

Experiment Report Form

The double page inside this form is to be filled in by all users or groups of users who have had access to beam time for measurements at the ESRF.

Once completed, the report should be submitted electronically to the User Office via the User Portal:

<https://www.esrf.fr/misapps/SMISWebClient/protected/welcome.do>

Reports supporting requests for additional beam time

Reports can be submitted independently of new proposals – it is necessary simply to indicate the number of the report(s) supporting a new proposal on the proposal form.

The Review Committees reserve the right to reject new proposals from groups who have not reported on the use of beam time allocated previously.

Reports on experiments relating to long term projects

Proposers awarded beam time for a long term project are required to submit an interim report at the end of each year, irrespective of the number of shifts of beam time they have used.

Published papers

All users must give proper credit to ESRF staff members and proper mention to ESRF facilities which were essential for the results described in any ensuing publication. Further, they are obliged to send to the Joint ESRF/ ILL library the complete reference and the abstract of all papers appearing in print, and resulting from the use of the ESRF.

Should you wish to make more general comments on the experiment, please note them on the User Evaluation Form, and send both the Report and the Evaluation Form to the User Office.

Deadlines for submission of Experimental Reports

- 1st March for experiments carried out up until June of the previous year;
- 1st September for experiments carried out up until January of the same year.

Instructions for preparing your Report

- fill in a separate form for each project or series of measurements.
- type your report, in English.
- include the reference number of the proposal to which the report refers.
- make sure that the text, tables and figures fit into the space available.
- if your work is published or is in press, you may prefer to paste in the abstract, and add full reference details. If the abstract is in a language other than English, please include an English translation.



	Experiment title: Characterisation of the brain size in Late Permian (~255 Ma) mammal forerunners	Experiment number: ESS 339
Beamline:	Date of experiment: from: 07 Oct 2015 to: 12 Oct 2015	Date of report: 17 Feb 2017
Shifts:	Local contact(s): Paul Tafforeau (email: paul.tafforeau@esrf.fr) Vincent Fernandez (email: vincent.fernandez@esrf.fr)	<i>Received at ESRF:</i>
Names and affiliations of applicants (* indicates experimentalists): Julien Benoit, Evolutionary Studies Institute, University of the Witwatersrand (Johannesburg, South Africa)		

Report:

The aim of the experiment was to characterize the nervous system and internal structures in four therapsids (specimen numbers: AM6556; NMQR1702; WB123; SAM-PK-11112), the ancestors of modern mammals.

Data was collected with great success. It was used to segment, digitally reconstruct in 3D, and measure the bony labyrinth (cast of the inner ear capsule) and endocranial cast (cast of the brain capsule) in order to highlight the evolution of brain and inner ear anatomy in mammalian forerunners. These results highlight the evolution of the inner ear, brain and behaviour at the deep evolutionary root of the mammalian clade.

So far, they led to the publication of one article:

Benoit J., Fernandez V., Manger P.R. and Rubidge B.S. (2016) Cranial bosses of *Choerosaurus dejageri* (Therapsida, Therocephalia): earliest evidence of cranial display structures in eutheriodonts. PLoS ONE 11(8): e0161457.

Another article is in review for publication in PeerJ:

Benoit J., Manger P.R., Norton L.A., Fernandez V. and Rubidge B.S. (in review) Synchrotron scanning reveals the palaeoneurology of the head-butting *Moschops capensis* (Therapsida, Dinocephalia). PeerJ.

In addition, two other articles are currently in preparation and will be submitted soon :

Benoit J., Fernandez V., Manger P.R. and Rubidge B.S. (in prep.) The bony labyrinth of Late Permian Biarmosuchia : Palaeobiology and diversity in non-mammalian Therapsida

Benoit J., Fernandez V. and Rubidge B.S. (in prep) The early evolution of endothermy in non-mammalian therapsids unveiled by synchrotron scanning.

Dr. Vincent Fernandez (ESRF) is associated as a co-author in all these papers.