

A radial section of tropical almond, *Terminalia catappa*, which occurs in tropical Queensland and the Northern Territory. The white objects are crystals of calcium oxalate. Crystals are common in many hardwoods and are an inherent part of the timber's structure. Their function is unknown.

Grains of truth

Wood

fragments

harbour tales

of fortune,

history and

justice.

Translating

them is all in

a day's work

for this

timber

sleuth, writes

John Layton.

At first glance the identification of wood may appear a dull and mundane occupation. Murder, mystery and intrigue, however, are part and parcel of Jugo Ilic's job as CSIRO's leading authority in the field.

His expertise has been called upon to help in the search for Captain Cook's ship Endeavour, to solve murders, and to assist Australia's timber industry by improving our knowledge and understanding of Australia's native tree species.

Ilic has at his disposal an extraordinary wood identification kit in the form of CSIRO's Dadswell Wood Collection. Housed at CSIRO Forestry and Forest Products in Melbourne, it is the world's second largest wood collection (the largest is in the United States). Started in 1928, this priceless library contains 47 000 samples representing nearly 13 000 different species from around the world. 'It is a national treasure and irreplaceable should it ever be lost,' Ilic says.

Ilic's interest in wood identification evolved from a work requirement to learn about the relationship between wood structure and wood properties.

In former days, CSIRO had a well-developed culture in wood anatomy driven by several scientists who were instrumental in describing and developing keys for the identification of Australian and South-East Asian timbers. These scientists became Ilic's mentors.

'Wood structure is somewhat like a fingerprint,' Ilic says. 'The size and disposition of the cells, which are about as thin as a hair and a millimetre or two long, determine the fingerprint of the species.'

'Initially identification is achieved by examining the appearance of the wood with a hand lens after it has been smoothly cut across the grain. In most cases this is followed by microscopic examination of thin slices cut across and along the grain. The appearance is then matched to known reference material.'

Wood samples turn up from some remarkable sources. Last year Ilic received wood from the bottom of Newport Harbour, in the north-eastern American state of Rhode Island, where a number of 18th Century shipwrecks, including Captain Cook's Endeavour, are known to lie.

A joint Australian-US project is investigating the Newport wrecks, and a team from the Australian National Maritime Museum assisting in the search for the Endeavour commissioned Ilic to identify wood samples taken from a wreck with promising dimensions. Ilic identified the Newport wood samples as Northern Hemisphere oak and Baltic pine. This information is now being assessed together with that provided by the scientific analyses of other recovered material in an attempt to positively identify the ship.

In another shipwreck mystery, Ilic identified a wood sample the size of a 50-cent coin found buried in sand dunes near Warrnambool, Victoria. His answer has sparked enthusiasm for a high-tech search involving sophisticated ground-based radar.

The ship hunters hope to locate the legendary Mahogany Ship, last reported more than 100 years ago well above tide reach, but lost beneath the shifting sand. Proof of the existence of this ship, thought to be an old Spanish or Portuguese exploration vessel, would push the arrival of Europeans to Australia back 250 years. Ilic says that although the sample is very old it is impossible to say if it came from the Mahogany Ship, as many ships have been wrecked off that part of the Victorian coast.

Ilic's expertise has been sought in a range of other intriguing cases. For example, forensic investigators asked him to identify

wood splinters taken from a murder victim's skull. The samples turned out to be from a species of imported rubber wood grown in south-east Asia.

'This information allowed police to find the alleged murder weapon – a baseball bat – and connect it to the crime,' Ilic says.

A few years ago an amateur wood turner was intrigued by the beauty of a piece of driftwood he found half-buried in sand on the Western Australian coast. It was estimated the wood had lain there for about 50 years and a sample was sent to Ilic for identification.

'The wood was from a rare species of tree, *Paratecoma peroba*, known to grow in a small region of Brazil. The question I had was how such a species arrived on the Western Australian coast,' Ilic says.

'After confirming the identification of the species with a US colleague, I discovered that timber companies traded this wood between Brazil and New York for a short time in the 1930s, when it was being appraised as a furniture timber. It is conceivable that a ship carrying this timber could have sunk or lost part of its cargo and the logs eventually drifted to Western Australia – a not unknown event.'

Ilic delved into the arcane world of the ancients when he identified wood from an Egyptian mummy's coffin, which was part of a collection bequeathed to the Museum of Victoria.

'The expectation was that the coffin would be made of Lebanese Cedar or some other high quality timber reserved for Pharaohs or nobles,' Ilic says.

'The coffin's inhabitant was unknown, but we found the coffin was made of figwood, which is a low quality wood, suggesting the person was of little importance. The coffin was thought to be 2500 hundred years old. Unfortunately, figwood's low quality means it also has poor durability. Our findings placed some doubt on the value of the collection.'

Fifteen years ago a wood turner submitted some timber that came from beams used as props in an ancient mine on the Mediterranean island of Crete. The timber appeared to contain minute golden beads scattered throughout the wood and on its surface. Ilic identified the wood as a species of pine, and the golden beads were found to be pure copper.

Interest intensified with the discovery that a similar wood sample had been collected by the then Governor-General of Australia while on a visit to Crete more than 40 years ago. The wood turned out to be the same species as that identified by Ilic and the golden beads were pure copper. A project was initiated to try to explain how beads of pure copper could have been deposited between the wood cells. But the results were insufficient to solve the mystery.

Ilic's work is also helping enhance Australia's future economic prospects, through the identification of Australian timber species that can replace more expensive imported ones.

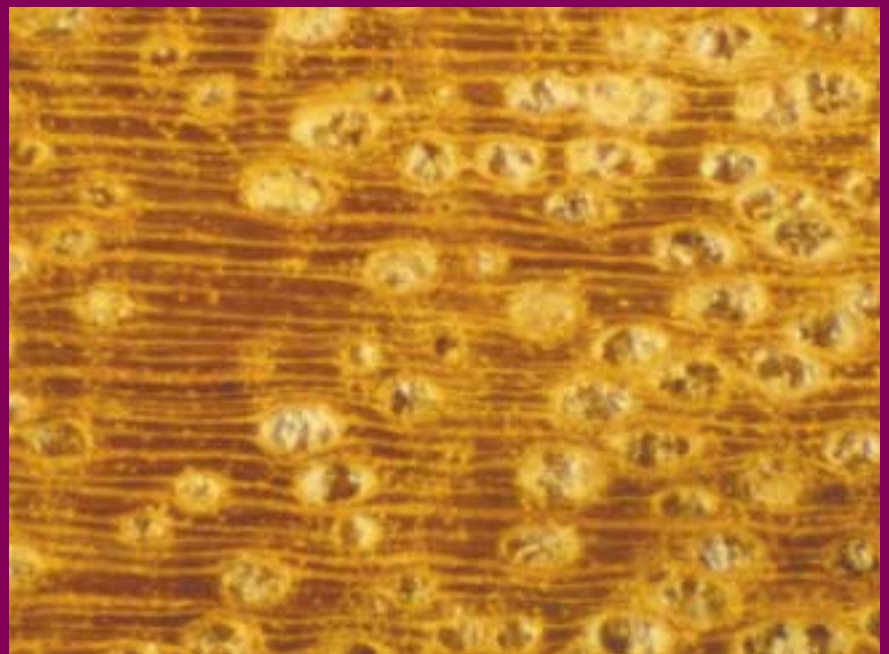
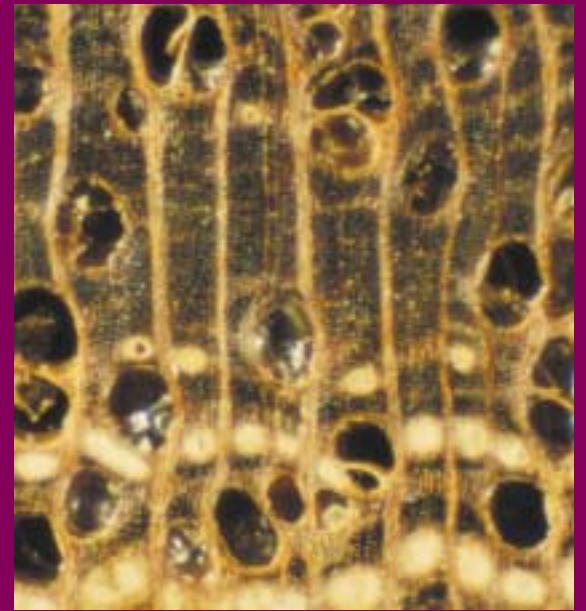
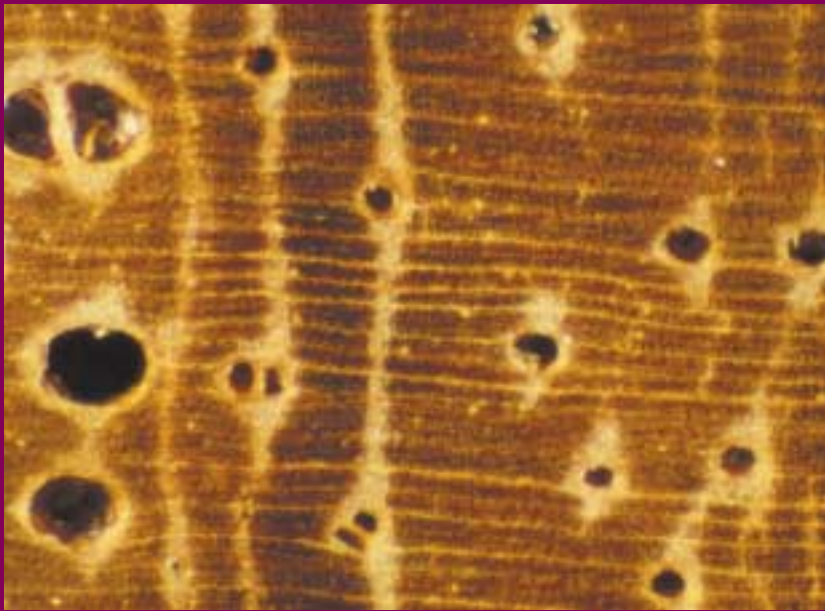
'By relating the structural aspects of imported timbers to previously unused Australian species, we are finding substitutes to boost our own timber industry. And in many cases the Australian species are superior to imported ones,' Ilic says.

Tasmanian oak, (messmate) and brush box, for example, are now used instead of Baltic pine for flooring, although brush box is becoming increasingly more difficult to source. Blackwood is used in place of imported mahogany and is proving to be more attractive. And many Australian dryland wattles appear to be harder than the hardest recorded timber: a species called *Lignum vitae*.

This is an edited version of a story by John Layton that first appeared in The Canberra Times' Panorama magazine.



Jugo Ilic at work in the Dadswell Wood Collection Library.



Microscopic grains of time.

Top left: South-East Asian rosewood (*Pterocarpus pedantus*) endgrain, showing large and small vessels which carry sap up the tree with wing-like and banded parenchyma tissue (rays) which are thin walled cells that are used for food storage.

Top right: Endgrain of meranti, *Shorea* sp., a South-East Asian timber mainly from Malaysia. It was used extensively for joinery in Australia. Today, it is scarce and expensive.

Above: A radial section of white cypress pine, *Callitris glaucophylla*, an Australian softwood. The dark spots are parenchyma (soft tissue) cells containing heartwood extractive compounds which are, in part, responsible for the timber's durability.

Above right: Alpine ash, *Eucalyptus delegatensis*.

Right: Yellow box, *Eucalyptus meliodora*.