

ivoryID Manual



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

1. Age Determination	3
2. Origin Determination	7
3. Open Seizure Data	9
4. Reference Samples	10

1. Age Determination

The screenshot shows the 'Data entry' step of the IvoryID web application. The form is divided into three main sections: 'Sample Details', 'Radiocesium Analysis', and '¹⁴C Analysis'. In the 'Sample Details' section, 'Origin of Sample' is set to 'unknown'. 'Reference Date' is '2016-09-01'. In the 'Radiocesium Analysis' section, 'Confidence Level' is '95.0 %'. In the '¹⁴C Analysis' section, 'Date of analysis' is '2016-09-01'. The '¹⁴C Analysis' table shows a mean value of 100 and a standard deviation of 1.7. An 'Analyze now' button is at the bottom left.

1.1 ¹⁴C data input

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

Measured ¹⁴C 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 ¹⁴C 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 ¹⁴C bomb curve needs to be resolved, measurement of ⁹⁰Sr or ²²⁸Th/²³²Th ratios is needed. In these cases, please **proceed with further analysis**.

The screenshot shows the 'Results' step of the IvoryID web application. It displays the '¹⁴C analysis' results. The 'Most probable Pdt.' is shown as a range: 'before 1965' (1964-02-01 - 1967-03-01) and 'after 1965' (2011-04-01 - 2006-11-01). A warning message states: 'Further analysis are recommended! Analysis result were not unambiguous. Further analysis is recommended.' There are buttons for 'Analyze ¹⁴C/¹³C' and 'Show results'.

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.**

The screenshot shows the 'Data entry' step of the IvoryID interface. It includes a progress bar with three steps: '1 Data entry', '2 Results', and '3 Save Results'. The 'Sample Details' section has a 'Reference Date' field set to '2014-09-01'. The 'Radiounclide Analysis' section has a 'Confidence Level' field set to '95.0' and a 'Date of analysis' field set to '2014-09-01'. The ' $^{90}\text{Sr}/\text{Ca}$ Analysis' section has two input fields: 'mean' with a value of '0.00035' and 'S.D.' with a value of '0.0005', and 'LLD' with a value of '0.003'. An 'Analyze now' button is at the bottom left.

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.

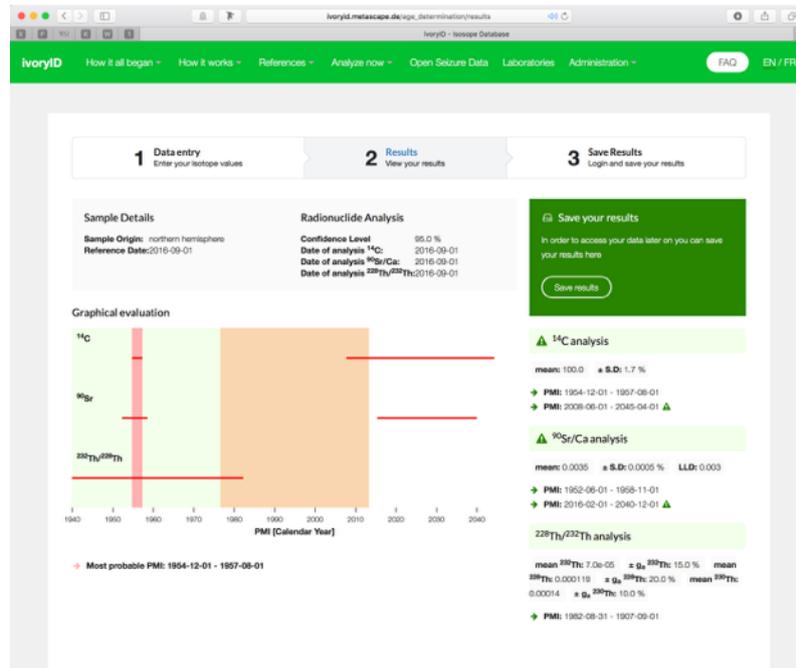
The screenshot shows the 'Results' step of the IvoryID interface. It displays the 'Result ^{90}Sr analysis' with a 'Most probable PMD' section. The results are categorized into 'before 1965' (1952-06-01 - 1959-11-01) and 'after 1965' (2016-02-01 - 2040-12-01). A warning message states 'Further analysis are recommended!' and 'Analysis result are not unambiguous. Further analysis is recommended.' There are 'Analyze $^{232}\text{Th}/^{232}\text{Th}$ ' and 'Show results' buttons.

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.



Save Analysis

1 Data entry
Enter your isotopic values

Name & inventory No. Name Inventory No.

Year of seizure Year of seizure

Notes

Public Analysis Public When checked your analysis will be accessible to all other website users as well

Save

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	Let./Lon.	Quality	Most probable year of death
1	Ugab River, Derust, Northwest Namibia Southern Africa	-20.50 / 15.36	uncertain	

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 for "How it all began", "How it works", "References", "Analyze now", "Open Seizure Data", "Laboratories", "Administration", "FAQ", and "EN / FR". The main content area is titled "Save Analysis" and features a three-step process:

- 1 Data entry**: Enter your isotope values.
- 2 Results**: View your results.
- 3 Save Results**: Login and save your results.

The "Save Results" step is active and contains the following fields:

- Name & Inventory No.**: Two input fields for "Name" and "Inventory No."
- Year of seizure**: One input field.
- Notes**: A large text area for entering notes.
- Public Analysis**: A checkbox labeled "Public" with a tooltip that reads: "When checked your analysis will be accessible to all other website users as well".

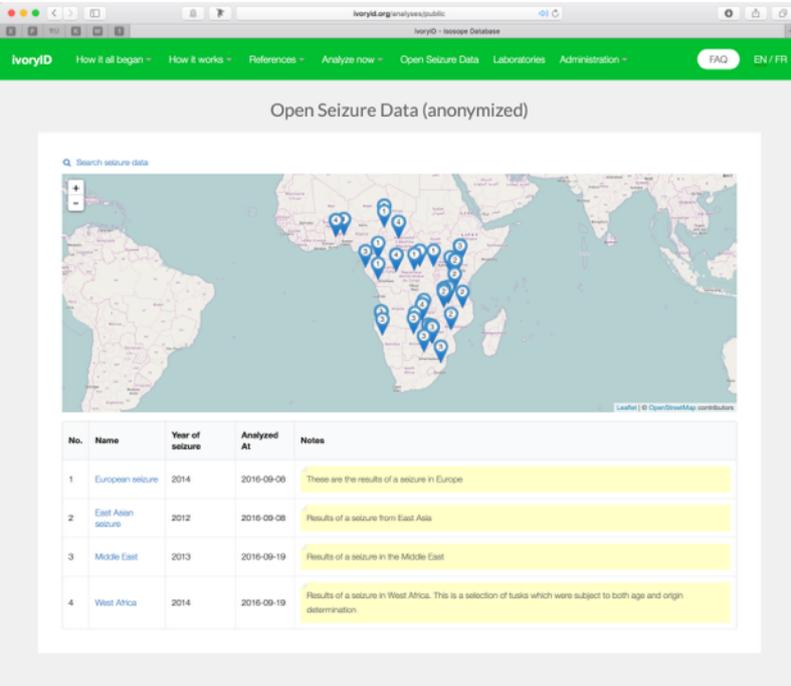
A green "Save" button is located at the bottom left of the form.

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



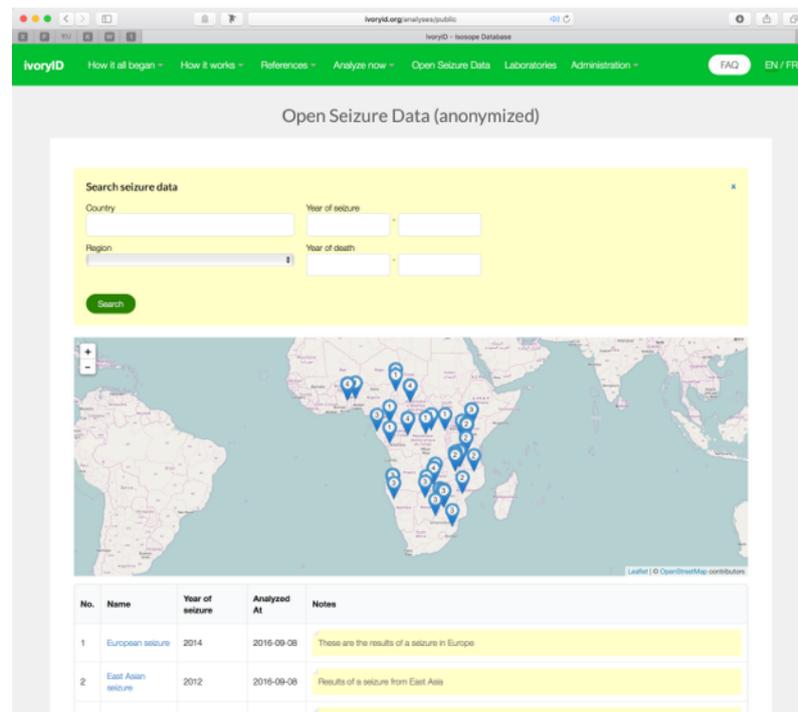
3.1 Open seizure data

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.

Reference Samples (origin)

Search references

No.	Inventory no.	Origin	Isotopes	CITES
1	40538	India, Trichoor Asia	$\delta^{13}\text{C}$: 22.0 $\delta^{15}\text{N}$: 7.7 $\delta^{18}\text{O}$: 15.3 $\delta^{21}\text{N}$: -48.2 $\delta^{34}\text{S}$: 10.9	Appendix I
2	40549	India, Mangalore Asia	$\delta^{13}\text{C}$: -19.8 $\delta^{15}\text{N}$: 6.7 $\delta^{18}\text{O}$: 15.1 $\delta^{21}\text{N}$: -50.0 $\delta^{34}\text{S}$: 7.3	Appendix I
3	ZD 1879.11.21.3	India Asia	$\delta^{13}\text{C}$: 20.9 $\delta^{15}\text{N}$: 11.2 $\delta^{18}\text{O}$: 15.5 $\delta^{21}\text{N}$: -52.9 $\delta^{34}\text{S}$: 10.1	Appendix I
4	ZD 1879.11.21.893	India, Tripurah-Tripura State Asia	$\delta^{13}\text{C}$: 23.0 $\delta^{15}\text{N}$: 8.3 $\delta^{18}\text{O}$: 13.7 $\delta^{21}\text{N}$: -66.1 $\delta^{34}\text{S}$: 7.5	Appendix I
5	ZD 1879.11.21.895	India Asia	$\delta^{13}\text{C}$: 21.0 $\delta^{15}\text{N}$: 7.8 $\delta^{18}\text{O}$: 12.8 $\delta^{21}\text{N}$: -67.9 $\delta^{34}\text{S}$: 10.4	Appendix I
6	ZD 1900.2.26.1	India Asia	$\delta^{13}\text{C}$: 21.0 $\delta^{15}\text{N}$: 8.4 $\delta^{18}\text{O}$: 14.8 $\delta^{21}\text{N}$: -44.4 $\delta^{34}\text{S}$: 6.1	Appendix I
7	ZD 1943.1	India Asia	$\delta^{13}\text{C}$: -19.3 $\delta^{15}\text{N}$: 7.5 $\delta^{18}\text{O}$: 12.7 $\delta^{21}\text{N}$: -58.1 $\delta^{34}\text{S}$: 8.4	Appendix I
...	...	India	$\delta^{13}\text{C}$: 24.4 $\delta^{15}\text{N}$: 6.8 $\delta^{18}\text{O}$: 14.1 $\delta^{21}\text{N}$: -53.6 $\delta^{34}\text{S}$:

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.

Reference Samples (origin)

Search

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

Region: $\delta^{15}\text{N}$ (0 to 20):

$\delta^{18}\text{O}$ (0 to 30):

$\delta^{21}\text{N}$ (90 to -5):

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

Search

No. Inventory no. Origin Isotopes CITES