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The Karyotype of *Lacerta princeps kurdistanica* and Its Meaning in Phylogeny

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INTRODUCTION

Lacerta princeps had been a rather unknown lizard with obscure phyletic relations until Eiselt /1968, 1969/ published his results from a larger series of both subspecies. He favoured a close relationship between this species and the green lizards /Lacerta s. str./, mainly because of morphological similarities and biogeographical reasons. Böhme /1971/ demonstrated similarities between L. princeps and L. lepida in hemipenial microsculpture, which separates these species from the green lizards, but which are probably a plesiomorphous character.

Arnold /1973/ in his revision of the whole genus Lacerta formed a subgroup called Lacerta part I, where he included the green lizards as well as L. lepida and L. princeps and ignored the differences Peters /1962/ and Böhme /1971/ had listed.

Immunological investigations of Engelmann & Schäffner /1981/ indicated a close relationship of L. lepida and L. princeps, and Lutz & Mayer /1984/ clearly demonstrated the great immunologic and electrophoretic similarity of these two species as well as the rather large distance to the green lizards and an even larger distance to the canarian lizards, which were discussed in relation to them by Peters /1962/, Böhme /1971/ and Rykena et al. /1977/. The artificial nature of Arnold's part I group is obvious from the present state of knowledge, but a clear set of synapomorphic characters unifying the L. lepida-princeps group is still lacking while the green lizards are perfectly defined by several derived characters /Peters, 1962; Böhme, 1971/.

MATERIAL AND METHODS

6 males and one females of Lacerta princeps kurdistanica were collected in the province of Mardin/Turkey in 1977 /Rykena et al., 1977/. Subsequent breeding in captivity in the following years resulted in 75 animals up to 1985. Some of these were employed for electrophoretic and immunologic studies /Lutz & Mayer, 1974/, but the main stock was used to collect data on growth and reproduction biology /Rykena & Nettmann. in prep./ while some males are used for karyotype preparations.

1 ml of 0.3% colchicin solution was injected intraperitoneally 24 hours before sacrificing. Testis and intestine tissue was incubated in 0.046 M KCl at 37°C for 15 min. and then fixed in methanol-acetic acid /3 : 1/ at 4°C for some hours. The tissue was minced,

and the suspension was then dropped on slides and air dried. The slides were stained in a giemsa solution [1 ml Giemsa (Merck) + 5 ml Ethanol abs. + 5 ml 1/15 M KH_2PO_4 + 5 ml Na_2HPO_4 + 84 ml aqua dest.] for 10 minutes and dried. Photographs were made using a ZEISS Photomicroscop with phase contrast optics on Ilford Pan F film.

RESULTS

A mitotic metaphase with well separated chromosomes is presented in Fig. 1. Two large metacentric chromosomes are visible as well as two microchromosomes, while in the group of acrocentrics one element is lost in this plate, as the comparison with other preparations has revealed. A karyotype like that in Fig. 2 could be obtained from more than 20 acceptable metaphases. One pair of large metacentric chromosomes together with 16 pairs of acrocentric chromosomes, ordered according the decreasing size and accompanied by one pair of microchromosomes, will be formulated as 2 n = 36 /17 M + 1 m/, NF = 38.

DISCUSSION

A karyotype of 2 n = 36, NF = 38 is rare in Lacerta, being found only in L. lepida /Matthey, 1949; Smet, 1981/ and in L. valentini, L. mixta, L. rudis and L. raddei /Darevsky & Kulikova, 1961/ while the common karyotype in Lacerta as well as in the whole family is 2 n = 38, NF = 38 /Matthey, 1949; Gorman et al., 1970/. Most probably the 36 karyotype evolved from the basic 38 chromosome type by centric fusion of two large acrocentrics, while the 36 chromosome karyotype of some L. vivipara populations consists only of acrocentrics and has probably lost the pair of microchromosomes.

The karyotype of Lacerta lepida is nearly identical to the L. princeps situation described here, as the results of Matthey /1949/, Smet /1981/ and our own observations have shown. (Bischoff, Cheylan & Böhme /1984/ erroneously cited 2 n = 38 for L. lepida. Smet /1981/ used a misleading definition of microchromosome, therefore his descriptive text contradicts his karyotype picture).

The situation in the group of caucasian rock lizards is difficult to interprete, since some of them /L. rudis, L. valentini, L. mixta, L. raddei/ have a 36 chromosome karyotype with a large metacentric pair /Darevsky & Kulikova, 1961/ as far as the small published drawing allows to conclude, while others /L. saxicola, L. caucasica, L. portschinski, L. armeniaca/ have the basic 38 chromosome karyotype /Kupriyanova, 1976; Darevsky & Kupriyanova, 1982 and unpublished/. A detailed banding analysis would be necessary to compare these karyotypes with those of L. lepida and L. princeps. From the present state of knowledge the hypotheses of a convergent evolution of the 2 n = 36 karyotype in the caucasian rock lizards and in the L. lepida-princeps group /Subgen. Timon/ is the most probable; but the alternative solution, which postulates a common root of Timon and the caucasian rock lizards where the 36 chromosome karyotype evolved and changed again by fission to 38 chromosomes in some lines of rock lizards, must also be kept in mind for further immunologic as well as karyotypic investigations. At present the Lacerta lepida-princeps group, or rather better, the subgenus Timon is supported by the karyotype data as well as the results concerning their reproduction biology /Rykena & Nettmann, in prep./, while the relation of this group to other Lacerta subgroups is still under discussion.

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REFERENCES

ARNOLD, E. N. /1973/: Relationships of the Palaearctic lizards assigned to the Genera Lacerta, Algyroides, and Psammodromus /Reptilia, Lacertidae/. - Bull. Brit. Mus. Nat. Hist. London, 25 : 291-366.

BÖHME, W. /1971/: Über das Stachelepithel lacertider Eidechsen und über seine systematische Bedeutung. - Z. zool. Syst. Evolut.-forsch., 9 : 187-223.

BISCHOFF, W., CHEYLAN, M., BÖHME, W. /1984/: Lacerta lepida Daudin 1802 - Perleidechse. - In: BÖHME, W. /ed./: Handbuch der Reptilien und Amphibien Europas, pp. 181-210, Aula Verlag Wiesbaden.

DAREVSKY, I. S., KULIKOVA, W. N. /1961/: Natürliche Parthenogenese in der polymorphen Gruppe der kaukasischen Felseidechsen /Lacerta saxicola Eversmann/. - Zool. Jb. Syst., 89 : 119-176.

DAREVSKY, I. S., KUPRIYANOVA, L. A. /1982/: Rare males in parthenogenetic lizard Lacerta armeniaca Mehely. - Vert. Hung., 21 : 69-75.

EISELT, J. /1968/: Ergebnisse zoologischer Sammelreisen in die Türkei: Ein Beitrag zur Taxonomie der Zagros-Eidechse Lacerta princeps Blanf. - Ann. Naturhist. Mus. Wien, 72 : 409-434.

EISELT, J. /1969/: Zweiter Beitrag zur Taxonomie der Zagros-Eidechse, Lacerta princeps Blanford. - Ann. Naturhist. Mus. Wien, 73 : 209-220.

ENGELMANN, W., SCHÄFFNER, H. /1981/: Serologisch-immunologische Untersuchungen innerhalb der Sammelgattung Lacerta /Sauria, Lacertidae/. - Zool. Jb. Syst., 108 : 139-161.

GORMAN, G. D., JOVANOVIC, V., NEVO, E., McCOLLUM, F. /1970/: Conservative karyotypes among lizards of the genus Lacerta from the Adriatic Islands. - Genetika, Beograd, 2 : 149-154.

KUPRIYANOVA, L. A. /1976/: Kariologiceskije obsojennosti dwuch widow jasceric roda Lacerta. - Citologija, Moskwa, 18 : 360-364.

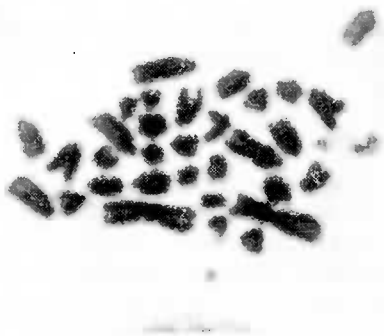
LUTZ, D., MAYER, W. /1984/: Albumin-imunologische und proteinelektrophoretische Untersuchungen zur systematischen Stellung von Lacerta lepida Daudin und Lacerta princeps Blanford /Sauria, Lacertidae/. - Zool. Anz., Jena, 212 : 95-104.

MATTHEY, R. /1949/: Les chromosomes des vertébrés. - Librairie de l'Universite, F. Rouge, Lausanne.

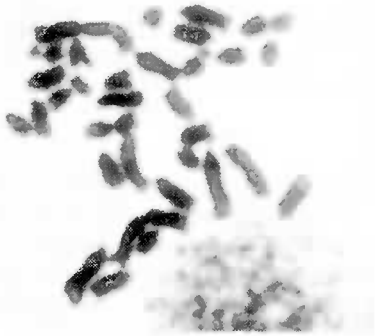
PETERS, G. /1962/: Studien zur Taxonomie, Verbreitung und Ökologie der Smaragdeidechsen. I. Lacerta trilineata, viridis und strigata als selbständige Arten. - Mitt. Zool. Mus. Berlin, 39 : 127-152.

RYKENA, S., NETTMANN, H. K., BINGS, W. /1977/: Zur Biologie der Zagros-Eidechse Lacerta princeps Blanford 1874. I. Beobachtungen im Freiland und im Terrarium an Lacerta princeps kurdistanica Suchow 1936 /Reptilia: Sauria, Lacertidae/. - Salamandra, 13 : 174-184.

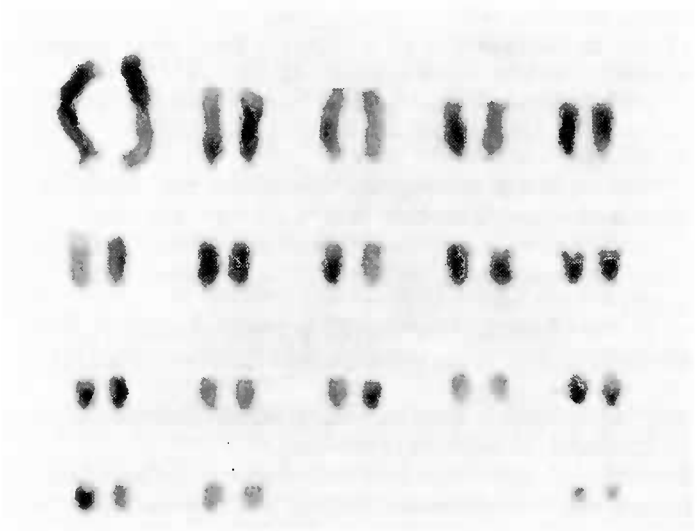
SMET, W. H. O. /1981/: Description of the orcein stained Karyotypes of 36 lizard species /Lacertilia, Reptilia/ belonging to the families Teiidae, Scincidae, Lacertidae, Cordylidae and Varanidae /Autarchoglossa/. - Acta Zool. Pathol. Antverp., 76 : 73-118.



1



2a



2b

Fig. 1: Mitotic metaphase from intestine tissue of male Lacerta princeps kurdistanica. One acrocentric chromosome is lost during preparation. Fig. 2a: Mitotic metaphase from testis of L.p.kurdistanica. Fig. 2b: Tentative karyogram, arranged from Fig. 2a.