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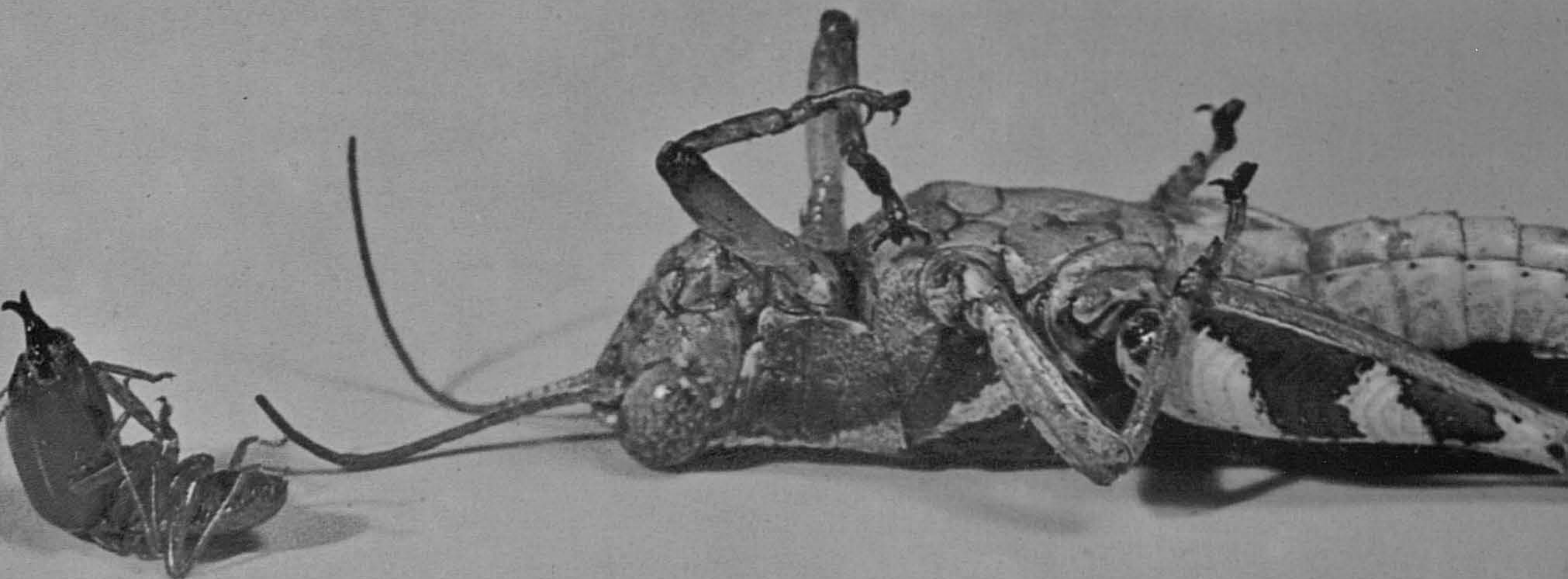
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I. S. P. — THE CONFERENCE CATALYST

The tremendous success of November's ISP 1971 Conference on Cocoa and Coconuts further confirms the position of the Society as a conference catalyst. The large number of papers from a wide range of individuals and organisations in the private and public sectors both within Malaysia and overseas is adequate testimony to the Society's ability to bring together so many diverse interests without in any way altering the basic structure of the Society.

Perhaps the role of conference catalyst is natural in view of our wide and growing membership. No other organisation brings together planters, research officers, engineers, agri-chemical executives and others with a real interest in tropical agriculture. No other organisation concerned with tropical plantation has Members in so many countries.

Success has attended all the Society's post-war conferences starting with the first mini conference on Cocoa & Coconuts in August, 1967. The Society has through its conferences done much more for its Members and for the industry as a whole and has on average at least broken even financially on the conferences to date.

While we have held a minimum of one conference a year since 1967, (the actual total is 7, big and small, in 5 years), it is not of course absolutely necessary to hold a conference annually. Nevertheless the growing international interest in these conferences and our need to draw to them persons of international repute, makes it almost imperative that we indulge in much longer-term planning than hitherto.

The following provisional long-term programme is to be considered by the Society's Council: —

1972	Oil Palm	—	(major conference)
1973	Palm Oil Processing & Marketing	—	(major or mini conference)
1974	Oil Palm	—	(major conference)
1975	Cocoa & Coconuts	—	(major or mini conference)

Oil palm being the second largest tree crop in Malaysia and already a major factor in the country's economy, it deserves the lion's share of the long-term programme, and of course the programme need not remain too rigid if subsequent events suggest that changes should be made.

The views of Members on the provisional long-term programme are earnestly sought. Should we include other crops or other subjects entirely?, *i.e.* should we have a conference on estate management from the administrative angle rather than the agricultural angle?

The fact that the Society has proved itself an excellent conference catalyst must in no way detract from our critical examination of the influence of conferences on the aims of the Society, and the time is ripe for consideration of longer-term planning in this light.



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ENVIRONMENTAL INFLUENCES AND THE IMPORTANCE OF COVERS AND SHADE FOR COCOA

by

B.J. Mainstone

Dunlop Research Centre, Batang Melaka, West Malaysia

PART II*

WORK IN RELATION TO THE LEVEL OF PERMANENT TOP SHADE FOR COCOA

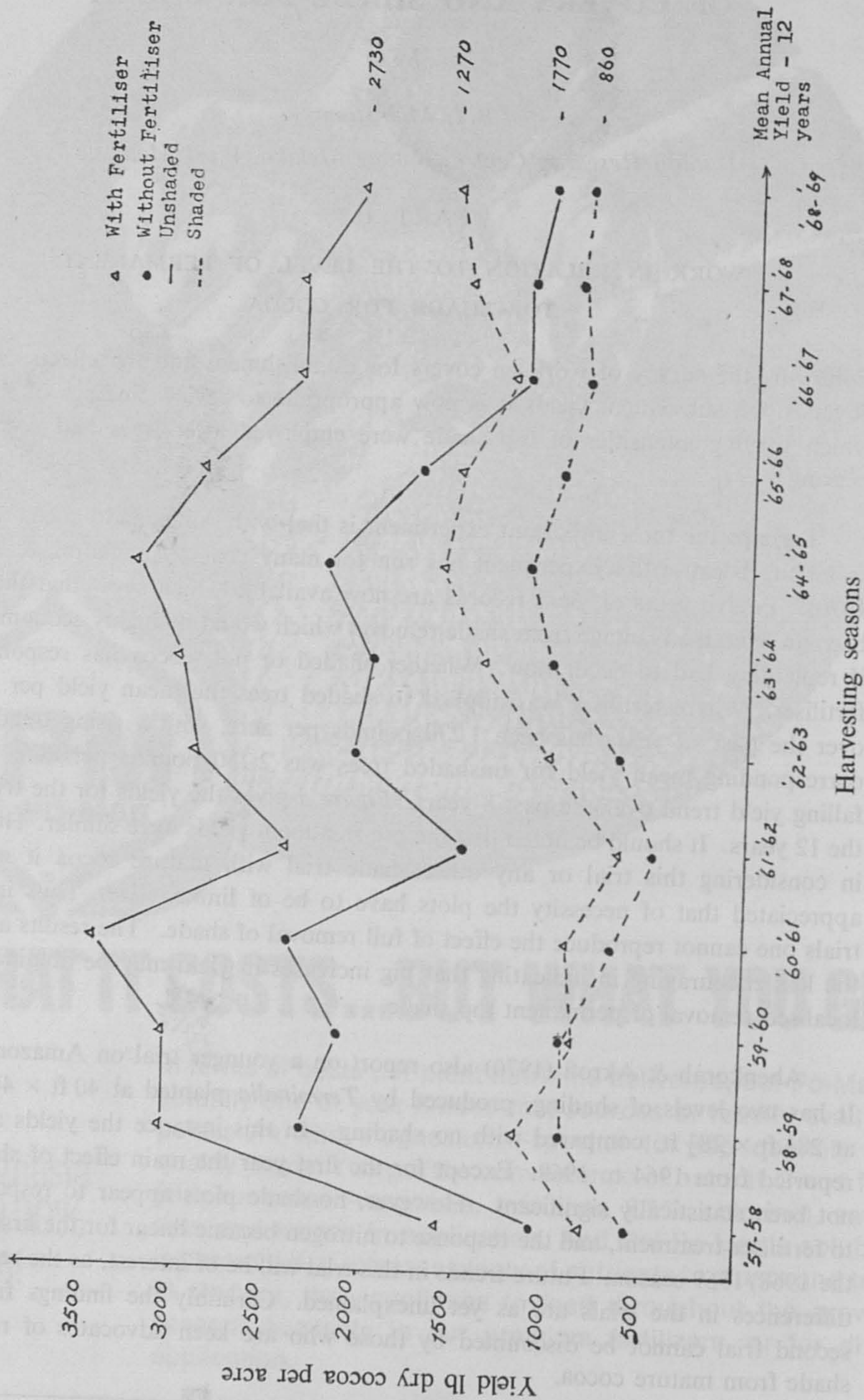
Following the survey of work on covers for establishment and the effects of these covers upon subsequent yields it is now appropriate to review findings of trials in which varying intensities of top shade were employed after trees had come into bearing.

Perhaps the most important experiment is that with Amelonado cocoa at Tafo in Ghana because this experiment has run for many years (Ahenkorah & Akrofi, 1970). Twelve years of yield records are now available which show that there has been an overall advantage from shade removal which would be highly economic even if replanting had to occur now. Whether shaded or not, cocoa has responded to fertiliser. Where fertiliser was applied to shaded trees the mean yield per annum over the past 12 years has been 1 270 pounds per acre, with a rising trend. The corresponding mean yield for unshaded trees was 2 730 pounds per acre, with a falling yield trend over the past 8 years. *Figure 3* gives the yields for the trial over the 12 years. It should be noted that the pre-treatment yields were similar. However, in considering this trial or any other shade trial with mature cocoa it must be appreciated that of necessity the plots have to be of limited size. Thus in shade trials one cannot reproduce the effect of full removal of shade. The results are none the less encouraging in indicating that big increases in yield may be obtained from localised removal of permanent top shade.

Ahenkorah & Akrofi (1970) also report on a younger trial on Amazon cocoa. It has two levels of shading, produced by *Terminalia* planted at 40 ft × 40 ft and at 28½ ft × 28½ ft, compared with no shading. In this instance the yields are only reported from 1964 to 1969. Except for the first year the main effect of shade has not been statistically significant. However, no-shade plots appear to respond best to fertiliser treatment, and the response to nitrogen became linear for the first time in the 1968/1969 season. Future trends in this trial will be of interest, as the reason for differences in the trials are as yet unexplained. Certainly the findings from this second trial cannot be discounted by those who are keen advocates of removing shade from mature cocoa.

* *PART I* appeared last month.

Fig. 3. TAF0 amelonado shade and fertiliser experiment K.1
 (After Ahenkora & Akrofi, 1970)





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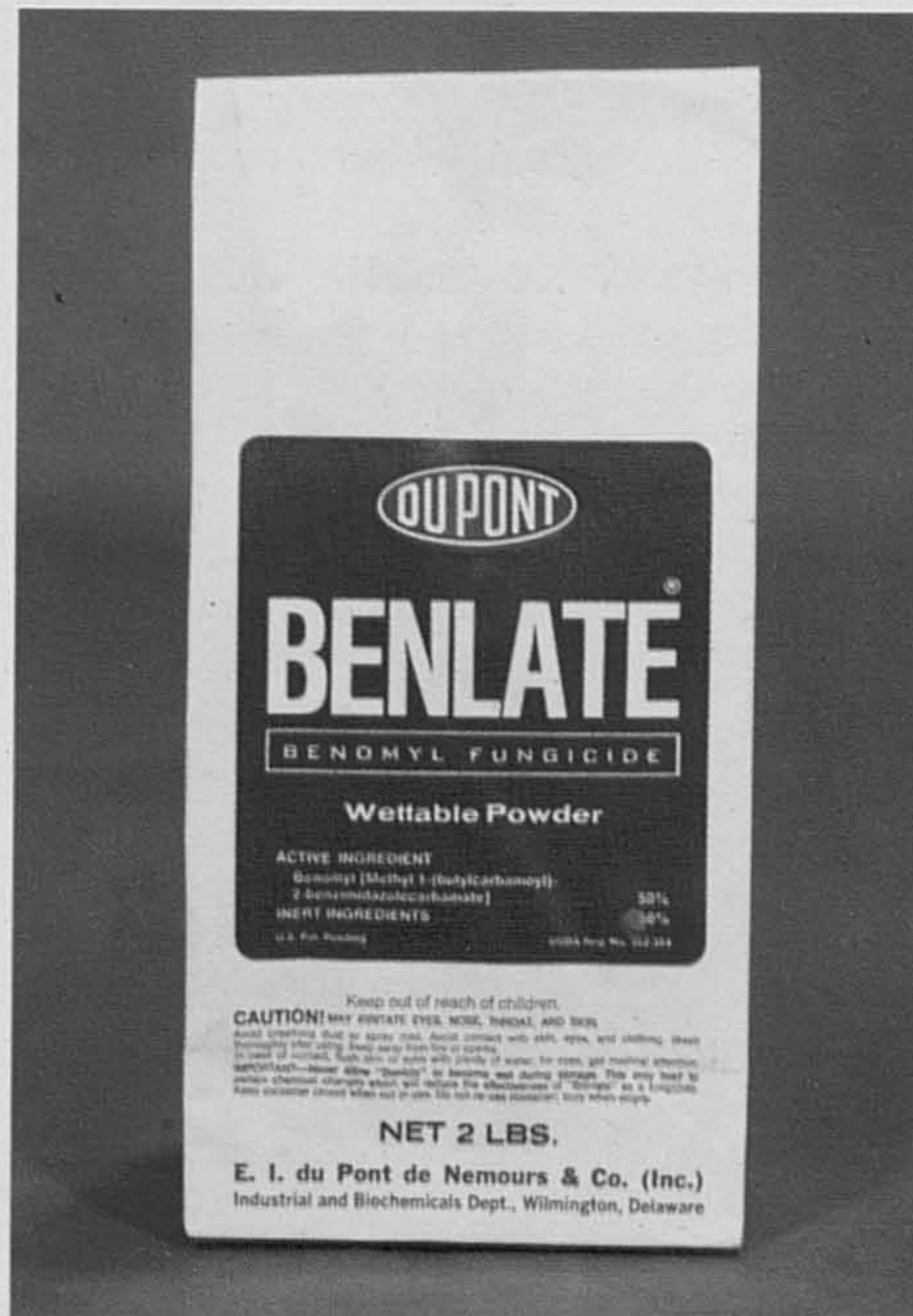
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WHEN TO APPLY:

Begin application when the first signs of insect attack are apparent on the bunches. Repeat at 14 day intervals as long as needed.



So far results have been taken from work carried out in West Africa, the West Indies or South America. Thus it is appropriate to refer to experience in New Guinea. Charles (1961) showed that at Keravat removal of shade from cocoa at maturity greatly increased yield at first, but that it later declined to less than that from shaded cocoa. However, in a later trial with four levels of shading, yield for the first two years increased linearly with decreasing shade. Charles (1961) noted that there was response to nitrogen fertiliser only where shade was removed.

From Sabah, Chok (1970) reports that removal of shade from Amelonado cocoa results in increased yields. Further, he observes that in small plots of Upper Amazon hybrids, which are generally unshaded, yields are higher than those from Amelonado plants, and he believes that at B.A.L. the new hybrids may well respond favourably to less shade protection than the Amelonado cocoa.

In concluding this section one must note the results from three trials reported by Vernon (1967). He showed that yield increases when light is increased from 30–60%, but that the rate of increase falls off with further increases in light intensity. Wyrley-Birch (1970) has pointed out that at 64% of full daylight an estimated 98.4% of the maximum crop would be obtained.

It thus appears that the mechanism of response to reduction in shade is not simple, and to talk about shade reduction as only involving increase in the intensity of daylight to which a plant is subjected is quite wrong. Accordingly a general discussion on covers and shades becomes appropriate.

GENERAL DISCUSSION

In relation to the establishment of young cocoa, covers and nurse shade plants are required for a number of reasons; the importance of these reasons will vary from location to location because of variations in soil and climatic conditions.

Where soil conditions are excellent for the growth of cocoa, as far as rooting is concerned the main need is to ensure that the young cocoa plants have sufficient nutrients and available water. The latter will tend to depend more upon rainfall than cultural operations, although competition from shade plants will have to be taken into consideration. With good soil conditions then, the need for nurse shades is truly that of shading, not only from sun, but also from the drying effects of wind. In such shading there will be a need to take into account water relations but, if these are ideal, then according to Lemée (1955) light could be reduced to about 30% of full daylight without having any detrimental effect upon cocoa growth, because in strip weeded rows, the leaf area index of the cocoa will be low and self-shading of negligible importance.

Unfortunately, ideal soil and water conditions rarely exist. Accordingly it becomes necessary to consider the case of ideal soil associated with a rainfall distribution pattern that from time to time will cause cocoa plants to come under water stress. In such instances it may be advisable to use a lower level of shade and certainly incorrect use of any nurse shade that from experience is known to compete

excessively for moisture. Unfortunately, little is known about the water competition levels of different shade plants. However, it is probable that those which proved best in Ghana (see *Tables 5, 6 and 7*) will be the least competitive, as in that country there is a very marked dry season each year.

Lastly for consideration is the situation where soil conditions are not ideal and the rainfall pattern is irregular, with occasional droughts. This is the case for many inland areas of Malaysia where attempts are being made to establish cocoa as a plantation crop. Here shade plants have a dual function. They should improve soil structure and water holding capacity, and they should also protect the young cocoa from the inclement aspects of the weather, that is from wind and too much exposure to daylight. The success with which these requirements are met will have long-term effects. Good success will tend to result in good later yields and *vice versa*. This is a situation where, in order to assist cocoa root development so that it may exploit more thoroughly a greater volume of soil, it may be permissible to allow nurse shade plants, and even primary top shade, to be a little competitive so that the time of coming into bearing is delayed in order to obtain better crops. In fact it may well be justified to consider removal of flowers for a period to delay the time of first harvesting. Delaying fruit production may allow the cocoa plants to have a better chance to develop a vigorous spreading root system, for work carried out on oil palms in Dahomey (Bénard & Daniel, 1971) showed that root growth of oil palms on a heavy clay soil was practically doubled by castration from the 23rd to the 43rd month. It was reported that castration resulted in palms acquiring increased resistance to water stress in the face of the severe conditions of the dry seasons. Dunlop is instituting an experiment to investigate the relevance of this work for cocoa, and it is hoped that deflowering will mean that, with better root systems, cocoa will later require less permanent top shade.

However, this question of deflowering, though relevant, is a digression. On the poorer cocoa soils there is need to build up the organic matter and make rooting easier. Bush covers tend to improve soil in depth by deep rooting, and open up traces that cocoa roots can later follow. They also improve drainage and aeration. However, the extent to which these types of improvement occur is not understood, and much work is needed to investigate the root systems of various cover plants and to note their influence upon the soil characteristics. Some root investigations have been carried out in West Malaysia by Chandapillai (1968) and in Nigeria by Swarbrick (1964). Much more work of this nature is required in order that trials with various covers and shade plants are not laid down in a semi-haphazard manner which will waste valuable manpower and time.

A problem remains, however, in that bush covers do not assist greatly in improving the crumb structure of a sandy soil. It would seem that to obtain good aggregation an increase of organic matter is necessary, but grasses are more able to build up large stable aggregates than legumes. This observation is supported by the work of Soong (1971) with a Rengam series soil. (*Table 8*).

Table 8. Effect of covers on aggregation in the 0–15 cm soil depth of a Rengam series soil (After Soong, 1971)

Cover	% aggregation	Mean weight diameter (mm)
Clean weeded	66	1.02
Legume cover	69	1.98
Naturals	66	2.33
Grass	76	3.39

Soong has also investigated the mean weight diameter of water-stable aggregates for a number of Malaysian soils under rubber planted in association with legume covers. The data, given in Table 9, indicate the variability that occurs between soil series. This table shows the relative need for improvement of each soil, bearing in mind that for the data presented, a considerable amount of improvement has already occurred through increases in organic matter from the legume covers. However, the benefit from grasses is not known. It is probable that benefits come from the more fibrous roots of grasses, which will tend to have a greater value where the soil clay and silt fractions are low and sand is present in quantity.

Table 9. Percentage aggregation and mean weight diameter of some soils under rubber with a legume cover (After Soong, 1971)

Soil series	% aggregation	Mean weight diameter (mm)	
		0–15 cm soil depth	15–30 cm soil depth
Kuantan	95.7	1.64	2.46
Segamat	96.7	1.83	1.80
Prang	96.7	2.81	2.02
Senai	89.0	1.88	0.39
Munchong	79.4	1.82	0.42
Durian	95.9	1.17	0.44
Jerangau	72.9	2.03	1.01
Rengam	66.6	1.98	1.36
Serdang	62.7	0.55	0.46
MSD (P=0.05)	1.8	0.23	0.22

The above data suggest that where soils are sandy, in order to assist not only cocoa root penetration but also aeration and water holding capacity, grasses should be allowed to follow bush legumes for a short period just before cocoa naturally shades out associated low growths. Soong's findings probably explain in part the good results noted by Opoku (1971) when cocoa was grown in association with *Pennisetum purpureum* (Table 6).

It is now appropriate to consider aspects of permanent top shade. A great deal has been written about the effects of reduction in top shade, but there is a need to appreciate that top shade plants function not only overhead but also in the soil. Thus it is important to consider reports on the effect on yield of the proximity of the cocoa plants to shade trees.

Zevallos & Alvim (1967) noted that in Brazil the yields of cocoa trees 2.5m from *Erythrina glauca* trees were higher than from those 8.4m distant. They observed that the soil in the vicinity of the shade trees was richer in mineral salts, better drained at a depth of 30–60 cm than soil elsewhere, and that cocoa roots penetrated into this deeper layer at only a short distance from the shade trees. In contrast to this work, Bonaparte (1967) compared yields of cocoa plants at distances of 2.15m, 4.82m and 6.81m from *Terminalia ivorensis* shade trees. Yields increased almost linearly with increasing distance from the shade trees. This gradient was thought to have been due to competition for soil moisture, nutrients and sunlight, although competition for light was believed to be the most important.

Clearly it is essential to estimate the function of final top shade trees. If it is mainly soil physical conditions that necessitate some top shade trees, the answer may be not so much in retaining shade permanently but thinning it at a later date when the cocoa roots are beginning to take advantage of the improved soil conditions. Shade requirements vary with age, but the variation may have a different time scale for different conditions, being more drawn out where environmental conditions are less satisfactory for cocoa growth.

In regard to shade removal there is a point not touched upon so far. It has been observed in various countries that pest problems tend to increase after shade removal and, if not checked, may lead to dieback and other effects that result in big drops in yield. Turner (1967) describes the complex situations that create dieback conditions. Lavabre (1959) goes as far as to say that shade in cocoa plantations can only be dispensed with when conditions are outstandingly good and where growers are able to maintain the necessary intensive cultural system. This is perhaps over-emphatic. An approach such as that put forward by Chok (1970) of a moving box system where the intensity of shading could be altered as seemed fit, although difficult to institute, has very attractive merits.

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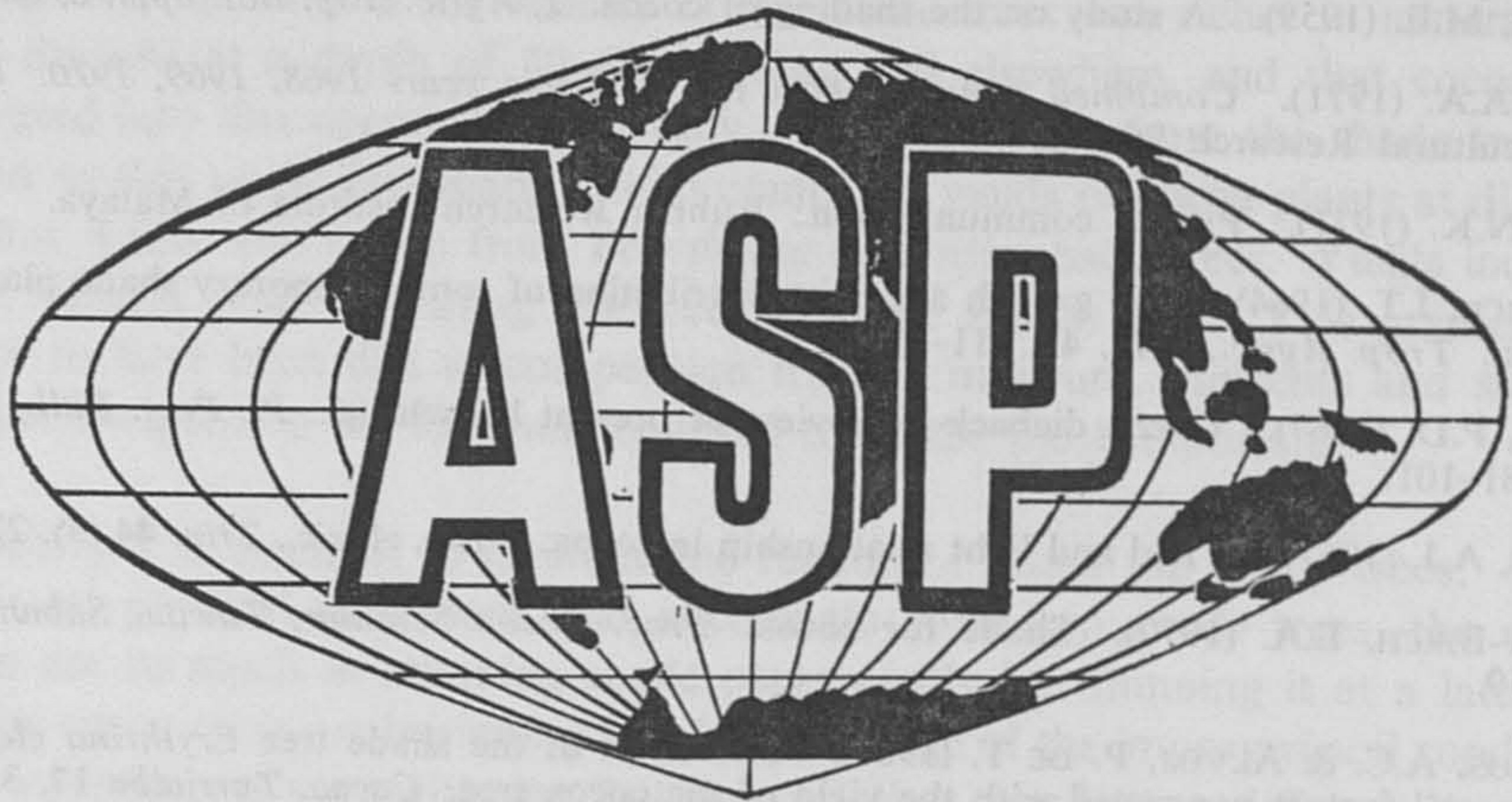
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Planter Interview:

P. R. WYCHERLEY



Educated at City of London School and University College, London. Dr. Wycherley was a guest student at Rijksuniversiteit Landbouwlageschool, Wageningen.

He joined the Rubber Research Institute as a botanist in January 1953 and was appointed Head, Botany Division in April 1965. His main fields of research were in *Hevea* variety trials; effects of and identification of cover plants; improvement of the germination and testing of leguminous seeds; initial investigations of trunk snap; crown budding; novel stimulants; performance in relation to climate; *Hevea* introductions; and collaborative research on South American Leaf Blight.

Dr. Wycherley twice visited Latin America and is an authority on the history of *Hevea* cultivation. He is the author, or joint author of over 20 signed papers on *Hevea* and many anonymous articles in the *Planters Bulletin*. He prepared *Planting Manual* No. 12 on Rainfall, and is the author of 30 other articles, reviews or letters on other scientific subjects, especially climatology and conservation of

natural resources and wildlife. He wrote 'Conservation in Malaysia' IUCN Suppl. Paper 22 and was Co-editor of 'Conservation in Western Malaysia, 1961'.

Until recently Dr. Wycherley was President of the Malayan Nature Society, and is past President of the Malaysian Scientific Association. He was founder Chairman of the Batu Caves Protection Association; councillor Malayan Zoological Society; Chairman, Terrestrial Conservation Section West Malaysia Biological Programme.

He is a Fellow of the Linnean Society of London, and of the Incorporated Society of Planters, and a Member of the Royal Photographic Society, the Fauna Preservation Society, and the Malaysian Branch of the Royal Asiatic Society. Dr. Wycherley's services to the I.S.P. range from six years as the Society's examiner in Botany, numerous lectures to Branches, and many outstanding contributions to the Society's conferences and this magazine.

As with so many Planter Interviews, the subject is about to leave the country after many years' residence and you will shortly be leaving to take up a new appointment in Australia. Before we take a retrospective look at your 18 years in Malaysia, will you tell us something about your new appointment and how it will compare with your past work for the Rubber Research Institute of Malaya?

I shall be taking up the post of the Director of King's Park and Botanic Garden in Perth, Western Australia. King's Park is an area of nearly 1 000 acres overlooking the Swan River very close to the centre of the city of Perth; and about a quarter of it has been converted into a botanic garden, *i.e.* with representatives of the flora

formally planted out in their orders. The rest of the Park is still what you might call typical park land, trees and under shrub. It is a very popular amenity of the city, many of the trees are dedicated to people, either fallen servicemen or to past worthies of the City of Perth and the State of Western Australia. It is a place which is very much in the hearts of the people of Western Australia and I shall have to be very conscious of this, and preserve their King's Park in the condition which the people have come to expect. I shall be fortunate in that Mr. Wittwer, the Superintendent on the gardening side, is a very experienced person in this and he will be able to give me great assistance in carrying this on.

There will be scientific aspects of the work because King's Park or rather the Botanic Garden in it, is also a research centre to study in particular the living flora of Western Australia, and so we shall not only be bringing the Western Australia flora into cultivation, but also studying the biology of the plants. This may include pollination, dispersal, cytogenetics and various similar aspects.

Are the plant immigration laws as strict as those in Malaysia, and will you be able to introduce Malaysian species to King's Park?

One could import Malayan flora but the quarantine regulations throughout Australia are very strict indeed. Almost certainly material would have to be imported as seed and carefully fumigated before and after despatch.

Apart from your work at the RRIM, your extra-mural interests have been unusually varied; the Batu Caves Protection Association, Zoo Negara, the Malayan Nature Society, the Malaysian Scientific Association and Motor Sport all come to mind and no doubt this list is incomplete. In each of these activities there must have been particular rewards, frustrations or unfulfilled ambitions, and perhaps hopes which you entertain for the future. We would be interested to hear more about this.

Quite a number of my interests of course have been concerned with conservation; in a sense a developing country is not a good atmosphere for conservation. There is a desire to realise the capital in natural resources as quickly as possible, and to use this for development and political and economic progress. This is very understandable and in many ways very desirable, but nevertheless, with rapid exploitation of natural resources, clearing of forests and so on, it is very easy, not only for the wildlife, but for soil, water reserves and so on, to be lost.

Originally when I joined the Malayan Nature Society (one of the objects of which is to promote the study of wildlife, both animals and plants in Malaya and the surrounding region) in 1953 there was little anxiety. However by 1960 Mr. Wyatt-Smith, who was the then President of the Society, realised, (and this was brought home to me too), that unless we started a drive for conservation and awakened people to this, the very rich wildlife here would soon be sadly depleted; and in the lowlands in particular, many of the characteristic species might go extinct and no longer be there to study. The Sumatran Rhinoceros is an obvious example of an animal which is just about on the verge of extinction. The Seladang were, in 1960, probably about 500 strong in Malaya; I should imagine that that number is

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at most 250 by now. The first Police Officer in Selangor, Capt. Syers used to go shooting seladang out near Batu Caves. I don't think there are any seladang at all left in Selangor now. The big mammals are only the most striking examples. The depredations run through the whole flora and fauna right from the insect life as well as vertebrates, birds and so on. It's certainly been frustrating in the sense that, although we can get some sympathy in government quarters for the principles of conservation, whenever it comes to the crunch, the exploitation of natural resources rapidly (and cheaply) wins out. The other aspect which is rather frustrating is that Malaysians seem to be very slow to come forward and be office-bearers in various societies and organisations. Happily at the moment the I.S.P. is an exception to this and we have a very good Malaysian chairman at present, but in so many of these other societies Malaysians seem to prefer to sit back and rather let the extrovert expatriates "carry the can" and then sometimes criticise them for hogging the limelight, so I think I would like to see Malaysians really run things themselves more; some organisations are almost grinding to a halt, so this is a great challenge.

Would you say that the activities of the Malayan Nature Society have had any influence in slowing down the assault on wildlife during the last ten years, or is the situation worsening?

For instance last year there was a proposal to log Taman Negara, the National Park, and the Nature Society made representations to the Ministry and drew attention to the fact that this was a national park and that there would be at least micro-habitat destruction, and in some cases complete habitat destruction, apart from all the disturbance, firearms and traps which come in with loggers, and that the National Park would cease to be the largest national park in S.E. Asia. And although I wouldn't say that the threat to the National Park is completely cleared, our representations have brought a stay in execution of any precipitate plans.

You think that the price of wildlife preservation is eternal vigilance by Malaysians themselves?

Yes, but there have been a few Malaysian crusaders, two notable examples being the late Dato' Sir Mahmud. b. Mat of Pahang who died only this year; he spoke up for the salt licks and big game in the forests of Pahang. The late Dato' Loke Wan Tho, the bird photographer was also a very strong supporter of the Nature Society and of bird conservation.

You name two people who are no longer with us; who is going to carry the torch in the future?

Yes, we've really got to look to the coming generation of biologists from the University of Malaya and the University of Penang, also liberal minded politicians and government officers. Tan Sri (Dr.) Haji Abdul Aziz, Chairman of the Public Services Commission, is Patron of the Nature Society and the Chief Game Warden, Enche Mohd. Khan is very active, but even so in this and every other case, there is room for more Malaysian participation.

And what about Batu Caves and Zoo Negara?

Well all I can say is that at Batu Caves now, tourism as it were, is coming to the rescue, but even so organisations such as Malayan Railways and the P.W.D. will carry on tearing down as much of it as they can, and I personally think that it is up to bodies such as the Economic Planning Unit to find ways of using other rock, e.g. granite instead of limestone, and to encourage the quarrying of the subterranean limestone, which is exposed in tin-mining, extensively through Selangor. It is usually argued, "Oh it is too expensive to dig it up"; on the other hand the cement works at Rawang has used underground limestone throughout its existence, and tin-mining, as you know, devastates the landscape; so if this is going to be done, one might as well take the limestone too, and leave the aboveground limestone as a characteristic part of the landscape. It being cheaper to knock down what stands up, this is again a case where cheapness wins the day.

As to Zoo Negara, it is undoubtedly one of the best zoos, certainly in south-east Asia and is very good by world standards, but apart from Dr. Gary Koon, the Kennedy Peace Corps Veterinary Officer who has been there for the past two years, none of the people running the Zoo is a zoo professional. They are enthusiastic amateurs, but it is because all of them: Dato' Hutson, Jack Kolfe, Tengku Mohd. and other active council members are people who have the welfare of the animals at heart that there has been every attempt to preserve the Zoo's natural surroundings and to avoid a menagerie type of development.

Is there a training scheme for keepers at the zoo?

Oh yes, all the keepers are Malaysians and Dr. Koon has been training some of them to be what you might call veterinary assistants in the Zoo hospital. Others are specialising in the care of particular animals.

In your long connection with the Botany Division of the RRIM, a major part of your work has been devoted to Breeding and Selection and, in fact, your monograph on Hevea Seed recently published in The Planter is evidence of this. Could you give us your view of the progress of the Hevea tree since 1953 and how you think the future is shaping?

The *Hevea* breeding programme is essentially a long pipeline; for instance RRIM 600 is an outstanding clone recommended for large scale planting and will I think, soon rival PB 86 in the total acreage planted. It was actually bred from a pollination done by Sharp in 1937. We have of course had our failures, such as RRIM 501, although people have made a lot of profit from it. Nevertheless it was really the first big case we had of a new phenomenon: that when we got up into very high yields, the tree was not able to maintain its growth, particularly of the trunk. The first priority from the tree's point of view would seem to be to put out the new leaf, but if at this time we are dragging the latex out of it, there isn't much left for making trunk and so we got this susceptibility to trunk-snap arising. RRIM 707 went the same way and RRIM 701 got through its preliminary trials all right, but now that it's getting out on a wider scale, it is proving susceptible to much dieback and so on. At the moment, we are hoping that RRIM 703 is going to prove a winner, but all the same, more disappointments than successes have emerged from

the many thousands of pollinations made. It is a continuing programme, with more material in the pipeline at every stage, and one just keeps going at it. No one can predict with absolute certainty which of all these things is going to be the winner, but if the programme is kept going intelligently, it is fairly certain that there are going to be new winners coming along eventually.

Now in regard to changes since 1953; actually just before then in 1951 and 1952, the RRIM imported quite a large collection of material of different *Hevea* species and different provenances from America. It was really the first large importation since the original Wickham collection in 1876. This was a base-broadening exercise, getting in new genes, which are partly needed very obviously for disease resistance. We know that our existing material here in Malaya hasn't got resistance to South American Leaf Blight and so that is one thing which is obviously lacking if that disease ever came here. We also see that a new form of *Phytophthora* leaf disease is developing rather fast in North Malaya and we need resistance to that. Apart from resistance to all the disease we've already got, it has been found in many crops that if one just keeps selecting on a very narrow band, vigour, ability to assimilate and so on, just reach a plateau, and so we had to bring in these new genes. All this imported material has good genes scattered amongst it but nearly every one of them is a poor performer in itself, compared with our existing bred material.

And so the problem is how to upgrade this collection gently without the disadvantages we can see in severe selection. Over the last few years, we have tested as much of this imported material as possible, and we've now selected that which appears to be particularly good in disease resistance and we are just this year planting these in a special seed garden with a honeycomb design of planting. This enables us to mix up pretty intimately in any one garden, forty-nine different clones, and these ought to give us a lot of reciprocal crosses through open pollination. Every tree has six different clones surrounding it and when they come into flower, we will get a mixed population of progeny which will in turn be planted up and culled rather gently. In this way, we shall be getting through a generation in about every 7-10 years. We hope that we shall thus get our genes thoroughly mixed up and upgrade this population. But you can see that although the RRIM did the right thing in introducing this material, it's still going to be probably another 30 years before any of the descendants become planting recommendations. The only exception to that is RRIM 725, which is an illegitimate seedling of FX 25, but that came from a seed garden in Panama, and is therefore not a case of wild material being upgraded; there was already quite a considerable amount of selection in its history.

At this year's RRIM Planters' Conference, we heard about the tripartite rubber tree and of the interaction between parts 2 and 3, the stem and crown, but nothing about part 1, the stock. Has any work been going on in stock/scion relationship studies?

In the temperate region there have been found very marked effects of the stock on the scion in fruit trees in particular. Now these effects have not been evident, or not to such a marked extent in rubber in the tropics. This may be simply that we

haven't had vegetatively propagated stocks and that where one is using different seedling families to provide the different classes of stock material, the differences between the averages of different seedling populations are not distinct. However there may be another reason for this. The stock is, as it were, competing with the scion. In the temperate regions, the leaves are on the tree only about half the year, whereas the root system is active for nearly all the year, except when it's depressed by frost and low temperature in winter. The leaf is also respiring as well as photosynthesising. In the tropics here, admittedly the roots are active all the year round, but the leaf is also on the tree almost all the year. I think that if one works out the balance between assimilation by the foliage and the respiration and utilisation by both the shoot and roots, that the roots are in a more competitive position in the temperate region than in the tropics, where the shoot is the dominant partner and changes in the shoot or stock are less important. So this may be a physiological reason why we don't see such big effects. In the original RRI work on rooting of cuttings under mist, the root system of the self-rooted cuttings was not satisfactory; it was not wind-fast, and so self-rooted material has not become commercial planting material, although we have of course had some experimental self-rooted cuttings and they are much more uniform than buddings on seedling stocks. Also we ran into a number of difficulties of budding a scion on to the self-rooted cuttings. They had no tap root and they seemed to be very short of any reserves to carry them through the period after cut-back. So the RRIM dropped this and went back to some rechecks on selection of seedling stocks, and it would look as if the main factor is to get vigorously-growing seedling material; selection for vigour is somewhat more important than whether the stock comes from high yielding material. And this means that the bigger the population you have, the more stringent your selection for vigour among the stock material can be. So that one would look for some fairly prolifically-seeding high-yielding clone (such as PB 5/51) either in a monoclonal field, or from say the boundary with another good clone or even from a seed garden; one must aim at as big a population as possible. There may be a few yellows and runts, but the bigger the population the more stringently all these can be eliminated. I should say, though, that the RRIM is going to take up the vegetative propagation story again, following work which is being done by the French in Africa. There, they have noted that if one sets the cuttings, almost but not quite horizontal, just inclined at an acute angle so that the point of the sloping cut at the bottom of the cutting is also pointing downwards, this seems to promote the formation of a pseudo tap root. And some other work done by Dr. McIndoe and Mr. Levandowsky of Firestone Plantations in Liberia years ago showed that it was possible to bud scions on to self-rooted cuttings if they had pseudo taproots. So this work is now going to be revived here as well. But for the time being I would still say that the many trials which have been done with seedling stock material indicate that heavy selection of seed for vigour from large populations of bred material or from clonal seedlings would recommend itself as the best policy. One should not try to get by with just a minimum number of seed in the nursery. Also the soil core method of transplanting has given us a very useful weapon whereby one can plant out many seedlings in the nurseries, carry out stringent selection before green budding and again stringent selection of the young green buddings which are transplanted with minimum set-back at the second leaf-whorl stage by soil cores.

I think that this approach, with the methods already available to us will not only save time in the field, but will give very uniform stands.

Is there any evidence of transmission of genetic characteristics of the stock being transferred to the scion?

There is some evidence that vigorous growing seedlings when used as stocks improve both the growth and subsequent yield of the scions budded upon them. This may be, (going back to the rather speculative plant physiology which I gave you earlier) due to a seedling which was vigorous in the first place being vigorous because its root system was not highly competitive with its shoot system; so when we put a new shoot or scion system onto it the same story applies; the rootstock is not so competitive with the new scion put on it as some others might be. However, whatever the physiological effect of the stock on scion, this will not be transmitted to the scions offspring.

If you used the self-seed of PB 5/51 as a stock, is there a possibility of this clone's susceptibility to Oidium being transferred to the scion?

I don't think there will be any effect of the root stock on scion with respect to leaf diseases. That would be very unlikely. One cannot perhaps absolutely, categorically, say it's impossible, but there are no very good examples of this. Some of the work in citrus did at one time suggest it, but what was then discovered was transmission of viruses across the graft union infecting the scion. Now it's curious that so far there is virtually no compelling evidence yet that there are virus diseases of *Hevea*. It would be quite amazing if *Hevea* has no viruses, because virtually every other plant species investigated has. Either *Hevea* is an almost unique exception or it's just that the viruses are not particularly virulent in causing disease symptoms.

Occasionally you might come across transference across grafts, where you have for instance, root tissues making specific alkaloids, which may be conveyed across the graft, this I think occurs in some solanaceous species.

The advent of Ethrel latex stimulant has emphasised the value of, and indeed the necessity for regular manuring of mature rubber trees. Among the benefits obtained is really excellent renewed bark, even of second renewal. It seems possible therefore that tapping from ladders will gradually become unnecessary. Do you see any future for a dwarf tree branching at say 65 inches from the ground? Could this be achieved by control of adventitious shoot pruning or would such a characteristic have to be inbred. Finally, would such a possibility re-instate high-yielding clones which have been discarded purely on the grounds of their tendency to wind-damage?

Well, certainly we would like to have a dwarf tree, not a stunted tree, but perhaps what I would call a dumpy tree, which was not tall but was short in stature and inclined to girth more. Now there are various growth regulators which cause a shortening of the internodes and will give this effect. This has not been done very successfully in *Hevea* yet, but it is a subject of research; suitable substances might be either anti-auxins or anti-gibberellins. They are antagonists to the natural growth regulators which cause shoot extension. There is a possibility of dwarfing by

repeated applications of growth regulators of this type. The other possibility is that one would find a genetic mutant in which the natural hormone balance within the plant was changed. If it completely suppressed auxin or gibberellin production, it probably wouldn't grow at all. But if there was either partial suppression of the auxins or gibberellins or alternatively some promotion of their antagonists within the plant, then one would have a plant which was a genetic dwarf. The RRIM is in fact actively seeking such a plant by searching through populations of seedlings. If any planters find in their seedling nurseries, what looks like not a runt, but probably a rather squat plant, with dark-green foliage it would certainly be well worth preserving and bringing to the notice of the Institute. We are also trying out mutagenic agents, such as X-rays and other chemical treatments to see if we can induce a mutation. The majority of mutations induced in this way are of course undesirable. Plants, animals, including ourselves, have obviously evolved a reasonably good system to cope with the environment. Any change, such as occurred when people were affected by atomic radiation for instance, is usually undesirable, but a very small proportion of mutants may be useful. So again it is a long road, and it's not one in which you can guarantee success. It is nevertheless well worth keeping in the competition, looking and searching through as big populations as possible.

Could control of adventitious shoot-pruning produce a dwarf tree? that is by leaving shoots which we at present prune between say 60-72 inches?

Well, I think that this very much depends on the clone. There is in some clones, particularly if rather densely planted, a tendency even if you leave the large branches on, for these to self-prune later. In some clones, which tend to have permanent branches low down, I think that this could be successful, but then in many clones I don't think it would work because they are going to self-prune their lower branches later on.

What you want to avoid is bunch-branching which happens if you pollard a tree, the bunch of branches together would be very weak. Also it's very deceptive; one thinks one is getting well-spaced out branches in the young plant, but when they thicken up later, their edges get closer together as it were.

Is there a role for Ethrel here—not the latex stimulant but Ethrel itself?

Ethrel releases ethylene, and ethylene is a naturally occurring plant hormone. One thinks of hormones usually as being dissolved substances; well, ethylene is a gas and it dissolves in water too.

Is there a chance of a plant growth regulator saving a valuable clone which has been discarded for its tendency to wind-damage?

I think that crown budding is the better bet. Anything which depends on very critical manipulation, pruning or repeated critical applications of hormones, is difficult to control and supervise on a very large scale. Crown budding is a much surer way of approaching this problem.

Has any work been done on crown buddings at say the 6 ft level, in view of the fact that Ethrel latex stimulant would appear to give us the chance of getting rid of tapping ladders forever?

Actually our first crown budding experiment at the RRI, was crown-budded at 6 ft. Later experiments were crown-budded at 8 ft; but in those days, people were still thinking they'd like as big a panel as possible, also they thought a low yielding crown might depress trunk yields unless there was a big gap. Although a dwarf tree is possible, it doesn't seem to be a very common thing in the growth form of *Hevea*.

We would be very interested to hear your opinion of the yield potential of the rubber tree which is maintained on a correctly balanced nutritional diet. It is understood that Professor Bonner has made some predictions about this.

At the moment the maximum utilisation of radiant energy in *Hevea*, and in most other crops which have been investigated, is only about 1% of the total solar radiation. This small proportion ends up as assimilates, as dry matter in the tree or the plant. That is about 2½% of the visible light. Whether or not that is an absolute maximum we don't know. The photosynthetic process has to waste energy in order to be irreversible. Another thing is of course, that about 60% of the energy is simply used in transpiration of water. Anyway if we take the figure of about 1% of the total radiation, this corresponds to somewhere about 35 metric tons per hectare of dry matter each year. Rubber has a higher calorific value than just ordinary dry matter, 2¼ times, so that if we divide 35 by 2¼ it's going to come down to somewhere about 15. In a sense then 15 tonnes per hectare might be considered to be an absolute maximum yield, but there are reasons to believe that because the synthesis of rubber is irreversible, some energy is wasted. Therefore it is unlikely that it could be so high, and one would probably have to halve the figure again, bringing it down to something like 7 tonnes per hectare as a maximum practical yield. Again one might say that if the tree was putting absolutely all its assimilation into producing rubber and had nothing left over for producing new leaf, wood, bark and so on, it wouldn't be able to survive this for long. So we have to make a further reduction to allow the tree some of its own assimilates to keep going. In this way we can therefore start whittling the whole thing down. If you take for example one tonne per hectare (that would be 1 000 kilos per hectare) or 1 000 lb per acre (the rough but not exact conversion) we can see that most of our planting material is already doing one tonne and clones such as RRIM 600 have got up into the 2 tonnes per hectare average for about 10 years of tapping. So far our maximum yields from RRIM 600 have been in the order of 2½ tonnes. If we are limited to 1% of the solar radiation, one could put an improbable all-up maximum somewhere about 15 tonnes, but having to allow for some wasted energy for irreversibility, and some assimilates to keep the tree going. I would say this comes to about 5 tonnes per hectare or 5 000 lb per acre as the kind of limit, which is likely to be sustained for long periods. That yield has been obtained for a year or so from trees which have been treated with Ethrel but it's too early to say now just how long this can be kept up or whether it can be kept up for the 10-year period which I have in mind. If one is able to conclude that the 1% is not a ceiling (and it has been suggested that

the theoretical maximum might be as high as 8%), then of course one can start multiplying away. So far, there are very few examples of any crops doing better than the 1% or so.

Except possibly on Kuantan series soils, manuring of Hevea with potassium is a comparatively recent practice and it has been observed that resistance to fungal infections is much greater where potassium levels are higher. Is it possible that clone PB 5/51 has been discarded as crown-budding material on the evidence of its performance on low potassium content soils?

The object of doing any horticultural manipulation is to cut down other jobs. I personally would not see the point of doing a horticultural manipulation which was then committing one to the necessity for further action, in this case pushing up the potash status. I would prefer to look round among some of the progeny of PB 5/51 (of which Prang Besar have many examples and of which many have inherited the PB 5/51 branch structure) and find ones which were not susceptible to leaf diseases and then use these as crowns if they prove in all ways satisfactory. These might well be selections which had been discarded because of there being no advance in yield. If you are going to use them as crowns the yield aspect is not so important.

As to what causes rubber trees to dry up, would you comment on the theory that this is due to potassium deficiency? If this were so and the old experiments with tapping intensity were made without reference to nutrient analysis, then it seems possible that cause and effect have been confused; that is to say, the more intensively you tap an under-nourished tree (particularly a potassium-deficient one) the sooner it will dry up and if you lessen the intensity you will ameliorate the situation.

I am inclined to the view that as a result of any strong drainage on the tree, whether it's due to intensive tapping or to a long flow situation, such as may arise with stimulation, extra energy is wasted in the production of the rubber. There are many things lost in the serum of the latex, not only rubber itself, but also nucleic acids, Mitochondria and also as you mentioned, potash in particular among the mineral nutrients. The tree as far as I can see, has to pay for this in one way or another. Some trees pay for it in a vastly reduced rate of growth as for instance in RRIM 501. In others, perhaps the growth process keeps going and competes strongly, so it's their rubber synthesising system that cracks up and they go dry. But I wouldn't like to be pinned down on saying exactly what, out of the various things which are lost in serum, whether a particular mineral nutrient or one of these sub-cellular organelles or nucleic acids which carry the messages from the actual genes to the enzymes, is responsible. It could be any or perhaps all of these things which are concerned; different factors may be critical in different clones and the end product that we see in the tree going dry is the final symptom; but in some of the different clones the pathway may be different. Different factors may be crucial, this is perhaps one reason why the work on Brown Bast has been so confusing, and different theories have been put up and some seem to work in some of the cases and others in others.

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It is noticeable that well-nourished mature Hevea has a darkish brown colour of the tapped panel and that trees on the way to drying up show an increasing pallor of the tapped panel. It is also noticeable that seedling trees never do have such dark coloured panels as budded trees. Is it possible that seedlings require greater quantities of nutrients in order to produce their latex? In this connection, it is well-known that seedling trees are more prone to drying up than budded trees.

Well, I think you have to be a bit careful there because if you were to look at say a small scale clone trial in which you have got a population of a hundred different clones, you'll find that quite a lot of these dried up too. The clones we plant on a large scale have of course been selected largely because they are the ones which hadn't gone dry in the smaller scale trials, so that I don't think you can say that it's just purely a difference between seedlings and buddings *per se*; you have got to bear in mind that there has been specific selection here. Where you get this wide variation within a population of seedlings, then you are going to get some trees which are much higher yielding or longer flowing than the average. You are always going to get some members of this population that can't stand the tapping system or the standard nutrition that you decided should be suitable for the average. This is more likely to happen among a population of genetically variable seedlings than in fairly uniform buddings of a well-known clone.

As to planting method, assuming in the case of seedlings that pre-selection takes place in the nursery and they are planted as clonal stumps, what would be your recommendation for pattern and density?

I think that for hills, soil and water conservation are very important, and also to have level paths for carrying out the latex. So I consider contour terracing is essential and therefore it's less easy to do equilateral triangle or quincunx planting on sloping land. On the flat areas though, I think that the more regular, either square or triangular planting is the better. But if you can afford to have your terraces as close as 22 feet, well you can certainly come down to a reasonably rectangular system there, or you can stagger them between the rows and be more or less triangular.

Assuming vigorous selection and uniform material is possible, for estates I would suggest an initial planting density of about 150 to the acre, and that there should be no need for any thinning whatsoever. Whether they were seedlings or buddings, I would hope that they would be planted in soil cores or by some similar method. For smallholdings, on the other hand, density is, in the last analysis, very much an economic question. The smaller the holding, the more one wants to put up an economic opportunity for the smallholder. The following assumes that the materials have been thoroughly well-selected. If it was a large smallholding, say 10 acres or more, the estate density of 150 per acre would also be suitable. But as the holding gets smaller it's desirable to increase the number of trees and this will probably also mean that one will have to improve the husbandry, fertiliser applications and so on and I would recommend something in the order of 200 trees. One of Colin Barlow's economic analyses suggested that it might even be desirable economically for smallholders to have as many as 250 trees per acre, but that is perhaps getting a little dangerous from agronomic considerations.

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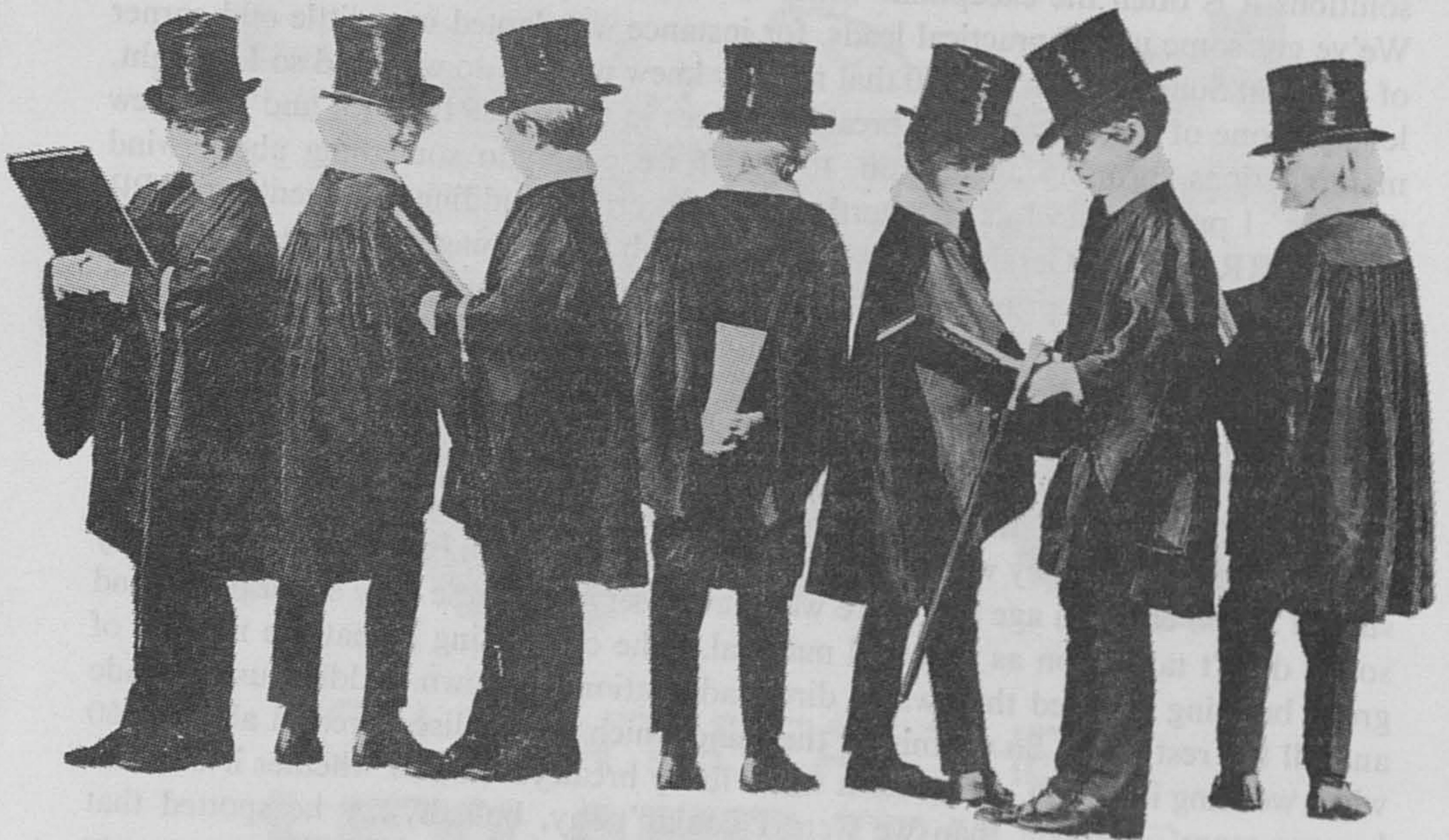
Finally, could you sum up your years at the RRIM mentioning, as you did with your extra-mural activities, any particular source of satisfaction or unfulfilled ambition and generally, any lasting memories, whether connected with your work or socially? also how do you see the future development of the Institute?

I don't think that anybody ever achieves all the things he sets out to do. For instance I would have very much liked to have got the absolute, complete solution to wind damage, which is one of the most serious problems still, and as we discussed earlier, it's one which is very much tied up with the physiological processes of high yield, partition of assimilates. I think I am a bit closer, (I hope to write these things up, I am working on it now) to some theoretical explanations but still in the practical solutions it is often the exceptions which are more important than the general rule. We've got some useful practical leads, for instance we planted up a little odd corner of a field at Sungei Buloh in 1960 that nobody knew what to do with and so I thought, let's put one of these really bad-breaking clones in there, RRIM 613, and try a few manipulations, pruning and so on, to see if we could do something about wind damage. I put in almost as an afterthought, two crown budding treatments with PR 107 and RRIM 612. Gerald Tinley helped me with the pruning operations. It wasn't his fault that all the pruning manipulations were disastrous; trees broke up even quicker than when we left them in the control plots, but the one thing that came out was that crown buddings stood up. That work has now been taken on by Yoon Pooi Kong, who is making an excellent job of it, in particular the adaptation of green budding to crown budding technique. Again one of the disappointments was that, when I first joined the Institute in 1953, I made some very young buddings on 6-week-old seedlings—they were in fact probably the first green buddings; but we really started at too early an age and there were few reserves in these very small plants and so we didn't take it on as practical material. The other thing is that the method of green budding we used then was a direct adaptation of brown budding using shade and all the rest of it. So we missed the thing which Hurof discovered in about 1960 when working in Sabah. Whether it was a lucky break for him or whether it was that he was more observant than we were I couldn't say, but anyway he spotted that if you put a *transparent* cover on a green budding you will push up the success rate appreciably. Also he started with about 5-month old material. So there have been some lucky strikes and some misses in the history.

The future of the Institute is of course tied up with the future of the industry. I think that there is no doubt that provided no unexpected disaster such as South American Leaf Blight hits us, that by south east Asian standards, rubber can continue to provide a good livelihood for many people in this country, and that the Institute's work will be to keep on with the breeding and selection; that pipe-line must carry on and what with all the things we have on, the new stimulants and so on, to make an even better livelihood for the smallholders in particular.

The Planter and the Incorporated Society of Planters wish Dr. and Mrs. Wycherley every happiness in their new life and confide that our separation is only a geographical one.

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HEADQUARTERS AFFAIRS



Members' Subscriptions are due on January 1st and let us hope that the wearisome, embarrassing and expensive business of sending out repeated reminders will not be necessary. Only about 60% of our Members pay their subscriptions the painless and efficient way, *i.e.* by Banker's Order, and those who do not are warned that this may be made obligatory in the near future, so they might just as well start now! Then there are those who pay too little, seemingly still unaware that subscriptions were raised two years ago! For their edification, and also for those who may be due to pay the higher rate, full details of annual subscriptions are printed on page 504.

Through the letter box recently came an advertisement for a brand of rat bat, (we'll call it "X"), guaranteed to "lure" rats. It read:

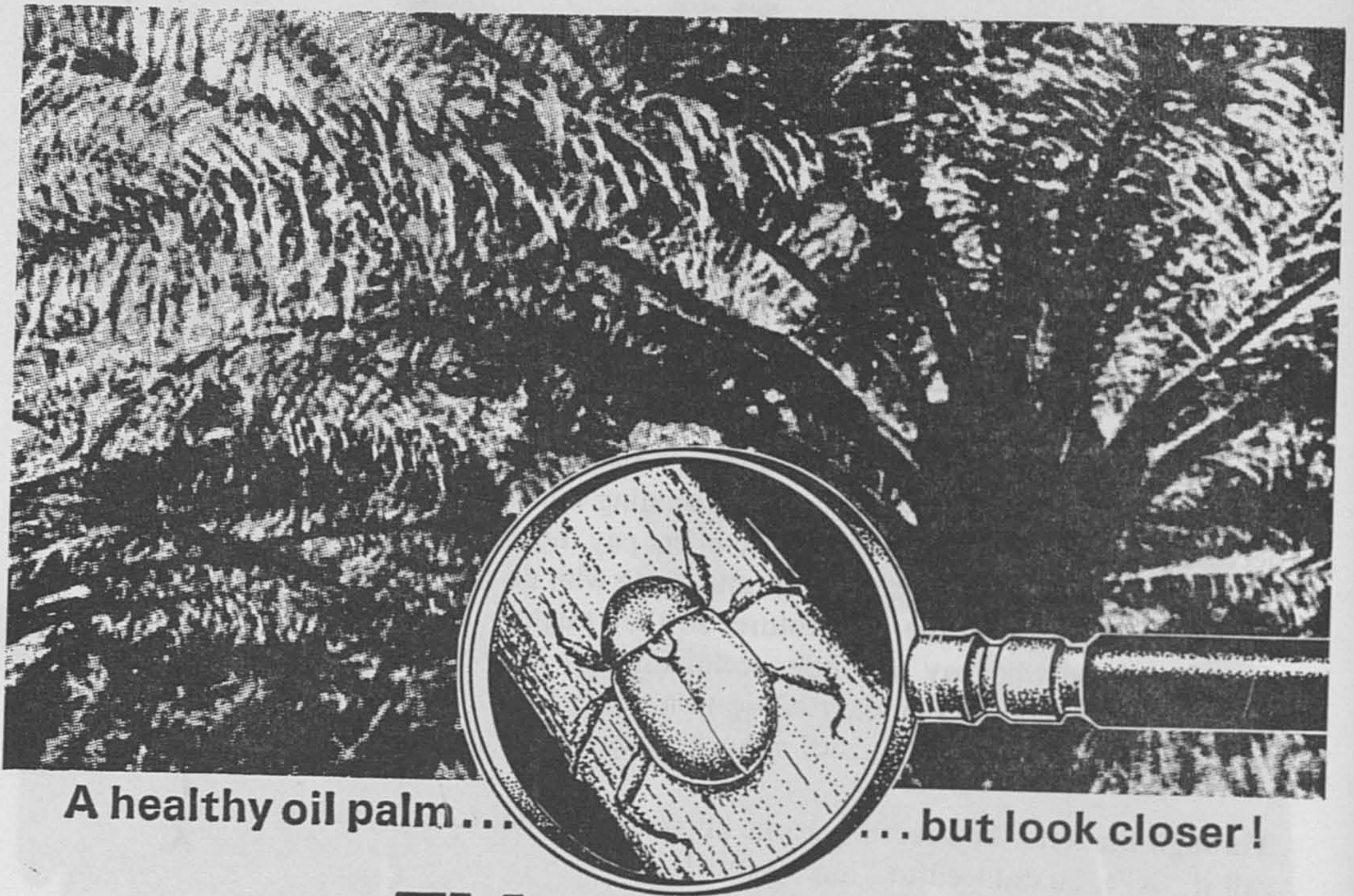
IF IT IS PROPERLY, "X" IS THE MOST EFFECTIVE RAT AVAILABLE IN MALAYSIA TODAY.

Remembrance Day for those who gave their lives in both World Wars was marked by a simple and dignified ceremony at the Cenotaph in Kuala Lumpur on 14 November. High Commissioners of a number of Commonwealth countries were in attendance and the Society's wreath was laid by Mr. A. S. Taylor, J.P., F.I.S.P.

In their recent Great Train Number *Punch* rang the changes on every conceivable ploy and gambit involving the passenger and British Rail, but they had to go back to P.G. Wodehouse* writing many years ago, for the snappiest: A man dashes up to the station ticket office and pants: "Quick! give me a return". "Where to?" asks the ticket clerk, to which the man replies in irritation: "Back here of course!"

Among visitors to Headquarters during this Conference month has been Mr. Geoffrey Hodgson, A.I.S.P., who now works for Goodyear in Sumatra. Of the many good deeds he has done for us, (we remain indebted to him for his history of the Society published in our Golden Jubilee issue in 1969) the latest is especially appreciated. Mr. Hodgson has unearthed and presented to the Society a copy of the ISP's very first publication: *Rubber Planting—a Book for the prospective Estate Assistant in British Malaya*. Published in August 1920, less than a year after the Society's foundation, it was printed at the Malayan Supply Co.'s press in Kuala Lumpur, and Mr. Hodgson paid a London bookshop 3/6d for it.

* (Who was ninety last month.—Ed.)



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This fascinating little book was primarily intended for the young man of half a century ago who had decided to leave home and try his hand at rubber planting on the other side of the world. Here are a few of its many felicities:

Europeans need more liquid in the tropics, but they should be moderate in the use of wines, whisky, beer and the like. "Binges" and "stunts" should be avoided.

Don't wear a body-belt unless and until you are compelled to do so. Body-belts are *pernicious* things.

For estate wear, red non-actinic undergarments are best, since the body is protected from the sun's blue (actinic) rays which are harmful and cause sunstroke, and only the red and orange rays (non-actinic) are allowed to act on the body.

A tennis racket strung specially for the tropics with black gut will be required. Bring golf clubs if you have a set. A 12-bore shotgun will be useful. A revolver is not a necessity.

Bath Room No. 1 should contain 1 Shanghai jar and 2 Commodes.

Bath Room No. 2 should contain 1 Shanghai jar and 1 Commode.

One constantly applauds* the directness and candour of this book, whose author was C. Ward-Jackson, an honourable man who was directly concerned with the original registration of the Society. A. B. Milne, the then Chairman of the Society, concludes his Foreword to the book thus:

"The old days are past when the fool of the family was packed off to seek his fortune in the Golden Chersonese. We have no time nowadays for family fools. The planter of tomorrow must needs be a much more wide-awake individual than his prototype of yesterday."

"Success or failure, in planting more than in most careers, is chiefly a matter of the Spirit of the Thing, for there is no business in the world where it is more essential to be the Captain of One's Soul, to have command of one's temper and one's appetites, to have tact and sympathy, courage and judgement. In short—to be just a Gentleman."

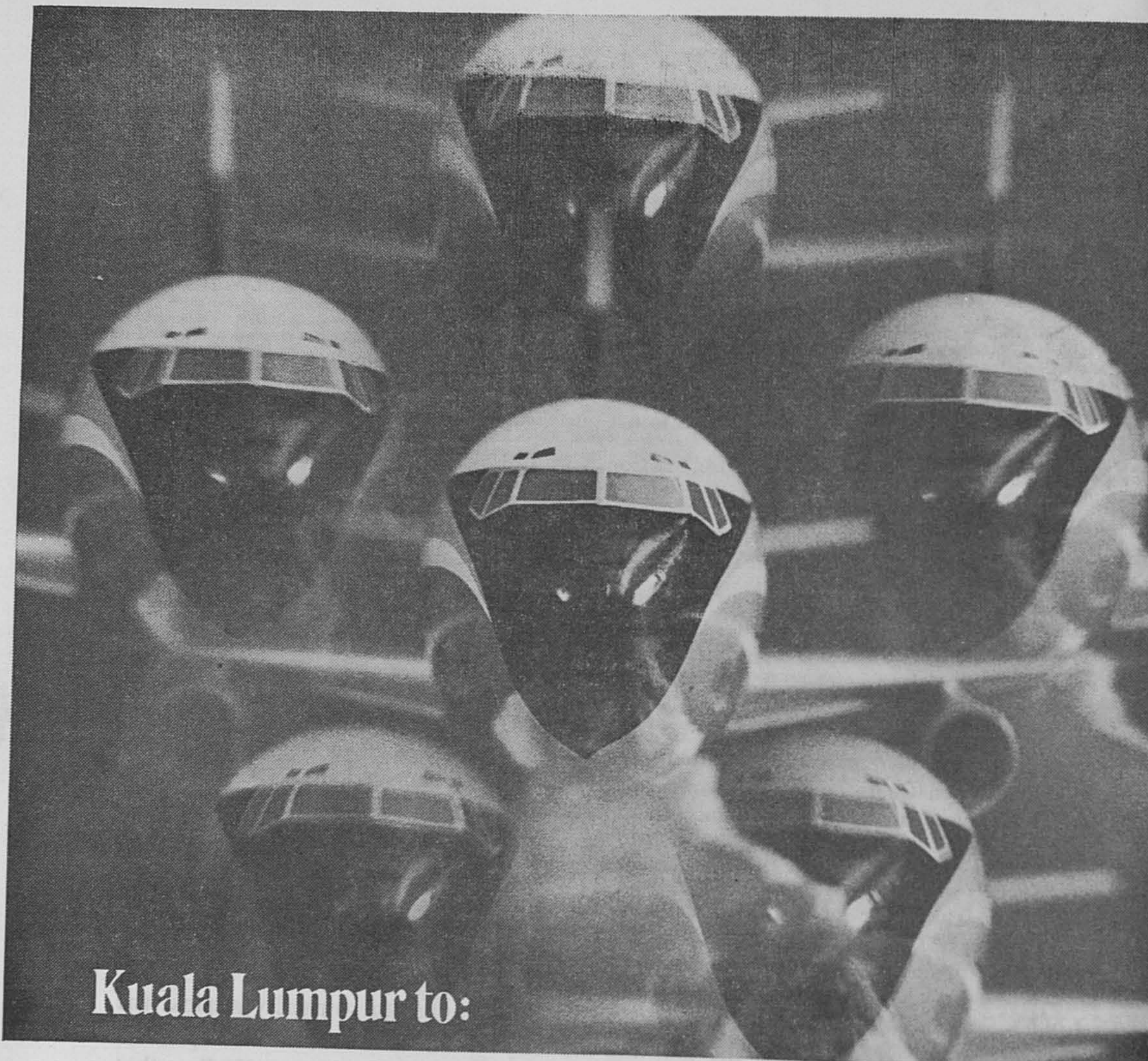
J.N.M., in his *Dateline Kuala Lumpur* last month, spoke up spiritedly against the denigration of expatriates in the planting industry which continues to be expressed in letters to the press and which the press continues to publish. Orson Welles, that great actor-dramatist, in an interview with Kenneth Tynan, (noted drama critic and literary manager of Britain's National Theatre) was asked:

"Since World War Two, you've lived and worked outside the United States. would you call yourself an expatriate?"

Welles replied:

"I don't like that word. Since childhood I've always regarded myself as an American who happens to live all over the place. "Expatriate" is a dated word that relates to a particularly 1920-ish generation and to a romantic attitude about living abroad. I'm prejudiced against the word rather than the fact.....I'm not young enough to bear arms for my country, so why shouldn't I live where I like and where I get the most work? After all, London is full of Hungarians and Germans and Frenchmen, and America is full of *everybody*—and *they* aren't called expatriates".

* (With a specially hearty clap for the section on Venereal Disease?).



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Recent developments in the plantation industry "power game" suggest that by the time these notes appear, a number of Planters will have been declared redundant, and this at a time when memories of the grim "rationalisation" of many executive posts in 1968 were beginning to fade, and be replaced with the hope that it wouldn't happen again.

Overseas organisations which subscribe to this magazine may not be aware that, as one of its many functions the Society administers an Employment Panel for Planters, through which it endeavours to put them in touch with prospective employers in the tropical plantation industry in Malaysia and overseas. We would be pleased to hear from any such employers who are on the look-out for qualified and experienced men, and would add that all enquiries are treated in complete confidence.

What price imagination? Two papers noted in the latest issue of PANS, (published by the Centre for Overseas Pest Research) certainly possess this quality. In addition to its well-known effect on the yield of the rubber tree, Ethrel we are told, also stimulates weed seeds to germinate. A few seed species are significantly stimulated at concentrations under 1 p.p.m., but most require much higher rates. It is suggested that mass germination of dormant weed seeds would permit mass destruction of the seedlings and thus be a most valuable aid to weed control.

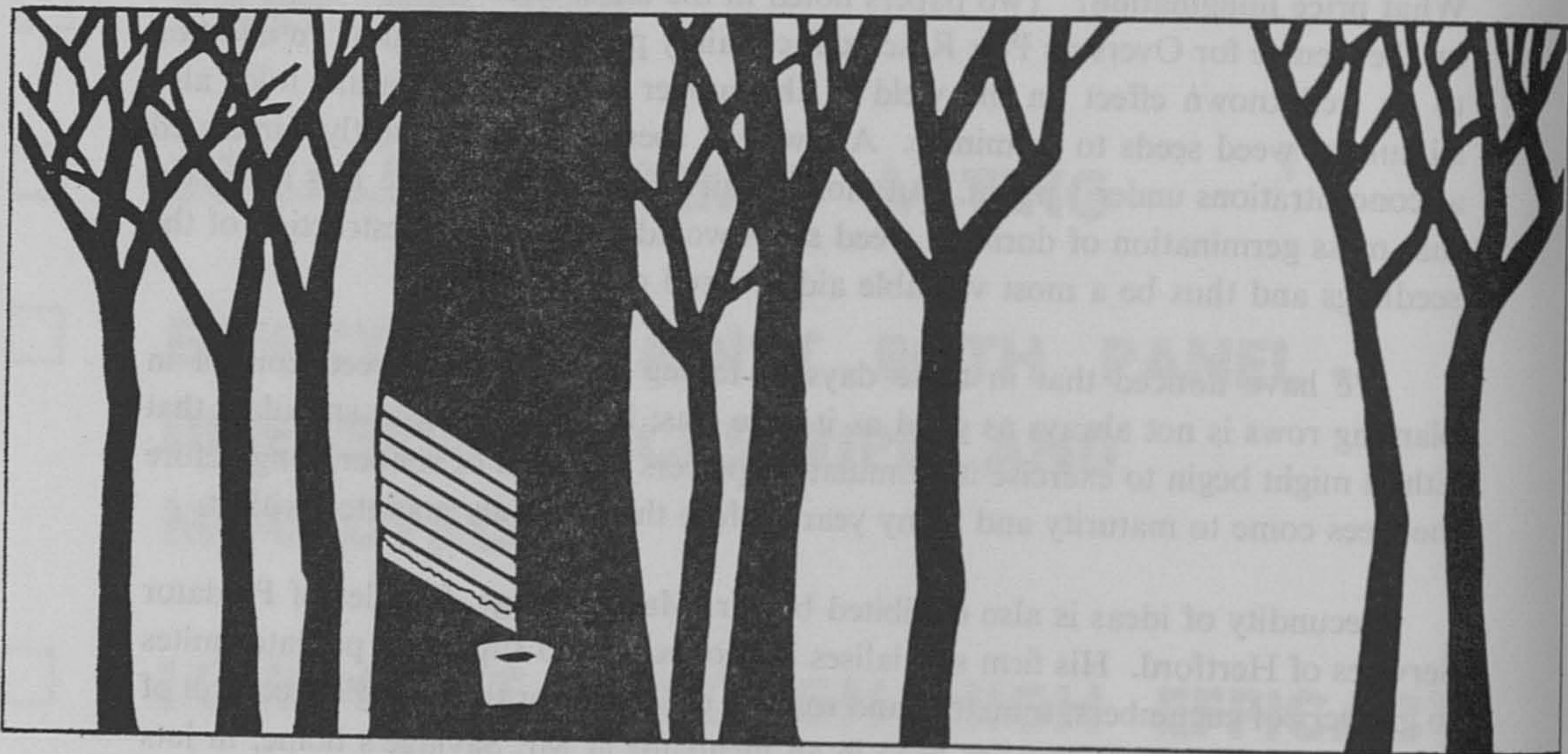
We have noticed that in these days of falling rubber prices weed control in planting rows is not always as good as it once was; it is intriguing to speculate that Ethrel might begin to exercise its stimulatory powers in a field of rubber, long before the trees come to maturity and many years before they are duly anointed with it.

Fecundity of ideas is also exhibited by Mr. Mark Savidge, founder of Predator Services of Hertford. His firm specialises in producing and supplying predator mites to growers of cucumbers, tomatoes and roses in the U.K., for the biological control of insect pests. The predators are bred in an incubator at Mr. Savidge's home, in lots of up to 40 000. They are counted out as required, and put into polythene bags containing leaves of French beans. Suitably packed, they are distributed to growers, who then release them where they are needed.

Here is a fine opportunity for someone to go into business and supply predators for some of Malaysia's plantation pests. Perhaps Mr. B. J. Wood could breed us one designed to be happy chomping away at a diet of leaf-feeding caterpillars? But perhaps it would be prudent first to find out what the predator would next turn its attention to, once it had finished off the caterpillars.

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DATELINE KUALA LUMPUR

Tun Razak has called for a new timber export body to be set up and eventually take over the work of the Malaysian Timber Export Industry Board. The idea is to get a larger share of the lucrative overseas market. Together with it, the Prime Minister ordered the setting up of a National Forestry Council for the "speedy execution of forest policy." Patterned on the lines of the National Land Council, the Forestry Council is expected to facilitate discussions between the central and State governments on the implementation of policy.

The question is, will the proposed council review the quality of the country's logging operations to-date? So far, loggers have appeared rather uninterested in the quality of their operations or the "regenerating" of exploited areas with suitable timber. Apparently their policy is maximum profits and minimum outlay. This is understandable in areas where logging is carried out prior to land clearing for settlement schemes. But what about other areas, particularly in East Malaysia, where timber is extracted in a most haphazard fashion and the jungle left to heal its own wounds? It is dangerous to take nature's resources for granted for they are far from inexhaustible. Now, while there is still plenty of time for planning, is the opportunity for formulating a more definite and comprehensive forestry policy.

Timber is one of the country's few valuable, renewable resources. Unfortunately, time is indispensable for the renewing process. Unlike rubber or oil palm which carry on producing for many years after the trees have matured, each forest giant cut down may well represent a century's growth. This natural resource should not be over-exploited or wasted, because no synthetic substitute threatens the price of quality timber, and there is no danger of a glut.

The value of Malaysia's timber is nothing to be sneezed at. Last year, West Malaysia exported \$303.1 million worth of forest products. Over 4.6 million tons of logs were cut down—of which 1.15 million tons were exported and the rest processed or consumed locally.

During a recent visit, Dr. Tsutomu Shioya, professor of forestry at Kyushu University, said it was vital for south-east Asian countries to "re-generate" their lost forests. Significantly, Japan is one of the largest consumers of Malaysian timber, and his warning should be noted. He pointed out that it might be profitable to replant the lost lowland forests and those being cut down for timber at the moment. "Other countries are also interested in your timber," Dr. Tsutomu said, "but the industry will only survive if there is conservation and regeneration. The time and money spent on this now will be well worth it, since the demand for timber is increasing."

The damage done by logging may not seem serious at the moment, but it was enough to prompt Mr. P. F. Burgess of the Kepong Forest Research Institute to remark that action should be taken to reduce the devastation and erosion caused by these operations. Mr. Burgess was quoted by the *Malay Mail* as saying that unnecessary damage was frequently caused by forest cropping as well.

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Again, it is difficult to reconcile logging operations with wild life conservation—what actually happens to disturbed forests?

Perhaps the Government should also spare a thought to preserving our wild fruit trees. Although, by themselves, these may not be a commercial proposition botanists have pointed out that their genetic structure represents an invaluable store for the purpose of hybridisation. Research has shown that these trees can help in producing more disease-resistant strains or in helping to reduce the size of the seeds of local fruits. Perhaps loggers should not be allowed to treat wild fruit trees as so much useless vegetation which has to make way for more valuable timber; it might even be a good idea to create reserves of wild fruit trees on which botanists can experiment in their natural surroundings.

On the subject of fruits and trees, it is interesting to note the amount of lore and legend surrounding them. In Malaysia, it's nothing as detailed or comprehensive as the tree alphabet of Indo-European myth. All the same, they can be just as puzzling. Take the case of the rambutan tree, about which there is a belief that if it fruits twice in a season, it is a definite ill-omen. The Japanese invasion followed hard on the heels of a double crop of rambutans, and two years ago, there was another double crop. The *Straits Times* noted the fact, and an estate owner in an interview with the newspaper dismissed the phenomenon as superstition. The double crop only did his pocket good, he said. A month later, the May 13 incidents broke out. Can anyone throw more light on this matter?

J. N. M.

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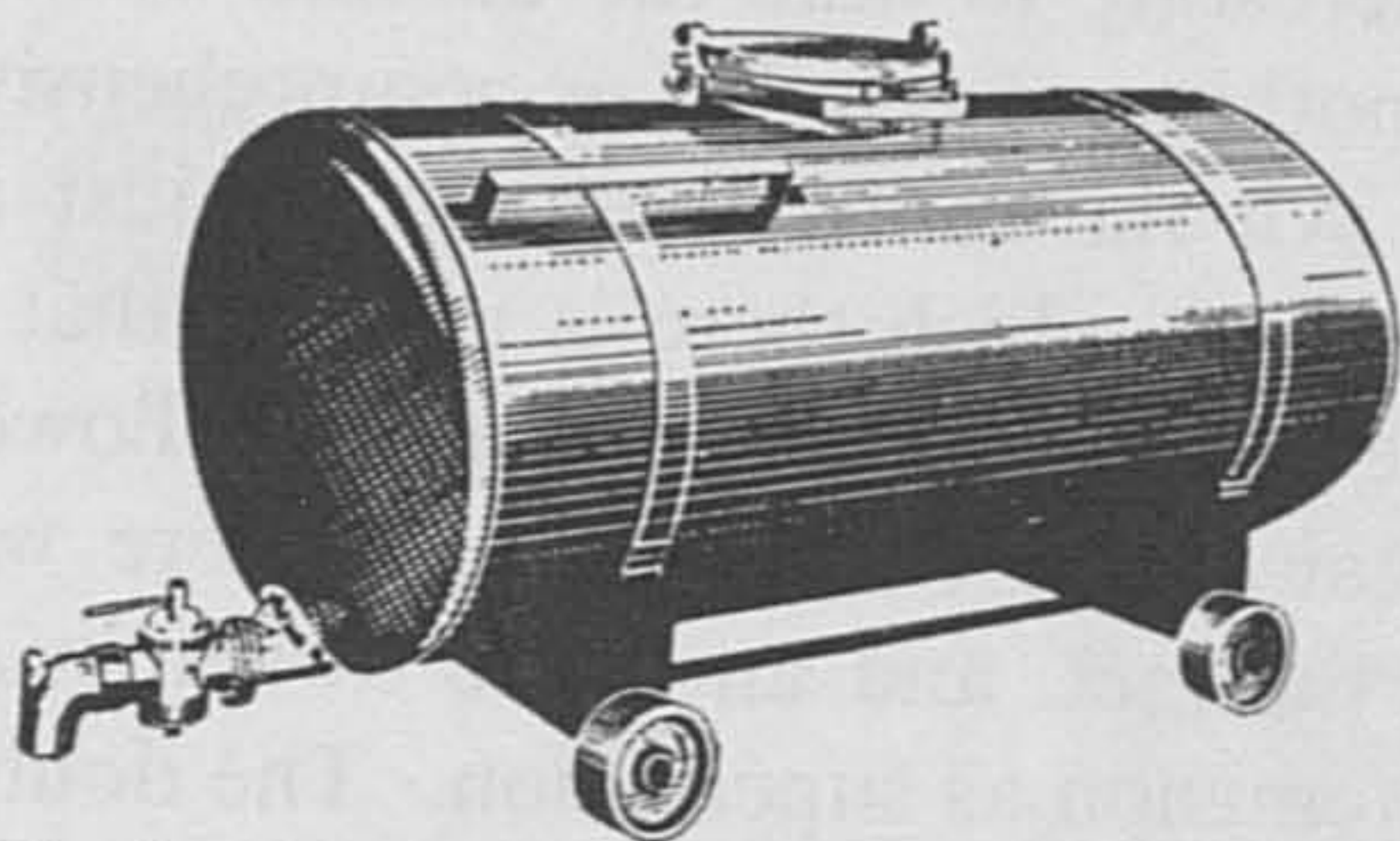
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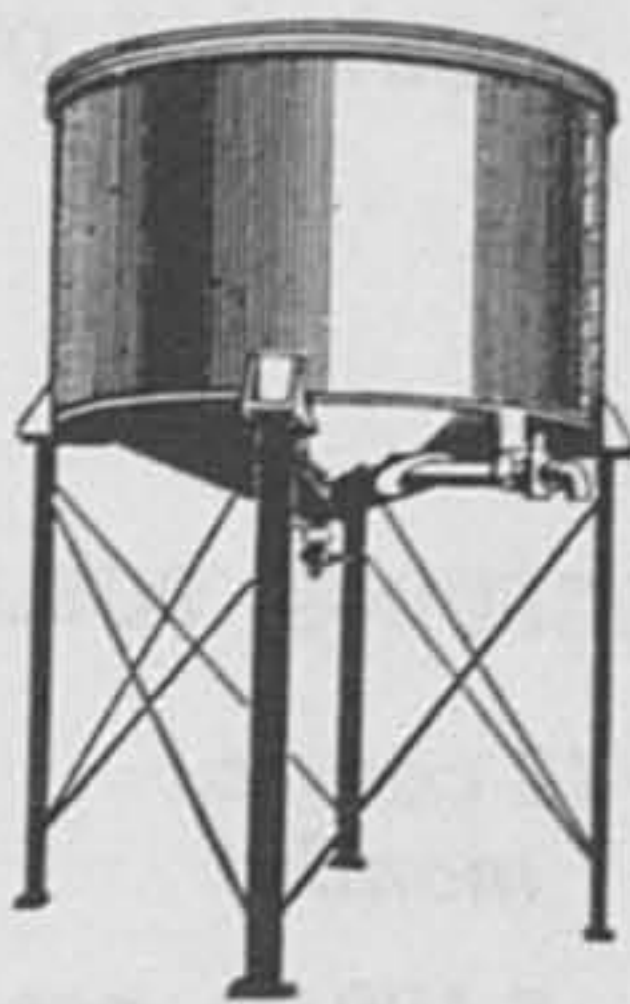
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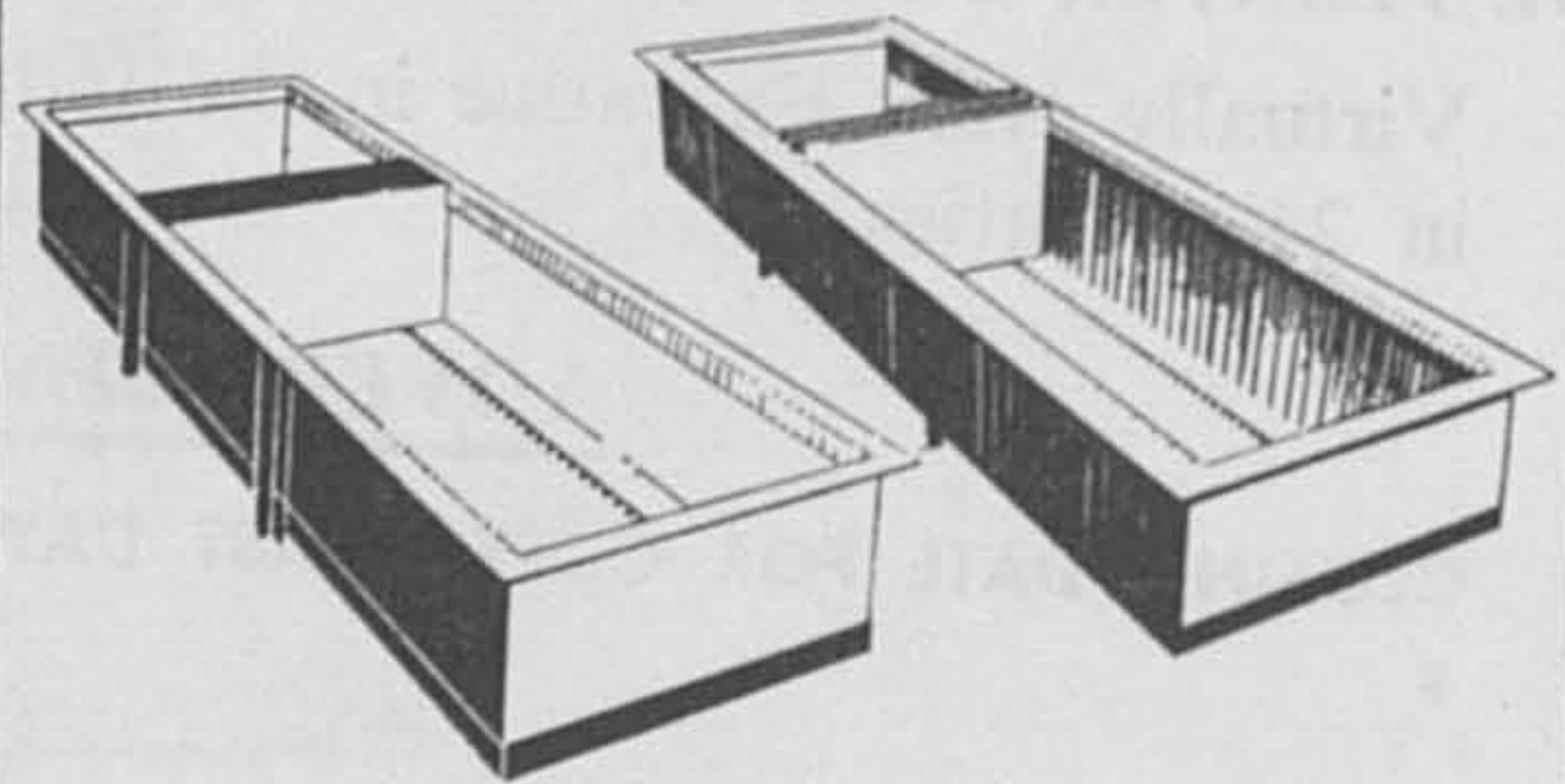


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OBSERVATIONS ON THE GOAT

Dr. Marcus Harry French, a Scotsman who until recently headed the Food and Agricultural Organisation's Animal Production and Dairy Service, says that goats are not the "despised, horned, hairy, dirty, often odiferous and usually mischievous billy of popular legend."

Writing in a 204-page scientific monograph, published by the FAO (price: £1.50) Dr. French says that : "Goats in fact, despite the considerable volume of condemnatory abuse levelled at them, are lovable animals that crave attention and good care. They seek amusement and variety, and much of their mischievousness derives from boredom and an innate and determined desire to rove outside the perimeters laid down for them by their owners."

The goat has long been a symbol of controversy. The anti-goats, mainly foresters and agronomists, contend that these voracious creatures—which graze as they wander—devour not only sparse grass and young shrubs, but that they eat the roots as well, making fresh growth impossible. They accuse the goat of being the major cause of the erosion responsible for much of the poverty in some developing countries. Pro-goat veterinarians and economists reply that with its ability to thrive on nearly barren lands where other animals would starve, the goat is indispensable to people in poor countries, for whom it is often the only source of milk, meat and hides.

Dr. French describes as "irrational" and "unfounded" the accusation that the goat—man's oldest friend in the animal kingdom apart from the dog—initiates and accelerates soil erosion.

"The erosive losses are more related to the soil type and often, as in the Peleponnesus area of Greece, there is no evidence that the presence of livestock intensifies erosion or that variations in the proportions of goats and sheep exert any direct effects", says Dr. French. "These facts are known to country people with the result that the diatribes against goats over the last 50 years have not eliminated this animal. The damage caused by goats is small when compared with the erosion and vegetative destruction inflicted by man over large areas of the earth."

The various aspects of goat husbandry—feeding, management, housing, physiological reaction to climatic stresses and genetics—are, says Dr. French, "the neglected Cinderella of animal production activities".

"The goat", he goes on, "continues as a producer of meat and milk long after the cow and the sheep have been forced to abandon the poorer areas at higher altitudes. This latter factor is often responsible for goats being found on abandoned lands and mountain grazings which have been ruined by over-exploitation. Man, of course, is responsible for encouraging or permitting such overgrazing, but he adroitly passes the blame to the goat."

Do you dig...

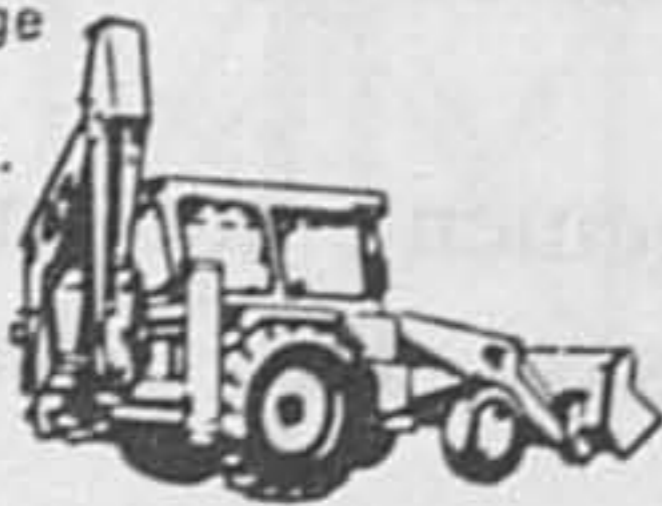


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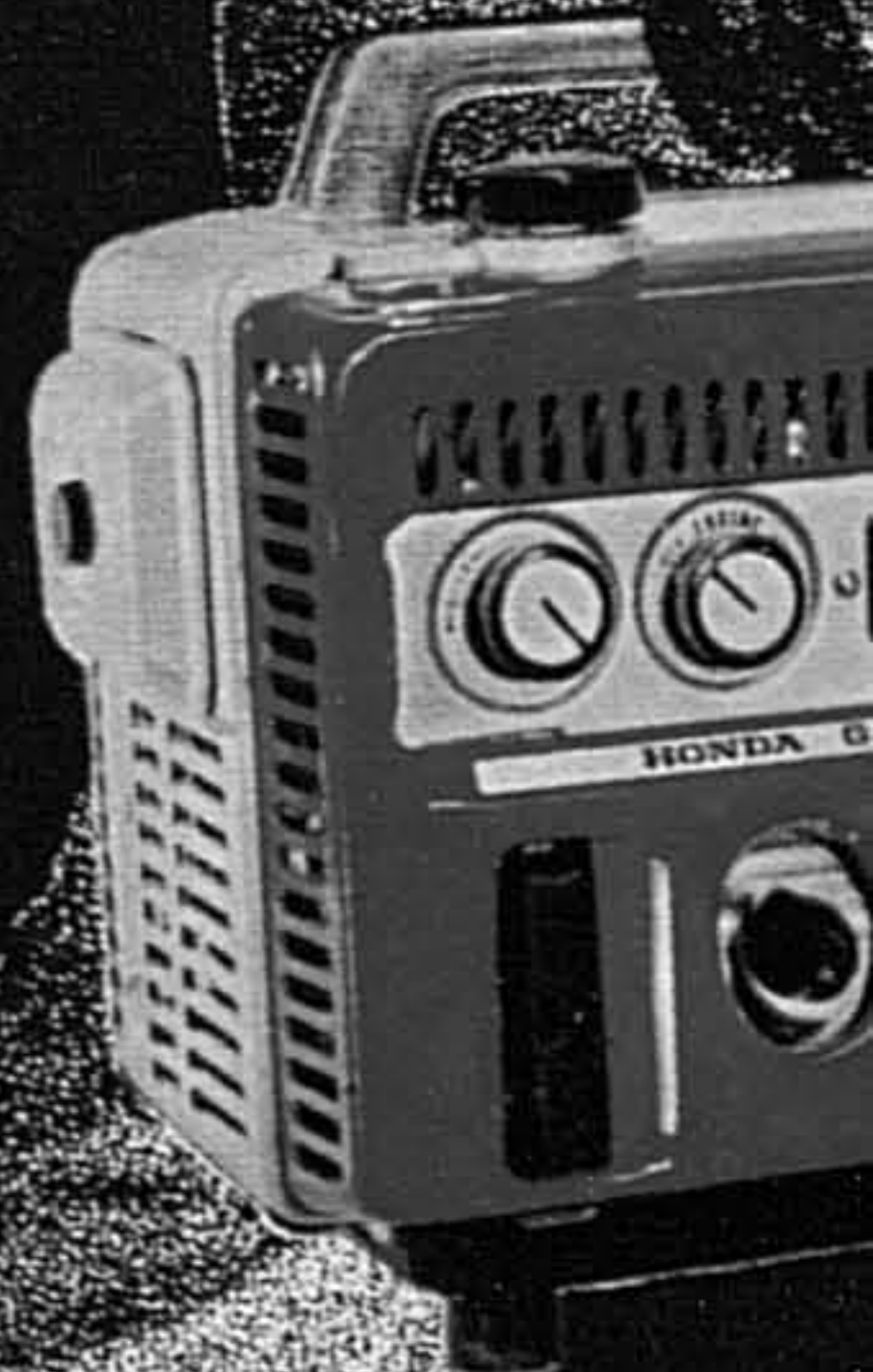
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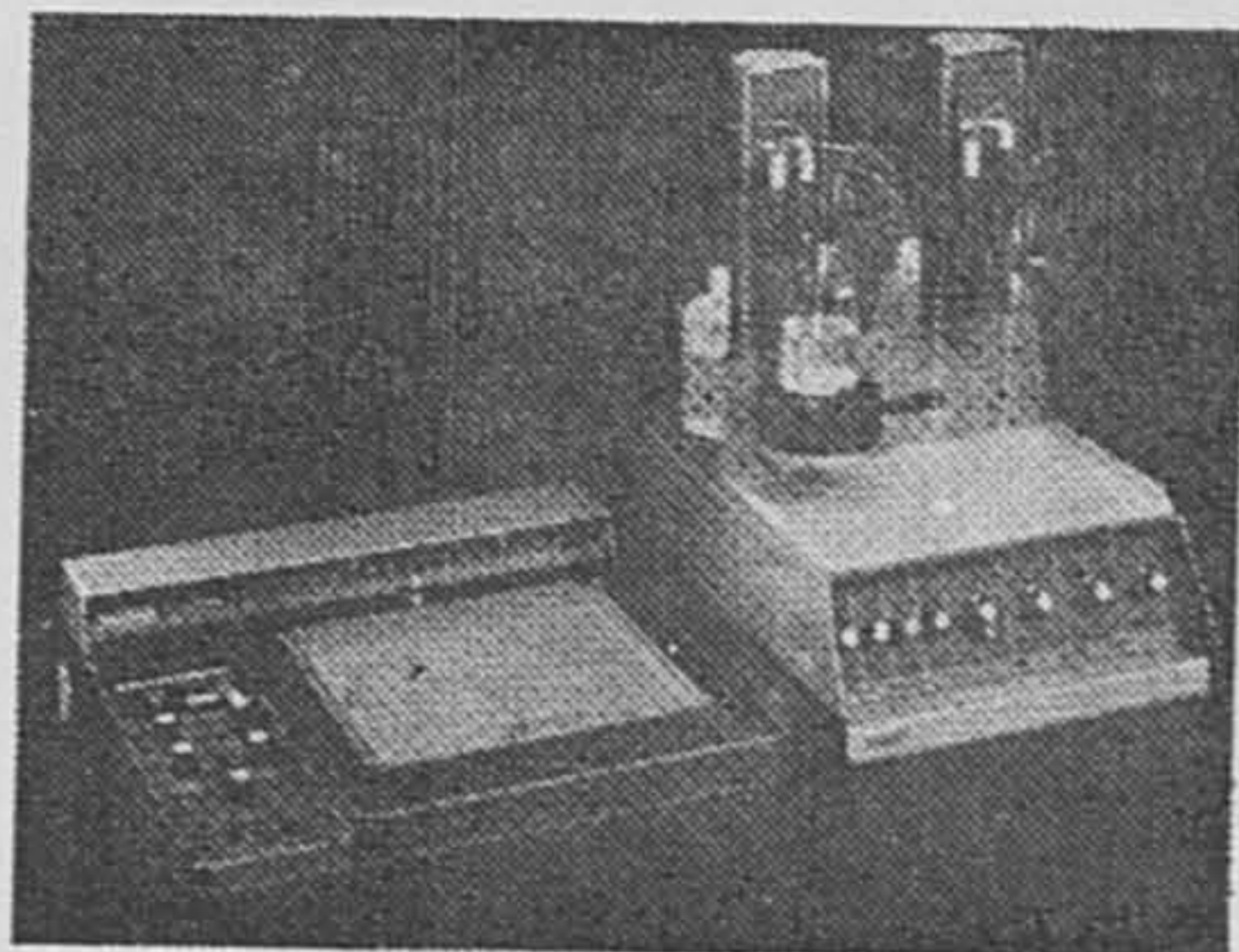
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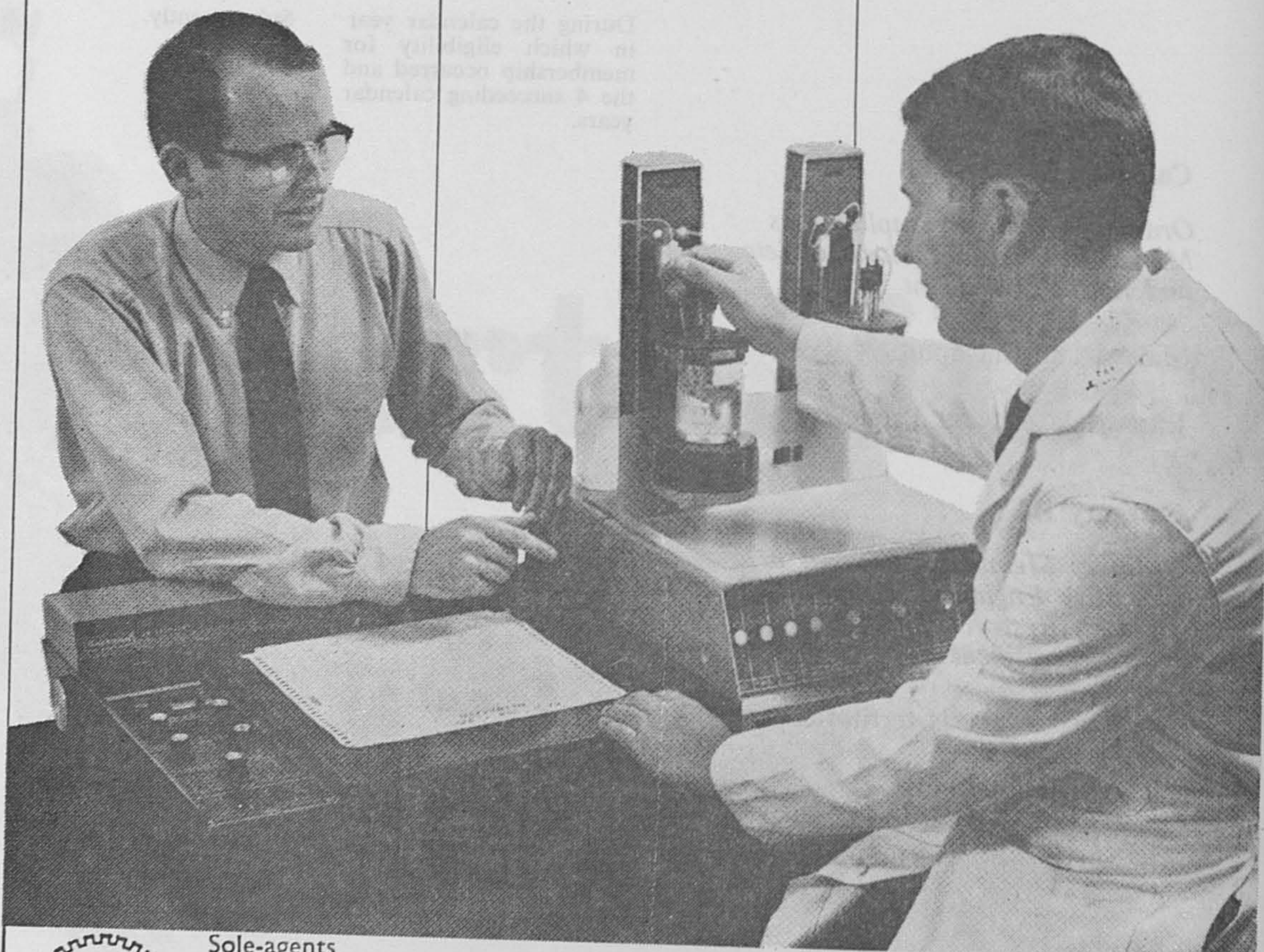


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Letters to the Editor:

Rome, 12th November, 1971.

Sir,

Reviewing past numbers of "The Planter" I have come across a letter to the Editor by Mr. R. H. Hirst, published in last April number and which had regrettably escaped my attention earlier.

As a rubber cultivation expert of the Food and Agricultural Organization of the U.N., I have been responsible for the introduction of *Hevea* into East Pakistan on a commercial scale and I think perhaps some of your readers might be interested in learning a little more about rubber in that country.

The small plantation described by Mr. Hirst is owned by a well-known Sylhet business family and was planted in 1962 with the assistance of the Rubber Planting Project (a branch of the East Pakistan Forest Industries Development Corporation) of which I was adviser since its inception.

The trees originated from Tjir. 1 clonal seeds imported from Malaya, but the small plantation received little care during the initial years and many seedlings were lost or were repeatedly damaged by cattle and goats. At the time, a few people believed that *Hevea* could be grown successfully so far north, and the owners carried on half-heartedly.

This small plantation may or may not be the northernmost existing. In pre-war days there was a plantation near Bhamo in Burma (about 24° N) of which a few hundred trees still existed when I visited the locality some ten years ago. Since then, it is known that seeds from these surviving trees have been collected steadily and used to establish small plantations in the area, also as far north as Myitkyina and across the border into the Chinese province of Yunnan.

For the record, an experimental plot of some 200 seedlings was established at Tetulia (or Tytalia) in the extreme northwestern corner of East Pakistan, about 27° N and in full view of the Himalayan snows. The last I heard, surviving plants were still growing reasonably well.

After having worked for many years in several tropical and subtropical regions outside Malaya I have come to the conclusion that *Hevea* is indeed one of the hardiest cultivated trees; it will grow under the most varied climatic and soil conditions and still pay its way.

The small amount of rubber produced by the plantation in Sylhet is undoubtedly sold locally to make slippers and the like; hence the high price paid.

About 4 000 acres of *Hevea* distributed over three estates situated respectively near Cox Bazaar (extreme south), Chittagong and Sylhet had been planted by the end of 1968 and of these at least 2 000 acres ought to be in tapping by now.

Further particulars about rubber cultivation in East Pakistan can be obtained from Report TA-2680 published by FAO in 1969.

(Sgd.) W. LLOYD.

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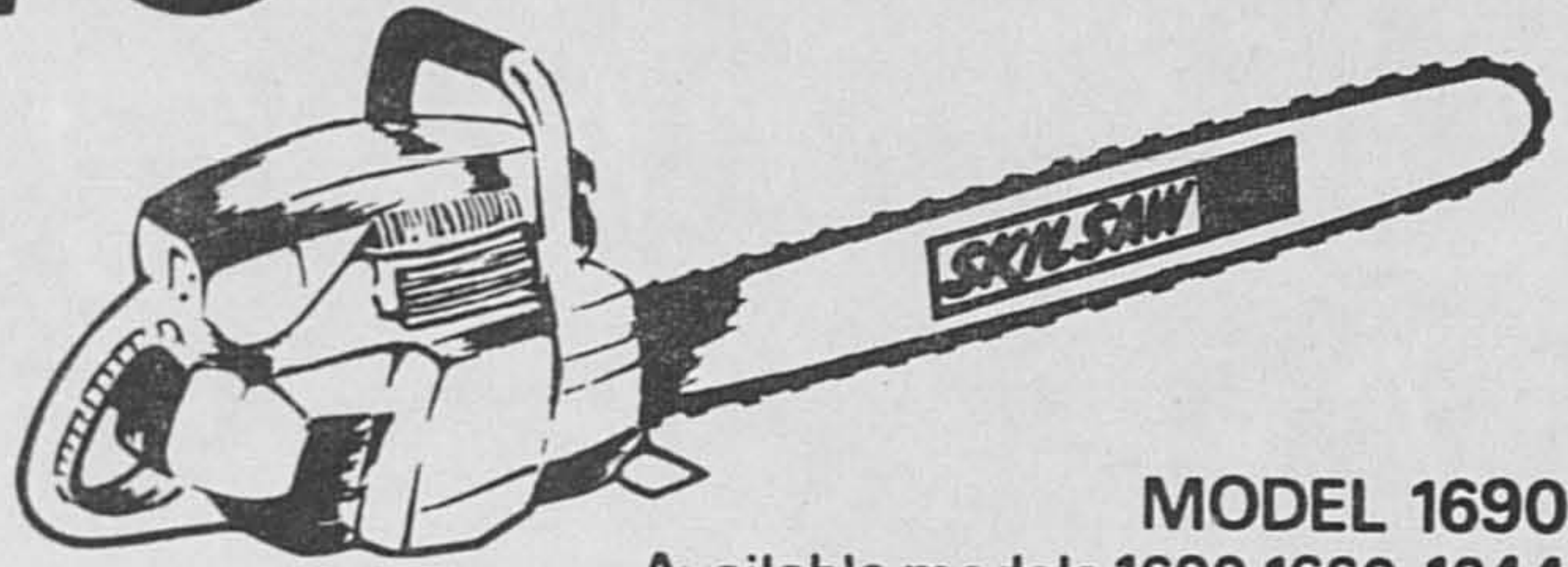
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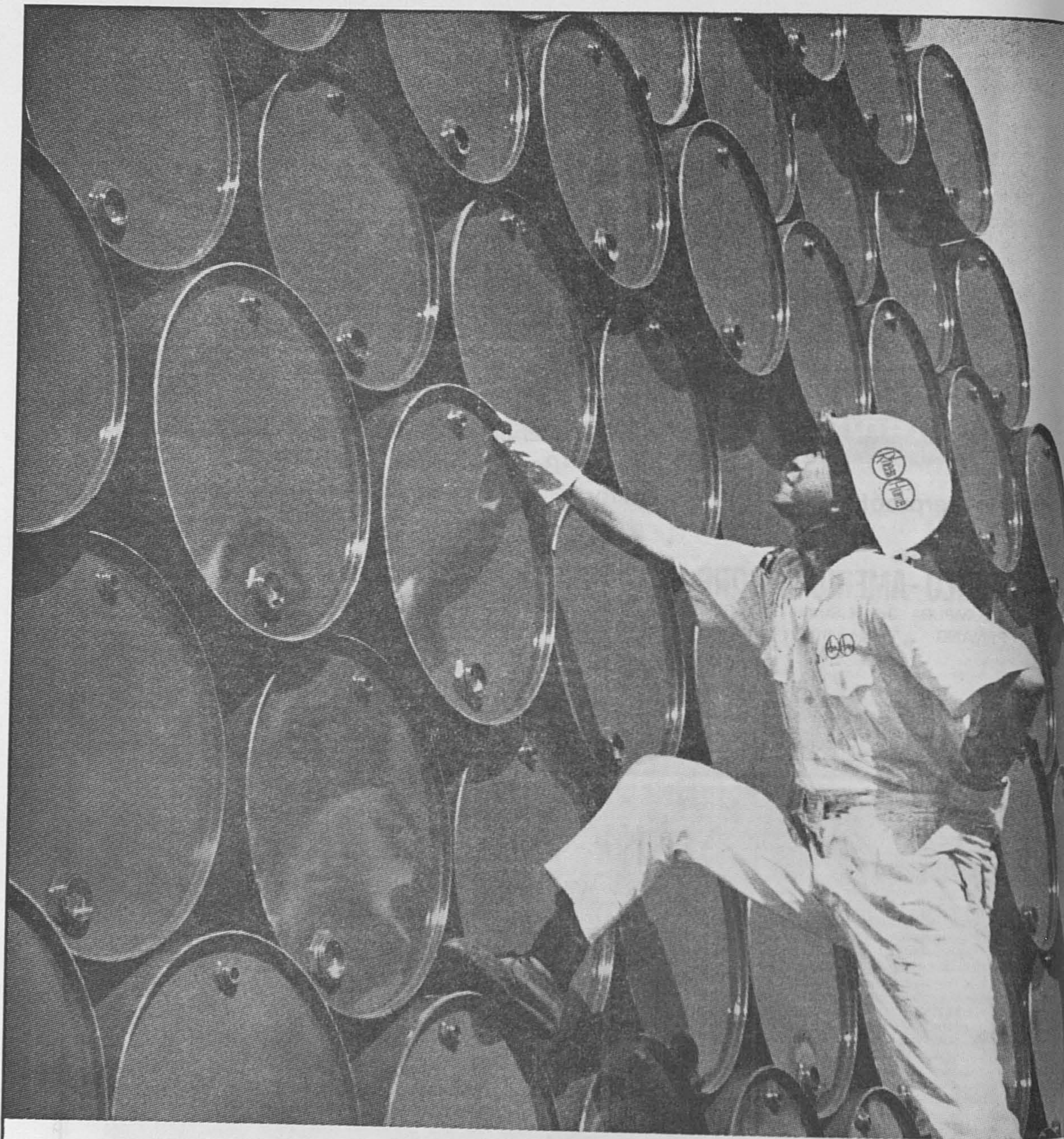
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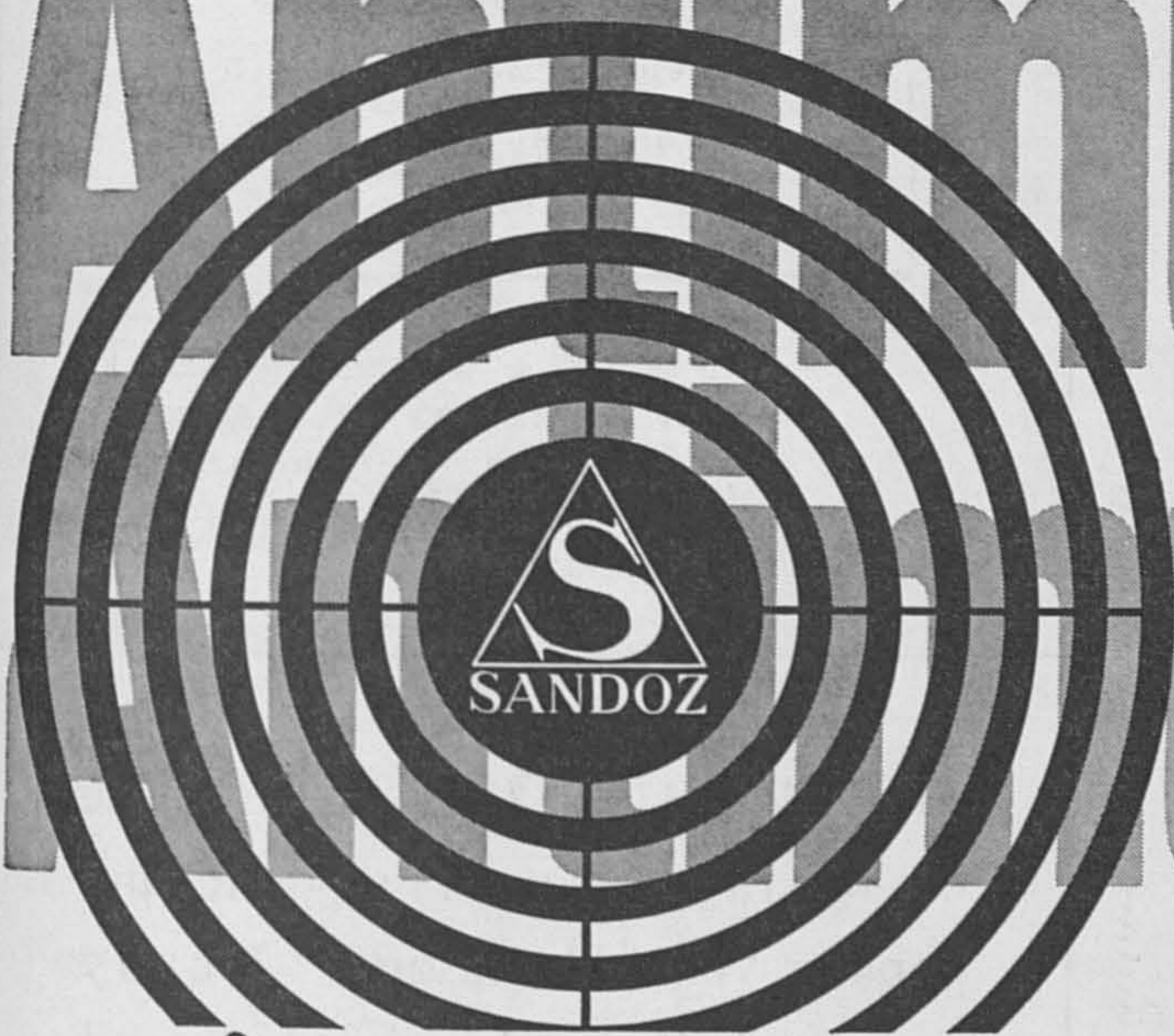
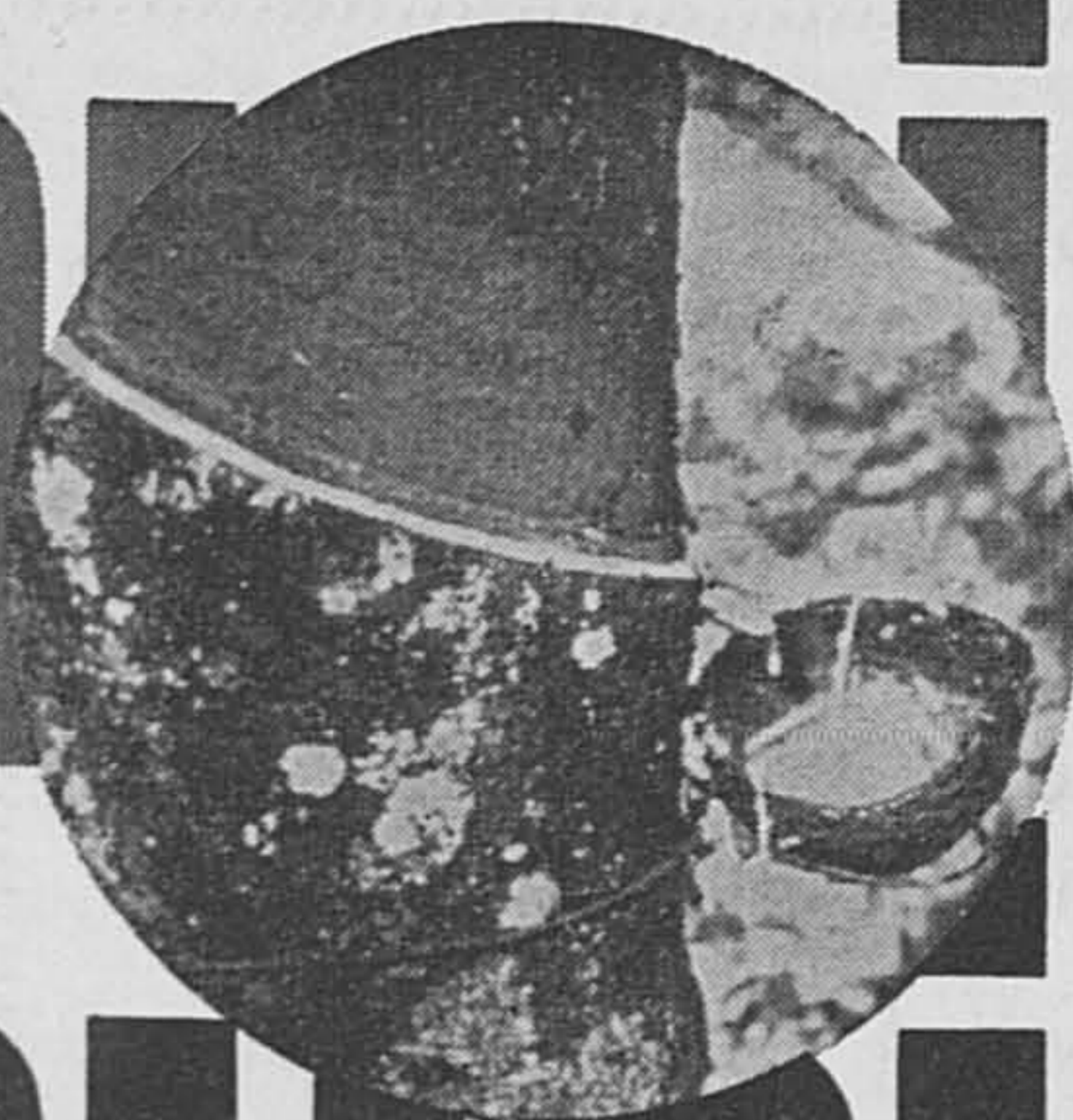
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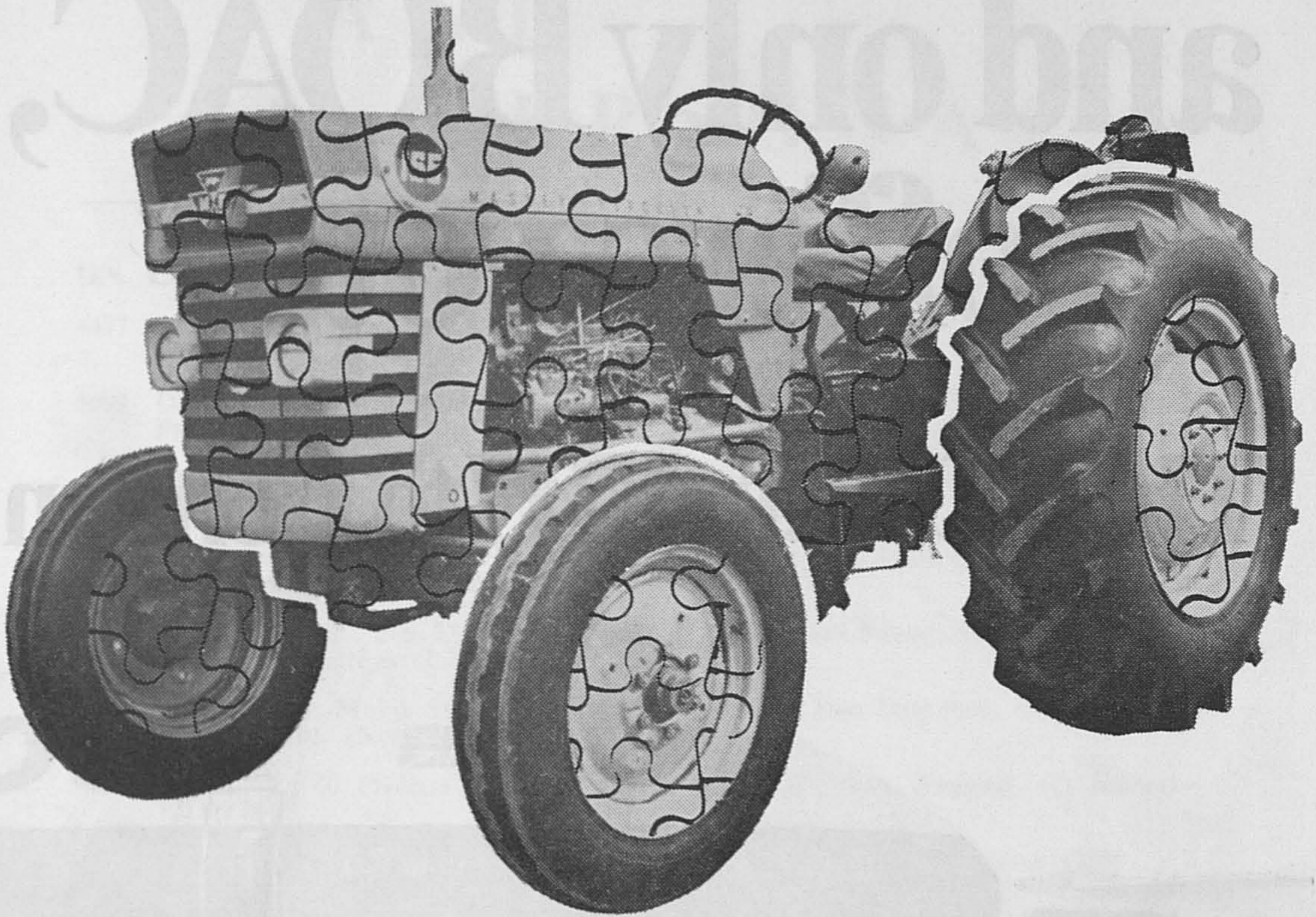
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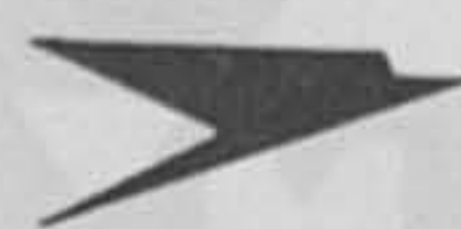


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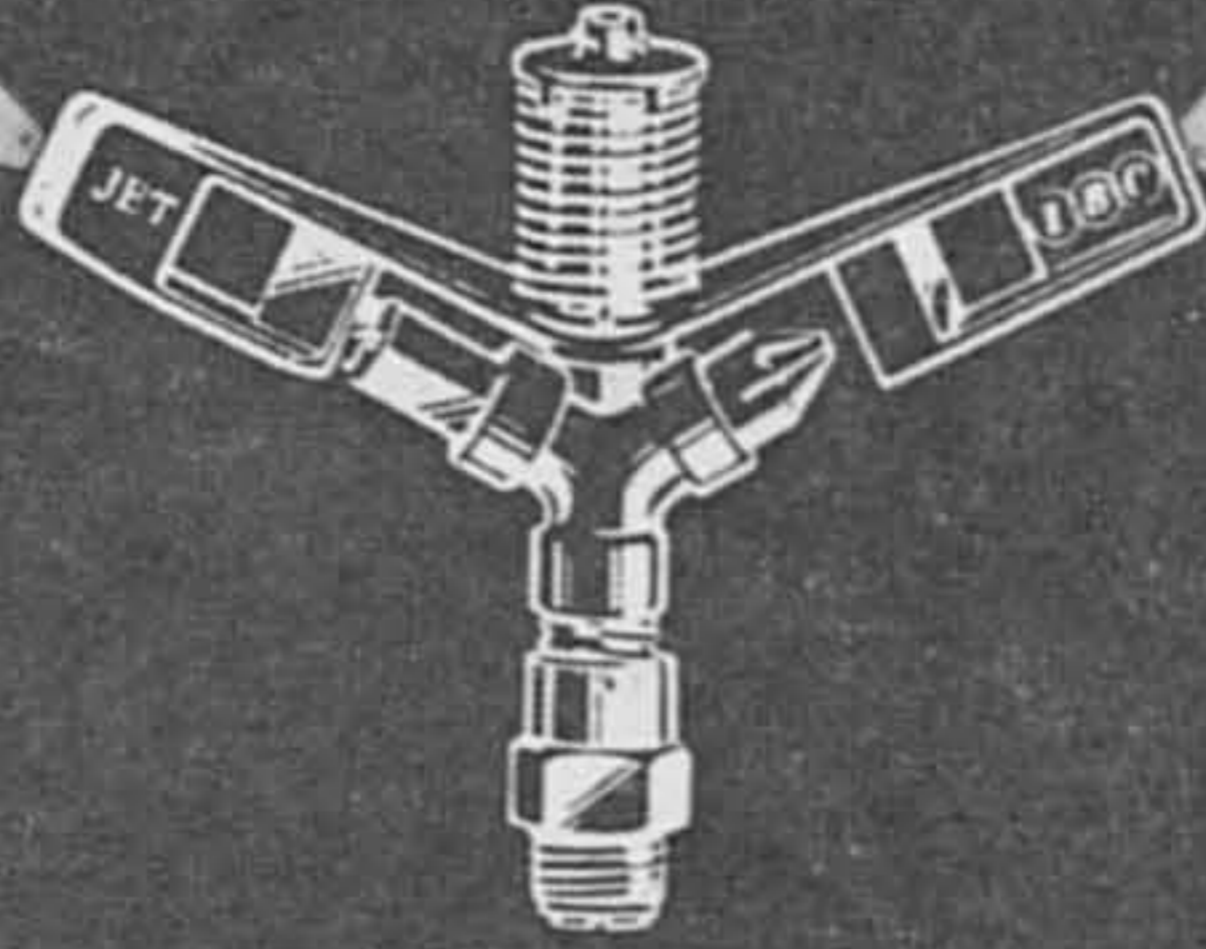
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(Kedah/Penang)—7/11/71
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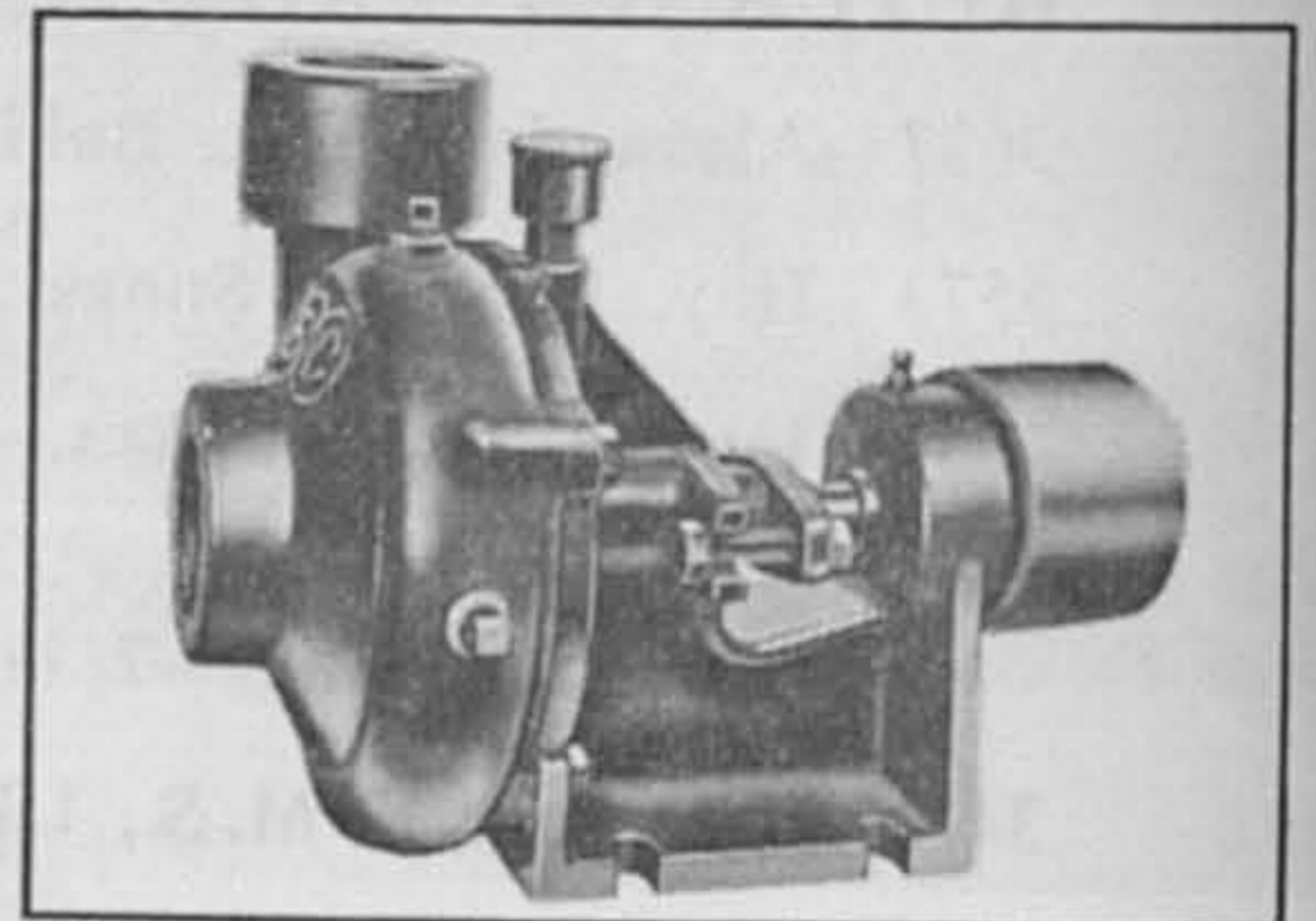
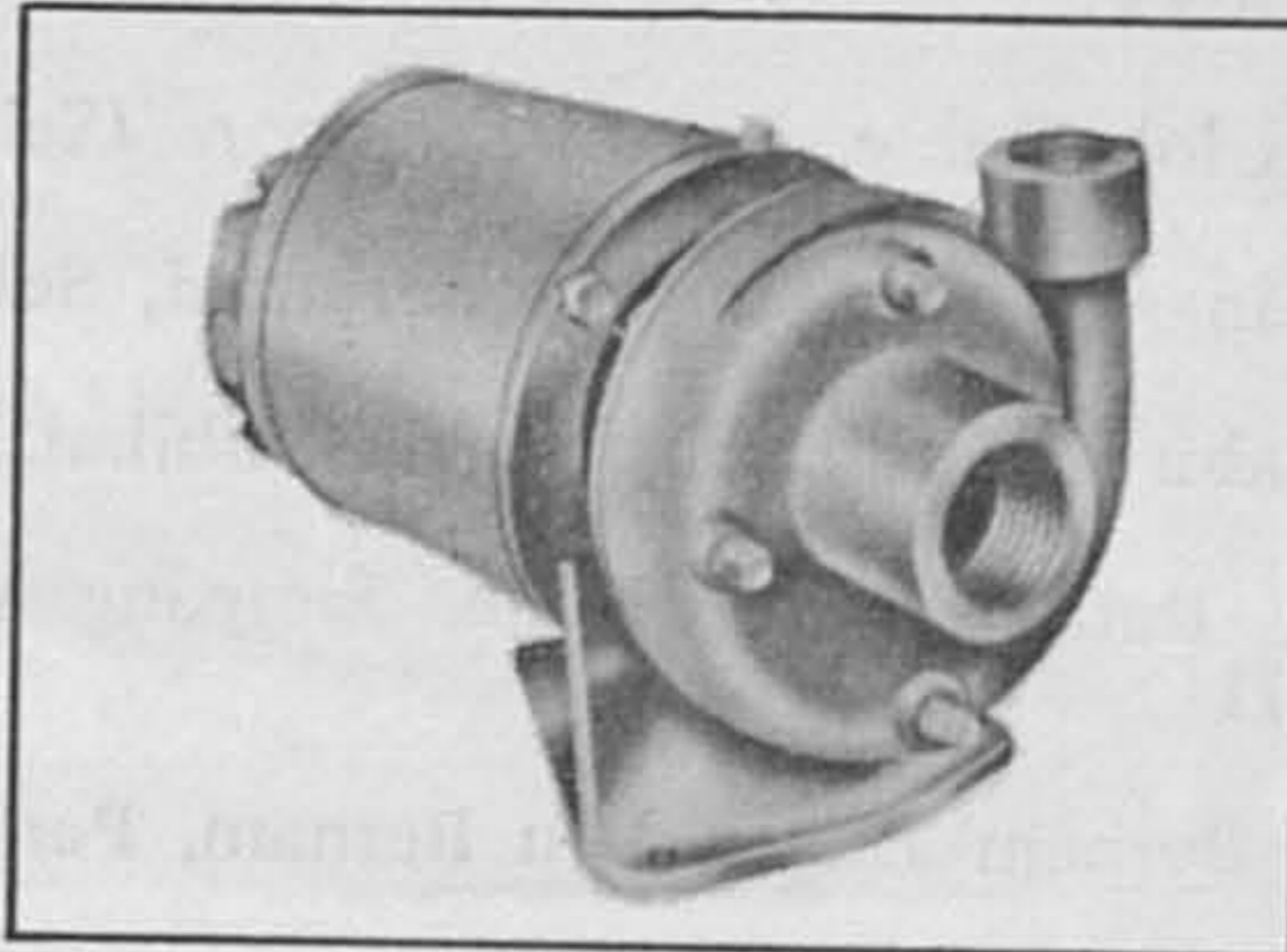
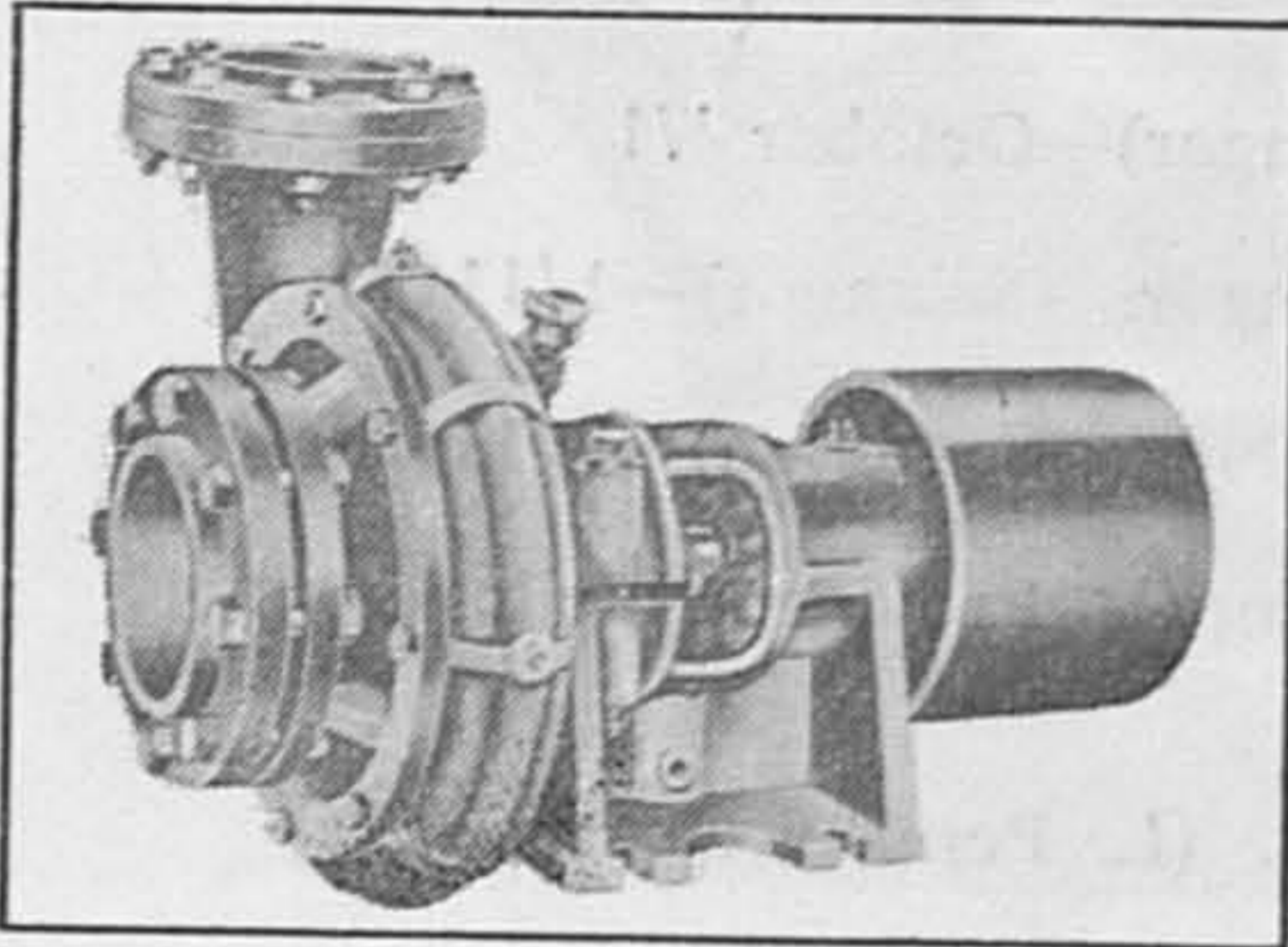
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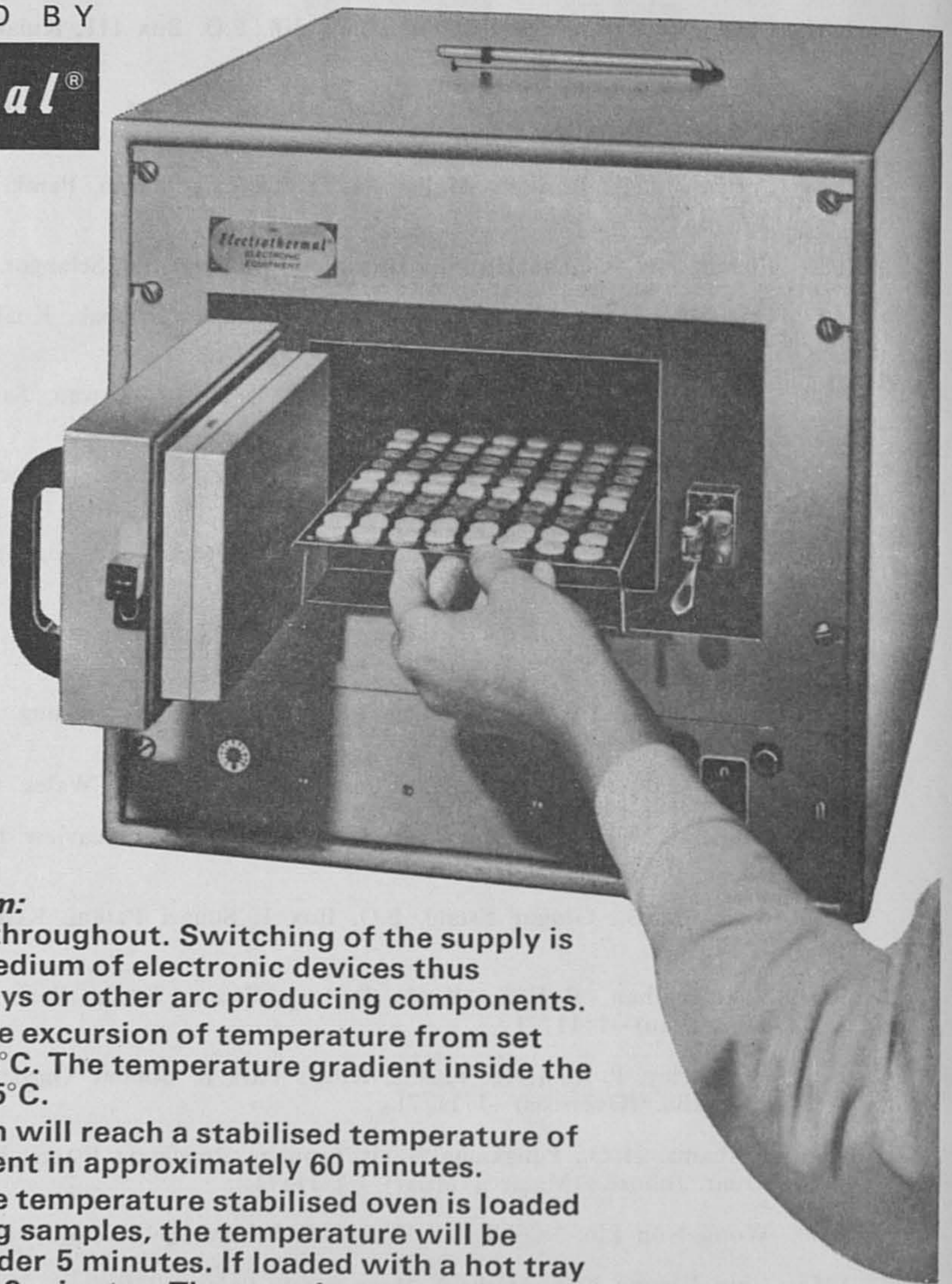
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- 4082 Slorach, A.F., Department of Lands Inspectorate, P.O. Box C.R. 91, Cranborne,
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