CHARACTERIZATION OF CHROMOSOMAL AND REPETITIVE ELEMENTS IN THE GENOME OF *RANA NIGROVITTATA* (ANURA, RANIDAE): REVEALED BY CLASSICAL AND MOLECULAR TECHNIQUES

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Karyotype study and microsatellites pattern in the genome of Rana nigrovittata were studied, with the aim to provide a standard karyotype, chromosome marker and the distribution of repetitive DNA elements, informative knowledge of cytogenetics and evolutionary events. Here, we analyzed the karyotype structure and the distribution of repetitive DNA sequence in this species using conventional banding and Fluorescence in situ hybridization techniques. The ten specimens (five males and five females) were collected from Phitsanulok province, Thailand. Mitotic metaphases were prepared from the bone marrows by the standard protocol. The result showed that R. nigrovittata had the diploid chromosome number of 2n = 26 and the fundamental number (NF) were 52 in both males and females. The karyotypes compose of six large metacentric, four large submetacentric, two medium metacentric, two medium submetacentric and 12 small submetacentric chromosomes. No sex related chromosome heteromorphism was observed in male (XY) or female (ZW) of this species. The NOR was observed in subcentromeric region on chromosome no 11. The C-positive heterochromatin blocks are mainly distributed in the centromere of most chromosomes, while some additionally in paracentromeric and telomeric regions. The large heterochromatic blocks were found on chromosome no 6. Some of repetitive elements were scattered while some were specific in the karyotype. The combine of conventional banding and molecular cytogenetics provide information for a cytogenetic determination of the examined species.

Key words: *Rana nigrovittata, karyotype, microsatellites, chromosome.*

ХАРАКТЕРИЗУВАННЯ ХРОМОСОМНИХ І ПОВТОРЮВАНИХ ЕЛЕМЕНТІВ У ГЕНОМІ RANA NIGROVITTATA (ANURA, RANIDAE) ЗА ДОПОМОГОЮ КЛАСИЧНИХ ТА МОЛЕКУЛЯРНИХ ТЕХНОЛОГІЙ

Дослідження каріотипу і структури мікросателітів у геномі *Rana nigrovittata* проводили з метою встановлення стандартного каріотипу, хромосомного маркера і розподілу повторюваних ДНК елементів, інформації щодо цитогенетики і еволюційних подій. У цій роботі ми проаналізували структуру каріотипу і поширення повторюваної послідовності ДНК у цьому виді, використовуючи традиційне пофарбування хромосом і флуоресцентну гібридизацію *in situ*. Десять особин (п'ять самців і п'ять самок) відібрали у провінції Пхітсанулок, Таїланд. Мітотичні метафази приготували з спинного мозку за стандартним протоколом. Результати продемонстрували, що *R. nigrovittata* мала диплоїдний набір хромосом ($2n = 26$), а фундаментальне число (NF) становило 52 як у самців, так і в самок. Каріотипи складалися з шести великих метацентричних, чотирьох великих субметацентричних, двох середніх метацентричних, двох середніх субметацентричних і 12 малих субметацентричних хромосом. У цього виду не спостерігали статево-обумовленого гетероморфізму хромосом у самців (XY) чи самок (ZW). NOR було виявлено у субцентромерній ділянці на хромосомі 11. В основному, С-позитивні блоки гетерохроматину розташовувалися в центромерній частині більшості хромосом, хоча деякі були додатково присутні у парацентромерних та теломерних ділянках. Великі блоки гетерохроматину було виявлено на хромосомі 6. Деякі повторювані елементи були розсіяні, хоча декілька були специфічними для каріотипу. Поєднання методів традиційного пофарбування хромосом і молекулярної цитогенетики дозволило отримати інформацію для цитогенетичного визначення досліджуваного виду.

Ключові слова: *Rana nigrovittata*, каріотип, мікросателіти, хромосома.

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