

SSEF - ETH Zurich collaboration achieves major breakthrough in pearl research: DNA fingerprinting and age dating of pearls

Basel, Switzerland --October 16, 2013: Researchers at the Swiss Gemmological Institute SSEF and the Swiss Federal Institute of Technology Zurich ETHZ have successfully extracted oyster DNA from pearls, allowing them to trace and fingerprint pearls from different origins. This is the first report of oyster DNA extraction from a pearl. The researchers' results have just been published in the international open-access journal [PLoS ONE](#), and the technology is currently being patented.

The team of Swiss researchers was able to recover minute amounts of DNA from a wide range of pearls. The amount of recovered DNA was sufficient to identify the mother oyster species of studied pearls. The sampled pearls came from *Pinctada maxima*, *Pinctada margaritifera* and *Akoya* oysters, which are the most important species in the trade of natural and cultured marine pearls. Samples also included *Pinctada radiata* pearls from the Arabian/Persian Gulf, *Pinctada maxima* from both Australia and Indonesia and *Pinctada margaritifera* from Fiji and French Polynesia.

By collaborating with the Institute of Integrative Biology (IBZ) of ETH Zurich, the research team had access to extensive DNA extraction expertise and technology. The project was led by Dr. Joana Meyer of ETH Zurich and Laurent Cartier of SSEF. This two-year research project funded by the Swiss Gemmological Institute SSEF was carried out to advance knowledge about pearls and to investigate the possibility of using DNA to carry out geographic origin determination of pearls.

An important part of this project was the development of a practically non-destructive technique to extract DNA so as to preserve the commercial value of tested historic and modern pearls. In one sample, 10 mg of drilled sample powder (see figure below) was sufficient to successfully identify the pearl-oyster species based on extracted DNA material.

Dr. Michael S. Krzemnicki, director of SSEF, commented: "This is a breakthrough in pearl science and opens up new and interesting opportunities for future pearl research and testing. We are constantly exploring new scientific methods to test pearls and are excited about this new method we have developed in collaboration with scientists at ETH Zurich, one of the world's leading universities. "

He went on to say: "These new methods give us a considerable advantage in distinguishing different types of pearls and for the future documentation of historic pearls. We hope to add them as client services in the near future."

New developments in pearl science

This development builds upon another pearl research project on age determination of pearls. This particular project was carried out by Dr. Michael S. Krzemnicki (SSEF) and Dr. Irka Hajdas from the Ion Beam Physics Lab of ETH Zurich, showing that the age of a pearl can be determined. This research was recently published in the international journal [Radiocarbon](#), and further research is currently underway on a larger number of pearl samples of different ages.

Combining these two powerful methods – DNA fingerprinting and age determination- will improve traceability in the pearl industry and offers new ways of documenting the provenance of both cultured and natural pearls, but will also will be helpful in documenting historic natural pearls.

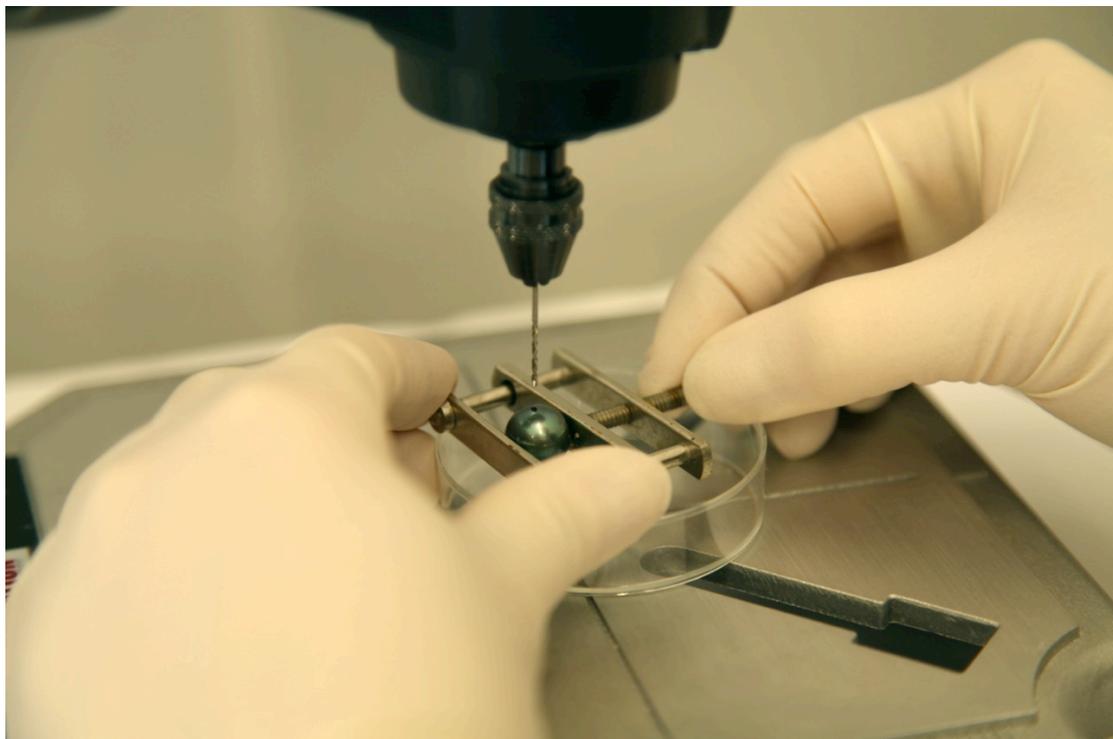


Figure 1: Pearls are drilled in a practically non-destructive manner to extract material that contains oyster DNA

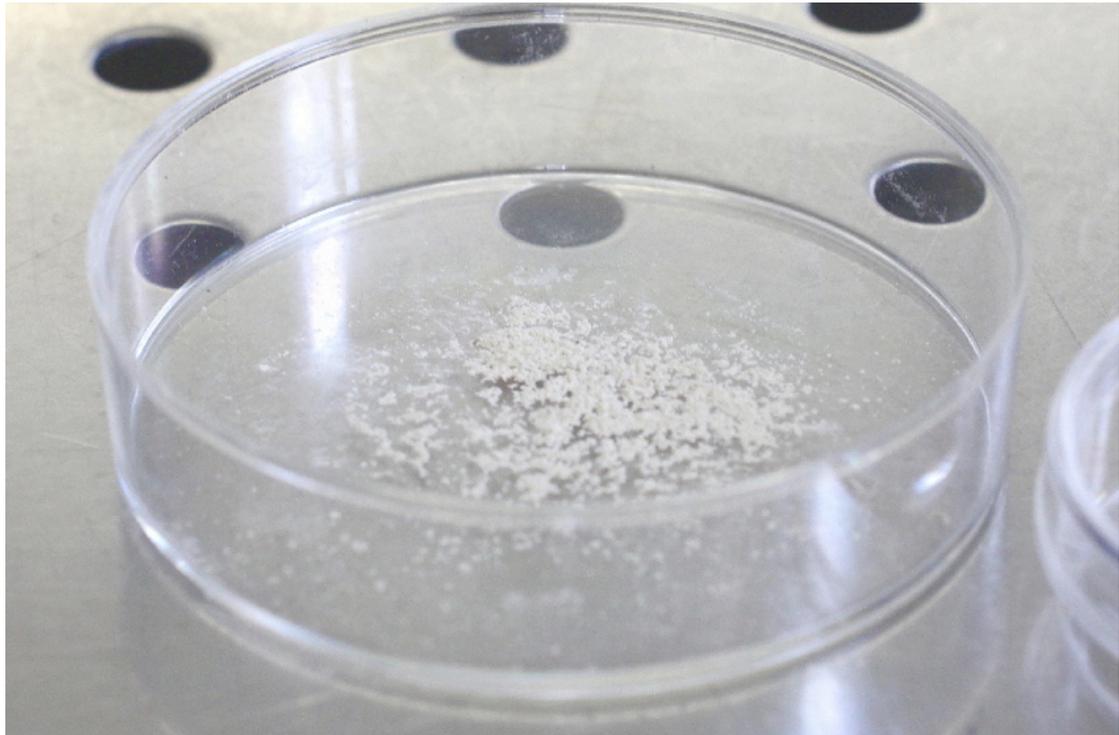


Figure 2: Small amounts of recovered pearl powder from pearl samples that contains DNA.

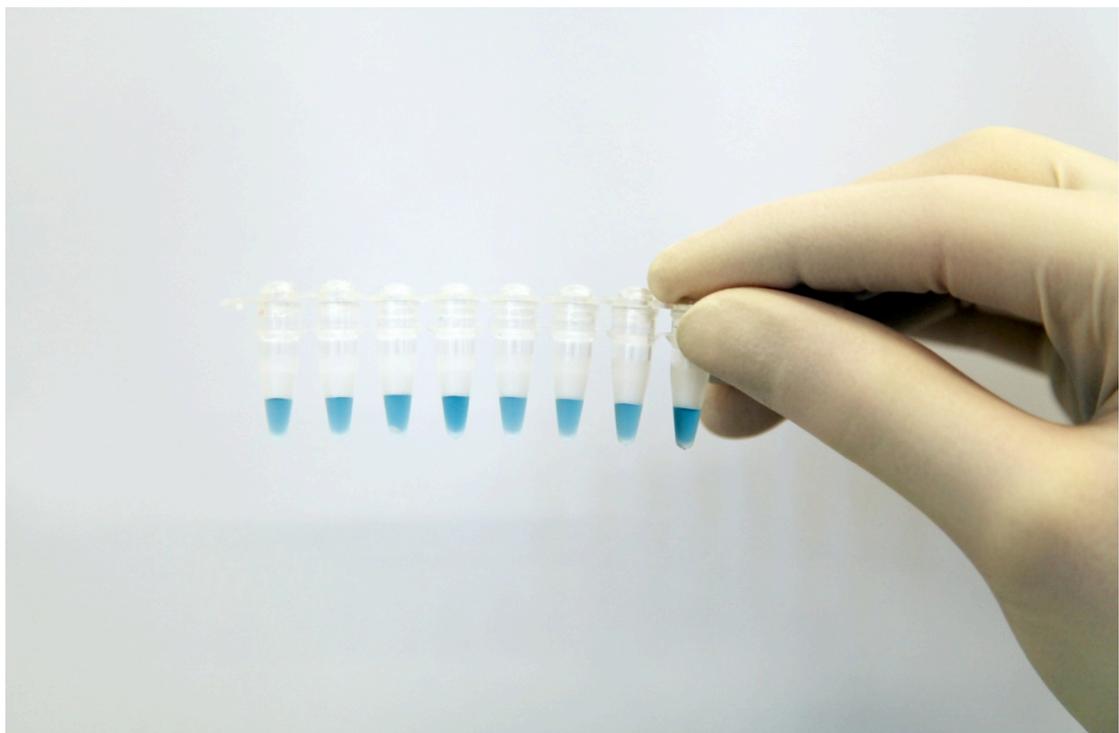


Figure 3: The extraction of DNA from sample material extracted from 8 tested pearls.

References

Meyer, J.B., Cartier, L.E., Pinto, E., Krzemnicki M.S., Hänni, H.A., McDonald B.A., (2013). DNA fingerprinting of pearls to determine their origins. PlosOne. [Link to article](#).

Krzemnicki, M. S., Hajdas, I. (2013). Age Determination of Pearls: A New Approach for Pearl Testing and Identification. *Radiocarbon*, 55(3–4). 1801-1809. [Link to article](#).

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About SSEF: The Swiss Gemmological Institute SSEF, part of the Swiss Foundation for the Research of Gemstones was founded by Swiss trade organisations in 1974 and works independently on a scientific basis. SSEF provides independent expert advice in the field of precious stone and pearl analysis to a wide clientele. It is one of the leading gemmological laboratories in the world and has certified many of the most exceptional natural pearls sold at auction in recent years. For further information about SSEF research on pearls and pearl treatments, see [website](#) . SSEF also offers an [Advanced Pearl Course](#) focusing on identification of natural and cultured pearls and detection of pearl treatments.

About ETH Zurich: The Swiss Federal Institute of Technology ETH Zurich was founded in 1855. It is consistently ranked one of the best universities in the world.