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Comparative Cytogenetic Study on Male and Female Captive Sumatran Elephant in Elephant Training Center, Way Kambas National Park

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Abstract

Sumatran elephant (*Elephas maximus sumatranus*) was one of five big mammals in Way Kambas National Park (WKNP). Cytogenetic study was a part of conservation effort for sumatran elephant, especially in conservation genetic field. Captive sumatran elephant's blood in Elephant Training Center (ETC) WKNP was collected to karyotype analysis. Captive sumatran elephant's chromosome was analyzed by squashing technique with pretreating cells in a hypotonic solution. The study of karyotypes were made by giemsa staining applied to captive elephant's blood cell. The diploid number of captive sumatran elephant was 56 both in male and female. The karyotype analysis performed different fundamental number in male and female, both of total fundamental number (FN) and autosomal fundamental number (FNa). Chromosome of female sumatran elephant showed the FN = 8, and FNa = 6, but in male sumatran elephant FN = 7, and FNa = . The karyotypes of X chromosome was large submetacentric and Y chromosome was small acrocentric.. The karyotype presented here will compilled with DNA fingerprinting analysis of all captive sumatran elephant in ETC WKNP as references in future breeding policy.

Keywords: captive sumatran elephant, karyotype analysis

Background

Sumatran elephant (*Elephas maximus sumatranus*) was one of five big mammals in Way Kambas National Park (WKNP), besides sumatran rhino, sumatran tiger, tapir, and bear. International Union for Conservation of Nature and Natural Resources (IUCN) classified the sumatran elephant as critically endangered species since 2011 (Gopala et al., 2011). In WKNP, sumatran elephant was categorized as wild elephant and captive elephant. The captive sumatran elephant can be found in Elephant Training Center (ETC) WKNP.

Rustiati & Priyambodo (2016) were collected the DNA samples of sumatran elephant for preliminary study of philogenetic analysis in order to decreased the negative effect of gene flow in small population of ETC WKNP. The cytogenetic study of captive sumatran elephant in ETC WKNP has not been done. Vaughn (1986) has suggested that proboscideans may have entered the final stages of their most interesting history. Despite this, these giants among terrestrial mammals are relatively poorly studied cytogenetically. Previous cytogenetic studies have been reported for asiatic elephant (Hungerford et al., 1966; Norberg, 1969). To our knowledge, however, no banded karyotypes have been published for either species, although Cand R-banding and NOR staining were used in a cursory cytogenetic examination of the asiatic elephant (Hartl et al., 1995).

Materials and Methods

Chromosomes from two sumatran elephants were harvested from cultured blood with fixated by formaldehid. All the samples were acquired form captive population in Elephant Training Center, Way Kambas National Park, Lampung, Indonesia. Pro-metaphase chromosomes of all samples were examined by Giemsa staining method. Autosomes were arranged in order of size with acrocentric/telocentric autosomal pairs preceding metacentric/ submetacentric pair). All karyotypes presen-

ted here represent the complete chromosome compement of single pro-metaphase cell.

The fundamental number (FN) of each karyotype ware calculated from visible major chromosomal arms per set of chromosomes, and the autosomal fundamental number (FNa) of a karyotype each karyotype ware calculated from visible major chromosomal arms per set of autosomes (non-sex-linked chromosomes) (Kim et al, 2005).

Results and Discussion

The normal diploid number of the sumatran elephant was 56 (Fig. 1). Hartl (1995) reported 10 individuals with diploid chromosome numbers of 56, as well as one individual with a diploid number of 55 derived by centric fusion. The normal (2n = 56) karyotype consisted of 24 acrocentric/telocentric autosomal pairs and three metacentric/submetacentric autosomal pairs. Chromosome complements were 2n = 56 although it was distinguished by having one less small acrocentric pair and one additional small submetacentric pair.

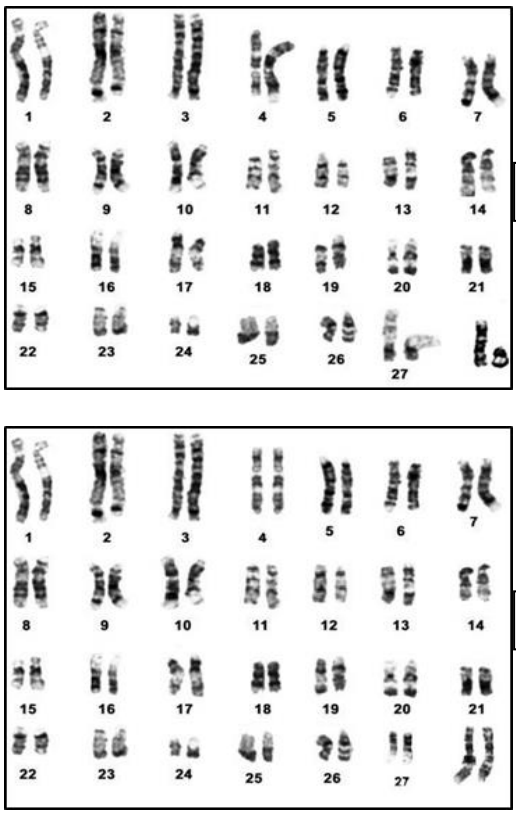

Figure 1. Cytogenetic analysis for Agam (A) and Bunga (B)

Chromosome complements were 2n = 56 in *E. maximus* was distinguished by having one less small acrocentric pair and one additional small submetacentric pair. The presence of a distinct heterochromatic short arm for metacentric pair 27 of *E. Maximus*. Fundamental number (FN) is the number of visible mayor chromosomal arm per set chromosomes. Fundamental autosomal number (FNa) is the number of visible mayor autosomal arm per set chromosomes. Agam has FN = 7, and FNa = 6; Bunga has FN = 8, FNa = 6.

Conclusion

Both of male and female sumatran elephant have 27 autosomes, included 23 acrocentric/telocentric, and three submetacentric/metacentric. Both of male and female sumatran elephant has large submetacentric X, and small acrocentric Y found in male sumatran elephant

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