

gone unnoticed by local birds, so one can find a nest on nearly every leaf base. The leaves, with their fine divisions, somewhat resemble those of bamboo and, in fact, this species is named after *Ochlandra*, a bamboo genus.

An even handsomer species in our collection is *Caryota urens*, from India, Burma, and Sri Lanka. It is by far the most common species in tropical lands. It had never been cultivated to any extent in California until 1962, when David Barry, Jr., who had introduced *C. ochlandra*, collected seeds from plants at the relatively high altitude of 4800 feet in Sikkim. Coming from a high altitude, these plants presumably are more frost hardy than lowland forms. It is even faster growing than *C. ochlandra* and the first plants, some forty feet high, are now flowering in southern California. We hope seed will be regularly available from California plants. Flowering in this species is spread over some seven years but is just as fatal to the plant. *C. urens* is a much-utilized plant in its native countries. The leaf-base fiber is used for rope, which is so strong that it was used to tie wild elephants. Toddy, a palm wine, is fermented from the sap and the toddy can be further distilled into the stronger *arraek* or boiled down into sugar.

The name "urens" means "burning" and refers to a notorious character of the caryotas. The fruits are red and conspicuous and they are impregnated with crystals of calcium oxalate which is very irritating to the tongue and skin; it is said that even the bark of the trunk, if wetted, will irritate the skin. Deaths have even occurred from the effects of the juice.

*Caryota urens* is a magnificent plant, with broad segments that form a large arching frond. Our largest specimen, some fifteen years old, can be found facing the North Vista by the

north door of the Art Gallery, where it has nearly exceeded the height of the roof. It dominates the landscape and attracts much attention from visitors. Unfortunately, it will probably soon flower—let us appreciate it while we may.

MYRON KIMNACH

## PALM BRIEFS

### Coconuts in the Celebes

Dr. Antony Davis is the coconut expert at the Indonesian Government Institute of Industrial Crop Research in North Sulawesi. He was a younger colleague of my brother, Professor J. B. S. Haldane, one of the bright young Indians enmeshed in the scientific seniority system which so often hampers Indian research. By now he is an old friend and has started a Haldane Research Institute in his own state, Kerala, where he started working on coconuts more than twenty years ago. He was sent out to Indonesia by FAO to help them with their problems. When I was there in 1977 he was in his second year and deeply involved in the reorganization of one of the most important crops of Indonesia. This Institute also deals with cloves, nutmegs, and other spices and indeed there are fellow institutes in other parts of Indonesia dealing with other important crops.

North Sulawesi is beautiful country; there is still a vast amount of deep forest but pressure of population has put a great deal of it under cultivation, mostly with coconut palms, dwarfing the wooden houses of the cultivators. The main buildings of the Institute where Mr. Sudasrip, the Director, and his staff live are on the outskirts of Manado. But the main plantations are only a short drive away and growing. It seems likely that in the future this

Institute will be working almost entirely on coconuts. The amount of local use is unusual. In North Sulawesi there is an average consumption of two hundred coconuts per head every year as against forty in other parts of Indonesia. These coconuts, picked young, are used mainly for their delicious milk, the best possible hot weather drink and the rest may be thrown away or a little of the soft nut scooped out. At the airport they sell paper bags of brown palm sugar, scrunchy with bits of fresh nut; I couldn't stop eating it! Nobody in this part makes any use of coir. However, most of the coconut plantations regularly replanted by the Dutch in their day, have not been renewed by the present plantation owners, including the government. The yield is falling.

This is a situation that involves not only scientific problems but also the economics of all the crops and the efficient organization of production. Dr. Davis is coping with the scientific side. Some of this means waiting for fairly long-term results but also he and his colleagues have to consider the best ways to replant so that the coconut grower will not suffer a disastrous drop in his income and so that the illiterate can be taught and helped. Of course Dr. Davis has the job of training his Indonesian successors; I thought they were a bright lot but somewhat handicapped by finding English a difficult language so that reading a paper in a scientific journal is a struggle. The transmission of information from one language to another is something that UNESCO should be thinking about very seriously. English taught as a university arts subject is not really much help and there are endless possibilities of small scientific misunderstandings.

The interesting thing is that the basic work of the Institute is all done on the spot with the main equipment

being an ability to keep accurate data in whatever language. For instance, here in Indonesia coconuts are planted on their sides in an east-west direction, never north and south. But in the experimental plot they are planted both ways: will there be a difference? If so, why? Some however have been planted vertically as in India; it is harder for the developing embryo to get out but this burial may make it tougher. Again it is local custom, especially when space is limited, to hang the nuts on poles to germinate; it appears that the embryo can stay in a dormant state until planting is done when they rush ahead. All this is a matter of watching over several seasons and not interpreting data to suit a theory. Antony Davis himself, if anything an over-enthusiast, is careful to tell this to his Indonesian successors. His early work on coconut spirals showed that in India much higher yield always came from plants with a leftward spiral. Here it appears to be 50-50. Now there seems to be increasing evidence of a difference in spiral ratios not only in coconuts but in twining creepers, pine kernels, and so on between the northern and southern hemispheres. If this is so the even ratio at the Equator might perhaps be expected. But it will be some years before the results will be definite and meanwhile yields will be carefully watched.

There are many odd things in their experimental plantations, including two palm trees which, instead of producing nuts, produce bulbils, that is to say small plants which look, when they are taken down, about four years old. This must be a mutation that occurs from time to time for I remember, some ten years back, driving south through Kerala when Antony suddenly saw a tree with exactly this habit and we rushed over to look at it. Did he

actually shin up the tree? I wouldn't put it past him. Now this means that these bulbils develop quickly into healthy plants that can be detached, potted up and replanted. If they develop into bulbil-bearing palms, they are useless for a crop but, as they are clones, they are very useful for experimental work and it may be possible to get up to 250 a year from one tree. It is also possible that some or all of them may bear nuts but at present it's a case of wait and see.

In another garden a hybridization program is going on, the genetics of which are in charge of Dr. Kiyonagi of the same Institute. There is a dwarf coconut palm that matured some two and a half years earlier but has only a low yield of comparatively poor nuts. Here there is a huge experimental acreage with the soft blue of one of the great Indonesian mountains rising dramatically behind it; it is planted with one row of tall palms and four rows of dwarfs. The male flowers of the tall palms fertilize the dwarfs, which have had their male flowers removed. The resulting hybrid seedlings are likely, on the evidence of trials elsewhere, to do better than either parent and it is hoped that all new plantations or renewals of older ones in Indonesia will be entirely from these hybrids supplied by the government. This project has been given financial help from the UN. Actually, a private French firm has produced similar hybrids from one African and one Malayan palm species and is selling the nuts. But each nut for growing is far too expensive for Indonesia, so the country has had to start its own program. So far, there has been no time to breed and evaluate the  $F_2$  generation. That, surely, means looking another twenty years ahead; we cannot indefinitely hurry the processes of nature.

There are also fertilizer trials going on. Interestingly, it is possible by fair-

ly heavy doses of fertilizer, much of which is produced in Indonesia, to revitalize old trees for a few years at least. During these critical years a new planting of hybrids will have time to grow.

With all this program, the Institute is bound to specialize in coconuts. Spices will be dealt with in the future in another Institute: the cloves, the nutmeg, and mace, the balm which grows wild and smells of cough cures, the peppers, and cinnamon. The Manado Institute has a banana expert, a very pretty one: many girls go through university nowadays and there are several on the staff. Bananas are a common intercrop with coconuts and so, for example, is maize; all crops must have their place in practical research.

I get the feeling that the Indonesians are very nice people to work with and for. At one plantation office, we were entertained with a charming xylophone concert and everywhere we visited a couple of tender coconuts would be picked and offered to us. Ever since, I have been trying to think of an English work which describes the fairytale taste or the texture of the slippery delicious kernel. I am sure the Indonesians have the exact word for it!

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### Notes on Palm Uses in a Spanish Treasure

The thousand-mile-long desartic peninsula of Mexico's Baja California would seem to be an unlikely habitat for palms, yet that land is the home of several interesting taxa that may be seen growing wild, especially in the rocky canyon bottoms. One of these is the San José hesper palm, *Brahea brandegeei*, which is often planted as