

Quest for Biological Information in Ancient Life

–from bioinformatics to the resurrection of extinct species–
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Research Area

1. Proteomics in extinct animals.
2. Genomics in extinct animals.
3. Recovery of cellular/nuclear functions in extinct animals.
4. Induction of totipotency by cellular reprogramming in differentiated cells.
5. Derivation of pluripotent stem cells and *in vitro* production of germ cells in extinct/endangered animals.
6. Development of reproductive biotechnology in endangered animals.

Tissues → Protein extraction & trypsin digestion



Woolly mammoth calf "YUKA" died c. 28,000 years ago and excavated from permafrost"

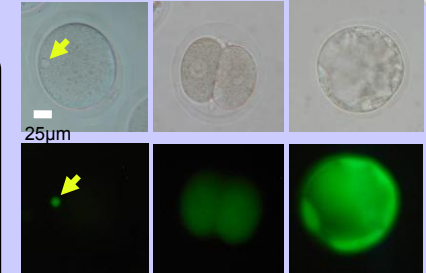
Comprehensive acquisition of MS/MS spectrum.



nanoLC-connected triple TOF MS spectrometer

Homology-based protein identification

Protein database of mammalian species



Development of somatic cell nuclear transferred egg. Donor cell was derived from GFP-transgenic mice. (Left) An oocyte injected with somatic cell nucleus. (Middle) 2-cell stage embryo (24 hpi). (Right) Blastocyst (96hpi).

Recent Activities

- Reprogramming towards totipotency is greatly facilitated by synergistic effects of small molecules. *Biol. Open* 6(4): 415-424, 2017
- Testis-specific histone variant H3t gene is essential for entry into spermatogenesis. *Cell Rep.* 18(3): 593-600, 2017
- Altered acetylation of proteins in patients with rheumatoid arthritis, revealed by acetyl-proteomics. *Arthritis Res. Ther.* 33(6): 877-886, 2015