

# NOTES ON THE NEW SUGAR CANE VARIETIES WHICH ARE NOW FREE FROM QUARANTINE RESTRICTIONS AND AVAILABLE FOR COMMERCIAL PLANTING.

By P. FOWLIE.

## CH. 64/21.

This variety was produced in Cuba by crossing Uba and D. 74. It is so like its Uba parent that doubt has been expressed as to whether it is a cross at all or only a Uba seedling.

In Cuba it has proved to be an improved Uba capable of giving better yields than Uba.

In this country it also seems more vigorous than Uba. Unfortunately it takes streak disease, but in spite of that it seems well worth a trial. Handmill tests at the Experiment Station indicate that it may be slightly better in sucrose than Uba, but there is evidently little difference between them in that respect. It ought to be planted in exactly the same way as Uba and there is no indication that it differs from Uba in its soil requirements.

## The P.O.J. Numbers 2714, 2725, 2727 and 2878.

These Java seedling canes all appear to belong to the family of Noble canes, being fairly thick and having broad leaves. In their breeding there is a strain of a wild cane which was introduced to give hardiness and disease resistance. One of their ancestors four generations back was a wild cane, otherwise they are descended from the Noble canes.

These Java numbers have been selected from many others for their resistance to mosaic disease coupled with the ability to produce good cane crops of high sucrose content. They all appear to be quite immune to streak disease.

Under dry land conditions it is probably best to plant these P.O.J. varieties in lines about 5 feet apart, if they are planted in good land under irrigation the lines may be 6 feet apart or even more. It is advisable to cut up the plant cane before it is placed in the lines. Setts having 3 good "eyes" each are found to give good results. These may be spaced from two to two-and-a-half feet apart from centre to centre.

## P.O.J. 2714.

Of the four released P.O.J. varieties this has given the least satisfactory results at the Experiment station. It seems to do best on free working, well drained soils and does not like heavy or naturally wet ones.

As plant cane it comes away quickly and often it looks better than the other P.O.J. canes during the early months of its growth. Its canes are thick and grow to a good height making a good appearance, but it does not stool out enough to be a really heavy yielding cane. It often has its older leaves attacked by a ring spot disease, but as this does not attack the younger leaves it does not appear to do much damage.

It is an early maturing cane, producing satisfactory sucrose early in the season. It ratoons fairly well, but not as strongly as the other P.O.J. released canes.

## P.O.J. 2725.

At the Experiment Station this variety has given consistently good results and it is undoubtedly the favourite P.O.J. number amongst planters here at the present time. It also likes a free working, well drained soil, but it is better able to adapt itself to adverse soil conditions than P.O.J. 2714. It now seems certain that it can be grown profitably without irrigation on many of our fair to good soils in the sugar belt. In tropical countries it is said to tassel too early, but in this country where tasselling is rather uncommon, this is not likely to be a serious drawback. Nevertheless, it perhaps ought to be noted that this variety has produced flowers at the Experiment Station when about twelve months old, though only in very small numbers.

When it comes up after planting, the shoots tend to spread out instead of standing erect. This habit of growth coupled with its rather short leaves always makes this variety appear short alongside the other P.O.J. numbers. It stools very vigorously and produces a good number of sticks per stool. It is an early ripener and seems to have satisfactory sucrose and purity almost any time in the year after it is twelve months old. The average sucrose tests it has given at the Experiment Station have been higher than those from any of the other released varieties. It ratoons at least as well as any of the released P.O.J. canes. The oldest ratoons at the Experiment Station now look very well indeed.

## P.O.J. 2727.

This variety has not yet been multiplied so much as P.O.J. 2714 and P.O.J. 2725, as it was received at the Experiment Station later, so plantings have had so far to be restricted to small areas and no comparative yield trials of it have yet been harvested.

It appears to suit a wide range of soils and does quite well without irrigation. In some other parts of the world it has a reputation for doing well on rocky ground. Probably it is the hardiest of the four released P.O.J. numbers. From its appearance it ought to yield quite well. Tests made at the Experiment Station show it to be lower in sucrose than the other P.O.J. varieties, but somewhat higher than Uba. It is evidently later in maturing than P.O.J. 2714 and P.O.J. 2725.

So far it has ratooned very well indeed. It has the reputation of being very resistant to mosaic and other plant diseases as well.

## P.O.J. 2878.

This is the cane which has come to be known as the "Wonder Cane of Java" because it raised the production of sugar in Java by over twenty-five per cent.

In this country it does not seem to be suited to such a wide range of soils as P.O.J.2725 and P.O.J.2727, but on good soils under irrigation it surpasses them and at the Experiment Station it has done better than P.O.J.2725 on heavy vleiland without irrigation, even during the recent prolonged droughts. It is rather slower to come away after planting than the others, especially if planted early in the spring, but when it has covered the ground and begun to form cane, it can grow very rapidly. Here it has been slower in coming to maturity than P.O.J.2725 and P.O.J.2714. After June, last season, it gave good tests for sucrose and purity at the Experiment Station, though not so good as P.O.J.2725.

In Java, under tropical conditions the crop takes about fifteen months on the average to mature so it seems likely that it will give best results as a two year crop in this country. Where it is desired to cut each season, 2725 will probably prove more suitable.

#### CO. 290.

This is creating more interest amongst planters at the present time than any other released varieties, and probably rightly so, as it is proving itself a very vigorous grower nearly everywhere. The sucrose tests obtained at the Experiment Station have shown it to be decidedly better than Uba though not so good as P.O.J.2725.

It was bred at Coimbatore in India, and, though probably not so highly drought resistant as some of the other Coimbatore seedlings it has come through the recent droughts very well indeed.

It has one character which is worth noting in this respect. When drought conditions set in it is one of the first canes to turn brown in appearance due to the withering up of a large percentage of its leaves; then with very little green leaf left it seems to be able to go through a long drought without dying where many other canes would suffer serious loss.

It prefers a good, strong, rather heavy soil, but appears to be worth a trial everywhere.

Being only slightly thicker than Uba, it can be planted in the same way and with the same spacing as Uba.

It grows very quickly from plant and covers the ground at an early age, thus reducing weeding to a minimum. The canes themselves stand very erect and trash easily.

It has a high degree of immunity to both mosaic and streak disease. It has not developed mosaic disease when inoculated by the Government Mycologist and it was growing at the Experiment Station for three years before the first case of streak was noticed. To date, only a few stools have shown any signs of streak, so it is hoped it will prove to be what might be called "commercially immune."

Experiment Station,  
South African Sugar Association,  
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Mr. FOWLIE continued: With reference to CH. 64/21, Earle says "this kind is clearly distinct from Uba, though it is very difficult to find technical characteristics by which to distinguish it. It averages a little thicker stalks than Uba; clears itself of trash a little better, it

arrows less freely, and the buds sprout less easily on the growing cane. They are equally late in maturing. On a series of analyses it will average a little better sucrose than Uba. It is equally immune to mosaic. Everything considered, it is the best of the S. Sinense canes, at least under Cuban conditions, and should be planted where canes of this class are needed."

With reference to CO. 290, I may say that the records of streak so far amount to about three stools at the Experiment Station, and one Planter has intimated to me that he found a few stools in cane which came from plant cane sent to him last October. It is just possible, cane from one of these infected stools at the Experiment Station might have got into his consignment. Anyhow he took out about half-a-dozen stools of streak infected cane. We hope that CO. 290 will not take enough streak for it to be a drawback. (Applause).

CHAIRMAN: Mr. Fowlie has just read to you a paper on a subject which is very near to the hearts of you all I am sure. This production of new canes is considered by many people to be the principal *raison d'être* for the Experiment Station; actually the Experiment Station exists for that and a great deal more. But this production of new canes is perhaps the most spectacular thing the Experiment Station has been doing, and one of the most visible results. I suppose most of the Planters here have had some experience with these canes, and as I see visitors from all directions, they ought to have some very widely different experiences and results from these canes. If you have any difficulties or queries as to the value of these canes in different kinds of soils, Mr. Fowlie is here to answer your questions. I would like to draw your attention to a paper which is down on the programme for this afternoon, it is headed "Notes on Varieties of Sugar Canes in the collection at the Experiment Station of the South African Sugar Association (Part II)." That gives results of a number of tests of canes including those now under discussion, so you will have the result of sucrose tests of these different canes, and by examination of those you will see what their value is in that respect. Although we are not reading this other paper at the moment I am drawing your attention to it.

Mr. JEX: I would like to congratulate Mr. Fowlie on his very excellent paper. I think he gives us quite a lot of sound information from close observation of these new varieties of canes. I have been most interested in them and I feel they offer very great prospects and encouragement. Mr. Fowlie has referred to the arrowing of some of the cane. This also occurred with some of my cane, but I would like to explain that I consider that was due mainly to a heavy hailstorm. This hailstorm battered the tops of the cane and I think that was the real cause of the arrowing, not so much that it is an indication of ripening. However, I had that particular cane tested, and the test at 11 months gave over 15% sucrose and 92 and 93 purity. I am speaking particularly of P.O.J.2725. The other fields did not arrow so badly. But P.O.J.2725 on that basis is such an early ripener that in favourable areas you could cut it at 12 months. The weight of the sticks at 11 months ranged from 8 to 10 lbs. each, so that it shows very vigorous growth.

As regards the variety CH. 64/21, I am very doubtful about it, it is too prone to streak. I have seen 100% streak infection on different experimental areas. I have not any myself, and don't intend to get it. My observations of streak are that it is the worst foe we have to contend with, and if these P.O.J. varieties will stand up to the climate they are going to help us very considerably, also the CO. 290. There is one peculiarity Mr. Fowlie does not mention in connection with CO. 290 and that is the splitting of the internodes. I don't quite know what causes that, or what the effect is, but there is that splitting. It might be due to droughty conditions. I had some sets up recently for planting and noticed particularly that nearly all the nodes were split.

Mr. TOWNSEND, Jr. : I would like to know if Mr. Jex has had any trouble with white ants. I have had a lot of trouble with the new canes from white ants, and yet the Uba next door to it is not affected.

Mr. JEX : Yes, I have had that trouble.

Mr. FOWLIE : The trouble with white ants is evidently fairly general. I would not say it is a very serious one, taking the canes throughout the country as a whole, but quite a number of places have reported it as rather a serious drawback to these P.O.J. canes. I think probably it is worse if you have a small spot of these new canes surrounded by Uba than it is where there are large areas of the new canes. The ants seem to prefer the new canes ; they may be softer or sweeter and more to their liking, and they go for them rather than the Uba.

Mr. A. TOWNSEND : I feel that with the new varieties it is a bit early for me to offer a decided opinion as to their relative values. There is no doubt P.O.J. 2725 strikes one as the best variety of the group. My son has mentioned the fault with regard to white ants. Of course the white ants trouble applies to any variety so far as you go ; you get them at particular seasons. But the difficulty we are experiencing is not so much with the white ants as the "black ants" (the natives). (laughter). I think with the soft variety canes, unless some special provision is made to protect them against the Natives, many planters will find that at least 40% of the cane is removed. That is my own experience and I found that when I came to reap a plot on Pendennis Estate for planting purposes, at least 60% of it had been stripped. There was no cane there fit to plant out, and the Natives had been systematically taking them as they grew up. That is not only my experience but that of my neighbours. As long as we have those soft varieties the Uba will remain immune from these "black ants" and the other cane will be largely reduced by the Natives. They take it home at night. I have tried to stop it by putting watchmen on, but in a good many cases a Native won't trap another. In Mauritius, I believe they had to pass a special Act making it a penal offence without the option of a fine, if anyone was found in possession of soft canes in this manner. I am confident that the time will come when we will have to apply to the Government to pass an Act of that sort here.

For the man who has water at his command to irrigate, these soft canes would appeal to him, but how they would stand up to drought such as we have had the last three years is very difficult to say. I think we have a great deal of thanks to give to our Experiment Station Staff for the way they have brought these forward and put them before us, and especially to Mr. Fowlie who has been among us, and we are very grateful to him for the service he has rendered. I feel sure Mr. Fowlie has a real interest in these canes. (Applause).

Dr. HEDLEY : I would just like to draw your attention to the analysis which the Chairman asked you to look at with regard to this P.O.J. 2725 cane, it is rather wonderful. Mr. Jex said he had tests made in which he got 92 and 93 purity, and that would confirm our figures at the Experiment Station. In September, the purity was 91 and the fibre was practically 12. But even earlier in the year, in March and April, we got 89 and practically 91 purity, and this time it ranks first. Then in May and June you find the purity and sucrose and fibre are all very good, the purity being 92.9, 90 and 91, and then at the end you find in November, February, the purity is still somewhere round 90 and 89. I think that is a very remarkable result. It looks as if this cane might be one that you could crop late or early, which is what is desired by the Industry. Instead of having to start the mills in May with Uba, you will be able to start with a cane like this and later crush the Uba.

Mr. O. J. ASKEW : I have been studying the analyses referred to and it seems to me that the result of P.O.J. 2725 gives the best as pointed by Dr. Hedley. I must say, so far as I am concerned, I bank on this P.O.J. 2725 (hear, hear). Mr. Townsend has talked about the trouble with white ants, and we have heard about the "black ants," but that does not apply to soft canes only. We have had a lot of trouble at Umhlali, where we found a lot of boys cut a good deal of our Uba cane down and we had to put a man on to watch there. I would like to ask if these white ants would attack the canes more in dry weather than in wet weather. It might be that the attacks by white ants would only be in dry weather. I have noticed that the trees in my garden for instance, are attacked by white ants more in dry weather than in wet. It might be the same with regard to the cane. We have planted out several of these canes, particularly P.O.J. 2728 and P.O.J. 2725 on the Umhlatuzi Flats and these two canes came up beautifully. We have planted a second crop, and I am sorry to say that owing to the flood it has killed the young cane, which we shall have to plant again. But the same thing applies to the hill country up at Kulu. The cane there is looking beautiful.

Mr. OWEN J. JOHNSON : It seems to me the irony of fate. Here we are producing more sugar than we can sell and we are studying how to get cane which is going to give us better sucrose content and all the rest of it. Still it is progress, and we can't stop the wheel of progress. Until markets get better, whatever cane we grow there will be a surplus and prices will be low. We have had a little experience with these different canes, and some of them I think are very promising. I regret that Mr. Fowlie stated that CH. 64/21 was subject to streak

disease, because in planting it we planted it at two different places and in one, we planted three long lines in the middle of Uba. It has beaten the Uba hollow. You will be surprised to see the experiment. If we get streak in it, naturally it will suffer and be like the Uba at present. If we can get a cane that is going to do away with the streak question, that will be of great help. Today, so far as we are concerned, we are losing at least 10% of a normal crop through streak disease. I am disappointed to hear that CH. 64/21 is susceptible to streak disease, because to me it is a very promising cane. When you come to the CO. 290, I have been watching the growth of it, and find that it makes a wonderful leaf growth. When you come to measure the length of cane on it, there is very little more cane on it than there is on Uba. It may be I am only looking at the young plant cane, and I don't know if Mr. Fowlie has had that experience. We are not out to grow leaves, but cane. The leaves may cover up so that the weeds won't grow, but we want cane. Compare that with P.O.J. 2725 and you will find there is not the cane on the CO. 290 that there is on the P.O.J. 2725, although that is very much shorter. There is one experience I would like to mention, and I was rather alarmed at first. We got this cane in the month of October. I got it in the drought and was afraid we would lose the lot. My son was anxious to get this cane to grow. He cut it in single eyes, and every eye grew, and there is not a miss. That was the biggest surprise to me, I expected the whole of it would be a failure. My son planted them a foot apart and that crop to-day is looking splendid. I heard of an experiment at Empangeni where they suffered very severely from drought. The Uba cane all round died and in fact the man's cane was practically extinct, but this bit of P.O.J. 2725 stood up to the test and was green when all the rest was dead. So if P.O.J. 2725 can stand drought in that way it is really a remarkable achievement and is going to be a huge success. Those of us who tried for years to get the Experiment Station going, will, I am sure, live to see the result of its work. I wish the Experiment Station every success and hope that eventually some of these canes will achieve the success we are looking for. (Loud applause).

Mr. JEX: May I just remark that these canes of mine are not grown under irrigation. They had a little help, but very little. As regards white ants, I would like to give my experience that I found a dressing of filter press cake very effective in keeping the cane free from white ants. I don't know what the ingredient is that does it but perhaps Dr. Hedley may be able to tell us. At any rate, where I applied the filter press cake it became obnoxious to the white ants.

CHAIRMAN: I just wish to refer to a point Mr. Johnson spoke of just now, and that is the fact that while suffering from excess crops we are considering means of increasing our output further. But I would like you to consider this point of view, that your trouble now with the increased cost is that you are getting a price for your production per acre which does not pay for the cost of what you are putting into that acre; but if instead of getting 20 tons off an acre, you are going to get 25 tons, the extra five tons does not cost you the

same amount per ton as your original 20 did. You have got the same acreage ploughed, the same acreage harrowed, and no more cane used for planting. It is true your harvesting and carting costs will be increased proportionately but even then not entirely so because these new canes are very much cheaper to trash. They mostly trash themselves. There is very much less cutting per ton. So that if your crop is increased, and if you only get export price for the extra cane that you get in that way, if you get 7/- or 8/- for the extra cane you produce, you still stand to make a small profit on that because you have not got to debit to your extra cane all the costs which you have to debit to your first 20 tons. So don't get alarmed at the fact that these new variety canes are going to give you heavier tonnages. Also there is this, that if you feel constrained to limit your tonnage to any definite point it is cheaper surely to get your cane off 200 acres than to get the same of 250 acres. You get the same cane and have less cultivation costs. With reference to two other points Mr. Johnson made about the effect of streak on cane and the method of planting the cane, that is the number of eyes planted, these two questions are being dealt with in a later paper. Another point I would like to mention is that it is as well with these new canes to give them every care and rather coddle them. There have been Planters who have got these canes and proceeded to carry out drought tests on them when water was available. You have bought those canes at so much per ounce, you might say, from the Experiment Station, who presumably know something already about their drought resisting qualities, so that it would be advisable to get a little more in hand before you risk the small amount you have available.

Mr. A. TOWNSEND: Mr. Jex mentioned the point of arrowing. I should like to ask Mr. Fowlie what his experience is at the Experiment Station with regard to P.O.J. varieties. It is a really serious drawback if it arrows at twelve months, and with the few plants I have experimented with on my farm, I found arrowing at twelve months. In fact nearly all the plants that the Natives did not reap, started arrowing. This is a very serious feature of that variety if it is going to continue. My own experience in the early days was that most of the arrowing took place in young canes. Why it should apply to the young cane I don't know. This particular variety, P.O.J. 2725, I find most of the young stuff started arrowing at twelve months old. I would like to know if it does this at Java.

Mr. FOWLIE: With regard to arrowing, our experience at the Experiment Station is very limited indeed. Out of the 60 or 70 varieties we have at the Station, I think we have only seen about three or four have arrows on them at all, and of these P.O.J. 2725 is decidedly the one which has had more arrows on than the others. Still we have had during the past season a matter of about four or five acres under P.O.J. 2725 and I only saw one or two arrows. The previous season with a much smaller area we saw rather more arrows, so evidently there is something in the season as well as in the age of the cane which makes it arrow. The P.O.J. 2725 which we have seen arrow has all been twelve months cane or not much more. We have never had it in any crop in the spring,

and I think you all know, at any rate our experience is, that arrowing does not take place early, but about September—October. If you have old cane kept over until that time possibly it would arrow, but usually the cane that does arrow is a little more than twelve months old in or about September, October and perhaps November. In tropical countries generally, arrowing takes place in practically all canes I understand, and it is more or less a question as to the time of arrowing. Some arrow much sooner than others. As I have mentioned in this paper, the tendency in the case of P.O.J. 2725 is to arrow early before it has formed a sufficiently big crop as compared with some of the old canes, noticeably P.O.J. 2878 which is a late maturing cane, and produces a much heavier crop before it matures and arrows and becomes ready for the mill. I think there is some relation between early maturing and arrowing. Of course early maturing is a good thing in some ways, so probably we have to put up with arrowing, which is decidedly a bad character, if we are going to get the benefit of the early maturity in other ways. I think there is no doubt about it but that in a country like this where arrowing is comparatively a rare phenomenon we may expect P.O.J. 2725 to give good results even as a two year crop although it may produce a certain number of arrows at twelve months. If it is ready to cut at the time the arrowing takes place there is no loss. I don't think an arrowed stick is any worse than another as long as it is mature.

Mr. O. J. ASKEW : I wish to take exception to something the Chairman said. I agree that if we can get 30 to 40 tons per acre instead of 24 that is the way out of the difficulty of increased costs, but I disagree entirely when he says we can go along on that basis and be satisfied with 7/- to 8/- per ton. I want to say from my experience of figures I am confident we can't produce sugar cane at 7/- to 8/- per ton, even if we get 40 tons per acre to make it pay.

CHAIRMAN : With reference to Mr. Askew's remarks, I don't wish it to go as my opinion that you can produce cane at 7/- or 8/- per ton. What I said was that the extra cane you got off without extra preparation could be produced at 7/- or 8/- per ton, that is the cane which does not require any extra ploughing, harrowing, etc.

There are one or two questions which are of interest to both Planters and Millers, and to which replies would be appreciated. How many Planters have received seed cane? How many acres are planted with new varieties? And when may we expect new varieties in any appreciable quantities at the mills?

Mr. FOWLIE : I was warned about these questions, so I took a little bit of trouble to prepare answers to them, and I have them here. This is the estimate I have made up:—

The number of Planters and Estates who have taken canes from the Experiment Station now exceed 300, and it is estimated that a few others have had a share from their friends. An estimate arrived at very roughly gives

the areas of the different canes at present growing, as follows:—

P.O.J. 2725	.. ..	250 acres
P.O.J. 2714	.. ..	60 acres
P.O.J. 2878	.. ..	50 acres
P.O.J. 2727	.. ..	15 acres
CO. 290	.. ..	100 acres
CH. 64/21	.. ..	400 acres

It is estimated that practically all of these canes are plant cane under one year old, or ratoons under one year old, and that no canes will come to the mill during the 1932/33 milling season. Some small amounts from these plantings may be milled during the 1933/34 milling season, but it is not likely that the amount will be considerable. If all these areas are replanted next planting season and an increase of fifteen fold is planted therefrom, which is a possible average, the areas to cut in the 1934/35 milling season would possibly be:—

P.O.J. 2725	.. ..	4,000 acres
P.O.J. 2714	.. ..	1,000 acres
P.O.J. 2878	.. ..	800 acres
P.O.J. 2727	.. ..	240 acres
CO. 290	.. ..	2,000 acres
CH. 64/21	.. ..	6,000 acres

The CH. 64/21 need not be taken into account from a Miller's point of view, as it is practically the same as Uba.

Mr. ALF. WARNER : My experience has been that what we called the big canes, the Louisiana canes which used to be planted here, they did not ratoon. Perhaps Mr. Askew also experienced that in the Umhlatuzi Flats. Most of these canes come from Java where they plant every year. I wonder if in this sub-tropical climate they will ratoon? As regards arrowing, I would not worry anything about it.

Mr. FOWLIE : With regard to the ratooning of these P.O.J. canes you must realise that we have not had at the Experiment Station too much chance yet to study the ratooning properties of these canes. It is about four years since we got the first plant of P.O.J. 2725 and P.O.J. 2714, and it is about three years since we got the first plant of the other two. We have these original stools still growing and they are being cut at least every year for planting. Sometimes plant cane has been taken even oftener than that. My impression is that P.O.J. 2725 and P.O.J. 2727 might be called good average ratooning canes, giving quite a nice stool as time goes on. The ratoons of P.O.J. 2725 now in the third ratoon look just as vigorous and just as healthy and nice as they did two years ago when they were only first ratoons. It is on a small scale remember. As far as P.O.J. 2714 is concerned it is a little bit disappointing. P.O.J. 2714 does not seem to be able to send up quite as good a stool after it has come to the third ratoon as it did when it was a couple of years younger. The rather disappointing thing about P.O.J. 2714 all the way through, even as a plant cane, is that it does not form a stool with enough canes in it to be as good a crop as one would wish. That character seems to persist in the ratoons on our soils at any rate.

It might be that there are some parts of the country where it will do better than with us and where it will produce a bigger stool and ratoon better. Now with regard to P.O.J. 2878 the Java "wonder cane" the indications are that when it ratoons it throws up rather too many sticks and they suffer in size and strength. It is true as Mr. Warner said, that in Java they don't ratoon and they do not trouble with this as a general rule, but in some parts they have ratoons. It is done occasionally and I am told that P.O.J. 2878 there has proved rather disappointing as a ratooner, and I think

it is disappointing because it throws up too many sticks, which are not strong enough, rather than because it does not throw up enough. I can't tell you any more than that, and you can take it more or less for what it is worth. It is not given as in any way final, as it is only our experience up to date.

CHAIRMAN: I would like you to accord your thanks to Mr. Fowle for this very excellent paper he has given us and for the very useful replies he has given to our questions. (Hear, hear, and loud applause).