DISCUSSIONS
of the
TWENTY-SECOND CONFERENCE
of the
Queensland Society
of
Sugar Cane Technologists
held at
CAIRNS, QUEENSLAND
From 28th April to 4th May, 1955
Edited by L. R. Brain

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TWENTY-SECOND CONFERENCE
Held at Cairns, 28th April to 4th May, 1955

OPENING SESSION

Messages of Welcome

The PRESIDENT (Mr. P. J. Staunton) extended a welcome to all delegates and introduced the Minister for Agriculture and Stock (HON. H. H. COLLINS), the Mayor of Cairns (Alderman W. J. FULTON) and the Chairman of the Mulgrave Shire Council (Councillor C. E. CAMPBELL). He also welcomed three overseas visitors, Messrs. P. O. Wiehe and J. R. Antoine, from Mauritius and Mr. J. F. Cochrane from the United States of America.

Alderman FULTON then greeted the delegates and visitors on behalf of the citizens of Cairns. He spoke of the fertile lands around Cairns and he hoped that the delegates would have an opportunity to see some of the beauty spots of the north.

Councillor CAMPBELL (Mulgrave Shire), welcoming the delegates, pointed out that progress in the sugar industry had been largely due to the spirit of co-operation between its members. He wished the conference every success.

After thanking the speakers for their words of welcome, the PRESIDENT asked the Hon. H. H. COLLINS to open the conference.

OFFICIAL OPENING

After expressing his pleasure at being present at this Conference MR. COLLINS said that the first technologists' conference had been held in 1929 when the late Mr. W. Forgan Smith had officiated at the opening. Since then it would be hard to measure, in pounds, shillings and pence, the value of these conferences to Queensland. Largely due to the efficiency of the industry, this State had achieved a most important place among the world's sugar producing lands.

The conference agenda, he said, showed a total of 34 contributions: two from the trade, 10 from sugar mill staffs, seven from the Bureau of Sugar Experiment Stations, four from Sugar Research Ltd. and two from the university. This showed that all parts of the industry worked together; there was little unused knowledge.

Queensland was now the fourth most important sugar growing country in the world. This had not been anticipated by those wise men at the turn of the century who looked on the sugar industry as a
means of populating our northern lands. Then most thought that only our own requirements could be grown. As a result of hard work and efficiency the State was now a big exporting country, and there was sufficient sugar-growing land in the State to enable us to outpace any of the existing sugar-growing countries, if a market for the whole output existed.

It had been said that chemists and engineers could make a greater contribution to the conference but they were very busy, so it was largely left to the research institutions—the Bureau and Sugar Research Limited.

MR. COLLINS went on to say that the industry was a shining example of private enterprise, farmers and Government co-operating in the common interest and was not equalled in this respect in any other primary industry in Australia, or for that matter, in the world. There were still matters needing further research, however.

Firstly, there could be greater use made of bagasse and molasses. The industry was unable to look forward to great expansion, so it must look to its internal economy for more efficient utilization of products now going to waste. The major use for bagasse was as a fuel but the industry could not use all the bagasse and it was costly to dispose of the surplus. At Yeerongpilly, the Animal Research Institute was carrying out stockfeed trials with a 70-30 mixture of molasses and bagasse. This would help to make a greater use of the two materials. Secondly, more could be achieved with wax-extracting plants. There was a commercial plant at Nambour and a pilot plant run by the Bureau at Bundaberg, which would attempt to improve the extraction process. Thirdly, more research could be done by sugar engineers in mill technology. Some mills overseas could crush twice as much cane in a given time as Queensland mills could with similar milling units.

At present, the industry faced a measure of restriction. There was nothing new in that. It had always been the policy to produce only sufficient sugar for known markets. It was better to have 9,000 growers operating under profitable conditions than 10,000 in competition and poor circumstances. The restriction, however, hit hard because it followed a period of rapid expansion. At the Maryborough Conference in 1948 when the mill peak was 737,000 tons, he had then thought and stated that it was time for the industry to get busy. In the following five years there had been an expansion to a peak of 1,170,900 tons. This was an all-time record of expansion over five years.

MR. COLLINS said that in his opinion the industry had been wise to harvest the whole of the 1954 cane crop even though there was a 100,000 ton sugar surplus. This surplus would be kept in a pool to supply the market if there were a series of bad years. The recent good years could not be expected to continue. The farmers would be paid for the sugar and it would be held in reserve. While there would be no further expansion in the industry it must continue to develop with a rapidly expanding home market. The present expansion of the market was 9,500 tons a year.

At a conference such as the present one, it was pertinent to recall some of the past achievements of technologists to encourage those now working.
MR. COLLINS said that in no other land was cane sugar produced wholly by the use of highly-skilled, highly-paid labour. All work was done under exceptionally secure conditions. Bulk handling had started at Mackay, at the refineries in Melbourne and Sydney, and at Lucinda Point. Facilities would be extended to Cairns, Townsville and other parts of the State when it was warranted. As a mean estimate there was £140 million invested in Queensland mills and farms, and annual production totalled £50 million. Eighty thousand persons were directly or indirectly employed in the industry. Australian sugar consumption was about 120 lb. per head annually. If a few more countries could eat that amount, there would be no trouble in selling the present surplus. Australian sugar was amongst the cheapest in the world to the consumer and was produced under the best labour conditions in the world. In the early twenties the estimated profitable price to grow cane was £30/6/8. To-day the price to the grower had gone up by 40 per cent., the price to the consumer by 80 per cent. and the basic wage by about 180 per cent. The industry also had made a substantial contribution to the canned fruit industry.

MR. COLLINS continued to say that the Sugar Board staff numbered only half a dozen yet it handled £50 million worth of produce annually. It merely made arrangements with private enterprise to refine and market the sugar. Government auditors saw to it that the arrangement with the C.S.R. was faithfully carried out. No cheaper way had been found for handling the State’s sugar.

He claimed that no other industry guaranteed that its product was the same price in all capitals, no matter where it was produced. Growers and millers received 5d. out of the 9d. paid for each pound of sugar. Their respective shares were determined by the Central Sugar Cane Prices Board, now presided over by a Supreme Court judge.

The Bureau of Sugar Experiment Stations was helping to make the industry efficient by breeding better canes and conducting other field improvements. This work had been largely responsible for the Queensland industry being placed in the forefront of the world sugar industry. Other research organisations had also helped. In some districts C.S.R. canes had proved of outstanding value.

Representatives of the Cane Growers’ Council, Australian Sugar Producers’ Association and the Colonial Sugar Refining Company had sat side by side with representatives of the Queensland and Commonwealth Governments in fixing the overseas sugar agreement. He believed that the agreement was the only one working to the entire satisfaction of the interests represented.

MR. COLLINS then wished the delegates every success in their discussions and officially declared the Conference open.

The SENIOR VICE-PRESIDENT (Mr. R. W. G. Hessey) thanked Mr. Collins on behalf of the members of the Society for his remarks. He said that the opening addresses by the Minister were always positive contributions to the Conferences and the Society was very appreciative of his continued support.

The PRESIDENT then declared Mr. Collins an honorary member of the Society for the duration of the Conference and presented him with the badge of the Society and a copy of the Proceedings.
APOLOGIES

Apologies were received from the following:—

E. Barbat  J. E. Dods  C. H. O’Brien
E. R. Behne  S. V. Fevre  W. B. Peake
J. Beiers  M. R. Gibson  I. F. S. Pollen
N. Bennett  E. L. Hoffman  H. J. Saunders
R. G. Blomfield  G. L. Kenway  C. N. Smith
E. C. Bow  G. F. Madin  R. A. Smith
J. G. Burnell  E. Mead  A. Spooner
A. E. Coyle  J. L. Mullins  M. J. Wilson
D. Crozier  H. Murdoch

DECEASED MEMBERS

The PRESIDENT expressed regret that the following members had passed away since the preceding conference:—

C. R. Cameron  D. A. Hourston  J. R. Nicholson
J. C. Collier  C. P. Kemmis  G. Tait
H. I. Dicks  M. Mullins
T. Eriksen  P. Mullins

FOUNDATION MEMBERS PRESENT

At the request of the PRESIDENT, the following foundation members stood and were honoured with acclamation:—

A. J. Coyne  J. W. Inverarity  J. M. MacGibbon

The PRESIDENT then delivered his address.

PRESIDENTIAL ADDRESS

It is singularly appropriate that this, our Twenty-Second Conference, is being held at Cairns; appropriate, inasmuch that in this area, twenty-five years ago, the Agricultural Section was brought into being and the Queensland Society of Sugar Cane Technologists emerged, fully fledged, to assist in overcoming in their broadest aspects, the many technical problems the industry then presented.

The first period in the history of this Society could well be called the “Era of the Manufacturing Technologist”. The industry, coincident with the infancy of the Society, was entering a world-wide depression, following a decade of tremendous expansion; markets were constricting and overseas price of sugar was to fall to an all-time low level; the outlook was grim. With the advent of the Society, the pooling and dissemination of technical knowledge and the mutual aid and co-operation so readily extended, the desired technical results began to be attained. The use of improved and better factory equipment, more efficient preparatory devices and the more intelligent use of maceration were quickly reflected in greater milling capacities and higher extraction. The application of pH control—soon to be automatic—and later the installation of multi-tray subsiders marked distinct improvement at the clarification station. Steam bleeding and careful attention to heat losses quickly reduced the amount of extraneous fuel required. The revolution in pan stage practice and procedures, followed by the advances in crystallization and curing, coupled with improved design and more efficient fuggalling equipment, are too well known to need reiteration here.

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By the end of the first decade the Agricultural Section—the foundations of which were so well laid at the first Cairns Conference—began to take command, and the spectacular "Era of the Agricultural Technologist" was ushered in. Carefully planned crop fertilization was well established. Improved cultural and irrigation practices were then being ably demonstrated. Disease control through the use of resistant varieties, and quarantine systems, and later the use of chemical organic compounds as preventatives against losses from fungus diseases and insect ravages, produced astonishing results. It is perhaps in the field of plant breeding that the most outstanding results were achieved. Considering a year of record tonnage per acre and record total yield—1954—81 per cent. of the crop was composed of Queensland-bred canes—a tribute to the splendid work of the Bureau of Sugar Experiment Stations and the C.S.R. Company.

Perhaps the crowning achievement of the era was the identification of the almost symptomless Ratoon Stunting disease; this had hitherto escaped notice, yet its discovery probably supplied the long-sought clue to the mysterious "running-out" of varieties, so disconcerting to the plant breeder. The application, through the agency of the Cane Pest and Disease Control Boards, of the simple control measure which was also devised, concludes another wonderful chapter in the history of technical conquest.

And the Administrative Section; by reason of its nature, in a Society such as this, perhaps not permitted to become spectacular, but nevertheless performing its many very necessary and useful functions. Integrating, directing and correlating the efforts of the research worker—chemist and engineer—into a pattern and a plan, and occasionally reminding the over-enthusiastic technologist that only those results which can be translated into pounds, shillings and pence, have the final commendation; and at all times ensuring that the facilities for fundamental research are provided and carried on. There are the long-range planners also, who have in the last few years given us the Sugar Research Institute, from which great things are expected in the solution of our ever-recurring problems.

What of 1954-55? During the year a crop of 9,864,305 tons was produced, harvested and processed, exceeding the previous records of 1952 and 1953 by 44 per cent. and 13 per cent. respectively. The production per acre for the State, approximately 26.8 tons, was an all-time record, but in the factory we find the technologist had to battle grimly to maintain his hard-won standard of efficiency, as at present assessed, in the face of many and varied ills. Perhaps the worst affliction is the "creeping paralysis" of ever-rising costs, many of which are entirely outside the orbit and control of the technologist.

Present major ills may be classified as—

1. An inadequate cane supply, overloaded with excessive extraneous matter, and provided by a labour force lacking in quantity and quality.
2. Lowered milling efficiency.
3. Clarification and recovery problems.
4. Sugar deterioration losses, due to long storage of raw sugar in the humid tropics.
How then may these ills be combated or their effects minimised?

Two general avenues are open—

(1) The installation of equipment of greater capacity and improved design,

and/or (2) The application of new technological processes.

It is disturbing to find capacities of completed extensions handicapped by poor cane supplies, often of a quality such that capacity is impaired and extraction made more difficult. The question of quality of raw material merits serious consideration. The year 1954 saw the mechanisation of harvesting advanced a further step with the first impact of the mechanical end-loader. The success of this venture may be measured by the fact that a further 200 machines have been ordered for the coming season. With the quality and strength of the existing labour force, plus the high cutting costs involved, the wider mechanisation of harvesting with its attendant problems appears inevitable. The acceptance of cane under these conditions may have a profound influence upon the existing price structure for cane payment. At the Cairns Conference of 1930, it was the expressed opinion of this Society that, to assess correctly sugar in cane, as well as factory recovery and control, the only reliable means was that of the sucrose-weight method and not our present vexed "Co-efficient of Work" basis. This has been reaffirmed throughout the years, and while complimenting the three mills which have now installed weighing equipment, one views with regret the apathy of the industry, generally, to this important feature. If a "new route" is to be shown, confusion may arise, even among technologists, due to the lack of uniform and reliable data. It is interesting to note that one symposium for the forthcoming International Conference of Sugar Cane Technologists, to be held in India, early in 1956, is "Cane Payment with reference to (a) general principles, (b) systems in vogue and (c) the most equitable system of payment".

High milling efficiency is of economic importance in the operation of a cane sugar factory, and is almost invariably a valuable index of overall factory performance. With the high production rates demanded—as a necessity to offset money expended on new equipment—extraction has become more difficult. Admittedly the problem is a complex one. One of the basic reasons is the universal lack of fundamental research into the physics of cane milling. Plagued by war shortages, improvisations, heavy maintenance, and then a phenomenal expansion programme, the factory engineer has had but little time to spend on his more besetting problems. The Presidential Address of 1954 drew attention to the necessity for relieving senior executives of some of their routine duties with mutual benefit to all. The Society regrets that of recent years, due to the pressure of duties, the factory engineer has in many cases been precluded from attendance at our Annual Conferences. It feels sure that, if the opportunity can be given to the engineer to present and discuss his problems, valuable progress can be achieved.

The scarcity of candidates for the post-graduate course in Sugar Technology at the University of Queensland is a matter for deep concern. The seeming lack of interest by, or the outside inducements offered to, the more highly trained technical officer may, in the years to come, produce a hiatus which could prove costly to our industry.
Clarification, with its profound effects upon recovery, shows no marked advances. Experiments with Lytron X-866, Elguanite, and like substances have, as yet, shown insufficient results of economic importance. The subject matter of one paper, to be presented to you, contains lines of original research which, if pursued and brought to fruition, could produce astonishing results to recovery and lasting economic benefits to the industry.

While the present means of sugar removal, storage and transportation remain, little mitigation of the problem of sugar deterioration can be expected. The implementation of bulk storage and handling moves slowly, if surely, towards the desired goal, and it would appear that a considerable time must elapse before its impact upon rising general costs can be felt.

Our industry has in recent years been so engrossed in the expansion challenge, that little if any attention has been devoted to the wider possibilities of by-products utilization. Interesting developments are taking place overseas in the use of surplus bagasse for paper manufacture, and we know that our technologists are watching these with great interest. The opportunity to convert a costly liability into a valuable asset is basic to the technological approach to his problems, and this will prove no exception.

In the field of research and investigation the industry has not been lacking. The main energies of Sugar Research Limited have been directed towards the milling problem, some results of which you will have an opportunity of discussing at this Conference. The experimental mill about to be built by Sugar Research Limited, supplemented by the unit already operating under the guidance of the University of Queensland, holds high hopes of improved design and general milling performance.

On the agricultural side, the discovery that maleic hydrazide could delay the arrowing of cane for several weeks, becomes a valuable aid to cane breeding. The search for and development of improved varieties still proceeds. A further batch of cane varieties from New Guinea has been imported to supplement the range of breeding material. Mr. J. H. Buzacott is at present visiting overseas sugar countries investigating cane breeding and genetics and seeking new material for the varietal breeding programme. The year has witnessed the full development of the pathology farm of the Bureau of Sugar Experiment Stations. This is the industry's disease research centre and is probably without parallel in the sugar world, both in regard to extent and to the number of cane diseases under investigation.

The continuing accent in cane breeding on the production of early maturing and special purpose varieties presents important features. The effect upon factory cane supply of suitable early maturing varieties cannot be over emphasised. Also related to the harvesting problem—but in a different manner—is the problem of over rich soils and their consequent lodged crops, high cutting costs and low sugar content. The introduction of a considerable number of less vigorous seedling canes, which have already demonstrated their ability to produce high early sugar, could, if successful, not only make lodging less likely but produce crops harvestable at award rates and with higher c.c.s.
New and exciting trends for industry loom with some of the newer sciences. The use of ultrasonics in food preservation appears to be well established and already Hawaii reports the application of radio-active isotopes to various uses from tracing the movement of irrigation water in the soil, of sugar throughout the cane plant, to weighing sugar and sugar by-products.

Thus it would appear that the industry has completed a cycle in the lifetime of our Society. As in the 1930's the industry, after a period of phenomenal expansion, again faces the imminence of restricted production, and a depressed price market. The technologist must grapple with fresh problems, and fashion new tools for his many tasks. When the history of this Society is written, I am certain that its record of achievements will have demonstrated the same sound growth and development as the industry itself, in the phase which we are now entering.

SECRETARY'S REPORT AND FINANCIAL STATEMENT

Mr. CLAYTON then presented the Secretary's Report and Financial Statement at the request of the PRESIDENT.

Secretary’s Report

Gentlemen—

I have pleasure in presenting the report of the Secretary for the year ended 28th February, 1955.

Membership

The roll of members is at present made up as follows:—

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<tr>
<th>Category</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Members</td>
<td>4</td>
</tr>
<tr>
<td>Full Members</td>
<td>156</td>
</tr>
<tr>
<td>Associate Members</td>
<td>188</td>
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<tr>
<td>Supporting Members</td>
<td>50</td>
</tr>
<tr>
<td>Overseas Members</td>
<td>23</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>421</strong></td>
</tr>
</tbody>
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The previous totals were 381 in 1954 and 373 in 1953. Thus there is a steady increase in membership and, as a reflection of this, the number of Proceedings printed has had to be increased to 600.

Seymour Howe Bursaries

It gives me pleasure to announce the awards of Seymour Howe Bursaries as follows:—

For chemists

Third Year:
ROSS NIELSON

For engineers

Second Year:
ALFRED ASHWORTH, Kalamia Mill
WILLIAM AULD, Mulgrave Mill

Third Year:
KENNETH BATSTONE, Kalamia Mill
ROBERT CORFIELD, Bingera Mill

Fourth Year:
KEITH VIERTZ, Moreton Mill
ALEX McLEAN, Moreton Mill
There were 39 applications for engineering bursaries and competition was keen. Alex McLean has displayed meritorious performance by winning bursaries in three successive years. Kenneth Batstone previously won a bursary in 1954. Edward Ellis who won a bursary in 1954 was defeated by a very narrow margin.

**International Society**

It is apparent from information received from overseas that plans for the 1956 Congress in India are well advanced. A statement on the situation has been prepared by Mr. N. J. King, Vice-Chairman of the I.S.S.C.T. and will be read later.

**Financial Statement**

I have to apologise for the fact that for the second year in succession I am not able to place before you a statement of accounts for the financial year. It is fully appreciated that this state of affairs is very unsatisfactory and is viewed with due concern by the Executive. However, I am able to offer the assurance that the matter has been considered by the Executive and arrangements have been made to ensure that proper statements will be drawn up in the near future. It is emphasised that all the necessary accounting data are available and merely await the services of an accountant to place them in proper form.

Actually, the finances of the Society are in a reasonably healthy state but must be watched closely in the near future in view of steadily rising costs.

As at 15th April, our current account at the Commonwealth Trading Bank of Australia was in credit £945. On behalf of the Society's General Fund, we also hold £250 invested in Commonwealth Treasury Bonds, giving us a total of approximately £1,200 in credit for our General Fund.

Big items of expenditure which yet have to be met from this fund are the costs of printing of the Discussions for the 1954 Conference and the printing of the Proceedings for the 1955 Conference. Accounts for these printings have not yet been received.

On behalf of the Seymour Howe Memorial Bursary Fund there is a credit of £445 in the Commonwealth Savings Bank Account and £110 is invested in Commonwealth Treasury Bonds. Adjustments are yet to be made to cover the bursaries awarded in the year ended 28th February, 1955.

The Ormiston Memorial Cairn Trust Fund is in credit to the extent of £20/2/6.

**Discussion**

The Secretary's Report was received on the motion of MR. BATSTONE, seconded by MR. CAMERON.

There was no discussion and the report was adopted on the motion of MR. R. GIBSON, seconded by MR. SLOAN.

**REPORT OF PUBLICATIONS COMMITTEE**

(This report was presented by MR. KING.)

During the year the Discussions of the 1954 Conference and the current Proceedings were published, in both cases the printing being carried out satisfactorily by Messrs. Watson, Ferguson and Company.
Proceedings.—Unfortunately it was not possible to post the Proceedings until Wednesday, 20th April, i.e., only one week prior to Conference. The late arrival of the majority of the papers made the task of the Publications Committee and the printer particularly difficult. Thirty-four papers were received and the number of pages in the Proceedings is the largest for very many years.

The papers cover a wide range of subjects and their technical standard is, in general, good; however, with a few notable exceptions, they were presented in a manner somewhat unsuitable for publication. Considerable editing was required, and many figures which were unsatisfactory for reproduction were re-drawn. It is once again recommended that the authors, most of whom are providing valuable information to the Society and the industry, take the trouble to look up past copies of the Proceedings with a view to modelling their manuscript on lines reasonably similar to the standards adopted.

It is of interest to record that of the papers to be presented at the Administrative and Manufacturing Sessions, ten were submitted by the trade, seven by research organizations, five by mill chemists, four by mill engineers and one by a mill executive. It is strongly recommended that the incoming Publications Committee should set the deadline for the receipt of papers for the Twenty-Third Conference at not later than the end of December.

The report was received on the motion of MR. SLOAN and MR. VENTON.

Discussion

Referring to the folded page illustration contained in the 1955 Proceedings, MR. CLAYTON said that the Society of its own resources could not afford the cost of such an illustration and financial support for its inclusion was supplied by the author and his Company to whom the thanks of the Society were due.

The report was adopted on the motion of MR. PEARCE and MR. R. GIBSON.

REPORT OF BULK SUGAR HANDLING COMMITTEE

(This report was presented by DR. KERR.)

Following the Report of the Committee submitted to the Mackay Conference in 1954, members of the Administrative Section of the Society held a meeting to consider the desirability of continuing the functions of the Committee, as constituted. It was agreed that, although little if any use had been made of the Committee by those responsible for the development of bulk handling of raw sugar, it could still discharge a useful function so far as the sugar mills are concerned.

The Committee was therefore asked to continue its existence, to serve as a channel through which all enquiries dealing with sugar handling generally could be routed. The main activities during the past year have been:

1. Open Storage for Raw Sugar

In order to avoid the necessity for providing temporary sugar storage space in the form of a costly structure, one mill sought advice on the building of open stacks, protected by suitable waterproof covers.
This information was supplied by Mr. C. B. Venton, based on his overseas experiences. Later in the season, one Mackay mill actually employed this method very successfully. The stack was built on suitably prepared dry foundations, and covered with tarpaulins. Several sharp rainstorms fell during the storage period, and when the stack was broken down for shipment, the sugar exhibited no evidence of deterioration or damage.

2. Protection of Sugar Sack Surfaces with Wax

One of the major oil companies requested the Sugar Research Institute to test the value of a special emulsified wax as a moisture barrier for sack sugar which would be held in storage through the wet season. The emulsion was prepared from petroleum jelly and microcrystalline wax, and could be diluted for use with water, and applied by spray gun.

Preliminary laboratory tests with sugar sacks suspended in a high-humidity room gave promising indications, and later the face of a sugar stack at Racecourse mill, in a galvanised building which was not considered an ideal store, was used for large-scale tests. The emulsion was applied in December, 1954, and while portions of the stack have had to be broken down to meet shipping demands, the balance will be retained as long as practicable, for observation.

Indications are that the wax, when applied to the sacks at an economical rate, does provide an effective water barrier under moderate conditions, though it does not prevent the entry of water vapour to some extent. In the laboratory tests the final moisture content of the sugar in the treated sack was lower than that in the untreated. Wax spraying might have some value in conjunction with open stack storage of raw sugar, under tarpaulin or other temporary water-proof cover.

3. Sugar Trimming Unit

During the past crushing season, experiments were made with an aerodynamic sugar trimming unit designed and fabricated by a Sydney engineering firm, and tested at Mackay harbour.

The first units were under-capacity; a more powerful model was put to work in November, with better success, but it still possessed minor defects which, it is understood, will be corrected. This type of auxiliary should have a real value in trimming sugar as it is being charged into the holds, especially with 'tween-deck ships.

4. Bulk Handling Installation, Mackay

This project is now under way, and good progress is being made with the installation. A meeting of local milling representatives, and available members of this Committee, were addressed by Mr. E. M. Plomley in Mackay recently. Advance information was given on the methods to be employed in transporting sugar to the terminal, and also in respect of emergency storage at the mills. Sugar interests keenly appreciated this, their first real opportunity, to receive specific details of the plan to be adopted, for handling their product.

The Mackay terminal has been designed to receive the daily make from each mill in the district. The mills will construct bins of 200–250 tons storage capacity, from which transport boxes, each of about 6 tons
capacity, may be filled speedily. These will be fixed to railway wagons or road vehicles, and hinged for rapid discharge at the terminal. Emergency floor storage for bulk sugar will be provided at each mill, but the objective will be to keep this clear, as far as possible, and use it only when circumstances demand. The sugar can be transferred by front end loader from the floor to elevators, which will take it back to the bin. With a 3 1/2 yard bucket, one end loader will handle from 40 to 60 tons per hour.

The proposed plan envisages that the terminal will receive all sugar during a 10-hour day; but in view of the problem which will confront the Railway Department, as well as the extra demand for motor trucks with road transport, it is generally considered that 2-shift operation at the terminal will be inevitable. The number of mills to be served by road transport is the subject of discussions between the Sugar Board and the Railway Department, but a strong recommendation has been made that the product of at least two mills in the district shall be transported by road.

All vehicles will be weighed, before discharge, at the terminal, and re-tared each time. With the tipping hoist gear to be provided, the total discharge time will be 5 to 6 minutes. Sugar will also be sampled at the terminal.

(Signed)
C. Gallagher
H. W. Kerr
A. D. Marriott
J. H. Nicklin
C. B. Venton

On the motion of MR. WEBSTER, seconded by MR. AHERTON, the report was received. As there was no discussion, the report was adopted on the motion of MR. KING and MR. GREENAWAY.

REPORT OF COMMITTEE ON THE TRAINING OF ENGINEER APPRENTICES

(At the request of the PRESIDENT, DR. CRAWFORD read this report.)

In the report published in the 1953 Proceedings of this Society, this committee set out certain views, suggestions, and a recommendation regarding the training of future sugar mill engineers.

Since that report was made, some further progress has been made by the committee as follows.

Total Exemption from some Apprenticeship Course Subjects.—This matter was discussed with Mr. H. D. Noyes, Chairman of the Apprenticeship Executive, and Mr. C. K. Evans, Director of Technical Education in the Department of Public Instruction.

Mr. Noyes gave the committee's views a sympathetic hearing. He said that a statement should be prepared for submission to the Apprenticeship Executive on the matter. This statement should set out the reasons for requesting exemptions, and showing where the Diploma Course covered subjects taken in the Apprenticeship Course.
The statement would then be considered by the Appropriate Group Committee, and then recommendations handed to the Executive.

During the discussion, Mr. Noyes made it clear that the Executive could not consider any request for exemptions unless it had assurances that the apprentice would complete the Diploma Course, and also that progress reports on studies would be required.

Mr. Evans pointed out that apprentices may obtain partial exemption from some Apprenticeship Course subjects if their qualifications were of the requisite standard. This partial exemption relieves the apprentice of the necessity of returning test papers during the year, but he would be obliged to sit for the annual apprenticeship examinations.

To obtain total exemption in any subject would require amendments to the apprenticeship regulations, and Mr. Evans was of the opinion that this course would not be adopted unless a very strong case was presented in its favour.

**Assistance to Apprentices.**—One scheme for assistance to Diploma students has been commenced by the Australian Estates Company Limited. Details of this scheme are:—

1. Allowance of one day per week for full-time study.
2. An engineer has been allotted to supervise and assist the students on this day.
3. Tuition fees will be paid by the Company.
4. A subsidy of 50 per cent. on purchase of text books.
5. Payment of travelling expenses when students must attend a Technical College for short courses.
6. Assistance in obtaining a suitable position, and transfer of indentures if necessary to enable the apprentice to complete the course.

Apprentices receiving this assistance will be encouraged to return to the Company's mills, after completing their training, but no undertaking will be required of the apprentice in this respect.

(Signed)  
J. Batstone  
W. R. Crawford  
L. A. Hayes

MR. JORGENSEN moved and MR. F. WRIGHT seconded that the report be received.

MR. LOGAN said that the training of engineers was of particular importance to the industry. He felt that every effort should be made to attract not only Diploma students but also University graduates, and he discussed at some length the necessity for suitable publicity, better remuneration and the institution of some definite course in sugar mill engineering.

MR. JORGENSEN said that, although apprentices were assisted in taking a Diploma course, there was no guarantee that they would remain in the industry. He was certain that better remuneration would be necessary to attract engineers willing to carry out an intensive course of study. He prophesied a future shortage of engineers in the industry.
MR. H. WILSON thought that the sugar industry should adopt methods which other industries had found to be successful and train its own engineers to overcome any possible shortage.

MR. COYNE referred to the high wages paid to unskilled labour and the consequent lack of incentive for young men to undertake a course of intensive study.

The report was adopted on the motion of MR. LOGAN, seconded by MR. JORGENSEN.

REPORT ON I.S.S.C.T. CONGRESS IN INDIA

A report on the forthcoming I.S.S.C.T. Congress in India by MR. N. J. KING was read by MR. CLAYTON.

On November 17th, 1954, a letter was received from Mr. T. Prasad, General Secretary-Treasurer of the 9th Congress. A copy of this communication and of my reply was sent to all members of the Q.S.S.C.T. Executive on November 22nd. The proposed itinerary for the congress tour covered the period January 17th to February 7th, and the actual proceedings of Conference from February 8th to the 16th. The tour period included nineteen nights on trains. Since the General Secretary-Treasurer invited comments on the proposal it was pointed out that the period of the tour was greater than at any previous Congress and that it might prove rather arduous.

Under date 31st December, 1954, a further letter was received from the General Secretary-Treasurer. This confirmed the dates of the Congress and incorporated a request for papers. It was stated that conveners for the Agricultural and Technological sections had been appointed and that the last date for receipt of papers would be April 30th, 1955. In view of the early closing date for receipt of papers it was considered desirable to circularise all members of the Q.S.S.C.T. as well as sugar organizations and mill managers. This was done on February 11th, 1955.

On March 22nd this year another communication from the General Secretary-Treasurer announced that the local committee had drawn up a revised itinerary for the Congress. In this, the Congress had been put forward so as to begin on January 4th and to finish on February 4th. The number of nights on train has been reduced from nineteen to twelve, and overnight stays at hotels have been arranged where practicable. Two special trains will be used and these will provide all necessary amenities for the delegates. Arrangements will also be made to reserve suitable hotel accommodation in Delhi (where the proceedings of conference will be held) and other places which are on the itinerary. The cost of excursions, sight seeing on the itinerary and the board on the trains will be met by the Organizing Committee. The delegates will be required to pay only the concessional fare and for their stay in hotels. It is anticipated that the cost of stay and travel in the country during the Congress will approximate to £150 sterling per delegate.

For the information of Society members who may be considering visiting India for the Congress the return air fare Sydney–Bombay (where the delegates assemble) is £425/5/- first class or £339/15/- tourist class.

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Persons desiring to take out membership of the I.S.S.C.T. for the forthcoming Congress are advised that the subscription is $10.00 or its equivalent. In terms of Australian currency this amounts, in round figures, to £4/8/6 plus exchange. All subscriptions are to be paid to the Regional Vice-Chairman (Mr. Norman J. King, Bureau of Sugar Experiment Stations), who will transmit them to the General Secretary-Treasurer in India.

GENERAL BUSINESS

The PRESIDENT then announced that MR. A. B. HENDERSON had resigned from the position of Assistant Honorary General Secretary and MR. L. J. WOODS had been appointed to that post.
Friday, 28th April, 1955

Morning Session

ADMINISTRATIVE SECTION

Chairman: R. C. GIBSON


The author presented his paper.

Discussion:

THE CHAIRMAN, in opening the discussion, said that MR. PRINCE had presented a paper which gave food for thought and the example applied to the carrier was worthy of consideration in most mills. He also stated that the introduction of machines in offices had eliminated a considerable amount of tiring routine work.

MR. WHALLEY congratulated the author on introducing to the Conference a paper which should prove valuable to sugar mill executives. He mentioned that during the expansion programme at Kalamia time analysis of jobs had proved most valuable. MR. WHALLEY then referred to the advantages of a public address system in a sugar mill. The installation of suggestion boxes at Kalamia Mill had brought forth many useful suggestions from the man on the job.

MR. DUUS thought that MR. PRINCE had illustrated by the application of these principles the limiting capacity of a carrier tip.

MR. SARANIN agreed that the sugar industry would benefit as so many other industries had already done where these principles had been applied. However, the principle should not be carried so far as to decrease mechanisation.

MR. TREMBATH said that one thing which appealed was the savings in cost as the available material was made to do the job.

MR. COATES then read a comment by Mr. Guy who said that the paper was, as so aptly stated, a plea and he personally hoped that the plea would fall on responsive ears. Expansion in most industries had left in its train inadequate plant facilities and unsatisfactory production methods, but the application of time and motion study principles was not the complete answer to the situation. He said that it should be regarded as one of the tools of management used according to managerial policy. He maintained that theoretical efficiency experts, although essential, must be kept expert, but not allowed to run the business. Mr. Guy pointed out that he was wary in agreeing with Mr. Prince on his statement, "successful application of these principles is one of the easiest ways of saving money in production costs". Although time and motion study did place emphasis upon individual
jobs and functions and could save money, the actual manufacturing processes appeared to be the most fruitful source of enquiry in any campaign to save costs or increase output.

Summarising, MR. PRINCE stated that time and motion study was not limited to the study of time and motion but introduced new ideas and new equipment. He agreed with Mr. Guy that experts should be “on tap and not on top”.
Thursday, 28th April, 1955

Afternoon Session

ADMINISTRATIVE SECTION

Chairman: J. V. HAYDEN


Introducing the paper, MR. WEBSTER explained that the main reasons for installing the system were an endeavour to reduce complaints from growers of errors in analysis and to reduce labour requirements. After installation of the sampler the number of complaints from farmers was greatly reduced while the laboratory and the whole system in fact were designed to reduce walking to a minimum. The system was designed for a particular area such as Plane Creek where there was no group harvesting of cane, and it was essential to pinpoint a two-ton sample of cane. It was essential to have a fast flow in the trough and that the pump be placed near the trough and be capable of delivering juice of high velocity in a small pipe line.

MR. CHAPLIN, continuing the introduction, mentioned that the original unit was built by Mr. Richards, and that since then some improvements had been made. The sampler had been simplified, having now only two coils, it was quickly and easily cleaned, and the number of moving parts had been reduced. Apart from a broken shaft on the motor no trouble whatever had been experienced.

Discussion:

In reply to MR. GALLAGHER, MR. WEBSTER said that the sampler was positively driven from the carrier and that its travel was directly proportional to the travel of the carrier. A pin placed in the wheel of the sampler depressed a switch at the same time as the sample of cane was passing through the first two rollers. The pump was chosen to have a small bowl which would empty quickly, and for a low capacity and a high head. MR. GALLAGHER said that wear on a 1 inch high speed pump would cause variation in the rate of flow.

MR. B. WRIGHT said that the sampler at Farleigh had been modelled on the unit at Plane Creek. However, the motor driving the turntable tended to overrun and a magnetic brake was fitted to prevent this occurrence.

MR. WEBSTER replied that Mr. Wright was referring to an earlier model used at Plane Creek. The motor now used had a reduction gear incorporated, the drive was slower, and overrunning was avoided.

MR. CHAPLIN said that the table turned a complete circle in just under half a minute.

MR. SLOAN asked what would happen if the carrier stopped while the pin was depressed. MR. CHAPLIN replied that this did not occur.
very often, but in the event of this happening, the table would continue to turn, and could be stopped manually. However, no further samples could be taken until the pin had passed through.

In reply to DR. CRAWFORD, MR. CHAPLIN agreed that commercial sequence controllers could be used, but that a sufficiently fine setting was not possible. A \( \frac{3}{4} \) inch diameter disc allowed finer settings.

In reply to MR. STAPLES, MR. WEBSTER said that at a crushing rate of 900 tons per shift, approximately 82 samples would be taken by the one female attendant.

Referring to the special type of pump required, MR. CLAYTON said that a suitable pump of this size would be difficult to obtain. The requirements were that pumping time be short, mixing should be kept to a minimum, and that the pipes should be clean and free of scale.

MR. TREMBATH enquired whether there was a standard loading for the first rolls of a mill for c.c.s. determination. THE CHAIRMAN, closing the discussion, said that there was no standard, except that the first mill should obtain the highest possible extraction. There was insufficient evidence to indicate what effect the degree of loading had on c.c.s. determinations.

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**Paper: “Copper and Brass Tubes for the Sugar Industry”,**

_by Clement Blazey._

In the absence of the author, the paper was presented to the Conference by MR. WILLIAMS, who briefly outlined the main points and exhibited the actual samples of tubes referred to in the paper.

**Discussion:**

MR. GALLAGHER asked for further information on the tube scale referred to in the paper. He said that tube failure seemed to be due mainly to cleaning abrasion rather than corrosion, and he queried whether tube material was specified from a corrosion or an erosion standpoint. He also described a case of tube failure where brass tubes were associated with steel tubeplates in a feed water heater.

MR. WILLIAMS, in reply, stated that the aluminium content in an alloy accentuated the film formation tendency. He told MR. GALLAGHER that, in annealing, quenching was a rapid process as opposed to slow cooling and the annealing treatment required depended entirely on the type of alloy. The annealer used for the electric annealing process was the Sneyd Annealer—probably an A.C. type.

DR. CRAWFORD considered that the special corrosion resistant film on the aluminium alloy brass might render it unsuitable for evaporator applications, if the film were highly resistant to heat transfer.

MR. WHALLEY thought that the two important aspects of the paper were the remarks on stress relief by heat treatment and the annealing of tube ends. One school of thought favoured complete annealing while the other favoured softening of tube ends only. His
experience was that cleaning devices tended to expand the centre portions of wholly annealed tubes, rendering withdrawal difficult; so that soft brushes and chemical cleaning were to be recommended. He exhibited a portion of a brass tube which had been in contact with sulphate of ammonia and had suffered subsequent cracking. He asked whether the failure could be due to these circumstances.

MR. WILLIAMS agreed on the first point regarding the complete annealing of tubes. He said that he would welcome an opportunity to examine closely the cracked sample. He thought that it was possible that the particular tube could have come from the tube mill with internal stresses.

MR. MORGAN, referring to Mr. Gallagher's remarks, stated that, in one case, electrolytic action at an aluminium-steel junction was prevented by cadmium-plating the tube. Perhaps similar treatment could be applied to brass.

MR. GALLAGHER agreed that the cadmium-plating of tubes had shown good results.

MR. SHAW said that the instance of electrolytic action referred to by Mr. Gallagher had been due to the presence of ammonia in the feed water. It had also caused deposition of copper on the faces of the main valve.

MR. JORGENSEN commented on the peculiar effects which could be obtained by various metal combinations in boilers.

MR. WILLIAMS, closing the discussion, stated that there was much still to be investigated and explained in alloy metallurgy.

Paper: “Liquid Level Controllers in the Sugar Industry”,
by H. G. NewboulT.

In presenting his paper, the author outlined the salient features indicating that he had a number of diagrams pertinent to the subject matter, and he invited delegates to peruse them later.

Discussion:

MR. MORGAN asked whether the electric limit type of switch was used in connection with float-operated controls, and he requested further information relating to “on-off” control. Concerning the use of centrifugal pumps in “on-off” control, MR. MORGAN questioned their suitability, maintaining that in the “off” position there was no outlet of liquid and that serious erosion could result.

In reply, MR. NEWBOULT, affirming that the electric limit type of switch was used in the instance cited, went on to describe how the switch consisted of a magnet harnessed to a float and moving in an arc inside a flange; on the outside of the latter there was positioned an opposing bar magnet. Referring to intermittent feed, the author quoted the valve action as four or five times per minute. On the third point MR. NEWBOULT declared that the feed was very rarely shut off completely, and that the incidence of erosion was so slight as to be negligible.
MR. SHAW spoke highly of the expansion type of control, and stated that if this type was adopted then the phenomenon of wire-drawing would be absent; however, he stressed the necessity for the valves to be correctly sized for the particular case, and also to be adjusted to the correct setting. Referring to response rates, he drew attention to the need for a very fast rate if there were large and sudden changes in the demand as in the case of the control of boiler feed water.

MR. NEWBOULT agreed that the expansion type of control did fail on some occasions; he gave as an instance the case of a full demand over a given period being abruptly changed to zero demand for, say, an equal period. In this case, MR. NEWBOULT emphasised that the “on-off” type of control was most suitable.

On the subject of evaporators, DR. CRAWFORD discussed the circumstances under which level controllers were most useful. He felt that an instance would be the decision to render a large set fully automatic, or again, the control of a set which was just on the borderline of its capacity.

MR. WHALLEY considered that there should be a good measure of flexibility in the limits of level control.

MR. NEWBOULT heartily agreed with the previous two speakers in reference to border-line capacity and flexibility.

by H. R. Thomas.

In introducing his paper, MR. THOMAS displayed samples of the various burners required for the flame cleaning operations described in the paper. He stressed the necessity of dehydrating a surface completely before it received further treatment. He mentioned that, in tests carried out by the Queensland Government Railways on steel bridges, the relative costs of cleaning by sand blasting, hand scraping and flame cleaning were 24/-, 12/9 and 4/- per sq. yard respectively.

Discussion:

MR. DUIS mentioned the extensive use which had been made of flame cleaning during the last war on steel work which was subjected to the action of salammoniac. He said that the main disadvantage of the method to-day was the problem of procuring supplies of the necessary gases.

MR. THOMAS cited the ship “River Hunter” as an example of the great loss which could be caused by rusting under unfavourable conditions. On this ship he had noticed rust up to $\frac{1}{4}$ inch thick.

DR. CRAWFORD asked for information on the temperature which would be reached by an $\frac{1}{8}$ inch steel plate when the flame was passed over it at a speed of 5 inches to 6 inches per minute, and he enquired whether the method could be used for de-scaling evaporator tubes. In replying, MR. THOMAS said that the temperature of the $\frac{1}{8}$ inch plate would be fairly high but that he could not supply an exact figure. Regarding the cleaning of evaporator tubes, he could not envisage a practical application.
In answer to MR. IZATT regarding the cleaning of new steel, MR. THOMAS said that all mill scale might not be removed by the flame treatment, although any that remained after treatment would be so well bonded to the metal that any subsequent treatment would not be affected.

MR. HOOPER, however, was of the opinion that, although its elimination was a difficult problem, mill scale should be entirely removed before painting even though sand blasting might be necessary.

Replying to MR. MORGEN, MR. THOMAS said that the ideal method of cleaning would be to sand blast the structure down to the virgin metal and then to flame treat to drive off all moisture prior to painting, which should be done when the plate was still warm. He said that the rise in temperature of the steel caused by flame treatment was not sufficient to affect the strength of the structure.

MR. IZATT mentioned the use of the wire brush and thought that this treatment might be sufficient. However, MR. THOMAS considered that, if the job were required to last a long time, it would be economical to use both the wire brush and flame treatment before painting.

In reply to MR. R. GIBSON, MR. THOMAS stated that there would be a tendency for the inside scale or rust in a pipe to fall off when the exterior was being flame treated, although the effect would not be very extensive.
Friday, 29th April, 1955

Morning Session

MANUFACTURING SECTION

Chairman: J. H. WEBSTER

by L. R. Brain.

The author briefly outlined the main aspects of his paper.

Discussion:

THE CHAIRMAN, thanking Mr. Brain, said that he felt sure that many chemists would be interested in this paper for a comparison of clarification methods.

MR. BRAIN, in reply to MR. COCHRANE, said that the growth of micro-organisms disappeared when hot liming was reintroduced, and he was under the impression that liming at low temperatures was mainly responsible for the infection.

MR. BRAIN told MR. HAYDEN that with the sulphitation process pans did scale up to some extent and were cleaned regularly. No chemical cleaning or ferment was used in the effets or the pans. He also told MR. DRINNEN that the clarification costs as stated in the paper were for chemicals only and did not include labour.

MR. VENTON thought that with these costs the use of active magnesium oxide could be economic.

DR. KERR said that Mr. Brain’s visit to South Africa and the work he performed there with the staff of the Sugar Milling Research Institute were an excellent example of the co-operation between sugar countries. Two of their research officers, viz., Dr. Van der Pol and Mr. Beesley, had not so long ago received portion of their training in Queensland. He said that while these two men were in Queensland he had suggested that, in preference to their going to Java to investigate the sulphitation process of clarification, they should study the Queensland method of defecation. DR. KERR felt sure that defecation would expand in South Africa. This paper had brought out the fact that there was no criterion of good clarification.

MR. F. KELLY said that the criterion of good clarification had occupied his attention for some time, and he was of the opinion that the industry had not investigated the problem from the angle of the recovery of sugar. Although the removal of ash and scale-forming materials had improved, the removal of colloidal substances did not affect the recovery of sugar. MR. KELLY said that there was no single criterion for good clarification.

In reply to MR. JORGENSEN, MR. BRAIN said that the growth of micro-organisms appeared in the tempering tanks where the temperature was about 120°F. With the introduction of hot liming the trouble disappeared.
MR. BRAIN told the CHAIRMAN that there were both vertical and horizontal heaters in South Africa and the method of descaling was by brushing. With sulphitation the tubes were only partially dried but with defecation a complete drying was essential before brushing when the scale was removed readily.

MR. SCRIVEN noticed while in the Caribbean that sulphamic acid was used for cleaning effets and no brushing was resorted to.

MR. VENTON mentioned that the use of sulphamic acid in the West Indies was attractive because of its solid form.

DR. KERR said that starch in cane was predominant in South Africa and this might give complications with defecation.

MR. BRAIN mentioned that investigations were at present being carried out in South Africa to determine the role of starch in sugar manufacture.

MR. B. WRIGHT said that he failed to see how the reduction of time in cleaning of effets was accomplished.

MR. COCHRANE said that due to the sulphitation process all material for filters supplied to South Africa had to be constructed in stainless steel.

MR. BRAIN told MR. STAPLES that an interval of about seven minutes existed between the two limings in the hot liming system.

MR. CAMERON thought that the usual practice of viewing clarified juice through a test tube was worthless.

In reply to MR. WALLACE, MR. BRAIN said that no trouble was experienced with the treatment during the period of the growth of micro-organisms.

MR. BRAIN told MR. SCRIVEN that the usual shutdown in South Africa was 24 hours.

THE CHAIRMAN, in closing the discussion, said that Mr. Brain's visit to South Africa showed the value of an interchange of ideas between sugar countries.

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Paper: “Laboratory Clarification Studies with Lytron X-886”,
by B. D. Sockhill.

In presenting this paper the author stated that Lytron X-886 as an aid to clarification would cost £110–£115 per 14,000 tons of cane crushed, i.e., an average weekly throughput. Its use could probably produce thicker muds and improve the operation of the settling equipment in the mill.

Discussion:

The CHAIRMAN observed that obviously considerable time and effort had been expended on this investigation and opened the paper for discussion.
Congratulating the author on his paper, MR. SARRANIN spoke of troubles at Millaquin last year with flood-damaged cane, which had forced the subsiders to the limit of their capacity. The use of sodium aluminate had been unsuccessful in improving the settling rate, and he hoped that the Sugar Research Institute would continue the work with Lytron X-886 using soil from the Bundaberg area.

MR. A. D. DOOLAN expressed the hope that the extravagant claims from overseas on the value of Lytron X-886 would not prove to be exaggerated. He mentioned laboratory tests in Brisbane using a polyelectrolyte produced in Taiwan, P.M.A.848, in which no improvement in clarification or settling had been detected. Further trials were planned by the Bureau including a factory trial with Lytron X-886.

MR. HESSEY told of a factory trial with Lytron X-886 at Pleystowe during the latter part of last season. However, the results should not be over-emphasised as the cane, at the time, was in a deteriorated condition. It was thought that as clarification was bad, an improvement might result from the use of Lytron X-886. A complete cover of conditions in the factory was attempted including clarity of juice, density of mud, purity rises from mixed to clarified juice, quality of sugar and viscosity of molasses. Actually, any improvement would be difficult to assess but only the clarity of juice appeared to show an improvement.

MR. COCHRANE claimed that Queensland was fortunate to have hand-cut cane and Lytron X-886 would most likely show best results with juices from dirty, mechanically harvested cane.

MR. F. KELLY spoke of the big part flocculation played in the operation of subsiders. He mentioned the difficulties he had experienced at Kalamia when large quantities of mud entered the factory with the cane. Although it was important to obtain a clear juice, one could not expect to get better molasses purities by removing such impurities as soil colloids which caused turbidity. He thought Mr. Sockhill’s paper was a valuable one.

MR. FOSTER said that suspended matter, which could be removed by the use of the polyelectrolyte, could increase the viscosity of molasses and adversely affect the quality of the raw sugar.

Congratulating Mr. Sockhill on his paper, MR. DRINNEN recalled the work of Mr. Cottrell-Dormer who used soil in juice to assist flocculation. At Bingera, a factory trial was undertaken after encouraging results had been obtained by the addition of clay to juice; but no obvious improvement was noticed either in juice quality or in mill work generally.

MR. HOY commented on the use of Lytron X-886 overseas and said that the material was now used in Indonesia successfully. He said that he would like to see some factory trials conducted in Queensland mills.

DR. KERR related how it had been observed at Mourilyan that juices from dirty cane had settled faster than those from clean cane in the previous season. This observation had prompted the addition to juices of these soils from the Innisfail district to assess their effects in
settling and clarification of juice. However, soil on the cane resulted in larger quantities of muds to be treated in the mill and was therefore a disadvantage. The report that the polyelectrolytes had caused a rise in purity of the juice was not logical when the small amount of material added was considered, and this paper had demonstrated that, in reality, the "apparent" rise in purity was due to suspended matter in the untreated juices. DR. KERR said that as the cane in Indonesia was very clean, Lytron X-886 could have the same effect as the addition of soil in that country, but this would not be expected in Queensland when there was plenty of soil carried into the mill with the cane.

MR. MacGIBBON told of the excessive amounts of mud in samples of first expressed juice in the southern areas during the 1954 season and the resulting difficulties in analysis. MR. SOCKHILL told Mr. MacGibbon that Lytron could probably be used as an aid in the clarification of these juice samples.

MR. STAUNTON said that the increase in subsider capacity due to the use of Lytron X-886 should be evaluated in future tests. In reply, MR. FOSTER said that the effect of Lytron X-886 was most noticeable in the first few seconds after addition to the juice and the final mud volume did not alter appreciably after ten minutes. The effect on subsider capacity in the mill was very difficult to evaluate.

MR. SOCKHILL, in reply to MR. SARANIN, said that the alluvial soils had shown the best settling properties on addition to juice.

MR. WHALLEY said that during the 1940 and 1946 seasons at Kalamia, the mud rose by 90 per cent., the pol of mud rose also and a considerable amount of sucrose was consequently lost. Lytron X-886 might have been very useful then at Kalamia. MR. SOCKHILL told Mr. Whalley that overseas publications had reported an increase in the filtration qualities of muds from juices treated with Lytron X-886 and MR. HOY supported this statement.

Closing the discussion, the CHAIRMAN expressed the hope that if mechanical harvesting of cane did come to the Queensland sugar industry, the cleanliness of the cane supplied to mills would be better than that obtained overseas.

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Paper: "Phase Rule Considerations in the Crystallization of Sucrose",
by F. H. C. Kelly.

The author outlined the main features of the research that led to this paper.

Discussion:

MR. HESSEY expressed his indebtedness to Mr. Kelly for opening up a fundamental and new line for this study of molasses exhaustion. He considered that the investigations were well justified and that the results should be followed up by further research. He said that this would be well worthwhile even if the same conclusions were not obtained because new avenues of investigation might also be opened up. Already the method of determining dextrose and fructose developed by Mr. Kelly was a valuable secondary result.
The paper really dealt with two main aspects—(1) The use of the phase rule for considering the effects of the major constituents on the solubility of sucrose. This concerned the region above the invariant point in the phase rule diagrams. (2) The dominant effect of the sparingly soluble substances such as some amino acids in limiting sucrose crystallization.

The crux of the matter lay in whether in practice it was possible to reach the limit fixed by these sparingly soluble substances. Other factors such as high viscosity could prevent this and consequently the solubility of the major constituents could be the predominating influence. One way in which this could happen would be by altering the solubility of sucrose thereby influencing the prevailing supersaturation and in turn the driving force for crystallization.

Regarding the sparingly soluble substances MR. HESSEY said that it was difficult to understand why the invariant point was necessarily connected with limiting the crystallization of sucrose as from the phase rule considerations alone sucrose would be expected to crystallize together with the impurity.

MR. HESSEY asked if Mr. Kelly could offer an explanation why inorganic materials did not prevent sucrose crystallization whereas organic substances did have this effect. It was of interest that calcium magnesium aconitate would coprecipitate with sucrose. Therefore it was doubtful whether the effect of sparingly soluble substances was controlled by phase rule considerations. He said that if the effect was related to solubility it might be possible to influence the effect without removing the substances. Mr. Stuart had found that the solubility of amino acids was susceptible to pH.

MR. HESSEY said that it was difficult to comprehend that, although the amino acid content of molasses was believed to vary considerably from time to time, this was not reflected in variations in molasses exhaustion.

In conclusion, MR. HESSEY said that Mr. Kelly had given very good evidence of the possible effects of sparingly soluble substances and had indicated means for their removal. Therefore it was highly desirable that further investigations should be made including those of possible applications in practice.

The CHAIRMAN then closed the discussion as no further time was available.

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**Paper: “A Simple Method of Determining No. 1 Mill Extraction”,**

*by K. A. Stuart.*

Introducing his paper, MR. STUART pointed out that the sampling and analytical errors in this method were much smaller than those in the conventional method. The determinations of pol and fibre in cane had an important effect on the usual method but influence the juice method to only a minor extent.

Tests carried out at Pleystowe during last season had shown that the method gave very consistent results. Therefore, the engineer could
be confident that any change from normal figures would be a true indication of a corresponding change in the performance of No. 1 mill.

Discussion:

Opening the discussion, the CHAIRMAN suggested that this method might be worthy of adoption by mills as a standard procedure.

MR. SARANIN claimed that a brix balance could be used successfully for determining No. 1 mill extraction as the data were sensitive to alterations in the settings of the mill. The results were normally lower than those of the normal method based on bagasse analysis.

MR. FOSTER thought that the method was excellent for No. 1 mill extraction, sampling was simpler than that of the disintegration method and could be carried out continuously.

DR. CRAWFORD considered that the method would give the accurate figures that mill engineers required.

MR. VENTON doubted the necessity of determining routine extractions for No. 1 and intermediate mills, and suggested the use of brix curves which were used satisfactorily in the British West Indies for milling control.

MR. STUART replied that, provided that extraction figures could be relied on, they would be of assistance in milling control.

MR. FOSTER pointed out that, if brix curves were to be determined, only one additional sample, that of mixed juice, would be necessary to calculate No. 1 mill extraction by the juice method.

MR. HESSEY stated that extraction figures were not necessarily the best criterion of the mechanical efficiency of a mill and brix curves might give useful information. It was proposed to investigate their application at Pleystowe.

MR. JORGENSEN said that for milling control he made use of the extraction of No. 1 mill, the moisture of bagasse from the intermediate mills, and both moisture and pol of bagasse from the final mill. The moisture of bagasse from intermediate mills was very important as shown by one mill which had pressure feeders on these units and was doing excellent work.

In reply to a question by DR. CRAWFORD, MR. STUART stated that the method would not give accurate figures for the extraction of the front roller of No. 1 mill as the first and last expressed juices were very similar in composition.

MR. LEWIS considered that the first mill and last mill extraction figures were most important, but that the extractions of intermediate units would be necessary to determine the cause of any otherwise unaccountable drop in overall extraction.

THE CHAIRMAN, summing up the discussion, said that the meeting appeared to agree that the new "juice" method was preferred for the determination of No. 1 mill extraction.

MR. FOSTER emphasised that the standard Queensland digester did not give complete extraction of pol, and therefore, its use, in the present form at least, should be discontinued.

Discussion:

MR. LEWIS said that the disintegrator method lent itself to automatic continuous sampling of final bagasse. He believed that there must be reasons other than poor extraction why the Queensland method was unsuitable, and he suggested chopping the bagasse prior to extraction. With finely chopped bagasse drying was more rapid also. He thought that some form of screw press was necessary to squeeze the extract from digested bagasse.

MR. FOSTER had no knowledge of the effect of fineness of bagasse on the rate of drying—he thought possibly that the presence of large particles permitted higher air flow rates. He was not in favour of chopping bagasse before using the Queensland method because this made the method too cumbersome.

MR. DRINNEN said that two disintegrator units would be used at Bingera this season.

MR. FOSTER said that 500 g. samples should be satisfactory for use with the disintegrator so that a unit smaller than that used by him could be used in mills for control work.

THE CHAIRMAN said that this method should be considered for adoption as a standard method for Mutual Control.

DR. CRAWFORD suggested that research into speeds of the stirrer should be made in an endeavour to shorten the period necessary for disintegration.

MR. C. WADDELL was told by MR. FOSTER that he had no knowledge of the effect of sample size on extraction with different batches of cane.

MR. NICKLIN thought that the disintegrator method was entirely suitable for adoption as the standard method.

DR. KERR said that it was necessary and desirable to streamline analytical methods. The disintegrator offered great possibilities for determining final extraction. He said that sampling of No. 2 mill juice gave a very satisfactory method of estimating first mill work.

MR. SARANIN referred to the work at Millaquin on determining first mill extraction. With the ordinary digester higher extraction was noted with poorly prepared cane than with well prepared material. There was no difference when using the disintegrator and the Bureau type digester.
Friday, 29th April, 1955
Afternoon Session
MANUFACTURING SECTION
Chairman: J. H. NICKLIN


Mr. Forbes-Smith presented his paper.

Discussion:

MR. LLOYD JONES said that an analysis of the curves given in the paper showed increased power consumption when using the slip resistor and that a reduced power factor would be obtained. Therefore the value of reducing peak loads with the slip resistor would have to be weighed against the costs of increased power consumption. He expressed the opinion that automatic carrier control would give better results.

MR. FORBES-SMITH, in reply, agreed that the instantaneous power values obtained from the curves did not favour the slip resistor; but, because the average motor load on preparation drives was relatively low, the increased loss due to the slip resistor was almost negligible.

MR. JOHNSON considered that a combination of flywheel and slip resistor would give the best results on these drives.

MR. SCRIVEN suggested that the use of the slip resistor involved greater complications in equipment and that the hydraulic torque converter would be preferable.

MR. FORBES-SMITH, in reply, said that as far as he could see the functions of both methods were very similar.

MR. SHEPPEARDB agreed with the use of the slip resistor for fluctuating loads and did not consider its use as an added complication because it had proved its reliability over a period of many years. He pointed out that the slip resistor had uses in other drives also, including the low powered drives. MR. SHEPPEARDB gave several instances of his experience with this item of equipment.

MR. B. WRIGHT considered that the use of the slip resistor showed that the effect was being treated and not the cause. In overseas practice every endeavour was made to provide an even mat of cane to avoid high peak loads, and suggested that it would be better to use rakes than to tip cane.

MR. FORBES-SMITH agreed but considered that, as in many cases the cause of the trouble was the tipping of the cane and this could not be readily corrected in every case, the use of the slip resistor was proposed as the simple solution at a reasonable cost.

MR. SMART asked if a high slip squirrel cage motor could be used instead of the proposed application of a slip resistor, and what the relative costs would be.
MR. FORBES-SMITH said he could give no figures for the relative costs. In the case of the slip resistor it was a safety factor where the heat was dissipated externally to the motor, while with a high slip squirrel cage motor the heating took place internally in the rotor. Because of this feature he preferred the use of a slip resistor.

MR. LLOYD JONES quoted approximate prices of £1,250 for a 250 h.p. squirrel cage motor and £1,400 for a slip ring motor of the same capacity.

MR. A. WADDELL said he had been successful with the use of slip resistors in many applications. He pointed out that the mill turbo-alternator sets of to-day could handle the loads imposed without the use of the slip resistor. However, the steam demand variations under fluctuating electrical loads could affect their operation, particularly when low steam conditions existed in the mill. If an ample and constant pressure steam supply could be guaranteed, he considered that slip resistors were unnecessary.

THE CHAIRMAN, in closing the discussion, reiterated the uses of the slip resistor on both large and small motors.

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In presenting his paper, MR. DIPLOCK mentioned that, before deciding on the use of busway, careful tests were carried out to make sure that the insulation would stand up satisfactorily under sugar mill conditions.

He emphasised (i) the advantages of busway over P.I.L.C. armoured cable and V.I.R. in waterpipe as regards the high ambient temperatures found in many parts of a mill, (ii) the simplicity of making junctions and tee-offs, and (iii) the fact that there was no wastage when alterations were necessary since sections of conductors and troughing could be used again.

**Discussion:**

THE CHAIRMAN, inviting discussion on the paper, commented on the excellence of the installation at Pleystowe Mill.

In reply to MR. SCRIVEN, MR. DIPLOCK said that (a) sixteen gauge mild steel (coated with a rust-resisting paint) had been used for the casing of the busway, but the use of galvanised steel might be desirable. (b) The clearances used slightly exceeded those required by S.A.A. requirements. (c) The construction included three phases and a neutral, i.e., four conductors, in the casing and an external earth. (d) The sections of the troughing and the covers were joined by overlapping the metal sheet, bolting and sealing with Duroseal compound.

To MR. JORGENSEN, the author replied that 2in. x $\frac{1}{4}$in. copper was used with a clearance of 2in. between phases for a 500 amp. run. Regarding the method used for jointing the busbars, the author told MR. DORE that the burrs on overlapping sections were removed by filing and the faces were treated with vaseline before bolting together.
MR. ADCOCK and MR. C. DOOLAN said that joints had been made successfully by filing, sand papering, applying vaseline and bolting together.

MR. JOHNSON and MR. SMART referred to corrosion of armoured cable laid in ash filling.

MR. SHANN suggested that there was a possibility of corrosion of cable armouring due to the inversion of sugar in mill floor washings which seeped into the ground where the cable was laid.

MR. HORNEY gave details of a severe short circuit which occurred in busway along a 30 ft. length and the busway stood up remarkably well. No replacements of the busbar or the Zelemite insulation was necessary, the latter being reconditioned by cleaning and varnishing.

MR. LLOYD JONES referred to the necessity of ensuring that busway be mechanically strong and capable of withstanding through fault currents of 25,000 amp. He also mentioned a type of plastic tubing that could be warmed up, slipped on to the busbars and moulded to them. This would ensure that, in the event of distortion due to through fault conditions, the bars could not make contact with each other or with the casing, and a short circuit would be prevented.

MR. PICKERING gave details of a procedure adopted in the jointing of aluminium busbars. After deburring and vaselining, draw-filing is carried out with a rough file and the shavings left in the bolted joint. A number of high pressure contact points are thus provided.

MR. ADCOCK spoke of the difficulty of jointing aluminium to copper satisfactorily and the importance of removing the hard white scale of oxide from the surface of the aluminium.

MR. REES said that compression joints were considered to be the only suitable type for aluminium cables in transmission lines, and MR. WOODS stated that this type of joint was used in England for 275kV. steel-cored aluminium transmission lines.

THE CHAIRMAN closed the discussion and complimented the author on an interesting and useful paper.


MR. MARTIN presented his paper and made special mention of the fact that P.V.C. insulation on sheathing on electric cables should not be regarded as a substitute for other types of insulation but as a definite advancement in the cable field. Apart from the dielectric properties of P.V.C. insulation, its mechanical nature and installation technique should be studied.

Discussion:

THE CHAIRMAN, commenting on the application of P.V.C. cable, mentioned its wide use in domestic work and that it already existed in sugar mills. Also it was interesting to note that P.V.C. cables laid underground could compete in cost with overhead reticulation.
MR. SHANN said that he had observed tests carried out on "Nylex" insulated cable and the figure quoted by Mr. Martin, of 32kV as the average breakdown voltage, had been found to be more of the order of 47 kV. He considered that the "Nylex" covering was a definite improvement on the polyethylene material.

MR. MARTIN said that polyethylene covering had a special application in portable equipment.

Referring to conditions quoted in the paper for the wiring beneath the furnace, MR. MARTIN told MR. JOHNSON that the conduit temperature on the outside surface was measured with a mercury bulb thermometer. MR. MARTIN also stated that P.V.C. compound gradually softened when subjected to high temperatures, and it was therefore necessary to use the recommended method for these operating conditions.

MR. MARTIN said that no discrimination was made between P.V.C. and V.I.R. cables for carrying capacity or ambient temperature limits under the S.A.A. wiring rules, but that only P.V.C. was suitable for installations where direct sunlight fell upon the cable or where oil was present.

MR. LLOYD JONES asked what terminating methods were necessary where P.V.C. cable was used for high tension applications. MR. MARTIN replied that cable boxes were not required and that the application of an adhesive bonding tape of polyethylene gave complete sealing.

MR. JOHNSON asked whether, as the overall diameter of P.V.C. cable was less than that of other types, the S.A.A. rules permitted a greater number of wires in a given size of conduit.

MR. MARTIN said that, although the diameter was less, the limiting condition was not so much the number of wires, but the rate of heat dissipation from each wire. In the case of P.V.C. cables, the smaller diameter could possibly cause a greater concentration of heat.

MR. SMART mentioned that he had changed all wiring in metering circuits to P.V.C. cable to overcome the adverse effect of oil.

MR. DIPLOCK remarked that he had some 15 miles of P.V.C. cable installed at Pleystowe mill and, although it was a little more difficult to handle in conduits, the difficulty of installation was reduced to a minimum by applying vaseline to the cable covering.

MR. CLAYTON said that P.V.C. cable had been in use in Hawaii when he visited those islands in 1948.

MR. PICKERING said that it was normal practice to use P.V.C. cable for panel wiring in motor starters.

To THE CHAIRMAN, MR. MARTIN replied that P.V.C. cables were cheaper than V.I.R. cable up to a limit size, and this limit was due to the high cost of the raw materials for P.V.C., which was two and a half to three times that of rubber.

MR. LOGAN asked whether damage by rodents had come to the notice of Mr. Martin. MR. MARTIN answered that he had received four complaints in some years of experience, and in each case a positive
reason was found. For example, a cable had been attacked that was across an entry hole, and in another case food had come into contact with the covering.


Presenting his paper the author briefly outlined the main features.

Discussion:

THE CHAIRMAN, opening the paper for discussion, mentioned that suitable air break switchgear for sugar mill use was now available; but, that it was now too late to meet the requirements of most mill expansion programmes. He expressed his preference for this type of equipment.

MR. LLOYD JONES mentioned the use of air circuit breakers in England for general use for all auxiliaries in power houses. They were used mainly to avoid the danger of steam contacting the oil. Even air insulated transformers were being used to minimise the use of oil in power houses.

MR. DIPLOCK said that the eleven 800 amp. and one 3000 amp. air break switches at Pleystowe had given excellent service.

MR. SHANN asked for the upper limit of voltage for air break switchgear and MR. REES quoted a figure of 3.3 kV.

In reply to a question from MR. JORGENSEN with regard to the limits of the use of air break switches in various positions, the CHAIRMAN explained that they could be used in most cases.

MR. DORE mentioned the economy of space that could be achieved by the use of air break switchgear as it could be supplied in tier form.

THE CHAIRMAN referred to the use of H.R.C. fuses with switches to meet the requirements of the S.A.A. rule regarding the control of 100 amp. circuits.
Monday, 2nd May, 1955

Morning Session

AGRICULTURAL SECTION

Chairman: C. G. STORY

Paper: “Recent Developments in the Study of Ratoon Stunting Disease”,
by C. G. Hughes.

The author presented his paper.

Discussion:

MR. GRIFFIN expressed concern at the apparently easy reinfection of clean cane and queried whether it would ever be possible to achieve entirely clean plantings. MR. HUGHES replied, that, in view of recent developments, it seemed likely that a nucleus of clean cane would have to be provided for all districts at regular intervals.

MR. WHITAKER asked whether it would be possible for the Bureau to implement its policy of enforcing the use of disease-free planting material in 1956. MR. KING replied that in those mill areas where sufficient stocks of clean plants were not available it would not be practicable to issue a Proclamation to that effect next year. In such cases it would be postponed for consideration at a later date.

MR. WILSON briefly discussed various possible causes for the recent findings of ratoon stunting disease symptoms in Burdekin treated cane. He said that the use of boxes of seven cwt. capacity was not conducive to satisfactory water circulation. He thought that it was necessary to maintain a treatment temperature of 50.5°C. in the tank to ensure a 50°C. temperature in the baskets.

MR. WIEHE outlined the occurrence of the disease in Mauritius and said that there seemed to be an environmental effect on disease intensity. High rainfall areas were more severely infected than the drier areas in contrast to Queensland experience. In reply to MR. VALLANCE he also gave some details of the laboratory investigations which had been pursued in Mauritius in order to establish identification of ratoon stunting disease. No conclusive results had yet been obtained but chromatographic methods and the use of ultraviolet light appeared to have some promise.

MR. VALLANCE exhibited some chromatograph strips obtained from tests in the Bureau’s laboratory. He said that there were some indications of a higher concentration of pentose sugars in the juice from diseased plants. MR. HUGHES also gave details of some of the many laboratory methods attempted without success.

MR. McBRYDE asked whether rats were important as vectors of the disease, and MR. HUGHES replied that although no work had been done he doubted if any importance could be attached to this means of spreading ratoon stunting disease.

MR. BATES asked if it was known how long the virus remained active on cultivating implements, e.g., tandem discs. MR. HUGHES
said that he was unable to give a time limit but suggested that the use of implements on headlands should remove any infected material, and that washing with a suitable disinfectant could possibly be practised.

MR. VOLP asked if it was desirable to use those Aretan spray planter units in which the solution was re-circulated. MR. HUGHES replied that this type of spray unit could be a definite source of reinfection. MR. KING suggested that the use of suitable sterilants might allow the re-usage of Aretan solutions in spray planters fitted with return pumps.

MR. WILSON brought to notice the crop improvements already obtained in hot-water treated plantings despite imperfections in treatments to date.

**Paper: “Temperatures Inside Containers in Hot-Water Treatment Tanks”, by G. Wilson.**

During the presentation of his paper, MR. WILSON commented on the use of thermostats to control temperatures in treatment tanks. He recommended the use of closed steam coils to prevent clogging of the thermostat by fibre and other material sucked back from the tank. He stated that the thermometers used in the investigations had a diameter of \( \frac{3}{4} \) inch, not \( \frac{1}{2} \) inch, as recorded in the paper (p. 112, Proceedings).

**Discussion:**

MR. McBRYDE suggested that more even heating of plants would be obtained if each basket were constructed with a hollow core in the centre. MR. WILSON replied that with baskets there was no difficulty because temperatures inside them reached equilibrium in about three minutes. With large containers such as those originally used in the Burdekin tank the hollow core might have produced an improvement.

MR. STORY asked if better circulation was obtained by placing the plants in a lattice or parallel arrangement in the baskets. MR. WILSON replied that his experiments did not give a clear answer to this question.

MR. GADALOFF asked if it would be practicable to hot-water treat whole stalks and use the stick method of planting. MR. WILSON replied that this was not practicable because hot-water treated plants gave very poor germination unless they were treated with Aretan. This treatment could not be carried out efficiently when the stick method of planting was used. The eyes were softened by hot-water treatment and were subject to damage if the stalks were subsequently cut into plants and dipped in Aretan.

MR. TAYLOR proposed that if plants were treated in bags which were perforated and agitated during treatment the risk of not curing r.s.d. was small compared with the risk of re-infection by cultivating implements, especially since there were many volunteers in the fellowed fields which were to be planted this year. He concluded that it would be better to improve the existing tanks rather than to go to the expense of providing ideal tanks and baskets. MR. KING stated that there was no proof that ratoon stunting disease was spread by cultivation.
implements causing root inoculation under field conditions. Mr. Hughes had obtained root infection by treating exposed roots with infective juice under artificial conditions. At present root inoculation by cultivation implements should be regarded as a remote possibility. On the other hand it is known that inefficient tank treatment does fail to cure r.s.d. MR. WILSON stated that partial cure of the disease was not good enough. Mr. Hughes had found that the treatment of plants at 50°C. for two hours completely cured plants of r.s.d., and the present paper set out conditions which had to be obtained in h.w.t. tanks to ensure that every plant was immersed in water at 50°C. for two hours. In a later discussion DR. SKINNER pointed out that unless conditions were provided which ensured complete control of the disease in the h.w.t. tank, it would not be possible to determine the importance of other factors such as field infection by cultivation implements and insects.

MESSRS. SHAW and CLARK discussed the technical requirements of instruments used to measure and control the temperature of hot-water treatment tanks. MR. SHAW noted that the latitude considered by MR. WILSON as satisfactory for hot-water treatment tanks required a very small tolerance and a considerable degree of accuracy on the part of the thermometer used. He went on to discuss the effect of immersion depth on accuracy, and also said that for the most accurate work it was necessary to use a thermometer with the largest possible calibration. In connection with the thermostatic control of tank temperatures, Mr. SHAW pointed out that some of the valves being used in h.w.t. tanks were not suitable because they had an accuracy of only 2 or 3°C.

MR. CLARK stated that a resistance bulb might be the best instrument for measuring tank temperatures. A high quality resistance bulb with a small range, for example, 5°C. over the span of the instrument, would be suitable. For controlling tank temperatures a ratio controller might prove to be the best instrument. It had two bulbs, one of which could be inserted in the water in the tank and the other in the centre of the plants in a basket. It measured the rate of change in temperature and it could be applied to a feed of steam to control tank temperatures.

Both MR. CLARK and MR. SHAW emphasized that more consideration should be given to the selection of suitable instruments for measuring and controlling tank temperatures.

MR. NIELSON suggested that the depth of thermometer immersion did not matter provided that it was standardised and calibrated in situ and a correction was made. MR. SHAW replied that under standardised conditions a calibrated thermometer could give accurate results, and MR. CLARK pointed out that the standardisation could be upset by changes in ambient temperature.

MR. NIELSON also stated that from the practical point of view of the Pest Board officer a knowledge of the temperature inside the plant was not important because it was sufficient to know that plants could be cured of r.s.d. if they were immersed in water held at 50°C. for two hours. MR. NIELSON also stated that the thermostat used on the Babinda tank controlled the temperature with an accuracy of 0.1°C.
MR. WILSON agreed that the thermostat at Babinda gave efficient control of temperature, and went on to say that errors due to depth of immersion were eliminated from his experiments because thermometers were standardised and constant depths of immersion were used.

MR. McBRYDE stated that an automatic recording thermometer was desirable to provide a check on the operator and to trace the cause of failures. MR. NIELSON pointed out that a recording thermometer would not only provide a check on the operator but would also provide him with protection if he should be accused of not treating the plants at the correct temperature. MR. WILSON emphasized that Pest Boards should make inquiries from him about suitable recording thermometers before purchasing them. At least one Pest Board had purchased a recording thermometer which was quite useless because its range was too great.

MR. SHEPHERD said that the temperature inside the plant was more important than the temperature of the surrounding water. MR. KING stated that this aspect had not been overlooked. It had been studied carefully by Mr. Hughes. The temperature inside the plant was the important factor in curing the disease. This disease could be rendered inactive in cane juice by temperatures lower than 50°C, but if the temperature of the water surrounding the plant was maintained at 50°C for two hours the temperature inside the plant was such that the plant was cured of disease. The Pest Board officer did not need to worry about the temperature inside the plant but should concentrate on maintaining the water outside the plant at the correct temperature.

MR. DOYLE asked about the actual effect of Aretan on h.w.t. plants. MR. WILSON replied that Aretan protected the plant from infection by micro-organisms when it was placed in the soil. A secondary effect was the stimulation of growth which often occurred when plants were dipped in Aretan.

MR. GRIFFIN questioned the value of a set time and temperature treatment which was applied to plants taken from different varieties at different stages of growth. MR. BATES replied that time-temperature trials with different varieties were at present being carried out on the Experiment Stations. MR. KING pointed out that a definite time and temperature were required to cure r.s.d. and the primary object was to eliminate the disease, not to protect the plant from damage.

In closing the discussion, MR. STORY stated that MR. WILSON would be testing h.w.t. tanks in Queensland this year to ensure that they were effective in providing the conditions necessary to free all treated plants from ratoon stuntting disease.


MR. HITCHCOCK, in summarising his paper, dealt with the insect transmission work carried out on ratoon stuntting and chlorotic streak diseases at the Northern Sugar Experiment Station, and some factors associated with the diseases in Northern Queensland.
Discussion:

MR. NIELSON asked if any other techniques had been used besides those mentioned. In one he had read of, the insects were fed on diseased juice in a container covered by a permeable membrane, before being placed on healthy plants. MR. HITCHCOCK replied that such techniques were for use when other work had narrowed down the field to only one or two vectors. The technique described in this paper was designed to show whether any of a large number of species under a variety of conditions were capable of transmission. More detailed work would follow incrimination of any species.

DR. SKINNER stated that it was necessary firstly to have completely clean cane. When this was done it would be possible to determine the importance of insect transmission and other methods of re-infection in the field.

In reply to MR. SHEPHERD, MR. HITCHCOCK stated that hot-water treatment for ratoon stunting disease also cured chlorotic streak disease but re-infection did occur. It was hoped to study the distribution of this re-infection in plantings of hot-water treated cane, where there was no danger of primary infected stools confusing the picture. In this way a clue might be obtained to the nature of the means of transmission.

THE CHAIRMAN explained that MR. SHEPHERD had received plants from a hot-water treated propagation area planted on low country. Unfortunately, the ratoons were found to be infected with chlorotic streak disease when inspected. As in other cases in the area this infection had been secondary but this source was often difficult to find due to masking of the symptoms. At present the only method of control in these low lying chlorotic streak areas was the continued introduction of clean stocks of cane.

MR. WILSON pointed out that in northern areas hot-water treated cane had shown some infection with chlorotic streak within a few months when planted on low land near diseased cane, but this was not observed to occur on similar land in areas where the adjacent cane was healthy as the result of a policy of plant selection. Some years ago Bureau trials had shown that chlorotic streak could cause up to 30 per cent. loss of plant crop in Badila. He quoted an instance where the healthy cane had become 100 per cent. diseased as first ratoons but still yielded 6.94 tons of cane per acre more than the ratoons grown from originally diseased cane.

MR. GREENAWAY stated that in the Mackay area infection had appeared in hot-water treated cane on new land within a few months. He asked if it was possible that hot-water treatment rendered cane more susceptible to chlorotic streak infection.

MR. WILSON suggested that more critical inspections in the treated cane plantings might have disclosed the disease whereas it might have been in other fields which were subjected to only routine inspections; or the symptoms of chlorotic streak might show more readily in cane free of ratoon stunting disease. Overseas reports that nitrogenous fertilizers masked chlorotic streak symptoms had not been borne out in North Queensland; on the contrary, it was considered that the streaks
were more easily detected on the greener leaves. It had also been observed that the streaks were not as easily detected in bright sunshine as on cloudy days. Chlorotic streak symptoms were not permanent in a diseased stool. Consequently, if a field showed 15 per cent. infection on one occasion and 5 per cent. a few weeks later, the stools representing the latter might not have been included in the former, but could be an additional number of diseased stools.

THE CHAIRMAN, thanking the author for his paper, stated that while chlorotic streak was an established disease in North Queensland, it was a new disease in Mackay, and consequently of extreme importance as it introduced a new problem into the area. He stated further that the farm drainage systems for low country were often inter-connected in local areas, and secondary infection was a serious consideration under these conditions.

Paper: "Notes on the Identification of Sugar Cane Varieties",
by J. C. Skinner.

The author presented his paper and briefly outlined the main points.

Discussion:

In reply to MR. WILSON, who asked whether it was possible to use the stem epidermal pattern to differentiate between crosses, DR. SKINNER stated that very little work had been conducted on this particular subject. Many hundreds of observations would probably be necessary before any definite conclusions could be drawn. This would be very time consuming and not a practical proposition. MR. TAYLOR said that if the stem epidermal pattern provided a practicable means of identifying unapproved varieties during early growth it would be most useful.

MR. C. WADDELL considered that a chart showing the various characteristics of approved varieties would be invaluable to Cane Prices Board employees for the identification of burnt cane. DR. SKINNER suggested that internode shape and bud groove characters could be used in this case. However, the normal visual identification through familiarity with the variety would be suitable in most cases.
MONDAY, 2nd MAY, 1955
Morning Session
MANUFACTURING SECTION
Chairman: J. H. WEBSTER


After welcoming the delegates from the University of Queensland, THE CHAIRMAN asked Mr. Pidduck to present his paper. The author then outlined the main features of his paper and spoke of a project which had recently been undertaken to study the effects of pressure on the coefficient of friction between bagasse and steel. While the work was far from complete, it appeared that the coefficient fell from about 0.4 at a pressure of 50 p.s.i. to 0.28-0.29 at 3,000 p.s.i.

Discussion:

DR. CRAWFORD offered his congratulations on this fine start on the fundamentals involved in the process of milling, and he drew attention to the special need for a knowledge of these relationships when the pressures obtaining were low, since these circumstances were important in the feeding of a mill. He asked whether the strains as measured in the case of wet bagasse were somewhat inflated due to the presence of water.

MR. PIDDUCK held the opinion that such an influence was entirely absent but he felt that any influence of this nature would lower the recorded value. He reaffirmed that steady conditions had always been developed during the tests described.

DR. CRAWFORD then asked whether the author could explain why the ratio of the axial to the radial pressures in the case of wet fibre should be about twice that for dry material.

In reply, MR. PIDDUCK stated that in his opinion hydraulic pressure influences came into the question. He explained that in the case of the wet material some water would eventually escape up the cylinder walls whereas with dry fibre the fluid present was air which could readily escape when pressure was applied, and which would continue to do so until removed entirely from the sample. MR. PIDDUCK emphasised that the wet bagasse had not been in a sloppy condition when subjected to these tests.

MR. JENKINS reported that at the time when the pressure was measured, the moisture in the bagasse was of the order of 30 per cent.

Referring to the comparison of characteristics for wet and dry bagasse, MR. F. WRIGHT held the view that the water present between the fibres would act as a lubricant in the case of wet material.

MR. PIDDUCK confessed that he had not thought of the water in that light, but he still considered that the water had an hydraulic effect as it did not escape from the pressure chamber as readily as did the air present in dry bagasse. MR. PIDDUCK then told Conference that the experiments on dry fibre had been undertaken in order to establish a lower limit for the ratio of the two pressures—axial and radial.
DR. CRAWFORD remarked that the whole investigation was important in its application to the design of pressure feeders.

PROFESSOR SHAW drew attention to Fig. 5 in the paper, and he suggested that MR. PIDDUCK explain to Conference the direction of increasing pressure for the trace.

The author then stated that the direction was from left to right. He could not explain why the curve for the radial pressure showed a step-down in the falling pressure, but he assured members that this had invariably occurred.

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The author presented his paper.

**Discussion:**

Opening the paper for discussion, THE CHAIRMAN said that many facts had been brought forward in this paper to settle long-lived arguments in the industry concerning maceration.

MR. VENTON appreciated the difficulty of the work done by Mr. Foster and said that 240 per cent. on fibre was also the significant value of maceration in tests conducted by the Bureau at Mulgrave in 1946.

MR. LOGAN was of the opinion that at few mills did the bagasse reach 175°F at the first intermediate carrier and the contact time was often less than five minutes. The milling trains might have to be redesigned to establish the necessary contact time.

Congratulating MR. FOSTER on his paper, MR. WHALLEY quoted the results of tests at Kalamia using an hydraulic press with a maximum pressure of 2,500 p.s.i.g. On plotting pol extraction against moisture extraction at varying temperatures it appeared that the temperature of maceration did not affect extraction below 140–160°F. At medium temperatures, the disadvantages to milling performance due to slip were very pronounced, but at high temperatures the gain in extraction overshadowed this feature.

He claimed that it was very difficult to keep the temperature of bagasse at a high value; 170°F was the usual temperature at Kalamia. He also said that the quantity of maceration water affected the extraction until the bagasse reached a saturated condition and that the brix of maceration fluids was very important.

In a mill equipped with a pressure feeder, the final moisture of bagasse was independent of the initial moisture. Therefore the limit of 240 per cent. fibre mentioned by Mr. Foster applied only to mills without pressure feeders.

He mentioned that "Extrapol" had been used without success even with cold maceration.

His tests had shown that the pol in open cells diffused more rapidly with a rise in the temperature of maceration and time was an important factor. He was of the opinion that high speed open carriers did not improve the efficiency of maceration.
MR. JENKINS was told by MR. FOSTER that the same mill settings had been used for both the hot and cold maceration tests. MR. JENKINS thought that, as the temperature had an effect on feeding qualities an alteration to mill setting to increase the rate of crushing with hot maceration might also increase the extraction. A rigid comparison could not be made unless the mill settings were suited to the prevailing conditions. When starting up with the maceration water cold, mills fed too well and with very hot maceration, pressure feeders were needed to give good results. He said that Mr. Foster had claimed that maceration on the first intermediate carrier had little effect on overall extraction. This was difficult to comprehend although preparation could be a contributing factor.

MR. JENKINS said that dilution figures could not be compared unless the fibre in cane was constant. At Fairymead, maceration per ton of cane had been used as a control figure.

MR. FOSTER claimed that high extraction at No. 1 mill reduced the amount of material to be heated subsequently and was therefore beneficial. Preparation was also important as it was easier to extract poul in open cells.

Referring to the tests at Racecourse, MR. McCracken thought that temperature was the controlling factor affecting extraction.

MR. JORGENSEN said that the settings of a mill were quite different when the mill was equipped with a pressure feeder.

MR. FOSTER agreed with MR. STUART that moisture per cent. fibre in bagasse was an important factor. As this figure was higher for No. 2 mill feed than for No. 5 mill feed, maceration should be more effective on No. 5 mill. He also told DR. CRAWFORD that the extra maceration water from the condensed steam used for heating could cause some slip, but the heat was the main reason for the extra extraction. To MR. McCracken, MR. FOSTER replied that the bagasse blanket appeared to be of the same thickness at Pleystowe and Racecourse. Further investigation was required on this phase of maceration.

DR. CRAWFORD said that the penetration of maceration water was affected by the blanket thickness.

MR. SCRIVEN said that the paper contained a fund of information. He wondered whether the method of applying maceration water by spray or by the boot method was important. In past years, a speed of six feet per minute was used for intermediate carriers, but now high speed carriers are used overseas with no boots. The maceration boot was then of debatable value. In reply, MR. FOSTER could not arrive at a definite answer from the quantity of maceration added; but with hot maceration a slow carrier was essential for diffusion. However, it was questionable whether a mill should use hot maceration unless a pressure feeder was installed.

Replying to MR. SCRIVEN, MR. CLAYTON said that the time was long overdue to determine the effectiveness of long intermediate carriers. At Mulgrave in 1946, the transit time in the intermediate carriers was varied from one to four minutes and, although extra diffusion did occur, the milling results were not improved. Apparently, the rapid mixing at the mouth of the mill was far more effective than the slow diffusion in the intermediate carrier.
To work successfully a maceration drum had to have excess fluid and this was not possible without recirculation on the intermediate carrier. He thought that, with the exception of mills with a pressure feeder, it was not worthwhile to recirculate maceration water in this manner.

MR. WHALLEY said that the lateral distribution of the maceration water on the bagasse blanket was important. It was better to have the upper layers of bagasse wet with maceration fluid than the lower layers.

He related how tests had shown that the higher the initial moisture the higher was the final moisture of bagasse and that recirculation had shown no beneficial results due to the comparatively high brix of the liquid.

MR. JORGENSEN said that to-day intermediate carriers were driven at 18-20 feet per minute. Drums and boots were essential at a maceration of 30-35 per cent. MR. B. WRIGHT said that cold bagasse fed better than the hot material. This fact was demonstrated at the commencement of crushing each week-end when the milling train was cold. The temperature of the mill rollers apparently affected feeding.

DR. CRAWFORD thought that it was important to keep the relative positions of the layers of bagasse constant.

MR. F. KELLY said that the two processes of breaking cells and removing sugar were operating in the milling train. The efficiency of a mill for breaking cells was not known and other mechanical devices to perform this operation should be investigated.

DR. KERR asked for comments on the basis for expressing maceration. Maceration per cent. fibre was not a complete figure as, although fibre was the constant material, dilution of the residual juice was the important criterion.

Concluding the discussion the CHAIRMAN said that the paper was an excellent contribution and it could give rise to an alteration in the design of mills and milling trains.


DR. CRAWFORD presented his paper, briefly outlining the main points.

Discussion:

MR. STUART, referring to Fig. 4, enquired whether factors "P" and "S" had been considered as being independent of each other. He considered that there was a relationship between "P" and "S" and that the ratio P/S became $k \times \phi a$, where $k=a$ constant.

He also considered that atmospheric pressure would have no effect on the outlet conditions of the feed chute.

DR. CRAWFORD in reply stated that there was a relationship between "P" and "S", but the resultant expression was indeterminate. Generally, however, an increase in P resulted in an increase of P/S, therefore angle $a$ would increase in some manner with P.
MR. F. WRIGHT stated that from experience he was able to substantiate the remarks of DR. CRAWFORD with regard to combinations of killer plate and hydraulic top roller loading. These combinations had resulted in poor feeding in standard mills and prevented floating, although in pressure fed mills equipped with killer plate control, normal floating did occur.

MR. HOLLYWOOD felt that an extension of work on the lines suggested in the paper coupled with experimental mill investigations would yield good results. At Inkerman it had been found that the No. 1 mill would run without pushers at a slightly decreased rate, and with comparable extraction, and he considered that for successful operation two factors were essential—(1) uniform preparation, and (2) a long feed chute with a minimum length of 10 feet.

He was of the opinion that the type of preparation had a greater effect on feeding qualities than was generally realised. It appeared that fine material had an appreciable effect of reducing crushing rates. The angle of the feed chute could be increased with advantage to 70°.

MR. JENKINS stated that there was a tendency for the pressure feeder-mill ratio to be set too high. Speeds in use did not agree with the speed ratio (feeder to mill) of 1.5 suggested by the Colonial Sugar Refining Company. He thought that in intermediate mills the existing type of carrier gave uneven feed, and was detrimental to the maintenance of a uniform feed blanket. Further, an even supply of tipped cane to the carrier would depend on the ability to control truck handling smoothly.

DR. CRAWFORD thought that it was a good precaution to reset the pressure feeder rolls occasionally to allow for variations in settings with wear.

MR. FORBES-SMITH requested a practical estimate of a desirable rate of change of roller speed, as far as governing was concerned. He wondered if pressure devices in the feed chute could be used to control the roll speed of the pressure feeder or if mill speed could be controlled by the ratio of pressures between feeder and mill rollers.

DR. CRAWFORD considered that the answer to the first question depended on blanket formation. A project was in hand to investigate the other possibilities mentioned.

DR. KERR wondered in what manner the blanket actually entered the rollers. Calculations indicated that the bagasse should enter in a blanket five inches thick.

DR. CRAWFORD intimated that various feeding devices would be incorporated in the experimental milling plant.


MR. SARANIN presented the paper on behalf of himself and his fellow author.

Discussion:

MR. FOSTER, congratulating MR. ALLAN and MR. SARANIN, said the method proposed for determining pol in open cells was promising.
With further investigation it should be possible to develop a method which had some meaning in relation to the milling process, as an error of 10 per cent. in the estimation would mean an error of 7 per cent. in mixing efficiency.

He also said that the results given in Table I showed that an increasing quantity of maceration had very little effect on extraction up to the third mill, but quite an appreciable improvement was evident at the final mill.

MR. SARANIN agreed with MR. WHALLEY, who said that first mill extraction did not appear to be affected by preparation and therefore a Searby shredder might be more useful if placed between the first and second mills.

MR. F. KELLY agreed with MR. WHALLEY also and said that probably considerable energy was wasted in breaking up the cane.

DR. CRAWFORD claimed that the idea of putting the Searby shredder after the first mill was not a new one. He said that it might be a good idea to put a two roller crusher in front of the Searby shredder.

MR. HAYDEN congratulated the authors and said that he was not in accord with the idea that cells remained alive after the cane was cut and in his opinion death occurred at the time of cutting.

MR. JORGENSEN claimed that the idea of putting the Searby shredder after the first mill was not a new one. He said that it might be a good idea to put a two roller crusher in front of the Searby shredder.

MR. ROBINSON said that some years ago there was a modified Searby shredder installed behind the first mill at Invicta. It gave a lot of trouble but results were reasonably good.

MR. R. GIBSON congratulated the authors and asked for information on crushing rates and size of mills referred to in Figs. 2 and 3 of the paper.

MR. SARANIN said the investigations were made from the point of view of pol in open and closed cells and he would acquaint Mr. Gibson with the desired information later.

MR. JENKINS referred to publications by Khainovsky which showed bubbles of air in killed cells.

MR. FOSTER said that as far as he knew Khainovsky referred to bubbles in mechanically damaged cells only and not in heat killed cells. The latter remained intact although the semipermeable membrane was damaged.

MR. CLAYTON, referring to remarks by MR. HAYDEN, said that the important practical idea was that the cells were alive until damaged in order to liberate pol.

In relation to the various methods of preparation which had been suggested, he said that the effect on the c.c.s. determination would have to be watched closely.

MR. KELLY suggested that the Masonite process might have an application in the preparation of cane. He also thought that it might be a good idea to instal an eight feet first mill with smaller subsequent mills.
DR. KERR said that MR. ALLAN and MR. SARANIN had performed a very creditable piece of work. The mixing ratio was a very important figure and the forced mixing which took place at the entrance to the feed rolls was worthy of further study and consideration. He thought that it was incorrect to assume, as Khainovsky did, that juice from cells broken at a mill was not expressed at that mill.

MR. JORGENSEN said that in Queensland good preparation and hot maceration were claimed to be necessary, but in some overseas countries this was not the case. He asked which of these two theories was to be believed.

THE CHAIRMAN congratulated the authors and closed the discussion.


MR. BULLOCK, introducing his paper, said that it represented a factual account of work carried out on the experimental mill. The variables chosen were dictated by convenience and limitations of facilities. Three degrees of preparation had been used—whole cane, chopped cane, and mill prepared cane.

He drew attention to the features of the mill—small rollers, fine grooves, and absence of juice grooves—which must be taken into account in interpreting the results.

MR. BULLOCK explained the significance of interaction between variables as mentioned in the paper. The correlations between variables were shown in Table III. Some of the correlations were well known in the industry. However, the interactions between speed and compression ratio, and speed and preparation were interesting. It was unfortunate that the range of compression ratios—2.0 to 2.5—was rather small.

There was a fairly definite relationship between mill power and extraction. There was an indication that the feed pressure was also closely related to the milling power consumption. He directed attention to the conclusions entered in the paper. The coincidence of higher extraction with coarser preparation was probably explained by the fact that drainage of juice was more complete with coarser preparation. When juice grooves were provided, the trend of results might alter.

Discussion:

PROFESSOR SHAW expressed his thanks for being offered the opportunity to open the discussion. He made it clear that the report presented was of an interim nature only. It would have been pleasing to be able to withhold any statements on the investigations until the work was complete and ready for application to practice. However, this did not accord with “University politics” as applying to the control of finance. So the conclusions to date were put forward to encourage discussion which might provide leads for future investigation. He also emphasised that priority of publication was a factor which must not be overlooked—a new approach to a problem should be publicised as early as possible.
PROFESSOR SHAW explained that the experimental mill differed in design from standard mills but was capable of being adjusted to suit a wide range of variables. The rollers were finely grooved for a start and it was planned that later on alternate grooves would be cut out to provide either coarser grooving or juice grooves. It was a question of which of these alternatives should be adopted next. In such plans limitations of finance were prominent. Although there was general belief that the project was financed by the sugar industry, in fact the University was meeting over two-thirds of the costs directly, besides providing numerous extras by way of assistance from associated departments.

The speaker went on to refer to previews of some papers to be presented before the Institution of Mechanical Engineers. These dealt with co-operation in mechanical engineering research, and extracts quoted claimed that research funds provided by industry were too limited. On the other hand, it was emphasised that the research body, given adequate finance, must be able to provide adequate technical services and facilities.

Regarding research projects undertaken by the University of Queensland, PROFESSOR SHAW expressed the hope that the industry would second members of its technical staff to the University for the duration of the investigations. He felt that this must be beneficial to all parties concerned. One member of the staff of the Sugar Research Institute had already assisted at the University. Both Australia and Great Britain were lagging far behind the United States in the proportion of industry and government funds devoted to research. In U.S.A. the government allocated $30 million annually for research—and this did not include funds for research in nuclear physics. In Britain only £1.5 million were spent, including contributions from University funds.

* In a concluding reference to the paper under discussion, PROFESSOR SHAW stated that he was not afraid of any criticism which might be levelled at the published work. He hoped that the discussion would provide a guide to further lines of investigation.

DR. CRAWFORD commended the author for the comprehensive report on his work. He felt it a pity that the tests were carried out on a mill with rollers having fine grooves and no juice grooves. The drop in extraction at higher rates of crushing was more severe than would be expected in practical milling. This was doubtless due to differences in the conditions of drainage of juice from the mouth of the mill. Nevertheless there was danger that a false impression would be created. The statistical analysis of the results recognized three variables, but he felt that juice drainage was a fourth. If this could be taken into account it might alter the significance of other correlations.

MR. BULLOCK, in reply, explained that conditions in the feed opening of the mill had been studied whilst feeding whole stalks of cane into the mill. Reversal of the mill showed that the bagasse completely filled the grooves and there was no bridging. Hence the concept of juice flowing through channels in the mass of feed was over-simplified. To his way of thinking drainage effects were closely associated with degree of preparation, but this would mean that drainage could not be treated as an independent variable. He went on to point out that there was
a point in the line of travel of feed into the mill at which the voids in
the solid material were completely filled. The point at which this
occurred depended on the compression ratio.

MR. F. KELLY agreed with PROFESSOR SHAW regarding the
financial problems of Universities. In considering the paper he had
wondered whether some light might be thrown on milling problems by
a study of the power required to break up particles in relation to the
area of new surface created. He made reference to the Rittinger formula
used in metallurgy. Referring to the curves in Figs. 4 and 5 of the
paper (relationships between extraction and power consumption at two
speeds) he suggested that a curve might provide a better fit than a
straight line in each case. MR. BULLOCK replied that no theory had
been put forward to account for the expenditure of work in a cane mill.
Extension of Mr. Pidduck's work on the compression of bagasse should
provide useful data. As regards the graphs, it was possible that a curve
might yield more satisfying results. However, the correlation on a
linear basis was highly significant.

MR. JENKINS, speaking on Rittinger's Law referred to by
Mr. Kelly, said that he understood the law was not highly regarded in
industry. Both Deerr and Hugot had studied the work done in com-
pressing bagasse, by integration of PV curves. He believed that they
had concluded that the efficiency of crushing was of the order of 50
per cent., but there might be a margin for error of about 15 per cent.
Deerr had accepted that the work done in the compression of bagasse
could be measured by the expression PV$\alpha$—but this was derived from
tests involving slow compression and might not apply to practical
milling. Faster compression would raise the pressures required for
promotion of the necessary juice flow and absorb more work. Hence
mill efficiencies might be higher than the approximate figure mentioned.

DR. CRAWFORD again emphasised that, for the proper investiga-
tion of milling, it would be necessary to eliminate the uncertain question
of drainage of juice by providing adequate juice grooves.

MR. BULLOCK agreed, but explained that there were complica-
tions in the designing of equipment to provide the free drainage desired.

MR. FORBES-SMITH referred attention back to Figs. 4 and 5.
He noted that the motor current was being used as an indication of
the power consumption. With the Ward Leonard system this was
broadly legitimate, but the relationship between current and power
developed would depart from linear at low loads. The efficiency of the
Ward Leonard motor must be expected to vary.

MR. BULLOCK explained that there had been insufficient time
to relate the extractions to the actual roller torques. He admitted
that the ampere-torque relationship would be non-linear at low loads.
However, he felt that the use of current instead of torque was correct
within the limits of accuracy quoted.

MR. KELLY, replying to MR. JENKINS, expressed the opinion
that Rittinger's Law was unpopular in industry because the efficiencies
revealed by the formula were most unflattering. He believed that the
law was sound. He reiterated his criticism of the linear curves in
Figs. 4 and 5, pointing out that established working knowledge demanded
the adoption of a curve providing decreasing increments of extraction
for equal increments of power.
MR. ROBINSON stated that, as a suggestion for further study, it would be interesting to investigate the effect of tilting the mill fore or aft of the vertical. In his experience this had a marked effect on the drainage of juice.

MR. YOUNG rose to express his pleasure at the high standard of the papers presented at the session. This morning session alone, he felt, had made it worth the while of every delegate to attend the Conference. He felt that co-operation between the sugar industry and the Universities was becoming well established, and the presence of representatives of the Universities of Queensland and Hobart gave evidence of this. This alone was sufficient to refute a common criticism that the Universities were too remote from reality to be of direct assistance to industry. In regard to research projects it might be necessary for a University to take some initiative, but if the sugar industry were approached with definite plans he was sure it would not be found reluctant to assist.

MR. YOUNG said that the papers and discussions had reached a standard which excelled any that he could recall even at International meetings. He congratulated the authors and added his congratulations to the Chairman for his excellent conduct of the session.
MONDAY, 2nd MAY, 1956
Afternoon Session

AGRICULTURAL SECTION
Chairman: C. G. HUGHES

Paper: “Pre-Emergence Weed Control in North Queensland—A Discussion of its Limitations”, by F. Nihill.

In the absence of MR. NIHILL the paper was presented by MR. HOY.

Discussion:

MR. VALLANCE said that the work outlined in the paper was a useful contribution to the information on weed control in the northern cane areas. The Bureau had experimented with somewhat similar types of contact plus pre-emergence sprays. Mr. Nihill had concentrated on the use of p.c.p. plus 2,4-D mixtures and had obtained information regarding their behaviour under varying conditions and on different soil types. The results obtained not only added to our knowledge, but the formulations used had practical possibilities.

MR. TAYLOR quoted an instance in which a South Johnstone grower used 2,4-D in powder form against nut grass without success and asked whether any information was available on the use of 2,4-D in this manner. MR. HOY replied it was preferable to use this weedicide as a spray in order to facilitate absorption by the plant.

MR. FOX, referring to pre-emergence spraying, said that he knew of a case where lack of cultivation appeared to retard the growth of the crop. This occurred on a sandy soil where cultivation might not be considered essential. MR. SKINNER was of the opinion that no crop losses occurred due to the omission of cultivation on such soils, but he went on to say that they were so easily cultivated that there was little advantage to be gained by spraying.

MR. KING suggested that some of the growers present might care to express an opinion on the costs quoted by Mr. Nihill. Previously the cost of 2,4-D alone, i.e., 32/- per acre, had been a matter of some concern. He asked whether the additional cost due to the presence of sodium pentachlorphenate would render the combined spray too expensive. MR. COYNE said that, as far as nut grass was concerned, £3 per acre would not be excessive.

MR. CRAWFORD said that he used considerable quantities of 2,4-D. In his opinion the method was very useful and he had found that plant or ratoon cane required two sprayings.

MR. HOY advised that, providing the right quantity of water was used, no difficulty should be encountered in dissolving 2,4-D. In reply to MR. ROUND, he pointed out that sodium pentachlorphenate was soluble in water but pentachlorphenol was not. He went on to say that when handling pentachlorphenol normal precautions should be taken. In reply to MR. SKINNER, he said that he had no detailed
information regarding the loss of activity of 2,4-D from continued use in the same ground. It was known that this material broke down in the soil due to high degrees of moisture, temperature or organic matter content. It was also susceptible to certain bacteria.

Replying to MR. CRAWFORD, MR. STORY said that Crotolaria goreensis could be killed by using a creosote base contact spray at the rate of about four gallons per acre. He had also controlled nut grass with applications of 2,4-D at the rate of 1 lb. per acre every six weeks.

MR. FOX commented that variable results could be obtained with 2,4-D. He felt that there was some need for investigation to find out why splendid results were obtained sometimes while at other times the degree of control was most disappointing.

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Paper: “Cane Varieties as a Solution to a Harvesting Problem”,

by Norman J. King.

The paper was presented by the author.

Discussion:

THE CHAIRMAN, opening the discussion, stated that the paper was most timely and revealed figures that the industry only too often overlooked. He considered the subject was one over which the plant breeder, grower, and miller could ponder most deeply.

MR. YOUNG agreed that there was much to be gained from erect, sweeter crops of reduced tonnage, but had some doubt whether a variety was available with the desired sugar content. Further, a variety would have to withstand cyclones which he considered were the major cause of lodging. MR. KING replied that he based his paper on normal climatic conditions. He did not view cyclones as the normal cause of lodging. In the North, lodging frequently occurred from weight of crop and wet soils alone. In reply to MR. FOX, MR. KING stated that lodging during burning was not the rule with most varieties and such a characteristic could be watched by the plant breeder.

MR. GADALOFF mentioned that 40 t.p.a. plant crops on his farm, which was not new land, remained erect, but second ratoons bent badly. MR. VALLANCE added that crops as light as 10 to 15 t.p.a. had been observed to bend on new soils, and in these cases he wondered if this was caused by some abnormal production of a growth regulating substance in the plant.

MR. SHEPHERD considered that the growing of light crops could involve more cultivation and consequently initial expense. DR. SKINNER replied that light canes often possessed good cover. Little was known by the plant breeder concerning the causes of lodging; but, with stalk lodging, it often appeared to be due to thin initial growth at the base.

MR. KING, in reply to MR. ANDREWS, stated that the growing of a reduced plant crop would not necessarily mean accentuated loss in the following crops. Figures showed that many growers now were producing ratoons nearly equal to the plant yield.

MR. C. WADDELL mentioned that in the Philippines, where lodging is a major problem, tillage practice is changing from heavy hilling up
to the reverse, *i.e.*, stubble shaving. MR. KING added that hilling up was never considered by the Bureau of Sugar Experiment Stations as a preventative to lodging. MR. WALZ recalled good results when hilling up was performed economically and well with horses. MR. VOLP considered that, with increased mechanization of farming, lodging was accentuated by deep tyne cultivation at high speeds.

MR. KING, replying to MR. SHEPHERD, mentioned that the Bureau had several of the less vigorous seedlings of high sugar content already under trial on rich river flats.

MR. R. GIBSON mentioned that N.Co.310 at Bingera in a crop of over 60 t.p.a. had given a gain of 2.0 to 2.5 units of c.c.s. over a comparable crop of C.P.29/116. MR. KING added that N.Co.310 apparently had good wind resisting qualities. In Formosa, where cyclone damage is severe, it was becoming a valuable cane.

MR. MUIR stated he was particularly interested in the paper as any trend to smaller erect crop would suit mechanical harvesting. Also the better condition of the cane could result in improved milling efficiency. This could be considered as a further gain.

MR. KING, in reply to MR. DART, said that he could not recall from personal observation any improvement in erectness in fields sprayed for weed control as compared with others which had been cultivated. Replying to MR. GADALOFF, he also advised that with two crops of the same sugar content, a 40 t.p.a. stand would remove more from the soil than a 30 t.p.a. crop.

MR. KING commented that it had been argued that with smaller crops of higher sugar content a mill might not reach its peak. However, his primary consideration in this paper was more profit for the grower. MR. TAYLOR considered that with present crop restrictions and under schemes based on farm tonnage peaks, such an argument would not apply. An improvement in sugar content of the cane would increase the total amount of sugar produced for each fixed farm tonnage peak. In reply to MR. PEARCE, MR. KING advised that farm trials based on the information contained in his paper would be considered but would be difficult to conduct. Canes prone to lodging would have to be used, and seasons could not be predicted.

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**Paper: “Mechanical Harvesting and Co-operative Ownership”, by C. G. Story.**

MR. STORY presented his paper and said that one of the factors contributing to the success of the scheme was the co-operation given to the Dumbleton Committee by Farleigh mill.

**Discussion:**

THE CHAIRMAN congratulated Mr. Story on his paper and opened the paper for discussion.

MR. MUIR also congratulated Mr. Story and hoped that some of the information contained in the paper would be widely publicised. MR. MUIR added that he thought farmers should become more co-operative and the formation of small groups for mechanical harvesting—both cutting and loading—was a step in the right direction.
MR. SHEPHERD said that he was of the opinion that the Rasmussen harvester at present used was to be replaced. MR. STORY replied that this machine had given good service over the four year period but that it was now the intention of the Committee to replace it with a heavier type—possibly a Fairymead machine. MR. SHEPHERD pointed out that the Rasmussen machine did not lay the cane in a manner suitable for mechanical loading. MR. STORY replied that this was why the Committee employed men to load, and went on to quote operational costs for the four yearly periods and detailed the system and method of loading the cane. Truck waggons drawn by horses appeared to be a better proposition than tractor drawn waggons, due to the stopping and starting. A two man loading gang was preferred to a three man gang because it was better balanced. The best cane for loading was that from a 30 ton per acre crop.

MR. R. GIBSON asked how far the farms were from the loading point. MR. STORY replied that the tram line ran through all the properties, and quoted a case of two men loading 41 tons of cane and carting it ten chains to the siding in an eight hour day using horse waggons. He said that the grouping was as even as possible. The ideal size for a group was one large enough to satisfy two loaders who would load eight to twelve trucks per day. MR. GREENAWAY added that the farmers were neighbours.

MR. YOUNG said he thought that grouping of the farms would overcome the problem of the larger machine cutting too much cane per day. MR. MUIR added that the Fairymead harvester was a proved machine and that a single row machine cutting up to 200 tons per day and a jib loader loading 80 tons per day would be satisfactory for a group of farmers.

MR. YOUNG asked if the Committee had any disagreement with the Union. MR. STORY replied that they had not and that the men were signed on as cane cutters at day rates and were paid on contract for the cane loaded. Messrs. MUIR and PEARCE discussed the economics of harvesting and loading at some length, and for the benefit of delegates outlined some of the possibilities in this respect. MR. R. GIBSON also gave interesting details with reference to Bingera Plantation.

MR. KING commented on the difficulty of handling standover cane which might be lying down. MR. STORY said that the 1951 standover crop at Mackay was not very heavy but was awkward for manual cutting.

MR. C. WADDELL, referring to burning and immediate harvesting, said that, during warm weather and under damp soil conditions in 24 hours after burning the c.c.s. could drop 1.3 units. After a second 24 hours a further loss of 0.5 unit could occur, and that for each succeeding 24 hours the drop was a further 0.25 unit.

MR. TAYLOR asked whether the properties in the scheme were hilly or flat. MR. STORY replied that the country was mainly flat and it was considered that this type of land was most suited to mechanical harvesting.

THE CHAIRMAN, ending the discussion, thought that history was in making with regard to the harvesting of sugar-cane.
MONDAY, 2nd MAY, 1955
Afternoon Session

MANUFACTURING SECTION

Chairman: J. H. NICKLIN


The paper was presented by the author.

Discussion:

The discussion was opened by the CHAIRMAN, who commented on the low first cost of this apparatus in comparison with that of air pumps.

MR. LLOYD JONES discussed the use of ejectors in power stations. DR. CRAWFORD remarked that an ejector was at one time used at Farleigh to supplement the air pump on the effect condenser, and this was confirmed and its use discussed by MR. B. WRIGHT.

MR. SMART requested information on the steam consumption of ejectors, and said that the presence of incondensible gases in the exhaust from ejectors would make the use of this exhaust steam unsuitable for process work.

MR. JORGENSEN said ejectors were not greatly used due to high steam consumption.

MR. SCRIVEN remarked that sugar mill and power house conditions were very different, the heat balance being more important in a power house. He discussed the steam consumption of ejectors and the power required for air pumps. MR. CHANDLER said he had no accurate figures with which to make a comparison of the steam consumption of an ejector and the power required by the equivalent air pump. He thought that the heat could be recovered from an ejector exhaust as from a turbine exhaust. An ejector could exhaust at about 12 p.s.i.g. and the exhaust steam could be used for process work.

MR. BRAIN described an ejector used in Mauritius to raise individual pan vacuum before putting a pan on the line. The exhaust was considered useless and discharged to atmosphere.

MR. GALLAGHER queried the figures for air pump capacity and considered that ejectors were suitable for boosting only.

MR. CHANDLER discussed air pump capacities and injection water, and said that the main source of air was the injection water.

MR. NICKLIN quoted sources of figures for air pump capacities, and remarked on the big variation from mill to mill. He discussed at some length the capacity of air pumps for condensers.

MR. VENTON described an ejector for cooling in a closed water circuit on crystallizers in Cuba. With this closed system the ejector gave good control, and was simple and cheap to instal.

The CHAIRMAN closed the discussion.
In introducing the paper, MR. COCHRANE suggested that the bagacillo screens should be built twice as wide as the bagasse elevator so that they could be readily cleaned during mill operation. He added that the limiting speed on centrifugal pumps handling muds was about 600 r.p.m. MR. COCHRANE complimented the industry here on its research into rotary filter operation and pointed out that in most other countries this work was left to the manufacturers. He stated that a new plastic material which could be punched with 937 holes per sq. in. seemed to have excellent possibilities for filter screens.

Discussion:

MR. COCHRANE told MR. G. WADDELL that the steam nozzle consisted of a brass holding nut fitted with a stainless steel tip carrying a fine elongated hole. He added that the scraper blade was made of rubber and its pressure on the screens could be adjusted.

MR. GALLAGHER said that the 600 r.p.m. mentioned by MR. COCHRANE did not mean much without reference to the diameter of the impeller. He thought that the passage of fluids through reciprocating pumps was little, if at all, different from that through centrifugal pumps. MR. COCHRANE replied that for a pump with an impeller 9 inches in diameter the limiting speed was 600 r.p.m. He explained that the power required for the vacuum pump represented a high proportion of the power required for the whole station.

MR. FOSTER said that the wash water should be applied immediately after pick-up rather than have air passing through the cake. MR. COCHRANE replied that it was desirable to draw all the liquid through between washes with the passage of some air. He had made a particular study of this operation. MR. FOSTER added that in laboratory experiments air compacted the cake and that washing was consequently slowed down.

MR. COCHRANE admitted that the washing time was reduced and that washing continued beyond the centre line of the drum. He explained to MR. SLOAN how the vacuum in the low vacuum receiver was controlled to give a pick-up vacuum of 8 to 10 inches.

DR. KERR thought that the first sentence on p. 240 should be omitted. Efficient washing involved displacement of the juice and dilution did not increase. MR. COCHRANE agreed that the washing was a displacement action. MR. DRINNEN congratulated Mr. Cochrane and hoped that he could visit mills in Queensland during the crushing season. MR. DRINNEN said that in two mills lime had been added to the mud in the mixing tank. MR. COCHRANE replied that bagasse and lime reacted to form an acid causing inversion. He thought that lime should be added to the filtrates.

MR. WHALLEY disagreed with DR. KERR in connection with washing—the juice was 14 brix and it had to be evaporated to 70 brix. He asked for details of the desirable fineness of bagacillo and its uniformity. MR. COCHRANE said that the filter screen or cloth was the filter medium only so long as there was no cake on it. The inter-spaces of woven screens held particles which could not be displaced.
MR. SESTERO asked if the reaction between lime and bagacillo occurred if the lime was added to primary mud, and he was told by MR. COCHRANE that some action would occur.

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The main points of the paper were briefly outlined by the author.

Discussion:

MR. FOSTER said that the general conclusions reached by MR. DAVIES were in agreement with those of his paper of last year, and he emphasised that the mud solids concentration of the feed mud should not fall below 4.5 per cent. to obtain good retention. Ability to pump the feed was always a problem and the type of paper pulp pump used at Plane Creek mill was most satisfactory. The figures of over 100% for retention quoted in the paper demonstrated the inaccuracy of determining mud solids concentration in the feed by the difference method. A value of approximately 4 per cent. for mud solids could not hope to be accurate when obtained by subtracting the sum of moisture, brix and bagacillo from 100. A direct determination would give much more accurate results.

A convenient check on retention would be to determine mud solids concentration in the filtrate and to keep the consistency of the feed as uniform as possible by appearance.

MR. COCHRANE claimed that a slimy condition of heavy mud might be due to the acid produced by the reaction of free lime and bagacillo. This would occur during the time the mud remained in the subsider. MR. DAVIES agreed on this point.

MR. HESSEY thought that some of the very low purities of filtrate encountered could be due to holding the mud in the subsider for excessive periods. If filtrate amounted to 10 per cent. of the total juice and there was a 10 per cent. drop in purity, 5 per cent. of which could be due to resolution and 5 per cent. to deterioration, there would be an overall loss of 0.5 per cent. of sucrose in the juice.

However, MR. DAVIES said that the purity drop could not be due to excessive detention of the mud as there was continuous removal of mud from the subsider.

MR. CAMERON said that although the author maintained that the practice of this system might only be peculiar to northern mills it would be useful as a guide to any mill operating a Wizard filter in conjunction with a Bach subsider.

The improved Wizard in operation at Isis was adequate for a crushing rate of 80 tons of cane per hour and the recent installation of a Searby shredder had given an increased supply of fine bagacillo which resulted in more satisfactory filter performance.

MR. F. KELLY thought that with the set-up of two filters it would be possible to test the value of re-pulping cake from the first filter and passing it on to the second filter. The two filters used in series would then give a further reduction in mud loss.
However, MR. DAVIES was of the opinion that there would not be sufficient filter capacity at Mulgrave to attempt re-pulping.

MR. FOSTER said that this method would increase the recirculation of mud solids. MR. KELLY mentioned that he would like to see the system tried in practice.

MR. COCHRANE told conference that this system had been tried by pulping cake from the first filter with water and returning the filtrate from the second filter to the mixing tank for the first unit. However, more filter capacity was required for such a system.

MR. STAUNTON complimented the author for his contribution, which was a result of his observations as a practising technologist. Emphasis had recently been placed on papers from research organisations and it was pleasing to see a member of a mill staff providing this excellent paper. He hoped that others actively engaged in the application of the findings of the research organisations would contribute likewise in the future.

Paper: “The Cleaning of Rotary Mud Filter Screens”,
by G. E. Waddell.

MR. WADDELL presented a summary of his paper and commented on the main points. He stated that the cleaning method in use at Mulgrave as reported in his paper had since been altered to that described by Mr. Davies. Commenting on some factors in mud filtration, the author said that conditions varied from district to district and, while he appreciated the necessity of heavy muds, often this was impossible to obtain at South Johnstone, due to stale cane. Optimum pH varied from season to season and he had often found mud consistency uncontrollable.

MR. WADDELL considered that Mr. Kelly’s suggestion of re-pulp washing for muds was unsuitable from the points of view of economics and colloid recirculation. The problem of filtrate disposal at South Johnstone had been overcome by using the filtrate as maceration on the mills. He considered that mud loss had to be considered in conjunction with the fact that low mud pH which gave recirculation of colloids might be offset by difficulties at the low grade station.

The cleaning of screens was not originally provided for in the filter installation but oscillating nozzles were now fitted at South Johnstone.

The method presented in the paper was used in an effort to bring back into use a set of choked screens.

Discussion:

Due to the fact that the previous papers also dealt with the subject of filtration and that discussion time on these papers had been limited, the CHAIRMAN said that the comments and discussion could be of a general nature and not restricted to the actual subject matter of the paper.

MR. WEBSTER agreed with the author on the advisability of keeping screens clean while running. He was of the opinion that good retention reduced clogging and that slimy muds had a great tendency to clog the screens. At Plane Creek with a Deming filtrate subsider and high retention it was a simple matter to maintain heavy muds and
low mud volumes. The Mulgrave method for screen cleaning had been used and the back of the screen was perfectly clean when the screen was removed from the filter.

MR. COCHRANE believed that with a deep and clear deck the material was swept from behind the screen and clogging was reduced. He stated that, when muds became light, up to 50 per cent. bagacillo on mud solids could be used.

In reply to MR. JENKINS, who asked whether any trouble had been experienced with muds of 50 per cent. bagacillo, MR. COCHRANE replied that a mud with excessive bagacillo tended to fall off the drum.

MR. WEBSTER said that slimy muds gave poor retention even with high bagacillo contents.

Disagreeing with a statement made earlier, DR. KERR said that washing would not wash more colloids into the filtrate.

MR. WADDELL remarked that they had used a filtrate subsider unsuccessfully at South Johnstone and said that with their present system the bagasse blanket filtered out some of the mud. He also remarked that in his experience filter operatives usually added a maximum of water.

MR. CLAYTON remarked that a shallow deck caused blinding of screens, but if the deck was too deep no distinction could be made between “clear” and “cloudy” filtrates.

MR. WHALLEY said he considered heavy muds desirable and thought that it was preferable to dilute a very heavy mud with water for filtration rather than to produce a light mud. Laboratory tests at Kalamia had established that juice absorbed by bagacillo was difficult to wash out, but that, in mud, juice was not absorbed in the bagacillo. He stated that they have electric strip heaters installed in shallow baths for use in cleaning filter screens in the slack.

With regard to recirculation, MR. COCHRANE suggested that the pick-up filtrate might be returned to the mud tank, particularly with a heavy mud. MR. DAVIES stated that a portable steamer was used at Mulgrave for cleaning screens in place on the filter.

MR. WADDELL said he had found vigorous boiling necessary to clean screens and strip heaters only gave simmering conditions.

MR. DRINNEN suggested that the filter tank should be used as the caustic tank.
In presenting his paper, MR. MORGEN drew attention to the fact that the higher the volatiles in a given fuel the easier it was to burn; he stressed the difficulties associated with the burning of bagasse. MR. MORGEN then laid emphasis on the need for a hot furnace in the combustion of bagasse under normal conditions, but he pointed out that if the material was kept in a loose condition and in good contact with the air the process of combustion was facilitated and the use of a lower furnace temperature was then permissible.

**Discussion:**

Concerning the use of high-moisture fuels, MR. JENKINS pointed out that use could not be made of direct radiation within a furnace fitted with water-cooled walls. The author agreed, and remarked on the necessity in such a case of adopting the "dutch-oven" type of furnace. However, MR. MORGEN felt that it was desirable to maintain the bagasse in a loose condition so that it might dry-out and burn while still in suspension. Regarding the use of secondary air, he emphasised that the idea was to use sufficient to ensure complete combustion within the furnace, and yet prevent the incidence of fly-ash.

MR. R. GIBSON told conference that a boiler fitted with a spreader stoker was installed at Bingera mill, and that it had given satisfactory service. He considered that a mechanical feeder as shown in Fig. I in the paper was not suitable for feeding bagasse to a furnace.

With reference to the burning of fuel on a flat grate, MR. HARDY thought that the action of the latest type of grate resembled that of a gas-producer in which the principle of destructive distillation was employed. He quoted a steaming rate of 35,000 lb. per hour as the limiting capacity for one of these units.

MR. MORGEN said that, although he had no personal experience in the problem of burning bagasse, his company had successfully used the pneumatic-spreader type of stoker overseas. He described installations in which both mechanical and pneumatic stokers were used on the same boiler, particularly where mixed fuels were involved. MR. MORGEN went on to explain that the principal factor relating to combustion efficiency was to have a low percentage of solid combustibles in the flue gases, and he said that a figure of 1.5 per cent. was obtained with the pneumatic type of stoker.

MR. HARDY pointed out that with the distillation type of furnace a figure of 13.5 per cent. CO₂ in the flue gases was regularly recorded. He then stressed the importance of a reserve of fuel in the furnace in case of a sudden interruption to the supply, emphasising that, whereas the distillation type of furnace did have such a reserve, a boiler fitted with a spreader stoker had practically no reserve.
MR. MORGEN then commented upon the possibility of packing of the fuel within the chute, indicating that if an angle of 60° were adopted for the chute, the difficulty would very probably be obviated. Referring to the subject of reserve fuel, the author agreed with Mr. Hardy that a reserve was very important, whether it be located inside or outside the furnace. MR. MORGEN referred to the ease of ash-removal by the use of dumping grates, but he did not advocate a large ash-pit, because of the costs involved.

MR. HARDY then pointed out that a figure of 51-52 per cent. was the limit for the moisture content of bagasse used in these stokers.

MR. MORGEN replied that bagasse of 38-40 per cent. moisture was sometimes encountered, whilst brown coal contained about 68 per cent. water; both, however, could be burnt very readily with spreader stokers, but the ease of ignition and combustion of the latter was directly attributable to its high volatile content. MR. MORGEN then stated that the expense involved in the installation of a pneumatic stoker was very small, necessitating two stokers and one 5 h.p. fan for a boiler generating 30,000 lb. of steam per hour.

DR. CRAWFORD considered that some very sound ideas were outlined in the paper, and he asked whether details of the installation in Fig. 5 were available.

MR. MORGEN answered in the affirmative.

Referring to mechanical spreader stokers, MR. BRAIN said that in South Africa one mill, Pongola, was equipped with these stokers and they were either under construction or to be installed at four other mills at least. One difficulty in the operation of the unit at Pongola was associated with the small reserve of fuel on the grate and extremely efficient renewal of bagasse feed to the boiler was essential in the case of a bagasse stoppage, as the fire could be lost in two minutes. He added that some of the boilers were to be fitted with oil burners for emergency use. Dumping grates were standard auxiliaries with spreader stokers.

MR. STAUNTON complimented Mr. Morgen on his paper, which provoked so much thought on this question of the burning of bagasse.

MR. SCRIVEN then spoke of various other uses for bagasse, and declared that from an overall viewpoint means had to be developed for the more efficient burning of bagasse.

MR. NICKLIN mentioned that, in regard to boiler efficiency, the best figure that had been obtained during tests at Kalamia mill was a little over 70 per cent., calculated on the gross calorific value of bagasse. He considered that it was somewhat unfair to calculate efficiencies on this basis since under working conditions it was impossible to regain the heat absorbed in vaporizing the water in bagasse. MR. NICKLIN then pointed out that other factors were very important in assessing boiler efficiency and he referred to the influence exerted by the use of economisers, flue-gas temperatures and the presence of unburnt material in the flue-gases. He stressed that when the CO₂ content in the exit gases was high, it was almost impossible to have no unburnt gas, and he expressed amazement when Mr. Hardy quoted a figure of 18 per cent.

MR. BRAIN again referred to the practice in South Africa. He told conference that, although 50 per cent. had been regarded as the critical limit for water in bagasse for use with a spreader-stoker, a unit
was to be installed in a mill where the figure was of the order of 54 per cent. He emphasised that the use of preheated air was common practice in these installations.

In conclusion, MR. MORGEN thanked the members for the reception accorded his paper at this, his first attendance at conference.


The author made brief mention of some of the points raised in his paper.

Discussion:

MR. JORGENSEN spoke of bagasse handling problems generally, particularly when mill stops occurred. He congratulated the management of Pleystowe on the solution of these problems.

MR. TORR discussed the use of chains in handling equipment, and the wear experienced by these chains.

MR. R. GIBSON, congratulating the author and his company, remarked that, since during mill stops the bagasse loft normally required most labour, the Pleystowe system made for greater all-round efficiency. He recommended the adoption of this system and raised the question of fire risks.

MR. WRIGHT, adding his congratulations, said that the Pleystowe arrangement made bagasse handling very simple. A good deal of thought had been given to the whole scheme. He enquired whether week-end cleaning of combustion chambers was still necessary.

MR. SAUNDERS replied that week-end cleaning was now unnecessary. All fires were cleaned once a shift.

MR. HARDY considered that the availability of surplus bagasse was a most important feature of the installation.

MR. SAUNDERS told MR. CHANDLER that no deterioration of bagasse in storage was now evident.

MR. JENKINS commented on the frequency of fires in the normal type of bagasse loft and considered that the separation of the bagasse store from the boilers was a very sound move.

MR. WEBSTER congratulated the author and the Publications Committee on the high quality of the illustrations in the paper.


The author, presenting his paper, drew attention to an error in the calculations for the frictional forces on the elevator, tan 30° being used instead of sin 30°. It was fortuitous that the error resulting was only small.

Discussion:

MR. B. WRIGHT described a method of preventing carryover of sugar on a paddle conveyor, which in his opinion could be applied to bagasse.
MR. BICKLE suggested that tilting of bagasse paddles might reduce the capacity slightly. This could be overcome by deepening the paddles.

MR. LOGAN said that the Kalamia elevator, which was of the same angle as that mentioned in the paper and fed on the bottom, operated quite successfully with only slight carryover.

MR. BRANDON offered some information on a rubber belt elevator equipped with flights.

MR. JORGENSEN suggested that the flattening of a rubber conveyor at the point of take-off would facilitate the removal of bagasse. The fire problem, however, was greater with rubber.

MR. R. GIBSON enquired whether breaks were to be fitted in the bagasse feed chute to the furnace to prevent blow-back.

MR. BICKLE replied that rotary feeders were to be employed in this capacity.

MR. JENKINS stated that, with rubber belt conveyors, a plough was satisfactory for complete removal at one point. However, partial distribution at various points would be difficult. He considered that the corrosion of chains was related to bagasse moistures, and the problem would possibly be greater in closed conveyers. He thought also that the actual power consumption might be somewhat higher than that theoretically required.

MR. BICKLE replied that the motors available for the drive were of greater power than that required from theoretical consideration.

MR. LOGAN considered that motors of the calculated size would be satisfactory, provided that their starting torque was sufficient.

In reply to MR. HONEYWELL, MR. BICKLE said that provision had been made for rapid access, for inspection and for clearing chokes in the feed chutes.

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The paper was presented by the author.

Discussion:

MR. HARDY stated that automatic lubrication of roller chains worked very well. He had seen it used on heavy coal-handling units and had no hesitation in recommending its use.

MR. SHAW congratulated Mr. Torr and stated that American development tended towards multiple-strand chains up to 12 strands. In Cuba there was a 16-strand, 3-inch pitch, 250 horsepower drive with a 5 to 1 ratio. He also stated that in America chains were supplied in a variety of metals for corrosion resistance.

MR. JORGENSEN congratulated the author and said that it was a most peculiar fact that one type of chain failed in one factory while in another it was successful. With regard to lubrication, a 2-in-1 chain required no lubrication for long life while roller chain had to be lubricated. He suggested that chains should be standardised in mills. Two strands
of type 67 chain on the bagasse conveyor at Racecourse were in service for 600,000 tons and that type 104 chain on the sugar elevator has been in use for twenty years with a wear of only about 1/64 inch in that time.

MR. TORR endorsed the remarks by Mr. Jorgensen on standardisation.

MR. SCRIVEN stated that it was well to bear in mind that standardisation tended towards stagnation. He said he had seen gunmetal chains which compared well with normal steel chains with or without steel pins and bronze bushes working well in sugar juices.

MR. TORR stated that stainless steel chains were three times dearer than normal chains. He said that Tully and Babinda mills had this type of chain and were pleased with them, but he would like to know how much maintenance was required. He was astounded at the amount of maintenance performed by mills on chains.

MR. LOGAN was supported by MR. TORR in his statement that before standardisation could be considered more fundamental data on power requirements for blockages, etc., were necessary.

MR. H. WILSON wanted to know if it would be possible to have a collared pin on one side of a chain and compound on the other to eliminate dust penetration, for cases where it was impossible to grease or it was not desired to do so.

MR. TORR said that life depended on the way the chain was used and the care taken. A cheap chain was not always the best one.

MR. D. MUIR asked for information on the severing action of the sharpened tooth root on sprockets. MR. TORR replied that he could not give much information, but thought that it only assisted the cleaning of the bagasse or cane from between the chain and sprocket.

MR. JORGENSEN suggested that a recess should be left at the root of the teeth to accommodate pieces of cane caught there.

MR. BRANDON said that Plane Creek mill had 6-inch pitch roller chain with 2½-inch rollers and case-hardened pins and bushes and the wear was considerable both with and without lubrication. He wondered whether speed had much effect. MR. TORR said that conveyor chain speed was limited, but he considered that lower speeds were more satisfactory.

MR. SCRIVEN considered that corrosion troubles should be solved by the manufacturers.

MR. HARDY suggested that continuous automatic lubrication would solve most of the problems.

In reply to MR. SCRIVEN, the CHAIRMAN said he thought that the standardisation committee was disbanded years ago. He then closed the discussion.
After opening his concluding season of conference, THE PRESIDENT said that the problem of selecting the outstanding paper presented had been very difficult; but he had finally decided to award medals to the authors of two papers, viz., MR. G. WILSON and MR. C. J. ALLAN and MR. A. P. SARANIN.

MR. WILSON expressed his gratitude for the honour bestowed on him, and MR. SARANIN also thanked the President on behalf of himself and his co-author.

Venue of 1956 Conference

THE PRESIDENT announced that an invitation had been received from Bundaberg to hold the 1956 Conference in that city, and MR. CLAYTON read the letter of invitation from the Mayor of Bundaberg. The matter had been fully discussed by the Executive, who recommended that Bundaberg be selected. This recommendation was accepted on the motion of DR. KERR, seconded by MR. BEST.

Resolutions of Sectional Meetings

THE SECRETARY then read the following resolution from the Administrative Section.

"That, if convenient, provision be made for members to give accounts of small items of equipment or methods of interest to the Society, but too insignificant to form the subject of a technical paper".

THE CHAIRMAN told MR. JORGENSEN that no papers would be submitted for this type of discussion, but the speaker could inform the Secretary of his intended subject beforehand.

The resolution was carried on the motion of MR. JENKINS and DR. CRAWFORD.

THE SECRETARY read a resolution from the Manufacturing section—

"That the proper authorities be approached in order to avoid the overlapping of subjects by an apprentice taking the Diploma course in Engineering and that the A.S.P.A. be asked to act in the matter of this approach".

MR. R. GIBSON remarked that the Administrative Section also felt that action was needed along these lines.

Adoption of the resolution was proposed by MR. ATHERTON, seconded by MR. JORGENSEN, and carried.
A second resolution from the Manufacturing Section was read by THE SECRETARY—

"That the Committee on the Training of Engineer Apprentices be retained and, if necessary, expanded".

The resolution was carried on the motion of MR. IZATT and MR. VENTON.

MR. NICKLIN then nominated to this committee MR. BATSTONE, DR. CRAWFORD and MR. HAYES, with power to co-opt. MR. JENKINS seconded the nominations, and these gentlemen were elected.

THE SECRETARY also read a third resolution from the Manufacturing Section—

"That the Committee on Bulk Sugar Handling be disbanded".

The resolution was carried on the motion of MR. VENTON and MR. INVERARITY.

Resolutions of the Executive

THE SECRETARY read the names of the following associate members whom the Executive recommended for promotion to full membership—


MR. SOMMERFELD moved that these promotions be adopted, seconded by MR. SCRIVEN. The motion was carried.

THE SECRETARY read the following resolution of the Executive—

"That it be a recommendation to the Publications Committee that the number of papers accepted for printing in the Proceedings be limited to 24 exclusive of papers on agricultural subjects".

MR. CLAYTON moved and MR. DUUS seconded that the resolution be confirmed.

Discussion:

In answer to MR. SCRIVEN, THE CHAIRMAN said that time was the big factor at present conferences. As the conference time could not be extended, with a limited number of papers more time could be devoted to the discussion on each one. MR. VALLANCE agreed with these remarks, but considered that the number should be reduced further so that manufacturing delegates could attend the agricultural sessions.

MR. WILSON moved and MR. GEORGE seconded an amendment to the motion—

"That, at the discretion of the editors, any paper not presented to the conference should be printed in the Proceedings although not discussed".

DR. KERR, however, said that selection of papers would be very difficult. He thought that all papers should be discussed and sessions should be held concurrently. He was not in favour of either the motion or the amendment.
MR. SCRIVEN considered that the limitation of papers was a retrograde step. Young members of the Society would not present papers under these conditions.

MR. KING, as chairman of the Publications Committee, stated that he did not wish to bear the responsibility of selecting or refusing papers on merit. He preferred concurrent sessions. MR. STAUNTON, however, was opposed to concurrent meetings.

MR. WILSON said that the first restrictions should be applied to trade papers, and MR. CLAYTON agreed that those papers would be the first to be discarded. Any papers which needed extensive alterations should not be published and this would help the Publications Committee.

MR. NICHOLLS claimed that the younger members would be discouraged by these restrictions.

MR. VENTON said that in previous years two trade papers had not been published, but the Publications Committee were not happy with this action.

MR. CLAYTON told Mr. Nicholls that the inexperienced contributor would not be penalised, but some papers should be returned for re-submission.

MR. MITCHELL said that to increase time for discussion papers could be discussed together.

The motion was lost.

THE SECRETARY then read a second resolution from the Executive—

“That the Society undertake the publication of the Second Edition of the booklet incorporating the Recommendations for Uniformity in Reporting Factory Data”.

The motion was moved by MR. JENKINS, seconded by MR. KING.

MR. KING said that Mr. Clayton had already rewritten the publication. He told MR. JENKINS that the Society would bear the responsibility of financing the publication.

MR. CLAYTON told MR. MacGIBBON that the new edition would be in English.

The motion was carried.

The following recommendation was also read by THE SECRETARY—

“This Executive recommends that MR. J. W. INVERARITY be made a Life Member of the Society”.

MR. STAUNTON moved and MR. MacGIBBON seconded this recommendation, which was carried.

MR. INVERARITY responded to this honour conferred on him by recounting his early days in the sugar industry in Mackay. He discussed the formation of the Q.S.S.C.T. and the research work which had been performed during his years in the industry. He expressed his gratitude to the Society for their action in making him a life member.
Expression of Thanks

THE PRESIDENT then desired that the thanks of the Society be conveyed in writing to the following individuals and organisations whose co-operation had been essential in making the conference a success—

Mossman Central Mill Co.
The Colonial Sugar Refining Co., Hambledon Mill.
Mulgrave Central Mill Co.
Cairns District Cane Growers' Executive.
North Queensland Fertilizers and Chemicals.
Northern Australian Breweries, Ltd.
The Bowling Clubs—Stratford, Edgehill, West Cairns, Cairns Masonic, Cairns.
The Cairns Golf Club.

THE PRESIDENT then specially thanked MR. G. BATES who had acted as accommodation officer for the conference. He presented Mr. Bates with a suitable gift as a reminder of the conference.

MR. BATES responded suitably to the presentation.

Election of Officers

THE PRESIDENT said that his term as President of the Society had been a pleasant experience. He thanked the Secretary and the members of the Executive for their support as well as all the members and supporting organisations. He then called upon the Secretary to take charge of the meeting.

THE SECRETARY called for nominations for President. MR. STAUNTON nominated MR. E. W. DUUS, Vice-President, and as there were no further nominations Mr. Duus was declared elected.

THE PRESIDENT thanked the members for this honour and paid a tribute to Mr. Staunton for his excellent Presidential term. He presented Mr. Staunton with a Gold Badge of the Society and a suitable gift for himself and his wife.

MR. STAUNTON thanked the members.

THE PRESIDENT then called for nominations for Vice-President. He nominated Mr. E. T. S. PEARCE, and Mr. Pearce was declared elected, as there were no other nominations.

MR. J. L. CLAYTON was nominated for the position of Secretary and MR. L. J. WOODS was nominated by MR. STORY for the position of Assistant Secretary. Both were elected unopposed.

THE SECRETARY then read the list of the executive representatives of the sections—

Agricultural Section: C. G. HUGHES (Chairman).
G. BATES (Secretary).
Manufacturing Section: J. H. NICKLIN (Chairman).
E. B. G. CAMERON (Secretary).
Administrative Section: R. C. GIBSON (Chairman).
W. RICHARDSON (Secretary).
Publications Committee

THE PRESIDENT then called for nominations for the Publications Committee, and MR. NICKLIN nominated Mr. N. J. King (Chairman), Mr. L. R. Brain (Editor), Mr. L. G. Vallance, Dr. H. W. Kerr, and Mr. J. L. Clayton. No further nominations were received and the nominees were elected.

General Business

MR. LOGAN enquired whether the Publications Committee could return papers for resubmission. MR. CAMERON said that one of his papers had been returned. MR. CLAYTON read the relevant part of the Constitution. He said that the Publications Committee had no written authority to return papers but this power was essential to its correct functioning.

In reply to MR. VALLANCE, MR. CLAYTON said that the Publications Committee had the power to co-opt. It had never been the principle to allot papers to the Committee only. The most suitable person was the one to edit a particular paper. Final decisions were made by the Committee.

MR. STAUNTON thanked the reporters for their work.

THE PRESIDENT then wished the delegates a safe journey home and declared the meeting closed at 5.00 p.m.