1909.

NEW ZEALAND.

KAURI-GUM INDUSTRY

(REPORT ON) BY MR. GOW.

Return to an Order of the House of Representatives dated the 22nd October, 1909.

Ordered, "That there be laid before this House the report of Mr. Gow on the kauri-gum industry."—(Mr. STALLWORTHY.)

REPORT.

SIR,— 17th November, 1908.

In accordance with the instructions contained in your memorandum of the 9th September last, I have to report that I proceeded to the Auckland gumfields districts, and beg to submit herewith the result of my investigations along the lines laid down by you.

During my visit to the fields I interviewed the majority of the wholesale gum-buyers, exporters, and various brokers in Auckland, the storekeepers on the fields, the executive members of the Auckland Gum-diggers' Union of Workers, and several of its branches, and also a great number of individual diggers and settlers at the principal fields, besides very many other persons who were able to throw any light on the conditions obtaining in connection with the digging and marketing of kauri-gum.

I went very fully and exhaustively into all matters connected with the industry with these persons; and, in addition to my remarks in reply to the specific questions contained in your memorandum, I have dealt with other matters which are considered by the residents of the fields as of great moment in connection with the present state of this very important but somewhat neglected industry.

(1.) THE NUMBER OF MEN EMPLOYED IN THE INDUSTRY.

There are approximately about five thousand legitimate diggers, including Austrians, on the gumfields. By "legitimate diggers" I mean those whose living is made exclusively at digging. In addition to these there are about three or four thousand casual diggers—that is, settlers and their families who go out occasionally, and also the Maoris. A few men also go out to the fields from Auckland in the summer-time.

(2.) THE AVERAGE QUANTITY OF GUM OBTAINED AND PUT ON THE MARKET PER MONTH.

The last return—that for September of this year—shows that 555 tons was produced and marketed. This is the lowest return for ten years for a September month, except in 1901, when the quantity was as low as 498 tons.

The decrease is not confined to September. There is a general falling-off compared with last year of between 25 and 30 per cent.: compared with ten years ago the falling-off is about 40 per cent. For this year the average monthly production has been 495 tons.

(3.) PRICES PAID TO THE DIGGERS FOR THE DIFFERENT QUALITIES OF GUM.

According to a report supplied to me by Mr. Samuel Stafford, secretary of the Waipu Branch of the Auckland Gum-diggers' Industrial Union of Workers, the prices received by diggers for the different qualities of gum are as follows:—

At Waipu, Ruakaka, and Vicinity.

	Per Cwt.
	s. s.
Superior ordinary, termed three-quarters scraped	90 to 112
Fair ordinary	50 ,, 60
Washed nuts	35 ,, 40
Chips and dust	12 ,, 14

NOTE.—Sometimes the diggers rescrape and class the "superior ordinary" mentioned above, the new grade being valued from 120s. to 200s. per cwt. according to the degree of cleaning and quality. The paleness and clearness of the gum and the *quantity in the sample* fix its price.

	Per Cwt. s.		s.
Three-quarters scraped, termed "steel"	70	to	85
Ordinary to fair, half-scraped	40	,,	50
Poor ordinary, rough sorts	25	,,	35
Sugary sorts	15	,,	20
Chips and dust	6	,,	12
Washed nuts, swampy white and black			10

Mr. R. Hebden, secretary of the Waihopo Branch of the same union, also supplied the following prices of gums dug in Waihopo, together with samples of the various gums referred to :—

	Per Cwt. s.
Best black gum	100
Good black gum	86
Ordinary black gum	36
Nuts	16
Mixed Chips	10
Chalk gum	10

(4.) The Number of Firms in Auckland and Elsewhere in New Zealand handling Gum.

The question as to the number of firms in the Dominion handling kauri-gum is somewhat difficult to answer. However, I think that, taking into account all the firms and businesses, I should put the number down at about fifty.

(5.) The Quantities of Kauri-gum sent to England, United States of America, and other Countries, per Annum.

It is somewhat difficult to obtain the correct return of the quantity of kauri-gum exported to England in particular, as the figures compiled and placed at my disposal by Mr. H. Edmonds, kauri-gum and general merchant, of Auckland, who supplied the statistics to the Commission of Inquiry into the Kauri-gum Industry, give information not of the quantity sent to the Home market, but of the quantity sent to Europe. However, these figures answer the question for all practical purposes, for the great bulk of the gum included in this return is not sent past the London market.

The largest export to Europe was in 1899, when the quantity totalled 5,347 tons. Last year it was only 2,925 tons. This year, so far, the exports have been less than last year, there being (up to and including September) a decrease of about 290 tons as compared with last year.

The following are the export figures for the last five years :—

	Tons.
1903	4,118
1904	3,542
1905	4,377
1906	3,988
1907	2,925

There is a possibility of the exports for the remaining months of the year exceeding those of the corresponding months of last year.

Last year 5,372 tons was exported to the United States of America, which quantity was a little above the average of the last five years, and more than 600 tons in excess of the exports for the year 1906. This year there is a remarkable falling-off in the exports to the States, the decrease so far being about 2,500 tons. This represents the enormous decrease of 50 per cent.

For the last five years the exports have been as follows :—

	Tons.
1903	5,257
1904	5,127
1905	5,743
1906	4,711
1907	5,372

A considerable quantity of gum is sent to Germany per annum; the other importers in their order of magnitude being Canada, France, Austria, and Holland. Small quantities are also exported to the Commonwealth and Fiji Islands.

(6.) The Total Quantity of Gum exported per Annum.

About 9,000 tons of kauri-gum is annually exported from New Zealand. To Europe and the United States of America over 8,250 tons is sent every year.

(7.) The Approximate Value of the Gum exported from New Zealand per Annum.

The approximate value of the gum exported per annum is also a difficult question to answer, owing to variations in the prices of this product. But, reckoning the value as being between £55 and £60 per ton, a fair estimate would, I should say, be about £475,000 per annum.

Note.—It may be noticed that the figures given above do not exactly coincide with the figures given in the statistics issued by the Registrar-General; but I have taken my particulars from

Mr. Edmonds's Statistical Chart, being the only figures I had available; and I understand these figures are regarded as authoritative by the wholesale merchants of Auckland.

(8.) Who are the Immediate Buyers of the Gum from the Diggers?

I find that the storekeeper in the immediate vicinity of the gumfields, or in the adjacent townships, is generally the buyer of the gum from the diggers. The latter say that they must sell to this market, and that they have often tried to sell in Auckland to merchants, but always got a lower price than if they had disposed of their gum to the buyer on the fields. This gives ground to the suggestion that there must be a ring, or an understanding between the merchants and the storekeepers to force the diggers to sell to the latter.

(9.) By what Channel is the Gum exported?

The kauri-gum is usually exported by three or four Auckland firms to London direct, and from thence to New York, Germany, or Austria. Shipments are also occasionally made to the two latter countries *via* Sydney.

Grading, and Appointment of Gum-graders.

The most important point, to my mind, in connection with the kauri-gum industry is the lack of uniform grading. The want of such a system is responsible for the multiplicity and the fluctuation of prices, the dissatisfaction and uncertainty among the British and American buyers, and also for the weakening of the average price of samples of New Zealand gum.

I consider that the adoption of a system of compulsory grading of all gum before it leaves the Dominion is the chief remedy for most of the evils which attach to the industry at present.

There cannot be any valid reason against systematic grading, as grading is done at present by every exporting house in the trade. The trouble lies in the fact that each exporter grades to suit his own particular fancy, and establishes what he calls his brands, and on this basis attempts to do business, irrespective altogether of whether the arrangement may be suitable or advantageous to the consumer.

In support of the contention that there should be a system of uniform grading, it has been proved to me that, if one merchant adopts certain standards and another merchant adopts others, the gum which the one classes as No. 4 may be classed by the other as No. 8; consequently there would be two samples of gum from the same fields differently classified, though they were of exactly the same quality. The effect of such a state of things is that there are variations in prices which benefit neither the buyer nor the seller.

A proof of the above is the dissatisfaction which exists among British and American buyers. If buyers are forced to purchase one grade of gum under three or more distinct classifications, it is obvious that they must exercise much greater care in accepting parcels from this country than would be necessary under a uniform standard of classification. It is clear that Government grading—or, rather, grading carried on under a universal classification sanctioned and defined by the Government—must inevitably harden the average price of samples, for the buyer would know exactly what he was doing (as standard samples would be sent to all markets), and could therefore afford to reduce the margin which he must at present allow for wastage and for increased cost of sorting. Furthermore, such grading would improve the standard of the whole industry, and thus enable it better to meet the world's competition.

Every variety and quality of gum can be as easily graded to suit the proposed Government standard as they are now graded to suit the requirements of the Auckland merchants. There is a great tendency to disparage any attempt being made to grade the gum, and consequently a large quantity is shipped out of New Zealand ungraded. This must entail considerable loss to the producers, and the sorters in Auckland.

The Auckland merchants have a very strong objection to grading; but I am convinced that a standard system would benefit the Dominion as a whole, and would place the industry on a sound business footing, bringing it up to a level with other graded products such as flax, butter, &c. The gambling element now attached to the trade would also by this means be effectually eliminated.

I cannot too strongly emphasize the fact that it is not only desirable from every point of view, but *absolutely vital to the industry*, that the Government should step in and standardise the industry by standardising the gum.

The objection to Government grading comes not from the buyers or the diggers, but from the wholesale exporters and the brokers, who say that grading cannot be satisfactorily carried out. This contention is incorrect, and is prompted by the fact that, if the numerous elementary methods now in vogue were done away with, the profits which the brokers now make would go to those to whom they really belong—the diggers.

The storekeepers, diggers, and sorters are all in favour of the Government enacting a measure requiring the grading of kauri-gum under conditions similar to those under which butter is graded. They consider that all cases should be stamped with the name of the exporter, and that the grade should be branded on the outside of the package. A penalty should be inflicted on any one removing or attempting to remove the brand or the grade-mark from the package. There is a strong feeling amongst the storekeepers that the gum is tampered with, and other inferior gums added. Complaints have also been made by some varnish-manufacturers that kauri-gum bought in London contained other ingredients—*i.e.*, ingredients foreign to the nature of true kauri-gum. It has been reported to me that an inferior variety of gum is imported from Noumea, in New Caledonia, to Auckland, and is there mixed with the lower grades of kauri-gum for export.

I would recommend, therefore, that the Government should employ a grader in Auckland to inspect the gum before it is shipped to Great Britain, and that a grader be stationed in London. The latter grader would have to watch that nothing but pure kauri-gum was sold at the auctions as kauri-gum. There should be a grader in New York also.

A kauri-gum expert, Mr. B. E. Williams, of Aranga, has offered to demonstrate to any representative of the Government at any time the practical manner in which the gum can be graded, and any required system of grading conformed to. This gentleman has very kindly promised to forward me at an early date a range of samples as now handled, and is also willing to furnish samples which may be partially adopted to form the basis of standard grades.

I would also recommend the Government to arrange a conference in Auckland between the representatives of the exporters, the diggers, and the storekeepers. As the basis of representation, I would suggest that the Kauri-gum and Diggers' Union should nominate the representatives of the diggers; that the Government should nominate the representatives of the storekeepers and small buyers who are not controlled by the brokers and wholesale merchants. The exporters and the brokers should conjointly nominate their own representatives. The object of the conference would be to classify and arrange the various grades to the satisfaction of all concerned in the gum industry.

I was given to understand that the higher class of kauri-gum is becoming very scarce, the great bulk of the gum at present shipped being of medium grades. I found also that very low grades are being exported—grades which a few years ago were thrown away as worthless, as they were then considered to be of absolutely no marketable value. These low grades, I am informed, are extensively used in the manufacture of linoleums. It is reported that kauri-gum is being exported from Auckland unsorted in order that it may be graded at a lower rate in other countries where the labour costs less. The firms doing this do not require to employ labour in the Dominion, and as a necessary consequence many sorters in Auckland lack employment owing to this method of exporting unsorted gum.

Gum-bearing Swamp Lands.

On my mission I made careful and extensive inquiries about the gum-bearing swamp lands belonging to the Government. I have seen the gum which has been taken from these swamps, and have no hesitation in recommending the Government to drain them. They would pay handsomely if this were done. Private holders of swamps containing gum have received as much as £40 an acre for the right to dig for gum, the diggers undertaking to thoroughly drain the swamps, and leave them in a condition suitable for cultivation; and even at this high rate of payment for the bare right of obtaining the gum, and notwithstanding the stringent conditions, I understand the diggers did exceedingly well out of the transaction.

I am of opinion that the Government should hold fast to the reserves and swamps for the British diggers: should a wave of depression sweep over the country they would prove a valuable source of employment for many of those out of work.

Certain suggestions have been made to me by the executive of the Auckland Gum-diggers' Union to the effect that in the event of the Government undertaking the draining of gum-swamps it should arrange to sell the digging-rights to the diggers in acre sections, or have them balloted for, when the swamps were drained.

After seeing the excellent work done by the Austrians in the Port Albert Reserves, I am afraid the suggestions of the executive are unworkable. To my mind it would be utterly impossible for one man to work an acre of swamp land in such a manner as to leave it in a satisfactory condition.

Indiscriminate digging seriously damages the surface and the land generally: it covers the land with dangerous holes from 1 ft. to 7 ft. in depth, and brings the clay substrata to the surface. These form great hills of useless clay. From £10 to £20 per acre would be the cost of replacing the normal surface of what is known as a dug-out field. A gumfield from which the gum has been extracted by systematic methods of digging and draining would leave the land of greatly increased value for agriculture or horticulture, as the case may be.

Many swamps would make a profit for the State from a land-value point of view if they were dug by first draining and afterwards by what is known as face digging—*i.e.*, removing to the surface all timber found within 3 ft. of it. Hundreds of thousands of acres in the gum-bearing country, now a useless barren waste, could be brought under cultivation and turned into comfortable homesteads by the careful handling of the gum lands. For the best results to be obtained, settlement must go hand in hand with digging. The letting of gum lands for the digging of gum only detracts from the value of the land and of the district.

Considering all the circumstances of the case, I think the Government should undertake the draining of the swamps, and when the swamps are drained they should be cut up into sections and balloted for by parties of legitimate diggers who would work amicably together. I may remark that the great success of the Austrians on the fields has been owing to their co-operative system of work, as against the Britishers' individualistic methods.

In the event of the Government draining the swamps and allowing the lands to go to the ballot, the diggers are quite prepared to pay a fair price for the right to work the sections, either in the form of an export tax, an increased license fee per annum, or a royalty on the gum procured from the land.

Should the Government approve my suggestion, I recommend that an experiment be made in draining a small swamp situate near Waipu. My reason for recommending this particular swamp is that it has a good fall towards a river, which would facilitate drainage operations, and, as I

understand it contains gum in large quantities, the cost of the experiment would not only be covered, but the whole transaction should pay handsomely.

Suggested Tax on Austrian Diggers.

It is freely stated that the Austrians only become naturalised in order that they may secure the five-shilling license and the right to work on Government reserves and swamps. There is a strong feeling that the Government should place a tax (through the banks) on all money sent by the Austrians out of New Zealand.

It has been suggested to me that, if the Government decides to appoint graders, and a representative to travel round in the interests of the industry, a license of at least £4 per annum should be charged to all Austrians, as the private landowner will reap the benefit of the work of the Government in establishing markets. It would, of course, be necessary that the Austrians should be advised of the change, so that when they enter into a contract they will be fully aware of their position. Judging by results, the Austrians could well afford to pay a license fee of £4 per annum, or an export duty of £1 per ton.

All Austrians should be debarred from working in Government swamps or reserves, as they can get full employment from private holders of gum lands or swamps. I understand that these private owners prefer the Austrians to the British diggers.

Austrians as Colonists.

As to the Austrians themselves, there are some fine men physically among the younger section. These men should make fine colonists: they are strong, healthy, and intelligent; they are also good workers, and appear to be economical.

Kauri-gum Acts.

In my opinion the Kauri-gum Acts require amendment in the direction of administration. At present the local bodies do not get a fair-enough return for the labour involved under these Acts, as it does not pay the Ranger to hunt up men for license fees after the first few months of the year. The only effectual way of collecting the revenue seems to me to be through the Police Department. The local police officers in uniform are for many reasons very much respected by the Austrians, and every assistance is usually given them in looking up new arrivals on the fields. On the other hand, the Ranger, being an ordinary civilian, does not seem to carry the necessary amount of weight, and is easily bluffed.

Sharp Practice in the Marketing of Gums.

There must be some very crooked dealings in connection with the marketing of kauri-gum in London, when such firms as the new Zealand Loan and Mercantile Agency Company (Limited), Mitchelson and Co., and others firms can handle with profit wool and other produce, but their dealings in kauri-gum result in heavy losses. These firms always advise their clients to sell in Auckland, as they can get a better price there than if they ship to London and incur all the heavy expenses attached thereto. First-class firms of high standing act as brokers only.

I may mention that several of the storekeepers on the Wairoa River have tried the experiment time after time of despatching their gum direct to London, thinking that it would save brokers' charges; but the returns have always showed a heavy loss. I have no doubt that there exists in London a kauri-gum ring, and that this ring has been in existence for several years.

A merchant who has been for many years connected with this business made the following statement: "It is rather astounding that such a firm as Mitchelson and Co. could not place their gum and secure a satisfactory offer or a satisfactory price. They were beaten, and the gum was reshipped to Auckland and sold at a much higher price to the representatives of the London combine."

Although there are so many firms in Auckland who handle gum, there are only four who export direct to the London, American, and European markets. The impression among varnish-manufacturers in the various parts of the world is that it is impossible to buy kauri-gum in New Zealand, and that it can be obtained only through London or American firms. One of the largest buyers of gum in the Wairoa told me that a few months ago a gentleman called at his office and in a very roundabout and guarded way introduced the subject of the gum trade. After a time he stated that he was from Cleveland, America, and that, as his health had broken down, a doctor had ordered him a sea-voyage. The firm with which he was connected was one of the largest varnish-manufacturing firms in the city. Seeing that he was to take a sea-voyage, the firm decided that he might as well visit New Zealand, and try to make arrangements for the direct shipment of gum. *He was surprised to learn that he could buy gum direct.* He had thought that the gum had to be sold through one channel. The Wairoa merchant offered to sell to him direct. He bought 50 pounds' worth of gum to take back to America, that being all he could spare at the time out of his personal expenses. Fortunately he missed the steamer at Auckland. He then cabled to his firm in Cleveland, and they immediately cabled out £500. He returned to the fields and purchased the 500 pounds' worth of gum, which he shipped from Auckland *via* London to New York. The freight to New York was £4 10s. per ton, including all charges. He has now made arrangements to buy all his gum through this Wairoa firm. This is an example of how the ring endeavours to blind the merchants.

Here is an astounding illustration given me by another gentleman engaged in the industry. He says, "There is no ring in New Zealand, but there is a ring in London. This ring has been

in existence for years past, and has been the means of turning nearly all the shipments made by speculators into heavy losses. I have seen the catalogues sent by London merchants to their agents here after sales in London, and on the catalogues, opposite a sale of, say, 100 cases, would appear the remark made by this buyer, 'Thrown away to ———; we shared.' Again, 'Our value, 56s.; we bought by arrangement at 40s.: how long can this man last.' And there are many such remarks on the catalogues."

The report of the High Commissioner in London is looked upon as useless by the majority of the storekeepers and diggers, as they do not understand on what basis of quality the classification is arranged.

A leading gentleman in the trade, in the course of a conversation with me, made the following remark, which is very suggestive: "As to the High Commissioner's reports on the sales of kauri-gum, I consider they are quite unintelligible to any one but the particular shipper who knows *what grades were offered, and whose grades they were;* but to the average storekeeper they are of absolutely no use: whereas if a brand or grade of gum were shipped under a Government standard grade, every one, storekeeper and digger alike, would know what value his gum of a similar quality would be worth."

In the event of the Government not seeing its way to establish standard grades, and as there exists a strong feeling amongst exporters and sorters that all unsorted gum sent out of the country should pay an export duty, I would recommend that a duty of, say, up to £10 a ton on all unsorted gum over £40 per ton in value should be imposed. In this connection I may say that there is a great falling-off in employment for sorters in Auckland. The reason given for this is that the diggers and storekeepers are now scraping the gum on their own account, as they find that by so doing they can command a better price on the market.

The Draining of Waipapa Kauri Swamp.

When I was in the Awanui district, Mr. Russell, chairman of the Lake Draining Company, which consists of some twenty-five diggers, interviewed me with reference to his company's right to work a lake. The facts of the case are as follows:—

This company drained the Waipapakauri Lake on their own account, without making any arrangement with the Government for the privilege of digging the gum after the lake was drained. Their position now is, that, after expending a considerable sum of money—they say, about £600—owing to their not having any legal rights to the land, any digger with a license can enter and dig for gum. The company fears that Austrians and Maoris will overrun their field, and the chairman considers that it is a great hardship, after all their expenditure, that any licensed digger can come along and enjoy the result of the company's labours. At the same time they would be only too glad to welcome any diggers, provided that such diggers paid an approximate sum based on the original expenditure incurred in draining the lake.

The lake extended over an area of some 90 acres, and before draining covered the soil to a depth of about 4 ft.

The following is a statement of the work done, which was handed to me by the chairman:—

Particulars of Tunnels and Ditch Work draining Lake.

Twenty-five men, 96 days, tunnel and two cuttings.
Ditch into swamp, 21 days.
Sawn timber, 2,500 ft. of heart of totara, for fluming through tunnel.
Split timber: Legs, 260—7 x 8; caps, 260—6 x 6; spreaders, 260—6 x 6; toms, 260—4 x 4; stays, 260—5 x 3; wedges, 5,000, more or less; slabs, 2,000— 7 x 3; caps and braces for fluming, about 1,000 ft.
Wages, expert miner, £25.
Freight on sawn timber, £1 5s.
Sundries, tools, &c., £7.
Explosives, £11.
Carting, horse-feed, &c., £10.

Of course, before starting, the company should have made suitable arrangements with the Government; but, as they omitted to do this, they now say they are prepared to make a statutory declaration before a Magistrate that if allowed the exclusive right to dig for gum on this 90 acres they will undertake to leave the land thoroughly drained, and the drains all open, and the surface of the ground as consistently level as the nature of their employment will allow.

While I think that the company should be granted the exclusive right to this swamp on account of the large sum of money which they have expended on it, I still consider that they should be required to pay a royalty on the gum produced, as private owners charge heavy royalties for the right to dig on private swamps. I therefore recommend that such exclusive right be granted to the company, and that a suitable royalty be imposed.

Cost of Necessaries of Life at the Gumfields.

During my travels I looked into the question of the cost of groceries and other necessaries of life on the fields, and found that as a general rule the ruling rates, considering cost of transit, &c., were very fair. In the Waihopo district, however, very strong objections were taken to the somewhat high prices which are charged by storekeepers, and the following statement of prices, with vouchers attached, was handed to me by the joint secretaries of the Auckland Gum-diggers' Union. The freight from Auckland to Waihopo and Waiharera is, I understand, from 10s. to £1 per ton.

Prices of Stores charged on Gumfields and at Auckland.

	Waihopo.	Waiharera.	Auckland.
Flour	8/6 (50 lb.)	8/6 (50 lb.)	6/0 (50 lb.)
Tea	2/0 per lb.	2/4 per lb.	1/3 per lb.
Sugar	0/3 ,, ,,	0/4 ,, ,,	0/2½ ,, tin.
Milk	0/9 ,, tin	0/10 ,, tin	0/6 ,, ,,
Candles	0/9 ,, lb.	0/10 ,, lb.	0/6 ,, lb.
Onions	0/3½ ,, ,,	0/3½ ,, ,,	0/1½ ,, ,,
Jam	0/6 ,, tin	0/6 ,, tin	0/5 ,, tin.
Potatoes	14/0 ,, cwt.	15/0 ,, cwt.	8/0 ,, cwt.
Bacon	0/11 ,, lb.	1/0 ,, lb.	0/9½ ,, lb.
Tinned beef ..	1/4 ,, tin	1/3 ,, tin	1/0 ,, tin.
Currants	0/10 ,, lb.	0/7 ,, lb.	0/5 ,, lb.
Hops	3/0 ,, ,,	2/0 ,, ,,	1/6 ,, ,,
Rice	0/4 ,, ,,	0/3½ ,, ,,	0/2½ ,, ,,
Cocoa	2/6 ,, ½ lb.	2/2 ,, ½ lb.	1/8 ,, ½ lb.
Sago	0/4 ,, lb.	0/3½ ,, lb.	0/2½ ,, lb.
Raisins	0/10 ,, ,,	0/8 ,, ,,	0/5 ,, ,,
Salt	0/2 ,, ,,	0/2 ,, ,,	1/0 ,, 20 lb.
Kerosene	5/6 ,, tin	5/6 ,, tin	4/8 ,, tin.
C. biscuits	0/6 ,, lb.	0/6 ,, lb.	0/3½ ,, lb.
Soap	1/0 ,, bar	1/0 ,, bar	0/6 ,, bar.
Baking-powder ..	2/6 ,, lb.	3/0 ,, lb.	1/9 ,, lb.
Sunlight soap ..	1/6 ,, box	1/4 ,, box	0/11 ,, box.

R. Hebden,
J. McAuley,
Secretaries, Auckland Gum-diggers' Union of Workers.

Information asked for by Storekeepers and Diggers as to the Commercial Aspects of the Gum Industry.

The following questions were submitted to me by the gum-buyers and representatives of the diggers:—

(1.) Who are the actual consumers of kauri-gum in Great Britain, United States of America, and Canada?
(2.) For what purposes do these consumers use kauri-gum?
(3.) Could we obtain samples of the kauri-gum as these consumers buy it for their particular purposes?
(4.) What prices are these consumers prepared to pay for the particular kind of kauri-gum they use?

I was not in a position to answer these questions, as, to enable one to do so, a representative would be required to travel through these countries to secure samples and gather the necessary information in a satisfactory manner on the spot.

I pointed out to the diggers that the matter of obtaining the information desired would involve a large outlay on the part of the Department in connection with the salary and travelling-expenses of such a representative. In reply the diggers stated that they were quite agreeable to pay an export duty of £1 per ton on all gums exported; and, as the yearly export exceeded some 8,000 tons, the revenue therefrom should not only provide for the expenses of such a representative, but should be more than ample to pay for a grading staff for this industry.

Mr. Rosse Trevor's Process of extracting Valuable Products from Kauri-swamp Peat.

While in Auckland Mr. Rosse Trevor, a chemist of that city, called on me with reference to his process for extracting valuable products from kauri-swamp peats. Mr. Trevor informed me that he had been experimenting at this process for some twelve years. He wished the Government to give him an opportunity of demonstrating the high commercial value of his invention.

I attach hereto Mr. Trevor's description of his process.

Auckland, 19th October, 1908.

Process for extracting Oils, Tar, and Gas from Kauri-swamp Peat.

The plant I have used is so constructed that it is continuous—that is to say, the peat put in from time to time, and the exhausted material drawn away. Also, as the peat sank down it came in contact with the greater heat, until the maximum heat was reached. When the peat was first placed in the extractor it was in a compact mass, and gradually as it approached the greater heats it separated, until at the last heat only a thin layer of peat was brought in contact with the heat. This is necessary because the whole of the component parts of the products must be brought off separately at their different temperatures — that is, at their respective boiling-points. All moisture (aqueous) must be driven off at or under 212° Fahr. Ordinary destructive distillation of kauri-peat will not give my products.

The chamber in which the soil is placed is connected with an expansion-chamber (which will keep warm during the process) by a suitable pipe (the tar separates out here), and from there to a second chamber which is used as a condenser, and which condenses most of the gas into oil. The uncondensed gas is then run through a condensing-worm, the oil drawn off, and the uncondensable gas collected if necessary. The gases coming over from the soil must be first introduced into an expansion-chamber as above, and not straight through a condensing-coil.

Temperatures—First, 200° to 212° Fahr.; second, 300° Fahr.; third, 400° to 410° Fahr.; fourth, 600° to 700° Fahr. These temperatures must be applied to the peat in turn. 700° Fahr. is generally sufficient to exhaust. The temperatures to be watched carefully are from 200° to 212° Fahr., and from 400° to 410° Fahr.

Treatment of Kauri-peat and Products.

By "kauri-peat" is meant swamp composed mainly of decayed and decaying kauri vegetable matter, leaves, bark, limbs, roots, &c., and decayed or sugary gum. There are thousands of acres of these swamps north of Auckland, and they are well known to contain large quantities of saleable kauri-gum and kauri timber lying buried. It is also a well-known fact to gum-diggers that the best of the kauri-gum lies beneath the kauri-trees buried in these swamps, and, as these swamps run from 4 ft. to 14 ft., more or less, in depth, it is impossible to get out either this valuable timber or the gum by the present system of digging.

In applying my process for treating this peat, and extracting certain valuable products, I would propose to take a swamp in a face, or run a wide drain through it, thereby draining the swamp if necessary, and uncovering the buried timber and gum.

The peat could be run up to the factory, and could be there treated, and returned to the swamp by tips, so as to leave a level surface. Diggers could be employed to load small trucks with the peat, and deliver it at the factory free of cost, and get out the timber for the gum which they would dig out. That is to say, it would pay diggers to deliver the peat to the factory and get out the timber for nothing; or, if labour was employed, the amount of gum and timber obtained would more than pay expenses of getting out and delivering at factory; or diggers would willingly pay extra royalty to dig on a drained swamp.

The products obtained from a kauri-swamp by my process would be kauri timber, kauri-gum, tar, oils, gas (illuminating or for power).

There is no machinery necessary in my process of extracting these products, tar, oils, and gas, unless it were thought advisable to use a gas-engine for power to haul logs or trucks from the swamp.

The gas made is a by-product, and would supply the necessary gas to the engine, or could be used underneath the furnace as auxiliary heating-power.

My plant consists of a cast-iron chamber, of suitable size, so constructed that it is continuous in working—that is to say, fresh soil is put in from time to time, and the exhausted soil is drawn out without interfering with the continuance of the process, and all particles of the soil are brought into contact with the right heat at the proper time. This cast-iron chamber is built into or sheathed round with bricks, and a small furnace added. It is connected by an iron pipe to a suitable expansion-chamber, where the gases which are driven off expand and separate from the tar; and from there to the second chamber, where most of the gases are condensed into oil, the remaining uncondensed gases going from there through a condensing-worm, and from thence into a small gasometer for supplying heat, power, or light.

Products.

Tar.—This is a splendid wood-preservative, and will prevent rusting or oxidization in iron or steel work. It dries well, and can be used in place of coal-tar.

Oils.—Some of these oils can be used with linseed-oil for painting purposes, especially for ships' hulls, piles, or wharf and bridge work. The main use I claim for the oils is for use on board men-of-war, torpedo-boats, or destroyers, as fuel. Such fuel is easily applied, can be used at a moment's notice either in the presence of coal fuel or alone. When used alone, no smoke or vapour of any kind is given off through the smokestack. If necessary, the whole of the fire-hole, fire-tubes, and spaces in the boilers can be filled with incandescent heat, and the whole of the oil can be gasified. The objection to oils already in use for this purpose is the thick black smoke which is given off, as by it a ship can be sighted at a long distance. This fuel oil could also be used on ordinary steamers or in stationary boilers. The oil is also suitable for linoleum-manufacture, japans, lacquers, &c.

The cost of producing this oil, tar, and gas by my continuous process would not exceed 2d. per gallon if 2 tons of raw material were treated in the twenty-four hours. The marketable kauri-gum and kauri timber which would be obtained is not, of course, considered in this cost of 2d. per gallon. Also, coal or fuel is allowed for at a cost of £1 7s. 6d. per ton. Fuel would not cost this, as the swamps are full of small timber which could be used. Also, the gas manufactured would be used as fuel. The necessary labour would consist of one man for, say, each eight-hour shift.

I may say in conclusion that these products are the results of experiments carried on by myself from time to time as conditions allowed, over a period of more than fourteen years; that I am a chemist, and have consulted some of the best known authorities in the world; also that it is absolutely necessary to use my process for the extraction, and my plant as here specified is the best kind to use.

My experiments have not been laboratory experiments, but practical ones, and I have treated several tons of peat from various swamps.

S. C. Rosse Trevor.
Auckland P.O.

Gums competing with the true Kauri.

I was surprised to find that many people, even on the gumfields, were not aware of the large number of gums which compete in the London and other markets with the true kauri product. The following is a rough list of the gums referred to:—

Animi,	Manila,	Argol,	Singapore,
Zanzibar,	Macassar,	Benguela (African),	Northcoet.
Copal,	Kovo,	Damar,	

The depression in the kauri-gum market may to a great extent be attributed to the large shipments of Manila gum which are going forward at the present moment.

THE IMPORTANCE OF KAURI-GUM IN THE MANUFACTURE OF VARNISHES, ETC.

To show the great value of kauri-gum in the manufacture of varnishes, &c., I append some extracts from an authoritative work entitled "A Few Notes on Varnishes and Fossil Resins," by R. Ingham Clark, F.L.S., F.R.G.S., &c., which speak for themselves.

J. GRAHAM GOW,
Trade Representative.

The Secretary, Department of Industries and Commerce, Wellington.

EXTRACTS FROM A BOOK ENTITLED "A FEW NOTES ON VARNISHES AND FOSSIL RESINS," BY R. INGHAM CLARK, F.L.S., F.R.G.S., ETC. PUBLISHED BY CHARLES LETTS AND CO., 3 ROYAL EXCHANGE, LONDON.

On the front page, "Compliments of Pratt and Lambert, Varnish-makers, New York and Chicago." On the last page, "Press of Robert L. Stillson, 514 Pearl Street, New York."

Pages 1 to 8 deal with the origin and antiquity of varnish. From the earliest times to the year 1884 the lacquer trade of Japan is dealt with. Lacquer is the crude sap of the *Rhus Vernicifera*, or lacquer-tree.

Pages 9 to 22 deal with the history of varnish-making in Europe, and comment on the varnish of the violin-makers of Italy, the secret of which was lost about 1760. Amber the supposed basis of this varnish. The uselessness of amber for varnish-making. Small and waste amber a drug on the market. A lot of 50 tons unsaleable at £20 per ton. Present consumption of gum for varnish-making, 3,000 tons per annum in England alone, by far the largest portion being kauri-gum. The various resins, kauri, animi, copal, &c., were commercially unknown in the seventeenth century, and many were unheard-of fifty years ago. Successful varnish-making a matter of personal experience with particular gums. The difference in production in 1832 and the present time, showing that to profitably manufacture in 1832 an output of 4,000 gallons per annum was necessary; at present an output of nearly that quantity per week is required. The fossil resins as a body are vulgarly designated copal, this being the general name in Mexico for all gums and resins. "Copal" of commerce supposed to have first been brought from Mexico.

Pages 24 to 26: Amber.—Amber is the resin of antediluvian coniferæ. Although met with in nearly all countries of the world, it is found in exceptionally large quantities in eastern Germany, on the shores of the Baltic and some Russian lakes. Mines of some importance are worked at Payentoung, in the valley of Hukung, Upper Burmah. The miners use tools of a primitive character, such as wooden crowbars tipped with iron, and wooden shovels. This amber is found in a stratum of cretaceous blue clay, irregularly associated with lignite. Slav and Chinese merchants buy this amber at 1s. per pound for the rougher sorts, but fancy prices are paid for special pieces suitable for jewellery or cigar-tubes. In some places this resin occurs in the brown-coal layer of bituminous wood, with pieces still adhering to the lower parts of trunks of trees. The larger pieces have always a pyramidal form, which attests distilation from trees, and removes all doubt as to its vegetable origin. As all resins are liquid in their first stage, they naturally envelope insects, consequently we find them present in almost every variety, but particularly so in amber. Bernard de Jussien has stated these insects do not belong to our continent or era, while Professor Zadbach, of Königsberg says that the trees yielding this resin (amber) must have grown upon the green sandbeds of the Cretacean formation which then formed the shores of the estuaries where the lower division of the Tertiary accumulated.

NOTE.—The ambris or fossil kauri-gum must be much older than amber.—E.G.F.

Pages 27 to 29: The animis.—Of the animis, the most noted and valuable is that exported from Zanzibar. The tree yielding this resin is now proved to be the *Trachylobium Verrucosam*, which is closely allied to the genus *Hymenæa*. Burton, Kirk, and Stanley have written detailed descriptions of the finding of this gum. It was assumed that the ripe old kind called "sandarusi" by coast Natives was the product of extinct trees; but Sir John Kirk attributes it to the same species that yield the new resin "chakazi." The fields from which the older resin is collected lie some thirty miles from Kas Gomani in latitude 30° S., to Kas Delgado, in laittude 10° 41′ S. The gum is always found overlaid with vestiges of decayed vegetation usually some 4 ft. deep, and associated with red sandy soil. The finest quality is dug by the Hawandi Tribe from the banks of a river of that name: its surface is strongly marked with indentations and elevations, giving rise to the trade term of "goose-skin." The whole trade seems to be in the hands of a few local houses. In the London market the price ranges from £200 to £350 per ton. Animi breaks with a dull even fracture, and has neither smell nor taste. The specific gravity is 1·08, and melting-point is 450° Fahr. Small and irregular supplies, known by the name of Madagascar animi, reach England from Mozambique: they closely resemble the Zanzibar kind in character, melting-point, and specific gravity, but, owing to mixed quality and rough cleaning, have a much lower value. Of late years considerable quantities of so-called animi have been received from Demerara. This fossil resin, the exudation of the locust-tree (*Hymenæa Courbaril*) of British Guiana, is evidently collected from the old roots and trunks of trees of a much earlier period. Some remarkably beautiful specimens, brilliantly clear, and ranging from 10 lb. to 60 lb. in weight, and containing many ants and other insects, are frequently met with. For some time the cleaned

higher grades were sold at from £200 to £240 per ton, but, owing to chemical defects when used for varnish-making, it now only sells for a little more than half these figures. This gum has a light specific gravity—viz., 1·030, and melting-point 450° Fahr. Although a weak gum, the writer thinks well of its practical utility, and regrets that larger and more regular supplies are not forthcoming.

Pages 30 to 37: The copals.—The term "copal" is the generic name given originally to any fossil resins; and consequently those kinds shipped from the west coast of Africa, south of Guinea, bear this name, although they are in character more closely related to the animis of the east coast. Benguela and Angola copals are the most valuable of the west coast varieties. Their botanical source is a matter of doubt. These resins are known to the Natives as "ocote cocoto" or "mucocoto," and are collected chiefly by the Bunda Natives. These gums are found in the first terraces of a range of mountains running parallel to the coast, and extending from the River Faire on the north to Cunene on the south; while, as to the width, it narrows to a few miles or broadens out to fifty or more according as the mountains recede or approach the coast-line. The whole region, except where traversed by rivers, is an arid desolate sandy waste. It is a matter of uncertainty whether the tree that produces this gum is still in existence or not. These gums are collected by Natives with crude tools, and disposed of to European traders. From this coast pieces larger than 1 lb. are seldom met with. The gum is generally covered with a thick white coating, and one particular discription of Angola has a fiery red incrustation probably due to oxidation, and the character of the soil. All have pronounced facets resembling the "goose-skin" of the Zanzibar animi. We consider them excellent, and the nearest in value to the Zanzibar kind of all the fossil resins known. They have a high melting-point of from 425° to 475° Fahr., and a specific gravity of 1·068.

Pages 38 to 42: Sierra Leone copal.—Sierra Leone copal was known as far back as 1678, when Barbot found some fragments on the beach which he thought was ambergris. The principal producing district is a limited one, extending about two hundred miles north and west of Sierra Leone. Unlike the majority of the varnish gums, it is now regularly taken from the tree (*Copaifera Guibourtiana*). This gum is called by the Natives "thobo," and is used by them as a remedy for sores and ulcerations, and also as a glazing for earthern pots, &c. The annual gathering of the gum-crop takes place about the end of March, the bark being cut and the gum collected. A strong coating is found on the old gum, which is extremely hard to move, although on the coast some rough attempt is made at cleaning by agitation in a lixivium prepared with the ashes of dry plantain and other stems. A special copal from Sierra Leone, known here as "pebble copal," is gathered from the beds of rivers, being washed from the mountain-slopes by the periodical rains. Sierra Leone copal is considered a valuable gum, and the imports amount to nearly 500 tons per annum. It is to be regretted that fields of earlier origin are not searched for, as with larger and more regular shipments the consumption would doubtless increase. The melting-point, about 360° Fahr., we do not consider a high one, and from its extremely pale colour and freedom from acid this resin is particularly adapted for some special descriptions of varnish. The specific gravity is about 1·068, and value from £60 to £120 per ton. Copals from Accra, Congo, Gaboon, and Loango occasionally reach England, but they are little known, and are received with such caution by manufacturers that a fair market is hardly open to them. That there are large districts in Africa containing untouched deposits of fossil resin is beyond doubt, for Sir Alfred Maloney, Governor of Lagos, has given particulars of a large district containing a fossil resin called by the natives "ogea," and Mr. James Heathcote, of Inhambane, East Africa (who was searching for the body of Captain Wybrant), discovered a tract of copal forest two hundred miles long, and collected six tons; but we never heard what became of it—it certainly never reached England as Inhambane copal. The Native names given to this copal are "stakate" and "staka," and the Zulu name "inthlaka." The field of supply is a hundred miles inland, and owing to difficulty of access it is unprofitable to open it up.

Page 43: South American copals.—In some parts of South America there are doubtless large undeveloped fields of fossil resins, as shipments arrive from time to time; but the supply is irregular, and varies in quality. It is said that there are trees still producing copals, which may account for the soft and mixed character of consignments. Were digging in old forestal ground resorted to, a much more valuable quality might be obtained. Several kinds of *Hymenæa* and *Icica* are reported to be the parent trees of these gums; but we think it is hardly to be doubted that they originate from the first-named genus, and principally *H. Courbaril*.

Pages 44 to 46: Manila copals.—The above includes all the Asiatic fossil resins at present known. Some of these are peculiar in themselves, resembling no other in appearance or character; others are so like New Zealand kauri that it is almost impossible at sight to distinguish them, the greatest adepts being able to do so by the sense of smell only. There are no fossil resins that require more care in buying and using. Some are so soft that they are little better than ordinary resin; others so hard that it is difficult to melt them; while they all have some tricky characteristic that causes trouble to manufacturers, even months after the varnishes are made. Although called Manila copals, from the fact of Manila being the port of shipment, there is actually no copal produced in the Philippines: the gums really come from other parts of the Malay Archipelago, the best from the Girantalo district of Borneo, and the worst from Ternate. These copals are mostly used in Germany. The largest sales are held in Amsterdam. The sorting and cleaning at port of shipment are all that can be desired, and they are well packed in cane mats or small cases of native make. It is hard to obtain any information concerning the producing districts or method of collecting, but, as gum-pits are spoken of, we may assume that the hard sorts are found some few feet below the surface, and under similar circumstances to the kauri of New Zealand. Many kinds have a tolerably high melting-point—viz., from 375° to 400° Fahr., with a specific gravity of about 1·70. These qualities are useful for certain grades of ordinary varnishes. Some of the

softer sorts shipped from Singapore are crop gums for which the trees are cut or tapped. In consequence of the melting-point being low, besides other and technical objections, these resins are unfit for use in making oil varnishes. The botanical source of the Manila copals is unknown, but we are inclined to think they are exudations of trees belonging to the natural order Dipterocarpeæ, and perhaps to some species of *Dammara* or closely allied coniferous plant. Commercially they do not hold the position in esteem or value of other fossilised resins.

Pages 46 to 53: Kauri.—Fifty years ago the kauri-gum of New Zealand was practically unknown; it therefore says much for the enterprise of the colonists that they have brought to such perfection in so short a time the collecting, cleaning, and sorting of this important product as to command a supremacy of the market. There is, however, we fear, a shadow to this pleasant picture, and, as it is as well sometimes to anticipate disaster, it behoves those interested to consider what the position will be when the kauri-fields begin to give out; for the excessive production stimulated by the ever-increasing demand is without doubt rapidly exhausting the known sources of supply. If it were not akin to heresy to make such a proposition, one would be inclined to suggest that the colonists should place an export tax on the gum. No other fossil resin could take its place, from a peculiarity it possesses (entirely its own) of assimilating with oils more readily and at an easier temperature than any other gum, not excepting those of a lower melting-point. The Manila copals enter largely into competition with kauri, but, as we have already stated, they are treacherous in use, and mostly contain strong acids and other objectionable substances, thereby upsetting all theory and practice, and resulting in injury to the manufactured article and regret to those who employ them. Kauri-gum is the product of the *Dammara australis*, and the quality is very diversified. The range of value in kauri is perhaps wider than in any other kind, so that consumers may choose qualities at prices from £20 to £300 per ton. There is a great variety of colour, from dark, almost black, to clear white, invaluable for certain kinds of varnish. Kauri is used by the leading makers of varnish in every country where made. This universal favour we by no means attribute to the superior results to be obtained by its use, but rather to the fact that it is easier to manipulate—that is, it unites with linseed-oil quicker and at a lower temperature than any other resin. It is probable that the essential oil it contains acts as a solvent; hence carbonisation is minimised, and a paler varnish is produced. The exports of this gum amount to 8,000 tons per annum, of which more than one-half is used in the United States of America. The specific gravity ranges from 1·070 to 1·080, and the loss by distillation in the process of manufacture from 15 to 25 per cent. The melting-point is fairly high, varying from 360° to 460° Fahr.

Pages 54 and 55: Gum damar.—The white damars of Batavia and Sumatra are employed only in the manufacture of colourless spirit or turpentine varnishes, and are commercially of three varieties—viz., the Batavian, from Java, and the Singapore and Padang, from Sumatra. The Batavian is the most valuable, on account of its perfect colour and freedom from yielding a milky solution when dissolved. They are the exudation from the *Dammara orientalis*, the trees being regularly cut for supplies. Their melting-point is about 260° Fahr., and specific gravity about 1·80. Several descriptions of dark and black damars are collected in India by making vertical incisions near the base, fire being set to the tree, and the resin allowed to melt and accumulate. These gums are obtained from the sal tree (*Shorea robusta*), the piney-varnish tree (*Vateria indica*), and probably other allied plants. The black or Kola damar is collected chiefly in the Tinnevelly district, from the *Canarium strictum*. All are of a very low melting-point, freely soluble in turpentine, and consequently useless in the manufacture of oil varnish. Indeed, they are commercially unknown in Europe, where they would have the value of common resin. The Natives of India largely employ these damars in the manufacture of bottle-wax and low-grade turpentine varnishes.

Page 56: Mastics.—Strictly speaking, neither mastic nor the damars can be placed in the category of fossil or semi-fossil resins; but, as they are indispensable for certain special purposes, they are worthy of mention among the varnish-gums. Mastic, the exudation of the mastic or lentisk tree (*Pistachia lentiscus*, natural order Perebinthaseæ) is a recent or crop gum. The best and palest qualities come from the Island of Chios. Considerable quantities of the finest kinds are consumed in Turkey and the East for beautifying the teeth. Small parcels of inferior and yellowish quality reach this country from Morocco and other places in the Mediterranean. It is in limited demand in Europe for making a colourless varish used by artists to preserve oil paintings, &c.; and, as the resin is readily soluble in alcohol or turpentine, its varnish can with facility be removed when discoloured by age or dirt.

Pages 57 and 58: Conclusion.—Although small shipments of so-called bastard animis and copals arrive from districts new to the English markets, the foregoing constitute principally the list of resins used in making oil and turpentine varnishes. The mistake with first consignments of any new description is that the resin is collected from the trees themselves, or from the immediate surface, instead of some few feet below the surface. Consequently we receive new and soft gums, useless and valueless for varnish-making, instead of hard and fossilised kinds, for which there is always a demand. Generally we are inclined to think that the degrees of hardness should be the principal consideration in estimating the commercial value of all resins, and as a rule it might be taken that, the higher the melting-point, the older and more fossilised is the gum. We conclude with thanks to Mr. John R. Jackson, Curator of the Museums at the Royal Gardens, Kew, who has kindly furnished us with such information on the subjects as the gardens afford.

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