

ivoryID Manual



How to use the database
<http://ivoryid.org>

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1. Age Determination

1.1 ^{14}C data input

This section starts with a check box from which hemisphere the sample derives from. The default value is **unknown**.

Measured ^{14}C concentrations which are detected by a low-level scintillation counter should be inserted in the respective field. It is also required to insert **dates** when the sample was **transported to the laboratory** and when the **analysis took place**.

1.2 Results of ^{14}C analysis

The "bomb-curve" had a rapid rise, peaking in ca. 1964, and a gradual decline. Thus, most samples from seizures are likely to be on the declining limb of the bomb curve. However, in certain cases, **two solutions of age** may be obtained (one between 1955 to 1965; the other 1965 to present). In certain cases where the problem of dual solutions of the ivory ^{14}C bomb curve needs to be resolved, measurement of ^{90}Sr or $^{228}\text{Th}/^{232}\text{Th}$ ratios is needed. In these cases, please **proceed with further analysis**.

The screenshot shows the 'Data entry' step of the ivoryID interface. It includes sections for 'Sample Details' (Reference Date: 2016-09-01), 'Radiometric Analysis' (Confidence Level: 95.0%), and '90Sr/Ca Analysis' (mean: 0.00035, s.d.: 0.0005, LL.D: 0.003). A green 'Analyze now' button is at the bottom.

1.3 ^{90}Sr data input

^{90}Sr is one such isotope: this is based on its production with ^{14}C due to nuclear weapons testing, but with a different rate of removal from the atmosphere (within less than a decade). Thus, the sample is compared with the calibrated " ^{90}Sr bomb-curve". Please **insert the respective ^{90}Sr values.**

1.4 Results of ^{90}Sr analysis

An unambiguous dating is enabled at following findings. If $^{90}\text{Sr}/\text{Ca}$ is lower than 0.003 Bq/g Ca the death occurred before about 1958. At values above 0.4 Bq/g Ca the time of death can be assumed to be occurred during about 1960 and 1970. If the interpretation is ambiguous, analysing thorium is a further possibility.

You can either visualize the results of the analysis by clicking on the respective button, or proceed with the Th analysis if the result is ambiguous.

The screenshot shows the 'Results' step of the ivoryID interface. It displays the result of the ^{90}Sr analysis as 'Most probable: 1965'. It provides two time ranges: 'before 1965' (1952-06-01 - 1958-11-01) and 'after 1965' (2016-02-01 - 2040-12-01). A warning message states 'Further analysis are recommended! Analysis result are not unambiguous. Further analysis is recommended.' Buttons for 'Analyze $^{232}\text{Th}/^{232}\text{Th}$ ' and 'Show results' are present.

1 Data entry
Enter your isotope values

2 Results
View your results

3 Save Results
Login and save your results

Sample Details

Reference Date: 2016-09-01
Reference Date: Date at which the ivory sample has been transported to the laboratory

Radionuclide Analysis

Confidence Level: 95.0 %
Students-Factor according to a confidence level of P

Date of analysis: 2016-09-01

$^{228}\text{Th}/^{232}\text{Th}$ Analysis

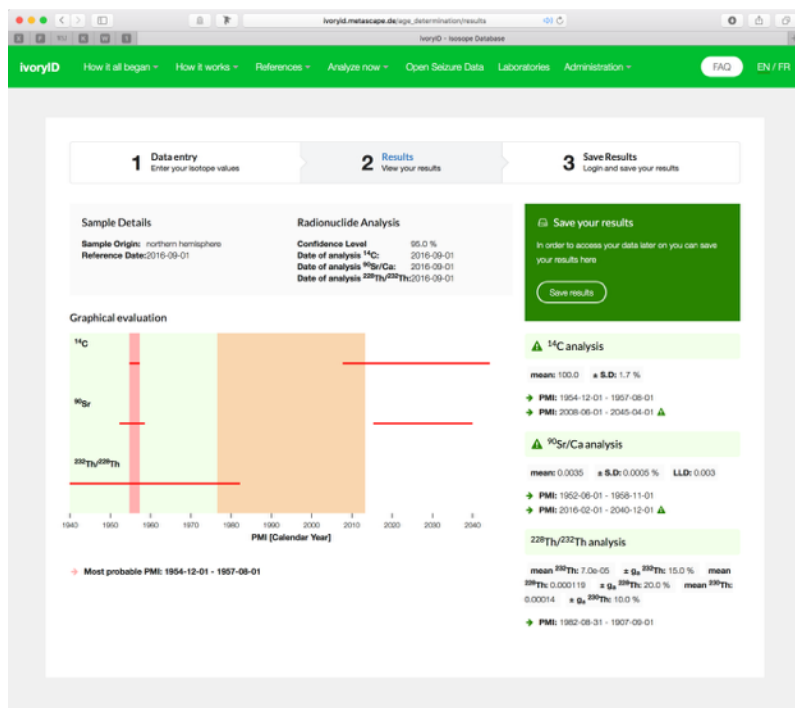
mean	\pm g	%
0.0007	10	%
0.00011	20	%
0.00014	15	%

1.5 Th Data input

An additional method is based on the relative uptake of radium (bio-available) compared to thorium (not bioavailable); this uses the in-growth of ^{228}Th from ^{228}Ra (half-life 5.7 years), resulting in a ratio of $^{228}\text{Th}/^{232}\text{Th}$ above that of secular equilibrium over time. This method will determine the absolute time since the tissue was formed and is independent of either "bomb-curve". With increasing time from death to analysis the ratio of activity of $^{228}\text{Th}/^{232}\text{Th}$ decreases from about 40 to about 1 if death occurred before 1968.

1.6 Overview of all results of age determination

This output summarizes the results of all tested radionuclides and indicates the most likely data of death.



The screenshot shows a web browser window with the URL `ivoryid.metscape.de/analysis/new`. The page title is "IvoryID - Isotope Database". The navigation bar includes links: "IvoryID", "How it all began", "How it works", "References", "Analysis now", "Open Seizure Data", "Laboratories", "Administration", "FAQ", and "EN / FR". The main content area is titled "Save Analysis" and contains a three-step process:

- 1 Data entry** (Enter your Isotope values):
 - Name & Inventory No.: Two input fields for "Name" and "Inventory No."
 - Year of seizure: One input field for "Year of seizure"
 - Notes: A large text area for "Notes"
 - Public Analysis: A checkbox labeled "Public" with a tooltip that says "When checked your analysis will be accessible to all other website users as well".
- 2 Results** (View your results)
- 3 Save Results** (Login and save your results)

A green "Save" button is located at the bottom left of the form.

1.7 Save your data

If you want to save your results, you have to create your own account while using the **log on button**. Thus, you can include additional data later on or you can research your data.

There is also an option as to whether your data are classified as public and can be seen and researched into by other users.

2. Origin Determination

2.1 Enter your isotope values

The database is set to run with five stable isotope ratios ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$, $\delta^{18}\text{O}$, $\delta^2\text{H}$, $\delta^{34}\text{S}$), but the determination of origin also runs with less than five values. However, it should be pointed out that accuracy of the assignment is higher the more isotope values are inserted.

2.2 View your results

- The test statistics plots the reference sample to one of the 386 geographical locations whose isotope signature is most similar to the test sample. The quality of the assignment is also assessed.
- You can also open and download a detailed report in pdf format, which provides more information about the statistics applied and the accuracy of the assignment.
- You can also add another sample from your seizure, which is added on the map.

No.	Location	Lat/Lon	Quality	Most probable year of death
1	Ugab River, Dorus, Northwest Namibia Download detailed report (PDF)	-20.50 / 15.36	uncertain	

Below the table are buttons: 'Analyze another sample', 'Save your results', 'or add to previous analysis', 'test origin', and 'Add'.

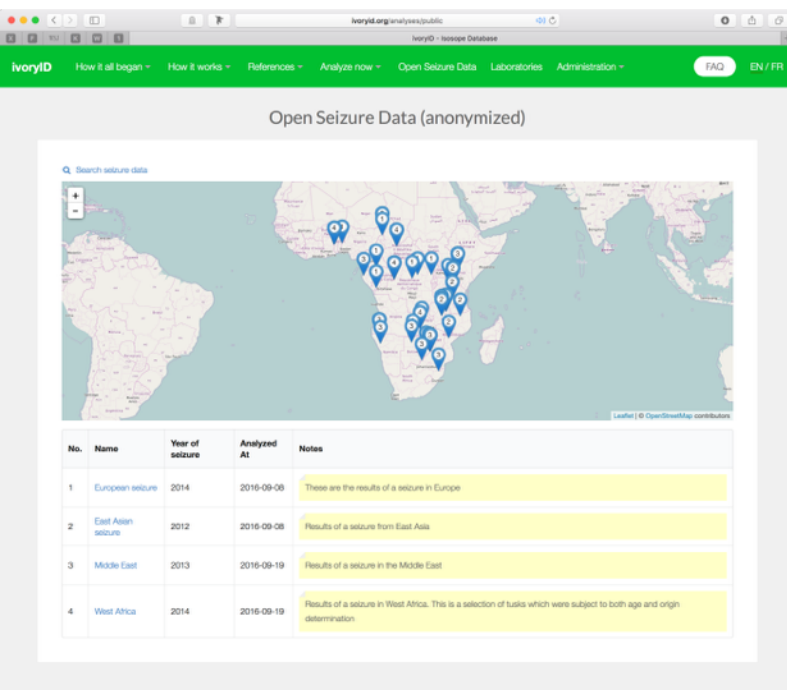
The screenshot shows a web browser window with the URL `ivoryid.org/analysis/new`. The page title is "IvoryID - Seizure Database". The navigation bar includes links: "IvoryID", "How it all began", "How it works", "References", "Analyze now", "Open Seizure Data", "Laboratories", "Administration", "FAQ", and "EN / FR". The main heading is "Save Analysis". The form is divided into three steps: 1. Data entry (Enter your isotope values), 2. Results (View your results), and 3. Save Results (Login and save your results). The "Data entry" step is active and contains four sections: "Name & Inventory No." with "Name" and "Inventory No." input fields; "Year of seizure" with a "Year of seizure" input field; "Notes" with a large text area; and "Public Analysis" with a "Public" checkbox and a yellow tooltip that says "When checked your analysis will be accessible to all other website users as well". A green "Save" button is at the bottom left. The footer includes "IvoryID", social media icons, "Federal Ministry for the Interior", "Moluccas", and "Partners".

2.3 Save your results

If you want to save your results, you have to create your own account while using the **log on button**. Thus, you can include additional data later on or you can research your data.

There is also an option as to whether your data are classified as public and can be seen and researched into by other users.

3. Open Seizure Data



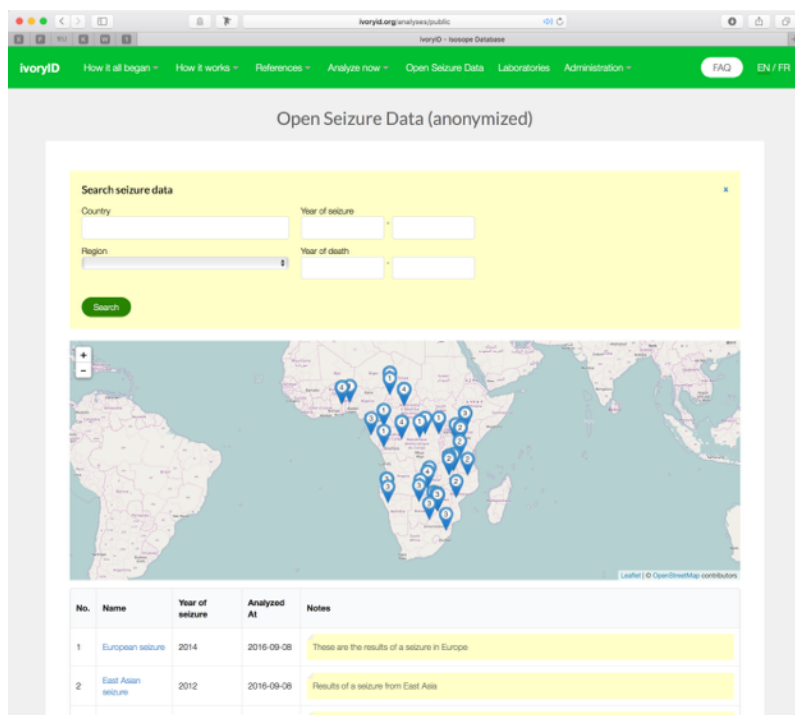
3.1 Open seizure data

Currently, this section only holds data from a range of seizures that have been analysed in the framework of the BfN project between 2012 and 2016. Those data can be assessed and searched into.

If you intend to share your own isotope data with other users, you need to classify your data data as public. Then the data can be seen and researched into by other users.

3.2 Search seizure data

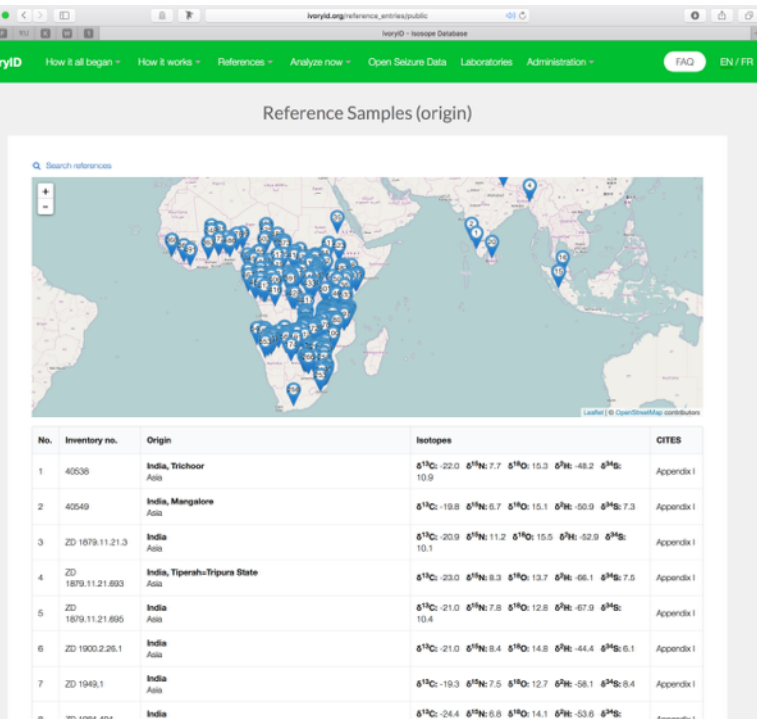
By clicking on the **Search seizures** button, open seizure data can be searched for variables, such as **Country, Region, Year of seizure, Year of death**.



4. Reference Samples

4.1 Reference Samples

The database holds isotope values of more than 700 reference samples from more 386 different locations throughout the ranges of distribution of the African and Asian elephant.



4.2 Search Reference Samples

By using the **Search references** button, the reference samples can be searched for isotope values (single and combined), Countries of origin, Region (West Africa, Central Africa, East Africa, Southern Africa, Asia) and CITES Appendices.

Search

Country: CITES: $\delta^{13}\text{C}$ (-30 to -5):

Region: $\delta^{15}\text{N}$ (5 to 20):

$\delta^{18}\text{O}$ (5 to 30):

$\delta^2\text{H}$ (90 to -5):

$\delta^{34}\text{S}$ (-5 to 25):

Map showing reference sample locations in Africa and Asia.

No.	Inventory no.	Origin	Isotopes	CITES
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