their comparatively higher concentration in coconut, do we have to look too far for an explanation for the low levels of cholesterol in the Polynesians and Sri Lankans? Does it not appear yet again that traditional wisdom and age-old practices have the fullest sanction of modern science?

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Value addition: A threat to *Calophyllum* species

At the 'Round Table Conference Assessment, Conservation and the Sustainable Use of Genetic Resources: Achieving National Objectives through Regional Collaboration', in Indonesia, from 11 to 13 October 1994, several scientists, government agents and traditional medicine-men met and discussed a number of issues relating to biodiversity prospecting. One of the important topics discussed at length was the screening of medicinal plants for pharmaceutical purposes, thereby 'adding value' to such species. Prof. Vichai Reutrakul from the Mahidol University, Thailand, a biochemist presently involved in screening medicinal plants for dealing with AIDS, reported that three species of *Calophyllum* have already shown promise in this regard. An active principle called *calonoli* has proved very effective against viruses under experimental conditions. Interestingly, one of the species screened and found promising is *C. inophyllum*, the Indian laurel.

Calophyllum is one of the many genera of trees in the family Clusiacea. The genus is widely distributed in tropical Asia and Africa. *C. inophyllum*, which is a fairly common tree in south India, especially in the coastal areas, is also found in some African islands and Southeast Asia. This species has been traditionally used by the local people in India as timber for boat-making and the oil extracted from the seeds as lamp oil. The oil is also used as a cure against

Figure 1. *Calophyllum inophyllum* typical leaf and fruit morphology.

rheumatism and a number of skin diseases The bark of this tree finds use as an astringent in internal haemorrhage.

Besides the Indian laurel, there are 3 species of *Calophyllum* in south India, viz. *apetallum*, *polyanthum* and *austroindicum*. The first and the third species are restricted to southwestern India and Sri Lanka. *C. polyanthum* is widespread in the Western Ghats, Sri Lanka and Southeast Asia. This species of magnificent tree (grows to over 30 m in height) was much exploited by the British for making ship masts and railway sleepers till about independence. This species continues to be one much sought-after by timber industries and as a result very few large trees are found in south India. During a study of vegetation in the Uttara Kannada district (where the species is most common in south India), the estimated population of *C. polyanthum* was 200 plants per hectare. However, about 50% of these were juveniles, less than 2 m in height. Mature trees over 25 m in height were scarce.

All south Indian species of *Calophyllum* have been quite a bit exploited as timber and hence are slowly declining Young trees are sought-after by the local people as a material for poles and fencing, thereby further reducing the chances of continued survival of the species. Although the average time taken for an active principle of plant origin to hit the market as a commercially available drug is 12 years, being much shorter than the generation time of most trees, this will soon lead to an unsustainable harvest of mature trees once any species is found useful Value addition to species of *Calophyllum* by way of finding use in the anti-AIDS industry can prove to be a threat to the continued existence of the genus unless immediate protective measures are taken

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Comments on 'Fullerenes: C60 from camphor – A novel approach'

(*Curr. Sci.*, 1994, 67, 602)

Recently, Mukhopadhyay *et al.*[1,2] have reported that fullerenes, in particular, C_{60}, are found in the soot formed on burning camphor in air. As evidence, they present powder X-ray diffraction data (XRD), fast atom bombardment mass spectra (FABMS) and scanning electron micrographs of what they believe to be samples of fullerenes.

The extreme reluctance of the fullerenes to form in sooting flames is well documented. As such, the results of Mukhopadhyay *et al.*[1,2] come as a surprise. Taken at face value, references 1 and 2 are an interesting addition to what we know about the mechanisms for the formation of fullerenes. The claim that this technique could replace the standard arc evaporation procedure is tenuous, since the reported fullerene yields are low.

The main problem is that the experimental data presented in references 1 and 2 are fraught with several inconsistencies. The FABMS data presented in Figure 1 of reference 2 is unconvincing. The isotope ratios are not as expected and the parent C_{70} peaks, which are normally found in the mass spectra of soot, are not seen.

The SEM pictures (see Figure 2 of reference 2) are unambiguously misinterpreted. Figure 2 *d* shows a spherical object about 10 μm across (as seen from the scale bar in the photograph) This object is identified as a single C_{60} molecule. The diameter of the C_{60} molecule is about 7 Å, and the van der Waals diameter (measured by STM, for example) is 10 Å. It is indeed strange that a sphere 10^4 times larger than C_{60} has been identified with the molecule.

It is difficult to conceive these spheres as being comprised of many C_{60} molecules, since packings of spherical objects invariably result in cubic or related morphologies. Likewise, the 'tubules' shown in reference 2, Figure 3, are entirely unlike the SEM pictures of any reported tubule, carbon or otherwise. The authors claim to see some sort of layering (not obvious to the reader) in these materials, which they ascribe to graphitic sheets. The scale bar again contradicts any such suggestion. In any case, graphitic sheets are usually separated by about 3.5 Å – beyond the resolution of any extant SEM. The XRD pattern in reference 1 does not resemble the pattern expected for C_{60}. It is difficult to understand how the authors concluded, based on the evidence presented, that their sample was C_{60}.

To conclude, on the face of things it is difficult to accept that Mukhopadhyay *et al.*[1,2] have made C_{60} from sooting camphor. Their interpretation of the experimental data is largely incorrect and their papers suffer from the grossest inaccuracies.

1 Mukhopadhyay, K., Murali Krishna, K and Sharon, M., *Phys Rev Lett.*, 1994, **72**, 3182.
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Mukhopadhyay et al.'s reply:

To Ram Seshadri's first statement, 'the extreme reluctance of the fullerenes to form in sooting flames is well documented', we would rather say that, 'it is very much known that fullerenes are present in sooting flames'[1–8]. The recent report by Heymann *et al.*[1] also confirms the presence of fullerenes at detectable levels in naturally occurring fires and even the