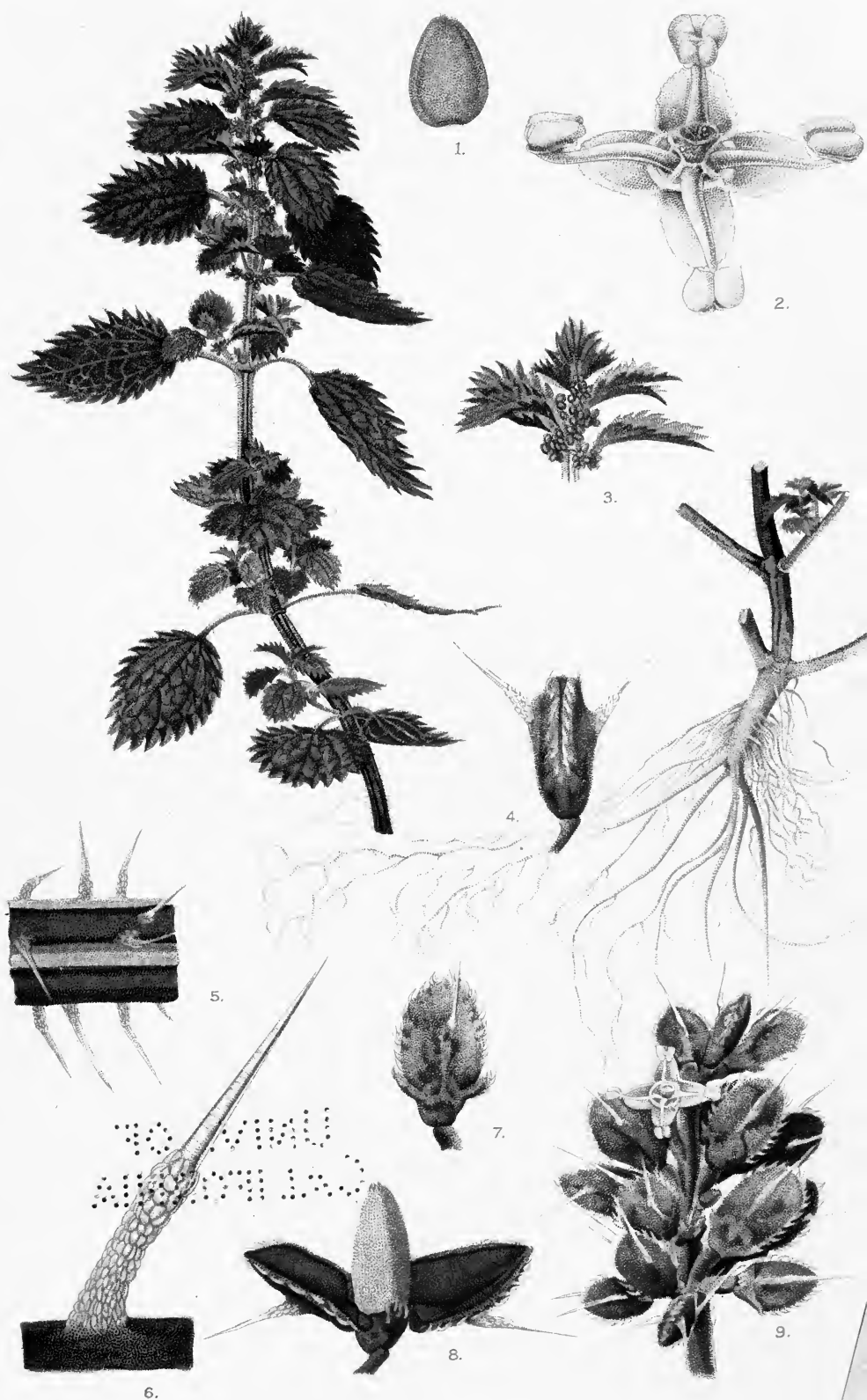








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THE WEEDS OF N. S. W.  
DWARF NETTLE. (*Urtica urens*, L.)

# THE WEEDS

OF

## NEW SOUTH WALES.

EXPLANATION OF PLATE OF DWARF NETTLE (*Urtica urens*).

1. Seed. (x 12.)
  2. Male flower thrown open, showing four anthers and perianth of four segments. (x 27.)
  3. Showing position of flower clusters on the stem. (x 2.)
  4. Side view of female flower. (x 12.)
  5. Part of stem showing the ribs and glandular hairs. (x 9.)
  6. A glandular stinging hair. (x 52.)
  7. Front view of female flower. (x 12.)
  8. Female flower thrown open, showing fruit and perianth of two segments. (x 12.)
  9. Cluster of flowers, the sexes intermixed. (x 9.)
- Stem and root of plant natural size. Nos. 1 to 9 enlarged as stated.

[See page 41.]

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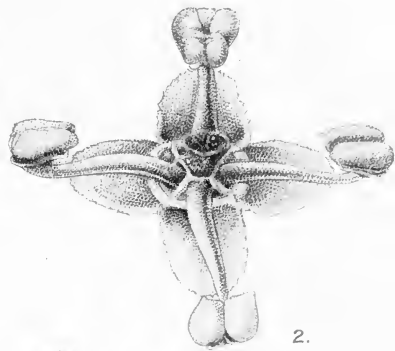
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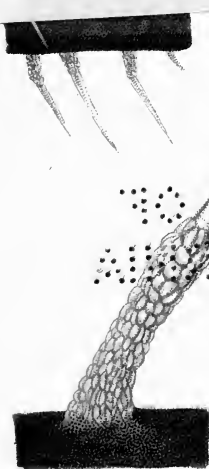
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THE WEEDS OF N. S. W.  
DWARF NETTLE. (*Urtica urens* L.)

UNIV. OF  
CALIFORNIA

# THE WEEDS

OF

# NEW SOUTH WALES.

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## PART I.

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BY

n.c.  
21

J. H. MAIDEN, I.S.O., F.R.S., F.L.S.,

Government Botanist and Director of the Botanic Gardens, Sydney.

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## INTRODUCTORY REMARKS.

MOST of the information contained in the following pages has appeared in articles by the author in the *Agricultural Gazette of New South Wales* during the last twenty-five years. It is now collected in this form in the hope that it will be of use to farmers and all others interested in the prevention of the spread of pests that annually rob them of thousands of pounds.

In this country of wide, imperfectly occupied areas, with special liability to attack by new weeds from the four quarters of the world, a moral obligation attaches to every citizen to do what he can to check the weed menace, and he should bear in mind that the expenditure of a shilling in tackling a weed when first observed, may perhaps be more efficacious than the expenditure of a hundred pounds in the following year.

When a weed gets into New South Wales (it may have come oversea in spite of precautions, or it may have spread from one part of the State to another, or have come from another State, for the States have no means of self-defence at the boundaries), it shows itself by means of a plant, or group of plants. Every plant which makes its appearance in a district should be viewed with suspicion, and, unless the finder knows what it is, he should pull one or more plants up by the roots, wrap them in paper, and address them (the postage is quite small) to "The Director, Botanic Gardens, Sydney." If that officer can name it in the form in which it is sent, he will promptly give advice, but if flowers have to be waited for before it can be named, he will ask for them and defer his advice, for some weeds cannot be named if only leaves be available.

Whether the weed be deemed to be harmless or not, it is desirable that the local Town Clerk or Shire Clerk be informed, in order that the proper municipal or shire officer may keep an eye on the intruder, and, if necessary, approach the local body with the view of suitable action being taken under authority of the Local Government Department.

Weed legislation is referred to at p. 18. As regards Commonwealth legislation, large numbers of food-seeds, such as wheat, are examined for weed-impurities, and seeds in general are tested similarly at the seed-testing laboratory of the Department of Agriculture in the Botanic Gardens, Sydney. The object of this is to protect New South Wales from weeds arriving by sea, and also from seeds of useful and ornamental plants which have lost their germinating power.



## Some General Observations on Weeds.

THERE are a great many definitions of weeds. One is "Any useless or troublesome plant." A weed may be a plant which, under different circumstances, is a useful one. Thus Johnson grass has many merits, but it becomes a weed of a most aggressive kind in a cultivation paddock. Useful plants, which have become scattered amongst a crop, cannot be separately harvested; they thus become useless, and even worse, for they vitiate the main crop. They are therefore weeds.

Immediately a plant gets out of control in cultivated or pasture land, it becomes a weed. Many are vegetable pariahs; they have had a bad time, and hence have developed characters which enable them to resist annihilation. Some are especially injurious, and tenacity of life and noxiousness may be combined in the same weed. How important it is, therefore, that we should know our weeds, and to assist in this, some illustrations will help identification. But an important thing to be kept in mind is that when a new weed appears on the property its identity should be ascertained, and particulars sought concerning it. To be on the safe side, it should be destroyed at once, as if it seeds it may get beyond control. Again, acclimatisation experiments with economic plants are full of surprises, and so are the unbidden acclimatisation experiments that weeds undertake in spite of us. It may turn out that a weed may hitherto have not a very bad reputation, but your property may offer special attractions to it and it may spread to an extent never previously recorded. Why run the risk? Keep your property well inspected, and "run in" every suspected weed, adopting the attitude of a policeman towards a suspected person.

Asa Gray, the American botanist, was a charming short-paper writer, and his "The Pertinacity and Predominance of Weeds," in his *Scientific Papers*, Vol. ii, p. 234, is profitable reading.

Following is a synopsis of this series of notes on weeds, and I trust that the presentation of the points (original to some extent) will be found useful.

### SECTION 1.—BAD POINTS OF WEEDS.

- (a) They take up the space which should be occupied by useful plants.
- (b) They screen off light and air and deprive the crop of various manurial constituents.
- (c) They are harvested with crops which they depreciate.
- (d) Some weeds are parasitic on crops and do not take their sustenance from the soil and air. They thus weaken the crop. Such plants are Dodder and Mistletoe.
- (e) Weeds harbour insect and fungus pests. The danger lies in the fact that we may not trouble to apply insecticides or fungicides to weeds, which form a nursery for pests.

(f) *They may be poisonous.* In order to illustrate points, it is necessary, at this place, to include some plants which are not, in strictness, weeds. Reference may be made to the following papers which have appeared in the *Agricultural Gazette of New South Wales*, chiefly, though not exclusively, on poison plants, with reference to New South Wales conditions:—

1. "Native Plants Poisonous to Stock," Feb., 1895, 2 pp.
2. "Plants Reputed to be Poisonous to Stock in Australia," Jan., 1897, 22 pp.
3. Same, with supplementary matter. June, 1901, 32 pp.
4. "Is the Tree Tobacco Poisonous?" and "Garden Plants Poisonous to Stock," June, 1904, 3 pp.

Dr. J. B. Cleland has a valuable resumé of the whole subject in the third Report of the Department of Microbiology, 1914, and the following paper by the same author should also be referred to:—"Experimental Feeding with some alleged Poison-plants of New South Wales," *Agric. Gaz.*, Jan., 1914, p. 65.

We have a large number of suspected plants, and some of these, having been duly tried, have been honourably acquitted. Other suspected plants are brought under review from time to time, and some plants (*e.g.*, grasses) which at one time were not suspected, have now proved to be poison-plants.

The literature in regard to the effects of poison-plants on stock and their remedies, by competent veterinary surgeons, is scarce, and the two following Bulletins are valuable, in spite of the fact that the individual plants referred to are different to ours:—

1. "Prevention of Losses of Live Stock from Plant Poisoning," by G. Dwight Marsh, *Farmers' Bull.*, U.S. Dept. Agric., No. 720.
2. "Stock-poisoning Plants of California," by H. M. Hall and H. S. Yates, *Bull.* No. 249 of the Agric. Exper. Station, Berkeley, Cal.

In this brief preliminary sketch I will, from the point of view of poison-plants, classify them in the following way:—

- (i) Saponins.
- (ii) Cyanogenetic Plants (Prussic Acid).
- (iii) Narcotics.
- (iv) Hemlock.
- (v) Suspected plants.
- (vi) Poison-plants concerning which further knowledge is required.

(i) *Saponins.*

If my readers will turn to my "Forest Flora of New South Wales," Part 53, page 55, they will find "A few notes on Saponins (Poisonous Vegetable Soaps)." A Saponin is a member of a group of glucosides which are characterised by the property of producing a soapy lather, and most of them (for there are many) are poisonous.

In Part 52, page 31, of the same work is an account of the "Fish-poisons of the Aborigines," and some of the poisons there enumerated are Saponins. A chemical investigation of Australian plants, with the view of ascertaining the presence of a Saponin, would be of interest, and would probably cause some surprises, in view of the fact that certain Australian plants in which this substance has already been found were not previously suspected of being poisonous.

Wattles (*Acacia*) are perhaps our principal plants which have been proved to be poisonous, but only a very few of them. Mr. W. L. Hindmarsh in recently sending me twigs of the Blackwood (*Acacia melanoxylon*) from the Lismore district, says that the bark and twigs have been used by the blacks to stupefy fish, and the twigs are suspected of poisoning pigs. An old reference in my *Forest Flora*, vol. i, p. 107, that the bark contains some poison, may be thus explained.

There is a paper on "The Toxic action of Saponin" in the *Philippine Journal of Science*, vol. i, pp. 1037-1042, by R. F. Bacon and H. T. Marshall. It takes the physiological standpoint and will be found interesting, especially as so little has been written on this somewhat obscure subject.

The Corn Cockle (*Agrostemma Githago*) is an ornamental weed from Europe, which I am sorry to say has been increasingly invading our wheat-fields during the last few years. Its seed is undoubtedly poisonous owing to the presence of a Saponin. It is the more dangerous because it is difficult to screen from wheat. It poisons fowls and renders flour poisonous, though, on account of its dark colour, it is not to be found in flours of high grade. It belongs to the Pink family (*Caryophyllaceæ*), a usually non-poisonous family of plants, and its poisonous character may give a clue to the statement that in America the seeds of one of the Chickweeds (*Stellaria media*) are said to injure lambs when eaten in large quantities.

#### (ii) *Cyanogenetic Plants.*

By this term we mean plants which contain a certain principle called a glucoside which, acted upon by a ferment in the plant, liberates hydrocyanic or prussic acid, a very poisonous substance.

In this connection read a paper on the "Variegated Thistle (*Carduus marianus*) as a Poison-plant," by Max Henry in the *Agricultural Gazette* for September, 1912, p. 807.

One or two of the Sundews (*Drosera*) so common in Australia in damp places, have been reported as poisonous to cattle. A few years ago some species were found to contain hydrocyanic acid, and this may be the key to the matter.

Oleander (*Nerium Oleander*). The prunings of this beautiful small tree are dangerous. Stock will rarely nibble the tree, but will eat the wilted prunings thrown over the fence. See the *Agricultural Gazette* for June, 1904, p. 544. Let me say that the practice of throwing garden prunings into the paddock in which are the horse and cow, may be a dangerous one. It may, of course, be instructive if it be noted whether the prunings are toxic, before or after wilting. But people do not, as a rule, make physiological experiments on their animals.

For a case of a grass being poisonous at a stage of its growth, see "A Blue Couch Grass (*Cynodon incompletus* Nees), which is sometimes Poisonous," *Agricultural Gazette*, 1912, p. 295. Dr. Petrie has shown that at certain seasons it contains hydrocyanic acid.

See also a paper, "The poisonous action of Johnson grass (*Andropogon Sorghum*)," by A. C. Crawford, in *Bull. U.S. Dept. Agric. Bureau Plant Ind.* 90, p. 31-34. Mr. F. B. Guthrie has also found hydrocyanic acid in this grass. See his article on "Sorghum Poisoning" in the *Agricultural Gazette*, Sept., 1912, p. 812.

See also a general paper on the subject by Dr. Petrie, viz., "Hydrocyanic Acid in Plants, Part ii. Its occurrence in the grasses of New South Wales," in *Proc. Linn. Soc., N.S.W.*, xxxviii, 624 (1913).

We know that certain grasses, such as *Lolium temulentum*, the Darnel, *Paspalum scrobiculatum* and *Festuca elatior*, display a ready tendency to become affected by minute poisonous fungi, and thus sheep and cattle are often injured and sometimes destroyed by them. But it should be borne in mind that these grasses are not always so affected, and in that condition the grasses are more or less useful fodder plants.

A species of Spear Grass, *Stipa robusta* Vasey, goes under the name of "Sleepy Grass" in the United States (see *Agricultural Gazette*, Vol. xxiii, p. 583). It is undoubtedly poisonous (see also Pammel, p. 357). On pages 580-583 are some notes on alleged poison grasses which will be useful for reference. Our common Spear Grass, of course, belongs to this genus.

### (iii) *Narcotics.*

Speaking generally, the Tobacco family (*Solanaceæ*) contains more or less of a poisonous principle or principles of a narcotic character. The worst offender is *Datura Stramonium*, often erroneously called Castor Oil Plant. It is a medium-sized heavy smelling herb with a large white bell-flower and a large nutmeg-grater sort of fruit which contains large numbers of black seeds. I have never personally known cattle to eat the plant; the smell repels them, but there are many instances of children chewing the deadly seeds, often with fatal results. The weed should therefore be carefully destroyed, not for the sake of the stock, but for the children's sake.

Then some of our native *Solanums* are stated to be poisonous, while others are harmless. The subject should be thoroughly threshed out by a committee, and until this is done we shall only be able to give stock-owners vague replies.

We have a true native tobacco (*Nicotiana suaveolens*), and this is certainly poisonous. It is a pretty little slender plant, with sweet-scented white tubular flowers. I believe it to be abundantly proved that it is, from time to time, responsible for the deaths of large numbers of sheep.

*Nicandra physaloides*, the so-called "Apple of Peru," is a weed which was originally introduced to gardens, and now it is spreading here and there. Pammel says, "said to be poisonous; used as a fly-poison in parts of the United States," and this should put us on our guard concerning it.

### (iv) *Hemlock.*

Undoubtedly the Hemlock (*Conium maculatum*), figured and described in the *Agricultural Gazette* for February, 1896, p. 79, is a deadly plant, dangerous alike to stock and human beings. Late research indicates that all parts of the plant are poisonous because of the presence of a resin known as Cicutoxin. It is a pretty fern-like plant in its early stages, and hence it has been cultivated under the name of Parsley Fern. It should be most carefully dug out and burned.

There is an excellent article on an allied plant, Water Hemlock (*Cicuta virosa*), *Technical Bulletin*, No. 81, by C. Alfred Jacobson, Agric. Expt. Station, Univ. of Nevada, Reno, U.S.A. (1915)

(v) *Suspected plants.*

That the following plants are poisonous, is an opinion very widely held in Australia:—

1. *Euphorbia Drummondii*.
2. *Stachys arvensis*.

There are others, but these will illustrate my point.

*Euphorbia Drummondii*, called "Milk Weed" because of its white juice, is a humble, prostrate succulent plant which has a pinkish cast, and which often occurs on river banks or in places with rich soil, and a fair amount of moisture. It is one of the plants which is most frequently reported as having killed sheep. Every year, particularly about March, I get many reports, chiefly from the west, of its devastations. But Mr. E. Stanley, when Government Veterinarian, showed in a paper in the *Agricultural Gazette* for September, 1896, p. 319, that it is not really poisonous.

He adduced what appears to be overwhelming evidence against the toxic character of this plant, quoting not merely his own varied experiments, but the observations of many stock-owners. The memoir is far too voluminous to print here, but is well worthy of reference by pastoralists and others. Following are Mr. Stanley's own remarks:—

... the weed is not only free from poisonous properties, but it is also a wholesome and valuable fodder-plant. Its natural habit is to grow freely after slight moisture, and to form green patches amongst the parched herbage; it is soft, juicy, and very tempting to hungry sheep; they eat it too freely and fill their stomach to engorgement; in this lies the danger, causing indigestion, which is followed by flatulency, and frequently death by suffocation.

This is the only explanation that can be given to account for its evil reputation. Nevertheless, it must be remembered that exactly similar disastrous consequences often follow satisfying the hungry appetite with ravenous feeding. I have known trefoil, lucerne, young thistles, green wheat, and even couch grass, cause fatal indigestion when stock have been indiscreetly fed upon them.

Drovers coming on such succulent food should permit only a moderate feed, and move them off such patches, until the cravings of hunger are gradually satisfied; then they may eat such green herbage with impunity.

*Stachys arvensis*, the so-called "Stagger Weed," is as widely distributed as the preceding, and the belief as to its poisonous nature is just as prevalent. It was described in the *Agricultural Gazette*, May, 1916, p. 336.

Following is a plant occasionally suspected as a poison-plant (there are several of them) out of pure ignorance. I am sorry I have no vernacular name for these plants, which belong to the group *Zygophyllum*. I have published a note "*Zygophyllum* from the Point of View of the Grazier," in the *Agricultural Gazette* for January, 1901, p. 23, to which I refer my readers.

They have four or five angled fleshy fruits, and the leaves are yoked or paired together. They usually occur in the drier parts of the State, are often trailing, and found under larger plants. Indeed, in the open they are usually eaten out by sheep, but both here and in South Africa they are often suspected as poison-plants, without any evidence at all, that I can gather; simply, I think, because they are a different green from surrounding plants, and not much is known about them. I believe them, indeed, to be useful fodder plants, and the fact that they are suspected as being poisonous does not redound to our credit.

(vi) *Poison-plants concerning which further knowledge is required.*

In the *Agricultural Gazette* for March, 1913, p. 241, Mr. E. Cheel has a note on the "White-flowering Passion Flower (*Passiflora alba*), injurious to stock," and the poisonous nature of these passion vines requires further investigation.

Pammel gives *Anagallis arvensis*, which we know as Scarlet Pimpernel, the name of Poison Weed. He says it is poisonous to horses and dogs. It and the closely-allied Blue Pimpernel (*A. cœrulea*) are very old Sydney weeds, having been recorded at least as early as 1802-4. They are found in grass land, and, while they have sometimes been sent as suspected plants, I cannot say that I have ever come across any direct evidence as to their poisonous nature. Ewart sums up the situation, and we cannot shut our eyes to the evidence, and must try and profit by it.

I have dealt at such length with the effects of the Pea family (Leguminosæ-Papilionaceæ), on stock that I will do little more than content myself with giving the reference "Plants reputed poisonous to stock," *Agricultural Gazette*, June, 1901, pp. 643-656.

It may be added that in the Report of the Administrator, Northern Territory, for the year 1912, p. 133, there is a paper "Poisoning of Goats due to Ingestion of *Crotalaria arborea*." We have *Crotalaria*s in New South Wales, but not this species, and at least one of them has been suspected.

The alleged poisonous character of a *Crotalaria* (*Burkeana*) has, however, given rise to spirited arguments in South Africa, e.g., *Agric. Journ. Union of S.A.*, June, 1911, p. 721. Our knowledge of the effects on stock of many of the indigenous Leguminosæ reflects no credit on us considering the magnitude of our pastoral and farming interests.

The common buckwheat (*Fagopyrum esculentum* Mœnch.) is an irritant. The Bureau of Microbiology at one time made some investigations, in co-operation with the Stock Department, in regard to a skin disease in sheep which had fed on buckwheat. It was believed to be identical with the disease known as Fagopyrismus in Europe. Pammel's "Manual of Poisonous Plants" points out that the feeding of buckwheat to pigs and other animals and the eating of buckwheat cakes by man are well known to veterinarians as causing dermatitis or skin irritation, and this property should be watched in regard to the ingestion of weeds belonging to the same family (Polygonaceæ).

Dr. Sydney Dodd has a paper on "Trefoil Dermatitis" in *Journ. Comp. Pathol. and Therapeutics* (1916). *Medicago denticulata* is one of the harmless Medicks (less correctly called Trefoils) associated with this distressing complaint which causes great irritation to domestic herbivora in New South Wales; it has so far gone under the name "Aphis disease."

The same paper also contains a note on "Fagopyrismus," and one on the skin irritation caused by St. John's Wort (*Hypericum*).

*Echium vulgare* or *plantagineum* is the common Blue Weed or Pateron's Curse which, first running wild in the Albury district, has covered large areas to the exclusion of almost any other vegetation, and is now spreading over the country here and there. When I first urged the eradication of this weed, I was opposed on the ground that it gives picking for stock, but recent research indicates that it is probably poisonous, causing slavering. It should certainly be eradicated and burnt (before seeding), whenever it makes its appearance on new ground, and closer settlement will have to tackle the problem where it has taken possession of large areas.

The Tape Vine (*Stephania hernandiifolia* Walp.), a native climber, with inconspicuous flowers, growing in coastal scrubs, is suspected of poisoning cattle. See C. T. White in *Q. Agric. Journ.*, October, 1917, p. 230.

(g) *Weeds may directly destroy property.*

The undermining propensities of Nut Grass (*Cyperus rotundus*), which have destroyed asphalt paths many a time, afford a remarkable illustration of the destructive force of a plant struggling for existence.

(h) *The æsthetic aspect of the weed question.*

We may object to weeds because they conflict with our æsthetic sense. I remember visiting a dairy estate and the absence of weeds was a great pleasure. The paddocks, and especially the strips alongside the fences were clean, there was no room for weeds, and one noticed this at once as a thing of beauty.

I once heard a certain nursery spoken of in these terms:—"So and so's nursery is a pleasure to see, you won't find a waistcoat pocketful of weeds in the whole of the place." This was some years ago, and it was almost literally true. It enormously enhanced the charm of the place. The presence of weeds jars the feeling of the man who loves neatness and order, and abolition of them should be our ideal.

### Weeds Considered in Relation to Animals.

1. May inflict pain by stinging.
2. Indigestible plants.
3. Plants which cause hair-balls.
4. Plants which irritate the mucous membranes.
5. Boring seeds.

1. *They may inflict pain by stinging.*

The common nettles (*Urtica*) are of this kind.

It is fortunate that we have very few plants which afford considerable annoyance by stinging, as plants of this kind are dangerous in that one usually comes into contact with them by accident. The large-leaved and small-leaved nettle trees (*Laportea gigas* and *photiniphylla* respectively) are found in the warmer coast districts and inflict great pain if their leaves are touched, cattle becoming quite furious. Fortunately, human beings are usually on the lookout for these large leaves, which have a characteristic appearance amongst the surrounding foliage.

In swampy estuaries at the extreme north coast of this State is a formidable tree (happily not in great abundance), known as "Milky Mangrove" or "Blind-your-eyes," owing to the exceedingly corrosive nature of the sap or juice. Unfortunately, there are a number of instances, particularly in Queensland, where human beings have received serious injury from cutting the bark, and doubtless cattle have been injured by it in the mangrove swamps in which it grows, although I have not noticed that actual cases have been recorded. Its botanical name is *Excæcaria Agallocha*.

### 2. *Plants which are indigestible, and therefore injurious.*

In this section we have two plants which are typical of many others. The first is the "Bean Tree" or "Moreton Bay Chestnut" (*Castanospermum australe*), a pride of our Northern rivers, but frequently ringed by stock-owners because the pods are believed to be poisonous. I do not presume to say that they are not, but if so, the poison is of a kind which is not revealed by chemical science. They are undoubtedly exceedingly indigestible, more than nuts usually are, and the mischief they do may perhaps be attributed to this cause. The woody fibre they contain forms a ball in the stomachs of animals which feed on them.

The weak-stemmed shrub (*Trema aspera*), which goes under the name of "Elm," "Rough Fig," and (only in Queensland apparently), "Peach-leaved Poisonbush," has often been recorded as poisonous, but neither chemical nor physiological experiments can detect a poison. But it is a very fair fibre plant, and would prove almost as indigestible to cattle as if they ate string.

### 3. *Hair-balls.*

There are many plants in which the presence of an injurious active principle is certainly absent, but portions of the plant contain hairs which have the property of felting, or of breaking up, and, while being unacted upon by the stomach, agglutinate together and form substances called bezoars, or from their origin, phytobezoars or hair-balls.

The best known instance of this kind is afforded by the woolly inflorescence of the Crimson Clover (*Trifolium incarnatum*), which has done much harm to stock. See the paper on "Crimson Clover Hair-balls," by F. V. Coville (Circular, U.S. Dept. of Agric. Botany, viii, 4).

The spinules of the Prickly Pear (*Opuntia*) not only inflame the mouths of cattle, sheep, and horses, but, when swallowed, form hair-balls. The woolly seeds of the Cape Weed (*Cryptostemma calendulaceum*) are licked up in great abundance by stock in summer and they readily produce hair-balls. So do the stiff awns of oats, both the crop oat and the wild oat (*Avena fatua*), and indeed other species.

Certain Brome grasses (*Bromus*) work similar mischief.

### 4. *Plants which irritate the mucous membranes.*

I have briefly referred to the Prickly Pear (*Opuntia*) with its barbed spinules like a black-fellow's spear, designed to penetrate and not to return. They cause intense irritation to the lips, tongue, stomach, and anus of animals. When ripe, a puff of wind will blow them on to an animal; it is not necessary to eat the plant on which they are found.

Certain grasses have awns which are barbed, e.g., one of the barley grasses (*Hordeum murinum*), figured and described in the *Agricultural Gazette* for October, 1904, with an illustration of its work on the jaw of a sheep.

Then we have *Chaetochloa* (*Setaria*) Foxtail Grass, *Avena sterilis* (wild oats), *Bromus* of many species (Brome grasses). All these are furnished with barbed hairs or awns.

Many such irritating grasses could be enumerated, but the present object is to draw attention to them in a general way.



## 5. "Boring" or Hygrometric seeds which irritate animals.

In certain species of *Stipa* (Spear Grass), the awn is very sensitive to even slight changes in the moisture of the atmosphere. If it should happen to fall on a sheep's back the free end of the awn catches on the wool, and as it twists and untwists, must force the sharp point at the base of the glume into the skin (the rigid hairs pointing upwards, prevent its ever being withdrawn), so that every change of the twisting awn forces the sharp point down into the skin, and sheep are killed in this way. See the *Agricultural Gazette* for 1894, p. 135.

The ordinary function of these twisting awns is, of course, to bury the seed in the ground.

See also an article by Mr. J. D. Stewart in the *Agricultural Gazette* for 1901, p. 357, on the "Injurious Effects of Certain Grass Seeds to Live Stock."

*S. spartea*, the "Porcupine Grass" of the United States, bears the same reputation in that country that *S. setacea* does with us. See Pammel, p. 355.

*Heteropogon contortus*, the "Bunch Spear Grass" (see the *Agricultural Gazette* for 1892, p. 856), is even more formidable than *Stipa*, but fortunately it is less widely distributed. Some species of *Aristida*, the "Three-pronged Spear Grass," may also injure sheep in certain seasons.

*Andropogon acicularis* Retz. Mr. Henry O. Forbes has an interesting note in *Nature* xx, p. 456, on the irritation produced by seeds of *Andropogon acicularis* Retz. on his own skin when he was in Java.

*Triodia*. Warburton (Warburton's Explorations, by C. H. Eden, p. 156), in referring to the so-called "Spinifex," or "Porcupine Grass" of Western Australia (*Triodia*), says that to horses it has on more than one occasion proved most destructive, piercing and cutting their legs, which in a very short time become fly-blown, so that the animals have either to be destroyed or abandoned.

## SECTION 2.—DISPERSAL OF WEEDS BY NATURAL MEANS.

## Weeds Distributed by the Wind.

1. Seeds dust-like.
2. Weeds with silky hairs.
3. Weeds with wing-structure
4. Weeds with "tumble-weed" structure.

## 1. Weeds with seeds fine as dust.

Among such seeds is the Poppy (*Papaver hybridum*), but there are very many kinds. They may be caught up by a breeze and deposited miles away from the parent plants. Obviously it is difficult to control an invasion of plants which behave like this.

In *Proc. Linn Soc. N.S.W.*, 1901, p. 697, Mr. R. H. Cambage points out that whirlwinds out west are responsible for the distribution of seeds even of large size.

## 2. Weeds with silky hairs.

These may be in three forms.

(a) Fruits with a pappus or parachute arrangement, as with so many of the Thistle or Daisy family (*Compositæ*). A good example is the Thistle. The seeds of thistles go sailing along like shuttlecocks.

(b) The carpels may terminate in long silky tails as in the *Clematis*, a white-flowering climber which adorns the bush. A puff of air sends them flying.

(c) Hairs may cover the seed, as in the case of the true Cotton plant (*Gossypium*), or Cape Weed (*Cryptostemma*). These seeds are not so light and feathery as those in (1) and (2). Still, the cottony hairs catch the breeze and facilitate the transport of the seeds to congenial soil.

## 3. Weeds with wing-structure.

We have what I may term the wing or aeroplane structure. This is readily recognised in the case of Pines, She-oaks, and a surprising number of our native plants. Sometimes the wing encircles the seed; sometimes the wing is at one end of a seed. In the case of a pine, for example, the ripe cone opens and the wing, weighted or balanced by the more solid seed, floats away to its destination, lazily if the air be still, but, if there be a fresh wind, a surprising distance.

## 4. Weeds with "tumble-weed" structure.

The entire panicle breaks off near the base of the culms and rolls over the ground, its progress being facilitated by the horizontal spreading branches, which act as sails.

We have this in grasses. For instance, the inflorescence of the common grass *Deyeuxia Forsteri*, breaks off and is rolled about by the wind. The Windmill grasses move about in the same way, and very often we notice how they accumulate in the corner of a paddock, sometimes overtopping the fence, and blowing over into the next paddock. Sometimes the grasses are carried along the railway-line, and the rush of the train keeps them in active motion. Standing on the Sydney Station I have often seen the inflorescence of grasses in front of the engine which must have been carried along for many miles.

Some plants are called "Roly-Poly" in Australia because of this tendency to take on this tumble-weed character. *Salsola Kali* is an example.

## Weeds Distributed by Floods.

Floods bring down seeds good and bad, generally bad, and deposit them in nice moist alluvial soil under conditions very favourable to germination.

In our own State it is notorious that the Prickly or Mexican Poppy (*Argemone mexicana*) and the Noogoora Burr (*Xanthium strumarium*) are transported and propagated in this way.

## Sling Fruits.

Such include the pods of Leguminosæ (the Pea, &c., family).

The mechanism by which the seed of the common Broom (*Ulex europæus*) is propelled some distance was described as far back as the year 1546.

An analogous contraction of the fruit capsules is responsible for the jerking out of the seed in a number of plants.

Such an arrangement is useful to the plant in that it extends the area over which the seed may be sown.

### General.

The chapter on "The Dispersion of Species by means of Fruits and Seeds," in Kerner and Oliver's "Natural History of Plants," ii, 833, is well worthy of perusal, if only for its beautiful and helpful illustrations.

The authors separately figure what they call sling fruits (those in which the seeds are expelled by torsion); creeping or hopping fruits (in which the mechanism is hygroscopic bristles); fruits which open upon being wetted with water; and an especially fine series to illustrate the dispersion of fruits and seeds by the wind. The same work also illustrates sticky fruits and fruits furnished with hooks, &c., to facilitate dispersal by animals.

Another useful paper for reference is "Migration of Weeds," by Lyster H. Dewey, in *Year-book of Agric., U.S.A.*, 1896, p. 263. The illustrations of seeds carried by winds, &c., are useful.

### SECTION 3.—DISPERSAL OF WEEDS BY ANIMALS.

#### 1. Mechanically by adherence to their coats and feet.

- (a) Fruits with burrs.
- (b) Adhesive fruits.
- (c) Gumminess of some seeds.
- (d) Weeds transported by the feet.

#### 2. Transport by wool-washing.

#### 3. Weeds and manure.

#### 1. Dispersal by adherence to coats and feet.

##### (a) *Fruits with burrs.*

Some of the Medics (*Medicago*) have twisted pods with marginal hooks forming burrs. Most of the Medics make excellent forage, especially for sheep, and the plants often die down, leaving an enormous quantity of these burrs, which are licked up by sheep and are very nutritious. At the same time, they find their way into the fleece and do a good deal of damage. Up-to-date pastoralists are doing all they can to encourage the spread of those Medics which have pods without burrs. Some of these (*M. orbicularis* and *M. scutellata*) are figured in the *Agricultural Gazette* for 1894, p. 5.

The largest Medic burr is that of *M. intertexta* L., which is described in the *Agricultural Gazette* for February, 1904.

Amongst grasses we have *Cenchrus australis*, the burry fruits of which Mr. A. M. Lea has illustrated in *Trans. Roy. Soc. S.A.*, xxxix, 92, under the name of "An insect-catching grass." It mats the hair of any animal which touches it. *Lappago* (*Tragus*) *racemosus* is another burr grass, figured in the *Agricultural Gazette* for 1896, p. 129.

Other plants with burrs are the "Native Carrot" (*Daucus brachiatus*), and the *Acana*, of which we have two species, *sanguisorbæ* and *ovina*.

Then everyone knows the Bathurst Burr (*Xanthium spinosum*), and its close relation, the Noogoora Burr (*X. strumarium*) figured in the *Agricultural Gazette* for July, 1917, p. 489, and October, 1899, respectively. These are typical burrs.

From time to time firms advertise their goods by means of printed thin card butterflies, the body of which is a burr. In 1910 the burr was the Burdock (*Arctium Lappa*) see *Agricultural Gazette* for 1910, p. 730. There was a revival in 1917, the Burdock burr (a very bad burr) in Queensland being used; the Bathurst Burr (*Xanthium spinosum*) was similarly distributed in a country district in 1918. These butterflies are thrown by practical jokers on the clothes and hair of people. I have no doubt this is an assault in law. In addition, the wholesale and retail distributors of these advertisements can be punished under the Commonwealth and State weed laws. It is a selfish and dastardly form of advertisement, from which our farmers and pastoralists are entitled to be protected.

The fruit of *Solanum rostratum* Dun, is a specially offensive burr. It is figured in the *Agricultural Gazette* for June, 1904.

Everybody in the country knows the pest called Bindi-eye or Bogan Flea. The principal weed (a native) which goes under this name is *Calotis cuneifolia*, and the burrs greatly injure wool, besides being a source of great irritation to man and domestic animals.

Stick-tights or Pitch-forks (*Bidens*) have a couple of barbed harpoons on the fruits and cause great annoyance by perforating the skin and adhering to wool.

The spinules of Prickly Pear injure wool, while one species in particular (*Opuntia aurantiaca*) breaks into small joints and is transported long distances with facility by adhering to the hocks of animals.

#### (b) Adhesive fruits.

Some seeds, e.g., that of *Polanisia viscosa* and *Pisonia Brunoniana* are very sticky, and the latter in particular captures insects, and soils fur and clothing by its bird-lime secretion.

#### (c) and (d) Gummy seeds and weeds transported by the feet.

Some seeds which meet with the moisture of damp soil or of mud develop a gummy secretion which facilitates their transport when they touch any object. Such seeds are the Plantains (*Plantago*) and many of the Cruciferae which include the Pepperworts (*Lepidium*).

The solid-angled fruits of the Cat's Head (*Emex australis*) and the Double Gee (*Tribulus terrestris*) present a sharp penetrating point to the feet of animals from all aspects. They lame them and are carried about more or less by the inconvenienced or suffering animal. But, in addition, the seeds of all kinds of weeds, cemented by soil or clay to the feet of animals, are transported by them without any distress.

The part that birds can play in the dispersal of plants by seeds in their stomachs and on their feet is discussed by Darwin ("Origin of Species," 6th edition, pages 326 and 328). Birds are often a prolific source of weed-seed distribution.

#### 2. Transport by wool-washing.

Every man has seen a burry or a moity or a grass-seed fleece. The number of weed-seeds thus arrested is enormous. Consequently at wool-washing establishments throughout the country (at Waterloo and Liverpool I have personally collected many plants which have been transported to those districts in wool) we find that the water detaches the seed, softens it and often puts it in a position to be readily germinated when it comes into contact with the soil.

In 1913, before the Linnean Society of London, Miss Hayward exhibited a series of forty-six Australian plants found on the banks of the river Tweed (between England and Scotland) and its tributary the Gala, together with a large collection of Australian seeds, the whole obtained from Australian wool, there being wool-washing establishments in the vicinity.

How many skirts have been ruined and trousers injured beyond remedy through walking in paddocks at grass-seed time. I have seen the upper leathers of strong boots matted so densely with grass-seeds that it would be impossible to pack any more thereon.

### 3. *Weeds and manure.*

This is, of course, one of the principal drawbacks of the manure formed by the droppings of herbivorous animals. Unless such manure is very carefully rotted, it always contains seeds of weeds, which flourish exceedingly.

Some weeds have small seeds with impervious coverings which resist the process of digestion and even fermentation of manure.

It is a matter of common knowledge that weeds arise near stables, where animals camp for the night, and so on. The trucking yards of railways are a fertile source of propagation of weeds. Take any country town, and you will make a fine collection of weeds where sheep and cattle are trucked. Within a square mile of Flemington saleyards I have collected more than a dozen western species of plants. It is at the yards that the concentration takes place, but the diffusion of weeds occurs more or less wherever stock trucks pass along the country.

I have been informed that, some years ago, when the Hawkesbury Agricultural College purchased the cleanings of the Flemington sheep and cattle trucks for use in the orchard there, several western weeds, quite unfamiliar to the district, were found growing where the manure had been spread.

Weed-seeds are often directly put on the land in the form of manure. They may be thrown on the manure heap under the impression that they will be destroyed by the fermentation of the manure, but it must be remembered that the coats of particular seeds may be very resistant to decomposition, while other seeds may find their way to the edges of the heap and not be acted upon at all.

## SECTION 4.—PREVENTION AND CURE.

- (a) Seed should be screened.
- (b) Weed-seeds should be excluded in packing of goods.
- (c) Weeds should be prevented from seeding.
- (d) Burying of weed-seeds is dangerous.
- (e) Worry weeds by frequent cutting.
- (f) Eradication.
- (g) Drainage.
- (h) Rotation of crops.
- (i) Smothering crops.
- (k) Chemical manures.
- (l) Chemical weed exterminators.
- (m) Special treatment.
- (n) Some weeds disappear naturally.

(a) *Seed should be screened.*

Cheap seed is often dirty seed. There is no economy in buying seed which can be sold cheap simply because it has been hurriedly collected or taken from paddocks infested with weeds. Such seed will be very dear in the long run. In this matter let us begin at the beginning by the inculcation of preventive methods. Prevention is better than all the remedies in the world.

All seed, without exception, should be screened. It is wonderful what a lot of rubbish may be obtained from a sample which, on a casual examination, may appear to be clean. It is only when the screenings are examined that the truth comes home to us. An analogous case is that of milk. Until separators were invented it never occurred to anybody that milk might contain so much foreign matter.

The time will assuredly come when all seeds will by law have to be screened, and the screenings consumed by fire.

(b) *Weed-seeds should be excluded in packing of goods.*

Imported goods often come in packing which contains weed-seeds. Articles packed in one part of Australia may communicate weeds to another part. One correspondent of mine specially stated that a certain weed was introduced into his part of the State in the packing of fruit-trees by nursery-men.

(c) *Weeds should be prevented from seeding.*

There is an old jingle which does not err on the side of exaggeration, "One year's seeding, seven years weeding." Cut the weed or pull it up when in flower or early fruit (seed); that is to say, do not run the risk of the seed ripening or of the fruit case opening and throwing its contents on the ground.

(d) *Burying of weed-seeds is dangerous.*

Sometimes it is recommended to bury weed-seeds, or weeds containing ripe seeds, deeply by the plough, or in pits. This is fatal to many, although much depends on the care with which the operation is performed. There is always risk in weeds not being deposited actually at the bottom of the pit, but the chief risk lies in the fact that some weeds have surprising vitality, and will get to the surface either through a fissure in the soil or because the soil becomes disturbed. Incidentally it may be mentioned that it is notoriously dangerous to try and get rid of nut grass (*Cyperus rotundus*) by burying.

(e) *Worry weeds by frequent cutting.*

Certain weeds should be cut down persistently, remembering that this causes atrophy of the root, and consequently the plant dies out. If necessary cut a weed a few inches below the surface, as cutting at the surface by a scythe or other implement causes many weeds to form lateral branches, often with a tendency to lie flat on the ground, thus adding considerably to the difficulty of extermination.

Use such cutting instruments as are available and appropriate. Cut the weed down faster than it can draw on its reserves.

(f) *Eradication.*

Sometimes the total removal of the plant is feasible and desirable. This may be done by hand-pulling, forking, loosening with plough, and gathering together by the harrow for burning.

A mechanical extractor is sometimes useful. One for large weeds with stems of the necessary toughness is figured at p. 814, vol. 2 (1891) of the *Agricultural Gazette*.

(g) *Drainage.*

The drainage of land always changes the character of the vegetation upon it, and is often the means of getting rid of undesirable weeds. This is the best way, for example, of getting rid of such weed as Stagger Weed (*Stachys arvensis*). At the same time the improved conditions permit the growth of wholesome grasses.

(h) *Rotation of crops.*

Rotation of crops is frequently advantageous for overcoming weeds not easy to suppress by other means.

(i) *Smothering crops.*

Weeds are sometimes dealt with by sowing crops which smother them. Change of crop is often useful, and particularly the introduction of root or other crops requiring hoeing and scarifying.

(k) *Chemical manures.*

The application of chemical manures is sometimes desirable. For example, nitrate of soda stimulates the leafy growth of grasses, and a dressing of lime that of clovers and other leguminous plants, and in this way weeds may be smothered.

(l) *Chemical weed-extermiators.*

The use of chemical exterminators of weeds such as salt, arsenic, kerosene, &c., is usually out of the question, as the labour is too great, to say nothing of the cost of materials and of the danger of sterilising the soil for a long period. The method is also uncertain, and, as a rule, can only be applied to special weeds, *e.g.*, Prickly Pear.

Sometimes a cereal crop with weeds can be sprayed by a substance which is selective in its action, destroying the weeds and leaving the crop uninjured. This is a field for experiment which has been but little investigated, but spraying with a 10 per cent. solution of iron sulphate for example has been attended with favourable results. Copper sulphate is even more favoured at the present time for this purpose.

(m) *Special treatment.*

Special weeds require special methods. For example, in Europe it is a usual practice to cut the stems of such plants as Blackberry and Sweet Briar with bill-hooks, and to enclose the ground containing the stumps with hurdles within which sheep, goats, or other animals are folded. The stock readily eat the young tender spineless shoots as they appear, and by degrees the plants become exhausted and die.

(n) *Some weeds disappear naturally.*

This may be attributed to two separate causes, or to a combination of them.

1. In course of time they exhaust the soil of the substances necessary for their healthy existence, and so perish.

2. Absence of rain at a critical period of the weed's history. It is not the total rainfall of a district that counts, but whether it falls at periods critical for the development of the plant. For example, at the period of germination, a little later to make leaf, a little later to form the flower and plump the seed.

Ten times as much rain may fall as is necessary for the absolute requirements of the plant, yet, if there are lengthy periods between the falls, development may be arrested, and either the weed may die in that particular season or it may not form seed for the next. In any case the weed disappears, and, I think, this lack of fortuitous rainfall is the key to the so-called mysterious disappearance of weeds in certain areas.

In the *Agricultural Gazette* for January, 1896, p. 39, Mr. John F. Tabrett gives an example of the migration of the common Black Thistle (*Carduus lanceolatus*) from a locality in the Hartley district where it was formerly abundant.

In Wallace's "Island Life," 3rd Edition, p. 513, is an instructive account of the temporary establishment of weeds which are (usually) later on overcome by the surrounding indigenous vegetation.

It is a matter of common knowledge that weed-infested areas become clean again or replaced by other weeds, and my readers are invited to record cases which have come under their notice. If land once infested by weeds were always infested, large areas of ground would be permanently in this condition except through the restless intervention of man.

Weeds will destroy each other if kept on the same block of land without outside interference. For example, it is sometimes the practice to fence a piece of land infested with Bathurst Burr (*Xanthium spinosum*), so as to prevent any interference with the plants. Left alone they grow luxuriantly for a time and then, struggling for existence on the same plot of soil, the plants become debilitated, and the weeds die out in patches and sometimes altogether.

## SECTION 5.—MISCELLANEOUS.

- (a) Annual and perennial weeds.
- (b) Native plants as weeds.
- (c) Places that harbour weeds.
- (d) Weed legislation.

There are three useful Australian weed manuals, as follows:—

1. "The Naturalised Flora of South Australia," by J. M. Black, Adelaide, published by the author.
2. "The Weeds, Poison-plants, and Naturalised Aliens of Victoria," by Alfred J. Ewart, assisted by J. R. Tovey, published by the Government Printer, Melbourne.
3. "The Weeds and Suspected Poisonous Plants of Queensland," by F. M. Bailey, published by H. Pole & Co., Brisbane.



These works will be referred to in the following pages under the names Black, Ewart, Bailey.

See also "A Manual of Weeds" by Ada E. Georgia (The Macmillan Co., New York). It deals with the weeds of the United States and Canada, and is of interest and value to us because a number of the weeds have found their way to Australia, and others may be expected to follow.

(a) *Annuals and Perennials.*

Some few years ago, the Engineer of the Patrick Plains Shire made the thoughtful suggestion that, for the purpose of administration, weeds should be divided into annuals and perennials. It was pointed out that, according to law, when weeds are first observed on an area, a notice must be served. Three months must elapse before any further action can be taken, and by that time most of the annual weeds have seeded, and it is practically useless to do anything to them.

Annuals usually flower early in the spring and should be properly destroyed before the seed ripens. They are also more readily destroyed than perennials. Perennials, of course, should be destroyed before the seeds ripen, but they are frequently more difficult to destroy, and often flower later in the season. In New South Wales it is not always possible to draw a sharp line between annuals and perennials, because some weeds and grasses which are annuals in Europe live through the winter here, but it would be well to classify all such doubtful weeds as annuals.

Annuals often make up for their short life by the large number of seeds that they produce. Perennials have the faculty most developed of reproducing themselves vegetatively, that is, by shoots in contradistinction to by seeds, and thus a plant may produce dense masses of growth without producing a single seed.

(b) *Native Plants as Weeds.*

Sometimes a native plant invades a man's cultivation paddock or orchard and becomes a weed, but the number of such complained of is vastly fewer than exotics. I have drawn attention to the subject in the *Agricultural Gazette* for 1913, p. 911, for example, in referring to *Olearia viscidula*, a native daisy with sticky foliage which sometimes goes under the absurd name of "Wild Verbena."

Some men are not liable to skin irritation; in most cases it is more or less of an idiosyncrasy. Incidentally *Humea elegans*, an ornamental sweet-scented plant, erroneously called "Wild Tobacco," may cause irritation. See the *Agricultural Gazette* for 1914, p. 236.

(c) *Places that harbour Weeds.*

(1) *Neglected Cemeteries.*—Two of the places that a botanist arriving at a township visits if he can are the railway line and the cemetery. The latter is, like the line, fenced more or less securely, and it is often a place in which the weeds of a district grow unchecked. We have many virtues, but keeping our cemeteries tidy and free from weeds is not one of them. This cannot be left to the individual owners of graves, who are often migratory.

(2) *Roadsides and Alsatia for Weeds.*—Roads being the land over which animals of all descriptions pass, many of them laden with merchandise, it is

not surprising that weeds make their first appearance on them. The weed-seeds may be contained in the manure of the animals or in the packing of merchandise. Seeds also may be blown on to the road from a long distance. The manured road-detritus blown to the side of the road, forms an admirable nidus for the weed-seeds and, if left undisturbed, they flourish exceedingly. The officers of the Government and of Shire and Municipal Councils are getting much more alive to their responsibilities in regard to weed-destruction on the roads than was the case a few years ago. The land inside railway fences is an excellent place for the growth of weeds in many places, in spite of the fact that there is some organised method of firing them. I always make for a railway line enclosure for the purpose of making a collection of good specimens of the weeds of a district, and the same protection is also excellent for the smaller native flora.

#### (d) Weed Legislation.

As Australia becomes developed, there is an increasing tendency in all the States to increase local self-government, and coping with weeds becomes usually one of the functions of local bodies. The underlying idea is that local people know what plants are most noxious to them, and the function of the State Governments is indorsement of their recommendations for proscription of specific weeds, subject to power of veto. This affords the necessary Government control, preventing local bodies, which may not have special knowledge, taking action prejudicial to their own interests.

The Prickly Pear (*Opuntia*) is dealt with by special legislation, both in New South Wales and in Queensland. What has been stated so far refers to weeds after they have got a footing in Australia.

To prevent the entry of undesirable plants into the Commonwealth, the Federal Government, in 1908, passed "An Act relating to Quarantine." An appendix to this Act forbids the entry of plants affected by certain diseases (chiefly caused by fungi), and mostly affecting economic plants. Another appendix prohibits certain weeds. These weeds have, however, already got a firm hold in the Commonwealth, and some are very widely diffused; the object is to put difficulties in the way of the importation of known pests into clean areas, leaving the circulation of weed-pests, already in the Commonwealth, the business of the State Governments.

In this connection a paper, "Weed-seeds and Impurities in Imported Seeds," by E. Breakwell, *Agricultural Gazette*, N.S.W., September, 1918, p. 633, is valuable. It not only shows specifically the weed-seeds arrested in a definite period, admixed with agricultural and other seeds imported into New South Wales, but how difficult in practice it must be to screen every new weed out of the State.

Many of the Australian weeds were introduced into the country in the very first years of settlement. They came from Britain in the packing of goods sent in the first fleet, from Rio de Janeiro, the Cape, and Calcutta, the two former being ports of call on the outward voyage, and the two latter being visited from Sydney for food supplies. Later on a trade in horses with Chilian ports was responsible for the introduction of such plants as the Bathurst burr (*Xanthium spinosum*).

As time went by, no restriction of any kind was placed on the introduction of plants, and gradually the varieties of weeds increased to the present formidable total, and, being let loose on a virgin continent, brought about unexpected results.

It is, of course, very difficult to prepare a proclaimed list of weeds to which no objection can be taken. Australia is a continent of three millions of square miles, and in her borders we may have severe frosts and tropical conditions, droughts, and a superabundance of rain, while the soils vary from the richest to the very reverse.

### Commonwealth Government Weed Lists.

The following list was proclaimed in the *Commonwealth of Australia Gazette* of 10th July, 1909, and is still in force:—

- Amsinckia angustifolia* Lehm. (Narrow-leaved Amsinckia). Bl., E.
- Anthemis arvensis* L. (Corn Chamomile).
- \**Anthemis Cotula* L. (Stinking Mayweed or Field Chamomile). Bl., E.
- Arctium Lappa* L. (Burdock). E., B.
- \**Argemone mexicana* L. (Prickly Poppy). E., B.
- \**Asphodelus fistulosus* L. (Asphodel or Onion Weed). Bl., E.
- Brassica Sinapis* L. (Charlock). Bl., E.
- Bartsia* spp. (all species of Bartsia). Bl., E.
- Calandrinia (Claytonia) caulescens* H.B. and K. (Purple Calandrinia). E.
- Capsella Bursa-pastoris* Mönch (Shepherd's Purse). Bl., E., B.
- Carduus* spp. (all Thistles). Bl., E., B.
- Cenchrus tribuloides* L. (Hedgehog or Burr Grass).
- Centaurea* spp. (all Star Thistles). Bl., E., B.
- Chrysanthemum Leucanthemum* L. (Ox-eye Daisy). Bl., E.
- Chrysanthemum parthenium* Hoffm. (Feverfew). E.
- Chrysanthemum scgetum* L. (Corn Marigold).
- \**Conium maculatum* L. (Hemlock). Bl., E.
- Convolvulus arvensis* L. (Lesser Bindweed). E.
- \**Cryptostemma calendulaceum* R.Br. (Cape Weed). Bl., E., B.
- Cucumis myriocarpus* Naud. (Gooseberry-Cucumber). Bl., E.
- \**Cuscuta* spp. (all species of Dodder). Bl., E., B.
- \**Datura Stramonium* L. (Thorn Apple). Bl., E., B.
- \**Echium violaceum* L. (Paterson's Curse or Purple Bugloss). Bl., E.
- \**Eichhornia speciosa* Kunth (Water Hyacinth). E., B.
- \**Emex australis* Steinh. (Spiny Emex). Bl.
- Erysimum repandum* L. (Treacle Mustard). E.
- Euphorbia helioscopia* L. (Sun Spurge). E.
- Euphorbia peplus* L. (Petty Spurge). Bl., E., B.
- Feniculum vulgare* Gaertn. (Fennel). Bl., E., B.
- Fumaria officinalis* L. (Fumitory). Bl., E., B.
- Galinsoga parviflora* Cav. (Small-flowered Galinsoga). Bl., E., B.
- Galium aparine* L. (Cleavers or Goose Grass). E.
- Gilia (Navarretia) squarrosa* Hook. and Arn. (California Stink Weed, Diggers' Weed, or Sheep's Weed). Bl., E.
- \**Homeria collina* Vent. var. *miniata* Sweet (Cape Tulip). Bl., E.
- Hypericum Androsæmum* L. (The Tutsan). E.
- \**Hypericum perforatum* L. (St. John's Wort). Bl., E.
- \**Inula graveolens* Desf. (Stinkwort). Bl., E.
- \**Kentrophyllum lanatum* Desf. (Saffron Thistle). Bl., E.
- Lactuca saligna* L. (Wild Lettuce). Bl., E.
- Lepidium draba* L. (Hoary Cress). Bl., E.
- Lepidium campestre* R.Br. (Field Cress). E.
- Lithospermum arvense* L. (Iron Weed, Corn Gromwell). Bl., E., B.
- Madia sativa* Mol. (Pitch Weed). E.
- Malva parviflora* L. (Small-flowered Mallow). Bl., E., B.
- Malva rotundifolia* L. (Dwarf Mallow). E.
- Matricaria discoides* DC. (Rounded Chamomile, Common Matricary, Wild Chamomile). E.
- \**Myagrism perfoliatum* L. (Musk Weed).
- \**Nicotiana glauca* Grahm. (Wild Tobacco Plant or Tree Tobacco). Bl., E., B.
- \**Onopordon acanthium* L. (Scotch Thistle). Bl., E.

\* Already proscribed in parts of New South Wales

- Oxalis cernua* Thunb. (South African Wood Sorrel). Bl., E., B.  
*Oxalis tetraphylla* Cav. (Four-leaved Wood Sorrel).  
*Papaver dubium* L. (Long-headed Poppy). Bl.  
*Papaver hybridum* L. (Wild Poppy). Bl., E., B.  
*Papaver rhæas* L. (Field Poppy). Bl., E., B.  
*Picris echioides* L. (Ox Tongue). E.  
*Picris hieracioides* L. (Hawk Weed). Bl., E., B.  
*Polygonum aviculare* L. (Knot Weed, Hog Weed, or Wire Weed). Bl., E., B.  
*Polygonum convolvulus* L. (Black Bindweed). Bl., E., B.  
*Polygonum persicaria* L. (Common Persicaria).  
*Ranunculus arvensis* L. (Corn Buttercup). E.  
*Ranunculus muricatus* L. (Sharp-pointed Crowfoot). Bl., E.  
*Ranunculus sceleratus* L. (Celery-leaved Buttercup). E.  
*Raphanus Raphanistrum* L. (Wild Radish or Jointed Charlock). Bl., E., B.  
*\*Reseda luteola* L. (The Weld or Wild Mignonette). E.  
*Romulea cruciata* Ker-Gawl. (Pink Star, Onion Grass, or Guildford Grass). Bl., E.  
*\*Rosa rubiginosa* L. (Sweet Briar). Bl., E., B.  
*\*Rubus fruticosus* L. (Blackberry). Bl., E., B.  
*Rumex acetosella* L. (Sorrel Weed). Bl., E., B.  
*Rumex conglomeratus* Murray (Clustered Dock). Bl., E., B.  
*\*Rumex crispus* L. (Curled Dock). Bl., E., B.  
*Rumex obtusifolius* L. (Broad-leaved Dock). E., B.  
*Saponaria vaccaria* L. (Bladder or Cow Soap Wort). Bl., E., B.  
*Scandix pecten-veneris* L. (Shepherd's Needle or Venus' Comb). Bl.  
*Senebiera coronopus* Poir (Swine's Cress). Bl., E.  
*Senecio didyma* Pers. (Lesser Swine's Cress). Bl., E., B.  
*Senecio Jacobæa* L. (Ragwort). E.  
*Silene cucubalis* L. (Bladder Campion). Bl., E.  
*Sisymbrium officinale* L. (Hedge Mustard). Bl., E., B.  
*Sisymbrium orientale* L. (*Sisymbrium columnæ*, Jacq.) (Indian Hedge Mustard). Bl., E.  
*Solanum heterandrum* Pursh. (Pincushion Night-shade).  
*Solanum sodomæum* L. (Apple of Sodom). Bl., E., B.  
*Spergula arvensis* L. (Corn Spurry). Bl., E., B.  
*\*Xanthium spinosum* L. (Bathurst Burr). Bl., E., B.

The following list, supplementary to the preceding one, was proclaimed in the *Commonwealth of Australia Gazette* of December, 1912, and is still in force:—

- Acæna ovina* Cunn. (Sheep's Burnet or Sheep's Burr). E., B.  
*Acæna sanguisorbæ* Vahl. (Burr Weed). E., B.  
*Ageratum conyzoides* L. (Goat Weed). B.  
*Amaranthus retroflexus* L. (Pigweed Redroot). Bl., E.  
*Amaranthus albus* L. (Common Tumble-weed). E.  
*\*Amaranthus artemisifolia* Mayn. and Walp. (Ragweed, Hogweed, Roman Wormweed. [A misprint for *Ambrosia artemisifolia*.]) Bl., E.  
*Asclepias curassavica* L. (Redhead or Milky Cotton Bush, Madagascar Cotton Bush, or Wallflower Cotton Bush). B.  
*Avena fatua* L. (Wild Oat). Bl., E.  
*Bromus secalinus* L. (Chess, Cheat, or Wheat Thief).  
*Camelina sativa* L. (False Flax, Gold of Pleasure). E.  
*Cerastium glomeratum* Thu. (Mouse-eared Chickweed). Bl.  
*Cerastium vulgatum* L. (Broad-leaved Mouse-ear Chickweed or Greater Burnet). Bl., B., E.  
*Chenopodium album* L. (Lamb's Quarters, Goosefoot). Bl., E., B.  
*Chondrilla juncea* L. (Chondrilla).  
*Crepis virens* L. (Smooth Hawk's Beard). Bl.  
*Cretica hedypnois* (Hawkbit or Cretica).  
*Crotalaria sagittalis* L. (Rattlebox).  
*Cucurbita perennis* Gray (Wild Gourd, Calabazita).  
*Diodia teres* Walt. (Button Weed, Alligator Head).  
*Daucus brachiatus* Sieb. (Dwarf Carrot). B.

\* Already proscribed in parts of New South Wales.

- Dipsacus sylvestris* L. (Wild Teazel).  
 \**Echium vulgare* L. (Blue Weed, Viper's Bugloss, Blue Thistle, Blue Devil). Bl., E.  
*Erechtites valerianæfolia* DC. (Brazilian Fire Weed). B.  
*Erodium moschatum* L'Herit (Musky Heronbill, Ground Needle). Bl., E.  
*Gaertneria discolor* (Franseria).  
*Githago lychnis* L. (Purple Corn Cockle). Bl., E.  
*Helenium autumnale* L. (Sneezeweed).  
*Hypochaeris glabra* L. (Smooth Cat's-ear). Bl., E., B.  
*Iva xanthifolia* Nutt. (Marsh Elder, False Sunflower, High-water Shrub).  
*Iva axillaris* Pursh. (Poverty Weed).  
*Jatropha multifida* L. B.  
*Jatropha curcas* L. (Physic Nut or Purging Nut). B.  
*Jatropha gossypifolia* L. (Cotton-leaved Jatropha, erroneously termed "Castor Oil Plant"). B.  
 \**Lantana camara* L. (Kamara Lantana). B.  
*Lantana Sellowiana* Link and Otto (Sellow's Lantana). B.  
*Lappula lappula* (Narrow-leaved Stickseed, Beggar-tick).  
*Leontodon hirtus* L. (Hairy Thrinia). Bl.  
*Lepidium rudemale* L. (Narrow-leaved Pepperwort). Bl., E., B.  
*Linum catharticum* L. (Purging Flax).  
 \**Oxalis corniculata* L. (Yellow Wood Sorrel). B.  
*Plantago aristata* Michx. (Bracted Plantain).  
*Pteridium aquilinum* L. Kuhn (Brake, Eagle Fern, Bracken). E.  
*Rhus radicans* L. (Poison Ivy, Poison Oak, Poison Vine).  
*Salsola kali-tragus* (L.) Moq. (Russian Thistle). B.  
*Sedum telephium* L. (Live-for-ever, Garden Orpine).  
 \**Sida rhombifolia* L. (*Sida retusa* L.) (Flax Weed). B.  
*Sisymbrium altissimum* L. (Tumbling Mustard).  
*Solanum carolinense* L. (Horse Nettle).  
*Silene gallica* L. (French Catchfly). Bl., E., B.  
*Stellaria media* DC. (Chickweed). Bl., E., B.  
 \**Stachys arvensis* L. (Stagger-weed, or Wound Wort). Bl., E., B.  
*Sagina procumbens* DC. (Procumbent Pearl-wort).  
*Tagetes glandulifera* Schranck (Stinking Roger). B.  
*Thlaspi arvense* L. (Wild Garlic, Bastard Cress, French Weed).  
*Triumfetta rhomboidea* Jacq. (Chinese Burr), "and all other noxious burrs." 7.12.12. Bl., E., B.  
*Urtica incisa* Poir (Cut-leaved Nettle or Native Nettle). E., B.  
*Urtica urens* L. (Small Nettle or Dwarf Nettle). Bl., E., B.  
 \**Verbascum thapsus* L. (Moth-Mullein). Bl.

The above lists are printed by the Commonwealth Government under the title "Proclamations under the Quarantine Act, 1908-1915," in force on the 31st December, 1915, and the Director-General of Quarantine informed me (July, 1918), that they were still in force. They have not been added to.

### Comments on the above two Lists.

It would be convenient to combine the above two lists into one, and to arrange them in strict alphabetical order, but there is official convenience in preserving the order of the weeds as given in these lists.

I have taken the opportunity of following some of the names with Bl., E., or B., indicating that some information concerning them will be found in the works on weeds by Messrs. Black, Ewart, or Bailey.

The following notes on some of the weeds will have interest for us in New South Wales:—

*Ageratum conyzoides* is a pale-blue flowered garden escape, which has spread rapidly in the warmer coast districts. Often called "Billy-goat Weed." Bentham calls it a common weed over all the warmer regions of the world.

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\* Already proscribed in parts of New South Wales.

*Amaranthus albus*.—There is a coloured figure of this in the *Agricultural Gazette* for March, 1908, p. 234.

*Amaranthus artemisifolia* is a slip of the pen for *Ambrosia artemisifolia*, the so-called "Dunbible Weed" of the Northern Coast districts of New South Wales, because it was found in that locality. For its occurrence in South Australia, see Black, p. 105. It is a great pest in the United States, and is stigmatised as "the universal weed of Ohio grain fields."

*Asclepias curassavica*.—Common in coastal Queensland, and gradually working its way down. It is now at least as far south as the Manning. It has showy flowers, and hence it is sometimes preserved for that reason.

*Avena fatua*.—A very bad pest in New South Wales and other parts of Australia.

*Acœna ovina* and *A. sanguisorba*.—The former is called "Sheep's Burnet" by mistake, a name which belongs to *Poterium sanguisorba*, see the *Agricultural Gazette* for April, 1898, page 360, and April, 1904, page 332. As the *Acœnas* are native plants, and are already very abundant in the eastern half of the State, the appearance of the plant in the list is not of much interest to us.

*Bromus secalinus*.—A grass, and a bad weed in wheat fields.

*Camelina sativa*.—This belongs to the mustard family, and is often spread with dirty clover seed. In Europe it is cultivated as an oil seed. It is an annual, and when it gets abundant in crops it becomes a nuisance.

*Cerastium vulgatum* and *glomeratum* are by some authors reputed to be synonymous. The name "Greater Burnet" attributed to the former in the official list is incorrect. They are chickweeds, humble plants common in gardens and waste places.

*Chenopodium album*.—This is an introduced salt-bush of little value, which has spread over large areas in New South Wales, chiefly in waste places. It has a disputed value to the poultry raiser, hence the name "Fathen." See *Agricultural Gazette*, 1905, p. 474.

*Chondrilla juncea* had not made its appearance in Australia till it was reported in New South Wales. See the *Agricultural Gazette* for 1918, p. 330.

*Crotalaria sagittalis*.—This is one of the leguminous poison-plants of the United States, and I have drawn attention to it in the *Agricultural Gazette* for 1901, p. 654. See Ewart, p. 24.

*Cucurbita perennis*.—This equals *C. fetidissima*, and is a native of Mexico. Ada Georgia, p. 404, refers to it.

*Cretica hedynois* should be *Hedynois cretica*. Recorded by the late Mr. Bêche and myself as an introduced weed in *Proc. Linn. Soc. N.S.W.*, xxix, p. 743 (1904). We know little of its detrimental properties. It is undoubtedly spreading in New South Wales from Scone to Tenterfield and Gunnedah.

*Crepis virens*.—It is often probably confused with *C. japonica*. It is somewhat common on the tablelands of New South Wales. For its occurrence in South Australia, see Black, p. 104.

*Diodia teres*.—Belongs to the Rubiaceæ. I know of no record of its occurrence in Australia. Ada Georgia, p. 400.

*Daucus brachiatus*.—This is a native plant, found all over the State, whose burr gets into the wool.

*Dipsacus sylvestris*.—This is a wild Teazel. I do not know of its occurrence in New South Wales. It is found in Tasmania. See *Agricultural Gazette*, Tas. V., 176, for a figure. Ada Georgia, p. 403.

*Erechthites valerianaefolia*.—A beautiful plant, originally a garden escape in Queensland, and found in the Dorrigo over ten years ago. Belonging to the daisy family, its feathery seeds blow about.

*Erodium moschatum*.—An Alfileria of the United States and forming good pasture over a large extent of country on the Pacific Slope. In many places it becomes a weed, and the fact that such a plant as this has been proscribed, shows how difficult it is to deal with the weed question.

*Gaertneria discolor*.—(Belongs to the Loganiaceæ). *Franseria discolor* is a synonym. I do not know of its occurrence in Australia. Ada Georgia, p. 458.

*Githago lychnis*.—This is generally referred to as *Agrostemma Githago*, and is the "Corn Cockle." Its bad point is that its black seeds, about the size of wheat, discolour and poison the flour. See p. 3.

*Helenium autumnale*.—I know of no local record. Ada Georgia, p. 481.

*Hypochaeris glabra*.—A close relation of *H. radicata*, which was originally figured in the *Agricultural Gazette* for January, 1917. Its characters and defects are similar.

*Iva xanthifolia*.—This is widely diffused and a great pest in the United States. I know of no local record. Ada Georgia, p. 453.

*Iva axillaris*.—I know of no local record. See Ada Georgia, p. 451.

*Jatropha multifida*.—Of interest only to Queensland at present. See Bailey, p. 179.

*Jatropha curcas*.—Of interest only to Queensland at present. See Bailey, p. 179.

*Jatropha gossypifolia*.—Of interest only to Queensland at present. See Bailey, p. 177.

*Lantana Sellowiana*.—A garden form of Lantana, which, like the previous three plants, has escaped from cultivation. See Bailey, p. 141.

*Lappula lappula* is a synonym of *Echinosperrum lappula*, a native plant.

*Leontodon hirtus*.—Allied to the Dandelion. In the *Flora Australiensis*, in vol. 3 (1866), it was recorded from near Parramatta. Black, p. 100, records it from South Australia under the synonym *Thrincia hirtus*.

*Lepidium ruderales* is one of the Pepper-worts, foetid and pungent to the taste and smell when bruised, and already well established.

*Linum catharticum*, "Purging Flax."—I have no record of this in Australia.

*Myagrurn perfoliatum*.—I have no record of this in Australia, other than the Victorian reference below.

*Oxalis corniculata*.—This small, yellow-flowered weed is all over Australia, and is perhaps a native as well as a cosmopolitan. The aborigines have long eaten the acidulous leaves to flavour their poor food.

*Plantago aristata*.—I have no record of this in Australia. See Ada Georgia, p. 394.

*Pteridium aquilinum*.—The common Bracken fern.

*Rhus radicans* causes severe irritation of the skin, even if not actually touched. See the *Agricultural Gazette* for 1914, p. 611.

*Salsola kali-tragus*.—This weed has proved a great scourge in the United States; a close relation is a native of Australia.

*Sedum telephium*.—I do not know of its occurrence in Australia out of gardens yet.

*Sisymbrium altissimum*.—This weed does not appear to have been recorded from New South Wales, but it is a great pest in the United States and Canada.

*Solanum carolinense*.—I have no record of this weed in Australia. Ada Georgia, p. 365.

*Silene gallica*.—This is figured and described in the *Agricultural Gazette* for 1895, p. 809.

*Stellaria media* is perhaps our commonest chick-weed. They are more unsightly than a menace to the farmer.

*Sagina procumbens*.—I have no record of this weed in Australia.

### Weeds proscribed in Victoria.

In the *Journal of Agriculture*, Victoria, for July, 1918, will be found a "List of Plants proclaimed under the Thistle Act (the Victorian Weeds Act) for the State of Victoria."

Victoria is our neighbour, and the list includes the following, which are not proclaimed in New South Wales:—

*Brassica Sinapistrum* (Charlock or Wild Mustard).  
*Carduus arvensis* (Perennial Californian Thistle).  
*Carduus benedictus* (Sacred Thistle).  
*Convolvulus arvensis* (Common Bindweed).  
*Cyperus rotundus* (Nut Grass).  
*Erechthites quadridentata* (Cotton Weed).  
*Gilia squarrosa* (Californian Stink Weed, Digger's Weed, or Sheep's Weed).  
*Loranthus celastroides* and *L. pendulus* (Mistletoes).  
*Lycium horridum* (Box Thorn).  
*Myagrum perfoliatum* (Musk Weed).  
*Raphanus Raphanistrum* (Wild Radish or Jointed Charlock).  
*Romulea cruciata* (Guildford Grass or Onion Grass).  
*Senecio Jacobea* (Ragwort).

A list of weeds which are only proclaimed for certain specified districts in Victoria is also published. These include:—

*Acacia armata* (Acacia Hedge or Prickly Acacia).  
*Andropogon halepense* (Johnson Grass).  
*Cassinia arcuata* (Chinese Scrub).  
*Cytisus canariensis* (Cape Broom).  
*Erysimum repandum* (Treacle Mustard).  
*Lepidium Draba* (Hoary Cress).  
*Madia sativa* (Pitch Weed).  
*Salvia verbenacea* (Wild Sage).

*Carduus arvensis*.—This so-called Canada thistle, a peculiarly dangerous weed, I have not been able to trace so far as occurring in New South Wales, although I have advertised for it.

*Carduus benedictus*.—Syn. *Carbenia benedicta*, a Mediterranean plant. I have no record of its occurrence in Australia.

*Brassica Sinapistrum*, and *Raphanus Raphanistrum*.—These two weeds, close relations of the cabbage and radish, are a great nuisance in wheat fields and cultivation generally. Both are vile, useless weeds, which produce seed abundantly.



*Convolvulus arvensis*.—This is a bad pest in many parts of Australia. See *Agricultural Gazette*, N.S.W., IX, p. 358. Mr. H. L. White, of Belltrees, Scone, points out that, as it has a deep-root system in certain areas, it is practically indestructible by the ordinary cultivation methods. He is trying grazing with sheep to eat the tops, and thus exhaust and destroy the plant. See the *Journal of Agriculture, Victoria*, XII, p. 343. Ada Georgia, p. 321.

*Cyperus rotundus*.—This is dealt with at p. 30. It is far more abundant with us than in Victoria, and yet it is not a proclaimed weed with us, for the reason that, in our warm, coastal districts it is practically impossible to eradicate it.

*Erechtites quadridentata*.—A native plant which no one in New South Wales appears to have officially reported. For Victoria, see Ewart, p. 39; for Queensland, see Bailey, p. 90.

*Gilia squarrosa*.—There is a note on it in the *Agricultural Gazette* for April, 1901, when it was first announced for Australia. It is still spreading in the Tumbarumba district. Ewart figures it.

*Loranthus*.—No concerted action has been taken to destroy our native mistletoes, partly because they are often on high trees and the cost would be great, partly because of their abundance, and partly because they are palatable to stock.

*Lycium horridum*.—We proscribe two species already, but local authorities have not made any application in regard to this one.

*Myagrum perfoliatum*.—See p. 23.

*Romulea cruciata*.—This is figured in the *Agricultural Gazette* for 1901, p. 232. It is in New South Wales in countless millions, chiefly in grass land, and, speaking generally, it is not easy to suggest a practical method of destruction. It is one of those all-pervading weeds of the Wild Onion class (see p. 38) and Nut Grass (see p. 30).

*Senecio Jacobea*.—Figured by Ewart. Causes disease in stock. It is a well-known pest in New Zealand and South Africa.

*Acacia armata*.—The fact that Victoria has had to proscribe this Wattle-hedge (often called Kangaroo thorn), should put us on our guard. It seeds freely, and forms a rapidly-spreading thorny barrier which affords a refuge for rabbits and other vermin.

*Andropogon halepense*.—This is a valuable grass under some circumstances, but a curse if it gets into the cultivation. It would be difficult to proscribe a grass of this kind in New South Wales.

*Cassinia arcuata*.—This is a native bush which seeds abundantly and spreads rapidly on rocky hillsides. We have a number of allied species.

*Cytisus canariensis*.—*C. scoparius* is proscribed in New South Wales. I have received the former as a garden escape from the Goulburn district.

*Erysimum repandum* (figured by Ewart; not formally recorded for New South Wales), and *Lepidium Draba*.—These are two weeds belonging to the Cress family. The latter is a small, white-flowered plant, which has been recorded as a pest in many country districts.

*Madia sativa*.—This is already in New South Wales. See the *Agricultural Gazette* for February, 1896. It has spread since then.

*Salvia verbenacea*.—This is widely diffused in Australia. As regards New South Wales, farmers and others have sent it to me for many years. See Black, p. 124; Ewart, p. 52.

## Proclaimed Weeds in New South Wales.

LIST OF PLANTS DECLARED TO BE NOXIOUS IN VARIOUS SHIRES AND MUNICIPALITIES IN NEW SOUTH WALES, UP TO AND INCLUDING 30TH JUNE, 1919.

Plants declared to be noxious.		No. of Municipalities.	No. of Shires.
Scientific name	Common name.		
<i>Alternanthera Achryantha</i> ...	Khaki Weed ... ..	4	4
<i>Amaranthus paniculatus</i> ...	Wild Amaranth or Prince of Wales' Feather.	1	.....
<i>Amaranthus viridis</i> ...	Pigweed ... ..	2	.....
<i>Ambrosia artemisiifolia</i> ...	Roman Wormwood or Dunbible Weed.	.....	2
<i>Amsinckia intermedia</i> ...	Yellow Burr Weed ... ..	.....	5
<i>Anthemis cotula</i> ...	Wild Chamomile ... ..	1	.....
<i>Argemone mexicana</i> ...	Mexican Poppy or Binneguy Thistle	9	21
<i>Asclepias physiocarpa</i> ...	Wild Cotton ... ..	1	2
<i>Bassia quinquecupis</i> ...	Roly Poly ... ..	2	.....
<i>Bursaria spinosa</i> ...	Blackthorn or Native Boxthorn ...	5	.....
<i>Carduus lanceolatus</i> ...	Black Thistle, Scotch Thistle (so-called), or Spear Thistle.	46	8
<i>Carduus marianus</i> ...	Variegated Thistle or Milk Thistle ...	4	1
<i>Carduus pycnocephalus</i> ...	Slender Thistle ... ..	2	2
<i>Carthamus lanatus</i> ...	Saffron Thistle ... ..	13	32
<i>Carthamus tinctorius</i> ...	Saffron Thistle ... ..	.....	1
<i>Cassia Sophera</i> ...	Yellow Pea ... ..	.....	2
<i>Centaurea calcitrapa</i> ...	Star Thistle ... ..	34	50
<i>Centaurea melitensis</i> ...	Cockspur ... ..	6	7
<i>Centaurea solstitialis</i> ...	St. Barnaby's Thistle ... ..	1	.....
<i>Chenopodium album</i> ...	Fat Hen or Goose Foot ...	3	.....
<i>Chrysanthemum segetum</i> ...	Wild Marigold ... ..	2	.....
<i>Conium maculatum</i> ...	Hemlock ... ..	1	1
<i>Cryptostemma calendulaceum</i> ...	Cape Weed ... ..	23	16
<i>Cucumis myriocarpus</i> ...	Musk Melon or Paddy Melon ...	3	4
<i>Cuscuta spp.</i> ...	Dodder ... ..	.....	1
<i>Cytisus scoparius</i> ...	English Broom ... ..	1	.....
<i>Datura Stramonium</i> ...	False Castor Oil Plant, Thorn Apple, Green Stem or Purple Stem Thorn Apple.	16	9
<i>Echium plantagineum</i> ...	Paterson's Curse or Blue Weed ...	14	47
<i>Eichhornia speciosa</i> ...	Water Hyacinth ... ..	8	18
<i>Emex australis</i> ...	Cat's Head ... ..	6	6
<i>Erigeron canadensis</i> ...	Fleabane ... ..	6	.....
<i>Erigeron linifolius</i> ...	Cobbler's Pegs ... ..	3	.....
<i>Gilia squarrosa</i> ...	Californian Stink Weed or Sheep Weed	.....	1
<i>Homeria collina</i> ...	Cape Tulip ... ..	1	1
<i>Hypericum perforatum</i> ...	St. John's Wort ... ..	7	22
<i>Inula graveolens</i> ...	Stinkwort ... ..	12	34
<i>Lantana camara</i> ...	Lantana ... ..	18	22
<i>Lepidium ruderale</i> ...	Wild Cress ... ..	1	.....
<i>Linaria elatine</i> ...	Blanket Weed ... ..	2	4
<i>Lithospermum arvense</i> ...	Corn Gromwell ... ..	.....	1
<i>Lycium barbarum</i> ...	Barbary Box Thorn ... ..	3	8
<i>Lycium chinense</i> ...	Chinese Box Thorn ... ..	2	.....

LIST OF PLANTS DECLARED TO BE NOXIOUS, &c.—*continued.*

Plants declared to be noxious.		No. of Municipalities.	No. of Shires.
Scientific name.	Common name.		
<i>Macrozamia spiralis</i> ...	Burrawang or Wild Pine Apple ...	.....	1
<i>Marrubium vulgare</i> ...	Horehound ... ..	10	3
<i>Martynia proboscidea</i> ...	Devil's Claw ... ..	.....	1
<i>Myriophyllum</i> ...	Thread of Life ... ..	1	7
<i>Nicotiana glauca</i> ...	Tree Tobacco ... ..	5	17
<i>Olearia viscidula</i> ...	Viscid Aster ... ..	.....	1
<i>Onopordon acanthium</i> ...	Scotch Thistle, or Heraldic or Common Thistle.	9	2
<i>Osteospermum moniliferum</i> ...	(None) ... ..	1	.....
<i>Phytolacca octandra</i> ...	Red Ink Plant or Dye Berry ...	14	3
<i>Polygonum hydropiper</i> ...	Smart Weed ... ..	.....	1
<i>Reseda luteola</i> ...	"Weld" or Dyer's Weed ... ..	1	2
<i>Ricinus communis</i> ...	Castor Oil Plant ... ..	10	5
<i>Rosa rubiginosa</i> ...	Sweet Briar ... ..	30	45
<i>Rubus fruticosus</i> ...	Blackberry ... ..	50	51
<i>Rumex</i> spp. ...	Docks ... ..	6	...
<i>Rumex crispus</i> ...	Curled Dock ... ..	5	.....
<i>Salsola kali</i> ...	Saltwort ... ..	1	.....
<i>Scolymus maculata</i> ...	Spotted, Golden or Californian Thistle	.....	1
<i>Sida rhombifolia</i> ...	Sida retusa, Paddy's Lucerne or Queensland Hemp.	11	1
<i>Solanum nigrum</i> ...	Wild Black Currant ... ..	2	.....
<i>Solanum verbascifolium</i> ...	Wild Tobacco Tree ... ..	.....	1
<i>Solanum cinereum</i> ...	Narrawa Burr ... ..	5	7
<i>Solanum sodomæum</i> ...	Apple of Sodom ... ..	2	.....
<i>Spartium junceum</i> ...	Yellow Broom ... ..	1	.....
<i>Swainsona galegifolia</i> ...	Indigo ... ..	.....	2
<i>Tribulus terrestris</i> ...	Caltrops ... ..	1	.....
<i>Ulex europæus</i> ...	Gorse or Furze... ..	4	2
<i>Verbascum thapsus</i> ...	Great Mullein or Shepherd's Blanket	.....	1
<i>Verbena bonariensis</i> ...	Purple Top ... ..	7	3
<i>Verbena venosa</i> ...	Wild Verbena ... ..	2	4
<i>Watsonia augusta</i> ...	Watsonia ... ..	.....	1
<i>Xanthium spinosum</i> ...	Bathurst Burr ... ..	97	103
<i>Xanthium strumarium</i> ...	Neogoora Burr ... ..	27	55

## The Twenty Worst Weeds of New South Wales.

The accompanying table is the best guide to the relative importance of weed pests in this State at the moment of publication. At the same time it must be borne in mind that its completeness is entirely dependent on certain official acts of shires and municipalities, and local government bodies as well as farmers naturally differ about the importance they attach to many weeds.

Although the sequence of June, 1919, is not a radical change from that of June, 1918, it will be seen that there are minor alterations in regard to at least half the twenty weeds.

WEEDS PROCLAIMED NOXIOUS WITHIN MUNICIPALITIES AND SHIRES IN THE STATE OF  
NEW SOUTH WALES.

Weeds.	Up to June, 1918.				Up to June, 1919.			
	Number of—				Number of—			
	Municipalities	Shires.	Total.	Se- quence.	Municipalities	Shires.	Total.	Se- quence.
<i>Xanthium spinosum</i> (Bathurst Burr) ...	100	104	204	1	97	103	200	1
<i>Rubus fruticosus</i> (Blackberry) ...	47	51	98	2	50	51	101	2
<i>Centaurea calcitrapa</i> (Star Thistle, &c.) ...	35	50	85	3	34	50	84	3
<i>Xanthium strumarium</i> (Ncogcora Burr) ...	26	51	77	4	27	55	82	4
<i>Rosa rubiginosa</i> (Sweet Briar) ...	29	44	73	5	30	45	75	5
<i>Echium plantagineum</i> (Paterson's Curse) ...	14	42	56	6	14	47	61	6
<i>Carduus lanceolatus</i> (Black Thistle, &c.) ...	47	8	55	7	46	8	54	7
<i>Inula graveolens</i> (Stinkwort) ...	10	24	34	11	12	34	46	8
<i>Carthamus lanatus</i> (Saffron Thistle, &c.) ...	14	32	46	8	13	32	45	9
<i>Lantana camara</i> (Lantana) ...	19	20	39	9	18	22	40	10
<i>Cryptostemma calendulaceum</i> (Cape Weed) ...	23	16	39		23	16	39	11
<i>Argemone mexicana</i> (Mexican Poppy, &c.) ...	9	21	30	12	9	21	30	12
<i>Hypericum perforatum</i> (St. John's Wort) ...	7	18	25	15	7	22	29	13
<i>Eichhornia speciosa</i> (Water Hyacinth) ...	8	18	26	14	8	18	26	14
<i>Datura Stramonium</i> (False Castor, &c.) ...	13	11	27	13	16	9	25	15
<i>Nicotiana glauca</i> (Tree Tobacco, &c.) ...	5	17	22	16	5	17	22	16
<i>Phytolacca octandra</i> (Red Ink Plant, &c.) ...	14	2	16	17	14	3	17	17
<i>Ricinus communis</i> (Castor Oil Plant) ...	10	4	14	18	10	5	15	18
<i>Centaurea melitensis</i> (Cockspur) ...	6	7	13	19	6	7	13	19
<i>Solanum cinereum</i> (Narrawa Burr) ...	5	7	12	20	5	7	12	20

NAMES OF MUNICIPALITIES AND SHIRES IN WHICH CERTAIN PLANTS HAVE  
BEEN DECLARED TO BE NOXIOUS.\*

Plant.	Common Name.	Municipality.	Shire.
<i>Amaranthus paniculatus</i> .	Wild Amaranth, or Prince of Wales Feather.	East Maitland.	
<i>Amaranthus viridis</i> ...	Fat Hen, or Pigweed ...	Burwood, Concord.	
<i>Ambrosia artemisiifolia</i> .	Roman Wormwood, or Dumb-bible Weed.	.....	Tweed, Byron.
<i>Amsinckia intermedia</i> ..	Yellow Forget-me-not, Yellow Burr Weed.	.....	Coreen, Berrigan, Mitchell, Coolamon, Culcairn.
<i>Anthemis Cotula</i> ...	Wild Chamomile ...	Stockton.	
<i>Asclepias physocarpa</i> ..	Cotton Tree, or Wild Cotton	Grafton ... ..	Bulli, Copmanhurst.
<i>Bassia quinquevispis</i> ...	Roley Poley ...	Camden, Forbes.	
<i>Bursaria spinosa</i> ...	Blackthorn, Native Box, or Boxthorn.	Dundas, Ermington and Rydalmere, Granville, Hunter's Hill, Prospect and Sherwood.	
<i>Carduus marianus</i> ...	Variegated Thistle, or Milk Thistle.	Balmain, Concord, Manilla, Maitland West.	Erina.
<i>Carduus pycnocephalus</i>	White Thistle, or Slender Thistle.	Kiama, Wyalong ... ..	Gunning, Tweed.
<i>Carthamus tinctorius</i> ...	Saffron Thistle ... ..	.....	Lachlan.
<i>Cassia Sophia</i> ...	Yellow Pea ... ..	.....	Bogan, Timbreebongie.

\* Weeds described at length and figured in the following pages of this work are not included in this table. In connection with them, the information is given with each individual weed.

## NAMES OF MUNICIPALITIES AND SHIRES, &amp;c.—continued.

Plant.	Common Name.	Municipality.	Shire.
<i>Centaurea solstitialis</i> ...	St. Barnaby's Thistle ...	Tamworth.	
<i>Chenopodium album</i> ...	Feather Top, Wild Goosefoot, or Fat Hen.	Burwood, Concord, East Maitland.	
<i>Chrysanthemum segetum</i> .	Wild Marigold ... ..	Botany, Windsor.	
<i>Conium maculatum</i> ...	Henlock ... ..	Orange.	Tumbarumba.
<i>Cucumis myriocarpus</i> ...	Musk Melon, or Paddy Melon	Albury, Murrumburrah, Picton...	Culcairn, Dalgety, Holbrook, Hume.
<i>Cytisus scoparius</i> ...	English Broom ... ..	Braidwood.	
<i>Cuscuta</i> sp. ... ..	Dodder ... ..	.....	Adjungbilly.
<i>Emex australis</i> ...	Cat's Head ... ..	Bega, Botany, Grafton, Maitland West, Maitland East, Windsor.	Bolwarra, Cessnock, Inlay, Mumbulla, Tarro, Wallarobba.
<i>Erigeron canadensis</i> ...	Fleabane ... ..	Adamstown, Ashfield, Balmain, Burwood, Concord, New Lambton.	
<i>Erigeron linifolius</i> ...	Cobbler's Pegs ... ..	Maitland West, Newcastle, Stockton.	
<i>Homeria collina</i> ...	Cape Tulip (African Weed)...	Richmond ... ..	Patrick Plains.
<i>Lantana camara</i> ...	Lantana ... ..	Ashfield, Balmain, Botany, Drummoyne, Glebe, Hunter's Hill, Kempsey, Manly, Maitland West, Mosman, Mullumbimby, Murrumbidgee, North Illawarra, Rockdale, Waverley, Willoughby, Woollahra, Wollongong.	Apsley, Bellingen, Byron, Cessnock, Dorrigo, Dumaresq, Erina, Gloucester, Kuring-gai, Kyogle, Lake Macquarie, Macleay, Manning, Nambucca, Stroud, Tarro, Tenterfield, Terania, Tomki, Tweed, Wallarobba, Warrigah.
<i>Lepidium rudemale</i> ...	Wild Cress ... ..	Stockton.	
<i>Linaria elatine</i> ...	Hairy Toad Flax ... ..	Corowa, Wagga Wagga ... ..	Burrangong, Coreen, Culcairn, Hume.
<i>Lithospermum arcense</i> ...	Corn Gromwell ... ..	.....	Hume.
<i>Lycium barbarum</i> ...	Boxthorn, African Boxthorn or Barbary Boxthorn.	Coonamble, Moree, Singleton	Boolooroo, Boomi, Gilgandra, Patrick Plains, Waradgeri, Warrar, Wingadce, Wollondilly
<i>Lycium chinense</i> ...	Chinese Boxthorn ... ..	Camden, Hay.	
<i>Macrozamia spiralis</i> ...	Burrawang, or Wild Pine apple.	.....	Tenterfield.
<i>Marrubium vulgare</i> ...	Horehound ... ..	Armidale, Bathurst, Bega, Braidwood, Carcoar, Cowra, Junee, Quirindi, Uralla, Yass.	Holbrook, Narraburra, Wau-goola.
<i>Martynia proboscidea</i> ...	Devil's Claw ... ..	.....	Macquarie.
<i>Myriophyllum</i> ...	Thread of Life ... ..	Lismore ... ..	Byron, Gundurimba, Kyogle, Terania, Tintenbar, Tomki, Woodburn.
<i>Nicotiana glauca</i> ...	Tree Tobacco, or Tobacco Bush.	Balranald, Hay, Moama, Nyngan, Warren.	Began, Canobelas, Carrathool, Cobbora, Conargo, Namoi, Marthaguy, Murray, Talbragar, Rylstone, Timbreebongie, Turon, Wakool, Waradgeri, Weddin, Windouran, Wingadce.
<i>Olearia viscidula</i> ...	Viscid Aster ... ..	.....	Cockburn.
<i>Onopordion acanthium</i> ...	Scotch Thistle, Heraldic or Common Thistle.	Armidale, Ashfield, Balmain, Botany, Glen Innes, Grafton, North Illawarra, Windsor, Wollongong.	Mulwarce, Tarro.
<i>Osteospermum monili-ferum</i> .	(Not known) ... ..	Stockton.	
<i>Phytolacca octandra</i> ...	Red Ink Plant, Dye Berry, or Ink Plant.	Annandale, Ashfield, Botany, Burwood, Concord, Drummoyne, Granville, Homebush, Hunter's Hill, Hurstville, Mascot, Mosman, Willoughby, Wollongong.	Eurobodalla, Inlay, Mumbulla.

NAMES OF MUNICIPALITIES AND SHIRES, &c.—*continued*.

Plant.	Common Name.	Municipality.	Shire.
<i>Polygonum hydropiper</i>	Smart Weed ... ..	.....	Port Stephens.
<i>Reseda luteola</i> ...	"Weld," or Dyer's Weed ..	Nyngan ... ..	Bogan, Dalgety.
<i>Rosa rubiginosa</i> ...	Sweet Briar ... ..	Albury, Armidale, Ballina, Bathurst, Bega, Botany, Braidwood, Cootamundra, Coraki, Corowa, Glen Innes, Hunter's Hill, Junee, Lismore, Manly, Maitland West, Murrurundi, Murwillumbah, Orange, Tenterfield, Tumut, Ulladulla, Uralla, Gundagai, Wagga Wagga, Walcha, Willoughby, Windsor, Yass, Young.	Abercrombie, Ashford, Bannockburn, Bibbenluke, Canobolas, Cessnock, Coolah, Coonabarabran, Crookwell, Culcairn, Dalgety, Demondrille, Erina, Eurobodalla, Gadara, Gloucester, Gundurimba, Gunning, Holbrook, Illabo, Inlay, Jindalee, Kyeamba, Macintyre, Macleay, Macquarie, Monaro, Mumbulla, Murrungal, Narraburra, Nundle, Patrick Plains, Peel, Severn, Stroud, Tamarang, Tenterfield, Terania, Tumbarumba, Tweed, Upper Hunter, Wallarobba, Warrah, Wollondilly, Yarrowluma.
<i>Rubus fruticosus</i> ...	Blackberry ... ..	Adamstown, Armidale, Ashfield, Ballina, Bega, Botany, Bowral, Braidwood, Burwood, Concord, Cootamundra, Coraki, Corowa, Drummoyne, Dungog, Glen Innes, Grafton, Grafton South, Granville, Gulgong, Homebush, Hurstville, Kempsey, Kiama, Kogarah, Lambton, Lismore, Maitland East, Maitland West, Merewether, Mosman, Moss Vale, Murrurundi, Murwillumbah, New Lambton, North Illawarra, Orange, Rockdale, Tenterfield, Tumut, Ulladulla, Ulmarra, Uralla, Wagga Wagga, Walcha, Waratah, Waverley, Willoughby, Windsor, Wollongong.	Abercrombie, Ashford, Bannockburn, Bellingen, Byron, Canobolas, Cessnock, Crookwell, Culcairn, Dorrigo, Erina, Eurobodalla, Gadara, Gloucester, Gundurimba, Harwood, Holbrook, Hume, Illabo, Inlay, Jindalee, Kuring-gai, Kyeamba, Kyogle, Lake Macquarie, Macintyre, Macleay, Manning, Mulwaree, Mumbulla, Nambucca, Narraburra, Nymboida, Orara, Patrick Plains, Port Stephens, Severn, Stroud, Sutherland, Tarro, Tenterfield, Terania, Tintenbar, Tomki, Tumbarumba, Tweed, Upper Hunter, Wallarobba, Warrah, Warringa-Wollondilly.
<i>Rumex</i> sp. ... ..	Docks... ..	Adamstown, Armidale, Burwood, Concord, New Lambton, Uralla.	
<i>Rumex crispus</i> ...	Curled Dock ... ..	Corowa, Homebush, Maitland West, Molong, Moss Vale.	
<i>Salsola kali</i> ... ..	Glasswort, or Saltwort ...	Stockton.	
<i>Scotymus maculata</i>	Spotted Golden, or Californian Thistle.	.....	Warrah.
<i>Solanum nigrum</i> ...	Wild Black Currant, or Blackberry.	Burwood, Concord.	
<i>Solanum verbascifolium</i>	Wild Tobacco Tree ... ..	.....	Tweed.
<i>Solanum cinereum</i> ...	Narrawa Burr ... ..	Burrowa, Cootamundra, Corowa, Junee, Wagga Wagga.	Crookwell, Culcairn, Hume, Illabo, Jindalee, Murrungal, Narraburra.
<i>Solanum sodomæum</i> ...	South European Nightshade, or Apple of Sodom.	Botany, Stockton.	
<i>Spartium junceum</i> ...	Yellow Broom ... ..	Braidwood.	
<i>Sonchinsona galegifolia</i> ...	Indigo ... ..	.....	Kyeamba, Tenterfield.
<i>Tribulus terrestris</i> ...	Bindii or Bendy-eye, or Caltrop.	Narrandera.	
<i>Ulex europæus</i> ...	Gorse or Furze ... ..	Braidwood, Hunter's Hill, Mascot, Willoughby.	Mulwaree, Wollondilly.
<i>Verbascum thapsus</i> ...	Great Mullein, or Shepherd's Blanket.	.....	Gostwyck.
<i>Watsonia augusta</i> ...	Watsonia ... ..	.....	Patrick Plains.

## Some Weeds of New South Wales.

### Nut-grass (*Cyperus rotundus* L.).

(CYPERACEÆ; Sedge Family.)

*Other vernacular names.*—This is not a grass, neither does it bear a nut. It is a sedge, and what is popularly called the “nut” is the tuber. In the United States it is often known as “Coco.”

*Aboriginal names.*—Mr. Max Koch, of South Australia, has given me the following names used by various tribes in his State, viz.:—“Kudnamarra” for the plant, and “Wurta,” “Yower,” and “Tharaka” for the tubers.

*Botanical name.*—*Cyperus*, Greek *kuperos*, which was the name given to the plant we now know as Nut-grass, and which has given the name to the genus to which it belongs; *rotundus*, Latin round, in allusion to the frequently spherical shape of the tubers.

Asa Gray refers to the Nut-grass of the Southern Atlantic States as *C. rotundus*, variety *Hydra*. In New South Wales writings sixty years ago it is referred to as *C. Hydra*, presumably a reference to the many heads or lives it has.

*Botanical description.*—A perennial, with a creeping rhizome swelling here and there into tubers.

*Stems* rather slender, triquetrous towards the top, usually 1 to 1½ feet high.

*Leaves* much shorter than the stem, the sheaths often long and loose.

*Spikelets* usually six to ten together in clusters or short spikes in an umbel of few rays, or sometimes almost contracted into a compact cluster; the spikelets usually brown, linear, acute, compressed, usually 5 to 6 lines long, and rather above 1 line broad, with about 12 to 20 flowers, but often much longer; the rhachis bordered by hyaline wings.

*Glumes* imbricate, more or less distinctly several-nerved, with a prominent keel usually green.

*Stamens* three. *Style* three-cleft. *Nut* ovoid, three-angled, less than half the length of the glume.

*Uses.*—The Australian aborigines roasted and ate the tubers in many parts of the continent, and continue to do so at the present day in South Australia.

*Oil.*—The rounded rhizomes (nuts) are said to yield an essential oil, which the natives of Upper India use to perfume their clothes. In Bengal the tubers of this species are more largely used in perfumery than are those of *C. scariosus*, being more plentiful. Roxburgh says that the dried and pounded root is used “as perfume at the weddings of natives.” The odour of the tubers is not altogether pleasant. The smell is of Khus Khus, with perhaps a dash of Patchouli thrown in.

*Fodder.*—Cattle eat this so-called grass, and hogs are remarkably fond of the roots. (Watt.)

"This plant, perhaps the most pernicious weed of the Southern States, is said to have some value besides that of its tubers as food for hogs. According to Captain W. W. Woolsey, of Aiken, S.C., horses eat it readily." (Kearney, *Bull.* No. 1, Div., Agrost., U.S.A.)

Cattle and horses cannot help eating Nut-grass when growing amongst true grass, but I have never been able to learn that they are fond of it in New South Wales.

About the year 1856, pigs were enclosed in a specially bad Nut-grass area in the Botanic Gardens, but the pigs confined themselves to a few holes about 2 feet deep. They did not work all over the ground in search of the "nuts," and the Nut-grass continued to flourish.

*Tenacity of life.*—The tenacity of life of this plant is remarkable. The growing shoots seem to stop at nothing. Many years ago some potatoes were brought to me completely riddled with Nut-grass, and Dahlia tubers are not safe from the pest. Crinum roots have been perforated by it, and I doubt whether any large, fleshy tubers are not liable to perforation by the shoots. If it be covered up with 3 feet of soil it will make its appearance at the surface and flourish. I have seen it come through 2 inches of blue-metal asphalt, which contained no visible crack. Mr. W. S. Campbell informs me that the roots have been found 30 feet below ground by men sinking a well in the Manning River district.

"The seeds have a hard coat, and do not yield to digestion in the case of any ordinary farm animals, except sheep. Manure, therefore, from cattle and horses fed on Nut-grass is likely to re-seed land abundantly with the weed." (Dewey.)

*How to get rid of it.*—The method of treatment will depend upon circumstances.

Poison (arsenite of soda) may be tried on walks, but the applications have to be frequent.

If the conditions will admit of it, no method is better than the combined smothering and fermenting process, *i.e.*, by covering it with several feet of manure, *i.e.*, stack the manure on ground affected by Nut-grass. In a couple of years the manure may be removed with safety, as in fermenting it has destroyed all plant-life below it.

Mr. J. Dawes, Superintendent of the Centennial Park, followed this method with success in the vicinity of the Rosarium. He piled the manure on the ground, straw and all, for a depth of 6 to 9 inches amongst his roses, and certainly made a success of the job.

Where there is a little Nut-grass, it may be got rid of by persistent hoeing, extending for weeks and months, or by the most conscientious digging up with a fork, to remove every nut. But, as a rule, this is the very best method to stir up the soil and to bring up the deep-seated nuts to the top and give them a fresh lease of life. As a rule, the digging method is an absolute waste of money.



Nut-grass (*Cyperus rotundus* L.).

1. Spikelet (x 4).      2. Transverse section of flower-stalk (x 4).      3. Transverse section of leaf (x 4).  
 4. Spikelet-scale (x 14  $\frac{2}{3}$ ).      5. Seed, not fully ripe (x 16  $\frac{2}{3}$ ).      6. Transverse section of same (x 16  $\frac{2}{3}$ )

"The plan of campaign to extirpate Nut-grass is simply to prevent it maturing seed above ground. Nearly everybody thinks that the nuisance reproduces itself from the nut alone, whereas it propagates a thousand times more from the seed. Hence, to effectually and quickly destroy Nut-grass on any land infested with it, the soil should be frequently stirred during the growing period of summer, so as to stimulate each nut tuber and seed to sprout. It is a waste of effort to attack it in winter, either by digging, ploughing, or turning hogs on it. The best time for fighting it is between midsummer and frost time. . . . The old method for destroying Nut-grass, by cutting it off under the surface of the ground every time a sprig appears above the surface, is a useless expenditure of labour."—(Tillman, quoted by Vasey and Dewey.)

Dewey also recommends that it be choked out by a vigorous growing crop. "After the summer crop is harvested, plough and prepare the land thoroughly; then seed it heavily to some winter crop adapted to the soil. Crimson Clover is the best for this purpose in most localities."

The best and fullest accounts of Nut-grass known to me are a circular on the subject by L. H. Dewey, published in 1894 by the Division of Botany of the United States Department of Agriculture, and an article (*Cyperus rotundus*, Benth.), in Watt's *Dictionary of the Economic Products of India*.

*Where Found*.—Indigenous to most tropical and temperate regions. Indigenous to Australia, though an introduction to many of the localities in which it is now found.

Although such an unmitigated nuisance in gardens and arable land, it is so difficult to destroy in large areas, that shires and municipalities refrain from proclaiming it.

**Water Hyacinth,** (*Eichhornia speciosa* Kunth. *Pontederia crassipes*, Mart.).

(PONTEDERIACEÆ).

Like many other pests, the water hyacinth was introduced to our northern rivers purely for its beauty as a flowering plant. Some twenty years ago a couple of small, wilted, insignificant-looking plants were procured from a home in one of the suburbs of Sydney, and placed in Swan Creek, situated 4 miles below South Grafton, on the Clarence River, with the object of beautifying the creek. The hyacinth, once liberated, thrived so well that in two years it took complete possession of the creek, which in this particular locality is about 50 yards wide and varies in depth from 10 to 35 feet.

During the flowering season the creek was a pretty sight, and lovers of flowers visited the locality from all parts of the district. Each, in departing, carried a small plant or two to place in watercourses near his or her own home, and it was not very long before the hyacinth had been innocently introduced to all parts of the district. Every flood or strong fresh in the Clarence or Richmond brought down quantities of hyacinth, which readily took root, and soon it was spreading so rapidly that acres of open water were covered with it, and presently rivers and creeks that had been



Water Hyacinth (*Eichhornia speciosa* Kunth.).

valuable waterways for the shipment of the produce of the farms in the vicinity had become completely blocked, and navigation entirely prevented or rendered distinctly dangerous to the steamboats and launches that plied upon the rivers. At times the hyacinth has even been responsible for suspending ferry traffic at Grafton, and on the Lower Clarence punt-wires have often been broken. In many of the "clumps" of hyacinth, which reached a quarter of an acre in extent, logs were to be found, and some idea of their danger may be estimated when it is remembered that these were being carried down with the current at the rate of from 4 to 6 knots an hour.

Efforts were made on several occasions to get rid of the pest, and at Swan Creek alone a sum of something like £800 was expended by the late Sir John See in dragging the hyacinth out of the stream. This work was never completed, however, and in a few years the whole of the creek was again covered.

The hyacinth is not confined to this State alone. In Florida the pest has assumed gigantic proportions, as the following extract from *Bulletin* No. 18 of the United States Department of Agriculture (Division of Botany) shows:—

*Damage caused by the Water Hyacinth.*

That the water hyacinth is becoming a serious menace to navigation in the St. John's River (Florida) is unquestionably true. Small boats with screw propellers find it impossible to penetrate a very large mass of the plants, as they lack the necessary power, and the plants soon become entangled in the screw, and prevent it from revolving. Parting the plant with boat-hooks, &c., is very slow and tedious. Paddle-wheel steamers are able to penetrate the extensive masses of the plants much better, but are generally hindered and frequently entirely blocked. When a large steamer, going at full speed, strikes a bank of the hyacinth, it comes almost to a standstill. In sidewheel steamers the plants collect between the wheel and bulkheads, packing it so solidly that it is often almost impossible to reverse the engine. This necessitates caution in approaching the landings. Steamers with low-pressure engines are troubled by the clogging of the injector pipes, so that sufficient water cannot be secured for the condensers. In the case of some boats, the obstruction is occasionally removed by blowing steam through the injector-pipe. This process, however, is rather dangerous, as the injector-pipes and condensers are not constructed with a view to having heavy pressure applied from within. Floating logs frequently lie concealed in the masses of the plants and form a serious danger to navigation. Several boats have already been injured to some extent by striking such obstructions.

The hyacinth is a pretty aquatic, and thrives in water in a warm climate. The foliage is killed by frosts in the winter. It seeds profusely, and it is mainly on this account that the plant is difficult to eradicate. At the base of the leaf stalk is a large bulbous-looking development, which is composed of numerous air-cells, which act as floats and support the plant in the water. The roots penetrate to a depth of from 2 to 4 feet, and it thrives just as well in 40 feet of water as in only a few feet.

The seed as it ripens falls between the leaves of the parent plant, and coming in contact with the water germinates and grows. As the older plants mature they are gradually forced below the surface of the water by the younger generation, and as they die they accumulate at the bottom. In shallow watercourses or lagoons it is only a matter of a few years when they will be filled up with a dense mass of decomposing organic matter.

It is claimed that the salt-water will kill it. While that is so, it has to be remembered that the rivers are frequently fresh for a considerable period in the early autumn, and during flood-time there is ample time and opportunity to have these floating weeds conveyed to fresh-water creeks and lagoons before the river again becomes salt.

Apart from the effect on navigation, too, there is a direct effect upon the farm supply of water in many cases. On hundreds of farms on our northern rivers the only supply of water for farm stock is obtained from lagoons, creeks, or blind watercourses. When the hyacinth becomes established such water is rendered unfit for drinking purposes. The decomposing plants give off most offensive smells, the water becomes inky black and putrid, and stock will not touch it. Along the banks of Alumny Creek, portion of which runs through the city of Grafton, the odours arising during the summer months are most obnoxious, and whilst no direct sickness may be attributed solely to this cause, at the same time it must be admitted that such a state of things is not conducive to health.

In times when feed is scarce, dairy cattle are sometimes tempted to reach out into deep water for the green feed the hyacinth offers, and as many as seventy head have been lost in a district within a comparatively short time, the cows slipping into the streams and being unable to get back. In the rivers or their tributaries, where there are swift-flowing currents, the hyacinth is not likely to do much damage. Though it may thrive in the still waters found in pockets along their banks, or be prevented from being carried away in the ordinary current by clumps of bushes or fallen trees, it is an easy matter to clear such channels by forcing out the weed with poles in flood time, when the waters would carry them away.

It is on the level country, where the waters are confined, as in lagoons or swamps, or the low country, as found on the lower portions of the coastal rivers, where the waters are still or move very slowly, that the hyacinth is difficult to eradicate. In some of the channels cut to drain swamp areas, the hyacinth gradually forced its growth against a somewhat sluggish current at the rate of several feet a month.

The above indicates the importance of the weed to individual farmers and also the methods by which it may be dealt with. The clearing of streams by mechanical means on such a large scale as to enable navigation to be continued or resumed is another matter, but means have latterly been adopted that have been attended with a good deal of success in this direction, though at considerable cost.

Water hyacinth has been proclaimed noxious in eighteen shires and eight municipalities as follows:—

## SHIRES.

Bellingen	Harwood	Nambucca	Tweed
Byron	Hastings	Port Stephens	Wallarobba
Cessnock	Kyogle	Terania	Woodburn.
Eurobodalla	Macleay	Tintenbar	
Gundurimba	Manning	Tomki	

## MUNICIPALITIES.

Ballina	Coraki	Lismore	Murwillumbah
Casino	Kempsey	Macleay	Richmond.

**Wild Onion or Sweet-scented Garlic (*Allium fragrans* Vent.).**

(LILIACEÆ; Lily Family.)

I do not know who will step forward and claim the honour of the introduction of this neat little, white-flowering liliaceous plant, which blooms regularly in a number of places in the coast districts every November. It was originally introduced into the State as an ornamental plant, and so, if it could be kept within bounds, it still would be, but where it has broken bounds it becomes a serious pest. To give an idea of its seriousness, there is no doubt that it is the most formidable weed in the Botanic Gardens at Sydney, being even worse than Nut-grass (*Cyperus rotundus*). I suppose I am within the mark when I say it costs £100 a year to keep it in check in that one establishment, which, at 4 per cent., represents a capital sum of £2,500. This estimate was originally made in 1897, twenty years ago, and although we have battled with it in a crowded garden, amongst so many subjects which cannot be removed, the figures are probably true now, in view of the fact that the area of the Botanic Gardens has greatly increased in the interval. It is more insidious than the Nut-grass, because it is more brittle. It seems as if a perfect plant grows from every fragment left in the ground. I direct attention to it in the most serious manner.

**Vernacular Names.**—It is commonly known as “Onion” or “Wild Onion” about Sydney. “Sweet-scented Garlic” is a name sometimes given to it, because it is allied to garlic, while the flowers are slightly perfumed. It is not to be confused with *Bulbine bulbosa*, the well-known “Wild Onion,” although in grassland, before flowering, the plants are not very dissimilar.

**Botanical Name.**—*Allium*, Latin for garlic; stated to be derived from a Celtic root *all*, hot or pungent; *fragrans*, Latin adjective, meaning fragrant or perfumed.

**Botanical Description.**—

*Leaves* a foot long, weak, diffuse, glaucous, linear, channelled, obtuse, and twisted at the end.

*Scape* smooth, erect, round, a little longer than the leaves, glaucous, with a little red at the base.

*Umbel.*—As many as sixteen-flowered in some umbels, with a short, scarious, two-leaved spathe.

*Pedicels* long, slender, rigid.

*Flowers* very fragrant, six-cleft, turbinate, with white, spreading, blunt, equal, concave segments, and a green tube.

*Stamens* (six) nearly the length of the perianth, erect, inserted into the mouth of the tube.

*Filaments* linear lanceolate, white, green at base.

*Pollen yellow.* *Ovary* cylindrical, six-ribbed, very smooth.

*Style* the length of stamens. *Stigma* small, simple, depressed.

The above description is taken from *Edwards' Botanical Register*, vol. xi, p. 898, *Allium fragrans*, var. *nepalense*, except that the number of flowers in the umbel of our plants is as many as sixteen in contradistinction to six in the typical variety.

**How to get rid of it.**—In an ordinary garden-border perhaps the best method is to dig each plant up very gingerly, so as to be careful to take up every fragment. In lawns (where it spreads like infection) frequent mowing is the only cure, while on hard ground it should be shaved off close to the ground as often as it makes its appearance, with the result that it will eventually die out; but above all be on the look-out for it, and tackle it on its first appearance on a lawn or in a garden. Endeavour to recognise it,



Wild Onion, or Sweet-scented Garlic (*Allium fragrans* Vent.)

A—Fruit (slightly enlarged). B—Seeds (magnified).

and then give it no quarter. When it has got a thorough hold on the ground it is almost impossible to get rid of it. Never let it flower if possible. The usual sulphate of ammonia treatment of a lawn is useful in dealing with Wild Onion, but the method is too laborious and expensive except in pleasure lawns. In garden-paths (and these are very often important sources of infection), the usual sodium arsenite treatment is most efficacious; indeed it has been proved that, wherever it can be applied, arsenic is the most certain agent for the destruction of weeds available to the cultivator. Obviously arsenic cannot be applied to the soil of a garden, or to a lawn.

*A congener.*—Attention may be invited to a close relation of our pest, viz., *Allium vineale* L., which is such a terrible pest in many parts of the southern United States. I trust that, by taking *A. fragrans* in time, it will never become such a pest as *A. vineale* is to many American farmers and orchardists. This is the subject of a special bulletin (No. 2, vol. viii, July, 1895) of the Agricultural Experiment Station of the University of Tennessee. It is considered by many to be "the vilest weed pest in our State." Equally serious reports are made from New Jersey, Maryland, Virginia, North Carolina, South Carolina, and Georgia. In Texas its place is taken by *Allium striatum*. The most serious complaint against it is that "it ruins our milk, butter, and beef"; a danger may, though to a less intense degree, be looming before us as regards *A. fragrans*.

*Where Found.*—South Europe and North Africa, from whence it has spread to most warm countries.

In our State it prefers good soil, fairly moist, hence low-lying, rich alluvial soils, but it is very accommodating in this respect.

### A Wild Onion or Onion Weed (*Asphodelus fistulosus* L.).

(LILIACEÆ: Lily, Onion, &c., Family.)

*Popular Description.*—A perennial onion-like plant, or more like spring onions, or perhaps chives. The base near the roots is enveloped in a silvery-white membrane ("Onion skin."). Flowers whitish, with a faint purplish flush and down each "petal" a pinkish or purplish stripe. The fruit contains the seeds in a jelly-like bladder.

There is a figure of the plant at t. 984 of the *Botanical Magazine*, under the name of "Onion-leaved Asphodel." It is a native of the Mediterranean.

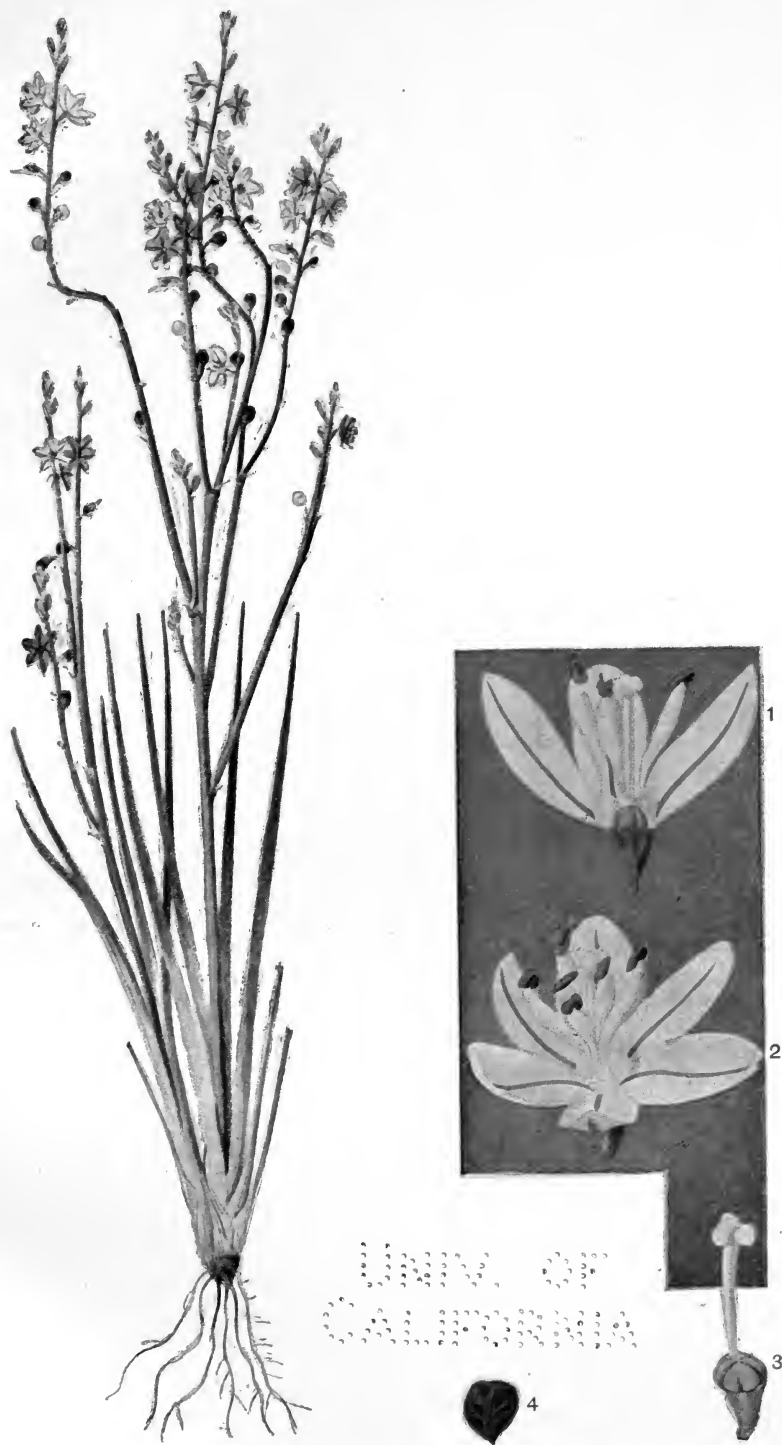
#### *Botanical Description.*—

Stem hollow; leaves radical, striate, cylindrical; perianth petaloid, the segments almost free, deciduous; pedicels jointed; anthers introrse, versatile; filaments surrounding the ovary, papillose on the back at the base; stigma three-lobed; fruit a three-celled capsule; seeds triangular, wrinkled.

Its nearest relation in the Australian flora is the yellow-flowered Bulbine, concerning which there is some difference of opinion as to its harmlessness to stock or the reverse.

*Experience in other States.*—It is common in South Australia, and Black speaks of it as "a common weed in waste places, roadsides, pastures." I saw it over considerable areas in the Port Lincoln district as thick as it was possible for a plant to be. Ewart says that it is proclaimed for several shires in Victoria. I saw it around Perth and Albany, Western Australia. In the *Queensland Agric. Journ.* for September, 1909, p. 158, the late Mr. F. M. Bailey says it "has begun to run out into the pasture near Toowoomba."





A WILD ONION, OR ONION WEED (*Asphodelus fistulosus* L.).

1. Flower with petals removed to show calyx. 2. Expanded flower, showing stamens.  
3. Fruit carpels with three lobed stigma. 4. Seed.



So that the weed has outposts over extensive areas in Australia. It tends to take entire possession of the land wherever it obtains a footing, and no animal is known to eat it except by accident, that is to say, cropped with other pasture.

*Experience in New South Wales.*—We have received it from Milson Island (Hawkesbury River), Muswellbrook, and Moor Creek, Tamworth. These localities suggest dirty seed or hay shipped at Sydney, and that the weed is travelling north. There is no doubt that it is abundant in localities adjacent to South Australia and Victoria.

Mr. E. F. Boller, the Hon. Secretary of the Bimbaya Branch of the Agricultural Bureau (Bega district) recently forwarded this plant for identification as new to the district, and inquiries as to the advisability of declaring the weed noxious. He notes a reference to this plant in an American paper, dated 28th August, 1915, as follows:—"Cows on pastures eat the tops of the plant during the fall and spring, thus imparting an offensive odour and flavour to the milk." Also that "a farmer in selling wheat containing any quantity of the seeds of this plant has to stand a dockage of from 10 to 50 per cent."

*How to deal with it.*—It spreads both by seeds and by offsets. Never let it seed; hoeing when in flower is particularly fatal to it. Begin extermination before it flowers, in order that no plant may escape. If possible burn every scrap of it; this must be done with care, as it is succulent.

### Dwarf Nettle (*Urtica urens* L).\*

(URTICACEÆ: Nettle Family.)

*Popular Description.*—A small, erect, annual nettle covered with stinging hairs. Leaves ovate-oblong (that is to say, roughly of the outline of a vertical section of a hen's egg), coarsely toothed. Flowers monœcious—that is to say, the male and female organs separate from each other, but on the same plant. Flowers in nearly stalkless, short clusters.

#### *Botanical Description.*—

An annual with erect or ascending branched stems rarely above 1 foot high, glabrous with the exception of the rigid stinging hairs. Leaves petiolate, ovate or elliptical, deeply and regularly toothed, 1 to 2 inches long. Inflorescence contracted into loose axillary clusters seldom exceeding the petioles, the males and the females intermixed in the same clusters, of the same structure as in *U. incisa*, except that the larger segments of the female perianth are ciliate on the margin, and usually bear a single dorsal stinging hair. (*Bentham.*)

*Other New South Wales Nettles.*—We have a native nettle called *Urtica incisa* and a very common introduced one called the "Tall Nettle," *Urtica dioica*, which is much larger than the nettle now figured, but possessing properties much the same<sup>†</sup>.

*Nettle-sting.*—The stinging hair of the nettle is fine-pointed and swollen at the base. Touching the nettle breaks off the tip, which penetrates the skin, and the pressure forces the acrid liquid from the bulbous base along the hair into the wound, and thus irritation is caused.

When you "grasp your nettle," instead of touching it lightly, the sting itself becomes crushed and rendered incapable of penetrating the skin.

Some people, and especially at some seasons of the year, suffer acutely if stung by nettles.

The juice of a dock (*Rumex*), of a plantain (*Plantago*), both very common weeds in New South Wales, or even of the nettle itself, are remedies for the sting.

\* For coloured plate see frontispiece.

*Uses of the Nettle.*—Like most plants of the family to which it belongs, the nettle contains a valuable fibre. Dwarf nettle would be an inferior raw product for the purpose of obtaining the fibre, but it may be pointed out that in Germany a good deal of attention has been drawn to the nettle fibre since the beginning of the war, certain fibre materials being unavailable.

In Britain, particularly northern England and Scotland, nettles are regularly used for the preparation of a temperance beverage termed nettle-beer. It corresponds to ginger-beer. It has a "bite," and is consumed in enormous quantities by the poorer classes. It is most pleasant to the taste, and I feel that if these herb-beers (*e.g.*, nettle, horehound) were better known in Australia they would fill a real want. They would be home-made, and are a vast improvement upon most of the sickly-sweet, characterless beverages usually sold as ginger-ale and lemonade.

*Where Native of.*—It is a native of Europe, Asia, and Northern Africa. It is very common in Britain, and has spread, chiefly in waste places, over a considerable area of Australia, extending far into the interior.

*How to deal with it.*—Nettles should be hand-pulled (with leather gloves, of course) wherever possible. This is the only certain method of destruction. In special circumstances they can be mown or otherwise cut down.

**Khaki Weed** (*Alternanthera Achryantha* R.Br., var. *echinata*;  
*A. echinata* Sm.).

(AMARANTACEÆ: Amaranth Family.)

*Vernacular Name.*—"Khaki Weed," because of the prevailing colour of the plant.

In the *Agricultural Gazette* of September, 1909, p. 760, I have a note entitled "A so-called Australian Weed in South Africa." I referred to this weed as *Alternanthera echinata* Sm., a South African plant. It is united in the Index Kewensis, with *A. Achryantha*, R.Br.; but it differs a good deal from that species, and is at least a good variety."

In the *Agricultural Journal* of the Cape of Good Hope, December, 1909, p. 656, is the following note:—

In the September issue of the New South Wales *Agricultural Gazette*, the noxious weed *Alternanthera echinata* Sm., known in Cape Colony as the "Amarantus Weed," and in the Transvaal as "Khaki Weed," is credited as being a South African plant. This is not so. It was introduced during the war, probably in forage from the Argentine, the plant being of tropical American origin. This plant has been proclaimed under the Noxious Weed Act in the following districts:—Kimberley, Vryburg, Somerset East, Transkeian Territories, and Pondoland.

In the *Flora Capensis*, v. 432, under *A. Achryantha* R.Br., we have *A. echinata* Sm., as a synonym, with the note—"A native of Tropical South America, but now becoming a troublesome weed in Tropical and South Africa."

I believe it is correct to say that this weed was introduced to Australia from South Africa, although its original home is Tropical South America; and it is certainly a fact that in South Africa over large areas it was credited as being an Australian plant, and was thought to be so by many of our soldiers, who brought specimens back as a curiosity from South Africa. Perhaps it was introduced into Australia as a weed from South Africa, but I have not sufficient evidence on this point.



Khaki Weed (*Alternanthera Achryantha* R.Br., var. *echinata*).

1. Two clusters of flowers. 2. Part of a flower, two outer perianth-lobes removed, showing two inner perianth-lobes enclosing fruit, and behind short outer perianth-lobe. 3. A single flower, the bracts removed. 4. Fruit, enclosing a single seed.

*Botanical Name.*—*Alternanthera*, from Latin *alterno* I change, or *alternus* alternate, and *anthera* an anther. The stamens (or anthers) alternate with the staminodia. *Achryantha*, from *achyrum* chaff, and *anthos* flower, in allusion to the chaffy nature of the flower.

*Botanical Description.*—A prostrate herb, spreading over the ground in a thick mass; probably annual.

*Stems.*—Much branched, rooting at the nodes, woolly-hairy.

*Leaves.*—Shortly petiolate, from ovate-lanceolate to nearly orbicular, usually  $\frac{3}{4}$  to 1 inch long, light-green, glabrous or nearly so.

*Flowers.*—Bisexual, sessile, supported by scarious bracts in heads in the axils of the leaves and much shorter than the leaves, bracts and perianth-lobes all scarious and straw-coloured, narrow and acute.

*Perianth.*—Divided to the base into five irregular lobes, three outer ones (sepals) and two inner ones (petals). Two of the outer ones pungent pointed, and longer than the third; the third less acute and denticulate in the upper part; the two inner ones equal, much shorter, gibbous, and with a prominent bunch of hairs on the back.

*Stamens.*—Five or fewer, united at the base into a short, exceedingly thin cup; very deciduous. Ovarium with a very short style and a single ovule.

*Fruit.*—A compressed indehiscent utricle.

*Uses.*—I know of none, except perhaps to assist in the recovery of humus on a scalded plain. So far as I know, stock never touch it. It is a humble plant.

We have an allied species, *Alternanthera triandra* Lam., and the late Mr. P. Corbet, of Mount Browne, sent it to me with the information that the Chinamen of the district use this plant, to quote their own language, "to cure sore hands, sore anything." I believe its reputed virtues are largely imaginary.

Another closely related plant, though not belonging to the same genus, is *Achryanthes aspera* L., which is found also in all the tropical and sub-tropical regions of the Old World, and also in several of the Australian States. The herb is administered in India in cases of dropsy, and for many other diseases. The ashes of the plant yield a considerable quantity of potash, which is used in India in washing clothes. The flowering-spike has the reputation in India (Oude) of being a safeguard against scorpions, which it is believed to paralyse (Drury). This is another plant which, in my view, has no medicinal value; at the same time no member of the family is poisonous.

*Where found.*—It has been proscribed in the following shires and municipalities:—

SHIRES.		MUNICIPALITIES.	
Dorrigo	Mumbulla	Bega	Grafton
Harwood	Orara.	South Grafton	Ulmarra.

### Cow-cockle (*Saponaria vaccaria* L.).

(CARYOPHYLLACEÆ: Pink Family.)

*Botanical Name.*—*Saponaria*, from the Latin *sapo*, soap, the leaves of some of the species containing a saponifying principle; *vaccaria* Latin *vacca*, a cow. I am not clear as to the connection, real or supposed, of cows with this plant. In Britain and North America it goes under the names of Cockle, Cow-cockle, China-cockle, and Cow-herb.

Cow-cockle (*Saponaria vaccaria* L.).

A. Entire plant (half natural size). B. Inflated calyx and seeds (natural size). C. Flower, the calyx opened (x 2½). D. Petal and two stamens (2½). E. Ovary with styles or stigmatic branches (x 5½). F. Seeds (x 7).

*Botanical Description.*—

It is an erect annual, about 2 feet high, perfectly smooth, without any hairs, and of a rather pale-green colour. Leaves opposite, lanceolate, about 3 inches long, sessile with a broad base, and the opposite pairs are united at the base. The flowers, which are terminal in a loose bunch on long stalks, are pink, about  $\frac{1}{4}$ -inch in diameter, but the size of the flower varies considerably. Calyx 5-angled, shortly 5-lobed at the top, much enlarged after flowering. Petals 5, emarginate at the top. The plant is best distinguished by the five very prominent angles of the calyx. Seeds spherical, tuberculate, black when fully ripe.

*Fodder or Other Uses.*—I cannot find that, except by accident, stock eat this plant at any time, and hence it lives its life unchecked unless man takes it in hand. In India, that country in which a surprising amount of information has been gathered together in regard to the uses and drawbacks of the native vegetation, some notes are available in regard to this plant also, and I extract some of them from the *Dictionary of Economic Plants of India* (Watt).

The properties of this plant are stated to be in every respect identical with those of *S. officinalis*, the soap-wort (O'Shaughnessy). Preparations of this plant have emulsifying properties on account of the saponin it contains. It does not appear generally to have assigned to it the saponaceous properties which its congener enjoys, but Murray mentions that in Sina the mucilaginous sap is used by the natives in place of soap for washing clothes. The writer of the dictionary recently questioned the cultivators in the Dhami State, Simla, as to the properties of the *Saponaria* which was found as a troublesome weed in their wheat-fields. They said that it often proved poisonous to young cattle, but that older animals would not eat it. They were ignorant of its saponaceous properties.

I may say I have not heard of it being suspected as a poison-plant in this State.

*How to get rid of it.*—Prevention is better than cure and it is best to buy clean wheat. The up-to-date farmer will screen his own wheat wherever the seed-wheat comes from, and carefully burn any suspected screenings. And if it should unfortunately make its appearance it should be hoed out or hand-pulled before it seeds. The road sides and the fences should also be carefully watched. I make no recommendation in regard to many weeds, but it is competent for any farmer to eradicate this particular pest unless he systematically neglects it for a year or two.

Following is what some American farmers say of it:—"This is at present the worst weed in grain-fields. Springing up with the wheat the latter is crowded out, shaded out, and robbed of the food it might otherwise get from the soil. A field well seeded to cockle as well as wheat, is practically beyond redemption."

*Where Found.*—It is a native of Europe, Asia Minor, India, Thibet, Siberia, &c., but not England, though found there in corn-fields. It has been tolerated as a pretty plant, and is, indeed, cultivated in gardens, and





**A POISON BUTTERCUP** (*Ranunculus sceleratus* L.).

Plant reduced to about half natural size. 1. Flower (x 25). 2. Fruit (x 25). 3. Seed (x 200).  
(All approximate measurements.)

Figure 1 displays a 3D scatter plot of simulated data points. The axes are labeled  $x_1$ ,  $x_2$ , and  $x_3$ . The points are distributed in a complex, non-linear pattern, indicating a non-linear relationship between the variables. The plot is rendered with a grid and a perspective view.

that is the danger of it. If it were ugly (if there be such a thing as an ugly plant) every man's hand would be against it. I do not remember that this plant has been recorded as found in New South Wales until I drew attention to it in 1903 in a note published in the *Journ. Royal Society, N.S.W.*, for 1903. During that year it sprang into unenviable notoriety, for it and the Cape Weed (*Cryptostemma*) were the two weeds most frequently sent in by farmers as new to them. It came from scores of localities in all parts of the State. I have no doubt that in the great majority of cases it came with seed-wheat, since, after the break-up of the drought, farmers often bought wheat that contained the seeds of various weeds. This wheat came from North and South America, New Zealand, and other places.

### A Poison Buttercup (*Ranunculus sceleratus* L.).

(RANUNCULACEÆ: Buttercup Family.)

*General Observations on the Buttercup Family.*—The genus *Ranunculus* includes some yellow-flowering plants known as buttercups, some of which are so small (e.g., *R. muricatus* and *sceleratus*) as to possess no special decorative merits. They, and the rest of the family to which they belong, are more or less acrid, and some of them are actually poisonous. Their acrid nature is a great protection, for stock usually avoid them, but the so-called Red Chamomile (*Adonis autumnalis*) has poisoned stock in this State (see the *Agricultural Gazette* for September, 1912, p. 810), while Monkshood (*Aconite*) is a well-known poison plant used in medicine, and Larkspur (*Delphinium*) is a notorious poisoner of stock in the United States, concerning which much literature is available.

The poisonous principle in buttercups is said to be especially virulent at the time of flowering, and it is also stated that they lose their injurious properties when dried in hay. Their injuriousness therefore occurs when browsed upon in the damp situations in which they are usually found.

Mr. T. W. Kirk points out that buttercups are especially injurious to pastures intended for the use of the dairy stock, as during the spring months they give an unpleasant taste to butter. He also says that honey gathered from certain species of buttercup will, if eaten new, sometimes cause serious illness, if not death. The poison is, however, volatile, and old honey from these sources is quite harmless.

The particular buttercup referred to here was first recorded from New South Wales by Mr. A. A. Hamilton in the *Agricultural Gazette* for October, 1913, p. 862, and from Mr. Hamilton's short paper some of the notes which follow are taken. It had, however, been sent to me in November, 1907, by Mr. C. T. Musson, of the Hawkesbury Agricultural College, from Baker's Lagoon, near Richmond, but I did not record the circumstance, and had, indeed, forgotten it.

*Popular Description.*—A rather small not ornamental buttercup, with small yellow flowers, and leaves which sometimes remind one of celery foliage.

*Names.*—In the United States it has been called "Cursed Crowfoot," while it is sometimes known as "Celery-leaved Buttercup" from a resemblance to that useful salad-plant, often observed, but not specially obvious in the plant figured. The name *sceleratus*, a Latin adjective meaning "profaned by guilt," has a sinister meaning; it obviously refers to the bad uses to which the plant has been put—*i.e.*, to aid beggars in malingering, and for the poisoning of human beings. The poisonous properties will be referred to later.

*Botanical Description.*—

An erect, much branched annual plant, glabrous or nearly so. Stem thick and hollow. Lower leaves stalked, divided into three or more obtusely toothed or lobed segments, the upper one sessile, with three narrow segments. Flowers small and numerous, the petals pale yellow, scarcely longer than the calyx, and without any scale over the hollow spot at their base. Carpels very small and numerous, and in a dense head.

It is a native of Europe and Northern Asia, including Northern India.

*Experience in other States.*—It is common in New Zealand, being especially plentiful in moist situations, particularly on the Canterbury Plains. In that State it has a bad name, and Mr. T. W. Kirk, in October, 1898, published Leaflet for Farmers, No. 46 (N.Z. Department of Agriculture), warning agriculturists against it.

*Experience in New South Wales.*—Mr. Hamilton first found it growing in a ditch at Waterloo—which is in the Botany Bay district, a little south of Sydney—and points out that it is in a suitable environment for propagation. I suggest that it got into its present situation by means of the wool-washing establishments in the neighbourhood, but this does not indicate whence it came, and I suggest that it is flourishing on the Monaro or New England, or some other cold region of this State. This leads me to again ask farmers and pastoralists to inquire into plants new to them which may attract their attention, but the danger in regard to this and the next weed lies in the fact that there is nothing in regard to them to attract special attention.

The fact that the first occasion on which this plant has been found in Australia is from the Snowy River (collected in 1905, Orbost, Victoria—Professor Ewart, *Proc. Roy. Soc. Vict.*, 1907, p. 86), points to the Monaro as a likely place for the plant to develop in. It may have travelled in wool, but *R. muricatus* affords very much greater facilities for attachment to the fleece.

*A Poison Plant.*—Mr. Hamilton quotes Pammel's "Manual of Poisonous Plants" in regard to this plant, which is said to be especially noxious to cattle. It is said to contain anemonol and anemonic acid, chemical substances originally obtained from the anemone plants closely allied to the buttercup.



**ROUGH-SEEDED BUTTERCUP (*Ranunculus muricatus* L.).**

Plant reduced to about a third natural size. 1. Flower (x 12). 2. Fruit (x 12). 3. Seed (x 48).  
(All approximate measurements.)

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He then quotes Watt's *Dictionary of the Economic Plants of India* to the effect that professional beggars in Europe used to employ its juices to produce blisters or open sores in order to obtain sympathy, and that the inhabitants of Wallachia (now part of Roumania) used to employ it as a vegetable—heat destroying its poisonous properties. This implies a low standard of living, and if, unfortunately, this buttercup should ever become plentiful, it offers no prospects as a vegetable to Australians.

*How to deal with it.*—Where this plant occurs only in single plants or very small quantities, it is desirable to dig out each plant and carefully destroy it, but where this is impracticable, the damp low-lying ground in which it is usually found should, if possible, be drained and cultivated. It is a buttercup worth going to reasonable expense over.

### Rough-seeded Buttercup (*Ranunculus muricatus* L.).

(RANUNCULACEÆ: Buttercup Family.)

*Popular Description.*—A small-flowered buttercup with shape of leaves not rare amongst buttercups, and bearing abundance of burrs very objectionable to wool-growers.

#### *Botanical Description.*—

Glabrous or sparingly pubescent, branched from the base. Lower and basal leaves on long broad petioles, the blade reniform or cordate-orbicular, three-lobed, cleft or crenate; the upper three divided cuneate, short-petioled or sessile; flowers light-yellow, the petals exceeding the calyx; head of fruit globular; achenes flat, densely muricate and spiny on the sides, tipped with a stout slightly-curved beak of one-half their length.

*Names.*—The name *muricatus* is a Latin adjective, often used in descriptive botany: it means rough, with short and hard tubercular excrescences (from a shell-fish, *murex*, *muricis*). The reference in the present plant is to the rough seeds (or rough carpels) and hence the name "Rough-seeded Buttercup" may be applied to it, as I do not know of any definite name already in use.

*Experience in Australia.*—A *burr-weed*. This buttercup has now spread over most of the States, chiefly in naturally damp, undrained places, such as buttercups usually enjoy. It mostly occurs in the cooler districts, but it is spreading chiefly owing to its rough hooked seeds. These constitute a real source of danger to the wool-grower, as they depreciate his wool, and the plant is not only spread by the fleece, but also by the hocks of the larger grazing animals.

*How to deal with it.*—See remarks under *R. sceleratus* above.

**Mexican Poppy** (*Argemone mexicana* L.).

(PAPAVERACEÆ: Poppy Family.)

*Other Names.*—For obvious reasons it often goes under the name of "Prickly Poppy." It is also called "Blue Thistle" and "White Thistle," because of the blueness or whiteness (whichever you like—botanists call it glaucousness) of its foliage. Sometimes it is called "Yellow Poppy." It is also sometimes known as "Binneguy Thistle," because it was so abundant at Binneguy, near Moree, attention being drawn to it in the press from that locality.

[Articles and notes on this weed appeared in the *Agricultural Gazette* for 1891, p. 175; 1895, p. 227; 1899, p. 490.]

*Botanical Description.*—

A rather tall, glaucous, prickly herb, with yellow juice; leaves sessile, deeply sinuated, lobed, the lobes irregularly prickly toothed. Flowers yellow, large. Capsules obovate, prickly.

*Is it poisonous?*—It belongs to the Poppy family, the best known member of which yields opium, which consists of the dried juice of the scratched fruits.

A Russian chemist found in the seeds of the Mexican Poppy an alkaloid which gives reactions similar to morphia, a substance which is, of course, obtained from opium. The *Pharmaceutical Review* of October, 1901, p. 458, contains a paper, "Does *Argemone mexicana* contain morphine?" a paper I have not been able to consult.

Mr. C. J. Salter, of the Dubbo district, to be quoted presently, says that sheep "would not even touch the Mexican Poppy." Further on, he says that horses would not touch a single leaf of the Mexican Poppy. At the same time he says that some chaff with some Mexican Poppy in it griped his horses.

In the year 1907, when on a visit to Aberdeen to inquire into the deaths of cattle and horses supposed to have been caused by poison-plants, my attention was especially drawn to Mexican Poppy, which was very abundant. I could not, however, see any sign of a plant being nibbled, and no one in the district had ever heard of nibbling. Published inquiries prior to and subsequent to 1907 have never elicited any case in which stock ate the plant. It seems to me that the plant contains something especially distasteful to them.

Mr. Salter's experiment should be repeated by a Stock Institute, for I do not understand it. It may be that other plants got mixed with the chaff as well as the Mexican Poppy. Further, and I am a layman in veterinary matters, I should have thought that Mexican Poppy, containing an active principle which is a sedative, would not cause "violent fits of gripes." At the same time, it is quite possible that, in addition to the alkaloid akin to morphia, there may be an active principle which would gripe.

*How to get rid of it.*—The method is simple on paper—hoe it out when it is in flower; but in practice this often cannot be done, because of the great hold it has secured, often in fissures, into which it has been washed with a quantity of nice silt by successive floods, so that the young seedlings have every chance.





Mexican Poppy (*Argemone mexicana* L.).

- A. Open capsule. B. Ovary (sepals, petals and stamens removed). C. Arrangement of the stamens round the ovary. D. The pitted seeds.

I cannot do better than refer to the experience of Mr. Chas. J. Salter, of Llamboddon, Dubbo, as published in the *Agricultural Gazette* for September, 1909, p. 760, and already quoted:

My experience of this plant is that in a paddock where it was growing very luxuriantly, and was also in various stages of growth, sheep in the paddock died for want of food. They would not even touch the poppy. I gave them salt, thinking this would help them to eat some of the plant, as I had often heard that if sheep were given salt they would eat almost any kind of food, but it proved quite useless with the Mexican Poppy.

The paddock mentioned must have carried some 3 or 4 tons to the acre of this weed, and the only means I found effectual for destroying it was by ploughing it up with a big disc plough. No kind of furrow plough could work for a yard through the dense mass of poppies.

I notice that the Botanist is of opinion that the best time to destroy this weed is when it is in flower. It seems to me, however, to be always in flower—you can see growing continuously on the same stalk flowers, green pods, and ripe seeds. The plant is always green—neither winter or summer seems to affect it.

It grows in all classes of land, even on stony ridges, where it is exceedingly difficult to combat.

Great benefit would result from the discovery of some effective means of destroying the Mexican Poppy, as it is flourishing in many districts, and looks as if it will soon take possession of the land, as nothing else seems to grow or flourish when it is established.

Mr. Salter adds that some time ago he had some hay with Mexican poppy plants in it cut into chaff. He noticed that his horses, after eating the chaff, would be seized with violent fits of gripes. He did not know at the time the cause of the malady, but as all the horses which ate the chaff in question were affected alike, Mr. Salter feels sure that the Mexican Poppy was responsible for the trouble. Recently he has noticed the poppy growing amongst some barley which was cut green for the horses, but they would pick over the fodder and not touch a single leaf of the poppy.

*Where Found.*—Its original home is Mexico, but it has now spread to many countries.

It is an old resident of New South Wales, the French botanist Verreaux having collected it in George-street, Sydney, in the year 1845! Fancy botanising there now! It occurs in many parts of Australia, but it is an especial pest in New South Wales and Queensland. It spreads because it produces large numbers of seeds, and stock will not keep it in check.

It is a common denizen of rubbish heaps and waste places generally.

It has been proclaimed in New South Wales by twenty-one shires and nine municipalities as follows:—

#### SHIRES.

Abercrombie	Cockburn	Liverpool Plains	Talbragar
Bogan	Coolamon	Marthaguy	Timbregongie
Boomi	Eurobodalla	Mitchell	Turon
Bolwarra	Gilgandra	Peel	Walgett
Canobolas	Lachlan	Tamarang	Wingadee.
Cobbora			

#### MUNICIPALITIES.

Aberdeen	June	Newcastle
Coonamble	Maitland West	Nyngan
Dubbo	Manilla	Tamworth.

**Hexham Scent** (*Melilotus parviflora* Desf.).

(LEGUMINOSÆ-PAPILIONACEÆ: Pea Family.)

*Popular Description.*—A weak but upright herb, with a strong odour, from which it derives its common name. It has the three leaflets of a "trefoil," with narrow teeth on their margins. The flowers are in open spikes, which rise from the fork made by the leaf-stalk and the stem. The seed remains in the pod, and falls with it.

It is a native of the Mediterranean region and India.

*Botanical Description.*

A slender ascending scented herb. Leaves pinnately three-foliolate, with narrow-toothed leaflets. Flowers small, yellow, in slender axillary spike-like racemes. Pod oval, wrinkled, indehiscent, one-seeded.

*Experience in other States.*—The experience of dairy farmers at King Island, off the coast of Tasmania, will transpire from what will be shown later.

Black, under the name *M. indica* All., speaks of it as found in cultivated land or sandy soil near the sea in South Australia, and he says that it is known as California Lucerne in the south-east of South Australia. This may be, as will be understood from what will follow, a misleading name. In California it is known as Bitter Melilot, and in the *Bulletin* of the California Experiment Station, No. 124, occur these words:—

Prof. A. J. McClatchie, of the University of Arizona Experiment Station, at Tucson, writes under date of 27th April, to the effect that in Arizona this plant is found to be the most successful green manure crop that can be raised in their orchards. He continues: "the conditions are somewhat different with us than with you. Ordinarily we have plenty of irrigating water to grow anything we choose, until as late as April at least. Before that time the *Melilotus* makes a fine growth. We began ploughing ours under about the first of April, the yield being 15 to 16 tons of green matter per acre, or 2½ to 3 tons of dry matter. Nothing else that we have tried will approach this in yield during the winter."

"Reference to the table shows that this yield is less than that of either the Pink or the Large Blue Lupin, and only just above that of the Succulent Lupin. At the same time the leaves of the Bitter Melilot are small and sparse, and the stalk is very woody; by far the largest part of the weight, therefore, is probably fibrous matter, unfitted for rapid decomposition, and of a nature to keep the soil perhaps too loose and dry—both disadvantageous features. On the other hand, the hold which this plant has acquired upon California as a weed, and readiness with which it can be obtained and with which it will grow, the small size of its seeds, and the fact that it will flourish and develop a fine mass of tubercles in alkali soils, are points which make it worthy of further consideration. As in California it makes but little growth in winter it could not replace the lupins for orchards and vineyards."

Ewart\* has the following remarks on Melilot:—

*Melilotus.*—Melilot. All the species contain Cumarin, a volatile odoriferous principle, which in excess produces a disinclination to locomotion, paralysis, and ultimately fatal symptoms. No harm is to be apprehended if the amount present does not exceed 10 per cent. of the herbage, and the aroma of Cumarin, which is also present in the grass (*Anthoxanthum odoratum*), renders stale hay more palatable. The seed of some species may last for fifty years.

\* Weeds, Poison Plants, and Naturalised Aliens of Victoria, p. 23.

The Melilot which comes most closely under the head of a weed, is the so-called King Island Melilot (*Melilotus parviflora*), which, though of some use as a humus-former on poor soils and for green manuring, is not a good grazing plant, and is an unmitigated weed on good land, especially among corn.

Mr. W. C. Grasby (*Western Mail*, Perth, W.A., of 20th July, 1912) states that it is well known in that State, particularly on the coast between Bunbury and Busselton, where it is esteemed as at King Island, and is known as "Naninup Weed." About Mandurah it is known as "Norris's Weed." He points out that it is found along the railway lines and in the older settled parts of the State, but it is not as valuable as the "wild clovers and trefoils." He adds that: "Experienced King Island landowners believe that Clustered Clover and common Burr Trefoil give better results under such conditions in King Island than does Melilot. This opinion was given me by a gentleman who owned 1,800 head of cattle on the island."

*Experience in New South Wales.*—Following are extracts from notes published by me in the *Agricultural Gazette* for 1895 and 1902, respectively:—

Owes its smell to the presence of cumarin, contained also in Tonka Beans. The odour is therefore agreeable in its proper place, but people object to it in their flour. When mixed with grain causes decrease in price.

"A very prolific seeder. Introduced into the district through the agency of winds and birds. Careful agriculturists experience little or no difficulty in keeping it in check." (Rothbury.)

"Frequents good alluvial lands, either cultivated or non-cultivated; also the public roads, by which means many weeds are spread. Many farms in the district are perfect seed-beds for noxious weeds, and this weed is spreading with great rapidity." (Comobello.)

"Introduced in seed grain. First observed about two years since, and is now spreading rapidly throughout the district. It is asserted that the seed of this weed becomes mixed with grain from which it cannot be separated, and the result is that it imparts to the flour an unpleasant taste and smell." (Armidale.)

"A very bad weed." (Woolomin, Tamworth.)

"Very troublesome in wheat crops. While many of the farmers cut it down, others make no attempts to keep it in check, thereby seeding their neighbours' clean lands." (Mudgee.)

The following note on this weed is from the pen of Mr. Thomas Wall, junior, Model Farm, Woolomin, Tamworth:—

"Hexham Scent" has been a nuisance here for the past twenty-five years. It grows splendidly in wet seasons. Frost will not injure it. It thrives best in cultivated land. If milch cows are fed on it in the spring, September or October, when sappy, the odour of the milk and butter is most objectionable to taste and smell. If at night I chance to be walking among the milkers that ate "Hexham" the day before, their breath is not very sweet. Milk drawn from the cow also smells. If "Hexham" is cut with any hay, such as wild oats or wheat, horses will get hungry before they take to it (the hay). If reaped with a crop of wheat, and bulked for some time for the thrasher, millers will be short of wheat if they buy it, as the flour smells. In fact, in new-baked bread the smell is most pronounced. I have seen crops of wheat growing some years ago in which the "Hexham Scent" took sole possession of patches in the paddocks. It was a plague to farmers during past wet seasons, but it is getting scarcer the last two or three dry seasons we have had. (1902.)



HEXHAM SCENT (*Melilotus parviflora*, Desf.).

1. Flower. 2. Flower thrown open to show staminal tube. 3. Flower showing pod with stigma attached. 4. Staminal tube thrown open to show the free upper stamen. 5. Fruiting raceme. 6. Seed.

[illegible]

In the *Agricultural Gazette* for December, 1907, I published a short paper, entitled "Hexham Scent—Identical with King Island Melilot—Farmers Beware," in which I protested against this State being flooded with seed of the above plant. My readers can turn to the original, and will observe that the protest is not an exaggerated one. The result was a flood of newspaper articles and correspondence in all the States, in volume I do not remember to have seen equalled during the thirty-six years I have been writing on weed subjects. Some of the articles were very personal, and suggested that it was a case of State jealousy in regard to a dependency of a smaller State (Tasmania). As the result of eight years' more experience, I retract nothing, and the controversy is useful, as showing that different opinions can be held in regard to this plant. There is an old and analogous saying that "one man's food is another man's poison." Further, we may say that it has been proved over and over again that a plant is only a weed under special circumstances. Lovers of gardens in Sydney and further south will remember the pretty little *Ageratum conyzoides* with pleasure, but on the Bellinger and further north, particularly in Queensland, it becomes a perfect pest, invading grass paddocks, and it goes under the name of "Billy Goat Weed." It is the same with animal life. In certain places the conditions are so favourable to multiplication, combined with absence of enemies, that they become overwhelming, and are called pests. It is desirable to remind ourselves of these truths. The pest Prickly Pear never knew its capacity for spreading until somebody took a piece from Scone to the Condamine early in the forties. There was no precedent for it.

Hexham Scent has been sold in Sydney and elsewhere under the name *Melilotus officinalis*, with the following note:—

"This is nearly related to Bokhara Clover, and has the same strong smell and deep-rooting habits. It is a wonderfully successful fodder plant on the poor sandy coast lands at King Island, off the coast of Tasmania. It grows there most luxuriantly, and the cattle fatten rapidly upon it. It should only be sown on poor sandy country with a good rainfall."

I have no objection to this advice, which should be taken literally. Confine it to the coastal strip, and best of all to the extreme south coast from, say, the Victorian border to as far north as, say, the Shoalhaven. These areas are exposed during the winter to abundant rain and cold saline winds, the climatic conditions approximating—as far as we can match them in New South Wales—to those of King Island. But I protest, with all the vehemence of which I am capable, against sending it inland or to our best and even second-rate lands.

I may mention that *M. officinalis* is a wrong name. Of *M. officinalis*, the Department of Agriculture of the United States says:—

"This European species has become widely naturalised in this country. It possesses little value—not enough to warrant its cultivation. It grows in swamps and wet meadows."

My final contribution to the 1907-8 discussion was in the following words, and I think they fairly state the position to-day:—

I wonder if those gentlemen who are interested in selling King Island seed have any practical knowledge of Hexham Scent in New South Wales. I have travelled a great deal in this State, and have heard many of our farmers

execrate it. I am not a farmer, and if farmers are in favour of this plant I shall be glad if they will give their testimony, and state the locality on which they base their experience.

I think, and I have already so stated, that the plant may be useful in the salt-laden atmosphere of King Island, with its soil consisting of nearly pure sand and its comparatively low temperature, but to indiscriminately distribute it in New South Wales—a semi-tropical country, with much good soil—is reckless, and even wicked. It is my duty to put our farmers on their guard, and if I had done less I should have been culpable.

When the millennium arrives all seeds for New South Wales will be detained at the Customs House and not issued until an official seed-testing station (of which we shall have many), pronounces the seed to be innocuous. In the Bible we hear of the man who sowed his neighbour's land with tares at night; in New South Wales we can do such things at noonday, and, what is more, be handsomely paid for it. The way in which seeds actually injurious are introduced or distributed in New South Wales is wrong, emphatically wrong. A good portion of my time is taken up in warning farmers in regard to weed-pests which they send to me, and many of them are directly traced to imperfectly cleaned agricultural and horticultural seeds.

I have never said, nor do I believe, that Hexham Scent or King Island Mellot is destitute of merit in suitable localities, but I take the opportunity of thus drawing attention to the fact that there are practically no restrictions to the admission of undesirable seeds into New South Wales. Because I believe such a state of things is wrong, I intend to take every opportunity of inviting attention to the matter.—(*S.M. Herald*, 27th December, 1907.)

Hexham Scent is allied to *M. alba* Lam., known as "Sweet or Bokhara Clover." It is a white flowering species, and is spoken well of in California, although the qualification is given that stock have to get used to it. But the opinions concerning it vary in the United States.

The official opinion (Department of Agriculture, United States of America) is: "This is a weedy biennial, concerning which extravagant claims have been made. It is chiefly valuable in the Southern States for early pasturage and for green manure."

A competent British authority speaks of cattle disliking it because of its bitter taste, and that it has the objectionable feature of rapidly becoming hard and woody.

In New South Wales it has been recommended by seedsmen for our Riverina country and other dry districts.

### Petty Spurge (*Euphorbia peplus* L.).

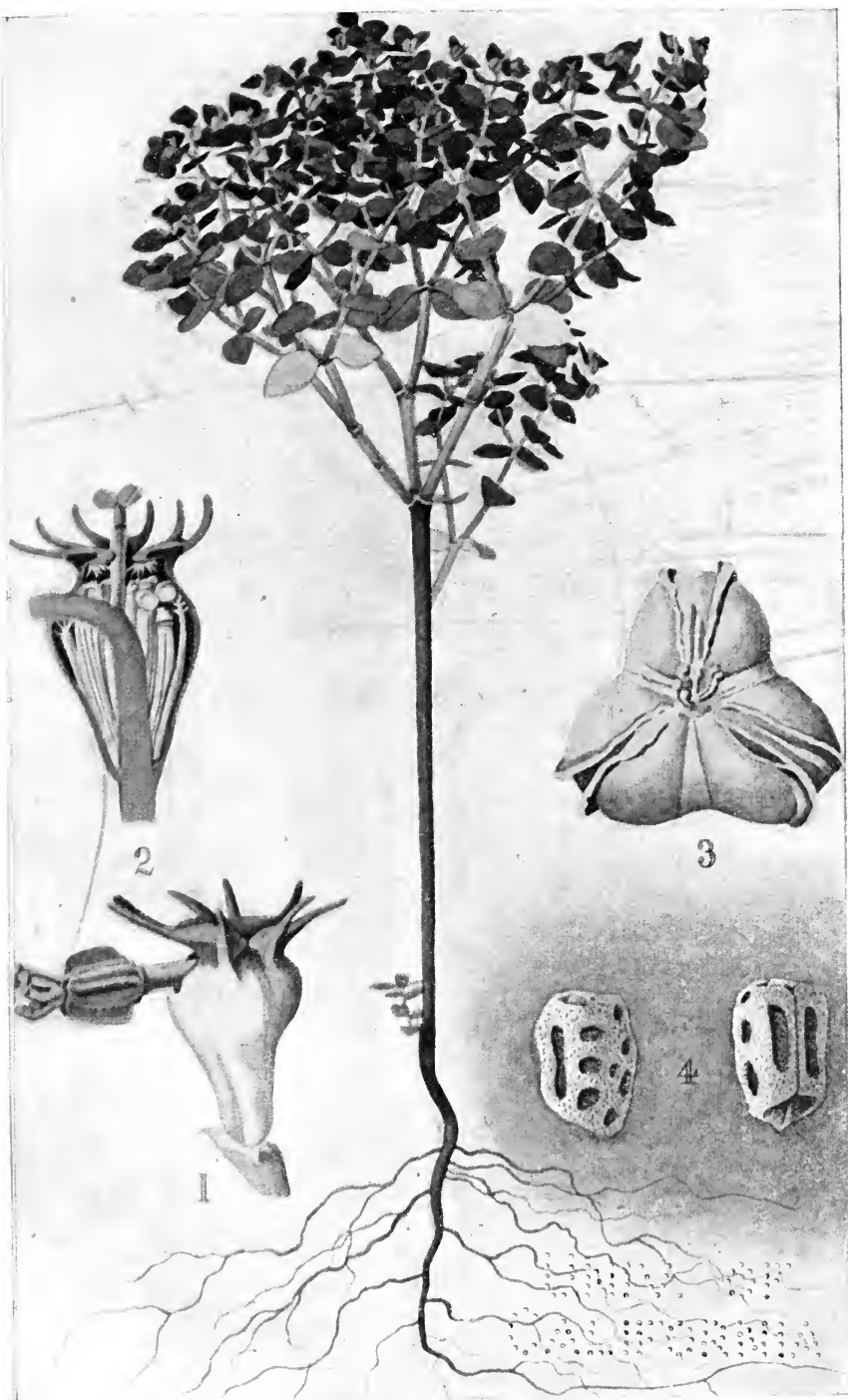
(EUPHORBIACEÆ: Spurge Family.)

*Popular Description.*—A bright green, erect plant, a few inches high, with inconspicuous greenish flowers, the whole plant exuding a milky juice, hence it is known, in common with its close relations, as "Milk-weed" in Australia. Asclepiads, also with milky juice, share this name also. Common enough in gardens and on rubbish heaps.

#### *Botanical Description.*—

An erect glabrous annual with milky juice. Leaves orbicular-obovate, entire. Umbel of two or three repeatedly forked rays. Involucral glands crescent-shaped, with long points.





**PETTY SPURGE** (*Euphorbia peplus* L.).

1. Flower, showing the cup-shaped involucre (Cyathium), terminated by the four horn-shaped glands, and a maturing pistillate flower to the left. 2. Flower with front of the involucre removed, exhibiting stamens, scales, &c. 3. Fruit, dividing into three carpels. 4. Seeds, showing depressed dots.



*Meaning of Name.*—The derivation of the word Spurge is *viâ* the French, from the same word as “purge,” indicating its medicinal effects. The word is applied to all species of the genus *Euphorbia*, and I would add that it is far too drastic and uncertain in its effects to be safely used as a purgative medicine.

The word “petty” is from the French *petit*, small, and indicates that it is a small plant in comparison with some others.

*Economic Value.*—In common with the rest of the *Euphorbias*, it has from time immemorial been used in Britain and Northern Europe as a wart-cure, and hence the name “Wart-weed,” applied to it and some other allied plants. In country districts when local irritation is caused by its application, a very old remedy is to apply oil freely.

For some years past the juice of this little plant has been recommended (to my knowledge) by Sydney physicians of the highest standing for the treatment of rodent ulcer, and I have seen cures effected by its means. But I certainly would not recommend its use (except for warts) unless under the care of a physician, for the juices of such plants are too dangerous to be employed except under proper safeguards.

From the note which follows, it will be observed that the milky juice (latex) affects the photographic plate, and it may be that it contains some radio-active principle which explains the cure to which I have alluded:—

ACTION of the latex of *Euphorbia peplus* on the photographic plate.\*

The milky juice or latex of this plant has been employed by surgeons for the treatment of rodent ulcer. It has occurred to us to test whether the dried latex has any action on a photographic plate. A thin layer of the juice is spread on glass and is dried. A photographic plate is placed a little distance above the dried film. When the plate is developed after three to seven days an image of the film appears on the plate. If a word be written with the juice a well-defined photograph of the word appears on the plate. Such an image appears when the distance between the film and the plate is not more than one centimetre. The thicker the film of dried juice the more dense is the image on the photographic plate. If tissue paper, thick paper, thin aluminium foil, or gold leaf be placed between the photographic plate and the film, the image is produced in the same way, and is sharply defined. If glass or mica be interposed, the photographic plate is protected, and no image appears. We have been unable to obtain glass or mica less than 1-100th mm. in thickness.

The film of latex may be heated to 200 C. without any diminution of its action on the photographic plate. At this temperature it commences to char, and the action on the photographic plate remains powerful despite the destruction of the organic matter. When the ash becomes white, the action on the photographic plate is much lessened. The photographic effect is also obtained during the passage of a dry air or of carbon dioxide, also under greatly reduced pressure.

*Habitat.*—We do not know the original home of this plant, but we know that from immemorial antiquity it has been known in Europe, Western Asia, and North Africa. It has spread over most parts of the world, and it is common in the coastal districts of most of the Australian States. It is a weed of arable land and occurs on rubbish heaps everywhere. It would appear to be difficult to break up land without the minute seeds of this Spurge finding a lodgment, and covering the ground with its bright verdure.

\* H. G. Chapman, M.D., B.Sc., and J. M. Petrie, D.Sc., F.I.C.—Report of the *Australasian Association for the Advancement of Science*, Vol. XIII, 1912.

*Structure of Flower.*—In figures 1 and 2 we have a peculiar inflorescence which bears the technical name of *Cyathium*, and which looks like a simple flower, but it consists of one pistillate and several staminate flowers. The *Cyathium* has a small cup-like involucre (see in section in figure 2) which is formed by the union of five *bracts*, which collectively surround a number of flowers. At the points of junction of four of these bracts are four crescent, or horn-shaped *nectaries*, often described as *glands*. Within the involucre are a number of *stamens*, and *scales* (note their feathery tops) are also seen. A *staminate flower* consists of a flower-stalk terminated by two stamens, and subtended by one of the scales just referred to. The *pistillate* or *carpellary flower* (female flower) can best be seen at figure 1, where it seems to be falling out of the *Cyathium*.

The flower of a *Euphorbia* is said to be naked (achlamydeous), that is to say, without either a calyx or a corolla.

Note the fruit (figure 3) when ripe beginning to separate into its three constituent carpels, which contain the seeds.

### **Paddy's Lucerne or Queensland Hemp (*Sida rhombifolia* L.**

Syn.: *S. retusa* L.)

(MALVACEÆ: Mallow Family.)

*Other Vernacular Names.*—It is of course not a hemp, nor is it confined to Queensland, but let that pass. It sometimes goes by the name of "jelly-leaf," on account of its mucilaginous character, which causes it to be nibbled by stock.

*Botanical Name.*—This plant belongs to the natural order *Malvaceæ*, or Mallow family, which includes a multitude of fibre plants. The earliest name for it is *Sida rhombifolia*. Theophrastus gave this name to an aquatic plant supposed to be identical with *Althæa*. *Althæa* includes such plants as the marsh-mallow and hollyhock. *Rhombifolia*.—From the shape of the leaves, which are more or less rhomb-shaped in the original forms.

*Synonym.*—The original scientific name of the plant is, as has been already stated, *Sida rhombifolia*, which includes a number of forms, one of which has been named *Sida retusa*. As the name *Sida retusa* has got such a firm hold on the minds of Australians, almost as firmly in fact as the vernacular ones, I would have liked to have adhered to the name *Sida retusa* in this paper, but I cannot transgress botanical laws.

*Flowers.*—It has a yellow flower about half an inch across, which is only fully expanded for a few hours in the middle of the day, and is very difficult to preserve.

*Fruit.*—This will be readily made out from the figure. It is brown when ripe, and the cup-shaped calyx contains a number of awned seeds.

*Leaves.*—Rather rigid; the shape will be readily made out from the figure. As has been already stated, the leaves, particularly when young, are more or less mucilaginous, a property shared in common with other plants belonging to the family *Malvaceæ*; hence the use of some of them, e.g., marsh-mallow, as demulcents.



Paddy's Lucerne or Queensland Hemp (*Sida rhombifolia* L. syn. *S. retusa* L.).  
 A. Section of a flower. B. Early fruit. C. Calyx (5-angled and 10-ribbed).  
 D. Carpel ("seeds") with two awns.

*Size.*—In warm, congenial situations, as on the northern rivers, it attains a height of several feet, with a stem thicker than a man's finger; but in the neighbourhood of Sydney, and further south and west, it is a very much smaller, scrubby shrub, rarely attaining a height exceeding 3 feet.

*Distribution.*—The warmer coastal districts of New South Wales in particular, and as far south as the Illawarra. It is an Australian native, which of late years has assumed a very aggressive character, and has travelled south, even invading the Blue Mountains and southern ranges, until it gets nipped with the cold. But it is undoubtedly developing increased resistance to cold, and is slowly encroaching on localities in which at one time it could not obtain a footing. About the suburbs of Sydney it may often be noticed by the sides of the roads and footpaths. After it has been a great pest in a district for a few years it gradually diminishes in luxuriance, and finally almost dies away, as if it had exhausted the sustenance it requires from the soil.

Paddy's Lucerne, in one or other of its forms, is to be found in the warmer countries of both hemispheres, but I am not aware that circumstances in any country cause it to be such a pest to agriculture as it is in eastern Australia.

A Grafton correspondent writes:—"It grows here only too luxuriantly, and is a perfect nuisance on some grass lands. One of the Grafton parks is entirely overrun with the pest, and this is the condition of many paddocks in the district. No difficulty need then be apprehended as to its successful culture if it could be made a commercial product."

A paragraph in the *Sydney Morning Herald* of 17th March, 1892, from Nowra, states:—"The Municipal Councils of the district are co-operating in the extermination of a noxious weed known as *Sida*. Cattle eat it, but the weed destroys the natural grasses. Some years ago it began to spread between Kiama and Gerringong, and now hundreds of acres have been rendered useless by it. The weed grows strongly, and is difficult to exterminate. In many cases a plough will not reach the roots."

*Propagation.*—From seed, of which it bears an enormous quantity. If anything is to be done with this plant as regards utilisation of its fibre (see below) it must be cultivated.

Stock eat up the tops of it without detriment, if in moderation; but it must be exceedingly indigestible if eaten in quantity, on account of its fibrous nature, while the ripe seeds are hard and prickly, and therefore irritating. I think its value as a fodder plant is unconsciously exaggerated for, unless there be plenty of grass (in which case the Paddy's Lucerne is not required at all), cattle are always liable to injury through eating this fibre plant. In Queensland, in the coastal districts, the further north one goes the more and more esteemed for a cattle browse this weed becomes. Indeed, I have seen some areas so thick with it that there is nothing else for the cows to eat.

This plant is sadly too well known by land owners in our coastal districts, and the very mention of Paddy's Lucerne awakens painful reflections, for it has rendered vast areas of excellent land largely unfit for pastoral and agricultural purposes. Property holders keep it down as far as they can, but when once it gets a firm hold of the land it is practically impossible to eradicate it, for it yields abundance of seed, which germinates freely.

Paddy's Lucerne is, in a word, a pest, a noxious weed, and there is no doubt that northern land owners (and even Parliament, as being a matter almost of a national character) would be willing to pay a very handsome sum if its extermination could be guaranteed. In such a way is the Prickly Pear (*Opuntia*) dealt with; but Paddy's Lucerne is not as useless a plant as the Prickly Pear and the Bathurst Burr, for, as is well known, it contains a really valuable fibre, besides having some value as a fodder, as already indicated. There is no doubt of this, for its value has been proved over and over again, and at the present time it actually forms one of the innumerable so-called "hemp" sent from India to Europe. I had excellent fibre made from New South Wales and Queensland plants in my keeping for years, and the samples are as good as, and better than, those obtained from an Indian source. The prospect thus presents itself: Can the double advantage be reaped of ridding the land of a pest (or rather of keeping it within bounds), and at the same time making a useful article of commerce out of it? The tempting problem has been so often attacked—but with failure, on account of the costliness of the process employed—that a man who attempts to tackle it now starts with prejudice against him, and rightly so.

*Mechanical Irritants.*—Since the seeds of Paddy's Lucerne have been known to cause the death of young fowls owing to their prickly character, it may be desirable to add a few notes in regard to other weeds with the power to cause irritation through mechanical means. Dr. Howitt in "Two Years in Victoria," Vol. I, p. 150, speaks, during the earliest gold rush of grass-seeds penetrating the skins and even the lungs of sheep. Mr. (now Prof.) J. D. Stewart, has an interesting article in *Agricultural Gazette*, New South Wales, vol. xii, 357 (1901), entitled "The Injurious Effects of Certain Grass-seeds to Live-stock."

Large numbers of these belong to the Daisy Family, and also to the grasses. For example, in the Daisy Family we have the burrs of *Calotis cuneifolia*, sometimes called Bindi-eye, and those of *Bidens*, which have forked awns like little pitch-forks. Then we have the boring seeds, which have already been referred to at page 9, and to which may be added certain awned seeds belonging to the genera *Hordeum* (Barley), *Avena* (Oats), *Bromus*, and also the Porcupine and Spinifex Grasses of the interior, *Triodia*.

Amongst *Hordeum* the principal miscreant in New South Wales is *H. murinum* L., figured and described in the *Agricultural Gazette* for October, 1909. Under *Avena* the principal pest is *A. fatua* L., the Wild Oat or Black Oat, which in some districts is a great pest. The "Farmers' Handbook," page 267, gives a good account of it. Under the genus *Bromus* we have quite a number of grasses with long irritating awns, and which seem to be increasing in New South Wales.

All the grasses mentioned are useful as forage in the young stage, and that is why they are tolerated, and become so bad later on.

Paddy's Lucerne is a proclaimed weed in one shire and eleven municipalities:—

## SHIRE.

Cessnock.

## MUNICIPALITIES.

Ashfield	Concord	Manly	Rockdale
Botany	Hunter's Hill	Maitland East	Waratah.
Burwood	Kogarah	Mosman	

**St. John's Wort** (*Hypericum perforatum* L.).

(HYPERICACEÆ: St. John's Wort Family.)

*Other Vernacular Names.*—"St. John's Blood" (because of the dye produced by the petals); "Witch's Herb."

*Botanical Name.*—*Hypericum*, said to be from two Greek words, uper and eicon (ikon), an image; the superior part of the flower represents a figure, but I am not clear as to the derivation myself;—*perforatum*, Latin, in allusion to the oil-dots of the leaves.

*Botanical Description.*—An erect glabrous perennial 1 to above 3 feet high, with a woody creeping root difficult to extirpate.

*Leaves* sessile, opposite, each pair covering those below them, oblong, obtuse, entire, generally about  $\frac{3}{4}$ -inch long, of a paler green colour underneath than above, sprinkled with pellucid dots.

*Flowers* large, bright yellow, in a forked leafy panicle terminating the stem.

*Calyx* cleft into five lanceolate pointed lobes.

*Petals* five.

*Stamens* numerous, with long filaments more or less distinctly united at the base into three bundles.

*Ovary* three-celled, with three styles with a terminal stigma.

The glands on the petals in the accompanying illustration are a little diagrammatic. It must be taken into consideration that the glands are less prominent in the living plant than in the dried plant. The tissue of the petals dries up with the exception of the oil glands, which remain unchanged. Oil glands are always more prominent in herbarium specimens than in the living plant.

All Australian specimens belong to a more narrow-leaved form than the common English St. John's Wort.

*Fruit.*—A dry capsule with rather numerous small seeds. The plant is most easily recognised by the oil-glands on the leaves, which are easily seen when held against the light, and give the leaf a perforated appearance. These oil dots pervade the whole plant, and are mixed with fewer dark purple opaque dots, especially on the flower, where the dark dots are frequently crowded along the margin of the petals as shown in the illustration.

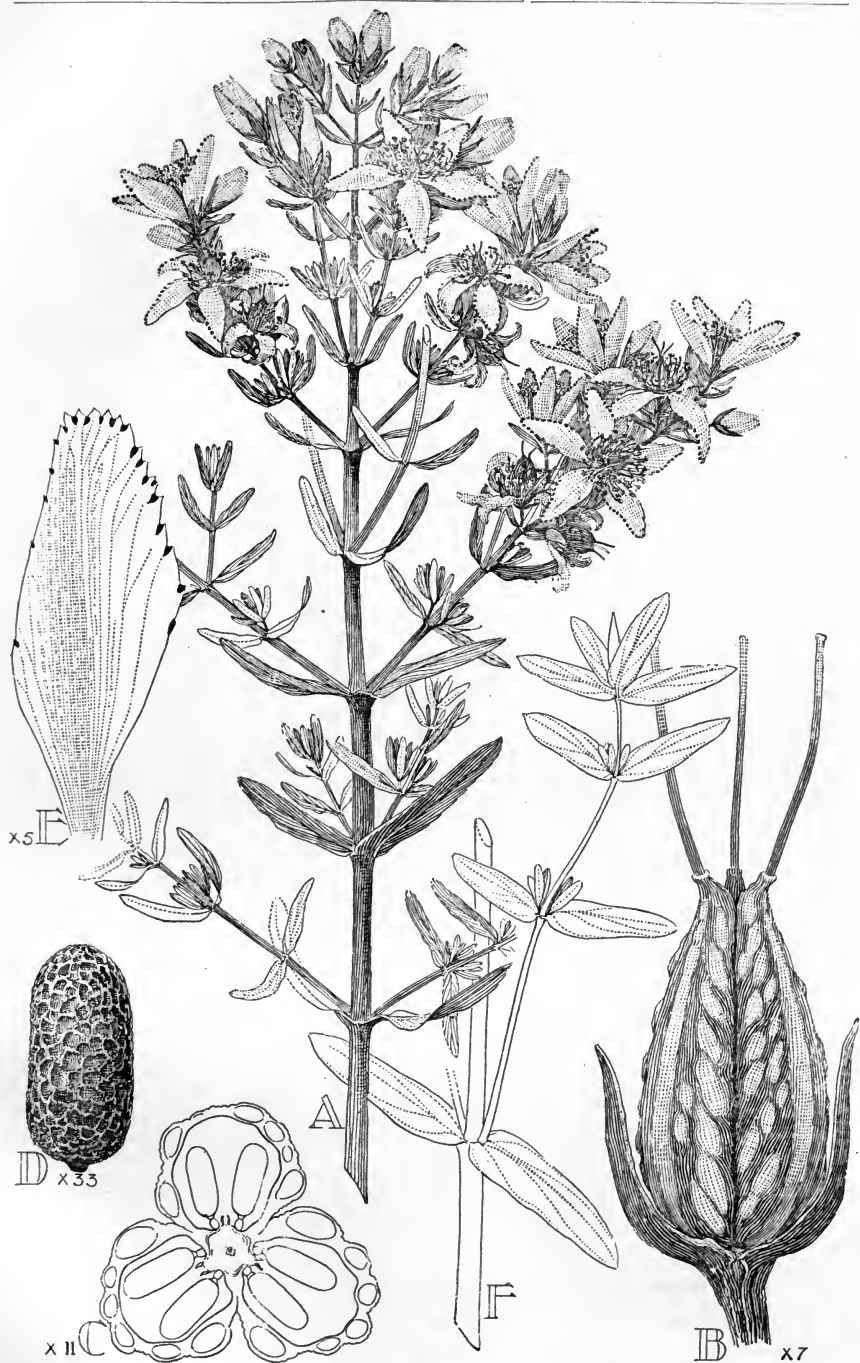
*Fodder or Other Uses.*—This plant has been used in domestic medicine in Europe from time immemorial, for example, in dysentery, phthisis, for wounds, &c.; oil boiled with the herb is used externally in rheumatism and gout. Mr. Theodor Lüdes, pharmaceutical chemist, of Rolland's Plains, favours me with the following interesting letter concerning it:—

"I dare say it is still used by the peasants on the east coast of Jutland (Denmark) as a tonic in the form of a tincture, prepared by maceration of the flowering tops with *Aqua vitæ* ("Aquavit" the Danish spirituous liquor—a "spiritus aromaticus" flavoured with caraway, fennel, &c.). I remember when I was an apprentice there was a great demand for an *Ol. Hyperic*, prepared *lege artis* from the dried herb and olive oil—said oil was used as a "cure-all" for rheumatism, bruises, &c., &c., but, as a substitute olive oil (pure and simple), coloured with alkanna root extract, had the same good action as the original article. It is open to doubt if the real *Ol. Hypericanus* had any medicinal properties at all. (Like a lot of other liniments, the rubbing does the trick.)\* I have in the end of the eighties made great quantities of *Tinct. Hyperici*, which was sold to a manufacturer of bitters. The tincture is of an aromatic bitter taste, and has, of course, a little flavour from the small quantity of ethereal oil contained. That the different species of *Hypericum* should be poisonous for cattle I doubt very much, as they are very common as a weed in Denmark. Were they poisonous the farmers there would soon declare war against them."

The petals contain yellow and red dyes, which have been isolated by Dieterich (*Pharm. Centralb.*, 1891, 683). The red juice of the flowers was considered by ancient classical writers to be a signature of human blood, and was hence employed as an application to wounds.

\* This professional secret is published for general information.



St. John's Wort (*Hypericum perforatum* L.)

A. Flowering stem. B. Fruit, consisting of 3 carpels. Part of the calyx removed. C. Horizontal section through ovary, showing the attachment of the seeds and the large oil-glands. D. Seed, with reticulate testa. E. Petal, showing the dark oil glands. F. Part of the stem. (Flowers yellow.)

*Hypericum bacciferum* and *H. cayenense* are stated by Simmonds to yield a gamboge. The power of expelling the demon of hypochondriasis and of acting as a charm against witchcraft was formerly attributed to the St. John's Wort of Europe. According to Stowe, it was always suspended over the doorway on the vigil of the saint, with herbs of like fancied power, and in the Pyrenees it is said to be still so used. The holes in the leaves were said to be made by the witches out of spite to its, to them, inconvenient virtues. Nor is this the only *Hypericum* viewed with superstitious awe since antiquity. The old Greeks used a "Hypericon," which is believed by some to be *Hypericum crispum*, by others *H. barbatum* or *H. empetrifolium*. They used also an "Androsaemon," perhaps *H. ciliatum* or *H. hircinum*, or "Koris" (*H. Coris*) and "Askyron" (*H. Androsæum*), a "Dionysius" (*H. androsaemon*), but it is doubtful whether all these names are referred to the precise species.

*How to get rid of it.*—The best way to get rid of this plant is to pull it up or dig it up before it seeds. I am quite aware that it has taken possession of large areas; this is all the more reason why it should be combated whenever it makes its appearance in new ground. The pulling up can be postponed until the plant is in flower, if need be, but it should always be borne in mind that it is a very free seeder.

*Where Found.*—It is found in the temperate regions of Europe and Asia. It is a troublesome weed in many parts of the United States. It was no doubt introduced here as an ornamental plant, and has shown wonderful colonising powers. It is a pretty little plant, and hence may be tolerated on that account until it makes its insidious hold firmly felt. Baron von Mueller first published the name of this weed in a list of Victorian weeds in the *Victorian Naturalist* for December, 1893. After a visit to Bright, in Victoria, where the weed has taken possession of enormous areas, I published a note in the *Victorian Naturalist* for July, 1900, p. 44. In the *Agricultural Gazette* for October, 1901, p. 1202, I formally recorded this weed for New South Wales—from districts so far apart as Albury and Mudgee. Since then I have received it from scattered localities, and unless steps are taken to check it, it promises to be one of our worst pests.

The following list of shires and municipalities in which this pest has been proclaimed is already formidable, and has been furnished by the Local Government Department, 1919:—

## SHIRES.

Abercrombie	Dalgety	Jemalong	Rylstone
Adjungbilly	Demondrille	Jindalee	Tumbarumba
Blaxland	Gadara	Kyeamba	(Mitchell).
Coreen	Hastings	Mitchell	Waugoola
Crookwell	Holbrook	Mulwaree	Yanko
Culcairn	Illabo	Narraburra	

## MUNICIPALITIES.

Albury	Corowa	Juneë	Wagga Wagga.
Cootamundra	Cudgegong	Tumut	

### Blue Weed or Paterson's Curse (*Echium plantagineum* L.).

(BORRAGINACEÆ; Borage Family).

*Botanical Name.*—*Echium*, from the Greek *Echis*, a viper; but, says Hooker, of disputed application. Plants of this genus are called in England "Bugloss or Viper's Bugloss"; *plantagineum*, from a resemblance of the leaves to those of the Lamb's Lettuce (*Plantago*).



Blue Weed, or Paterson's Curse (*Echium plantagineum* L.).

A. Inflorescence. B. Corolla split and opened out. C. Ovary with style.

*E. vulgare* L. is known in the United States of America as "Blue Weed," "Blue Devil," and "Blue Thistle."

For the origin of the name "Paterson's Curse," see below. I have seen it called "Beggars' Blankets," but the plant usually known by that name is *Verbascum* (Mullein).

*Botanical Description.*—Genus *Echium*:—

Herbs sometimes shrubby; usually large, stout, hispid or scabrous, with tuberos-based hairs. Leaves entire. Flowers white, red, purple, or blue, in spiked or paniced racemes. Calyx 5-partite. Corolla-tube cylindric or funnel-shaped; throat dilated; limb unequally 5-lobed. Filaments unequal, adnate to the corolla below, exserted. Style filiform, stigma 2-lobed. Nutlets 4, inserted by flat bases on the flat receptacle, ovoid or turbinate, wrinkled, scabrid. Distribution.—Chiefly S. Europe and Oriental; species, 20.

*E. plantagineum* L.; cauline leaves linear-oblong cordate at the base, calyx much shorter than the corolla-tube, cymes elongate, stamens slightly protruded. *E. violaceum*, Brit. Fl., not of L. Cornwall and S.W. of Jersey; fl. June-Aug. Root fusiform, annual or biennial. Stem, 1-3 ft., erect or ascending, diffusely branched. Leaves radical 4-6 in., lanceolate, petioled; cauline spreading obtuse, sometimes dilated at the base. Cymes 4-6 in., spreading, curved. Calyx-lobes subulate-lanceolate. Corolla 1 in., dark blue-purple. Nutlets as in *E. vulgare*. Distribution.—Spain and Mediterranean region to Greece.

I proceed to give the specific description of *E. vulgare* for reasons which will be evident presently.

*E. vulgare* L.; cauline leaves lanceolate or oblong, rounded at the base, cymes short, calyx exceeding the corolla-tube, stamens much protruded. *E. italicum* Huds., not of L. *Viper's Bugloss*.—Waste ground on light soils in England; an alien or colonist in Scotland. Watson; S.E. of Ireland; fl. June-August. Root fusiform, annual or biennial. Stem 1-3 ft., erect or ascending below, stout, leafy. Radical leaves petioled, 4-8 in.; cauline sessile, acute, rounded at the base. Cymes 1 in. or more, axillary, recurved, lengthening in fruit, paniced towards the ends of the branches; bracts and calyx-lobes linear. Corolla  $\frac{3}{4}$  in., red-purple in bud, then bright blue, rarely white. Nutlets angular, rugose. Distribution.—Europe, N. Africa, W. Siberia, introduced in N. America. (The Students' Flora of the British Islands, 2nd Edition, by Sir J. D. Hooker.)

*Synonyms.*—*E. plantagineum* L. is, as Hooker states, a synonym of *E. violaceum* Brit. Fl., not of Linn.

If we examine Hooker's descriptions of *E. vulgare* L. and *E. plantagineum* L., we find two important points, viz.:—

*E. vulgare*:

- (1) Cauline leaves lanceolate or oblong, rounded at the base.
- (2) Calyx exceeding the corolla-tube.

*E. plantagineum*:

- (1) Cauline leaves linear-oblong, cordate at the base.
- (2) Calyx much shorter than the corolla-tube.

Now, if the drawing be consulted, it will be seen that the flowers are those of *E. plantagineum* as regards the important botanical character (2). The arrangement of the inflorescence is also of that species, that of *E. vulgare* being coarser and more crowded.

Coming to the cauline leaves, we find that they are cordate at the base; but if "Illustrations of the British Flora," Fitch and Smith, No. 691, be referred to, it will be found that the cordate base is by no means a prominent character. I therefore name our "Paterson's Curse" *E. plantagineum*, although I admit it is not absolutely typical. But allowance must always be made for a naturalised plant growing under conditions perhaps very different to those of its native country; furthermore, *Echiums* are rather large, coarse plants, and very few herbarium specimens comprise whole plants, including, of course, representative cauline leaves. As a rule, the flowering tops are alone picked off and sent for examination.

*Echium* is a difficult genus, without a sharp line between some of the species; and it is my intention, if I receive good specimens of the other species acclimatised in Australia, to return to the subject, for the last word has not been said in regard to the Australian forms.

In good land, where the plants are wide apart, I have seen one plant 5 ft. 6 in. high, and up to nine flower-stalks on each, but where it has been established some time it grows as close together as the wheat plants in a crop, and does not stool at all—just grows one straight stalk.—E. A. HAMILTON, Cumberoona, *via* Albury.

*Fodder or Other Uses.*—

It is in no way injurious to stock; in fact, in the early spring I consider it one of our best fodder plants, as the first leaves are very succulent, and it is the quickest-growing plant during the frosty weather. When the plant matures, however, the flower-stalk is very rough and hairy, and the stock will not eat it; and then, when it seeds and dies off, all the grass is killed underneath, and there is nothing left on the paddock at all.—E. A. HAMILTON.

That "Paterson's Curse" produces some feed is undoubted, but it is a smothering, rough, coarse plant, whose room is far better than its company.

*How to get rid of it.*—The intensely bristly character of this weed calls for its destruction wherever it appears. It should be cut out with hoe or mattock before it seeds, wherever it begins to make its appearance. Being quite an ornamental plant when in flower, it has been spared for sentimental reasons; that is the danger in the case of a weed such as this.

Both sheep and cattle eat the plant when there is little or no other feed to be had. Mr. P. Hore, of Mugvee Estate, kept a number of sheep in a small paddock last spring that was covered with "Paterson's Curse," and the sheep completely ate it out, and appeared to do well on it. The worst of the weed is that it chokes all other vegetation, and neither grass or other vegetation will grow near it; and when it dies the ground is left black and unprofitable.—Mr. F. FRENCH, Inspector of Stock, Albury, 18th April, 1904.

A neighbour of ours has got rid of it in a small paddock by running a very large mob of sheep on it and eating it quite bare several times in the year, so preventing it from seeding. By doing this for three years he has his paddock free from it, with the exception of a few plants, which he pulls up as they appear. It is hard to estimate the damage it is doing here, as people have not yet begun to try and get rid of it; but I offered 6s. per acre to have it hand-picked last spring, and it was not accepted. Our neighbour offered a party of Syrians work pulling it up, and they wanted 13s. per acre.—E. A. HAMILTON.

*Where Found.*—

This weed was introduced to this district by the people (Patersons) who lived in a small farm adjoining this estate, as a garden flower, about twenty-five years ago. It did not spread much at first, but grew out on a small hill near the house, gradually enlarging every year. However, about eight years ago it got through the fence on to a travelling stock reserve and into our paddocks. Then, as soon as the stock began to travel through it, it spread very quickly, and now it is all over the district, particularly on stock routes and reserves, being carried to these by the stock. There is one patch of about 100 acres in this property, where it is growing as thick as possible; and there the plant merely sends up one flower-stalk to a height of from 1 to 3 feet, but where the plants are growing thinner it grows (on good soil) to a height up to 5 feet, and with a spread across of about 3 feet. Along the road for about 4 miles it is one blue stretch. The plant has spread right up to the head of the Murray, and some local drovers told me they saw it growing at Bourke.—E. A. HAMILTON, Cumberoona, *via* Albury, 15th March, 1904.

There is no question that the plant is spreading. I have seen it or heard of it on reliable evidence from many of the drier parts of this State. Some localities have already been given; others are Dubbo, Nyngan, Paldrumatta Bore, *via* Wilcannia. In Victoria, like New South Wales, it comes from the Upper Murray. It also comes from Geelong. In South Australia it has been sent from the Flinders Range. We have much to learn of its distribution yet.

The country it thrives best in is a rich black soil river-frontage country; and the Upper Murray, Cumeroona, Wagra, and that locality, situated from 17 to 30 miles from Albury, is where it is to be seen in the spring growing most luxuriantly, and the purple flower in the valleys, as seen from the surrounding hills, is exactly like water in a lake.—Inspector of Stock, Albury.

I have noticed it invariably in close proximity to main roads, being the inference that it was brought there by travelling stock; and the largest extent seen by me was in Cumeroona, about 17 miles above Albury, on the Upper Murray road. One patch must have covered something like 100 acres, at a rough estimate. Wherever the plant gets a fair hold it completely smothers the grass.—A. H. CHESTERMAN, Staff Surveyor.

I am forwarding, under separate cover, a herb which has, according to report, only appeared on the plains here during the last two or three years—that is, since the sheep came back after being away during the drought. My object in writing is to inquire if it is poisonous, as it is very thick in the wheaten-hay crop; and, if not, if it is good feed for stock? At present the stock will not touch it, and if it is poisonous can any means be suggested for its eradication, since there are so many patches of it hereabout?—H. P. SMITH, Illilawa, Hay, 1st November, 1904.

The following list of shires and municipalities in which this plant has been proclaimed noxious is very formidable, and has been supplied by the Local Government Department, 1919:—

## SHIRES.

Abercrombie	Culcairn	Lachlan	Tamarang
Berrigan	Demondrille	Lockhart	Timbreehongie
Bland	Gadara	Lyndhurst	Tumbarumba
Bogan	Gilgandra	Macquarie	Turon
Boree	Gloucester	Mitchell	Wakool
Carrathool	Goobang	Mulwaree	Waradgery
Cessnock	Holbrook	Mumbulla	Wagoola
Cobbora	Hume	Murray	Weddin
Conargo	Illabo	Murrumbidgee	Windouran
Coolamon	Jemalong	Murrungal	Urana
Creen	Jindalee	Narraburra	Yallaroi.
Crookwell	Kyeamba	Rylstone	

## MUNICIPALITIES.

Albury	Gundagai	Parkes	Wagga Wagga
Burrowa	Hay	Quirindi	Wyalong.
Cootamundra	Junee	Temora	
Corowa	Murrumburrah	Tumut	

Purple-top or Wild Verbena (*Verbena bonariensis* L.).

(VERBENACEÆ: Verbena Family.)

*Botanical Name.*—*Verbena* (see below); *bonariensis*, Latinised adjectival form of Buenos Ayres, the capital of the Argentine Republic, South America, the home of this particular plant.

*Botanical Description.*—Genus, *Verbena*. Note.—*V. venosa* and *V. bonariensis* both belong to the section *Pachystachyæ*, with abbreviated flower-spikes.

*Species.*—*Bonariensis*, L.

An erect, coarse, rigid herb of 2 to 4 feet, the stems scarcely branched, acutely four-angled and roughly hispid, especially on the angles.

*Leaves.*—Sessile, lanceolate, or the lower ones ovate-lanceolate,  $1\frac{1}{2}$  to nearly 3 inches long, coarsely toothed, hirsute, the upper ones distant, small, and narrow.

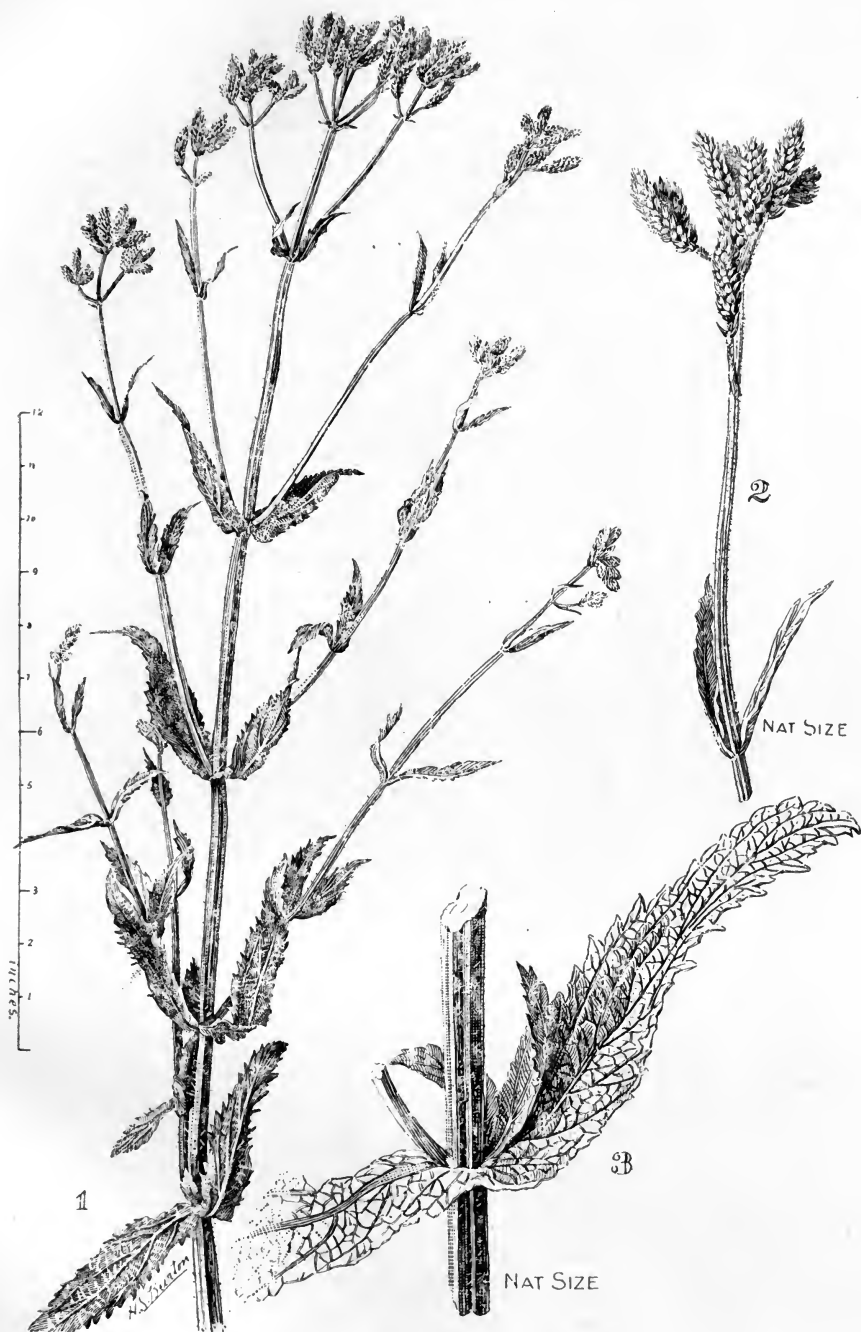
*Flowers.*—In rather close spikes of  $\frac{1}{2}$  to  $\frac{3}{4}$  inch, which are usually clustered at the end of the branches of a rigid corymbose, trichotomous panicle, and generally assume a bluish-purple hue.

*Bracts.*—Acute, ciliate, hirsute, 1 to  $1\frac{1}{2}$  lines long.

*Calyx.*—Shorter than the bract.

*Corolla-tube.*—Shortly exceeding the calyx, the lobes broad and spreading.

(B.Fl., v. 36.)



Purple-top or Wild Verbena (*Verbena bonariensis* L.).

General view of plant, much reduced. 2. Showing inflorescence, natural size. 3. Showing the angular (quadrangular) stem and the venation of a pair of the opposite leaves. Natural size.



In contrast to the other *Verbena* (*V. venosa*, figured on p. 71) the present species is far less showy. The short and crowded flower-spike of *V. bonariensis* is by no means so conspicuous as that of the dwarfier plant *V. venosa*.

*Vernacular Names*.—"Wild Verbena or Vervain," "Purple-Top or Weed" are the only names under which I have heard it referred to.

*Fodder and other Uses*.—So far as I am aware, stock never touch it except by accident, and then the feeding only serves to prune it. It bears numerous seeds and spreads rapidly in waste places, and even encroaches on pasture land. The most that is good that can be said of such plants as this and its close relation, the Lantana, is that, while it has possession of an area, such land is rested, one cannot say fallowed. There is nothing poisonous about the plant. At the same time its room is better than its company, and it ought always to be hand-pulled when it makes its appearance in a fresh place.

*Where found*.—The species is common in waste places and pastures in extra-tropical South America, and has spread as a weed of cultivation over South Africa, the Mauritius, and some other countries, and is evidently introduced only into Australia. (B.Fl., v. 37).

It is a very old Australian colonist, and now it is found practically over the settled parts of Australia. It has been proscribed in the following municipalities and shires:—

SHIRES.			
Cockburn	Gloucester	Mumbulla.	
MUNICIPALITIES.			
Burwood	Dubbo	Hamilton	Umarra.
Concord	East Maitland	Moss Vale	

### Blue Weed (*Verbena venosa* Gill. et Hook.)

(VERBENACEÆ: *Verbena* Family.)

*Botanical Name*.—*Verbena*, Latin for the herb Vervain (a *Verbena*), an equivalent also for all sacred leaves, such as laurel, olive, myrtle, rosemary, &c., used to adorn altars in Roman times. Paxton, however, says it is said to be derived from its Celtic name "Ferfaen." *Venosa* (Latin), full of veins, referring to the under side of the leaves.

*Botanical Description*.—Genus—*Verbena*, Tournef.:—

*Calyx*.—Five-toothed.

*Corolla*.—With five spreading slightly unequal lobes.

*Stamens*.—Usually four, enclosed in the corolla tube.

*Ovary*.—Four-celled.

*Fruit*.—Dry, separating into four nuts.

*Herbs* or rarely shrubs with opposite leaves.

*Flowers*.—Usually in terminal bracteate spikes.

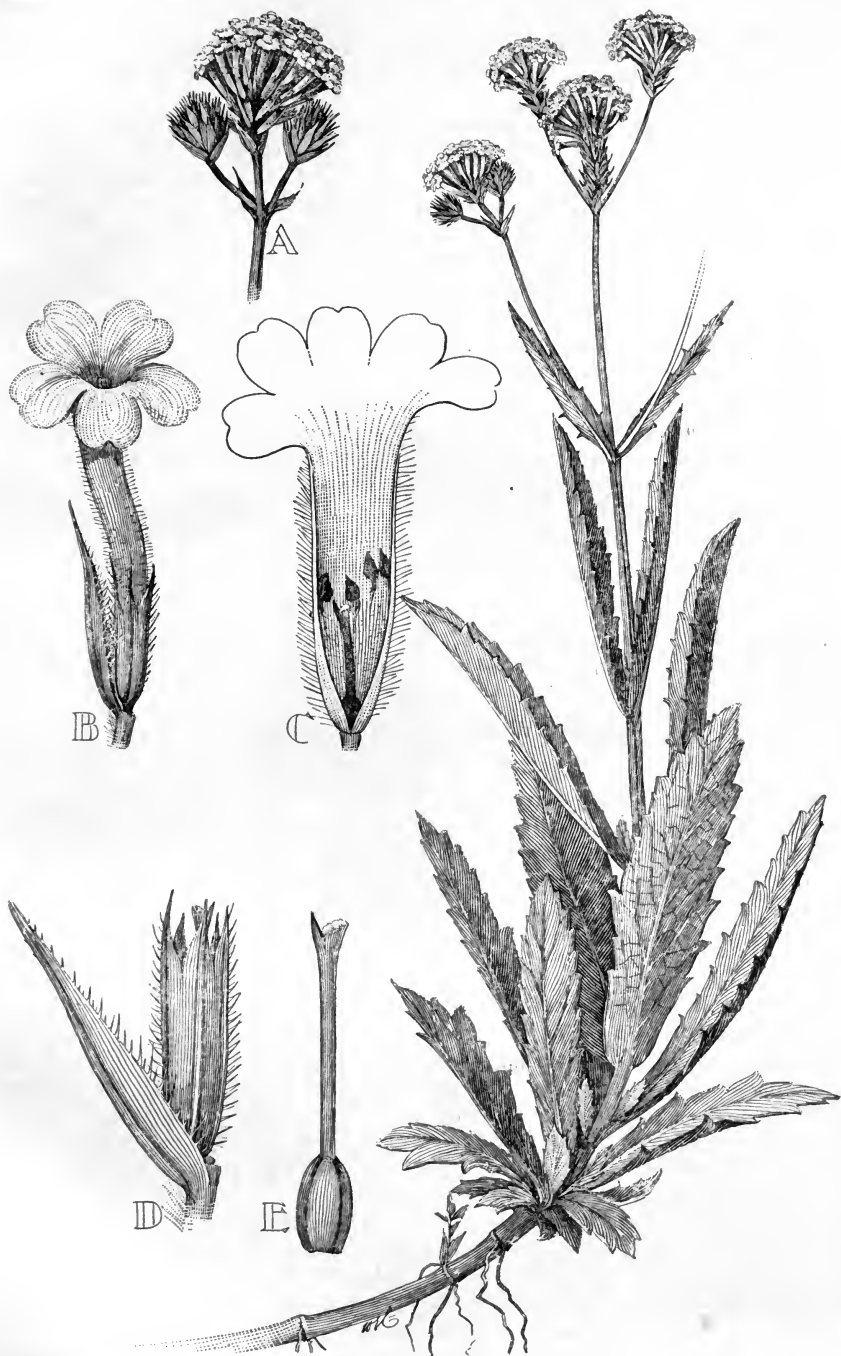
*Species*.—*Venosa*, Gill. et Hook.—A perennial herb with a simple erect quadrangular stem, about 1 to 1½ feet high, the whole plant rough, with short harsh hairs.

*Leaves*.—Opposite, oblong-lanceolate, acutely and remotely dentate, sessile, with a broad subcordate base, strongly veined underneath (the character from which the specific name "*venosa*" has been derived).

*Flowers*.—Blue-purple, in short spikes, terminal, and on rather long peduncles in the axils of the uppermost bracts and floral-leaves.

*Corolla*.—Three times longer than the cylindrical calyx, and twice longer than the bracts; the tube hispid.





Blue Weed (*Verbena venosa* Gill. et Hook.).

A. Part of Inflorescence.

B. Whole flower, with bract.

D. Calyx, with bract.

C. Corolla opened, showing stamens and pistil.

E. Pistil.

*Calyx*.—Splitting when the enclosed fruit is ripe. (Description taken from New South Wales specimens, with the help of Dr. Gillies and Hooker's original description in Hooker's *Botanical Miscellany*, Vol. 1, p. 167 (1830).)

It is only likely to be confused in New South Wales with *Verbena bonariensis*, a taller and much more widely diffused plant.

*Vernacular Names*.—People in New South Wales most commonly call it "Blue Weed," a name it shares with other *Verbenas*, with *Echium*, and other plants. The colour of the flowers is, however, of a rich purple. "Wild Verbena" or "Vervain" are also applied to it.

*Fodder or other Uses*.—I cannot find any use to which this plant is put. It is harsh, and stock always reject it. It possesses no poisonous properties. It is a very pretty plant, and hence leniency has been shown to it, but it should be pulled up wherever it makes its appearance in a fresh place.

*Where Found*.—It is a native of the Argentine, South America, but it has now spread to most sub-tropical regions of the world. In New South Wales, though not the commonest *Verbena* by any means, it is widely diffused in the coastal districts, and is spreading westerly. It frequents grass land, and commonly invades a district through the sides of its roads. It was doubtless originally brought to this State as a garden plant.

It has been proclaimed in the following shires and municipalities:—

#### SHIRES.

Cockburn  
Copmanhurst

Gloucester  
Patrick Plains.

#### MUNICIPALITIES.

Moss Vale, Ulmarra.

### Stagger Weed (*Stachys arvensis* L.).

(LABIATÆ: Mint, &c., Family.)

*Popular Description*.—An annual herb  $\frac{1}{2}$  to  $1\frac{1}{2}$  feet high, with opposite leaves, oval, or occasionally almost heart-shaped at the base, and with wrinkled margins. The flowers are grouped in circles round the upper part of the square stem, one circle immediately above each pair of leaves.

It is a native of Europe and Western Asia.

*Botanical Description*.—

A weak, spreading, hairy annual. Leaves small, petiolate, ovate-crenate. Flowers small, pale-purple, in false-whorls of 2 to 6. Calyx with five nearly equal teeth as long as the tube. Corolla upper-lip erect, concave and entire.

*Experience in other States*.—It is common in South Australia, Victoria, and Queensland. Ewart suggests that somebody has confused the word "Stachys" and "Staggers" and has thus helped to perpetuate the popular idea as to its poisonous nature. Bailey deals with it in his book on weeds and more fully in the *Queensland Agricultural Journal* for 1899, p. 49. There is, however, nothing fresh in his note; he records popular experience over large areas in the Australian States.

*Experience in New South Wales*.—This is one of the weeds most frequently sent to me for determination, and almost invariably I am informed that it has caused staggers or that it is suspected of poisoning. So numerous are the letters, particularly in the autumn, that this is one of the weeds for which a set reply has been formulated to save time in correspondence.

It is to be found all over the State, but chiefly in the coastal districts and tablelands.



**STAGGER WEED (*Stachys arvensis* L.).**

1. Bud, showing calyx.      2. Calyx opened to show corolla, stamens and pistil.      3. Corolla thrown open to show  
4. Seed.



I published the following representative notes in the *Agricultural Gazette* for 1895, p. 299, concerning it:—

Sent in also as "Shivering Weed," "Wax Weed," and "Dummy Nettle."

"A very prolific seeder. Introduced into district through the agency of birds and winds. Careful agriculturists experience little or no difficulty in keeping it in check. Causes animals that feed on it to stagger or shiver; hence its name. Flourishes alike in rich or poor soils." (Rothbury.)

"Grows throughout the district." (Eglinton, Bathurst.)

"Is considered good food for milking cows, though if eaten by horses and cattle while engaged at work causes trembling and loss of the use of their limbs, and sometimes even death. It is not spreading, and no steps have been taken to eradicate it." (Booral.)

"Introduced five years ago by floods." (Codrington.)

"A most noxious weed, found growing throughout the district, as a rule in cultivated land." (Bega.)

A supplementary note by G. R. Brown, of Port Macquarie, is "most frequently seen about the edges of lucerne paddocks; very little in this district. Said to give horses the shivers if overheated when driven. Cattle not affected by it. Introduced here in lucerne seed and hay." (*Agricultural Gazette* for 1895, p. 677.)

Mr. C. T. Musson (*Agricultural Gazette* for 1894, p. 848) speaks of it as "a valuable bee plant, but I think its room is better than its company."

Mr. Turner figured the plant in the *Agricultural Gazette* for 1890, p. 307, and suggests that its injurious properties may be attributed to mechanical action: "By means of its very fine hairy stems and leaves (it) irritates the alimentary canal in some part and produces acute inflammation." He then describes how this weed is accused of giving animals the staggers, and that horses are particularly liable to this serious disease.

In the *Agricultural Gazette* for 1895, p. 32, we have a "Revised Report on the Disease Shivers, i.e., Tremors in Horses, Cattle, and Sheep," by E. Stanley, Chief Veterinary Inspector. This was the first Australian official report on the weed so far as I know. He has preliminary remarks, and then notes on the symptoms, etiology, and remedies.

He speaks of it as a disease existing amongst horses grazing on certain low-lying lands, and that it had been known on the Richmond and Hunter Rivers for fifteen years. He says that it resembles in many of its aspects Paludism or Malarial Fever in mankind.

He adds, "It is interesting and important to note that this disease is generally attributed to animals eating the hedge nettle (*Stachys arvensis*), but I see no foundation for such a belief. It is merely a coincidence that this weed flourishes at the same season, in the same pasture, at the time that this disease is prevalent. It also flourishes, and is eaten by numberless animals, in thousands of places where the disease has never been heard of."

The paper is an important one, and cannot usefully be abstracted. The original should be consulted by every stock-owner.

Some incidental references to *Stachys arvensis* are to be found in a paper in the *Agricultural Gazette* for 1900, p. 1112, by Mr. (now Prof.) J. D. Stewart, entitled "Staggers in Sheep. Progress report on investigations carried on at Narrabri." The weed in the Narrabri experiments is referred to as Marsh Mallow, but the botanical name is not given, and, in view of the looseness with which the name Marsh Mallow is applied in Australia, I do not feel justified in guessing at it. It is, however, one of the Malvaceæ. At all events *Stachys arvensis* does not appear to be concerned, and the point seems to be therefore made that you can have staggers without Stagger-weed (*Stachys*).

In England it goes under the name of "Corn Woundwort," and it is figured in Sowerby's "English Botany." Sowerby says:

No uses or peculiar properties are ascribed to this herb, nor has it any beauty to boast. It partakes of the disagreeable smell of others of the same genus. As a weed it gives little trouble, though not infrequent in kitchen gardens on a light soil, being easily eradicated when the first flowers appear.

Here is a weed that has been known to Britons for centuries, and its power to induce disease (staggers or any other) does not appear to have been known. This is negative evidence which supports Mr. Stanley's views.

The plant is probably harmless enough, though its nutritive value is not likely to be high. I have already quoted a statement that it is good for milch cows.

The late Rev. Dr. Woolls said the same thing many years ago:

*Stachys arvensis* is useful in the winter season as food for cows. Many cartloads of it have been cut down for that purpose in the orange orchards near Parramatta, but I am informed that, when the plants are old, they impart an unpleasant flavour to the milk. (*Proc. Linn. Soc. Lond.* x, 40.)

The late Mr. Sylvester Browne, of Minembah, near Singleton, had a large dairy, and was one of the most observant men I ever knew in regard to forage plants. One day, after seeing his beautiful cows, I was walking over his property and came across a large patch of *Stachys arvensis*. I said, "Are you afraid of that, Mr. Browne?" He said, "Certainly not. Cows are fond of it and they yield good milk on it."

The truth seems to be that germs allied to malarial fever are found in similar localities to those in which *Stachys arvensis* grows, and animals, particularly horses, which are overdriven, or which otherwise have a predisposition to this disease, catch it as they browse the plant.

*How to deal with it.*—It is a lover of moisture and is found in low-lying places—depressions, ditches, creek-sides, borders of swamps and of cultivation, &c. Endeavour should be made to drain the land in paddocks, to permit the growth of useful grasses.

*Stachys palustris* L., an allied and larger plant, has been found once on the Richmond River, N.S.W., but little is known concerning it.

### Buffalo Burr (*Solanum rostratum* Dunal).

(SOLANACEÆ: Potato Family.)

*Botanical Name.*—*Solanum*, the Latin name for a herb called "Nightshade or Banewort," *Solanum* being the botanical name for the plants commonly known as "Nightshade" in Britain; *rostratum*, Latin, beaked, in allusion to the beak-like appearance of one of the stamens, as shown in the drawing.

*Vernacular Name.*—"Buffalo burr." Called "burr"\* from the fruit, which was "doubtless spread to some extent by the buffaloes, as it has been found along the buffalo wallows." "Beaked Horse-nettle" is another name. The prickly *Solanums* are often called "Horse nettles" in the United States, on the *lucus a non lucendo* principle; the meaning of the adjective "beaked" has already been given. "Sand burr," because it prefers sandy land; it is also called "Rocky Mountain Sand burr." Sometimes called "Spiny Nightshade."

*Botanical Description.*—

Annual, densely stellate-pubescent with 5—8-rayed hairs, usually copiously armed with yellow subulate prickles; stem erect, branched, 1 to 2½ feet high;

\* "Bur" is the American spelling.



Buffalo Burr (*Solanum rostratum* Dunal.).

A. Imperfectly expanded flower, showing the beaked stamen to which the plant owes its specific name.  
 B and C. Two seeds, greatly enlarged. D. Flower, showing the cluster of prickles under the calyx.

leaves ovate or oval in outline, irregularly pinnately 5—7-lobed or 1—2-pinnatifid, 2—5 inches long, petioled, the lobes mostly oblong, obtuse; flowers racemose, yellow, about 1 inch broad; racemes lateral, pedicels stout, 3—6 lines long, erect both in flower and fruit; calyx densely prickly, surrounding and wholly enclosing the berry, the prickles becoming as long as the fruit, or longer; calyx lobes lanceolate, acuminate; corolla about 1 inch broad, slightly irregular, its lobes ovate, acute; stamens and style declined, the lowest stamen longer with an incurved beak; fruit, including its prickles, 1 inch in diameter, or more.

*Fodder or other Uses.*—I have vainly searched for any use or redeeming feature that I can ascribe to this bad weed.

*How to get rid of it.*—The burr or fruit is a spiny ball, full of black seed. It becomes attached to passing animals, hence its liability to rapidly spread. "It is often blown about as a tumble-weed in the prairie region of the United States."

It is an annual and should be pulled up or mown down before it matures its seeds. If, therefore, people recognised it and pulled it up before seeding, it could be destroyed in one year. It is stated to be "expected to be an impurity in West American Alfalfa (lucerne) and clover seed." It is a matter of common knowledge that rubbish-heaps in the vicinity of townships are allowed to propagate weeds unchecked, it being simply nobody's business to eradicate them. One of the Farmers' Bulletins of the United States Department of Agriculture, speaking of this as the way in which the Buffalo burr has often been spread, says: "Similar instances might be multiplied; in fact, probably the majority of the cities and towns of this country are harbouring noxious weeds which should be destroyed in simple justice to the farming communities which aid most directly in supporting the prosperity of these towns." These observations can with justice be applied to New South Wales also. One Bulletin says it has been transported in packing materials. In the United States it is looked upon as likely to occur "wherever western grain is handled," and I am afraid we may trace its advent here to dirty seed-wheat or dirty chaff. It is recognised as a bad weed in the United States, and a number of experiment stations have published warnings concerning it.

*Where Found.*—Native of the United States of America, originally growing on the western plains, close to the mountains, from Mexico northward. The Buffalo burr has been working eastward until it is now found in many States east of the Mississippi River, and has even crossed the ocean, threatening to become a troublesome weed in Germany.

In 1904 I announced this as a new Australian weed making its appearance at Boggabri in this State. Shortly afterwards it made its appearance at Yass. Later it appeared in the Hay district, and it has been proclaimed at the request of the Berrigan Shire.

### Thorn Apple or False Castor Oil Plant (*Datura Stramonium* L.).

(SOLANACEÆ: Potato Family.)

*Common Names.*—In the Jerilderie case to be presently referred to, the local doctor informed me that the plant was known as "Wild Castor Oil Plant." Throughout the greater part of New South Wales its most common name is "Castor Oil" without any qualification, and I will presently show how regrettable the use of this name is, causing the greatest confusion.





Thorn Apple or False Castor Oil Plant (*Datura Stramonium* L.).

- A. A flower laid open to show the arrangement of the five stamens and pistil.
- B. The fruit, showing the leathery pericarp, dehiscing by four valves.
- C. A seed, which is somewhat kidney-shaped, and covered with large shallow pits.

Confusion of name is especially to be regretted when a poison-plant may be referred to. In most English speaking communities it goes under the name of "Thorn Apple," and I would like to see the use of this name encouraged by people who find *Datura* too much for them. In the United States it has other names, which I have not seen used in Australia and which need not be mentioned here, except "Jimson Weed" (a contraction of "Jamestown Weed," from the North Carolina town), which is much employed in American literature.

*Botanical Description.*—

A rather tall, bushy annual. Leaves ovate, angular, irregular toothed or lobed. Flowers solitary, shortly pedunculate. Calyx loosely tubular. Corolla funnel ("trumpet") shaped, above 3 inches long, white. Capsule nearly globular, very prickly.

*Popular Description.*—A somewhat succulent, bright green, heavy-smelling herb of 2 or 3 feet high, growing in waste places. The leaves are rather large, irregularly cut or toothed, and paler on the underside. Flowers large, white, usually described as trumpet-shaped. The fruit (the "prickly pod" of farmers) is rather large, much rougher than a nutmeg grater, and it sheds a large number of black, kidney-shaped seeds which have little dots over them.

*Other Species.*—Ewart and Tovey ("Weeds, &c., of Victoria") have a figure of *Datura Stramonium*; while in the *Queensland Agricultural Journal* for July, 1917, p. 31, C. T. White has useful notes on and photographs of *Datura Tatula*, the Purple Thorn Apple (a species with purple stems which is obtaining a rather firm hold in the colder parts of New South Wales), *D. ferox*, a Thorn Apple new to Queensland, and *D. Metel*, the Hairy Thorn Apple, not uncommon in Queensland, but not an escape in New South Wales, as far as I know. There is also a native species of *Datura*, viz., *D. Leichhardtii* F.v.M., which is confined to Queensland.

*Confusion with the True Castor Oil Plant.*—A few years ago I started a discussion in the papers as to whether this plant is poisonous, and to what extent. The statements made were most of them very interesting, and I tried to sift them out into (a) Thorn Apple or False Castor Oil Plant (*Datura Stramonium*) and (b) True Castor Oil Plant (*Ricinus communis*).

Most of the correspondents referred to the Thorn Apple; a few, including the following, evidently referred to the True Castor Oil Plant:—

From the contradictory evidence given, would it not be possible to suppose that its poisonous properties depended somewhat on the district in which it grew? Although introduced into the Loyalty Islands, its medicinal properties are well known there. The natives, and also the Europeans, will chew from half to a whole seed, throwing away the residue. In New South Wales, on the other hand, I know of an instance where only a small portion of a seed was eaten, resulting in terrible pains in the abdomen, accompanied by violent vomiting. The plant is of great use for shade purposes in poultry runs, where I have seen the young leaves eaten off with no ill-effects.

The following two I will not be certain about, although I can make a guess, as the True Castor Oil Plant is far more sensitive to cold than the Thorn Apple. They were probably the latter.

I distinctly remember that on one occasion, about two seasons ago, cattle ate down quite a large and well-grown patch of this plant without suffering any ill-effects whatever. They left only stalks about, from 1 foot to 18 inches high. I cannot clearly recollect, but I think the plants could not have reached beyond the flowering stage.—("Guabinga," Terra Bella, *via* Wellington, 21st November, 1907.)

In a recent *Agricultural Gazette* you inquired of readers whether cattle ate the wild castor oil plant. I state positively that they eat it in all its stages of growth, and after it is dead. As to its effects, I may say that I saw twelve head of young cattle (out of a travelling mob) die within an hour after eating dry castor oil, and last autumn, after turning a six months' heifer out of a yard that it had been in all night without food, I found it dead in a patch of dry castor oil close by shortly after. It appears to me to be very fatal to hungry stock. I have seen my sheep eating both dry and green, also rabbits eating the small young plants.—(Murga, 6th January, 1908.)

*Further classification of the evidence.*—(1) *Evidence that stock eat the weed (Thorn Apple), but that it does not poison them:*—

Mr. E. W. Turner, junior, writes:—In reply to Mr. Maiden's inquiry whether stock will eat castor oil weed, I have seen sheep eat the dry pods freely. I could not guarantee there were many, or even any, seeds in the pods, but can swear to the pod-eating all right. Of 1,000 sheep running amongst castor oil for a fortnight, only two died, and as most of the mob were eating the pods, I could not understand why it should affect some and not others. The paddock in which the sheep were had plenty of castor oil and a fair amount of grass. The identity of castor oil cannot easily be mistaken, because, no matter what name it goes under, it always has the same beastly smell.

Mr. H. V. Jacob, Boggabri, writes:—I have seen this plant growing in large quantities in this district, and some ten years ago the late Mr. A. T. Brooke, who at that time owned Milchengorie Station, told me that he would never allow the plant to be cut up, as it was good feed for sheep. I have seen the sheep at times strip every particle of leaf off the bush, and apparently it did them no harm, although I must confess the sheep did not touch it till practically every other particle of food was consumed. In the 1902 drought the plant was fairly luxuriant, and the sheep cleaned every leaf off without any harm, while the plague of mice, which were at that time very thick, climbed the stalk of the plant and devoured the seed very rapidly. As the seed is enclosed in a very prickly pod, the cattle or other stock could not touch it, but the mice were able to gnaw the pod through, and thus get at the seed. The latter is small and black, and probably each pod contains a few hundred seeds. The castor-oil plant prefers the rich river flats, as a rule, although it often grows on the black soil near the river, but I have never seen it grow anywhere but fairly handy to the river, and it never seems to spread to any extent.

Mr. van der Merwe, then of the Hawkesbury Agricultural College, wrote to me that in the Orange Free State, South Africa, stock never seemed to touch it, but they must have gradually acquired a taste for it, for one year after the plants were nearly fully developed the cattle started eating them, and soon stripped off all the leaves, leaving only the stems and thorny seed heads, and even these, which were not quite ripe, were eaten. I distinctly remember a cow picking off one of these heads and chewing it, while I wondered how they managed to eat the prickly stuff. The following year the young plants were not given a chance, but were eaten as soon as they grew high enough to be fed off. It was known that the plant was poisonous; but we had begun to look upon it as not poisonous to cattle. It may be that the cattle were gradually immunised against the effects of the poison by small doses, until they could even eat the seeds with no bad effects, and that this may account for the fact that there were no fatalities.

Mr. Percy Murray, of Canowindra, writes:—I have seen cattle and sheep eating these pods greedily all day long, and when I have killed ration sheep the stomach has been full of seeds. Fowls are also very fond of them; also quail I have shot have nothing else in their crops but the castor seed. The cattle also eat the leaves, but sparingly; rabbits will eat all the bark when they are cut down. I am satisfied in my mind that the castor oil here is not the cause of deaths.

Another letter is from a well-known pastoralist in the Merriwa district, who desires that his name shall not be published. He writes: It is a common thing for cattle to eat the leaves of the castor oil plant, without any ill effect.

(2) *Evidence that stock eat the weed and that it poisons them:—*

Mr. P. R. Gordon, the late Chief Inspector of Stock, Queensland, reported that the stomachs of cattle that had died contained *Stramonium* plant, and analysis traced the poison to this plant. He adds: It may be remarked that in each instance the poisoning was confined to quiet milking cattle, and it will be found as a rule that mortality from poisonous plants is confined to quiet milkers, or their progeny. These pet animals will nibble at and eat plants that ordinary bush cattle will not touch, unless forced to do so from sheer starvation.

Mr. R. W. Peacock, late manager of Bathurst Experiment Farm, wrote:—Last year a couple of our sheep died suddenly, and upon post-mortem examination their paunches were found full of this plant, and the lining membrane in a very inflamed condition. I haven't the slightest doubt but that death was caused by it.

(3) *Evidence that stock will not eat the plant.*—My own cow (and her successor) grazed in a paddock containing Thorn Apple plants. I eventually eradicated them entirely, but I never saw a cow (nor a horse) touch one of the plants, although I watched carefully for years. The old Benevolent Asylum grounds at Sydney (now resumed for the railway station) always had Thorn Apple plants growing amongst the grass, and the Asylum cows treated them with contempt. I watched those plants for years, and never knew them to be touched.

Many stock-owners have told me, during the last twenty years, that they have never known stock to eat this plant.

For twenty years I have systematically observed it near milking yards and stables in hundreds of places in country districts. In cases where I have mentioned to the farmer or dairyman that the plant might be poisonous, my remark has been invariably received with incredulity, as indeed the very presence of the weed would indicate.

V. K. Chesnut, an authority on the subject, in his "Thirty Poisonous Plants of the United States" (Farmers' Bulletin, U.S. Dept. Agric., No. 86, p. 30), says: "*One or two instances are recorded* [the italics are mine], in which cattle have been poisoned by eating the leaves of young plants which were present in grass hay." I look upon Prof. Chesnut's evidence as very important.

The evidence is more or less contradictory, but not irreconcilable. There is no doubt that some cattle and sheep eat the plant, and that most cattle refuse to touch it. The evidence that some cattle and sheep eat it without injurious effects is perfectly clear. The probable explanation is that given by Mr. van der Merwe, that animals eating it in small quantities to begin with, gradually become immune to its poisonous effects. A rigid modern series of experiments on the effects of this plant on stock is a desideratum, and I hope it can be carried out, for we have already too many "open verdicts" in regard to the deaths of stock. I think that my suggestion as to the licking up of seeds from the ground should be followed up, as this may be a clue to some reputed cases of poisoning.

The question of prolonged use of small doses and consequent immunity is so important as to require emphasis. I have known wharf labourers to chew such a quantity of tobacco as I think would either kill or seriously affect the health of an ordinary man.

Dragendorff writes of *Datura Stramonium*:—"Leaves and seeds are used like *Atropa* (Deadly Nightshade) and *Hyoscyamus* (Henbane). . . . The seed contains Hyoscyamin, Atropin, Hyoscin, and Oxyatropin." The leaves contain the poisonous alkaloid Daturin of some chemists, but in much smaller proportion than the seeds. Even the latter possess only 1.10 per cent.

In cases in which stock have eaten the herb, I desire to know whether the toxic effect which has been recorded is *in any way owing to the very dangerous seeds* (in some cases the empty seed-pods have been eaten), or can be attributed to *foliage alone*. It is a disgrace to us, an important stock-owning country, that we have not yet settled this point. Personally I have raised it frequently enough.

A farmer, of Kingsthorpe, Queensland, wrote to me as follows, after he had read my article on Thorn Apple in the *Agricultural Gazette of New South Wales* for January, 1918:—

An old farmer here had blight in his eyes, and was pulling out the weed by hand, and then went and bathed his eyes without thoroughly washing his hands. The lids turned out, and the doctor said this was caused by the poison in the Thorn Apple. His eyes have been bad now for over fifteen years, so anyone pulling it out cannot be too careful.

I had some growing in a prairie-grass paddock, and the horses were running in it, and their legs swelled up very much; they could hardly walk. A neighbour told me they would die, as he had had one die from the swelling like mine. I kept them out of the paddock, and in a few days the swelling went down and they got well.

I have noticed that when cutting it, it has a tendency to bring on headaches. (This is a common experience.—J.H.M.)

Until recently it was chiefly confined to the scrub soils on the Darling Downs, but now it is spreading everywhere.

*Our best-known Asthma Remedy.*—The leaves of Thorn Apple have been used in Europe for a century or more, for mixing with tobacco for smoking in cases of asthma, just as *Euphorbia pilulifera* is sometimes employed by people in Australia, who use it for a similar complaint. There is no doubt it often gives relief in this distressing complaint, and *Stramonium* cigars could be made locally just as they have been in Europe for close on fifty years. A rough article could be made for domestic use, or the leaves may be merely smouldered (with or without the aid of saltpetre) and the smoke inhaled. As regards the sale of these medicinal cigars, the revenue authorities offer no objection to them, provided they are made wholly of *Stramonium*, and are not so made up and advertised as to lead the public to believe that they are tobacco.

*Poisonous nature of the Seeds.*—Following are extracts from an illustrated article I wrote for the *Sydney Mail* of 5th April, 1890:—

In the early part of the last month two men were camping near Jerilderie, when one of them gathered a quantity of a plant which he believed to be marsh-mallow, made a decoction of it, which was drunk cold by himself and his companion, with the result that they became so seriously ill that they had to be conveyed to the Jerilderie Hospital. Under the skilful treatment of Dr. A. C. Robinson the men fortunately recovered, and to that gentleman I am indebted

for a sample of the plant, together with some notes on the case. The plant proves to be *Datura Stramonium* L., the well-known Thorn Apple of Europe, which, singularly, bears the name of "Wild Castor Oil Plant," in the district in which this unfortunate occurrence took place.

Although, as far as I know, this is the first recorded instance of poisoning by Thorn Apple or Stramonium in the Australian colonies, cases are on record of poisoning by it in Europe, while in India Thorn Apple poisoning is a common occurrence, chiefly because it is administered from bad motives. The plant is common enough in all the colonies, chiefly near populated places, and its chief situations are near waste-heaps on which the rubbish of cultivated places has been thrown. It is also by no means a "new chum," and was probably introduced, with garden seeds in the first instance.

I now quote Dr. Robinson's words in regard to his Jerilderie patients: "One of the men when brought here was comatose, the other was able to walk, but was excited and suffering from delusions. I used emetics (zinc sulphate) and the stomach pump, after which I administered copious draughts of strong, hot coffee. In about twelve hours after taking the plant both were able to walk about, but the mind was deranged in the worst case for forty-eight hours. Both afterwards described the effects they felt to be a swelling of the tongue, thick speech, giddiness, and drowsiness. One man said his head and body seemed to swell as if it would burst through the skin." From what I can learn, the men were fortunate in escaping with their lives, and one man has particular cause for gratitude. I make no apology for detailing the symptoms and treatment, especially as the plant is spreading, and poisoning by it may have to be coped with in the absence of a medical man.

Mr. C. Pierrepont Johnson records that accidents have frequently happened in Europe in swallowing an infusion of Thorn-apple herb in mistake for other preparations, as was the case at Jerilderie. Dr. Taylor records an instance in which a woman took two teacupfuls of the infusion, instead of senna tea. She was seized with giddiness, fainted, and became quite insensible in two hours, but the contents of the stomach being removed by the stomach pump, she eventually recovered.

The seeds are by far the most poisonous portion of the plant, and have caused death in numerous recorded cases. In India there were twenty-one deaths out of ninety-two cases. Sixteen grains killed a child in twenty-four hours, and, as the plant seeds freely, it is proper to put people on their guard.

The following amusing account of the effect of Thorn Apple on some British soldiers in North America early in the seventeenth century is taken from Beverley's "History of Virginia":—"This, being an early plant, was gathered very young for a boiled salad by some of the soldiers sent thither to quell the rebellion of Bacon, and some of them ate plentifully of it, the effect of which was a very pleasant comedy, for they turned natural fools upon it for several days. One would blow a feather into the air, another would dart straws at it with great fury; another, stark naked, was seen sitting up in a corner, like a monkey, grinning and making mouths. A fourth would fondly kiss and paw his companions, and sneer in their faces with a countenance more antic than any on a Dutch doll. In this frantic condition they were confined, lest in their folly they should destroy themselves. A thousand simple tricks they played, but after eleven days returned to themselves again, not remembering anything that had passed.

From the following statement it will be seen that we have a far earlier record of poisoning by the seeds, but there are few records altogether; it is hardly possible that there are not more occurrences of this kind:—

Dr. Henry Early (*Australian Medical Journal*, vol. ii. 1857, p. 241) describes seven cases of poisoning amongst children in the Immigrants' Home, Melbourne. The symptoms and signs were dilated pupils, a bright scarlet efflorescence, rapid pulse, much thirst, great excitement, maniacal paroxysms, startings, muttering, and occasional screaming, and catching at imaginary objects. Half

a drachm of the seeds, which were fortunately immature, were obtained from the motions in one case. All recovered. Dr. P. T. Thane, of Yass, New South Wales, in 1899 (*Australian Medical Gazette*, p. 54) records three cases, two fatal. One was a girl of 5 at Yass. There were flushed face and rapid breathing, and later dilated pupils, loss of conjunctival reflex, tonic spasms of the muscles, a temperature of 104.4 degrees, and drowsiness without delirium. The seeds were vomited, passed in the motions, and found post-mortem in the stomach. Another case had occurred at Wagga three years before. The temperature rose to 104.6 degrees, and there were coma, clonic spasms, delirium, dilated pupils, and death in fifteen hours. A previous case at Yass, under Drs. English and Doolan, had had delirium, dilated pupils, and a dry skin, but no rise in temperature; recovered.—Dr. J. B. Cleland, in *Agricultural Gazette*, Tasmania, xlii, 366, 1914.

*Where it is Found.*—It is now widely diffused in New South Wales, as is shown by the following information supplied by the Local Government Department in June, 1919, as to the shires and municipalities in which it has been declared to be noxious.

## SHIRES.

Cessnock	Crookwell	Marthaguy
Cobbora	Hume	Port Stephens
Coreen	Illabo	Wingadee.

## MUNICIPALITIES.

Aberdeen	Braidwood	Picton	Warren
Armidale	Coonamble	Tenterfield	Windsor
Bingara	Dubbo	Tumut	Woollahra
Botany	Kiama	Uralla	Young.

Wiser than we, Victoria has long since proclaimed it for the whole State.

Following are abstracts of some typical reports published by me in the *Agricultural Gazette* many years ago:—

Pretty well diffused; usually in good land, in the warmer, moister parts of the colony, but, like many other weeds, adapting itself more and more to circumstances. In the valley of the Hunter and other northern rivers it is very abundant.

As a rule, grows in rich soils, especially cultivated land, in which it is spreading. No special attempt has been made to eradicate it. Locally called "Devil's Stinkweed." (Emu Plains.)

An utterly useless weed, with a most unpleasant smell. Mostly frequents the rich river flats and the roadsides, where it grows in countless numbers unchecked. Is kept in check on cultivated land by hoeing annually. (Pomona, Wellington.) Erroneously known here and in many other parts of the colony as "Castor Oil Plant," but not to be confused with *Ricinus communis*, the real Castor Oil Plant.

Spreads rapidly in cultivated land and rich soils, while poor grass lands are almost free from it. No steps have been taken to eradicate it. (Wellington.)

Found growing throughout the district. (Eglington, Bathurst.)

Mostly frequents cultivated land. Introduced with the packing of fruit-trees from the nurserymen. (Manilla.)

Is rapidly spreading on cultivated lands, and utterly useless. It is locally known as "Oil Plant." (Singleton.)

*How to deal with it.*—It would be a good thing to make a raid on these plants year after year, wherever they work mischief; pulling or hoeing them out when the plant is in flower is best. They should never be allowed to seed. To carry out this advice effectively will be a matter of the greatest difficulty, since the weed is enormously developed in New South Wales; and, further, its commonest habitat is the banks of rivers and creeks—precisely where cattle have to go to drink.

### Castor Oil Plant (*Ricinus communis* L.).

(EUPHORBIACEÆ: Spurge Family.)

*Often confused with Thorn Apple.*—The Castor Oil of the average Australian is the Thorn Apple (*Datura Stramonium*), see above. The true Castor Oil plant is, however, very much larger, and with smaller fruits, than the Thorn Apple. An old figure of the true Castor Oil plant will be found in the *Botanical Magazine*, t. 2209.

A form with rich coppery leaves, known as var. *Gibsoni*, is often seen in Sydney gardens, for it is very ornamental.

#### *Botanical Description.*—

A tall, erect plant. Leaves peltate, palmately lobed, irregularly serrate. Calyx, 5-partite in the male flowers, 3-partite in the females. Stamens numerous. Styles 3, bifid. Capsule echinate, 3-celled. Seeds large, mottled.

*Where Found.*—It grows in many tropical and sub-tropical countries, preferring light sandy soils. It is well known to us in New South Wales, having been proclaimed as a weed by no less than five shires and ten municipalities, as follows :—

#### SHIRES.

Eurobodalla	Narraburra	Rylstone.
Mulwaree	Jindalee	

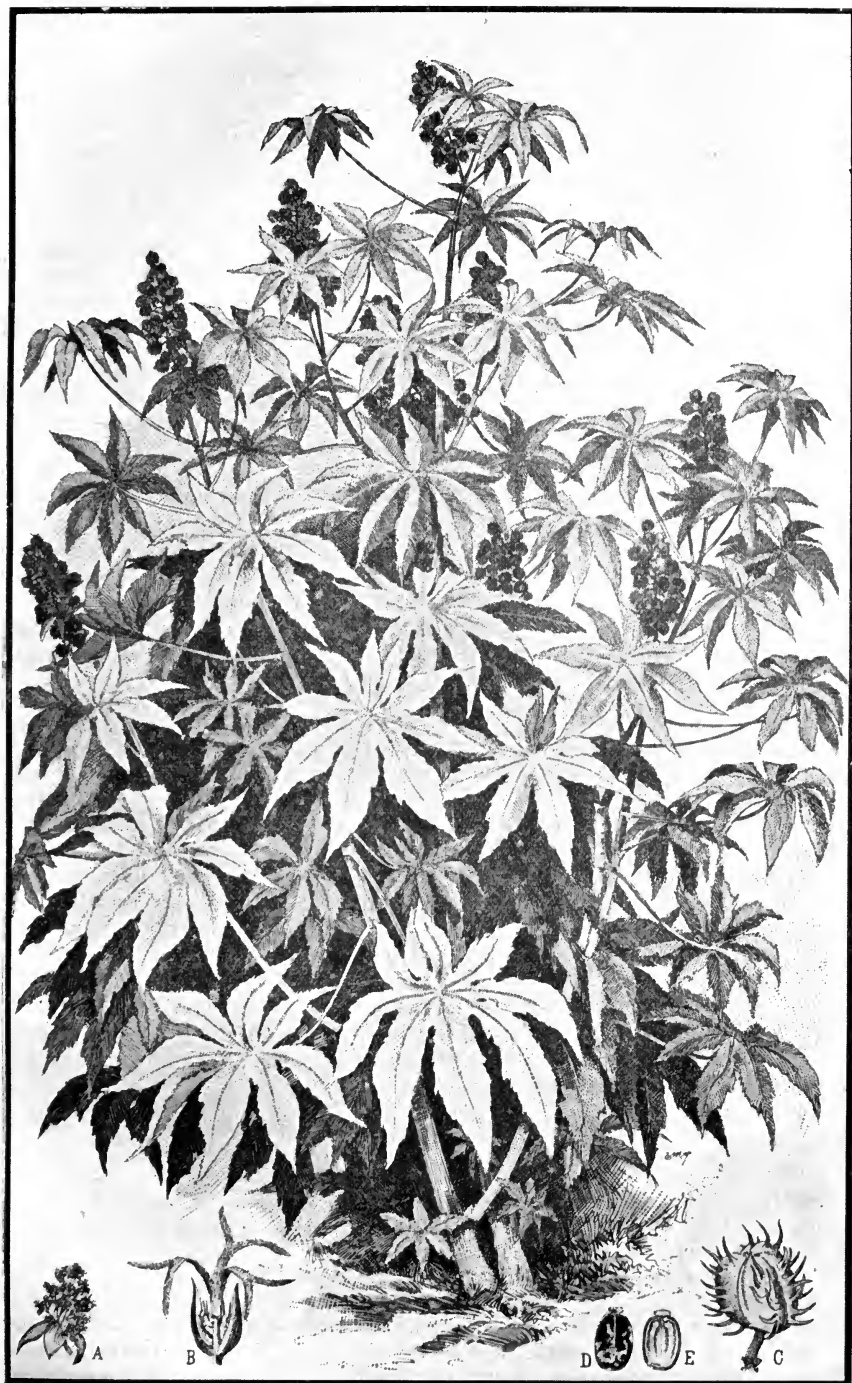
#### MUNICIPALITIES.

Burwood	Concord	Manly	Yass.
Coonamble	Corowa	Junee	
Cootamundra	Cowra	Woollahra	

*Castor Oil Leaves as Fodder.*—In the *Agricultural Gazette* for October, 1911, p. 888, Mr. Mark H. Reynolds, Inspector of Agriculture, writes as follows:—On the Macquarie flats, in the Dubbo district, this plant was the predominant vegetation in 1876. After the first frost the plant begins to die, and it was then that Mr. W. Baird turned 1,100 wethers into about 90 acres. At first the sheep would not touch the Castor Oil plants, but ultimately they fattened on them. The mutton was slightly tainted by the feed, but the flesh was of good colour.

Three years ago Mr. Baird did likewise, on the same piece of land. The prickles on the pods of the plant become very soft after they have been frosted, and the seeds were what the sheep particularly relished; but they also ate the wilted leaves.





Castor Oil Plant (*Ricinus communis* L.).

A. Male flower. B. Female flower. C. Capsule. D. Seed. E. Longitudinal section of seed.

Its use as a fodder is new to me.

"The Castor Oil Industry," by Charles M. Daugherty, *Year-book, U.S. Dept. Agric.*, 1904, p. 287, gives an admirable account of this substance. At that time the use of castor oil in the United States, being only measured by hundreds of thousands of gallons, was small in comparison with that of cotton-seed oil or linseed oil, which ran into tens of millions. At the same time, it is a most important oil.

It is used in dyeing and printing cotton goods, and the well-known Turkey red owes its fastness to castor oil. Its use as a domestic remedy is proverbial, although the quantity so employed is diminishing since the rising generation prefer something more palatable, even if it is not so efficacious. The work quoted gives an account of its minor uses.

Then is given an account of its manufacture, and the residue, known as "Castor pomace" is a valuable fertiliser for potatoes, wheat, oats, and maize.

Follows an account of the sources of supply of castor beans and their distribution. It is pointed out that the one great castor bean-producing country of the world is British India. The most important paper on castor beans that I have seen in recent years is entitled, "Breeding New Castor Beans," with the sub-headings, "Castor oil now becoming of immense commercial importance as motor-lubricant—Careful breeding of varieties having desired attributes necessary to produce best commercial seed—Many characters show Mendelian behaviour."

The paper is by Orland E. White, Curator of Plant Breeding, Brooklyn Botanic Garden, Brooklyn, New York, and is published in the *Journal of Heredity* for May-June, 1918, pp. 195-200.

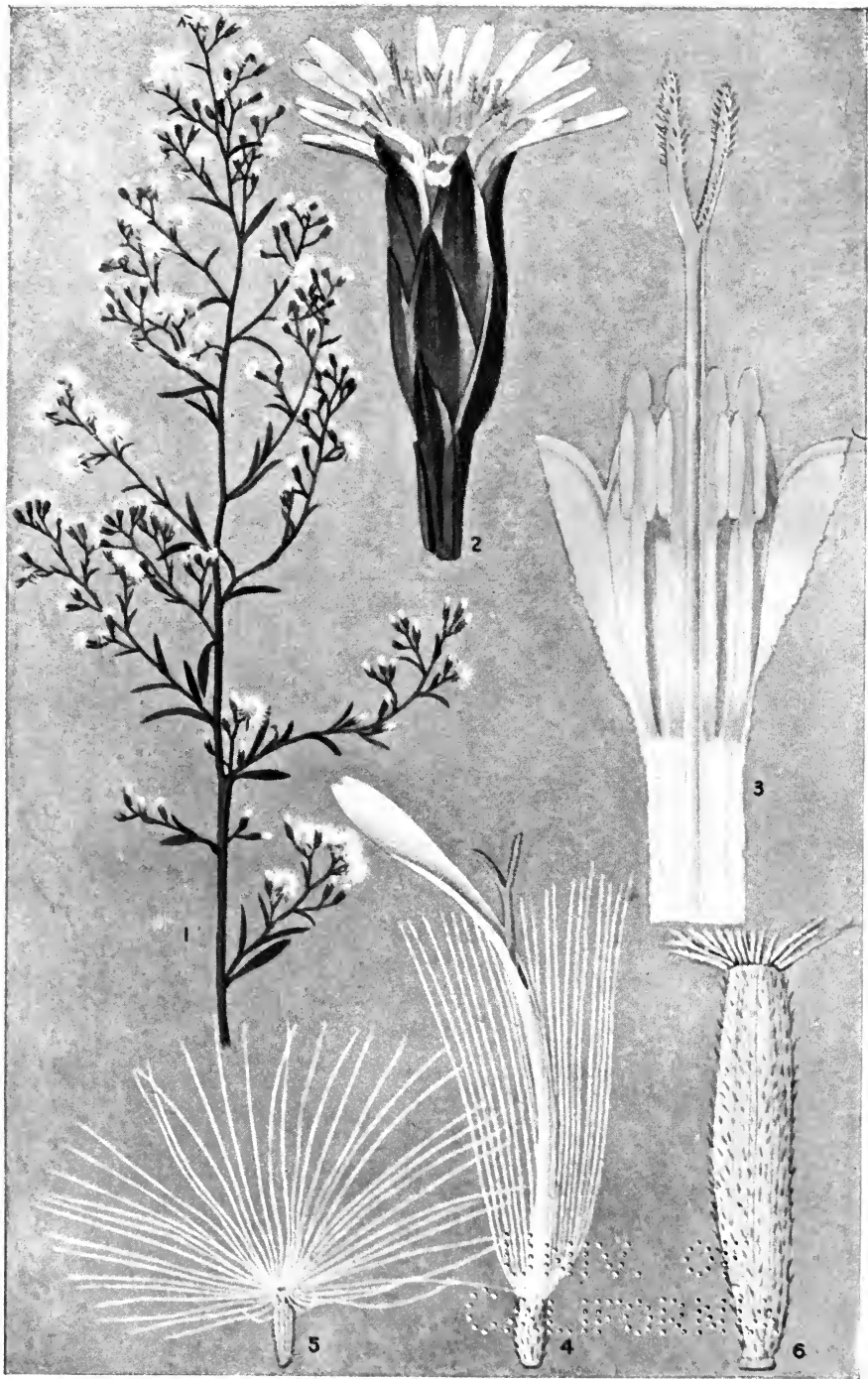
It is stated that the growing of the beans used to be a useful local industry in the middle-western United States, but that over-production and competition with cheap Hindu labour soon made it unprofitable. The United States chiefly imports its castor beans from India. Castor oil has proved itself valuable as an aeroplane motor lubricant.

The author has some splendid illustrations, especially plates of beans, to show (a) variation in size, shape, pattern, and colouring, (b) commercial types of castor beans, (c) results from crossing different types. There are also plates of (d) male and female flowers of the castor bean, and (e) loose and compact fruiting spikes.

The paper is an admirable brief resumé of original work done.

In Australia, even more than in the United States, castor bean growers, when they have got over the difficulty of deciding on the most profitable sorts, are still faced with the competition of the cheaply-paid natives of India.

*Will it be a Profitable Crop in New South Wales?*—The fact that it is a weed over such large areas shows that it can be easily cultivated, and it may be that the best way of getting rid of the pest is to harness it in the service of man. But in order to do this, the utilisation of the weed-form may have



**BUSHY STARTWORT (*Aster subulatus* Michx.).**

1. Flowering branch. 2. Flower 3. Floret opened to show stigma and anthers. 4. Ligulate floret.  
5. Achene showing arrangement of pappus. 6. Achene (seed) much enlarged.



to proceed concurrently with the cultivation of improved forms, such as Mr. Orland White has already selected and raised. Cultivation is essential, as a crop can be controlled while the indiscriminate produce of a weed is difficult and expensive to collect.

It may, of course, be that the industry will have to be assisted by the State, in view of Indian competition, but the oil is so essential to industries in New South Wales that the expediency of such assistance should be considered.

Dr. O. Ercole, who interested himself in this plant, published a pamphlet entitled "The Cultivation of the Castor Oil Plant," which was reprinted in the *Agricultural Gazette* for February, 1906, p. 173, to which my readers are referred.

### Bushy Starwort (*Aster subulatus* Michx.).

(COMPOSITÆ: Daisy Family.)

*Popular Description.*—A rather wiry branched plant, bearing a profusion of not showy small white, daisy-like flowers, and small, narrow leaves. Its usual height is about 2 feet.

#### *Botanical Description.*—

An erect herbaceous biennial with a paniculately branched inflorescence. Involucre narrow turbinate; outer florets ligulate; achenes shortly pubescent, pappus bristles simple.

*Vernacular Names.*—"Bushy Starwort" is one of those manufactured names that I very much dislike, but it is either that or *Aster subulatus*, which is probably no more difficult to remember, and much preferable. The word "Starwort" is sometimes given to Asters. It is sometimes known as "Cobblers' Pegs," but this name is better deserved for *Erigeron*.

In Britton and Brown's "Illustrated Flora of the United States" it is given the name of "Annual Salt-Marsh Aster" from its favourite habitat.

*Habitat.*—It is a native of the eastern United States, in salt-marshes, from the coast of New Hampshire to Florida.

It is common in New South Wales, having been recorded as *Aster dumosus* L. for many years. That is a closely allied species, but as our New South Wales plant has been determined as *A. subulatus* by a well-known American botanist, his determination has been accepted, and those who wish to look up the references may turn to the Proceedings of the Linnean Society of New South Wales, xxiv, 363, for the year 1909.

*Properties.*—This Aster is an aggressive coloniser which has taken possession of large areas in New South Wales, usually in damp situations, in districts so far apart as the coast and Brewarrina. Except that it is not ornamental and is of very little fodder value, I have no specific charge to make against it, for it does not appear to possess any injurious property whatever. It is simply a cumberer of the ground—one of many plants that, under ordinary circumstances, possesses no positive virtues, and no special vices.

**Stinkwort** (*Inula graveolens* Desf.).

(COMPOSITÆ: Daisy Family.)

*Botanical Name.*—*Inula*, a Latin classical name for Elecampane, and, perhaps, a contraction of the word *Helenium*, which was applied to the same species. By mediæval writers it was written *Enula* (Bentley and Trimen). *Graveolens*, the Latin word for strong-smelling.

*Botanical Description.*—

This will be found by persons interested in the botany of the plant at page 468 of vol. v of De Candolle's *Prodromus*. It is there described as a hairy-viscid, very branched, small shrub; the lower leaves being oblong-lanceolate and sub-dentate, while the upper leaves are linear and entire.

This pest is one the most serious that has ever afflicted Australia, and is much better known in South Australia and Western Australia. I appealed to Mr. W. Catton Grasby, who is a native of the former State, and who has been for a number of years agricultural editor of the *Western Mail* in the latter State. He is a well-known agricultural authority, and he has favoured me with the following valuable and interesting account of it:—

*Introduction of Stinkwort.*—I think that the late Dr. Schomburgk was correct in stating that it was first introduced in the Onkaparinga district of South Australia, and the date he gives, 1863, is probably the year or so before the plant was brought under his notice. My father was chairman of the Onkaparinga District Council, and it must have been about 1865 or 1866 that he pointed out to us children a patch of green in the summer time on Mr. Spoehr's farm not far from the Balhannah bridge across the Onkaparinga River. I could only have been 6 or 7 years old at the time, but I have a mental picture of that spot, and remember how the pest increased from year to year until it spread all over the district, and we boys had the yearly task of pulling and hoeing it up for some time on our farm. There is no possibility of my memory playing me false in regard to the spread of the pest and the efforts made by many farmers to keep it in check. The dates must be approximately correct, because I left Balhannah to go to school in Adelaide when I was 10 years old, which would be the beginning of 1870, and we had then had a number of years' experience in trying to keep the pest off the farm.

I do not think that Mr. Spoehr really knew how the weed came on his place. He was a German, and had obtained seeds from Germany. That is all that is known about it. When my father first saw it spreading, he took green specimens to Dr. Schomburgk, Director of the Adelaide Botanic Gardens, and I can remember from boyhood my father giving an account of the interview. The doctor said, "Vot is de use of dese plants? I cannot identify from them. You must bring me plants in flower." As soon as the plants were in flower, father took him further specimens, and in due course the doctor identified the plant as "Stinkaster," or *Inula graveolens*. The doctor said that it was a common weed in Germany and Central Europe, but not dangerous, and he persisted in this attitude for some time, until the pest got a firm hold. By 1879 he had changed his views. The plants, as I first remember them on Mr. Spoehr's land, would be from 18 inches to fully 2 feet tall, because the land was rich and they were not crowded. My father endeavoured to get the plant proclaimed a noxious weed, but he was unsuccessful. Years later, when the pest had become established and beyond control, my father, in recalling the above facts, used to say, "If, instead of bothering about names and regulations, I had taken you boys and anyone else we could have got to help, and pulled and burned out every plant, we might have exterminated it."

*Spread of the Pest.*—The above shows that it is something over 50 years since the plant was introduced, and I have watched it spread from Spoehr's

Stinkwort (*Inula graveolens* Desf.).

- A. Lower leaf, oblong-lanceolate and sub-dentate. B. Upper leaf, entire and nearly linear.  
 C. Portion of flowering twig. D. Flower-head, passing into fruit. E. Receptacle, showing  
 concave depressions and radiating bracts. F. Seed with pappus

farm in every direction, until now it is common in every portion of the agricultural area of South Australia, a large portion of Victoria, and a considerable part of Western Australia. Around Balhannah efforts were made by many farmers to keep it off their farms, but gradually all but two gave in. These persistent men were Mr. Thomas Edwards, of Oakbank, and Mr. John Comac, of Bonney's Flat. Each of these men was determined not to let his land become infested. Mr. Edwards succeeded until he died, but the property is now as badly infested as any other. Last time I saw Mr. Comac's little property (of, I think, 80 acres or so) it was still free from Stinkwort, although it adjoined the farm on which the pest originally appeared. When last I was there Stinkwort still grew freely on the spot where I first saw it. This is mentioned as an answer to those people who say that it is not necessary to bother about Stinkwort, because in time it dies out. It certainly becomes weaker, but the dying out is a myth. As the pest began to spread there was a great deal of talk about suppression, eradication, control, and so forth, just as there is in New South Wales and Western Australia at the present time. My opinion is that when once it gets a hold, any attempt at eradication is nearly as useless as trying to block back the tide.

*Value as a Fodder.*—As long as I can remember, discussions have taken place in regard to the utility of Stinkwort. The first man that I can remember having given it a fodder value was one who was too lazy to attempt to try and keep it in check; he used that argument as a reply to my father, who was urging him, in the interests of the district, to pull or hoe up the Stinkwort on his property. All who have claimed a food value for it have not been actuated by the same motive, but some have. I think that the following seems to state the case as to its fodder value:—

(1) No kind of stock will eat Stinkwort freely, and it cannot be classed as a fodder.

(2) When it is young and growing amongst other feed, cattle, horses, and sheep eat it to a certain extent, and if it is not too plentiful and there are sufficient stock on the paddock they will keep it eaten down; in some cases, as was mentioned by a well-known Meckering farmer in the *Western Mail* of 15th March, 1918, under the pen-name of "Granite," they may keep it right down for a season. Stinkwort will affect the flavour of milk and butter, and, if eaten freely, the mutton of sheep.

(3) The majority of people do not appear to exercise ordinary observation when claiming that their stock freely eat Stinkwort. I have heard men make this claim on their farms, and have pointed out to them that the Stinkwort plants only showed evidence of being nibbled, which was proof positive that the stock did not eat it freely. I took a good deal of notice of it when I was Head Master at Roseworthy Agricultural College, from 1894-96, and it was a frequent subject for discussion with farmers.

*Value as a Subsoiler.*—I look upon Stinkwort as being up till now a useless plant so far as profit to the farmer is concerned. It is objectionable, but I do not think that it is directly noxious, and the only harm it will do to stock is when, owing to a shortage of feed, they eat the well-developed plants and are injured by the accumulation of woody fibre, as mentioned by Mr. F. E. Place. I think, however, that it has some value, especially in heavy lands with strong clay subsoil, because it sends down a deep tap-root, and for this reason it may be considered as one of Nature's subsoilers. In decaying, the roots let in the air, and, of course, furnish a certain amount of humus. Undoubtedly these thick crops of Stinkwort on lands with clay subsoils do a considerable amount towards opening and aerating the soil.

*Control.*—My opinion is that every farmer should endeavour to keep the plant in check as long as he can do it at reasonable expense. This is best done by pulling and hoeing up the odd plants when they are green. They must not be allowed to stand until the buds are ready to open, because if they are pulled at that time the flowers will open and seeds will be produced sufficiently mature to germinate. When, owing to the neglect of neighbours, Stinkwort becomes too plentiful on a farm to permit of being pulled or hoed, it is best to let it go. It is not a serious trouble to wheat or hay crops; it is fairly easily dealt with on fallows; it is not actually noxious; and, as it grows in summer when



nothing else does, it is more an objectionable than a strictly injurious weed. It does not grow nearly so freely and vigorously in ordinary years in Western Australia as it does in South Australia, where summer rains are much more common. In our agricultural areas only an average of about 10 per cent. of the rain falls in the five summer months. During the last three summers we have had a bigger proportion of summer rain, and the influence on Stinkwort has been very marked. It therefore seems probable that in portions of New South Wales Stinkwort will be found more troublesome than it is in South Australia. The secret of treatment against Stinkwort is for every farmer in a district to keep it down when it first appears. As the seeds blow so freely, if one man neglects it he may seed the whole of his neighbourhood.

In the 1894 report, page 60, of the firm of Merck, of Darmstadt, we find "*Extractum Inulæ graveolentis spir. spiss.*" In other words, dried alcoholic extract of Stinkwort. It is prepared from the leaves, freed from essential oil. The report goes on to say: "It was known to the ancient Greeks, and has long been used for colic dysuria, and amenorrhœa. In Australia it has been used as an anti-asthmatic. The plant, or rather the extract obtained from it, has lately become more interesting, as M. Mendelsohn (*Deutsch. med. Wochenschr.*, 1894, No. 30) produced with it paralysis of respiration and the locomotor apparatus in animals of various species. Closer investigations proved that in symptoms of paralysis two different substances are concerned, of which one convulses the front extremities, whilst the other produces paralysis of the hind extremities, which latter eventually predominates in the general effect. These results of investigations might lead to practical application of the remedy."

But do not let these investigations incline the farmer to look upon Stinkwort with a more tender eye, for even if a very large demand (which is exceedingly unlikely) were to spring up for this drug, it could be readily satisfied from its native home on the shores of the Mediterranean.

In the *Garden and Field* for July, 1894, it was pointed out that in Europe the dried plant is used for smoking bacon and hams. One gentleman in South Australia tried the experiment, and reported it to be a success.

Elecampane (*Inula Helenium*) is a very close and well-known relation of the Stinkwort.

A decoction of the root of the Elecampane was said by Dr. Withering many years ago to have cured sheep affected by scab. Elecampane was at one time largely used in medicine, but now its use is chiefly restricted to veterinary medicine.

*How to get rid of it.*—In discussing methods of eradication of Stinkwort (*Garden and Field*, April, 1894), it was agreed that vigorous measures should be used by everyone who had an interest in keeping the land clear, as those who had no experience of Stinkwort did not realise the immense loss which would accrue through allowing it to get beyond control. One gentleman intended to plough it under before it flowered. Another speaker thought such a course would be very dangerous, as ploughing would not destroy it—indeed, stirring the land, he was afraid, would only increase its vigour. He was hoeing it, and found it effectual, although it might require several years' hoeing to thoroughly eradicate it. He believed that hoeing before the plant flowered, as well as pulling up, which was better still, though more troublesome, was the only effective means of dealing with the pest.

This advice is clear and specific enough. Where it has once seeded it will not be got rid of in a year, and its eradication means more hard work for the farmer, who has quite enough work to do already. (See *Agricultural Gazette*, 1895, page 308.)

*Where Found.*—Countries round the Mediterranean Sea, from which it has spread to many warm countries.

*Stinkwort in New South Wales.*—As will be seen from the accompanying list, the pest has already got a footing in New South Wales, as could have been confidently predicted. I do hope that our farmers will be able to cope with it, as it has been one of the most costly weed-pests to the South Australian farmer.

In April, 1889, I reported as follows to the Agricultural Society of New South Wales in regard to Stinkwort, specimens of which had been sent over from the Royal Agricultural Society of South Australia:—"To none of my correspondents nor myself is the plant known as having been introduced into New South Wales, though that is only a matter of time, probably short. Specimens of an *Inula* were sent to Sydney last year from southern New South Wales, suspected of doing injury to stock. Except by analogy, nothing is known of its properties here, but I do not for a moment believe that it is poisonous, although such a rank-growing weed, so full of fibre, would be highly indigestible, and the bitter would probably be very palatable to stock, especially to horses. The hyaline sticky resin is probably an interesting substance, common to many composites, but I do not think European chemists have worked at it, while Australian ones certainly have not. Species of *Erigeron* (cobblers' pegs) are almost as great a curse in parts of New South Wales as this species of *Inula* appears to be in South Australia, and no practicable plan appears to be known for the eradication of either."

In the *Herald* of 28th March, 1890, is the following telegram from Albury. It refers to Stinkwort:—"A noxious weed new to this district has been found in the paddocks near Burrumbuttock. It is said to be identical with the weed common in South Australia. It begins to grow in the summer months, has a straight stem, and grows (according to the nature of the soil) from 3 inches or 4 inches to 3 feet and 4 feet high. It is of a nice green colour, has small yellow flowers, and a very strong and nasty smell. It spoils all grazing land, especially for dairy cattle. The milk becomes green, with a very offensive smell, and the butter, after about two days, will give an unbearable smell."

Mr. G. S. Mackay, Secretary of the Albury Pastures and Stock Board, writes to the Department under date of 15th March, 1894: "Stinkwort has only lately made its appearance." In the *Agricultural Gazette* of May, 1895, page 308, Mr. Odewahn, of Walla Walla, near Albury, reports it (the word *Inula* is spelt *Mula* through a typographical error).

It has made up for lost time since then. Up to June, 1919, the Stinkwort had been proclaimed by thirty-four shires and twelve municipalities, making forty-six in all, and to-day it is well advanced in the list of New South Wales weed-pests. Following is the list, furnished by the Local Government Department, of shires and municipalities that have proclaimed the weed.—

## SHIRES.

Adjungbilly	Boree	Coreen	Demondrille
Berrigan	Conargo	Crookwell	Goobang
Bogan	Coolamon	Culcairn	Goodrabigbee



(*Soliva sessilis* Ruiz. and Pav.).

1. Flower-head. 2. Inner, male florets. 3. Male floret open to show anthers.  
4. Capitulum in fruit, sessile in a fork. 5. Achene (seed).

THE  
END

SHIRES—*continued*.

Gunning	Lachlan	Narraburra	Weddin
Holbrook	Lockhart	Timbregongie	Windouran
Illabo	Mulwaree	Tumbarumba	Wingadee
Jemalong	Murrunga!	Urana	Yanko.
Jindalee	Murray	Wakool	
Kyeamba	Namoi	Waugoola	

## MUNICIPALITIES.

Albury	Corowa	Murrumburrah	Wallendbeen
Balranald	Junee	Parkes	Wyalong
Cootamundra	Moama	Wagga Wagga	Yass.

***Soliva sessilis* (Ruiz and Pavon).**

(COMPOSITE: But it would not be proper to call it Daisy Family.)

*Popular Description*.—A small, insignificant plant with finely divided small leaves and inconspicuous greenish flowers, and bearing a profusion of burrs armed with numerous spines.

*Botanical Description*.—

Villous, or the leaves glabrous, twice divided, primary divisions 3-5, petiolate, parted into 3-5 narrow lanceolate lobes; flower heads depressed; achenes broadly obovate, thin-winged, the wings entire or sometimes panduriform-excised near the base, spindulose-pointed at summit, in some wings reduced to an acute margin; persistent style long and stout. (Gray's "Synoptical Flora of North America," p. 365.)

*A Close Relation*.—"Gymnostyles anthemifolia is stated by M. de Jussieu to be a native of New South Wales, but as I have observed it only in cultivated ground in the neighbourhood of Sydney, and as it has certainly been found in South America, of which four other species of the genus are undoubtedly natives, it has probably been imported into New South Wales, perhaps from Brazil." (Robert Brown, in the "Proceedings of the Linnean Society of London," vol. xii, p. 102, published in the year 1818.)

This is *Soliva anthemifolia*, which, although described in the *Flora Australiensis* iii, 552, is clearly indicated as an introduction, in these words:—

"A small genus, apparently limited to the warmer regions of America, except where introduced with cultivation."

Nevertheless, Mueller placed it in his "Census of Australian Plants." It is a larger plant, and less prickly than *S. sessilis*, and is found more or less over the State, extending to the North Coast and the Western Plains.

*First Record in New South Wales*.—The Australian history of the present species (*S. sessilis*) so far as I know it, is as follows:—

It was first sent to the Botanic Gardens in October, 1899, from the Cricket Ground in Moore Park, Sydney, by the late Mr. Sheridan, managing trustee. It is quite easy to imagine how it came to Sydney. A sailor from, say, Chili, where it is very common, would get the burrs in his shore trousers and fold them up when he returned to his ship. Arrived at Sydney he would sit down and witness a cricket match, leaving one or more of the seed-containing burrs on the cricket ground. A small and insignificant plant, it was not noticed until it got a good hold, and I remember how it grieved Mr. Sheridan, for he had received many complaints from patrons who said that they could no longer sit on the grass with comfort; they had to stand up.

The following year it was reported from Parramatta. In 1903, Mr. Jesse Gregson sent it from Newcastle. Since then it has spread abundantly in the coast districts, particularly in sandy grass land.

A Mr. Burgess wrote from East Maitland: "It grows very plentifully in the local show ground. The fruits are very sharp and hard, and it is almost impossible to sit on the grass. The fruits also enter the bicycle tyres, and in the course of a day or two work their way through and cause a puncture. The local name is 'Jo Jo.'"

The Mayor of Lambton wrote: "Lambton Park is at present overrun with it. It has completely grown all over the 20 acres, and is a menace to cattle."

It seems to have a preference for well-kept grounds for cricket and other games.

It is impossible to say when it first came to Australia. New South Wales has had direct traffic with South America for very many years, and it is very likely that it came in the tails of horses to Sydney or Eden, or some other part of the South Coast more than half a century ago. It is inconspicuous and therefore could easily be passed over—unless you sat on it.

While a native of Chili, it has spread extensively in other parts of South America, and also to California. It is now widely distributed in sub-tropical countries.

*How to get rid of it.*—When it is present in quantity it is too costly to attempt to deal with it, except in the case of valuable lawns. In such cases I would get rid of it partly by means of a small, sharp steel trowel, and partly by encouraging the growth of the couch grass by top-dressing, and also by the use of such a stimulant as sulphate of ammonia, which will cause a heavy and smothering growth of grass. There seems no trouble with buffalo grass, the weed, as a rule, losing itself under the coarse mat of this grass.

### Bathurst Burr (*Xanthium spinosum* L.).

(COMPOSITÆ: A Family which includes Daisies and plants widely differing in aspect.)

This pest owes its name to its having been first prominently brought to notice at Bathurst, in this State. At the present time no product, no institution of the "City of the Plains," is so identified with it as this wretched weed. The association clings to Bathurst as tenaciously as the burr to a fleece; but it is undeserved, as the weed is far more abundant in some other parts of the State.

It originally came in the tails of horses from Valparaiso, Chili, South America, in the forties. I think it came to Twofold Bay first. Not many years afterwards it arrived at Bathurst, *viâ* Molong. At Bathurst it was first noticed on the site of the Old Black Bull Inn, corner of Bentinck and Howick streets.

Its hooked fruits readily attach themselves to the hides and fleeces of animals, and the clothing of man. The presence of these burrs greatly depreciates the value of wool; what with the actual deterioration of wool, and the cost of the labour in eradicating the plant, it must have cost the State enormous sums already, and is at the present time a steady drain on the resources of the State.

For some notes on the spread of this burr on advertisement cards, see p. 12 of this work.



**Bathurst Burr** (*Xanthium spinosum* L.).

A. Fruiting head (Burr), covered with prickles (enlarged).  
B and C. Leaf, showing also the strong trifid spines (both natural size).

*Botanical Name.*—*Xanthium*, Greek *Xanthos*, yellow, some plants belonging to the genus having been used in ancient times by the Greeks to dye their hair. *Spinosum*, Latin, in allusion to the strong spines possessed by our plant.

*Popular Description.*—A rigid, much-branched, annual shrub, of 1 to 3 feet high, very spinous. The fruit is nearly egg-shaped, and covered with hooked prickles.

Well known as the plant is, many people are still ignorant of it; the object of this article is to forewarn such, and to stimulate to action those who know the pest, and who are passive in regard to it.

*Botanical Description.*—

This will be found at page 535 of the third volume of the *Flora Australiensis*. The Bathurst burr belongs to the same family as the Daisy, viz., the *Compositæ*. It is what is called a monœcious plant—that is to say, the male and female flowers are distinct, though on the same plant. The female flowers are, of course, succeeded by the fruit, and these fruits form the burrs to which the noxiousness of the plant is mainly due. The hooked prickles on the fruits seem to be wonderfully contrived to attach themselves to wool, &c. The trifid, or three-pronged spines, are very strong, and increase the formidable nature of the plant.

*Is the Bathurst Burr Poisonous?*—In the year 1880, Dr. Joseph Bancroft read a paper before the Queensland Philosophical Society, entitled “The newly-introduced poisonous burr, *Xanthium strumarium*.” This plant was reputed to have caused the death of a number of cows, and Dr. Bancroft, having experimented on small animals with an extract of the plant, pronounced it to be poisonous. He adds, “To follow out further the inquiry into the properties of the genus *Xanthium*, I prepared extract from *X. spinosum*, the so-called Bathurst burr. This plant is not eaten by cattle, and in its young state possesses none of the soft, tempting foliage of *X. strumarium*, so that we never hear of cattle being poisoned by eating it. Extract of the Bathurst burr gave similar results, differing in no way from the poison of *Xanthium strumarium*.” I refer my readers to the paper itself, but such advances have taken place in the methods of inquiry into poison-plants during the last few years that I do not think Dr. Bancroft himself would now consider his experiments conclusive. At the same time, I invite my readers to state any evidence they can bring forward which may seem to point to the poisonous nature of the Bathurst burr. Speaking of *X. strumarium*, which in America is known as Cocklebur or Clotbur, Mr. Goff, *Bulletin* No. 39 of the Agricultural Experiment Station of the University of Wisconsin, says: “It has been said that the plant is poisonous to cattle, but this is probably a mistake. It is at least known that cattle sometimes eat sparingly of it without serious results.” (See an article by me on *X. strumarium*, “Noogoora Burr,” in the *Agricultural Gazette* for October, 1899.)

*How to get rid of it.*—It is too much to expect to entirely get rid of this all-prevailing pest, but, with patience, it can be largely kept in check. It should be prevented from maturing seed, and, therefore, it should be cut down with a hoe or mattock in the spring or summer; where convenient it is also desirable to burn the plants as soon as they are dry enough to admit of this being done, as large quantities of seeds are produced, the destruction of which should be ensured. Serious as has been the spread of this weed already, it is still spreading, and to permit this to go on unchecked is simply



unpardonable. I am quite aware that farmers and pastoralists have not, as a rule, the funds with which to employ sufficient labour for its extirpation, but, even under present conditions, much more can be done to combat this terrible pest. I would still remind those in charge of roads of the amount of good they can do to the country by insisting on keeping the roadsides free from the worst weeds. In this connection the roads are the arteries of the country; along them course things good and bad, and bad weeds allowed to establish themselves on the roads will as assuredly contaminate the surrounding country, as impure blood will induce disorders throughout the animal system. Let us have some enthusiasm in this matter of weed-repression.

Its introduction to South Africa is attributed to the merino sheep brought from Europe. Writing in 1873, Dr. Shaw (*Journ. Linnean Soc.* xiv, 202) says: "The weed extended itself throughout the sheep-walks of the Colony to such a degree, and so endangered the character of the wool through its achenes, that special legislative enactments have been made in regard to its extirpation; and rigid enforcement of penalties alone has kept it from being a sweeping curse to the wool-producers. In the Orange River Republic, where only until last year this weed was allowed to revel undisturbed, it had so affected the wool of some parts of the country as to make it nearly unremunerative as a staple product. Tardy legislation on the obnoxious introduction had to be adopted there also." In a note in the *Victorian Naturalist*, vol. 71 (1888), Consul Layard, of Noumea, stated it was introduced to the Cape in a cargo of wool wrecked off Cape Agulhas and spread out to dry on the shores of Simon's Town. He adds that he "believes and hopes that he destroyed the first and last plant of Bathurst burr that sprang up in New Zealand, about 1863." Unfortunately, as we find from Cheeseman's "Flora," it is by no means scarce in the North Island of New Zealand, while I feel sure it was an introduction before 1863.

*Magnitude of the Pest in New South Wales.*—The Bathurst burr (leaving out Prickly-pear, which is in a class by itself) is far and away the most widely diffused and most feared weed pest in New South Wales. Up to June, 1919, it had been proclaimed a noxious weed in ninety-seven municipalities and 103 shires, making 200 local authorities in all. The next pest is the blackberry, which is proscribed by 101 municipalities and shires altogether.

It always seems to have been our premier pest. Mr. L. Shepherd, of the Darling Nursery, Sydney, wrote in December, 1856, to the *Sydney Magazine of Science and Art*, i, 109; and Mr. F. Creswick, in June, 1858, had a paper in the same magazine, ii, 23, urging its importance and suggesting its destruction.

The following is the list, as furnished by the Local Government Department, of shires and municipalities in which the Bathurst burr is proclaimed:—

## SHIRES.

Abercrombie	Bibbenluke	Canobolas	Copmanhurst
Adjungbilly	Bogan	Carrathool	Coreen
Amaroo	Bolwarra	Cessnock	Crookwell
Ashford	Booolooroo	Cobbora	Culcairn
Bannockburn	Boomi	Cockburn	Dalgety
Barraba	Bulli	Coolah	Demondrille
Bellingen	Burrangong	Coolamon	Dorrigo
Berrigan	Byron	Coonabarabran	Dumaresq

SHIRES—*continued*.

Eurobodalla	Liverpool Plains	Narraburra	Tumbarumba
Gadara	Lockhart	Nundle	Tweed
Gilgandra	Lyndhurst	Nymboida	Urana
Gloucester	Macintyre	Orara	Wakool
Goodradigbee	Macleay	Patrick Plains	Walgett
Gostwyck	Macquarie	Peel	Wallerobba
Gundurimba	Mandowa	Port Stephens	Waradgery
Gunning	Manning	Severn	Warrah
Gwydir	Marthaguy	Stroud	Waugoola
Harwood	Mitchell	Sutherland	Weddin
Holbrook	Monaro	Talbragar	Windouran
Illabo	Mulwaree	Tamaring	Wingadee
Imlay	Mumbulla	Tarro	Wollondilly
Jemalong	Murray	Tenterfield	Woodburn
Jindalee	Murrumbidgee	Terania	Yallaro
Kyogle	Murrungal	Timbregongie	Yanko
Lachlan	Nambucca	Tintenbar	Yarrowluml.
Lake Macquarie	Namoi	Tomiki	

## MUNICIPALITIES.

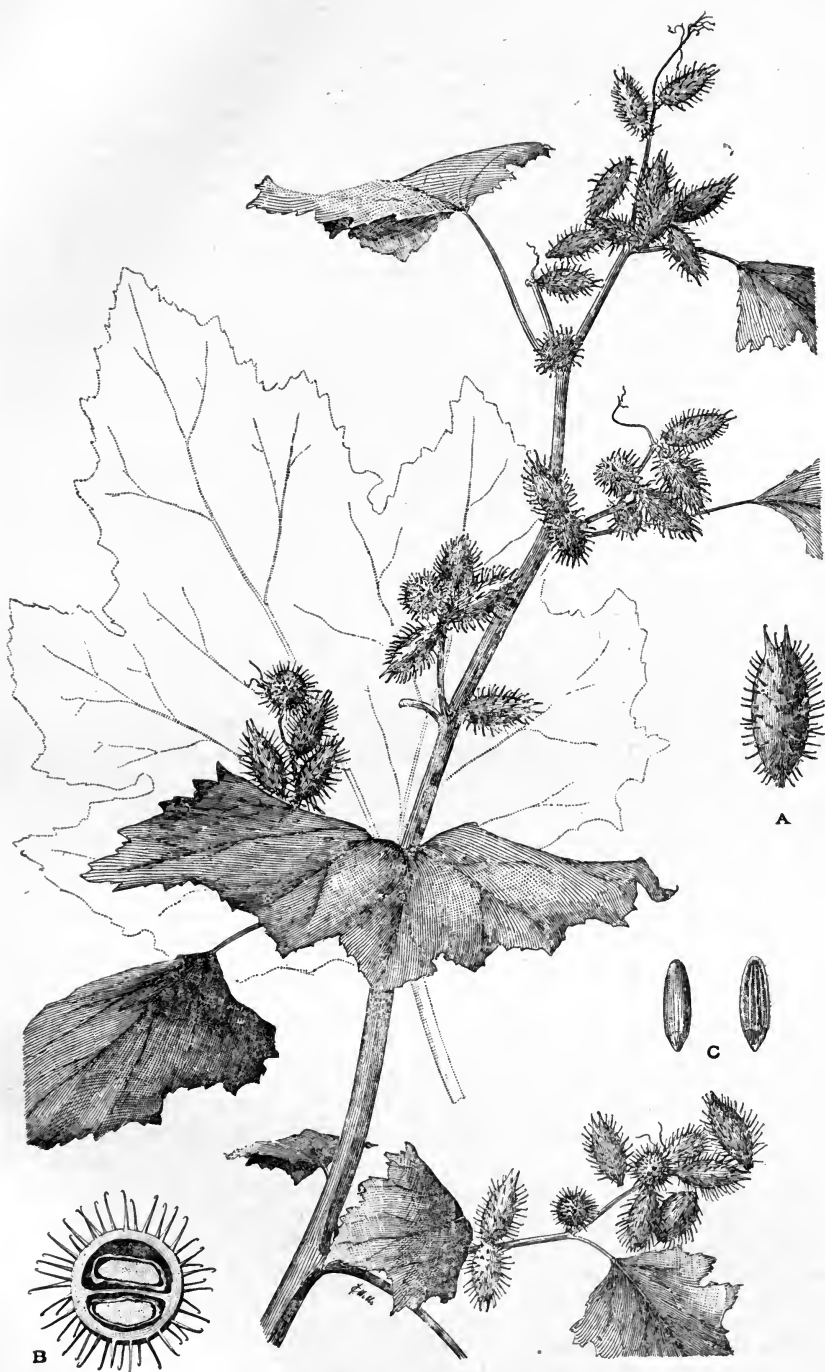
Aberdeen	Casino	Gunnedah	Molong	St. Peters
Adamstown	Concord	Hamilton	Mosman	Stockton
Albury	Coonamble	Hay	Moss Vale	Temora
Alexandria	Cootamundra	Homebush	Mullumbimby	Tumut
Annardale	Coraki	Hunter's Hill	Murrumburrah	Ulladulla
Armidade	Corowa	Illawarra North	Murrurundi	Ulmarra
Ashfield	Cowra	Inverell	Murwillumbah	Uralla
Ballina	Cudgegong	June	Narromine	Wagga Wagga
Balmain	Drummoyne	Kempsey	New Lambton	Walcha
Balranald	Dubbo	Kiama	Newcastle	Warren
Bathurst	Dundas	Lambton	Nyngan	Willoughby
Bega	Forbes	Lismore	Orange	Windsor
Bingara	Glebe	Macleay	Peak Hill	Wollongong
Botany	Glen Innes	Maitland East	Penrith	Woollahra
Braidwood	Goulburn	Maitland West	Pictou	Wyalong
Burrowa	Grafton	Manilla	Queanbeyan	Yass
Burwood	Grafton South	Manly	Quirindi	Young
Camden	Granville	Mascot	Richmond	
Campbelltown	Gulgong	Merewether	Rockdale	
Cargoar	Gundagai	Moama	Singleton	

It is legislated against by the Commonwealth and all the States.

*Where Found*.—It is believed to be a native of Chili, South America, but it has spread to most warm countries of the world.

**Noogoora Burr** (*Xanthium strumarium* L.).

If a ship brings small-pox to our shores, the most stringent quarantine regulations are put in force, and the disease is forthwith stamped out; if a suspicious case arises inland, a medical man of much experience is despatched to the district, and the matter is inquired into on the spot at once; but I am sorry to say that as regards weed, fungus, and insect pests, which war against the tiller of the soil or the pastoralist, we have no such ready method of treatment. In the first place, we usually hear of the spread of an unknown weed from some chance correspondent, and then, when it gets so bad that something must be done, the time for arresting its spread has passed. I was talking to Mr. F. M. Bailey, the Government Botanist of Queensland, a few days ago (this was written in 1896) about the pest which forms the subject of this article. He said, "I well remember when £50 would have stamped it out in my colony; now it would take untold wealth to do it."



Noogoora or Cockle Burr (*Xanthium strumarium* L.).

A. Fruit (burr). B. Transverse section of fruit. C. Convex and flat (furrowed) sides of seed.

In 1899 I estimated that in New South Wales £1,000, judiciously spent, would entirely free us from the pest. Without any desire to be sensational, I stated that, if allowed to spread unchecked, it would in a few years deteriorate our territory to the value of a million of money. To-day—1920—this is probably not very wide of the mark. The weed has spread enormously, and has already been proclaimed by twenty-seven municipalities and fifty-five shires.

*Vernacular Names.*—It is called “Noogoora” burr in parts of Queensland, owing to its prevalence in that locality; the name is, however, scarcely suitable in New South Wales. In the United States it goes by the name of Clot burr or Cockle burr.

*Botanical Name.*—*Xanthium* (already explained); *strumarium*, from the Latin *struma*, a swelling, in allusion to the shape of the fruit.

*Reports from New South Wales in regard to it.*—It has been recorded from New South Wales for at least twenty-three years. Following are two reports concerning it:—

Mr. A. H. Hammond, of Rose Vale, Byron Bay, wrote under date 21st April, 1896:—“I am forwarding a specimen of noxious weed which we would like to know the name of. It has been brought here only recently, but bids fair (as you will see by the seed) to spread far and wide in a very short time. This specimen is the top of a plant 6 feet high, and the limbs at the base are about 5 feet across. It grows very much like the castor-oil plant when young. It is at present growing on the side of a road, and if a noxious weed, I think the maintenance man on that portion of the road should be instructed to keep it brushed down.”

On the 15th April, 1896, Mr. Forester Pope wrote from Burringbar, Tweed River:—“I forward specimen of a burr which has recently made its appearance in this district, and which, I fear, is likely to become a severe pest if not checked in time. It is my belief that it was originally brought here by men who brought horses from Queensland to work on the railway. Mr. W. M. Charles, of ‘Warrana,’ Tweed River, says it is the ‘Narcoora’ (Noogoora) burr, and that he has seen whole paddocks destroyed by it. He also says that the seeds will germinate after lying two years in the ground. The plant grows to a height of 5 feet from the ground, with spreading branches, covering a space 5 or 6 feet in diameter. The burrs when ripe are light and easily catch in horses’ manes and tails, from which they are only removed with great difficulty. It is confined chiefly at present to the Tweed district. I have seen very little of it on the Richmond, but I am quite sure from what I have seen of it myself that, unless it is checked, the consequences will be most serious. I have not noticed that anything will eat the leaves. It dies in the winter, but comes up again stronger than ever in the spring.”

Mr. G. H. Gordon, Chairman of the Warialda Sheep and Pastures Board, writing to Mr. Bruce about the spreading of the burr in that district, said: “During the week ending Sunday, 9th July, 1898, I visited with Mr. Kirkpatrick, I.S., the country about Boggabilla, thence to Goondiwindi, at his request and in compliance with your wish to him, and now advise that the Noogoora burr has for this season advanced to a stage when it would be useless in expending money in cutting it. All that can be done, *pro tem.*, is to thresh it out about the Goondiwindi Bridge and Boggabilla Common Crossing of the river, at a cost not to exceed from £10 to £15. By so doing

a certain amount would not be carried away by stock and distributed through the country; but unless the same thing is done by the Queensland Government, on the other side of the river, the expenditure would be of very little use. The balance of money available now should be utilised when the burr is fit to cut next season, and this amount it will be necessary to largely supplement if the pest is to be coped with. I regret to say that both sheep and cattle have already largely distributed it all over this north-western portion of the colony, and I feel sure that unless legislation to cut both the Bathurst and Noogoora burr is at once brought about, the loss sustained by the colony will be enormous. It is apparent that all commons and stock routes are the growers and distributors of the pests. The Noogoora-burr comes down from Queensland waters, and unless the Queensland Government at once takes the matter in hand with New South Wales, it will be useless New South Wales expecting to do any permanent good by cutting, unless by a large annual expenditure."

Mr. Stock Inspector Kirkpatrick added, in reference to Mr. Gordon's communication: "I agree with Mr. Gordon's recommendations, but would suggest that a few pounds—say, £5 or £10—be spent on either cutting or threshing at the plants near to where travelling stock are likely to come in contact with them, and so prevent the seed from being distributed along the stock routes." This, of course, will be done. In Queensland, the pest has, unfortunately, become well established, and the Department is indebted to the Honorable the Minister for Agriculture in Queensland for the following report upon it:—"The Colonial Botanist, Mr. F. M. Bailey, the author of the article, has received no reports that it can be generally met with in the north, but it has overrun many parts of South Queensland, especially on the coast side of the Main Range, the main cause of distribution, in his opinion, being attributable rather to the dissemination of the burrs by means of stock, to which they stick, than by flood waters, though, of course, the latter have done their part. No systematic attack has yet been made upon this pest, the cost of which would be very great; but, under the powers of the Divisional Boards Act of 1887, clause 177, some Boards have attacked the pest within their boundaries. In such divisions where there are unoccupied Crown lands and reserves for the condition of which the Crown is liable, the course usually followed is for the Divisional Board to notify this Department that this or that area requires clearing of noxious weeds, and to submit tenders for the cost, with the recommendation of the Board as to which should be accepted. Upon approval of the work and tender, supervision of the contract is carried out by the Board, who, upon completion of the work, certify thereto, and payment is made to the Board by this Department. With regard to reserves, those vested under trustees for certain purposes are, in connection with noxious weeds, treated in the same manner as in the case of private persons, and are cleared at their expense; and such reserves as camping, water, road metal, crossing, gravel, pasturage, quarry, and road reserves that are under the control of the local authorities, are paid for by them, and not by this Department."

Referring to the statement above in regard to the delayed germination of the seeds of this plant, this is a fact well ascertained, and one which adds to the danger of the plant. Those who are interested in the question are invited to consult an interesting paper by Prof. J. C. Arthur, of Purdue

University, United States of America, on "Delayed germination of Cockle-burr and other paired seeds." (*Proceedings 16th Annual Meeting for Society for Promotion of Agricultural Science, Springfield, August, 1895*).

*The Cockle-burr in Queensland.*—This weed has been established in Queensland for a number of years, and there is no doubt that it is working its way south from that State. In this way we obtained Paddy's Lucerne, which, year by year, moves onward into our territory. It is commonly known in South Queensland as "Noogoora-burr," covering (in 1879) no less than 500 acres on the Noogoora Estate, near Brisbane, alone. It is a well-recognised pest in the northern State.

Ex-Senator Walker writes:—"I may inform you that this burr came to Noogoora much earlier than 1890. The Noogoora property at one time belonged to a Mr. Bauer, a cotton planter, and the burr is supposed to have come from either Mauritius or Natal with some imports. It grows prolifically on the banks of the Brisbane River, and I think I can say pretty confidently it came as far back as 1871. I had occasion to visit Noogoora in 1871. The burr was not then the nuisance it afterwards became, but it got its name from having broken out at Noogoora. Doubtless you can make further inquiries from Queensland, if you wish to ascertain the exact date at which it became troublesome. Cattle are rather fond of it when the shrub is young; when older it is dangerous. I am not sure it was not introduced with the cotton seed." (It is supposed to have been so introduced in that way during the early sixties.)

*Is Cockle burr poisonous?*—I alluded to this matter in my article on the Bathurst burr, in the *Agricultural Gazette* for July, 1896, page 445, and expressed doubt as to its poisonous nature. Months before my article could have reached him, Professor J. C. Arthur, of Purdue University, U.S.A., wrote to me: "I am preparing an account of what we know as Cockle-burrs (*Xanthium canadense*, *strumarium*, and *spinosum*) for the farmers of this State. I learn that in Australia these plants, when young, are reputed to be poisonous. They do not have such a reputation in this country, and I wish to obtain all information regarding the matter I can." I sent Prof. Arthur a copy of Dr. Joseph Bancroft's paper and of my own. He replied: "I am unable to entirely account for Dr. Bancroft's results, but I am convinced that whatever may be true of decoctions of the plant, *Xanthium* is not poisonous in any form in which domestic animals will eat it in the field. I have recently been able to trace the supposed poisonous effects of *Xanthium* in one district in this State to an outbreak of anthrax."

A. Zander (*Pharm. J. Russl.*, 1881, quoted by Sohn) has examined the seeds of the Cockle-burr, and finds in them a poisonous glucoside, to which he gives the name of Xanthostrumarin. It is most probable that this poisonous principle is present in minute quantity, and I agree with Prof. Arthur that the form in which cattle eat the plant is innocuous. *Xanthostrumarin* develops a succinic odour on warming, and is soluble in alcohol and ether. For its behaviour with reagents, I must refer my readers to Sohn's *Dictionary of the Active Principles of Plants*.

The late Dr. J. Lauterer, in *Proc. Roy. Soc., Q.*, xviii, 60, says: "Pigs die after eating the young plants."

Dr. J. B. Cleland, in *3rd Rep. N.S.W. Bureau, Microbiol.*, collects the data as follows, and it is obvious that here we have another plant which is worthy of the attention of a Stock Institute.

Bailey (*Queensland Agricultural Journal*, vol. iii, 1898, p. 356), thus refers to this plant:—

Year after year I have received specimens of it for identification, with the report that it was suspected of poisoning stock. Only the other day I was instructed to visit Nerang, where stock had died, as was supposed, from browsing upon poison plants. At the spot where the stock had died there was a dense growth of Noogoora Burr, and it was said that there was a similar young growth of this plant when the deaths occurred (September). At the time of my visit (5th October) young stock were feeding upon plants of this species, but these were, for the most part, very weedy and not at all succulent, on account of there being such a dense growth of them. I consider that this plant would only be really dangerous when making a rank, succulent growth. Mr. W. C. Quinnell, Government Veterinary Inspector, who accompanied me to Nerang, furnished a report for the Chief Inspector of Stock, and by kind permission I am enabled to attach hereto an extract from same.

Experiments made by the late Dr. Joseph Bancroft, soon after the plant made its appearance in the colony, proved conclusively its poisonous nature. Its effect on cattle was to paralyse the heart, induce torpor, and cause death without pain or struggle. He also advised most exact measures being taken to avoid adding this poisonous weed to the flora of Australia.

Various medicinal properties have been ascribed to this plant by writers, but none of sufficient importance to in any way compensate for its noxious character as a weed.

The only way to keep this plant in check is to destroy the young plants as they spring, so as to prevent the production of seed.

Extract from report of W. C. Quinnell, M.R.C.V.S., London, to the Chief Inspector of Stock, *re* poisoning of stock at Nerang:—

Arriving at Nerang, Mr. Bailey and I were met by Mr. Clare, the acting Clerk of Petty Sessions, who took us to the locality where the animals had been pastured, and where we soon discovered the weed which had caused the injurious effect, for on examination of the pasturage it was seen that the Noogoora Burr was generally abundant, and it had been eaten down over certain areas . . . . .

I regret not having had the opportunity of seeing an animal attacked with the reported malady or making a post-mortem examination, as deaths in the township had ceased two or three weeks previously. However, we received from the owners and those that interviewed us a very clear description of the symptoms and post-mortem—the latter made by Mr. Clare—and I have no hesitation in stating that the mortality was due to the cattle feeding too freely upon the succulent spring Noogoora Burr, producing the disorder known as Tympanites, or Hoven, viz., a distension of the rumen or paunch with gas derived from fermentation of the ingesta, and ultimately death by asphyxia, induced by pressure of the stomach on the lungs by the medium of the diaphragm, or from absorption of noxious gases into the blood.

Symptoms.—Tympanites (variously known as “Hoven,” “Blown,” or “Fog-sickness”) is easily recognised by the swelling on the left side, which may make its appearance while the animal is feeding, or shortly after. The symptoms are rapid, as a rule, in their appearance; rumination is suspended there is dribbling of saliva from the mouth, and the nostrils are dilated. As the accumulation of gas increases the greater is the distress of the animal, owing to the increasing obstruction to the entrance of air into the lungs; and this is characterised by means of grunts, bloodshot and staring eyes, staggering gait, and, insensibility at length supervening, the animal falls prostrate to the ground.

Prevention and Treatment.—Animals should be immediately removed from affected areas, and the localities thoroughly cleared of the noxious plant.

In Early Stages of the Disorder.—Diffusible stimulants administered promptly are efficacious in dispelling accumulated gases, viz., a full dose of ammonia, ether, alcohol, or chloroform, in solution. Exercise and friction to the abdomen hasten the expulsion of gas. The introduction of a hollow probang allows escape of gas when the amount of food in the stomach is limited.

In Extreme Cases.—When distention and distress are present, puncture abdominal wall (the most prominent part of the swelling is generally a sufficient guide for the operator) with trocar and cannula; or, when these are not at hand, a butcher's, carving, or other large knife would serve the purpose.

After abatement of acute symptoms, administer a strong purgative to remove any irritant, and feed for several days on soft, digestible food.

It would seem that in most of the instances recorded by Mr. Bailey, death was due to tympanites. In other cases, however, hydrocyanic acid may play a part.

*Some Alleged Medicinal uses for Cockle burr.*—The plant was formerly used in medicine in Europe, and its burrs and the prickles on them are still employed in India and China; its seeds yield a lamp-oil, and are made into a flour. An extract is prepared from the roots, and in China applied to ulcers (Smith, in Balfour's *Cyclop. of India*.)

In some parts of Germany, where it is called "Spitzklette," it has a popular reputation as a remedy for ague, and in Russia it is considered to be a prophylactic in hydrophobia.

The control of this weed is the same as that of its close relative, Bathurst Burr (see page 96).

*Where Found.*—Southern Europe and Central Asia, whence it has spread to many sub-tropical countries.

In Queensland it is believed to have been introduced with cotton-seed imported for a plantation. Mr. T. W. Kirk, in one of the New Zealand "Leaflets for Farmers," traces its introduction into that Dominion through earth ballast, deposited by a ship from Buenos Ayres.

It has been proscribed in the following shires and municipalities:—

## SHIRES.

Ashford	Dumaresq	Mandowa	Tamarang
Bannockburn	Gundurimba	Manning	Tarro
Barraba	Gwydir	Mulwaree	Tenterfield
Bellingen	Harwood	Muswellbrook	Terania
Bolwarra	Hume	Namoi	Tintenbar
Boolooroo	Illabo	Nambucca	Tomki
Boomi	Jemalong	Narraburra	Tweed
Byron	Jindalce	Nundle	Upper Hunter
Cessnock	Kyeamba	Nymboida	Walgett
Cockburn	Kyogle	Orara	Warrah
Copmanhurst	Lachlan	Patrick Plains	Wingadee
Crookwell	Liverpool Plains	Peel	Woodburn
Culcairn	Macintyre	Port Stephens	Yallaroi.
Dorrigo	Macleay	Rylstone	

## MUNICIPALITIES.

Aberdeen	Coraki	June	Mullumbimby
Ballina	Corowa	Kempsey	Murwillumbah
Bingara	Dungog	Lismore	Singleton
Botany	Gunnedah	Macleay	Stockton
Burrowa	Grafton	Maitland East	Ulmara
Casino	Grafton South	Maitland West	Wagga Wagga.
Cootamundra	Inverell	Moree	





GROUNDSEL (*Senecio vulgaris* L.).

1. Stamens.      2. Tubular floret opened out, showing adnate stamens and bifid stigma.      3. Stigma.  
4. Achene with the pappus hairs sessile on the top      5. Involucre after the shedding of the seeds.



**Groundsel** (*Senecio vulgaris* L.).

(COMPOSITÆ: Daisy Family.)

*Popular Description.*—A very common annual on cultivated and waste ground. From 6 to 12 inches high; its stems are furrowed and bearing half-clasping pinnatifid leaves. Its flower-heads are composed of a number of small yellow flowers which ripen quickly and are distributed by the wind. Each plant keeps on flowering during several months of the year, and it is usual in spring and summer to find heads in all stages of development upon the same plant.

*Botanical Description.*—

An erect, nearly glabrous annual. Leaves irregularly pinnatifid and toothed. Flower-heads in close terminal corymbs or clusters. Involucre cylindrical. Florets all tubular and bisexual.

*Vernacular Names.*—The name Groundsel is in almost universal use in Britain, and has doubtless been employed for many more than a thousand years. It is of Anglo-Saxon origin, and the syllable "sel" is from a root signifying "to swallow," since the plant was considered valuable when taken internally for "a running of the eye."

"In several parts of England it is called Simson, apparently a corruption of the Latin *Senecio*, perhaps through the medium of the French *Senesson*."—(Sowerby.)

*Where Found.*—It is a native of Europe and Russian Asia.

"Everyone knows the common Groundsel, a weed found in all kinds of cultivated ground in Britain, as well as on banks by roadsides and similar places."—(Sowerby.) This also expresses the situations in which it is found in New South Wales. Although abundant near houses, it is not an aggressive weed, and can certainly not be looked upon as a serious pest by the agriculturist.

*Native Senecios.*—We have many native *Senecios*, there being no less than eighteen species in New South Wales, without including varieties, but it is generally reported that stock will not touch them.

On one which in the Armidale district had become so plentiful as to exclude almost every other plant, I reported as follows a few years ago:—

"I have never heard of a native *Senecio* (which belongs to the Daisy family) being reported as injurious to animals. An allied plant, *Senecio Jacobæa*, though a weed, is eaten by sheep in England without injury, although in New Zealand it is reputed as inducing cirrhosis of the liver in stock.

"In the present case what has probably happened is this: The ordinary herbaceous vegetation (including grasses) edible by stock may be mainly composed of annuals depending on the annual production of seeds, and consequently not able to withstand cropping by animals beyond a certain point.

"There are certain plants, of which the present one is an example, which provide themselves with a defence against herbivorous animals in the shape of bitter or acrid or other deleterious properties, or strong smelling oils, or resinous exudations, or a covering of hairs or spines. These, being not interfered with by animals, go on to the seeding stage and take the place of the fodder plants which are either eaten out or have not been permitted to propagate their kind. The ripening of this weed-seed may of course take place some distance away, but makes the presence of seedlings from this weed-seed obvious to a lessee, when he sees them actually spring up on his property, where they have taken the place of the forage plants which have been eaten out.

"From what I have said you will observe that no remedial measure of the 'press-the-button' order is applicable in this case."

*Economic Aspects of Senecio.*—Sowerby wrote of Groundsel over a century ago:—"It is annual, and flowers almost all the year round. The flower-buds and young tops are the food of many small birds, and are given to canary-birds and others in a state of confinement." This is no unimportant use, for the welfare of small cage-birds affords great pleasure to many people.

We are also interested in two introduced species—one a yellow flowering ivy-leaved creeper (*Senecio scandens*), which has made itself very much at home in many parts of coastal New South Wales, not far from the sea, and which is often called "Cape Ivy"; it comes from the Cape of Good Hope, but it is not a true ivy, of course.

The other is the Ragwort (*S. Jacobæa*), which is common in Victoria, but so far as I know, it has not been officially recorded as having made its appearance in New South Wales, although I am perfectly certain it is in this State.

In the Cape of Good Hope species of *Senecio* are recorded as having induced cirrhosis of the liver in stock, and in New Zealand *S. Jacobæa* is blamed for the similar and fatal complaint amongst horses known as "Winton disease."

It will thus be seen that at least one species of *Senecio* has fallen under suspicion, and, bearing in mind the fact that the properties of one species of a genus are often shared more or less by other species, it is very possible that our Groundsel contains some principle worthy of investigation.

In the *Agricultural Gazette* (October, 1898), I published the following paragraph:—

An extract is prepared from the plant and roots of the European *Senecio vulgaris* (Common Groundsel), which is used medicinally in some ailments peculiar to women. See Dalché and Heim (*Nouv. remèdes*, 1896, pp. 409 and 697), *Therap. Monatshefte*, 1897, p. 275; also Merck's *Ann. Report*, 1897, p. 65.

Our native species of *Senecio* are numerous and widely diffused; here is a suggested line of research for some of our medical practitioners.

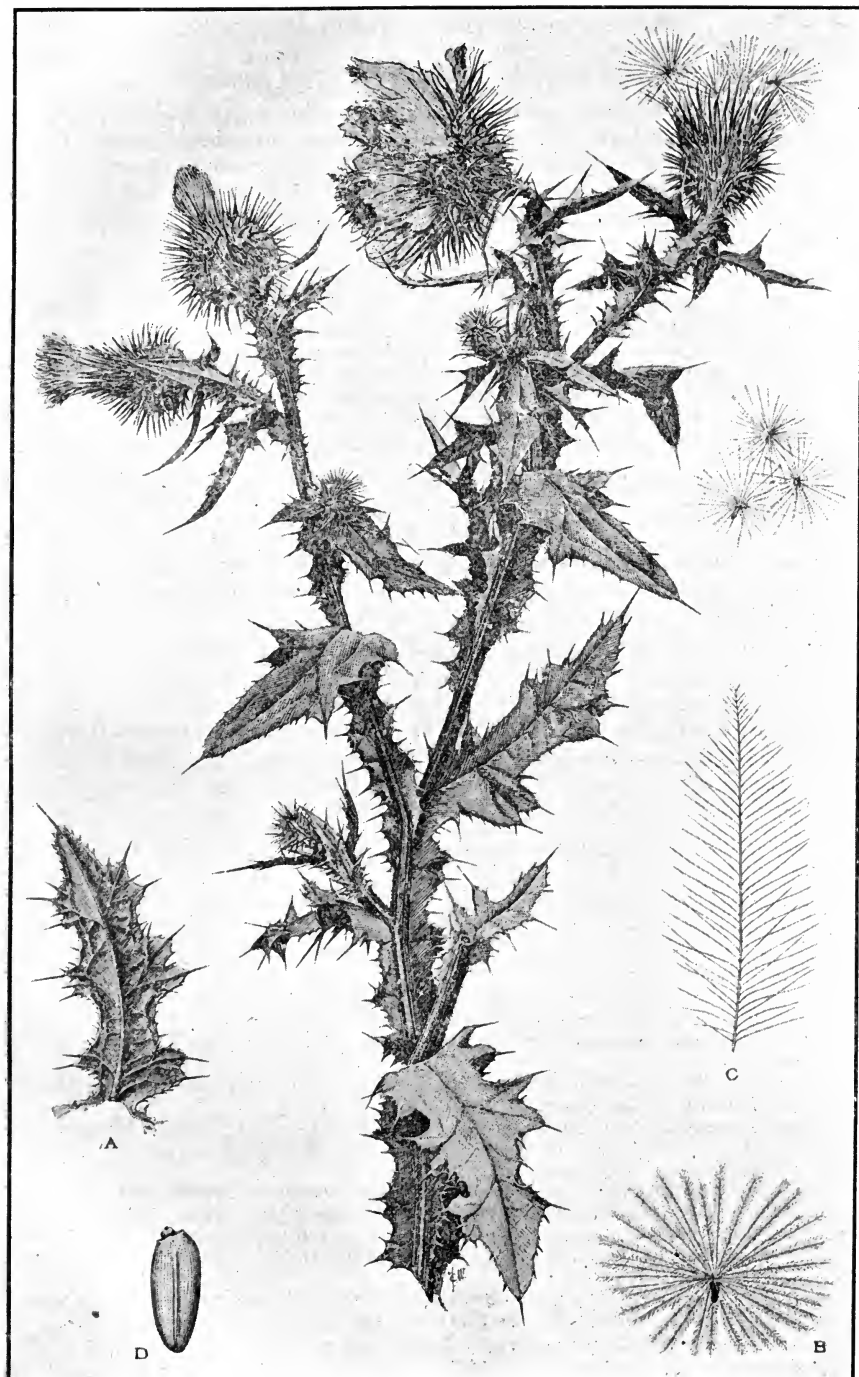
Now, I do not wish to suggest that there is anything deadly lurking in the humble Groundsel, but I desire to emphasise the point that the examination of plants by chemical methods is even yet in its infancy, and I fully believe the plants all around us are coyly smiling at us, and that many of them contain active principles of great interest and perhaps of economic value; but the said principles can only be wooed and won by the chemist. As regards our plants, we are walking over nuggets, which, until we use our pick, will remain where they are.

I know no branch of science that is more likely to secure interesting, and perhaps economically valuable, and possibly, sensational results, than that of the chemist. For some lines of research it would be desirable that he should have pharmaceutical training, and he should be in close co-operation with the physiologist.

### **Black or Spear Thistle (*Carduus lanceolatus* L.).**

(COMPOSITÆ: Daisy Family.)

*Other Vernacular Names.*—Its usual name in England is Spear Thistle. In the United States it is called "Boar Thistle," or "Purple Thistle." In Canada it goes under the name of the "Bull Thistle." In New South Wales it is often known as "Green Thistle," and, by reason of its comparatively dark colour, "Black Thistle."



Black or Spear Thistle (*Carduus lanceolatus* L.).

A. Under side of a leaf, showing venation (three-fifths natural size).

B. Pappus, natural size.

C. Individual bristle of the pappus (magnified).

D. Fruit (magnified).

*Botanical Name.*—*Carduus* (Latin), a thistle, *lanceolatus*, lance-shaped, in allusion to the leaves.

*Synonyms.*—*Cirsium* or *Cnicus lanceolatus* L. (old names).

*Popular Description.*—It would be waste of time to fully describe this plant on the present occasion, but attention may be drawn to the fact that it is usually in this country supposed to be the true Scotch Thistle. The latter, however, differs in being whitish-cottony in appearance, and in other respects. Spear thistle seeds (fruits) are greyish, striped, smooth, and shining. It is a biennial.

*Botanical Description.*—

A rather stout thistle, attaining 3 or 4 feet. Leaves waved, pinnatifid, and very prickly, rough on the upper side, white and cottony underneath, decurrent into prickly wings along the stem. Flower-heads not numerous, rather large. Involucres ovoid, above an inch long, the bracts lanceolate, ending in a stiff prickle. Florets purple, all tubular. Receptacle with bristles between the florets. Achenes glabrous. Pappus of plumose bristles.

*Uses.*—"The plant contains the large percentage of 2.44 of nitrogen and 5.53 of potash, and will thus pay largely for the little trouble it takes to kill it, if properly composted after cutting." C. F. Millspaugh, *Bulletin* 23, *West Virginia Agric. Exp. Station*, U.S.A.

A tea of the root has been used in rural medicine for rheumatism and also for neuralgia in the United States, but I am afraid its medicinal virtues largely exist in the imagination.

Dr. Withering, an old British botanist, says of this thistle, "Few plants are more disregarded than this, and yet its use is very considerable. If a heap of clay be thrown up, nothing would grow upon it for several years, did not the seeds of this plant, wafted by the wind, fix and vegetate thereon. Under the shelter of this, other vegetables appear, and the whole soon becomes fertile. The flowers, like those of the artichoke, have the property of curdling milk."

It is, of course, occasionally eaten by stock in Australia when more tempting food fails.

*What our Farmers and Pastoralists said of it in 1895:—*

Frequents both cultivated and uncultivated land, on which it is rapidly spreading. In order to keep it in check it is sometimes cut while in flower, but before seeding. (Sassafras.)

First made its appearance in 1861. Is spreading rapidly in cultivated lands. On account of the lightness of the seeds, which are carried for miles by the winds it is almost impossible to eradicate. Locally known as Scotch Thistle. (Crookwell.)

As a rule frequents cultivated land. No steps have been taken for checking or eradicating it. (Queanbeyan.)

Notwithstanding that considerable sums of money have been expended in endeavouring to eradicate this weed, it still has possession of large areas of the best alluvial land. (Queanbeyan.)

Introduced into district in hay or chaff, and spread by winds. Mostly frequents old camping grounds and alluvial flats along the creeks. Wherever it is allowed to grow unmolested for a lengthened period the native pasture grasses are crowded out. Is relished by stock, even when there is no great scarcity of grass. (Moama.)

Brought into the district a number of years ago by travelling stock. Is very plentiful, and is spreading rapidly. (Deniliquin.)

Will be found growing on almost all old cultivated land; is a rapid grower, and is spreading extensively. (Young.)

Utterly useless. Grows, as a rule, on cultivated and rich lands. (Singleton.)

Grows throughout the district, and is spreading rapidly. (Glen Innes.)

First appeared about sixteen years ago, when it was introduced by travelling stock. As a rule, it grows along the road sides, and in cultivated and ring-barked land, wherever growing excluding valuable grasses. Little or no attempt is made to eradicate it. (Manilla.)

Is spreading in both cultivated and uncultivated lands. It is kept in check on cultivated land by cutting down. It is injurious to sheeps' wool. (Cowra.)

Injurious to stock. Introduced into the district eight years ago by travelling stock, and is now spreading in both cultivated and uncultivated lands. (Molong.)

This weed appears to have been introduced to the Bathurst district by the millers about seven or eight years back in New Zealand wheat. In that colony this thistle is highly esteemed on the stations, where sheep and horses thrive on the buds and flowers during the hot dry weather, when grass has become scarce. (Eglington, Bathurst.)

Flourishes and spreads in any soil or under any condition. It is kept in check by chopping down and burning. (Narrabri.)

Found growing throughout the district. It is utterly useless. (Singleton.)

Occupies some of the best lands, particularly alluvial flats. Kangaroo rats feed on the roots. It is gradually dying out. (Booral.)

Thrives in almost every class of soil. It is sometimes cut down or brushed. (Tintenbar.)

Though growing in the district, it is not at present very troublesome. (Wardell.)

Spreads rapidly. Mostly frequents public roads. No attempt has been made to eradicate it. (Byron Bay.)

Grows vigorously at first, but is soon either crowded out by grasses or dies. It is never found growing in cultivated land. (Murwillumbah.)

As a rule, frequents cultivated land, in which it is very troublesome. Many of the farmers cut it down, while others make no attempt to keep it in check, thereby seeding the adjoining clean lands. (Mudgee.)

Grows throughout the district. (Oberon.)

Very common in the district. (Blayney.)

First appeared in 1884, when seed was introduced by sheep. It is now spreading all over the district. In cultivated lands the farmers do their utmost to keep it under control, but in uncultivated land no steps have been taken for its eradication. (Orange.)

Appears around root stumps immediately after ringbarking, also at the sides of fences in cultivated land. In cultivated land it is annually destroyed by hoeing, though in uncultivated land it is untouched, and is spreading. (Pomona, Wellington.)

Not edible by stock, and it sticks in the wool of sheep. Introduced from the Upper Macquarie River by the waters of the river. Spreads rapidly in cultivated land and rich soils, while poor grass lands are almost free from it. (Wellington.)

Made its appearance about eight years ago. Has an extremely long thorn. Grows wherever the soil has been disturbed. (Neville.)

One of the most troublesome and useless weeds in the district. (Dubbo.)

Appears immediately after ringbarking. The local municipal council has passed a bylaw compelling the eradication by fire of all noxious weeds in the district. (Dubbo.)

Frequents mostly cultivated and forest land, and, owing to the opening up of country by ringbarking, is rapidly spreading. In cultivated land only it is kept in check. (Narromine.)

*How to Get Rid of It.*—It may be removed by cutting the first year plants below the crown of the root with a spud. Second year old plants can be mown down in flowering time. Never let them seed. In this way, by careful treatment, a paddock may be cleared of it, but, as a rule, the ground in the vicinity of thistles contains a plentiful sprinkling of seed, unless the very greatest care has been taken to kill the thistles before the seed has had time to mature. At an Agricultural Conference, the late Hon. G. H. Cox, M.L.C., gave an amusing account (to the hearers) of his experience with

this thistle. He first discovered a plant or two on his property, and had them cut down. Next year there were four thistles, which were carefully eradicated. The following year there were a great many; these were cut down, and the year after their number was so great that repressive measures were discontinued. In a few years they died down naturally, and have since given no trouble. This is not an age of miracles, and the thistles spread, either because the men carelessly allowed them to seed, or because seed blew in from infected paddocks. This thistle may be eradicated from any paddock in one or two seasons by hard work directed by intelligence, but the circumstance remains that clean land may be readily infected by seeds blown over from dirty land in the neighbourhood. I have dealt with this aspect of the question elsewhere, and need not repeat myself here. The key to such problems is that this weed only dies out on a large scale provided the rains do not reach it at a critical time, *e.g.*, for germinating the seed, for stimulating it into flower or seed. Although land owners are sometimes lenient to this weed, because it dies out of itself after a term, and its leaves have some manurial value, there is no doubt that its disadvantages far outweigh its advantages, and the careful farmer will look upon it as a mortal enemy, while the pastoralist will regard it as a nuisance, only to be tolerated because its eradication involves too great a monetary tax upon him.

*Where Found.*—Europe, North Africa, and Siberia, but introduced into most (perhaps all) temperate countries in the world.

As showing what a pest it is considered, it has been proclaimed a noxious weed by eight shires and forty-six municipalities, as follows:—

SHIRES.			
Bolwarra	Harwood	Nymboida	Port Stephens
Bulli	Macleay	Orara	Tarro.
MUNICIPALITIES.			
Aberdeen	Concord	Manilla	Richmond
Adamstown	Dubbo	Manly	Stockton
Alexandria	Glebe	Maitland East	Temora
Annandale	Glen Innes	Maitland West	Ulladulla
Armisteadale	Grafton	Mascot	Ulmara
Ashfield	Grafton South	Merewether	Uralla
Balmain	Goulburn	Molong	Walcha
Bathurst	Hamilton	Mosman	Willoughby
Bega	Hunter's Hill	Moss Vale	Windsor
Burwood	Kiama	New Lambton	Yass.
Botany	Lambton	Orange	
Carcoar	Macleay	Quirindi	

### True Star Thistle (*Centaurea calcitrapa* L.).

(COMPOSITE: Daisy or Thistle Family.)

*Vernacular Names.*—This is the Star Thistle, or the True Star Thistle, so called in England. It has been sent to the Department from Grenfell and Gunnedah as the "Pink Chinese Thistle" (to distinguish it from the yellow one, *Kentrophyllum* or *Carthamus*), but the Chinese would be justified in repudiating the association as an insult.

*Botanical Name*—*Centaurea*—With an allied plant, the Centaur Chiron is said to have cured the wound in his foot, caused by the arrow of Hercules. *Calcitrapa*.—The name is in allusion to the resemblance of the calyx to the *Calthrops*, or iron ball, covered with spikes, formerly used for throwing under horses' feet to lame them on a field of battle.





True Star Thistle (*Centaurea calcitrapa* L.).

- A. One of the individual flowers of which the "head" is composed.  
 B. A "head" or thistle, in fruit, showing the formidable involucre bracts—hence the comparison to calthrops  
 C and D Two extreme forms of involucre bracts. E. Seeds.

This thistle seems to be execrated by everybody. In regard to most plants which are reputed to be a nuisance, apologists find at least one redeeming feature in them, but I have never heard a good word put in for the Star Thistle. It is a vegetable outlaw, and every man's hand is against it, or would be, if it were not so prickly.

The indictment against the Star Thistle is that it is a terrible pest. It is not edible (fresh or as ensilage), it covers the ground with a prickly growth, which impedes the locomotion of sheep, cattle, and man; it smothers all other herbage and grass.

I have spoken of the Thistle Acts of Victoria and South Australia in my account of the "Saffron or False Star Thistle" (*Kentrophyllum* or *Carthamus*), *Agricultural Gazette*, 1894, page 298. Apropos the South Australian Act of 1887, the "Star Thistle" aimed at was *Kentrophyllum*, as this was supposed to be the genuine article, but, curiously enough, the *real* Star Thistle (*Centaurea calcitrapa*) made its presence felt about the time of the passing of the Act, and so, as it was not specifically stated which Star Thistle was alluded to, it may be taken to refer to both.

*Popular Description.*—A weak-stemmed, crawling, scrambling plant with small pink or purple thistle-like flowers. It forms masses 2 or 3 feet high and more than that in diameter. It is not so rigid as the *Kentrophyllum* described in the *Agricultural Gazette* for 1894, but the prickly leaves and flowers are sufficiently formidable to cause it to be handled very carefully. Its spreading habit protects the main stem, so that it is not easy to get at the root for the purpose of destroying the plant.

*Botanical Description.*—

We have several weeds and garden flowers belonging to the genus *Centaurea* in New South Wales, and therefore it will be useful to many to have a description of the genus.

Genus *Centaurea*.—Involucre globular or ovoid, the bracts imbricate, numerous, ending either in a prickle or in a fringed or toothed appendage. Receptacle bearing numerous bristles between the florets. Florets all tubular and five-lobed, the outer row often larger and neuter. Anthers tailed. Style branches linear, often cohering, thickened at the base. Achenes glabrous usually obliquely or laterally attached at the base. Pappus short, of simple bristles or scales, sometimes very short, or rarely wholly wanting. Erect or prostrate herbs, usually rigid. Leaves alternate, entire or pinnatifid, rarely prickly. Flower-heads large and solitary, or smaller and paniculate. Florets purple-blue or yellow.

*Species calcitrapa.*—A coarse green annual, rarely slightly woolly. Leaves pinnatifid, not decurrent. Flower-heads sessile amongst the upper leaves or in the forks ovoid. Receptacle with bristles. Involucral bracts ending in long, stiff, spreading spines with smaller prickles at their base. Florets purple, all tubular. Pappus, none.

*How to get rid of it.*—Being an annual, the Star Thistle should be destroyed when just coming into flower. It can be ploughed in if the pest is abundant. It bears an enormous quantity of seeds, which are wafted about by the wind, so that it is of little use to clear a paddock of the weed if there is plenty of it on your neighbour's land. Road maintenance men should be instructed to carefully destroy this and other weed pests found growing by the road-sides. Road-sides are notoriously such propagating places for noxious weeds (which are brought along by travelling animals, in

the first place), that it is to be hoped that officers in charge of roads will, as a national duty, see to the extermination of the most injurious weeds. The eradication of the worst weeds would, in most instances, hardly increase the work of a man to a perceptible degree, and, with vigilance, the work to be done would rapidly diminish.

*Where found.*—The Star Thistle is a native of the countries in Europe, Asia, and Africa surrounding the Mediterranean, and also Great Britain and other countries of middle and northern Europe. Its range is pretty well that of *Kentrophyllum* (or *Carthamus*). Now, however, it is to be found in probably every country in the world except the coldest.

The following paragraph, taken from my original article in the *Agricultural Gazette* for 1894, may be instructively compared by all landowners with the lists of municipal and shire councils (supplied by the Local Government Department) of the New South Wales areas in which it has been proclaimed up to 1919. If it continues to spread at the present rate, in a few years it will be proclaimed for the whole State:—

There are a number of plants in the vicinity of the cattle and sheep sale-yards at Homebush. At first I knew of only one, which I used to visit regularly for specimens, but since then I have found several in Homebush and Flemington. It was probably brought to these localities by sheep, the seeds being stuck in their wool. Only a month ago Mr. Ross, of Bathurst, writes that he has noticed it there for the first time. It has been sent recently to the Department from Wagga Wagga, Grenfell, and Gunnedah. I have seen it in other parts of the colony, and have received it from additional localities. Generally, I have noticed it in small patches at very wide intervals. It is a most insidious foe, and landowners are recommended to make themselves acquainted with it, and to keep their land clear of it.

The list of shires and municipalities in which this pest has been proclaimed is already formidable, as may be seen from the following, furnished by the Local Government Department, 1919:—

## SHIRES.

Abercrombie	Dalgety	Macquarie	Tenterfield
Barraba	Dumaresq	Mandowra	Terania
Berrigan	Gadara	Mulwaree	Timbreebongie
Bibbenluke	Gilgandra	Mumbulla	Tumbarumba
Bland	Goodradigbee	Murrumbidgee	Tweed
Canobolas	Gundurimba	Murrungal	Wakool
Carathool	Gunning	Narraburra	Wallerobba
Cobbora	Hume	Patrick Plains	Waradgery
Cockburn	Jindalee	Peel	Waugoola
Coolamon	Lachlan	Rylstone	Wingadee
Coreen	Liverpool Plains	Talbragar	Wollondilly
Crookwell	Lockhart	Tamarang	Yarrowlumla.
Culcairn	Lyndhurst		

## MUNICIPALITIES.

Balmain	Cootamundra	Maitland, West	Quirindi
Bathurst	Coraki	Manilla	Richmond
Botany	Corowa	Molong	Temora
Braidwood	Cowra	Mullumbimby	Wagga Wagga
Burrowa	Dubbo	Murrumburrah	Windsor
Burwood	Goulburn	Murwillumbah	Wyalong
Carcoar	Hay	Orange	Yass
Concord	Junee	Queanbeyan	Young.
Coonamble	Lismore		

**Cockspur or Saucy Jack** (*Centaurea melitensis* L.)

(COMPOSITÆ: Thistle Family.)

*Other Vernacular Names.*—"Saucy Jack" is a name by which this weed is very commonly known. "Burr," "Yellow Burr," and "Chinese Burr" are less common names. It does not come from China, nor am I aware that the Chinese have had anything to do with its introduction or dissemination. Its name *melitensis* denotes "Maltese" (adjective), hence "Malta Thistle," though I do not remember having heard it called by that name by farmers. It would be simply impossible now to upset the names of "Cockspur" and "Saucy Jack."

*Botanical Name.*—*Centaurea*. With an allied plant the Centaur Chiron is said to have cured the wound in his foot, caused by the arrow of Hercules. *Melitensis*, Latin for Maltese, Malta being one of its Mediterranean localities.

*What our Farmers and Pastoralists say of it.*—Following are some of the replies relating to Cockspur sent in answer to the Department's circular in 1893:—

Utterly useless. Grows as a rule in cultivated lands. No attempt has been made to eradicate it. (Singleton.)

First made its appearance about thirty-two years ago. Mostly favours cultivated land, and promises to be a most troublesome weed. It excludes valuable grasses wherever it makes its appearance. Little or no attempt has been made to eradicate it. (Manilla.)

Flourishes and spreads in any soil, or under any condition. In some instances it is kept in check by cutting down and burning. (Narrabri.)

Is exceedingly troublesome in wheat paddocks. Many of the farmers cut it down, whilst others make no attempt to keep it in check, thereby seeding their adjoining neighbours' clean land. (Mudgee.)

Found growing throughout the district. (Eglington, Bathurst.)

The sharp spines and bitter taste destroy the value of hay when it becomes mixed with it. Frequents good alluvial lands, either cultivated or uncultivated, also public roads, by which means many weeds are spread. Many farms in the district are perfect seed-beds for noxious weeds. (Comobella.)

Grows in almost any situation, though, as a rule, on the rich river flats. It is spreading on uncultivated land, but kept in check on cultivated lands by annually hoeing. (Pomona, Wellington.)

Introduced from the Upper Macquarie by the waters of the river. No steps have been taken for its eradication. Spreads rapidly on cultivated land and rich soils, while poor grass lands are almost free from it. (Wellington.)

Depreciates quality of forage crops, and is spreading all over the district. First appeared in 1884, when seed was introduced by sheep. In cultivated lands the farmers do their utmost to keep it under control, but in uncultivated lands no steps have been taken for its eradication. (Orange.)

Brought sixteen years ago into the district by travelling stock. Is very troublesome in cultivated land. (Molong.)

Will thrive in almost any soil. When mixed with hay and chaff it greatly reduces the price of these fodders, on account of the bitter taste and thorny quality of the seed, which makes it a very difficult task to separate from other grain. In order to keep it in check several of the farmers resort to summer fallowing, and destroying the weeds with the hoe. (Neville.)



Cockspur or Saucy Jack (*Centaurea melitensis* L.).

A. Section of flower head, showing young seeds (natural size).

B. Involucral bract (magnified).

C. Seed (magnified).

Made its appearance about fifteen years ago. It is very troublesome to the wheat or hay grower. When young, during the winter months, it is splendid feed for stock; later on the leaves and seed-pods are surrounded with spikes, which at times penetrate strong boots. Early in the morning during dry seasons, before the dew has left the plant, certain portions of it are eaten by stock. It is spreading throughout the district, especially in cultivated land. The local municipal council has a bylaw compelling the eradication, by burning, of all noxious weeds in the district, and a notice is forwarded annually to residents, requesting them to do so. This effectively keeps the weed in check. (Dubbo.)

Introduced by travelling stock and floods, and mostly frequents low-lying flats along the river banks and watercourses. Stock will not eat it. No special effort has been made to eradicate it. (Dubbo.)

After the first autumn rains it springs up, and retains a green, fresh appearance when almost every other plant is dead. While young it is eaten by cattle, though to butter made from the milk of cows feeding on it, it imparts a disagreeable flavour. (Hillston.)

Is spreading in ringbarked country and on the plains. With a few exceptions, no general or effective measures have been taken to keep it in check. (Condobolin.)

Almost completely covers roadways and old folding grounds. In time of drought cattle and horses eat it with avidity, and are kept in good condition. (Condobolin.)

Makes its appearance with hay and wheat crops. Possesses an exceedingly bitter fruit, and if eaten by horses has a dangerous effect. (Young.)

Cattle will not eat it. Crowds out valuable grasses. Thrives on both cultivated and uncultivated land, and is spreading rapidly. A number of land-owners cut it down annually, but fresh seed is soon sown from neglected holdings. (Forbes.)

Introduced into district in hay and chaff, and spread by winds. Spreads rapidly, and wherever allowed to grow unmolested for any length of time crowds out native pasture grasses. It is a most troublesome weed, and, except through dire necessity, is never eaten by stock either in a green or dried state. In order to keep it in check it is, as a rule, cut down and ploughed in. (Moama.)

Does not grow very extensively. The farmers keep it in check. (Corowa.)

First appeared about twelve years ago. Useless as a fodder. Generally occupies the richest soils, and is spreading in both cultivated and uncultivated lands. (Yass.)

A very troublesome weed, especially in cultivated land, in which it is rapidly spreading. (Queanbeyan.)

Since farmers left off folding their sheep, it is not very common in the district. (Crookwell.)

*Cockspur as a Fodder-plant.*—Stock will eat this wretched plant when it is quite young. What will the poor things *not* eat if they are compelled by stern necessity? A speaker at an Agricultural Conference in 1892 stated that on certain runs, near the Lachlan, sheep had to eat this or starve, that they ate it and thrived upon it, and that it is, in fact, a pastoralist's stand-by. But I hope no one will relax his efforts for the eradication of this weed for this reason. Scarcely any vegetation can be more thoroughly indigestible than the Cockspur, to say nothing of its aggressiveness and prickly nature, and the serious extent to which it deteriorates wool. In making a list of fodder-plants it must be remembered that a far simpler process would be the enumeration of plants which animals *never* touch in Australia. The list would not be a very long one, so that the ranking of a plant, such as the Cockspur, as a fodder-plant, may not mean much after all.

*Popular Description.*—A so-called thistle with yellow flowers. The Saffron or False Star Thistle (*Carthamus* or *Kentrophyllum lanatum*), also has yellow flowers, but they are very much larger, and the plant is altogether larger, more robust, and more rigid than the Cockspur. The flower-head is surrounded with prickly involueral bracts. The leaves are hoary and even slightly silky. The edges of the leaves are wavy. Their shape may be made out from the accompanying plate. It will be observed that they clasp and run down the stem, a characteristic which may be noted. The shape of the seed can be readily made out from the drawing. It is larger than that of St. Barnaby's Thistle (*Centaurea solstitialis*).

*Botanical Description.*—

The Cockspur is not a British plant, and therefore a description of it will not be found in the ordinary British text-books. It may be described as follows:—An erect, rigid annual, slightly woolly white. Stem-leaves narrow, entire or nearly so, decurrent. Flower-heads terminal, sessile, ovoid. Receptacle with bristles. Outer involueral bracts with short palmate spines, intermediate bracts with a long spreading terminal spine and short divaricate spines at the base. Inner bracts with only a short terminal spine. Florets yellow; all tubular. Pappus bristly.

*How to get rid of it.*—It is a proscribed plant under the Victorian Thistle Act, and it is even worse in New South Wales than in the southern State. It is an annual, and should be cut down as it begins to flower. Do not allow it to mature its seed. Farmers will be disposed to reply, "That is easier said than done," but without setting ourselves at present to the herculean task of freeing the country from its worst weeds, the Cockspur is a weed that must be dealt with seriously. It is nothing less than terrible to reflect on the havoc worked by weeds in this country of recent years. The galling part of it is that much of the mischief is preventable.

*Where found.*—It attains its full luxuriance in the dry western country. It is not a native of Australia, and has extended here just as it has to most of the warmer countries of the world. Dr. Schomburgk states that it was first introduced into South Australia in 1844. It is a native of the Mediterranean regions.

The Local Government Department's list of shires and municipalities in which this weed is proclaimed, shows that it is spreading, but does not fully indicate its spread. We have it from Byrock and Tenterfield, so that with Culcairn the State is pretty well embraced. It will also stand the cold of Jenolan Caves and other cold places.

It is frequently confused with other Star Thistles, though the hope may be expressed that the present book will tend to reduce errors of that kind.

SHIRES.

Cessnock	Coonabarabran	Terania	Wollondilly.
Culcairn	Tamarang	Wingadee	

MUNICIPALITIES.

Botany	Lismore	Tumut	Windsor.
Coonamble	Murwillumbah		

**St. Barnaby's Thistle** (*Centaurea solstitialis* L.).

(COMPOSITE: Thistle Family.)

*Popular Description.*—An annual plant, with a yellow, prickly thistle-like flower; the whole plant covered with a short whitish cottony covering; the lower or radical leaves dissected, the terminal lobe larger than the lower ones, and the upper ones linear, with wavy edges.

*Botanical Description.*—

Stem near 2 feet high, alternately branched, winged from the decurrent leaves, which are lanceolate and entire, slightly waved; the radical leaves are 4 or 5 inches long, lyrate, the lobes alternate, acute, the terminal one large, and more or less triangular. Flowers solitary at the end of each branch, bright yellow. Scales of the calyx tipped with palmated yellowish spines, of which the central one is very long, strong, and different from the rest. The whole herb is harsh and rigid, but clothed with a cotton-like web (as is the calyx), somewhat viscid, and intensely bitter.—Sowerby's "English Botany," xii, t. 243.

*Allied Thistles.*—We have already figured and described two *Centaureas*, viz., *C. calcitrapa*, the other ordinary Star Thistle (see page 110), and *C. melitensis*, the Cockspur (see page 114). The former is pink-flowered, and the latter is yellow-flowered like the weed now under description.

Comparing the two yellow thistles, Bentham says that "*C. solstitialis* is an annual, with the habit, foliage and yellow florets of *C. melitensis*, but with a much longer and stouter spine to the intermediate involueral bracts, while the inner ones have a jagged scarious appendage without any spine."

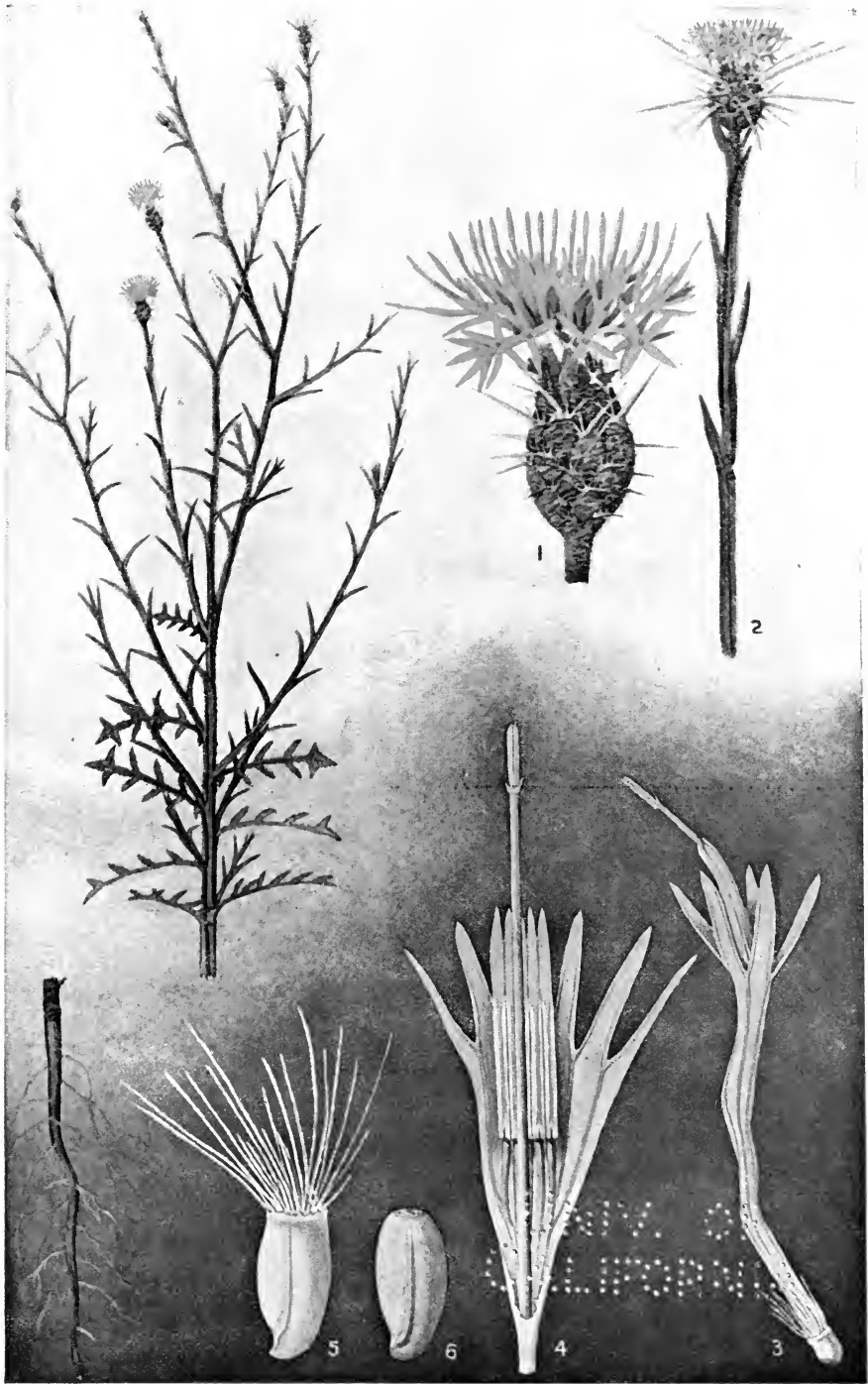
*Names.*—Sowerby wrote in his "English Botany" considerably over a century ago, "It flowers about midsummer, whence the name, but lasts till late in autumn, and in the south of Europe even till December." The name referred to is St. Barnaby's Thistle (apostle and saint), and his day is 11th June, which explains the reference to midsummer.

"Yellow Thistle" or "Yellow Star Thistle" which it shares with *C. melitensis*.

*Where found.*—It is a native of Europe, North America, and Western Asia. It has become extensively distributed in Australia, having been recorded from practically every State. In New South Wales it is widely diffused. Western localities are Richmond and Bathurst; southern ones, Burrinjuck and Queanbeyan; but it doubtless occurs far beyond these boundaries. A correspondent from Tamworth in January, 1917, wrote: "I saw only a very few plants of it until to-day, when I saw a paddock very badly infested."

As a rule it is looked upon as a weed pure and simple, and the advice is given to eradicate it when it is in flower, as it is an annual and must not be allowed to seed. The following paragraph will give food for thought.





ST. BARNABY'S THISTLE (*Centaurea solstitialis* L.).

1. Flower enlarged.      2. Flowering branch (natural size).      3. A floret.      4. Floret opened to show  
 stigma and anthers      5. Achene showing arrangement of pappus.      6. Mature achene (seed).

Handwritten text, likely a signature or a small note, located at the bottom left of the page.

*A Plea for Further Investigation.*—A Western Australian farmer having raised the question of the value of this weed as sheep-food, and the danger of sheep eating the seeds infecting clean land, Mr. W. C. Grasby dealt with the matter in an informative manner in a recent issue of the *Western Mail*. Mr. Grasby had had a good deal of experience with this weed in South Australia, where it seems to be commoner than in any other State. He says:—

If a farmer desires to carry on the business of wheat-growing pure and simple, it is desirable to do everything possible to prevent the spreading of Cockspur (St. Barnaby's Thistle is meant), Cape Weed, and other plants which grow on the fallow. If, however, it is desired to conduct the business of wheat-growing in conjunction with sheep, it is desirable to have every kind of plant which will produce good sheep feed, growing on the land. A Tammin farmer in reply to an agricultural expert who pointed out the presence of Cockspur, Cape Weed, Wild Mustard, &c., said, "I want to keep sheep, and the more weeds my land will grow the more sheep I can keep, and if I have sheep I can control the weeds when I want to grow wheat."

In boyhood I have spent many weary days in hoeing up such weeds, but now I look upon Cockspur and other weeds from a different point of view, and, before I condemn, I ask their value as sheep feed. As I go through the wheat belt I find that farmers who keep sheep would rather have Cockspur than be without it. There is a prevailing opinion that wheat-growing by itself is not profitable with present averages and prices, and, in order to keep sheep, farmers must have what are called weeds, which will support the sheep when the land is not in crop. From another point of view, it is necessary to have weeds and sheep. We cannot carry out the systems of rotation developed in countries where summer rains are the rule and not the exception; and, under clean fallow and alternate cropping, land must rapidly deteriorate in fertility. It is not in accordance with book teaching, but it appears to me that we have to look upon edible weeds, such as have been mentioned, and more especially the wild clovers, as a rotation of crops which cost nothing and are best suited to our climatic conditions. Of course, it is not suggested that clovers and trefoil are as valuable as Cockspur.

As to the distribution of seeds by sheep, there is room for difference of opinion. A farmer of wide experience says that sheep do not, to an appreciable extent, distribute the seeds of plants that they eat, but those which are carried in the wool, and he gives a good deal of evidence in support of his opinion. He points out that weeds of various kinds grow where horse droppings and cattle droppings are found, but not to the same extent when sheep have travelled. He states that he has carefully examined and washed the droppings of sheep, and, so far, has failed to discover clover seeds which have not been digested.

Looking at the question from every point of view, I think I may, without hesitation, advise that, if a farmer wishes to keep his fallow clean, the wise plan will be to keep the sheep off. Probably the best plan will be to put the mower over weedy ground, rake up the Cockspur and burn it, and then keep the ground free of crop and surface cultivated, whenever the Cockspur appears, until it is all destroyed. The ground, in the meantime, should not be ploughed, for that will bury the seeds. It is entirely for any individual to decide whether the value of the Cockspur on the fallow for the keeping of sheep will pay for having this weed present on the land. I think it will, but I would be glad if those old farmers who have had considerable personal experience would be good enough to contribute their experience.

### Saffron or False Star Thistle (*Carthamus lanatus* L.).

(COMPOSITE: Thistle Family.)

*Other Vernacular Names.*—As people usually call this “Star Thistle,” I have simply prefixed the word “false” for a reason indicated below. Baron von Mueller proposed the name “Saffron Thistle” for it. It is, of course, open to the objection that it has nothing to do with saffron; its congener (*C. tinctorius*) is the well-known safflower of India, sometimes said to be used for adulterating saffron. But in adopting the name Saffron Thistle, I have taken into account the fact that in the illustrated work on thistles (by Baron von Mueller), issued by the kindred Department of Agriculture of another State, this name is employed, and it would be a convenience to adopt a uniform vernacular nomenclature for the pest. But whether the public of these two great States will take the slightest notice of these benevolent efforts to save confusion, time alone will tell. My own opinion is that they won’t, and having started to call it “Star Thistle,” star thistle it will remain to the end of time. It is called “Chinese Thistle” in the Gunnedah district, and “Yellow Chinese Thistle” (to distinguish it from the “Pink Chinese Thistle,” *Centaurea calcitrapa*) in the Grenfell district. But the Mongolians are not responsible for its introduction.

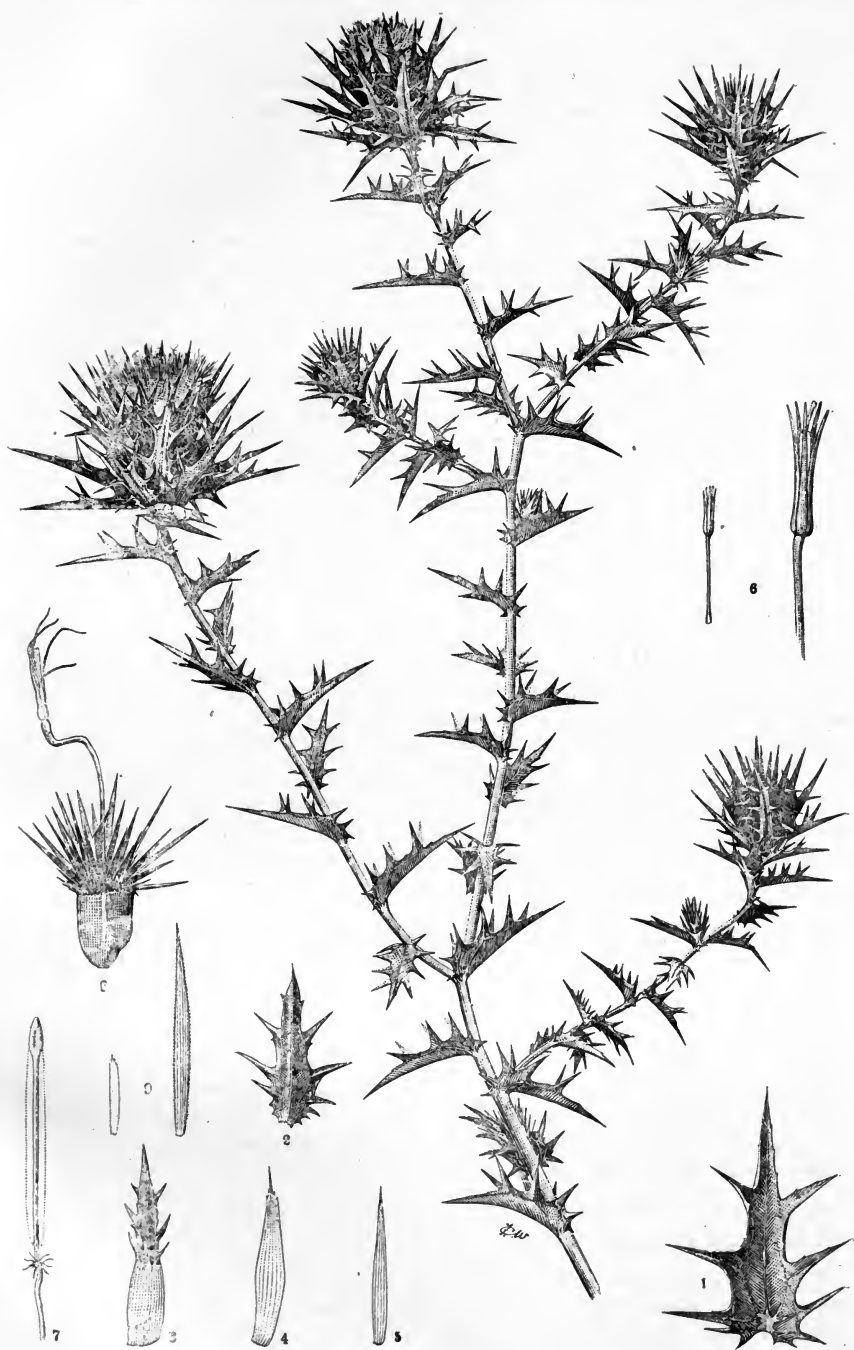
*Synonym.*—*Kentrophyllum lanatum* DC., et Dub. By many authors at the present day (notably Bentham and Hooker, *Genera Plantarum*), *Kentrophyllum* is included under *Carthamus*, of which the best known species is *C. tinctorius*, the safflower of India.

Following is the earliest record I can find of the Saffron or False Star Thistle in Australia:—“Woolly Kentrophyllum (*Kentrophyllum lanatum* DC.), a native of the Mediterranean coast; a great nuisance. It is of modern introduction. Cattle and sheep do not eat the plant, and its extension becomes very rapid, especially in the north and south. In 1887, the Legislature passed an Act for preventing the further spread of this thistle, but which was then erroneously thought to be the true Star Thistle, *Centaurea calcitrapa*. The further spread of the true Star Thistle should also be prevented.” (Schomburgk, *Annual Report Botanic Gardens, Adelaide*, 1888, p. 23.)

The South Australian Act referred to is No. 409, assented to 9th December, 1887, and its title is “An Act for amending the Act. No. 26 of 1862, and for preventing the further spread of the Star Thistle.”

Mr. Albert Molineux, General Secretary of the Agricultural Bureau of South Australia, says of it: “*K. lanatum* is eaten to some extent by stock, and it might make ensilage; it is not worse than *Onopordon acanthium* (true Scotch thistle). I hope, however, this will not convey the impression that it is anything but a real nuisance.

“*Star Thistle as Fodder.*—Mr. Margarey, Narracoorte Branch, Agricultural Bureau, S.A., noticing a query in the report of the Burra Branch in the *Journal* for April as to whether star thistles had ever been utilised as food for any animal, reported that he had mown and cocked a large

Saffron or False Star Thistle (*Carrhamus lanatus* L.).

1. Stem-clasping leaf. 2, 3, 4, 5. All stages, from a floral leaf to a bract. 6. Individual florets.  
7. Anther showing bristly appearance at upper part of filament. 8. Fruit, crowned with the  
pappus and the remains of a floret. 9. Extreme forms of the scales of the pappus.

quantity during the dry weather; that he had left it in cock till the rains came, when the sheep took to it, and have now eaten nearly all of it, which leads him to believe that it would make excellent silage. The Chairman stated that from observations he believed that the seed would be very suitable for poultry." (*Journal Bureau Agric.*, S.A., i, 64, July, 1890.)

The following account by a Riverina grazier of its fodder value was circulated in the press in September, 1911, and is instructive:—

My experience of Saffron Thistle is in direct opposition to those who consider it a noxious weed. Until it runs up to a hard stem it is one of the sweetest of grasses to be found. Its root is open and fibrous, and has the fertilising qualities of rape, as it opens up the surface of the ground, and renders it mellow, and allows the air and moisture to enter, which in grazing land is a very necessary result to obtain. The thistle runs up to a long stem in the end of October and November, when the grass has developed, and the thistle stalk protects the grass from blowing off in the winds of summer; and between the cover protected and the fertilising influence of the thistle roots, the first autumn rains send up a coat of grass that is the principal food that the stock depend on for the winter, unless the rains are very plentiful, as the difference in a medium dry autumn between the land protected by Saffron Thistle and the open bare places on which it doesn't grow is most noticeable. I have seen the thistle some years ago in the Goulburn Valley, and some of the sheep farmers are of opinion that it was a great loss when it died out, which it does after a reasonable time. As an objectionable weed it has no comparison with Cape weed or cockspur. Both these weeds start with the first autumn rains, and smother grass and crops where the seed has an opportunity of spreading, while the Saffron Thistle only begins to grow up in October and November, when the food for stock is well advanced, and when wheat is nearly fit to cut for hay; and, as far as cultivation is concerned, if land is well ploughed it will not come up again until the land is allowed to go out of cultivation, and then the thistle has the same effect as a crop of rape, as any farmer can prove by ploughing up a paddock on which a good crop of thistle grew. His yield will always be a fair bit above the average.

These are meritorious attempts to utilise a weed-pest. I would, however, recommend that uncompromising war be waged against it; that it be destroyed utterly. In cocking and carrying there is great danger of the seeds flying about and infecting clean land.

In Victoria there is in force a lengthy Act "To consolidate the law relating to the Eradication of Thistles," No. MCXLV, 10th July, 1890. Clause 3 gives a list of the thistles and allied plants included in its operation, but *Carthamus lanatus* is not included in the list. It is, however, described and figured in the "Illustrated Description of Thistles, &c., included within the Thistle Act of 1890" (Department of Agriculture, Melbourne, 1893), so it has presumably been proclaimed a thistle under clause 3 of "An Act to amend the Thistle Act, 1890" (No. 1,337, 6th November, 1893). Landowners, lessees, or occupiers are, under these Acts, to destroy thistles under a penalty not exceeding twenty pounds.

In New South Wales it has been proclaimed (1919) by thirteen municipalities and thirty-two shires.

*Popular Description.*—A prickly plant, growing in bushy masses, and attaining a height of 2 or 3 feet. The flowers are yellow, and are surrounded with prickly clasping leaves almost of the same shape as those which clasp the stem. The stem is a little furrowed and, in this State, usually more or less silvery in appearance; plants growing in Europe are

greener. The plant, particularly the upper portions of it, is more or less thinly-woolly, or rather spider-webby. Perhaps these few notes will supplement the plate in making the identity of the thistle clear to every farmer.

*Botanical Description.*—A botanical description will only be understood by botanists, and is perhaps unnecessary here. Those who desire the original description will find it in De Candolle's *Prodromus*, vol. vi, p. 610 (1837), while a botanical description in English will be found at page 17 of Baron von Mueller's *Illustrated Description of Thistles*, Melbourne, 1893.

In Moloney's "Sketch of the Forestry of West Africa," p. 376, I find under *Carthamus lanatus*, "Blessed Thistle" of the Parisians, said to possess sudorific, febrifugal and anthelmintic properties, Mérat et Sens, *Dictionnaire Médicale*, tome ii, p. 115. "Widely cultivated." The last statement is apparently taken from Oliver's "Flora of Tropical Africa," vol. iii, p. 439. Why it is "widely cultivated" I do not know. It may be that the seeds yield oil. It is closely related to the safflower (*Carthamus tinctorius*), but contains very much less colouring matter. But I recommend Australians not to attach the slightest commercial importance to the supposed medicinal or tinctorial properties of our wretched weed.

*How to get rid of it.*—It is an annual, and the only way to get rid of it is to cut it before it comes into full flower, and then burn it. Landowners should not be content with cutting it, as the dried plant may lame or otherwise injure sheep, &c., and a few seeds may escape destruction. It is manifest that united action should take place in dealing with the pest, for if there be an infested paddock in a district, the wind will waft the seeds like little shuttlecocks into the surrounding land. The pest is not yet so prevalent in this State as it is in South Australia and Victoria, and it is to be hoped that landowners will eradicate it on the principle that "a stitch in time saves nine."

*Where Found.*—This plant is a native of the Mediterranean region (Europe and Africa, and South-West Asia). It has found its way into most temperate and warm regions of the world.

I have received it from most parts of New South Wales. It is proclaimed in the following areas:—

## SHIRES.

Abercrombie	Culcairn	Mulwaree	Wakool
Berrigan	Dalgety	Mumbulla	Waradgery
Bland	Gadara	Murray	Waugoola
Canobolas	Gilgandra	Murrumbidgee	Windouran
Carrathool	Goodradigbee	Murrungal	Yarrowlumla.
Cobbora	Gunning	Patrick's Plains	
Coolamon	Imlay	Rylstone	
Coreen	Lyndhurst	Talbragar	
Crookwell	Macquarie	Tumbarumba	

## MUNICIPALITIES.

Blayney	Glen Innes	Tamworth	Wyalong
Braidwood	Moama	Temora	Yass
Burrowa	Orange	Tumut	Young.
Cowra			

**Cat's Ear or Flat-weed** (*Hypochaeris radicata* L.).

(COMPOSITE: Thistle or Daisy Family.)

*Popular Description.*—A dandelion-like plant from which, however, it can readily be distinguished by its less deeply toothed and more hairy leaves, and its branching flower-stalks.

*Botanical Description.*—

A hispid perennial, leaves all radical, spreading, toothed or pinnatifid. Stems erect, branched, with large terminal flower-heads. Florets yellow, all ligulate, much longer than the involucre. All achenes with slender beaks; the pappus plumose.

I regret the necessity for reducing the size of the plant in the accompanying plate, as it is likely to cause confusion with another species, but any erroneous idea will, as far as the flower is concerned, be corrected by examination of figure 1.

*Names.*—In Australia this is generally known as "Flat-weed," because its leaves, like a rosette, lie flat on the ground. It is also known, to a not inconsiderable extent, as "Dandelion;" this in ignorance, as it bears some superficial resemblance to the true Dandelion (*Taraxacum Dens-leonis*).

In Smith and Sowerby's classical "English Botany" the name is given of "Long-rooted Cat's Ear," in contradistinction to other species of *Hypochaeris*, which are known as Cat's Ear.

*Objectionable Features.*—Like so many of our weeds, this comes from Europe, Northern Africa, and Western Asia. It has now spread in every Australian State, chiefly in grass paddocks. It is one of those plants with which we are so familiar and which has no outstanding characteristics, that little has been written about it.

The chief objection that is raised to it is that its rosette of leaves smothers good grasses, and, as stock are not attracted by it, it often forms large patches to the exclusion of most other vegetation. On a lawn it is a positive disfigurement, especially as the long flower-stalks add to its unsightliness. It possesses no poisonous properties, and can only be got rid of by means of the hoe, or some other cutting implement, which is of course only practicable where the cost of labour is relatively unimportant, as in the case of a tennis-lawn. It is of advantage to cut down the flowers by means of a scythe or lawn-mower according to circumstances, but, like the Sow Thistle, it is a matter of luck to what extent one's land may be re-seeded by it in any particular year.





**CAT'S EAR OR FLAT-WEED (*Hypochaeris radicata* L.).**

1. Flower, natural size.      2. Ligulate floret (x 20).      3. Floret opened to disclose anthers.  
4. Seed showing beak and pappus.      5. Seed greatly magnified to show sculpture.

TO THE  
HONORABLE

**Prickly Lettuce or Compass Plant** (*Lactuca Scariola* L.).

(COMPOSITÆ: Daisy Family.)

*Botanical Name.*—*Lactuca*, Latin for lettuce; *Scariola*, Latin for wild salad.

*Botanical Description.*—

Rather scabrous below, leaves suberect, radical obovate-oblong, sinuate-toothed or runcinate, upper sagittate amplexicaul, auricles acute spreading, branches of panicle long spreading, fruit grey. Waste places, rare, Worcester, Norfolk, Essex, Kent, and Surrey; native (?) Watson; fl. July-August. Closely allied to *L. virosa*, but prickly only towards the base; branches more erect; leaves usually more runcinate; heads smaller; fruit narrower. ("The Students' Flora of the British Islands." Sir J. D. Hooker, 2nd Ed., p. 226.)

*The Prickly Lettuce a Parent of the Common Lettuce.*—Alphonse De Candolle ("Origin of Cultivated Plants") says:—

Botanists are agreed in considering the cultivated lettuce as a modification of the wild species called *Lactuca Scariola*. The common lettuce is, indeed, known to botanists as *L. Scariola*, var. *sativa*.

*Vernacular Names.*—"Prickly Lettuce," from the prickles on the wavy margins, on the midribs of the leaves, on the lower side, and lower part of the stem. Its milky juice, yellow heads of flowers, and other characters, show its affinity to the common vegetable lettuce. It is sometimes known as "Milk Thistle." Its name of "Compass Plant" is so interesting that it will be specially referred to in the next paragraph.

*The Compass Plant.*—In Europe the leaves of this plant markedly twist themselves in the sun, so that their margins become directed upwards and downwards (i.e., in a vertical position), with their margins directed north and south; hence this is called a "Compass Plant." The physiological reason for this is to enable the lower and upper surfaces of the leaves to be approximately uniformly presented to the action of the sun's rays. *Silphium laciniatum* is another Compass Plant. The following observations refer to our *Silphium* and *Lactuca*:—

Healthy living plants as they grow in the sunny meadows look as though they had been laid between two gigantic sheets of paper, somewhat pressed, and dried for some time in the way plants are prepared for herbariums, and had then been removed from the press and set up so that the apex and profile of the vertical leaf-blades point north and south, i.e., in the meridian, while their surfaces face the east and west. This inclination is so well and regularly observed by the living plants on the prairies that hunters are enabled to guide themselves over such regions, even under a clouded sky, by means of these plants; for this reason *Silphium laciniatum* has been called a "compass" plant. The life of the compass plant is assisted by this placing of the vertical leaves in the meridian, in that the broad surfaces are placed almost at right angles to the incident sunbeams which illuminate them in the cool and relatively damp morning and evening, while at the same time they are not too strongly heated nor stimulated to excessive transpiration. At mid-day, on the other hand, when the sun's rays only fall on the profile of the leaves, the heating and transpiration are proportionately slight. It is of interest that the leaves of these compass plants, as well as those of the above-mentioned lettuce, show this inclination and position when they grow on level, moderately dry, unshaded ground; and that in damp and shady places, where there is no danger of over-transpiration from the powerful rays of the noontide sun the twisting of the leaves does not take place and they are not brought into the meridian. (Kerner and Oliver, 1, 338.)

It would be interesting for dwellers in the country to observe whether the Prickly Lettuce, transferred to the Antipodes, still retains the property of causing the plane of its leaves to be north and south.

*Fodder or Other Uses.*—Mr. M. W. Thompson says, "Cattle and horses are very fond of it." Other correspondents have stated that stock nip at it; but, as a rule, very little is known about it in New South Wales, and senders always express their ignorance concerning it. In Sowerby's "British Flora" it is described as "a bitter, acrid, and fœtid weed." It cannot be specially nutritious, though it is likely enough that stock eat it with other food.

If one turns to Watt's "Dictionary of the Economic Products of India," interesting notes will be found as to the economic value, not only of the Prickly Lettuce, but also of the Common Lettuce. For example, the seeds yield a clear, sweet, transparent oil, while the dried juice (*lactuarium*) has medicinal properties.

*How to get rid of it.*—

While this weed cannot now be exterminated, it may yet be subdued. If prevented from seeding, in most places, it will decrease in numbers and aggressiveness. When mown, the plants stool freely, and so must either be cut with hoe or pulled to prevent altogether the ripening of seeds. Community of effort will be most effectual in limiting its spread.—*Ohio Bulletin*, 83.

Prevention of seeding is the remedy.—*Wyoming Bulletin*, 31.

A most vigorous but insidious foe.—*Wyoming Bulletin*, 31.

The plant has many of the qualities of a successful intruder, as well as an uncompromisingly weedy appearance. . . . Where the top is injured, sprouts are sent out from the base of the stem in a very troublesome manner.—*Indiana Bulletin*, 52. In Indiana its extermination is no longer considered a possibility.

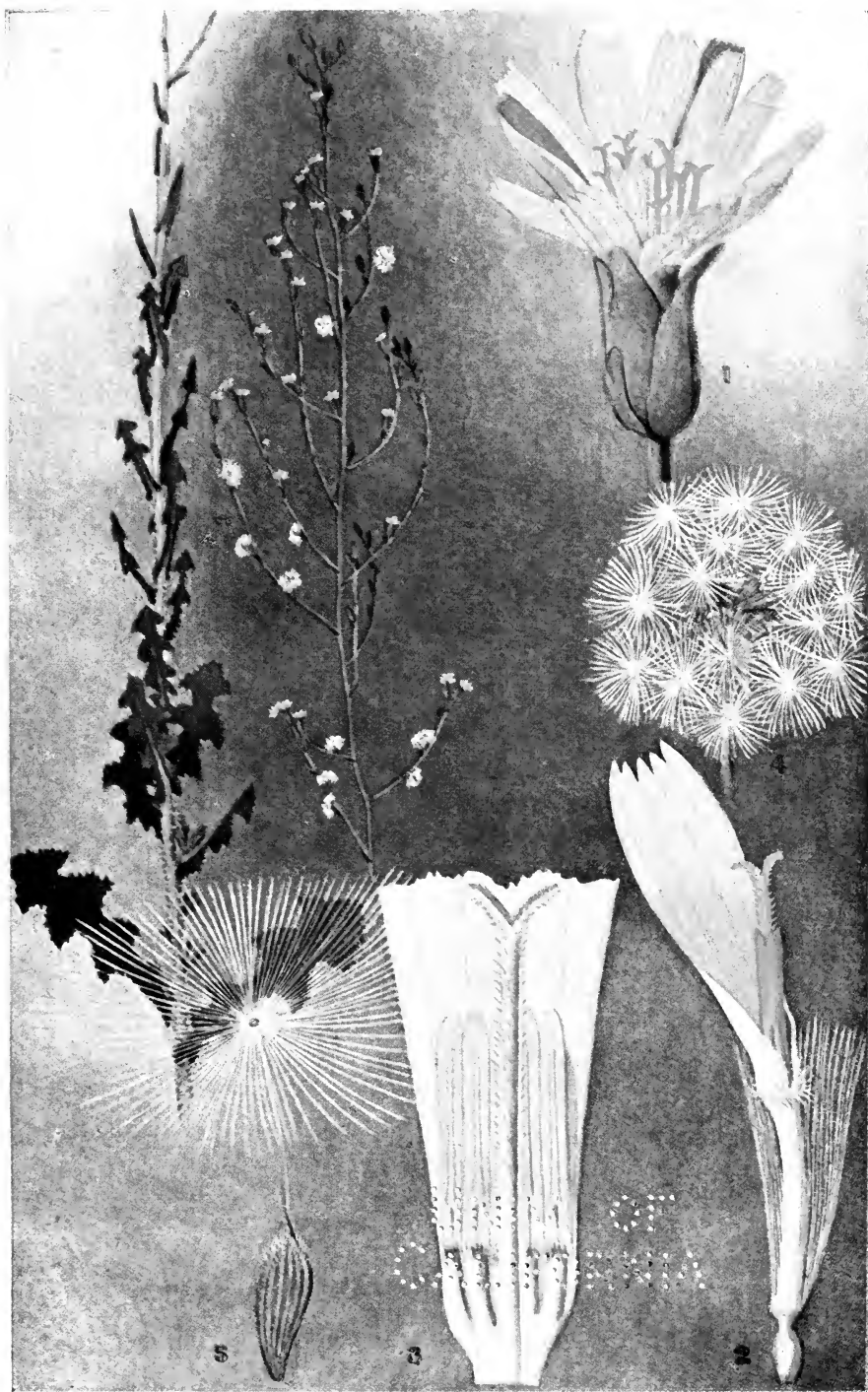
"A most pernicious weed, a single average plant has been found to bear more than 8,000 seeds."—*Farmers' Bulletin*, 28, Dept. of Agric., U.S.A.

I look upon it as a plant whose room is better than its company. In New South Wales it attains a height of 6 or 7 feet. It spreads rapidly, not merely by seed, but also vegetatively, when bruised or cut. So that if hoed out this should be done below the ground surface.

Unlike most annual weeds, the prickly lettuce is very troublesome in meadows and permanent pastures. Clover intended for a seed crop is often entirely ruined. Oats and other spring grain crops suffer more or less damage.

Sheep, and sometimes cattle, will eat the young prickly lettuce, and in some localities their services have been found very effective in keeping it down, specially in recently cleared land where thorough cultivation is impossible. Repeatedly mowing the plants as they first begin to blossom will prevent seeding and eventually subdue them. Thorough cultivation with a hoed crop, by means of which the seed in the soil may be induced to germinate, will be found most effective. The first ploughing should be shallow, so as not to bury the seeds too deep. Under no circumstances should the mature seed-bearing plants be ploughed under, as that would only fill the soil with seeds buried at different depths to be brought under conditions favourable for germination at intervals for several years. Mature plants should be mowed and burned before ploughing. The seed appears as an impurity in clover, millet, and the heavier grass seeds, and the plant is doubtless most frequently introduced by this means. As the seed may be carried a long distance by the wind, the plants must be cleared out of fence rows, waste land, and road-sides.—*Farmers' Bulletin*, 28, U.S. Dept. Agric.

*Where Found.*—It is a native of Europe (doubtfully of Great Britain) and Asia Minor, but it has now spread to many parts of the world. More definite localities may be found in De Candolle's "Origin of Cultivated



**PRICKLY LETTUCE** (*Lactuca scariola* L.).

1. A single flower-head. 2. A single ligulate floret. 3. Floret opened out, showing stamens, style and stigma.  
4. Head of fruits (with their pappuses) 5. A single seed (fruit) with their pappus parachute appendage.

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Plants." During thirty-five years it has traversed the United States, from the Atlantic to the Pacific, and has established many permanent colonies by the way. In New South Wales I recorded it as a new weed before the Royal Society of New South Wales in November, 1903, and in the *Agricultural Gazette*, February, 1904, and April, 1905, although there is no doubt it has been in the State long before that.

The surmise in an article written in 1905 that it is spreading has been amply confirmed, especially during the last few years. Most of our correspondents simply report it as a new arrival, and are puzzled by it, but the consensus of opinion, where it is expressed at all, is that it is not wanted, although a few report that it has some forage value. In Britain, where it is a native (a doubtful one according to some), it has not been recorded as a fodder plant.

A whole countryside can be sown by one gust of wind from a few plants, hence it is difficult of control by man. If a man's land were free of it to-day, he cannot tell whether it will be not sown with it to-morrow. This remark applies to thistles and allied plants generally. If only a few plants are seen they should be cut down or eradicated before or during the flowering season. If the seed is already in the land, one can only hope that the precipitation of rain may not favour either the germination of the seed or the development of the plant, for certain periods in the life of every plant are critical as far as rainfall is concerned.

### Sow Thistle (*Sonchus oleraceus* L.).

(COMPOSITE: Thistle or Daisy Family.)

*Popular Description.*—An annual with a yellow flower like a dandelion, with a tap-root and an erect, branched stem, with toothed clasping leaves. It has a hollow stem and milky juice.

#### *Botanical Description.*—

An erect, glabrous annual with hollow stem. Leaves alternate, sometimes prickly toothed, the upper ones stem-clasping and undivided, the lower ones usually pinnatifid. Flower-heads in a short corymbose terminal panicle. Florets yellow, all ligulate. Achenes not beaked, with a pappus and numerous fine simple bristles.

*Names.*—The name "Sow Thistle" is a very old English one. I do not know that sows are especially identified with it, although pigs, in common with all grazing animals, eat it greedily. It is not a thistle in the modern sense of the term; a century or two back the word had a very extended meaning and was applied to almost any plant that, after flowering, produced thistle-down.

In Sydney, where the old name has no special significance, it is most commonly known as "cocky weed," as it is so frequently gathered for cockatoos.

*Character as a Weed.*—This is a pest of gardens, for its parachute-like seeds settle on the land like a light cloud, and the weed springs up in a tidy garden by the thousand. It is not poisonous, and the only way of dealing with it is by hand-pulling.

*Two Forms.*—There is a more rigid form, with prickly toothed leaves which also occurs in New South Wales and possesses the same properties. It is known as variety *asper* (rough), and some, following Linnaeus, look upon it as a distinct species, under the name of *Sonchus asper*, but there are gradations between it and the normal form.

If we turn to the plate, figure 5 (it is magnified a dozen times) shows the seed of the normal form like a minute maize-cob, the individual "grains" corresponding to minute transverse roughnesses. In variety *asper* the seeds are quite free from these roughnesses.

In other words, the ordinary Sow Thistle, which is quite a smooth plant, has rough "seeds" or achenes, while the variety *asper*, rough or prickly as its name denotes, has smooth seeds.

*Its Economic Value.*—This is a plant known to everyone who keeps birds. The singing birds at once eat the underneath portion of the flower, particularly if it is going to seed, and so does the tame cockatoo, while a handful thrown to the fowls is at once devoured, and no growing plant of it is ever seen in the fowlyard. It has some slight food value for stock.

There is little fibre in it, and, so far as I am aware, there is no deleterious property of any kind in this weed.

Leichhardt, in his "Overland Journey to Port Essington," says that the young shoots make an excellent vegetable, and on more than one occasion I have known it to be boiled and used for food when vegetables are scarce. It is, however, only a stop-gap, and certainly not a rival of spinach and cabbage.

*An Alien.*—Bentham speaks of it as "a weed of cultivation, probably indigenous to Europe and temperate Asia, but now distributed over the greater part of the globe, and perhaps truly indigenous in Australia."

It is now found in many districts in all the States.

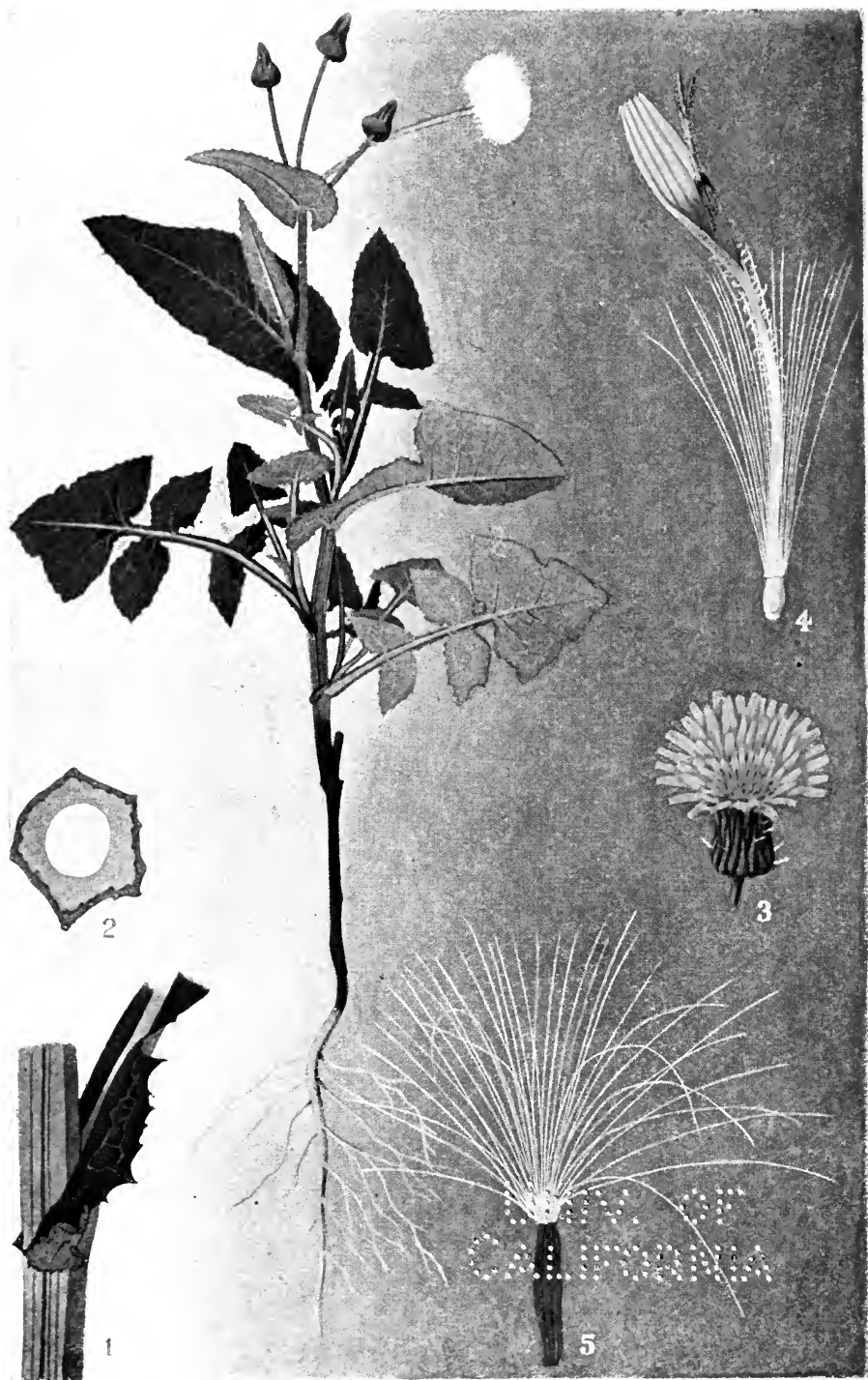
It occurs near the water's edge in most countries, and sometimes is found in places where there is scarcely an introduced plant competing with the native vegetation. Hence the difficulty, in any particular country, of saying that it is an alien. In Australia it has spread, during historic times, in many localities in which it is now abundant, but, so far as we know, it existed in Australia before the advent of the white man. Hence some botanists look upon it as indigenous, but, bearing in mind its facility of migration (its seeds can be blown across the water for great distances), its colonising power, and the fact that it is not specially Australian in its relationships, it is better, I think, to look upon it as introduced.

*How to get rid of it.*—It is a weed of cultivation; it becomes a "nuisance"; it interferes with the orderly appearance of the tidy garden, and hence it chiefly offends the æsthetic sense. It contains no trace of poison.

Wherever ground is broken up, or there is a holding place for ever so little soil the Sow Thistle may establish itself. It is an annual, and the only way to get rid of it is to pull it up before it matures its seeds. It is, however, very difficult to control; I have known an area apparently completely free from it one year, sown thick with it the next, the seed having come we know not whence, carried by the wind, helped by the thistle-down.

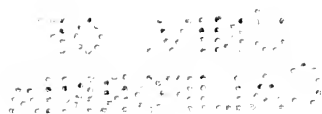
It is only in a garden that one desires to get rid of it, and I recommend no method other than hand-pulling.





**SOW THISTLE** (*Sonchus oleraceus* L.).

1. Portion of stem showing the clasping base of the leaf. 2. Section of stem showing hollow centre.  
3. Flower (natural size). 4. Ligule floret (x 12). 5. Seed with pappus (x 12).



**Cape Weed** (*Cryptostemma calendulaeum* R.Br.).

(COMPOSITÆ: Daisy Family.)

*Popular Description.*—A spreading herb with a rosette of leaves deeply “cut,” and hoary on the underside. Flowers, yellow, daisy-like. Seeds enveloped in a woolly covering.

*Botanical Description.*—

A prostrate herb with rosulate leaves, sinuate lyrate or pinnatifid, scabrous above, hoary beneath. Flower-head solitary on a scape-like peduncle, radiate, yellow. Achenes thickly clothed with long soft hairs.

*Experience in other States.*—This is a very old introduction to Australia. It is a native of South Africa, and probably came to Western Australia first. At all events it seems to have first got a good hold there. In Huegel's *Enumeratio Plantarum*, p. 67 (1837), it is recorded from King George's Sound from collections made in 1833. In Mueller's Report as Victorian Government Botanist, dated 14th September, 1868 (printed in *Journal of Botany*, vii, 183), he notes that Baron von Huegel noticed and recorded it in 1833, “as a exterminable weed of Australia.” In Lehmann's *Plantæ Preissianæ*, i, 487, it is recorded as having been collected at Fremantle in 1839.

The late Dr. Schomburgk, Director of the Botanic Gardens, Adelaide, wrote of it in one of his Annual Reports (1875):—

*Cape Dandelion.*—A native of the Cape. It was in the year 1850 that I first noticed a few isolated plants on the side of the road leading through the Gawler Plains. The following year a few made their appearance on the banks of the Gawler River. From year to year it is rapidly taking possession of pastures, as well as cultivated land, and is now found quite 200 miles towards the north from its starting point, covering even the untimbered mountain ranges to their summits. When in bloom the country presents a peculiar appearance, and as far as the eyes reach a yellow carpet only is seen. It is an annual, and although doing much harm to the more tender indigenous herbage, it is much liked by cattle and sheep, which eat it eagerly, preferring it even in a dry state to wheaten hay and licking the large and very abundant seed from the ground. When in bloom many people consider it injurious to the lungs from the inhalation of the pollen by which the air is impregnated. This circumstance may also be attributed to the moist atmosphere prevailing when the dandelion is in flower. Though the plant has taken possession of the land for the last twenty-five years it grows as vigorously as ever, and it seems that overstimulation fails to bring about degeneracy and subsequent extinction.

Now we come to Victoria. It seems to have got a hold in that State almost as soon as in South Australia. Thirty-nine years ago in the suburbs of Melbourne I saw large grazing paddocks with the plants all over as thick as they could stick, as the phrase goes. So abundant was it over half a century ago that a proposal was made to utilize the cotton on the seeds for commercial purposes.

See a paper “Remarks on a filamentous material grown upon the plant *Cryptostemma calendulaeum*, believed to be suitable for manufacturing purposes,” by Henry H. Hayter. (*Trans. R. S. Vic.*, vi, 26). (Read 11th November, 1861.)

He speaks of it as exceedingly common around Melbourne, and of its “gradually working its way into the interior, where it is much disliked as it forms only indifferent pasture for animals, and when it dies away, as it does during the summer months, it leaves the country quite bare, and almost as black as if it had been passed over by a bush fire.”

The "filamentous material" (fibre) which formed the subject of his paper was the hairs of the seeds. He adds:

"I have been informed by a hatter in Melbourne that it would form very good material for the manufacture of felt hats, and I believe it could also be converted into textile fabrics and paper. The fibre is short in staple, but curly, fine, and exceedingly tough."

Specimens were sent to the London Exhibition of 1862, but it did not appeal to manufacturers.

*Experience in New South Wales.*—I do not know when it first came to New South Wales, but it certainly did not get a firm hold until long after it had done so in the southern States.

Mr. Turner has figured and given an account of the weed in the *Agricultural Gazette* for 1891, p. 505. He quotes south-western localities and Wilcannia (in both cases probably coming from South Australia or Victoria).

I published the following notes concerning it in the *Agricultural Gazette* for 1895:—

Was introduced from Milton about five years since by horses, and is one of the most troublesome to keep in check. It is spreading rapidly in both cultivated and uncultivated lands. In order to keep it in check it is sometimes cut down. (Sassafras.)

Supposed to have been introduced in packing in cases of goods. It thrives in almost any position. Spreads rapidly, chokes pastures, and is a prolific seeder. No attempt has been made to eradicate it. (Bombala.)

Will thrive almost anywhere, no matter how poor or dry the soil. Wherever allowed to grow any length of time it will crowd out native pasture grasses. Although it imparts a bitter taste to milk and butter, it is a fodder plant by no means to be despised. It certainly makes its appearance in spring when the young grasses are abundant, but it lasts into the middle of summer, and being of a succulent nature, allays the thirst of cattle. In the dry season it is regarded by some settlers as a boon. In lands under cultivation it is kept in check by ploughing and hoeing. (Moama.)

As a rule, grows among wheat, barley, and other cereals. Crowds out valuable fodder plants. (Hillston.)

Made its first appearance in 1884, when seed was introduced in sheep's wool, and is now spreading with great rapidity. In cultivated lands the farmers do their utmost to keep it in check, but in uncultivated lands no steps have been taken for its eradication. (Orange.)

"This has made its appearance in the neighbourhood of Nowra, where it has created a small scare. It is one of those plants which will spread throughout the colony unless eradicated on its first appearance in fresh localities." (*Agricultural Gazette* for 1897, p. 81.)

Since then the weed has spread by leaps and bounds. During the drought of 1902, when dirty chaff from all over the Commonwealth and from many places beyond, came into New South Wales, weeds spread as they had not done for years. At that time several correspondents stated it had not previously been seen in New England, but there is plenty there now. Its course seems to have been from south to north, and pretty well the whole State is covered now.

It belongs to the Daisy Family, reputed to be a non-poisonous family, but the seeds are covered with fibre and they are licked up by grazing animals, and may form hair-balls (phyto-bezoars) in their stomachs, which may even cause death.

It has some food value, though sometimes it is so succulent that hungry animals may gorge themselves on it and become blown.



CAPE WEED (*Cryptostemma calendulaceum* R.Br.).

1. Floret. 2. Ring of connate anthers unfolded. 3. Bilobed stigma and style.  
4. Seed enclosed in woolly covering. 5. Seed naked.



About seven years ago a stock inspector on one of the Northern Rivers stated that Cape Weed had been found on different parts of the river, and appeared to be becoming more plentiful. He thought it had probably been introduced in chaff. He says the plant is rich in chloro (whatever that is), and is very deadly to horses, causing in the first place a swelling of the head and glands. Horses become very violent, then coma ensues, with tetanus symptoms, shivering fits, low temperature, and finally death. Cattle are not affected if feed is mixed, but where Cape Weed predominates impaction ensues, with fatal results.

This was the first occasion I had heard of poisonous characters being attributed to Cape Weed by a responsible officer, but I have not heard the report confirmed, and suspend my judgment. Years ago, when I was staying with a friend near Melbourne, his cows habitually fed on this weed (they had little else to eat at that time), but I never heard the suggestion of poison. I have seen horses, cattle, and sheep feed on the weed many times since, and do not know of evidence justifying it being branded as a poison.

*How to deal with it.*—It is very difficult to get rid of an overwhelming plant like this. Its rosette-habit enables it to smother grasses and better plants. The seeds with their beautiful fibre-attachments are caught by the wind and blow all over the place. When a paddock is full of it, unless money is no object, it cannot be got rid of, but I would strongly recommend any landowner to dig it up by the roots and burn it when it first makes its appearance on his property. He may thus stave off the invasion for a number of years, which is worth while, even if the invasion becomes more persistent as time goes on, and he may ultimately not be able to resist it.

Much of the turf in the suburbs of Sydney contains many Cape Weed seeds, and as the plant dies down in the winter, when turf is usually moved, the purchaser of turf for a new lawn should be very alert for Cape Weed as the weather begins to get warm, say in September or October. Dig it up with a knife; never let it seed.

Our roadsides are the great repositories of this weed. As the local authorities become more alive to its detrimental character, vigilance in regard to this pest will be even more active than it is. It is proscribed by many municipalities and shire councils. It is a source of great satisfaction to note how many shires and municipalities are becoming vigilant as to the dangers of weeds.

The weed has been proscribed in the following Local Government areas:—

## SHIRES.

Bulli	Erina	Manning	Terania
Bolwarra	Gundurimba	Orara	Tweed
Byron	Harwood	Stroud	Wallarobba
Cessnock	Kyogle	Tarro	Wollondilly.

## MUNICIPALITIES.

Ballina	Goulburn	Hurstville	Mosman
Burwood	Grafton	Kiama	Moss Vale
Casino	Grafton South	Lambton	Mullumbimby
Concord	Hamilton	Lismore	Stockton
Coraki	Homebush	Maclean	Ullmarra.
Glen Innes	Hunter's Hill	Maitland West	





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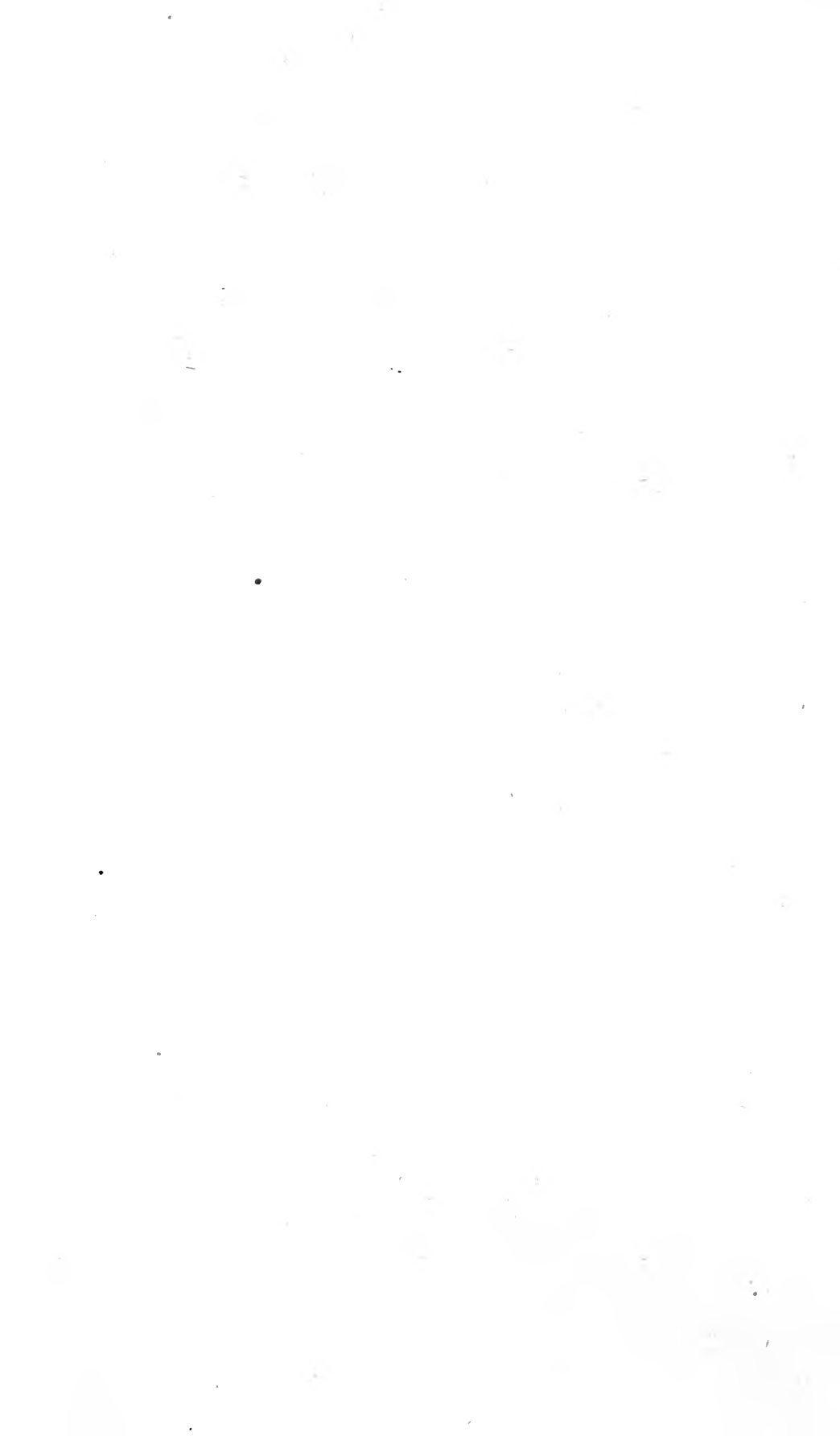


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