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Munger's Banyan: Estimating Age by Radiocarbon

News context: PIB, 3 July 2026. Original paper: 23 April 2026 | Actual publication date: 20 October 2026 | Prelims - General Science and Natural Heritage

Why in the News

On 3 July 2026, PIB released the details of a scientific age-test of a banyan tree in Munger, Bihar. Samples from this Ficus benghalensis tree indicated a minimum age of about 700 years. The study is linked to researchers of the Birbal Sahni Institute of Palaeosciences, Lucknow - an autonomous institute under the Department of Science and Technology.

The news's main point is not only "old tree" but which sample was tested by which method and what conclusion follows from it. The paper was published on 23 April 2026; do not treat July's official discussion as the date the research was first published.

An important limit: the study says "the oldest accurately dated banyan". It should not be turned into a claim that every banyan on earth has been tested, or that Munger's tree is the oldest among all living trees. Scientific proof of age and a universal age-record are different things.

Diagram: pcsmantra.com's original method outline based on PIB, the original research abstract and Oxford's calibration details: samples from wood near the pith of a secondary trunk and an old main branch; alpha-cellulose separated; radiocarbon measured by AMS; calibrated with IntCal20 and OxCal. Limit of the conclusion: the sample's age indicates the tree's minimum age - not an exact planting day or a survey of all banyans.

Why Is Counting a Tree's Age Not Always Easy?

In many trees, clear annual growth rings can give time information. The method linked to the study of tree rings is called dendrochronology. But it is wrong to assume every tree has every ring clear, separate and exactly one year's. In the Munger study's details, the lack of clear annual rings in tropical broad-leaved trees is named as an obstacle.

The banyan has another difficulty. Its form can be like a web of many branches and secondary trunks. Taking the age of a young supporting trunk as the whole tree's age would not be right. Where the sample came from is as important a question as the figure found in the laboratory.

What Was Done in Munger?

Researchers took samples from wood near the pith of a secondary trunk and an old main branch. Wood around the pith can tell about that part's early growth. Alpha-cellulose was separated from the samples and radiocarbon was measured by Accelerator Mass Spectrometry (AMS).

Per PIB, the IntCal20 calibration curve and OxCal software were then used. These are not just big names: calibration is necessary to connect the laboratory's radiocarbon age to calendar years.

The Scientific Basis of Carbon-14

Atoms of the same element have the same number of protons but can have different numbers of neutrons. These are called isotopes. Carbon's atomic number is 6. Carbon-12 has 6 neutrons, carbon-13 has 7 and carbon-14 has 8.

Carbon-14 is radioactive, and its physical half-life is about 5,730 years. The half-life is the period in which half the initial amount of a radioactive isotope decays. This does not mean the sample's entire material disappears after exactly one half-life.

Radiocarbon dating is useful for estimating the age of carbon-containing material that was once alive, such as old wood. A sample of a tree's old wood tissue can be dated even if the whole tree is still alive. So "a radiocarbon test simply cannot happen on a living tree" is not a correct statement.

Why Are Radiocarbon Age and Calendar Age Different?

The ratio of carbon-14 in the atmosphere has not been the same throughout the past. So subtracting the laboratory's radiocarbon age directly from the current year to get an exact historical year is not right. Tree rings of known age and other independent records help build the calibration curve.

In the radiocarbon context, BP (Before Present) has the conventional base date 1950, not the current year of reading the article. Keep a second caution too: conventional radiocarbon ages are reported using the historical half-life convention of 5,568 years; carbon-14's physical half-life is about 5,730 years. Do not treat these two numbers as the same thing without context.

The calibrated result is often given as a probable age-range. Because of measurement uncertainty and the calibration curve's shape, there can be more than one probable calendar range. A scientific method does not mean getting an absolutely certain day-month-year in every situation.

The Correct Meaning of "Minimum Age"

If a sample from a tree's old part indicates roughly seven centuries ago, there is a basis that the tree is at least as old as that old part. This does not by itself give the exact day the tree's seed germinated, the year of the first branch, or the age of every later trunk.

In the original study, samples from different parts gave different radiocarbon ages. This need not be considered a contradiction: the parts of an old living tree can have formed at different times. The sample's age, that part's formation, and the whole organism's minimum age are conclusions at different levels.

Direction of Preparation from Past Questions

Towards the statement and correct-pair formats of UPSC Prelims 2023's official General Studies Paper-I, prepare isotope-neutron numbers, method use, and the difference between measurement and calibration. The questions below are original practice, not actual PYQs.

Prelims Style: Practice Questions

Question 1. Consider the statements:

1. Carbon-14 has 6 protons and 8 neutrons.

2. Carbon-14's physical half-life is about 5,730 years.

3. When one half-life passes, the entire quantity of carbon-14 in the sample ends.

How many of the above statements are correct?

(a) Only one (b) Only two (c) All three (d) None

▶ Answer and explanation

Question 2. Identify the correct statement:

(a) In the radiocarbon context, BP's base is each time the current year of the test (b) Calibration removes uncertainty completely in every situation (c) The IntCal20 calibration curve and OxCal software can be used to understand calendar age (d) Testing old wood tissue is possible only when the whole tree has died

▶ Answer and explanation

Question 3. Regarding the Munger banyan, what is the most proper conclusion?

(a) The samples gave a scientific estimate of the tree's minimum age (b) The age of every banyan on earth has been measured (c) Every branch and every secondary trunk formed in the same year (d) The exact day and month of the tree's planting was found

▶ Answer and explanation

Frequently Asked Questions (FAQ)

Short answer: on 3 July 2026, PIB released the details of a scientific age-test of a banyan tree in Munger, Bihar.

Question: What is the news related to Munger's banyan?

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years. The study is linked to researchers of the Birbal Sahni Institute of Palaeosciences, Lucknow.

Question: What was done in Munger?

Researchers took samples from wood near the pith of a secondary trunk and an old main branch. Wood around the pith can tell about that part's early growth. Alpha-cellulose was separated from the samples and radiocarbon was measured by Accelerator Mass Spectrometry (AMS).

Question: What does a tree's minimum age mean?

If a sample from a tree's old part indicates roughly seven centuries ago, there is a basis that the tree is at least as old as that old part. This does not by itself give the exact day the tree's seed germinated, the year of the first branch, or the age of every later trunk. In the original study, samples from different parts gave different radiocarbon ages.

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