

The Chromosomes of the Lamprey on the Genus *Lampetra*(Agnatha, Petromyzonidae) from Korea

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Chromosome numbers of 3 species of Korea lampreys(Genus *Lampetra*) were investigated. Approximately 160 small and mainly acrocentric chromosomes were present in the three species of Korean lampreys. And the diploid chromosome numbers of three species were not significantly different between the species.

Introduction

Karyotype analysis is known to be a useful method in elucidating phylogenetic and cytogenetic relationships among the species. So an accurate cytogenetic survey of the fish species is important in establishing the systematic relationships of the teleosts. In spite of the considerable phylogenetic interest of lampreys to vertebrate evolutionist, there are comparatively few records of the chromosome numbers of lampreys, mainly due to the difficulty of counting the large numbers of very small chromosomes that are generally found in this group(Okkelberg, 1921 ; Robinson and Potter, 1968 ; Potter and Rothwell, 1970).

The living lampreys(Petromyzontiformes) have an antitropical distribution(Hubbs and Potter, 1971). The majority of over 40 species are located in the Northern hemisphere and these are now generally regarded as comprising a sufficiently homogeneous group to justify their assignment to a single family, the Petromyzonidae(Vladykov and Kott, 1979 ; Potter, 1980). Three species of lampreys in Korea are included on the genus *Lampetra*, *L. japonica*, *L. reissneri* and *L. sp.* The second non-parasitic species *L. sp.* was recorded as a new species by Shim(1992) for the differences of the caudal pigmentation at ammocoete stage and the isozyme patterns.

To obtain a basic information for understanding systematic relationships among species, the somatic chromosomes of Korean lampreys were studied.

Materials and Methods

All captured specimens were brought in the laboratory and kept in well aerated aquariums. They were collected from the following localities : *L. japonica*, 6 ammocoetes from Dongmag-ri, Geunduck-myon, Samchuck-gun, Gangwon-do(Maeub river) ; *L. reissneri*, 8 ammocoetes and 2 adults from Shingi-ri, Unbong-myon, Namwon-gun, Chollabuk-do (Nakdong river) ; *L. sp.*, 8 ammocoetes from Chungyang-ri, Kimhwa-eup, Cheolwon-gun, Gangwon-do(Hantan river). The specimens, regardless of ammocoetes and adults(except *L. japonica*), were placed in 0.1% colchicine solution for 12~24hours immediately prior to sacrifice. Then gill epithelium and kidney tissues were removed, minced with small scissors into fine fragments and then suspended in 0.075M KCL solution. Following the hypotonic treatment, the cells were fixed in three changes of Carnoy solution. Slides were made by flame drying method with 5% Giemsa staining.

Results and Discussion

The mitotic index in somatic tissues of the lamprey was very low and it was extremely difficult to prepare complete complements in which exceptionally high numbers of very small chromosomes are adequately spread.

The majority of counts in *Lampetra reissneri*(Fig. 1) lay between 142 and 161 on total 84 metaphase spreads(Table 1), but there was no sharp mode. In *L. japonica*(Fig. 2), the di-

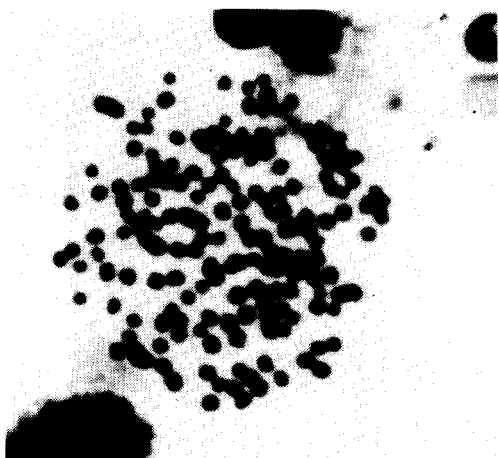


Fig. 1. Metaphase plate of *Lampetra reissneri*.

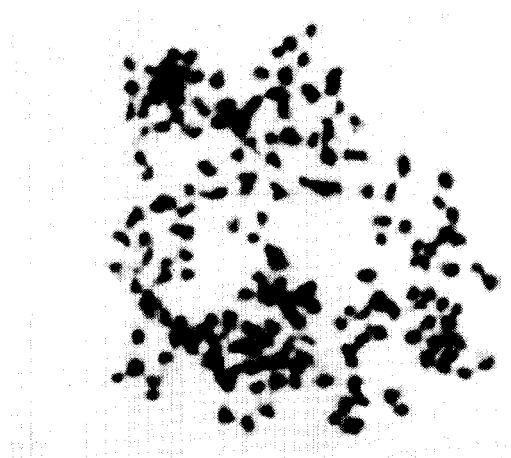


Fig. 2. Metaphase plate of *Lampetra japonica*.

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Table 1. Frequency distribution of diploid chromosome counts of the genus *Lampetra* from Korea

species	diploid chromosome number																				No. of cells			
	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159		160	161	162
<i>Lampetra reissneri</i>	-	-	1	2	1	3	2	4	2	3	5	3	1	-	-	3	2	4	7	14	17	10	-	84
<i>Lampetra</i> sp.	-	5	4	7	5	7	4	4	3	7	9	18	8	1	3	-	-	5	2	-	4	4	-	100
<i>Lampetra japonica</i>	1	1	1	-	3	5	-	4	1	1	4	8	3	1	-	-	-	1	-	-	1	1	-	36

ploid chromosome number ranged from 140 to 161 on total 36 metaphase spreads. The numbers of chromosome of *L. sp.*(Fig. 3) were counted from 142 to 161 and each counted number was dispersed all over the equal ranges. There could be more real chromosome numbers than the metaphase spreads counted on this study, as it cannot be ruled out the possibilities of the small, overlapped and undetectable chromosomes are existed. The wide range of counted number(about 140-160) was due to a experimental difficulties and errors.

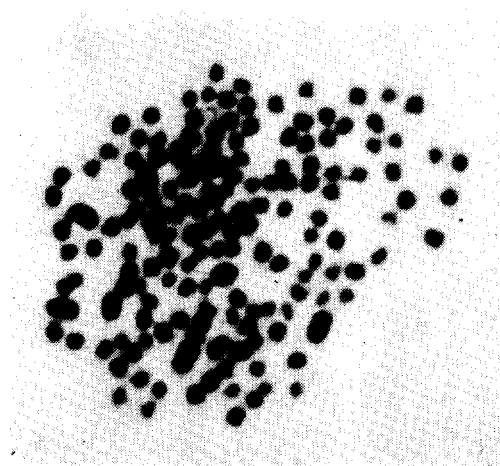


Fig. 3. Metaphase plate of *Lampetra* sp.

Approximately 160 small and mainly acrocentric chromosomes are present in the three species of Korean lampreys. The diploid numbers were not significantly different between the species.

In the previous reports, counts for *Entosphenus(Lampetra) reissneri* ranged from 94-96(Nogusa, 1960) to 165-174(Sasaki and Hitotsumachi, 1967). In these intra-specific variations in diploid values, the occurrence of geographical variations and endopolyploidy must be considered(Robinson and Potter, 1969). These crepancies either represent true geographic variation in chromosome number or errors on part of the investigators. The possibility of these variations resulting from polyploidy was discussed by Potter and Rothwell(1970). Further studies using a variety of tissues from animals caught in different geographical localities would help resolve the problem of the true karyotype of this species.

Higher diploid numbers appear to support that polyploidy played a role in lamprey evolution, as has already been suggested by Ohno *et al.*(1968), Howell and Denton(1969) and Robinson and Potter(1969). Ohno *et al.*(1969) suggested that the ancestral vertebrate genome contained 48 acrocentric chromosomes, the situation found in hagfishes and sev-

eral teleosts. On the basis of Nogusa's data(1960), they postulated that *E(L). reissneri* was a tetraploid.

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韓國產 칠성장어屬 無顎類(*Agnatha, Petromyzonidae*)의 核型

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韓國產 칠성장어屬 無顎類 3種 *L. japonica*, *L. reissneri*, *L. sp.*에 대한 核型을 조사하였던 바, 이들은 모두 약 160여개 정도의 dot chromosome 형태였으며 染色體 數에 있어서 種間의 유의한 차이는 인정할 수 없었다.