Karyotype of Four Agamidae Species from the Phu Phan National Park in Thailand

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ABSTRACT Karyotypes of *Calotes emma* (Gray),1845, *C. mystaceus* (Dumeril & Bibron),1837, *C. versicolor* (Daudin),1802, and *Draco belliana* (Gray),1827 from the Phu Phan National Park (Thailand) were investigated. Three species of genus *Calotes* have the same karyotype consisting of 2n = 34, 6 pairs of macrochromosomes and 11 pairs of microchromosomes. Their macrochromosomes of pair number 1, 3, 4, 5, and 6 are metacentric, and 2 is submetacentric. Karyotype of *D. belliana* are different from others. There are 6 pairs of macrochromosomes, 11 pairs of intermediate size chromosomes and 2 pairs of microchromosomes. Its chromosomes of pair number 1, 3, 4, and 6 are metacentric, the pair number 2 and 5 are submetacentric. Its intermediate size chromosomes of pair number 7 - 15 seem to be metacentric and the last 2 pairs are microchromosomes.

KEYWORDS: Agamidae, karyotype, *Calotes*, *Draco.*

INTRODUCTION

The Phu Phan National Park is situated at the Phu Phan Mountains which covered two provinces, Sakonakorn and Kalasin. The forest of this area is well-kept from human invasion because it used to be the communist operative location in the past. Therefore, this area is quite complete in the biological diversity, 81.23% of the area is the forest and there are 162 species of wild animal (32.9 % is mammal, 26.1% is avian, 10.5% is amphibian, 23.0% is reptile and 7.5% is fresh water fish).[1]

Agamidae is the important family of reptile in Thailand. The people, especially in the Northeast of Thailand like to eat it after cooking in different ways. The family of Agamidae can be found everywhere except in the evergreen forest. Due to its use as food, in the future the population of this family might decline. By the above reason , it is necessary to obtain the karyological data to contribute to the basic knowledge of family Agamidae in Thailand.

MATERIALS AND METHODS

Calotes emma (Gray),1845, *C. mystaceus* (Dumeril & Bibron),1837, *C. versicolor* (Daudin), 1802, and *Draco belliana* (Gray), 1827 were collected from the Phu Phan National Park of Thailand. They were intraperitoneally injected with 0.1 ml of Phytohemaglutinin (PHA) per gram body weight for 24 hours and with 0.1 ml colchicine solution (2 mg/ml) per gram body weight for 2 hours before sacrifice. Marrow cells were treated with 0.075 M KCl for 20 min and fixed in acetic acid - methanol (1:3) solution.[2] Mitotic chromosome preparations were made by an air dry method and stained by the modified G – banding technique.[3] The karyotype was determined for each specimen on the basis of comparing photographs of 10 metaphase cells. The photographs of chromosomes enlarged were measured and numbered. Calculation for centromeric index and arm ratio on each chromosome is used accordingly to Levan *et al*.(1964)[4]

RESULTS

The chromosome number of *C. emma* was 2n =34. Pairs of chromosome 1, 3, 4, 5, 6 were metacentric, 2 was submetacentric and the others were microchromosomes. Its karyotype and idiogram of chromosome pairs were shown in Fig 1a and 2a. The relative length, centromeric index and arm ratio of macrochromosomes were shown in Table 1. The chromosome number of *C. mystaceus* was 2n = 34. Pairs of chromosome number 1, 3, 4, 5, 6 were metacentric , 2 was submetacentric and the others were microchromosomes. Its karyotype and idiogram were shown in Fig 1b and 2b. The relative length, centromeric index and arm ratio of macrochromosome were shown in Table 2. The

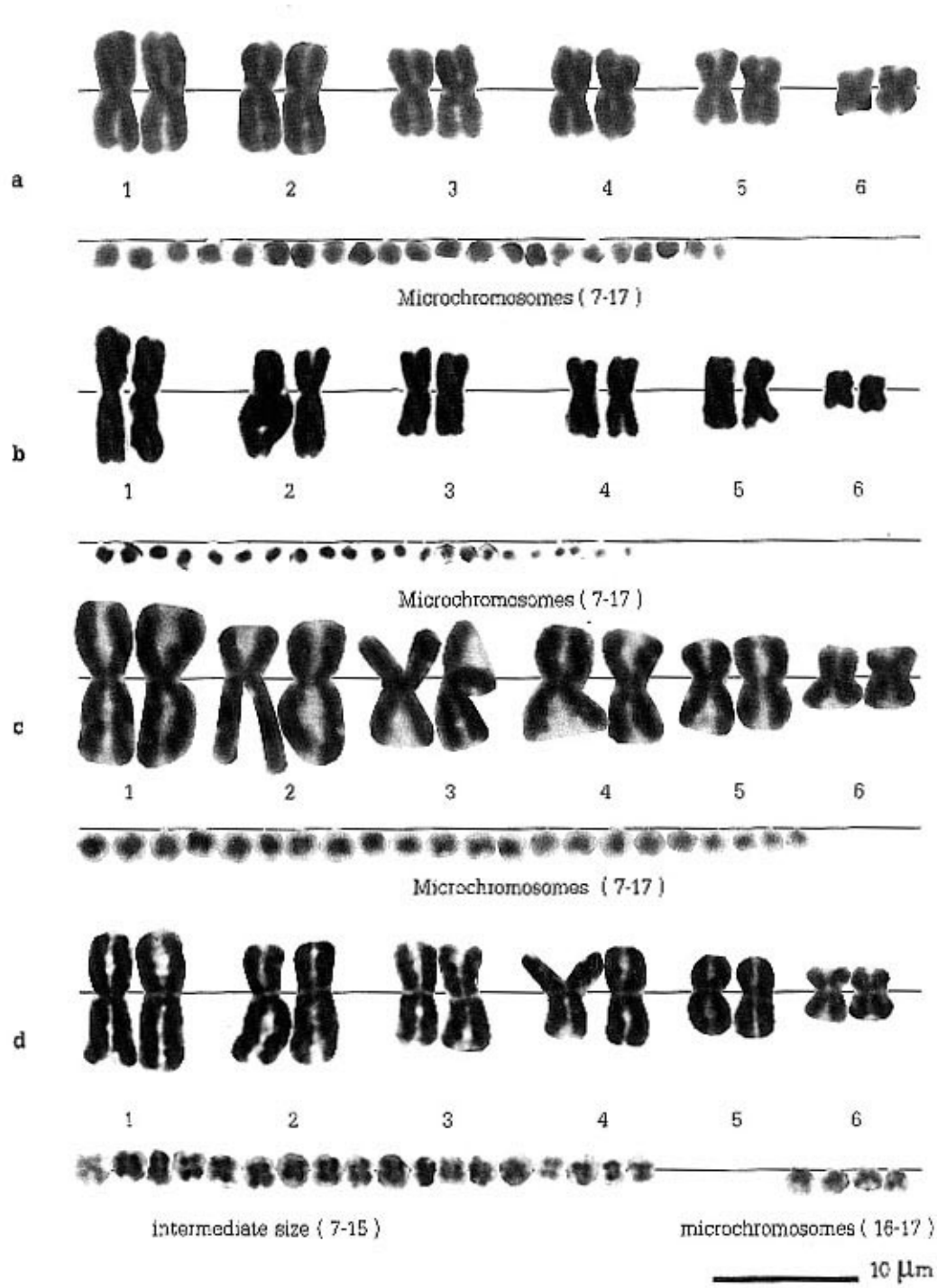

Fig 1. The Karyotypes of (a) *Calotes emma* (Gray), 1845, (b) *C. mystaceus* (Dumeril & Bibron), 1837, (c) *C. versicolor* (Daudin), 1802 and (d) *Draco belliana* (Gray), 1827.

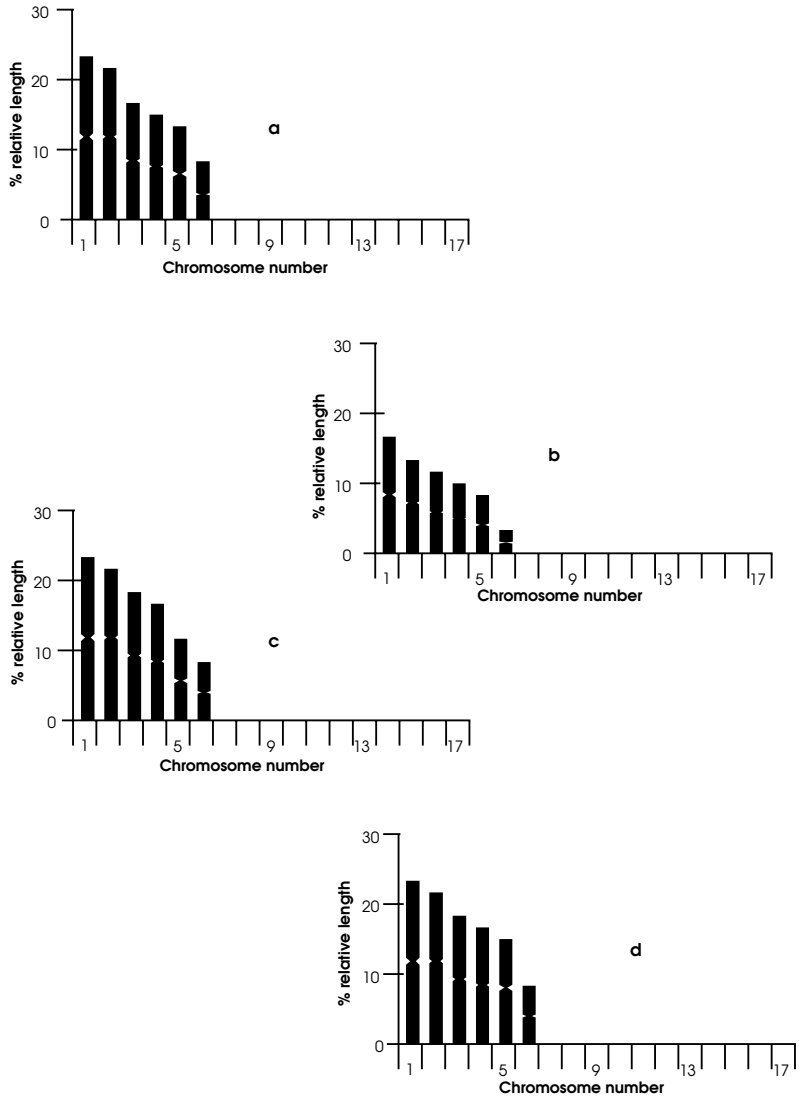

Fig 2. The Karyotypic idiogram of (a) *Calotes emma* (Gray), 1845, (b) *C. mystaceus* (Dumeril & Bibron), 1837, (c) *C. versicolor* (Daudin), 1802 and (d) *Draco belliana* (Gray), 1827.

Table 1. Relative length, centromeric index and arm ratio of macrochromosomes of *C. emma*.

Pair no.	R^L	I^C	AR	Type
1	23.591	47.385	1.113	M
2	21.340	44.156	1.267	SM
3	17.125	48.649	1.059	M
4	15.370	47.619	1.103	M
5	13.406	48.148	1.077	M
6	9.169	46.029	1.147	M
7-17	-	-	-	Mi

R^L: relative length, I^C : centromeric index,
AR : arm ratio, M : metacentric, SM: submetacentric,
Mi: microchromosome

Table 2. Relative length, centromeric index and arm ratio of macrochromosomes of *C. mystaceus*.

Pair no.	R^L	I^C	AR	Type
1	16.475	47.949	1.087	M
2	14.176	41.892	1.387	SM
3	10.728	48.214	1.074	M
4	10.153	49.057	1.038	M
5	9.004	46.809	1.136	M
6	4.215	48.268	1.075	M
7-17	-	-	-	Mi

R^L : relative length, I^C : centromeric index,
AR : arm ratio, M : metacentric, SM: submetacentric,
Mi: microchromosome

Table 3. Relative length, centromeric index and arm ratio of macrochromosomes of *C. versicolor*.

Pair no.	R^L	I^C	AR	Type
1	23.601	48.584	1.058	M
2	20.898	43.016	1.325	SM
3	17.749	46.759	1.143	M
4	16.181	45.833	1.184	M
5	12.805	47.407	1.110	M
6	8.766	41.026	1.188	M
7-17	-	-	-	Mi

R^L : relative length, I^C : centromeric index,
AR : arm ratio, M : metacentric, SM: submetacentric,
Mi: microchromosome

Table 4. Relative length, centromeric index and arm ratio of macrochromosomes of *D. belliana*.

Pair no.	R^L	I^C	AR	Type
1	22.644	46.875	1.134	M
2	20.752	40.879	1.449	SM
3	18.398	47.436	1.110	M
4	16.273	49.328	1.038	M
5	13.442	43.842	1.282	SM
6	8.491	46.341	1.175	M
7-15	-	-	-	M
16-17	-	-	-	Mi

R^L : relative length, I^C : centromeric index,
AR : arm ratio, M : metacentric, SM: submetacentric,
Mi: microchromosome

chromosome number of *C. versicolor* was 2n = 34. Chromosome pair number 1, 3, 4, 5, 6 were metacentric, 2 was submetacentric and the others were microchromosomes. Its karyotype , idiogram , relative length, centromeric index and arm ratio were shown in Fig 1c, 2c and Table 3.

The chromosome number of *D. belliana* was 2n = 34. Chromosome pair number 1, 3, 4, 6 were metacentric, 2 and 5 were submetacentric. The smaller chromosomes pair number 7 to 15 seem to be metacentric and the last 2 pairs (16 - 17) were microchromosomes. Its karyotype, idiogram, relative length, centromeric index and arm ratio were shown in Fig 1d, 2d and Table 4. There was no heteromorphism in these 4 species.

Discussion

Four species of Agamidae from Phu Phan National Park have the same chromosome number of 2n = 34. The chromosome number is the same as *C. jerdomi, C. versicolor*, and *Ptyctolaemus glularis* which studied by Sharma and Nakhasi (1980),[5] and also the same as *Japalura variegata* (Gray), one of Agamidae in India which studied by Dey et al (1988).[6] From our studies, *C. emma*, *C. mystaceus*, and *C. versicolor* have the same karyotype with 6 pairs of macrochromosomes and 11 pairs of microchromosomes. Pair number 1, 3, 4, 5, 6 are metacentric and 2 is submetacentric. All of them has no heteromorphism.

Chromosomes of *D. belliana* is quite different from the others. There are 6 pairs of macrochromosomes , 9 pairs of intermediate size and 2 pairs of microchromosomes. Macrochromosome pair number 1, 3, 4, and 6 are metacentric and pair number 2, and 5 are submetacentric. Moreover, 9 pairs of the smaller chromosomes seem to be metacentric and the others 2 pairs are microchromosomes.

Acknowledgments

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