довательностям ДНК относятся ТП (сателлиты). Число и локализация ТП-последовательностей S1 отличается у разных видов лягушек рода *Rana*. У *R. temporaria* S1A локализован на обоих плечах хромосомы 1, на коротких плечах хромосом 2—5 и на длинных плечах хромосом 7 и 9 (см. рис. 3*б*). Подобную картину FISH-сигналов на одном или обоих плечах некоторых пар хромосом после гибридизации с зондом S1 наблюдали и у других видов лягушек рода *Rana*. У *R. graeca* повтор S1A локализован только на четырех парах хромосом в перицентромерной области, у *R. italica* — на всех 13 парах хромосом (Picariello et al., 2002), у *R. pseudodalmatina* и *R. macrocnemis* повтор S1B локализован в перицентромерной области коротких плеч хромосомы 2 (Picariello et al., 2018). Таким образом, распределение S1 по хромосомам амфибий может использоваться как маркер идентификации этих хромосом.

Полученные нами данные о кариотипе травяной лягушки будут в дальнейшем использованы для изучения распределения повторяющихся последовательностей ДНК, идентифицированных в полногеномной сборке (Streicher et al., 2021). Дальнейшие модификации существующих цитогенетических методов и разработка новых, а также увеличение набора используемых флуорохромов и контрастирующих агентов позволят безошибочно идентифицировать хромосомы амфибий и выявлять дополнительные хромосом-специфичные маркеры.

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KARYOTYPE OF THE GRASS FROG *RANA TEMPORARIA*

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The article is devoted to the cytogenetic study of one of the model species of amphibians — the grass frog *Rana temporaria*. The aim of the study was to develop a standard karyotype of *R. temporaria*, to identify chromosomal markers and to clarify the genome structure. We analysed the karyotype structure, the heterochromatin distribution and the specific localisation of some repetitive sequences on the chromosomes using different chromosome staining methods, including routine Giemsa staining, C-banding, staining with the fluorescent dyes DAPI, CMA3 and SYBR Green and fluorescence *in situ* hybridisation (FISH) with probes to the 5S rDNA and the S1A tandem repeat. The karyotype of *R. temporaria* consists of 26 chromosomes, (NF = 52) divided into 2 groups: 5 pairs of large chromosomes and 8 pairs of small chromosomes. C-banding revealed heterochromatin blocks in the centromeric regions of most chromosomes, and additional interstitial C-bands were detected on some chromosomes. SYBR Green staining showed intense fluorescence in the centromeric regions of some chromosomes. FISH with a probe to 5S rDNA confirmed the location of this gene on the short arm of chromosome pair 7. FISH mapping of the S1A tandem repeat showed the location of signals on both arms of chromosome 1, the short arms of chromosomes 2—5 and the long arms of chromosomes 7 and 9. Difficulties in detecting G- and Q-bands on amphibian chromosomes are discussed. The data obtained are compared with the results of previous studies and modifications to existing cytogenetic methods are suggested. Both DAPI and CMA3 staining showed a generally uniform fluorescence on all chromosomes, with the exception of a single DAPI-negative site corresponding to the NOR on chromosome 10. SYBR Green could be a useful method for the analysis of amphibian chromosomes, given the difficulties in detecting bands using traditional methods and fluorescent dyes.

Keywords: chromosomes, amphibian, heterochromatin, C-banding, DAPI, CMA3, SYBR Green, nucleolus organiser region NOR, 5S rDNA, tandem repeat S1A