The larval salivary gland of *Acricotopus lucidus*, chromosome maps and band nomenclature, puff nomenclature

The larval salivary gland

The larval salivary gland of *Acricotopus lucidus* is morphologically subdivided into three distinct lobes, the anterior (AL), main (ML) and side (SL) lobes (Mechelke 1953; Fig. 1a, b). The lobes are arranged differently in each of the two glands of a larva, therefore Speiser (1973) has distinguished type 1 (Fig. 1a) and type 2 (Fig. 1b) glands.

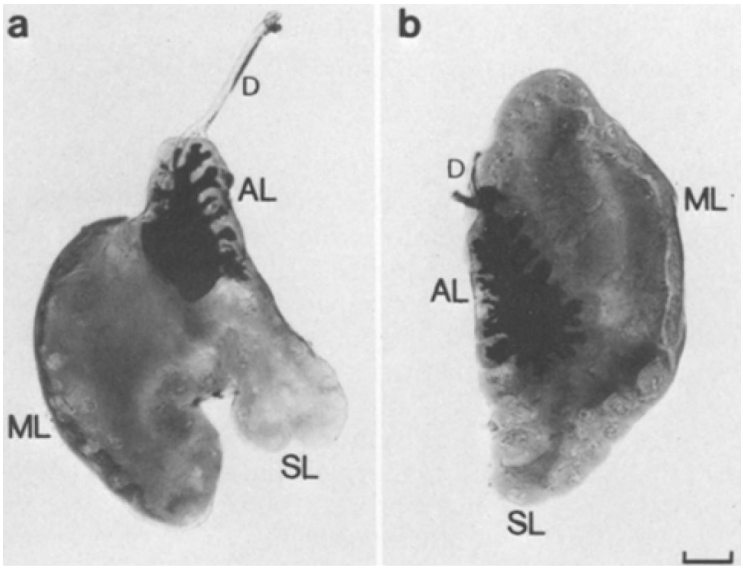

Fig. 1a, b. Salivary glands of *Acricotopus lucidus*, 4th larval instar. **a** Gland type 1. **b** Gland type 2. The specific staining of the anterior lobe secretion by paraldehyde-fuchsin shows the presence of acidic glycoproteins. **a** and **b** are from different animals. AL anterior, ML main, and SL side lobes; D glandular ductus. Bar represents 100 µm

In the inbred lines used, the AL, with the expression of BR 3, BR 4 and BR 7 and the ML and SL, with the expression of BR I and BR 2, exhibit a specific BR pattern (Mechelke 1953).

In a gland, 12 to 16 cells show the AL-specific and 60 to 70 cells show the ML/SL-specific BR pattern.

Within a gland the nuclei do not all reach the same level of polyteny. In 4.LS it ranges from 1,024 to 4,096 C and in 4.LS/PP and PP from 2,048 to 8,192 C (Speiser 1973).

Chromosomal maps and band nomenclature

Each of the three salivary gland chromosomes of *A. lucidus* exhibits a heterochromatic segment at a characteristic position. These heterochromatin blocks located in a submedian (chromosome I), or nearly median (chromosomes II and III) position represent the

centromeric regions and so each chromosome can be subdivided into a shorter left-hand and a longer right-hand arm (Mechelke 1953; Staiber and Behnke 1985; Table 1).

Table 1. Parameters of the chromosome map 1

	I			II			III			Chromosome set
	I/1	C	I/2	II/3	C	II/4	III/5	C	III/6 +5A3/5A5	
Length of the unstretched chromosome arms and the centromeric regions at 2,048–4,096 C (µm) (Speiser 1972 and own results)	62	5 186	119	93	5 215	117	93	7 205	105	589 17 606
Length of the stretched chromosome arms and the centromeric regions in Plate I (µm)	114	5	219	171	5	215	171	7	193	1,083 17 1,100
Number of bands	224		420	345		459	363		405	2,216
Number of sections	5 (1A–1E)		9 (2A–2I)	7 (3A–3G)		10 (4A–4J)	8 (5–5H)		9 (6A–6I)	48
Active loci identified through band decondensation	30		56	52		65	51		51	305

The centromeric blocks, which are easy to recognize, provide clear reference points for chromosome mapping. The following nomenclature has been established for the salivary gland chromosomes of *A. lucidus* :

1.The chromosome arms IL/IR, IIL/IIR, IIIL/IIIR are numbered 1 to 6, so that left-hand arms receive odd, and right-hand arms even, numbers (IL = 1, IR = 2 and so on).

2. Starting from the centromere, each arm is subdivided into sections of 50 bands. The sections are marked alphabetically with capital letters.

3. Within each of these sections the bands are numbered consecutively, in the distal direction, from 1 to 99 in *odd numbers*, *even numbers* are assigned to the *interbands*. With this system each band and interband can be precisely and individually designated by a specific sequence of number, capital letter, number (for example 1B29, 4E55 or 2A94, 6F8). It is not possible to tell with certainty the number of bands composing the compact centromeric regions. The centre of the centromeric blocks is designated AO. The outer bands of the centromeres are designated 1A1, 2AI, 3A1 etc..

The results of the mapping are presented in map 1 and map 2. The drawings of the chromosome arms are based on the lengths summarized in Table 1. All three chromosomes, at a polyteny level of 2,048-4,096 C, have a length of 606 µm, unextended. In Plate I the arms (not the centromeres) are drawn extended and here the total length of the chromosome set is 1,100 µm. The total number of bands registered in the chromosome complement is 2,216 (Table 1).

Puff nomenclature

In order that each puff can be defined precisely, the designation of the puffs is based on the exact nomenclature of the bands.

Following the number of the chromosome arm, those band(s) to which the initial locus (or the loci) of a puff can be delimited are put in parentheses, for example 1(D 37), 6(B 7,9).

All puffs which can be localized on the basis of band decondensation are represented in the drawn cytogenetic map (1.) of the salivary gland polytene chromosomes. The system is the same as that used by Pelling (1964) for *Chironomus tentans*. In AL and ML/SL, during the developmental period from mid-fourth larval instar to pupation, a total of 305 active loci can be identified by band decondensation (nucleolus, 5 BRs and 299 puffs).

References

Mechelke F (1953) Reversible Strukturmodifikationen der Speicheldrüsenchromosomen von *Acricotopus lucidus*. Chromosoma 5:511-543

Pelling C (1964) Ribonucleinsäure-Synthese der Riesenchromosomen. Autoradiographische Untersuchungen an *Chironomus tentans*. Chromosoma 15:71-122

Speiser C (1973) Quantitative DNS-Bestimmungen im Verlauf der Ontogenese von *Acricotopus lucidus*. (Chironomide). Dissertation, Universität Hohenheim

Staiber W, Behnke E (1985) Developmental puffing activity in the salivary gland and Malpighian tubule chromosomes of *Acricotopus lucidus* (Diptera, Chironomidae). Chromosoma 93:1-16