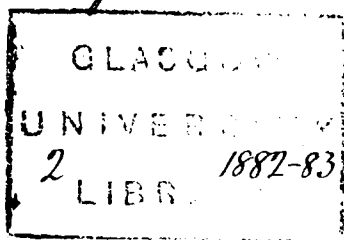


J. O. Guthrie M.B. (Ch.)  
(Glasgow 1876)



Lincoln  
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Tutu or Tūpātiki.  
Cornia russifolia

I have been led to select this most interesting shrub as the subject of my thesis for various reasons, amongst which are the following:

Tutu is a rapid and fatal poison affecting man and beast. It shows peculiar symptoms and no less peculiar sequelae. The severity of its action varies in a great degree according to the part of it that is employed, as for example, the seed is deadly but the pulp surrounding it is not so, being used as a food by the Maoris. There is every reason to suppose that Tutu or its preparations would prove most useful therapeutic

\*: Since writing this I have  
noticed an elaborate  
report on the poisonous  
properties *C. ruscifolia*, by  
Dr. L. Lindsay, in Brit. & For.  
Med. Chir. Rev., July, 1865.

agents, but notwithstanding that fact, and also that it may be found in great quantity almost all over New Zealand, I have failed to obtain any definite description of it or of its symptoms published. \*

The derivation of the word Titu is somewhat mysterious. There is no doubt regarding its being a purely Maori word, but although I have consulted many gentlemen conversant with the Maori language, I have been unable to obtain any clear explanation. The most probable one is that given me by the Rev<sup>d</sup> J. W. Stack who spent many years amongst the Maoris. He says it may be derived from the Maori words - Ti - to stand, and - Pakihi - an open space free from forest, as it is generally found in clear

patches. Others however say it derives its name from the fact of the juice requiring to be pressed out of it.

It may be well how to give a short botanical description of the plant, its varieties, habitation and mode of growth; then a few remarks upon its uses by the Maoris and other interesting facts, after which I shall endeavour to give a short description of the symptoms and sequelae so far as I have been able to obtain them from a multitude of sources. These various investigations have been so far mutually confirmatory that a tolerably clear description may be given, and as the evidence diverges only with reference to minor details of little importance, I.

have thought it better in most instances to leave the disputed points out altogether. Hence, however short and deficient what follows may appear, it will have the virtue of being a clear and almost correct description—the outcome of many sources—so far as it goes.

### Botanical Description

#### Habitat—

Cariaria Ruscifolia is abundant in the Northern and Middle Islands of New Zealand being known in the former by the name of "Tupa-kiki" (Colenso); "Tutu" and in the latter "Puhou" (Hyatt).

The shrub is from ten to fourteen feet high with long pleyllate four-angled

branches, and a trunk sometimes -  
- though rarely in New Zealand -  
six to eight inches in diameter.

The leaves generally oblong-ovate,  
acuminate, sessile or upon very  
short petioles. Three to four  
inches long. Racemes slightly  
pubescent, axillary, eight to  
twelve inches long, gracefully  
drooping; pedicels one third  
inch long; with a small subulate  
bract at the base. Flowers small  
green. Calix and lobes broadly  
ovate subacute. Petals small,  
fleshy. Stamens on filiform  
filaments; anthers sometimes  
abortive in what would  
become female flowers; but  
the plant is usually hermaphroditic. W. Cunningham  
describes the flowers as uni-



Sexual, and the petals as glands.  
The amount of swelling of these  
glands, which finally envelope  
the ripe carpels and give  
the fruit the appearance of  
a berry, varies much. Wt-  
Coleus, however, considers  
this a characteristic of importance  
and states that the less  
juicy berries have seeds that  
are not poisonous; this I  
consider very doubtful. De-  
Candolle states that poisonous  
effects were produced upon  
the French army in  
Catalonia by the seeds of  
*Coriaria myrtifolia*.

The Genus  
*Coriaria* contains but few  
species - possibly only two -  
one, with two varieties

(*C. ruscifolia*, and *C. thymifolia*),  
Common to South America and  
New Zealand; the other an  
European plant (*C. myrtifolia*),  
apparently also found in  
the Himalaya mountains.

The proper place  
of this plant in the Natural  
System has been much dis-  
puted, it having apparent  
claims to rank near *Chenopodiaceae* and *Phytolaccaceae*,  
though stronger on the whole  
to be retained near *Rutaceae*.  
The name is derived from  
'Corium' (L. leather) the bark  
being used for tanning.  
The above <sup>botanical</sup> description has  
been taken almost entirely  
from the "History of the  
Antarctic voyage of H.M.S.

Discovery Ships Erebus and Terror  
— 1839-1843

by J. D. Hooker, &c.

In Hooker's  
"Handbook of the New Zealand  
Flora" 1867, he adds to his  
remarks on *C. muscifolia*,  
that some believe the  
whole plant to be poisonous  
which opinion I endorse  
with the reservations to  
be hereafter noted. He also  
introduces a third variety or  
species, *C. angustissima*,  
abundant in Northern  
and Middle Islands (N.Z.)  
an annual herbaceous  
plant called *Tūtū* in  
Otago or "ground *Tūtū*" and  
said to be rare with which  
latter remark I cannot

concern.

Maout and  
Decaisne ("Traité Général  
de Botanique" 1838) say with  
regard to *C. multifolia* -  
as found in the region of the coast  
of the Mediterranean -  
that it possesses a con-  
siderable amount of tannin  
which is utilized. They  
further remark the  
existence of a narcotic  
principle which makes the  
leaves and fruit poisonous  
and being fraudulently  
mixed by certain druggists  
with those of *Senega* frequently  
causes fatal results to  
the sick. They then go on  
to mention the use of the  
juice as a drink by the

Natives and Colonists of New Zealand - which I shall presently more fully note.

A full description of the Characters of *C. myrtifolia* may be found in Payer's "Traité d'organogénie comparée de la Fleurs" 1857.

*Coriaria ruscifolia* of Chili - is a shrub called in Chilean "den", ~~the~~ bark & leaves of which have been used from early times to dye black according to Moquin. It has been found in the sand of the sea shore within a few miles of Valparaiso by Bracken.

ridge - and even as far  
as Peru by Feuillée.

("Chronological History of  
Plants" - Pickering 1879)

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Speaking generally there are in  
New Zealand simply two well-  
marked varieties viz. - first  
tree-Tūtū, growing often to a  
height of twelve or fourteen feet  
and having dark green leaves -  
and second ground Tūtū  
a dwarf with brown or brown-  
coloured leaves. Both are found  
all over both Islands of N.Z. and  
grow most luxuriantly along  
the banks of water courses.

The presence of  
Tūtū especially when it  
attains a large size gener-  
ally indicates fertility of soil.

It is generally the practice with the  
Maoris for the women to go out in  
the early spring in parties to gather  
the berries, which they carry home  
on their backs in large baskets. On  
reaching home they squeeze the juice  
out of the berries with their hands  
into large calabashes and afterwards  
strain it through close flax matting  
in order to get rid of the seeds  
and small stalks. The juice thus  
obtained is of a port wine colour  
or rather perhaps <sup>of the</sup> black currant wine.  
The taste is exquisite, and the  
bouquet deliciously fragrant. The  
Maoris drink it freely without  
suffering any ill effects, but here  
can be induced to taste it after  
it commences to ferment which it  
does in about twenty four hours.  
Europeans are always careful to

strain the juice prepared by the Maoris through some fine muslin before drinking, being afraid of the seeds which might remain in small quantity. I have said the taste of the juice is delicious and may add the following from a gentleman brought up amongst the Maoris. He says; "When living in the North Island I had frequent opportunities of tasting the juice and seeing the injurious effects produced on man and brute by the poison contained in the berries and shoots of the plant. When I was a child we always looked forward with pleasure to the ripening of the Titu berries, and though a summer never passed without persons young and old being poisoned, we could not resist the



temptation to drink the delicious juice".

Persons of the native race who suffer from Titia poisoning are invariably affected by taking the whole berry into the mouth and extracting the juice by pressing the berries against the teeth with the tongue. There has always been a dispute between the Maoris and Europeans regarding the actual cause of the poisoning - the Europeans maintaining it is the seed, and the Maoris on the other hand that it is the stalk which supports the berry on the fruit stem, ~~and the~~ Maoris may

be seen at any time taking a bunch of berries, thrusting it into the mouth, and carefully drawing out the main stalk with the attached

pedicels and, extracting the juice with the tongue and teeth, <sup>they</sup> spit out the seeds - but not all - for they often swallow a few without any ill effects. It is an interesting and certain fact that Maoris can thus swallow a few seeds, whereas it is as certain that Europeans cannot do so without injury. Can it be possible that the Maoris become tolerant of this poison as we know any one can do of opium and many others?

In 1845 three or four sailors landing at the Bay of Islands partook of the berries, a few hours afterwards they died in great agony and Dr. Davies who attended them attributed death to the action of the seeds. In this case no leaves, stalks, or young shoots were taken. It may be added that the

Maoris use Tutu almost invariably for suicidal purposes.

Regarding the fatal dose much diversity of opinion exists - some saying as low as four or five seeds - This however I believe to be an exaggeration. Probably from one drachm upwards would be nearer the truth. Of the fatal dose of other parts of the plant no definite details could be obtained.

The part of the plant employed is of great importance in judging as to the gravity of a case, as the effect varies not only in the severity of the symptoms but in the suddenness of their appearance. The most powerful in point of causing death especially amongst cattle, are the young succulent shoots which appear in the early spring, much

\* Passing

like peeled Cabbage stalks, a few inches above ground. Not only are those the most fatal but they are the most greedily devoured by Cattle and Sheep, which may be often seen ~~tearing~~ <sup>\*tearing</sup> the fresh green leaves and fruit and showing a distinct preference for the shoots. Next in order come the seeds - that is by themselves without the surrounding pulp - then the green leaves, and lastly the stem and bark. The pulp and juice, as before noted, cannot be said to be poisonous in any degree as compared to the other parts of the plant. Again, we may go still further with reference to the varying power of this peculiar plant, and say more broadly that all parts of the ground Titii

*or. c. angustissima* are more powerful and more speedy in their action than the corresponding parts of the tree *Tutu or. c. pycnostachia* - *c. ~~pycnostachia~~* <sup>*thyrsifolia*</sup>. Both forms are however much more dangerous because more insidious in spring.

Now, with regard to the symptoms of poisoning by *Tutu*. It may be premised that they vary in suddenness and degree according to the dose and part of the plant employed, but the general character remains the same throughout.

Although there is actually only one class of symptoms - the mild drifting into the severe - I shall, for the sake of perspicuity, divide them into two classes, first mild or non-convulsive

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and second degree or convulsive.  
1<sup>st</sup> Mild. The first symptom which attracts attention, is a feeling of dizziness or giddiness, and this may appear so soon as one or two minutes after the drug has been taken. The dizzy feeling gradually increases until the patient becomes, as he often says ~~to~~ is, partially intoxicated. His gait becomes unsteady and he leans for support upon the nearest article. The eyes become slightly suffused and following this the head appears heavy and is allowed to fall on either shoulder, or supported on the hand for rest, during which the patient complains of a fulness or bursting sensation passing into great oppression and most acute pain over the frontal regions.



At this stage, if a sharp Emetic is taken followed by free vomiting, the patient gets relief. These symptoms, particularly the frontal headache, mitigate, a troubled sleep ensues and next day slight nausea, headache, furred tongue and lassitude, are all that we are called upon to treat.

2<sup>nd</sup> Severe or Convulsive Symptoms.  
The symptoms before described may or may not be well marked. If they are lingering a better prognosis may be given, but if they are short and almost immediately followed by what I am about to describe, our prognosis must be grave indeed.

The eyes pass from being suffused into a fixed or staring state by degrees and within a few minutes look startled and then twitch. This

twitching increases in rapidity and passes to the arms and lower limbs gradually taking the form of a well marked epileptiform convulsion with few intermissions. The frequency and duration of those convulsions vary according to dose and part of plant taken; every seven minutes may be taken as the shortest interval and they may last from two or three minutes up to fifteen or even more. This is however only an approximation as I have been unable to obtain sufficient data to fix those periods with any degree of certainty.

The mouth is frothy and the tongue protruded and likely to be bitten. Faeces and urine may be voided during a convulsion. If the case tends to recovery the

intervals increase in length and the convulsions diminish. If not a new feature is added to each convulsion, which is noteworthy and important. Towards the termination of the convulsion the patient does not as heretofore gradually assume a comparatively natural appearance, but a stiffening and stretching of body and limbs appears - slight and scarcely noticeable at first, - but as the convulsions increase in frequency so does this stiffening, until in the intervals the patient lies as if he tried to lay his limbs out to the full extent - not like ophiothotonos simply an appearance which I can only describe as a "flat rigidity".

The convulsions increase in severity and frequency, the intervals

diminish, the rigidity lasts longer and the limbs tremble, the eyes again become more fixed and staring the skin assumes a dusky hue and a fatal termination ensues either during, or very soon after, a fit.

Sequela. In mild cases little trouble is occasioned beyond great depression besides tendency to headache and disordered digestion with now and then diarrhoea or constipation which may last for a week or two.

In severe cases the following may appear either in a few days or after a period of weeks; and it is to be noted that they are very much more frequently, when well marked, permanent than transitory. Blindness,

strabismus, impediments to speech  
hemiplegia, insanity. I only  
mention them as I have had  
few opportunities of studying the  
various forms carefully. Of  
their existence and being clearly  
traceable to the effect of this prison  
on the nervous system, there cannot  
be the least doubt.

### Post-Mortem Appearances.

Unfortunately we have little clear  
evidence to give on this head, owing  
chiefly to the foolish objections  
raised to autopsies in this colony,  
and also to the still more foolish  
system of coroners holding inquests  
and calling medical evidence  
with the almost invariable result  
that "after the evidence - we may  
share the feelings of the relations  
Statera" in which the twelve

Enlightened farm labourers cordially agree— few opportunities are obtained. This is the more unfortunate as owing to the fear farmers have of ~~losing~~ "tired" animals being left a moment unburied in case, as they think, of spreading disease and ~~contamination~~ <sup>contamination</sup> of an animal cannot readily be obtained.

The only appearances noted as peculiar were well marked congestion of the mucous membrane of the stomach and upper part of the abdomen with congestion of the liver. In one case in which poisoning had been caused by the seeds patches of inflammation and even slight abrasion of the foetic mucous membrane were described.

In this case the seeds were "entangled" in the mucous membrane of the stomach by means of their rough coats which appeared like this under the microscope.



The brain and great nervous trunks were not examined.

Treatment. The treatment used by the Maoris is as distinctly a matter of routine with them as Marshall Hall's method of treating the apparently drowned is with us. The rationale of it I cannot explain. It is this - first, immerse the patient in a river - second, thrash him well with water weed - third, subject him to the smoke from a wood fire, and fourth insert a rag into the mouth to prevent biting of the tongue.

In the non convulsive cases, a speedy

*\*  
Veterinary*



Emetic is certainly indicated, but care must be taken to use those that are not depressing of which mustard is perhaps the handiest. After the poison has been got rid of the depression which follows requires our special care and free stimulation is called for. In fact many push it to the extent of the "potion tod" of old days. I have found ammonia with now and then coffee generally sufficient. In fact many medical men and ~~veterinary~~ surgeons believe that ammonia has almost a specific action if given in time, but I cannot endorse this as I believe it is purely its action as a diffusible stimulant which is beneficial. Beyond this the sickness and sequelae generally are best treated by agents suitable to the requirements of each case.

Chloroform may be employed to mitigate the Convulsions but I am unable to say that I have seen any great benefit therefrom.

So far then for the consideration of this subject with relation to human beings.

I propose now to give a few details with reference to the action of Strychnine on animals, and more particularly Cattle and Sheep as they are out of all proportion the most frequently attacked.

Cattle and Sheep suffer almost always from Strychnine the young succulent shoots of which they are very fond. It is rare to find them suffering to any serious extent from Strychnine the leaves or fruit for, besides the effect being much less severe, they are by no

means to find of the leaves and fruit as they are of the shoots. This point I made a matter of experiment. I procured a heifer of four years of age. It had previously fed ravenously in an ordinary grass paddock. I had it taken away and put into a paved yard where it was kept for four days with no other food than freshly cut Titia leaves and fruit replaced every morning. For the first three days the animal did not approach the Titia, on the fourth morning it ate a few mouthfuls and turned away as if in disgust - but the fourth night it had not touched another leaf, and thinking it hopeless to continue the experiment longer I turned the animal again into a grass

Paddock. When it fed as before.  
Again I procured  
a merino ewe <sup>and</sup> subjected it to the  
same experiment with a precisely  
similar result. It must be said  
however that these experiments were  
not made in spring but in the  
middle of autumn when the Lute  
has in a measure lost its flavour.  
The old leaves may be freely  
devoured by cattle without any  
ill effect. Cattle may become  
remarkably tolerant of Lute  
if they begin eating it by  
degrees, but if there is a large  
quantity of shoots near them  
they will learn the best grass to  
get at it, and eat so freely that  
the result is almost certainly  
fatal. The symptoms are always  
worse when before partaking the

Stomach is empty: and further the fact of its being a dewy or trusty day also markedly increases the suddenness and severity of the symptoms.

### Symptoms in Sheep and Cattle

They may be divided into two classes first:-

Milder. Here the animal has a fit, but so soon as it recovers, it runs off anywhere but still keeping up a head gallop through all obstacles until it is perfectly tired out. It is not uncommon for them to push off a distance of six or seven horse miles in this way without stopping. The first effect of this, is rather to increase the action of the poison, but afterwards it is certainly beneficial.

x  
Jellu

for very few cattle which thus  
take to running die. Hence  
driving is the first thing a  
stock owner does when he finds  
an animal "tired." Passing  
through a river seems to act  
most powerfully when cattle are  
in this state, and almost all  
deaths which occur from this  
hidden form of the symptoms  
are due to the animal passing  
through a creek in its career.

Yet if they do get safely through the  
water, they ~~soon~~ rapidly recover  
so that this also is a frequent form  
of treatment - and stock owners  
deliberately drive them through a  
river, considering that the risk of  
first contact with water (although  
they freely admit it to be great)  
is more than counterbalanced by

the benefit derived from it afterwards. This may also be the reason why the natives make it so important a part of their treatment with reference to human beings.

After the animal has run a mile or two recovery is almost certain, as it literally takes the poison off and after it is tried out and having rested for a time it soon begins gradually to feed again as if nothing had occurred. Mr. Shack writes me that he has seen "many a one having to run for life from a beast maddened by Yutu".

Second: Severe. Here the animal stands and has fit after fit until, as almost invariably occurs, death relieves it.

The first thing noticed



by Stockowners is the glaring or  
startled appearance of the eyes which  
lasts a variable time and is followed  
by winking and twitching at  
first slow but gradually increasing  
until as the motion of the eye  
becomes quick the muscles of the  
nose follow and also twitch, then  
the muscles of the cheek and the  
neck from which it passes over  
the trunk and then the limbs  
stiffen. The peculiar jerking of the  
muscles of the head, neck and  
trunk increases in frequency, yet  
the limbs remain stiff and as  
the twitching increases the animal  
gradually goes backwards a step or  
two at first. Only as if afraid of  
hunting the head, but soon a little  
further until it rolls over backwards  
and lies so stretched I cannot use

any other term) that it cannot lift its head. While it is lying it froths at the mouth and the twitching of the muscles of the trunk still continues.

Such is the best description I can give of what is so well known in New Zealand as a "Tutu fit" in cattle - a form of convulsion so peculiar that it deserves to have been better described and attracted more attention than it has done.

The duration of the fit depends of course on the amount taken and other circumstances already noted.

The usual limits are however from five to thirty minutes. The intervals also vary but they have been known as short as only five

minutes. Between the fits the animal appears comparatively natural, but never rats. As they improve (which is of rare occurrence) the change is noted from the gradual increase in length of the intervals.

Regarding sequelae in animals, the most common by far is blindness either partial or complete, and in either form permanent. A peculiar form is not uncommon where the animal can see comparatively well during the day, but at night is almost blind.

In sheep a common but very peculiar result often follows, which could not be better named than by a term inappropriate to animals namely dementia. To

understand this we will suppose a mob of sheep occupying a narrow road. A "Tited" sheep comes up behind at a rapid walk. As it approaches the mob instead of joining it, as would be naturally supposed it walks straight through it bleating the whole time, until it passes out in front and continues its lonely journey as before. Yet such an animal will carefully avoid such dangers as falling over a precipice for instance.

An attack of Titis poisoning does not effect fattening afterwards.

The treatment usually employed for sheep and cattle is driving, bleeding, and stimulation either with whisky or ammonia

In "cutting and tailing" lambs those which before the operation had frequent fits, after it, seemed almost well - hence the treatment by bleeding.

Regarding post mortem appearances, the only peculiar features I have been able to hear of are that the animal becomes most rapidly distended with gas, and the mucous membrane of the stomach appears congested either in patches or as a whole. The Titi is always discernible in the contents of the stomach.

I may add that men have died of a scratch sustained in hooking an examination of an animal killed by Titi but yet the Maoris have been known to eat.

Such a carcass without any ill effect.

The mortality from Titic poisoning in cattle is very great. As many as thirty out of a mob of eighty cattle have been found dead in one paddock within one hundred yards of each other. They died from eating the young shoots growing in a cleft of rock close by. But this is a peculiar instance although I know personally of nine working bullocks being killed in one paddock in one night, and also one bullock was convulsed before my eyes while in the yoke from partaking of Titic during the time the dray was being loaded. In this instance the bullock rushed madly at any one who

was near. After being driven for about an hour, he recovered.

Horses rarely touch Tūtū but if they do they vomit for days afterwards. Rabbits never eat it. An elephant travelling with a menagerie in the Waitaki district was killed by Tūtū in 1869. Particulars of this may be found at page 399 of volume II of the Transactions of the New Zealand Institute. Birds are not affected by the seeds.

I had intended, before concluding this paper to have made some remarks upon the poisonous nature of the Tūtū plant, but owing to my health giving way suddenly and demanding my instant return to England I unfortunately have been unable

to push my investigations so far.  
I can only refer you on this subject  
to an interesting article by the  
late Dr. Skaer on the poisonous  
principle of *Coriaria Rustifolia*

In Tütü we undoubtedly  
possess a therapeutic agent of  
great power which I firmly believe  
might after careful investigation,  
be of great benefit in many  
nervous affections, and more  
especially in those for which  
strychnia is now employed.

But into this I do not propose  
to enter, for having given you such  
details of the action of the  
poison as I possess, I willingly  
leave the therapeutical part of  
the subject to those possessed of  
better opportunities for such  
investigations than a New Zealand



J. O. Galtieri M.B. & C. Co.  
(Glasgow 1876)

Country practitioner. Suffice it to say that there would be no difficulty whatever in making Pharmacopæial preparations of various strengths, such as an Extract, Succus, Liquid Extract, or Tincture from the shoots: a powder from the seeds and a decoction, or infusion from the leaves or stem.

Herewith I send the following samples, which I am sorry to say have suffered greatly from a protracted sea voyage:

<u>I.</u>	The fruit freshly plucked in bunches		
<u>II.</u>	Dried fruit	do	do <sup>10.</sup>
<u>III.</u>	Seeds	do	do
<u>IV.</u>	Shoots	do	do
<u>V.</u>	Stem	do	do
<u>VI.</u>	Leaves	do	do