DISCUSSIONS

Professor Harland :

In Dr. Ruinard's extremely interesting paper, he has mentioned in one part, the practice of utilizing leaves by roasting. I would like to know what he actually means by 'roasting'. I do not think that he has got the right word.

Dr. Ruinard :

It is not the word that I mentioned but may be it is in the paper. Actually the leaves are roasted. The highland people do not have any cooking utensils so they put the unpeeled tubers into leaves, roast the whole thing and eat it.

Professor Harland :

What do the leaves look like when they are processed in this way?

Dr. Ruinard :

There is not much left.

Professor Harland :

Have you eaten these yourself?

Dr. Ruinard :

No sir.

Professor Harland :

I think that this is a lesson to us all. We go around telling the native farmers what to do, and I find that very few people have eaten these things that they talk about. Now this scheme for increasing the nutritional quality of the sweet potato is extremely important, but I notice that he began with high yielding clones. Now I think that it is rather unlikely that the high protein content would be found if the yield of carbohydrate is also high because, in general, there is a negative correlation between protein content and the yield. For example, if you select wheat for high protein content you have a concomitant reduction in yield. This also applies to sugar cane. Sugar cane with a high nitrogen content is lower in yield than the others. This is a point to bear in mind, that you must preserve a balance between carbohydrate and protein.

Dr. Ruinard :

I would like to comment on what you said about the relation between carbohydrate and protein. It is not what we have found in our analyses, but I should say that we have worked on this for only 3 or 4 years. We have only made a beginning and we should have gone farther in the direction which you mentioned, if we had had the time.

Professor Harland :

With regard to this remark of mine, I know that your work came to an abrupt and untimely end, but it is for the guidance of those working in other parts of the world. As far as my bibliographical researches have gone, they are not complete, but I understand that the Russians have got as high as 5 percent in protein as a result of their selection work.

Now, it is worthwhile pointing out, that if you conduct analyses of a large random sample of available plants, the protein content will fall on a normal frequency distribution and from this normal frequency distribution calculating the standard deviation, the theoretical limit of selection would be about 3 times the standard deviation and that is the figure I think should be aimed at in selection. You have a ceiling towards which you can usefully work. Now, I understand that this civilization that you were talking about was a milkless civilization. Did they have any source of milk?

Dr. Ruinard :

No, I don't think so.

Professor Harland :

There are a series of general problems — world wide problems. The problem of the milkless civilizations and how they have resolved their problems is a part of a general phenomenon. The Chinese solved it by the domestication of the soya bean; and the Andean people resolved it by the domestication of the guinea pig, which is the protein unit of the Andean people. I just wanted to point out the general phenomenon that we have to consider milkless civilizations in general.

Dr. Ruinard :

I would like to comment on Professor Harland's remarks, for which I am very thankful. When he said about the Russians having found 5 percent protein in sweet potato — was it fresh weight or dry weight?

Professor Harland :

I do not know because I have not had access to the report.

Dr. Ruinard :

Just to prevent misunderstanding. I was speaking of the highest protein content of 1.7 in fresh material. Fresh material contains 20 to 25 percent under those conditions of dry material, which means that it was real protein — not crude protein — in those tubers was roughly 8 percent, which is really very good.

Dr. Yen :

With regard to Dr. Harland's question about what these things taste like, I have had to subsist on similar food and the sweet potato leaves are just like any other greens. They are very difficult to pick out because most of the highland peoples use at least six species when they cook and they are cooked together.

Now could I go on to something else? There is one warning about this course. A nutritionist working with a very isolated tribe, high up about 8000 feet I believe, and a very poor tribe indeed with very few resources, is supposed to subsist almost entirely on the leaves because they do not get many tubers. In this population there is a high incidiece of goitre, and this is supposed to be directly correlated with the intake of leaves.

I do not know whether you can recommend high intakes of this material. Dr. Ruinard has a statement in his paper which he didn't make in his presentation which was the luxury of shifting cultivation. I will take issue at this as an observation after only one trip in Dutch New Guinea and some of the records from anthopologists who have been there since Dutch rule. I have never really seen a completely normal shifting cultivation in Dutch New Guinea myself. As far as the introduction of crops into native economics, I would agree entirely with Dr. Ruinard about the difficulty of doing such a thing. I would like to point out however, that since peasant vacation of these areas there have been various programmes to introduce plants as peanut, cabbage, bean, solanum, potato, tomato. All these plants were unsuccessfully introduced by missionaries and administrators especially on the Australian side, but the interesting thing is that when you revisit these areas the people adapt to the growing of these things or they are able to adapt them within the agricultural systems, they do use them now in the higher areas of New Guinea in some very peculiar ways. This can be compared with things like pyrethrum and coffee which have also been introduced and these have not been adapted into native sytems, they have to be worked on a plantation system. They are of no use in the society. The other one is viruses in the highlands. This is a very interesting comment of Dr. Ruinard. We collected many varieties from both sides of the New Guinea continent and we did not see any virus symptoms when we collected, but when we brought them into quarantine under very clean conditions but in a temperate zone, then they started to show in the most peculiar patterns, that we could not identify the viruses even with the help of plant pathologists.

Dr. Jones :

I too, would be stimulated to make a lot of comments on what Dr. Ruinard and Dr. Harland have said, but I would like to speak of one thing, and it relates to the current enthusiasm in some circles for trying to solve alleged protein deficiency in diets by increasing the protein content of the staple food stuffs. Dr. Ruinard does not give us his basis for concluding that there is a protein deficiency in these diets, and an imaginary reason for this is that probably there have not been any dietary or nutritional studies in this population of sufficient reliability to demonstrate whether there is a protein deficiency or not. But if there were, it would seem to be much more sense on economic ground to seek the solution not in the basic modification of the basic staple which as Dr. Harland pointed out, that if you start breeding for one trait you may loose the other, and you may be trying to sell by growing a crop that would yield less, just because you have a higher protein content. And this doesn't make much sense. A much more likely way of achieving what you may be after would be, I think, to look into the other foods that are eaten and see if it possible to introduce very high protein, supplementary foods. I would suspect that in highland New Guinea, the protein contribution which you would get from spinaches is quite high and quite significant. As you pointed out, although these diets are alleged to be bad, the population is there and has been for quite a long time, which suggests that they got protein somehow or other. I would also suggest that, as has been the case in many parts of Africa, if you had a true quantitative measure of the amount of pig meat consumed, you would find that this was not a trivial contribution.

Dr. Ruinard :

I would like to answer Dr. Jones, about this remark. In the first place, you said something about the protein factor. The quality of the protein factor is probably what you meant. There was an investigation and it has been completed. A lot of tubers and leaves were sent out to the laboratories in the Netherlands, and they did some research there to find out the quality of these proteins. No conclusion has been arrived at, so we do not know how things are. It would have to take more time to complete this. This is for nutritionists and medical doctors to decide, and they decided this and became pretty alarmed about the situation, so they pushed us to do something about it, and in the second place there was no choice. It is very difficult in these primitive societies to change habits — to change feeding habits, habits of life and so forth — so what else can you do than to try to improve the food they have. They do not want to eat anything else.