BAOJ Biotechnology

Kai Wang, BAOJ Biotech 2016, 2: 1
2: 010

Mini Review

The New Age, the New Cytogenetics

Kai Wang*

*Center for Genomics and Biotechnology, Fujian Agriculture and Forestry University, China

Cytogenomics arises from the integration of classical molecular cytogenetics and the new technologies available to study chromosome biology [1]. The new sequencing technologies, the array-based analysis of genomic diversity, the broader application of chromatin immuno-precipitation, and the use of chromosome conformation capture technologies, have contributed to the expansion of molecular cytogenetics into the field of "cytogenomics." [2, 3] That is, cytogenetics has gone beyond the limits of optical resolution.

In the last 15 years, >50 plant genomes have been published, with half of them in the last two years thanks to the recently available sequencing technologies [4]. These works have demonstrated that plant genomes are highly complex and were subjected to chromosome rearrangement events during the course of evolution, including whole-genome duplications and complex chromosomal rearrangements responsible for chromosome number variations. These studies have also revealed that structural variation is an important contributor to plant genetic diversity. Elucidation of the sequence of events that led to the extant genomic diversity and organization in plants will certainly benefit by a multidisciplinary approach involving comparative genomics, cytogenetics and other disciplines [2]. Integration of such approaches and knowledge are instrumental in understanding karyotype diversity and genome organization in closely related taxa, characterizing and understanding the evolution and the function of highly repetitive sequences as well as specific chromosome structures, such as centromeres and knobs, that remain difficult to access using the current sequencing technologies [5] Therefore, the exchanging of mutidiciplinary technologies with the classical cytogenetics has improved greatly the concept and application for modern cytogenentics. We believe that the new cytogenentics will bring us with more deeply knowledge on the genome structure and behavior of plant.

References

1. Speicher MR, Carter NP (2005) The new cytogenetics: blurring the boundaries with molecular biology. Nat Rev Genet 6: 782-792.

2. Ferguson Smith MA (2015) History and evolution of cytogenetics. Mol Cytogenet 8: 19.

3. Robinson T J, Yang F (2012) Molecular cytogenetics: karyotype evolution, phylogenomics and future prospects. Heredity 108: 1-3.

4. Michael TP, Jackson S (2013) The First 50 Plant Genomes. The Plant Genome 6.

5. McKinley KL, Cheeseman IM (2016) The molecular basis for centromere identity and function. Nat Rev Mol Cell Biol 17: 16-29.

***Corresponding author:** Kai Wang, Center for Genomics and Biotechnology, Haixia Institute of Science and Technology, Fujian Agriculture and Forestry University, Fuzhou, Fujian 350002, China, E-mail: kwang5@126.com

Sub Date: April 19, 2016, **Acc Date:** April 24, 2016, **Pub Date:** April 26, 2016.

Citation: Kai Wang (2016) The New Age, the New Cytogenetics. BAOJ Biotech 2: 010.