

April 24, Tuesday / 16:00~17:00

Speaker: Prof. Peter Waddell

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Title: Quantitative Assessment of Phylogenetic Indels  
and the Root of Placental Mammals

Venue: OIST Initial Research Project Lab, Seminar Room

#### Abstract :

Recently sequenced genomes of mammals and other vertebrates involve vast amounts of data. Ultimately, it is hoped that these will provide direct and detailed information on an extensive list of biological processes, such as transcriptional regulation. A key challenge is to separate selection, the sign of function, from mutation, a background process analogous to erosion. At present, genome-scale sequences are providing a wealth of new information on mutation processes, including DNA insertion and/or deletion.

Indels are supplanting sequence substitutions for deep phylogenetic inference, so it is essential that they can be accurately modeled. However, thus far, surprisingly little is known of their phylogenetic properties or how these may illuminate their biology. Here we give an example of novel quantitative analysis of a 2mb pair region in primates.

One of the hardest parts of the mammal tree to resolve is the location of the root [1]. It is unclear which of the three hypotheses, Epitheria (Xenarthra diverging first), Atlantogenata (Xenarthra with Afrotheria) or Exafricoplacentalia (Afrotheria first) is correct. Indel data are “sifted” from gigabases of aligned sequence. Finding a data configuration of 51 for Boreotheria with just 2 and 1 supporting alternatives, and finding 4 15 3 for Epitheria, Atlantogenata and Exafricoplacentalia (respectively), rejects the alternatives with  $p < 0.05$  [2]. Estimating the ancestral population sizes of mammals at such an ancient age is shown to be particularly difficult, but potentially soluble.

Finally, we look at how deletions have modified the transcriptional regulatory region of the essential cancer gene TP53. We illustrate how we are using cell lines to investigate their impact upon the evolution of cancer regulation across Mammalia.

#### References:

[1] WADDELL, P.J., N. OKADA, AND HASEGAWA (1999). *Towards resolving the interordinal relationships of placental mammals*. *Systematic Biology* 48: 1-5.

[2] WADDELL, P.J., H. KISHINO, AND R. OTA. (2001). *A phylogenetic foundation for comparative mammalian genomics*. *Genome Informatics Series* 12: 141-154.