

## 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.



	<b>Experiment title:</b> Fin spine vasculature as a test for homology and gnathostome interrelationships	<b>Experiment number:</b> EC688
<b>Beamline:</b> ID 19	<b>Date of experiment:</b> from: 29 Aug 2010 to: 31 Aug 2010 14 March 2011 to: 16 March 2011	<b>Date of report:</b> 5 Feb 2018
<b>Shifts:</b> 12	<b>Local contact(s):</b> Sophie Sanchez and Paul Tafforeau	<i>Received at ESRF:</i>
<b>Names and affiliations of applicants (* indicates experimentalists):</b>  Anna Jerve* Per Ahlberg* Sophie Sanchez* Min Zhu Henning Blom Qingming Qu* (not listed as an applicant, but assisted during the experiment) Barbro Bornsäter Mellbin* (not listed as an applicant, but assisted during the experiment) Vincent Dupret* (not listed as an applicant, but assisted during the experiment)		

## Report:

Experiment EC688 was split up into two-scan sessions. In August 2010, we successfully scanned the fin spine and scale from a putative early fossil bony fish, *Lophosteus* (**4**), a dorsal ridge spine from the placoderm, *Romundina* (**1**), several acanthodian spines that were collected in Skåne, southern Sweden (**2**), and a possible fin spine from the Devonian of Scotland.

During the second session in March 2011, we finished scanning the Swedish fin spines started in August 2010, in addition to material from China and Estonia. We successfully obtained high- and low-resolution data for the Swedish material (**2**), but only got low-resolution data for the Chinese and Estonian material due to some technical problems that occurred during the experiment. A similar error occurred whilst scanning some other material and we ended up having to cancel those scans as well. We noticed that some of the Chinese material was not scanning very well, possibly due to diagenetic alteration. In the end, a few of the low-resolution scans of the Chinese material showed that some of these spines have a different paleohistology compared to other morphologically similar fin spines from other taxa (**3**). Unfortunately, we have been unable to publish these data in a scientific journal without accompanying high-resolution scans.

Three publications (**1,2,4**) and one doctoral thesis (**3**) have come from experiment EC688. I have included the full citation and some images from the published journal articles below. We have yet to publish the Scottish material, as we are still unable to determine with complete certainty that these fossils are indeed fin spines. However, preliminary results from these fossils and other data collected during the experiment were presented at the Society of Vertebrate Paleontology annual meetings in 2010 and 2011. (*Please note:* abstracts are not included as it would make the document exceed the 2-page limit for the report.)

## Conferences:

**2011.** Poster. Evidence of endochondral ossification in (possible fin-) spines from the Upper Devonian, Scat Craig Locality, Scotland. Society of Vertebrate Paleontology annual meeting. Nov 1-5. Las Vegas, Nevada

**2010.** Talk. Modes of gnathostome fin spine development inferred from three-dimensional histology. Society of Vertebrate Paleontology annual meeting. October 2010. Pittsburgh, Pennsylvania

## Publications:

**1.** Jerve, A., Qu, Q., Sanchez, S., Ahlberg, P.E., and Haitina, T. **2017.** Vascularization and odontode structure of the fin spine of *Romundina stellina* Ørvig 1975. *PLoS One* 12 (12): e0189833. doi:10.1371/journal.pone.0189833

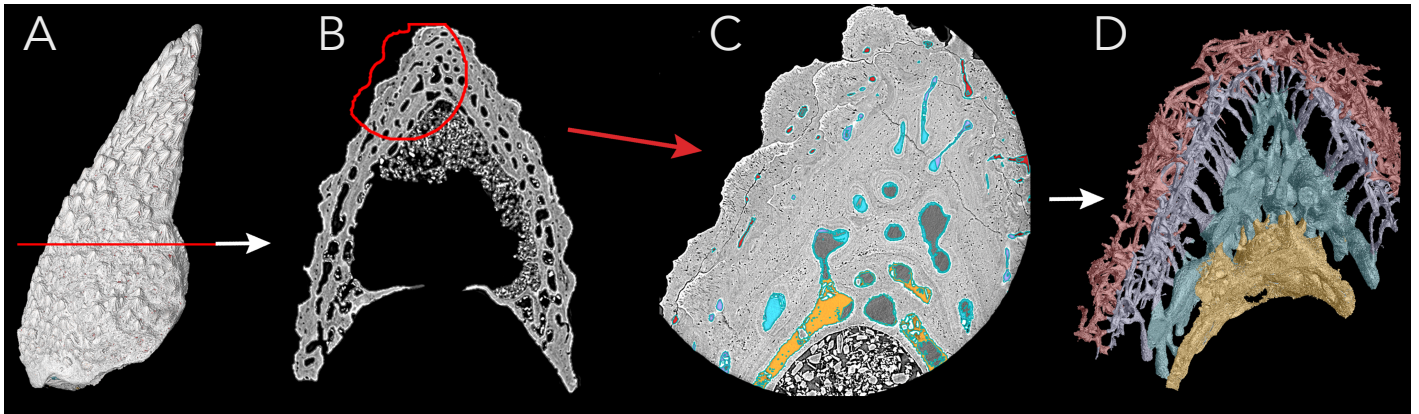
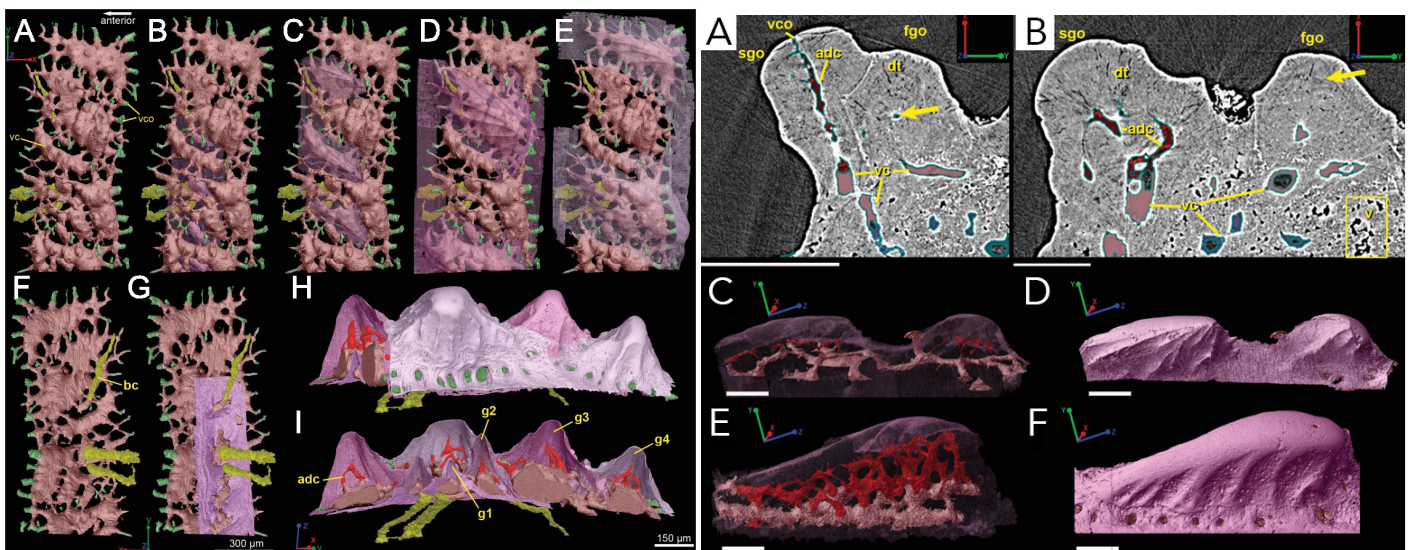


Image showing a progression from a low-resolution (voxel size: 7.46  $\mu\text{m}$ ) (A) reconstruction and (B) scan slice of the dorsal ridge spine of *Romundina stellina* to the high-resolution (voxel size: 0.678  $\mu\text{m}$ ) (C) region of interest and (D) resulting reconstruction of the vascularization in that portion of the spine. Scale bars are: A, B: 2000  $\mu\text{m}$ ; C, D: 350  $\mu\text{m}$ .

**2.** Jerve, A., Bremer, O., Sanchez, S., and Ahlberg, P.E. **2017.** Morphology and histology of acanthodian fin spines from the Silurian Ramsåsa E locality. *Palaeontologia electronica* 20.3.56A: 1-19. doi:10.26879/749

**3.** Jerve, A. **2016.** *Development of three-dimensional histology of vertebrate dermal fin spines.* PhD thesis. Acta Universitatis Upsaliensis Upsala, Uppsala University.

**4.** Jerve, A., Qu, Q., Sanchez, S., Blom, H., and Ahlberg, P.E. **2016.** Three-dimensional paleohistology of the scale and median fin spine of *Lophosteus superbus* (Pander 1856). *PeerJ* 4:e2521. doi:10.7717/peerj.2521



Images from publication 4 showing the three-dimensional vasculature of *Lophosteus superbus* of the scale ((left) and the vascularization of individual odontodes in the fin spine (right), both from high-resolution data (voxel size: 0.678  $\mu\text{m}$ ). Scale bar in the right image is 200  $\mu\text{m}$ .