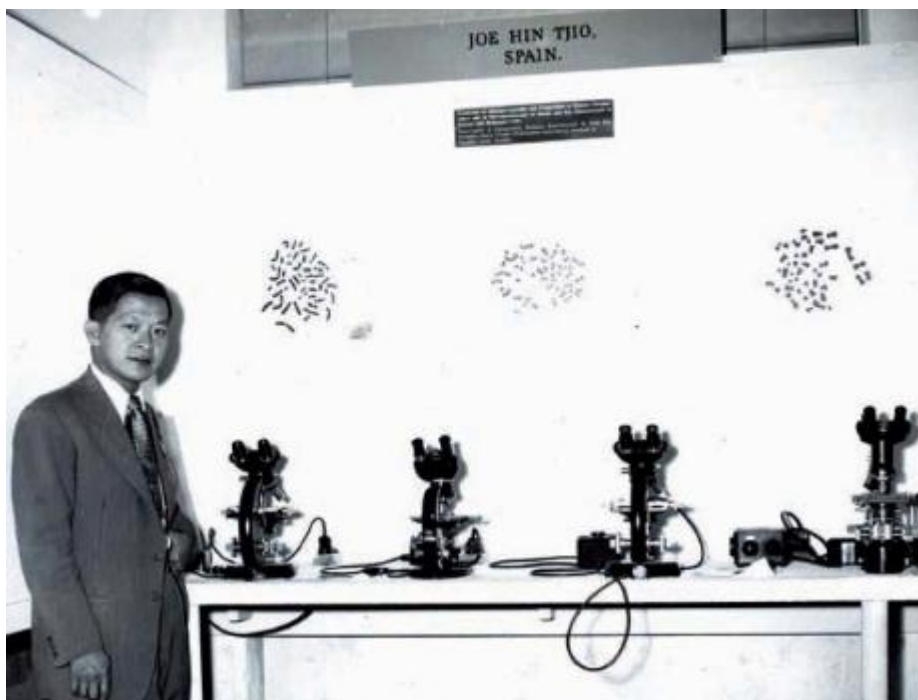


# **ЦИТОГЕНЕТИКА ЧЕЛОВЕКА, ЕЕ ТЕОРЕТИЧЕСКИЕ ОСНОВЫ И НАУЧНО-ПРАКТИЧЕСКОЕ ЗНАЧЕНИЕ**

Волков А.Н., к.б.н., доцент

*Кафедра биологии с основами генетики и  
паразитологии*

*Кемеровский государственный медицинский  
университет, Россия.*



Joe Hin Tjio  
(ОКОЛО 1956 Г.)

## THE CHROMOSOME NUMBER OF MAN

By JOE HIN TJIO and ALBERT LEVAN

ESTACION EXPERIMENTAL DE AULA DEI, ZARAGOZA, SPAIN, AND CANCER CHROMOSOME LABORATORY, INSTITUTE OF GENETICS, LUND, SWEDEN

WHILE staying last summer at the Sloan-Kettering Institute, New York, one of us tried out some modifications of Hsu's technique (1952) on various human tissue cultures carried in serial *in vitro* cultivation at that institute. The results were promising inasmuch as some fairly satisfactory chromosome analyses were obtained in cultures both of tissues of normal origin and of tumours (LEVAN, 1956).

Later on both authors, working in cooperation at Lund, have tried still further to improve the technique. We had access to tissue cultures of human embryonic lung fibroblasts, grown in bovine amniotic fluid; these were very kindly supplied to us by Dr. RENE GRUBB of the Virus Laboratory, Institute of Bacteriology, Lund. All cultures were primary explants taken from human embryos obtained after legal abortions. The embryos were 10–25 cm in length. The chromosomes were studied a few days after the *in vitro* explantation had been made.

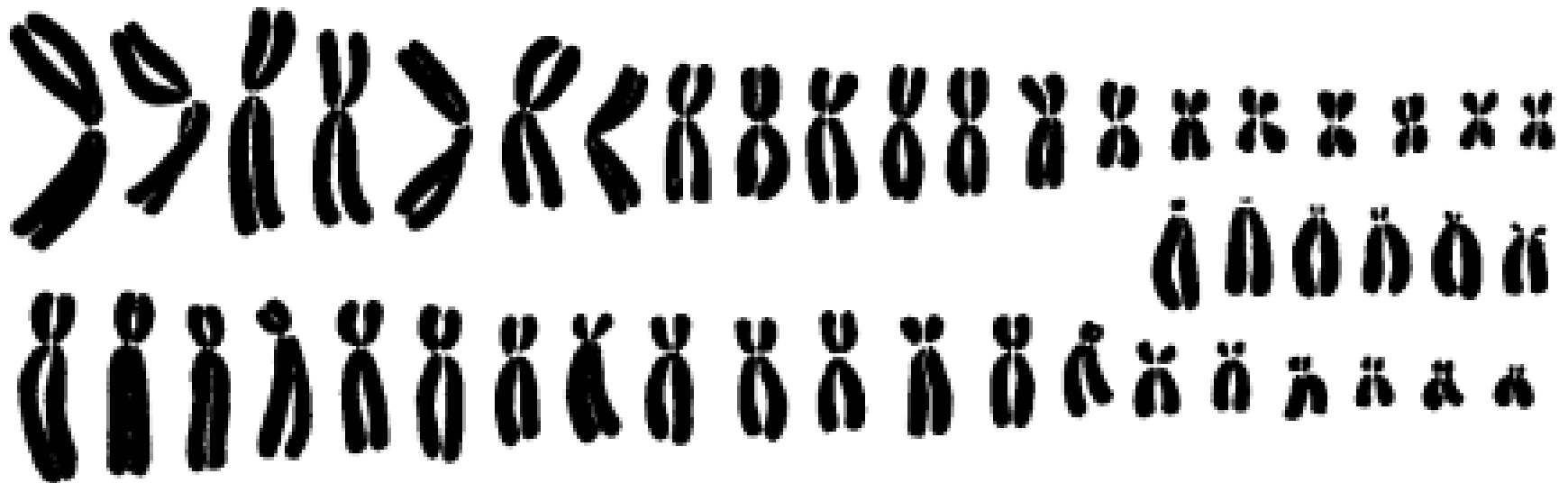
In our opinion the hypotonic pre-treatment introduced by Hsu, although a very significant improvement especially for spreading the chromosomes, has a tendency to make the chromosome outlines somewhat blurred and vague. We consequently tried to abbreviate the hypotonic treatment to a minimum, hoping to induce the scattering of the chromosomes without unfavourable effects on the chromosome surface. Pre-treatment with hypotonic solution for only one or two minutes gave good results. In addition, we gave a colchicine dose to the culture medium 12–20 hours before fixation, making the medium  $50 \times 10^{-6}$  mol/l for the drug. The colchicine effected a considerable accumulation of mitoses and a varying degree of chromosome contraction. Fixation

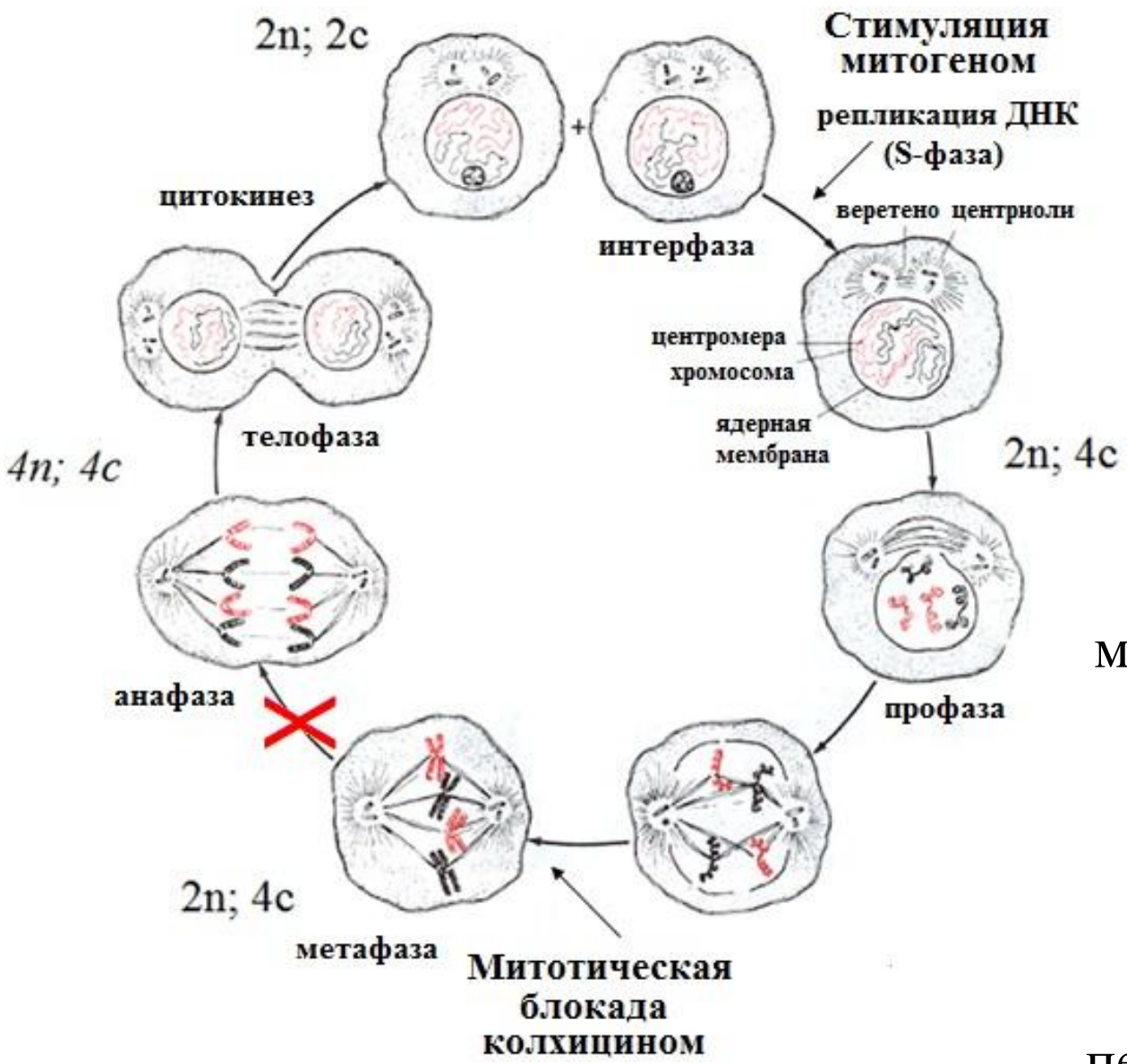
TABLE 1. *Number of exact chromosome counts made.*

Embryo No.	Number of cultures	Number of counts
1	5	15
2	10	98
3	3	119
4	4	29
Total	22	261

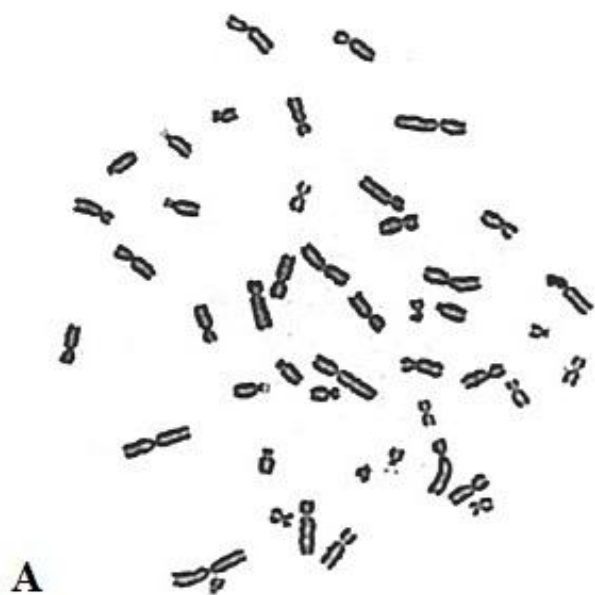


Метафазная  
пластинка и  
кариограмма  
хромосом  
человека  
по Джо Нин Тью  
(1956 г.)

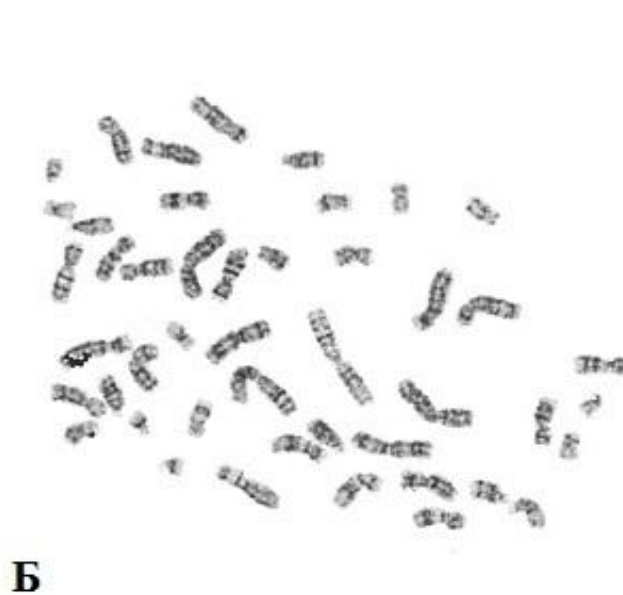




Принцип получения  
 метафазных хромосом  
 человека  
 при приготовления  
 цитогенетических  
 препаратов  
 из лимфоцитов  
 периферической крови



A



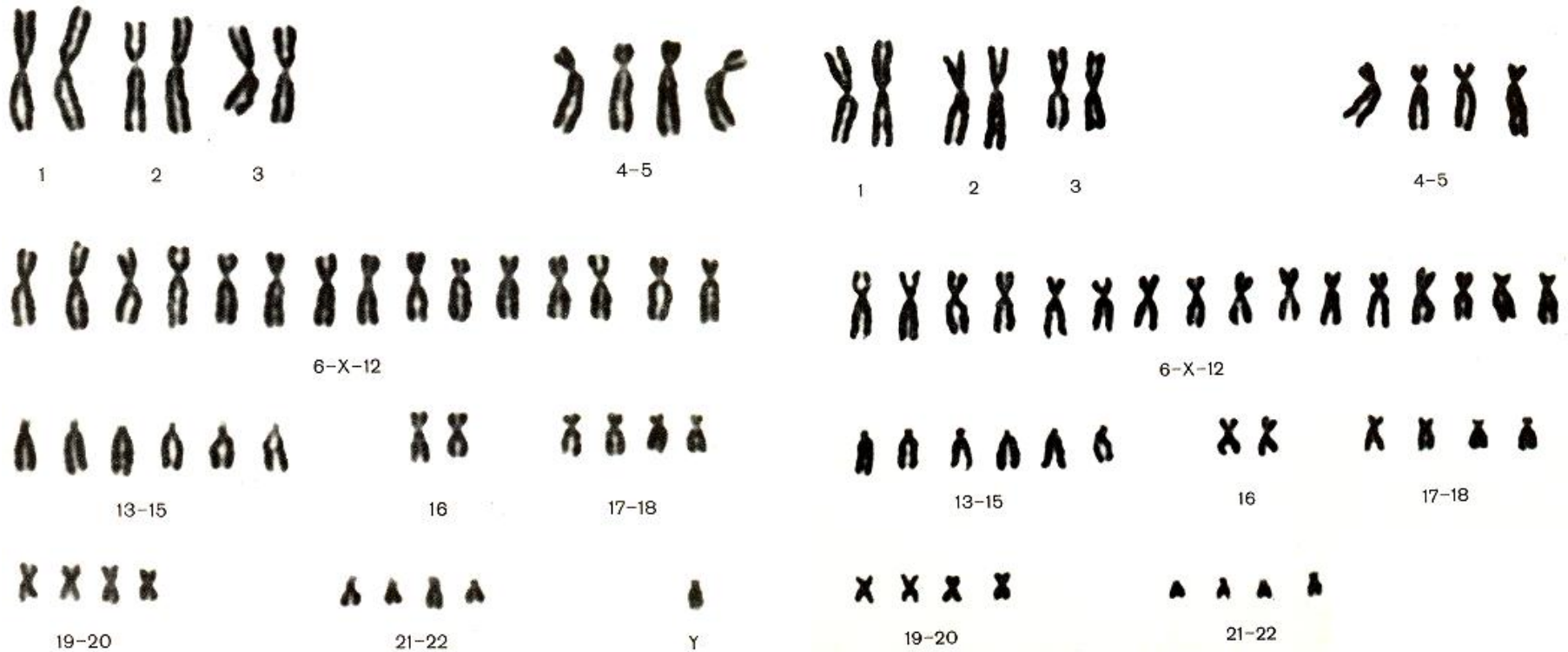
Б



В

Три метода анализа  
метафазных хромосом  
человека: А – рутинное  
окрашивание,  
Б – дифференциальное  
окрашивание,  
В – флуоресцентная  
гибридизация in situ (FISH)

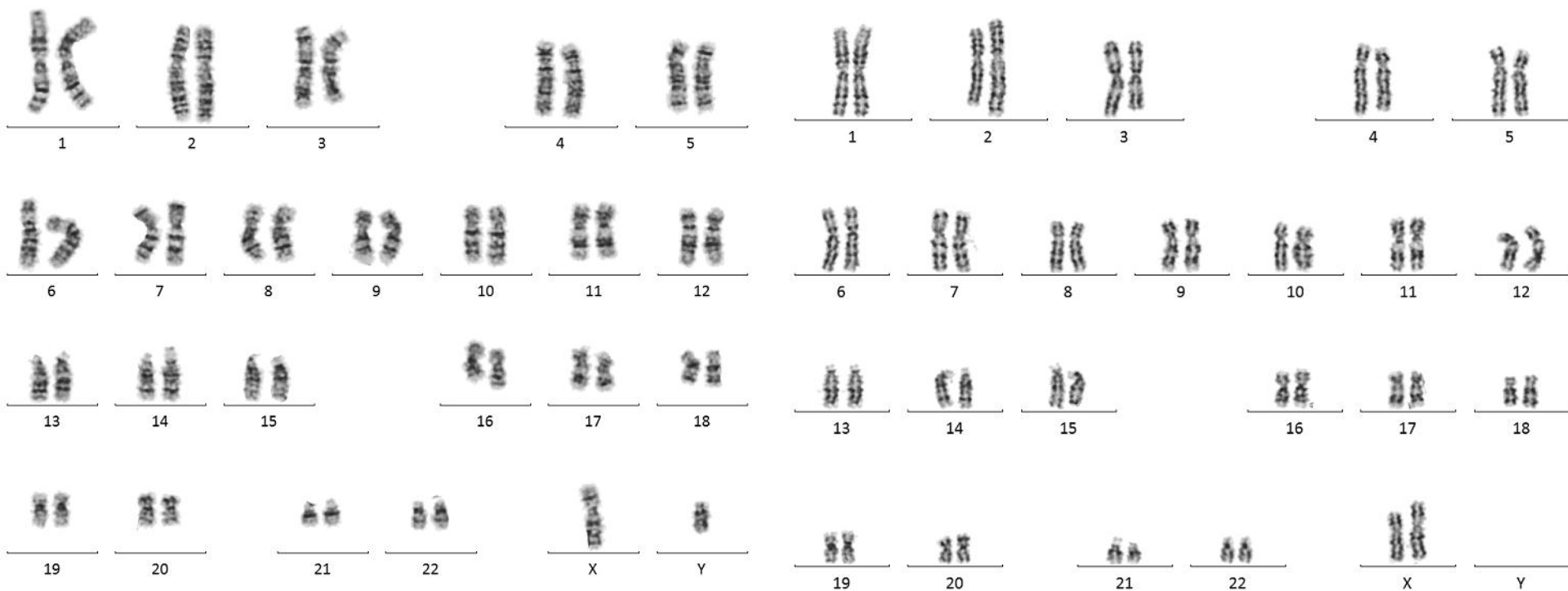
# Кариотип человека при рутинном окрашивании хромосом



Нормальный кариотип мужчины  
(46, XY)

Нормальный кариотип женщины  
(46, XX)

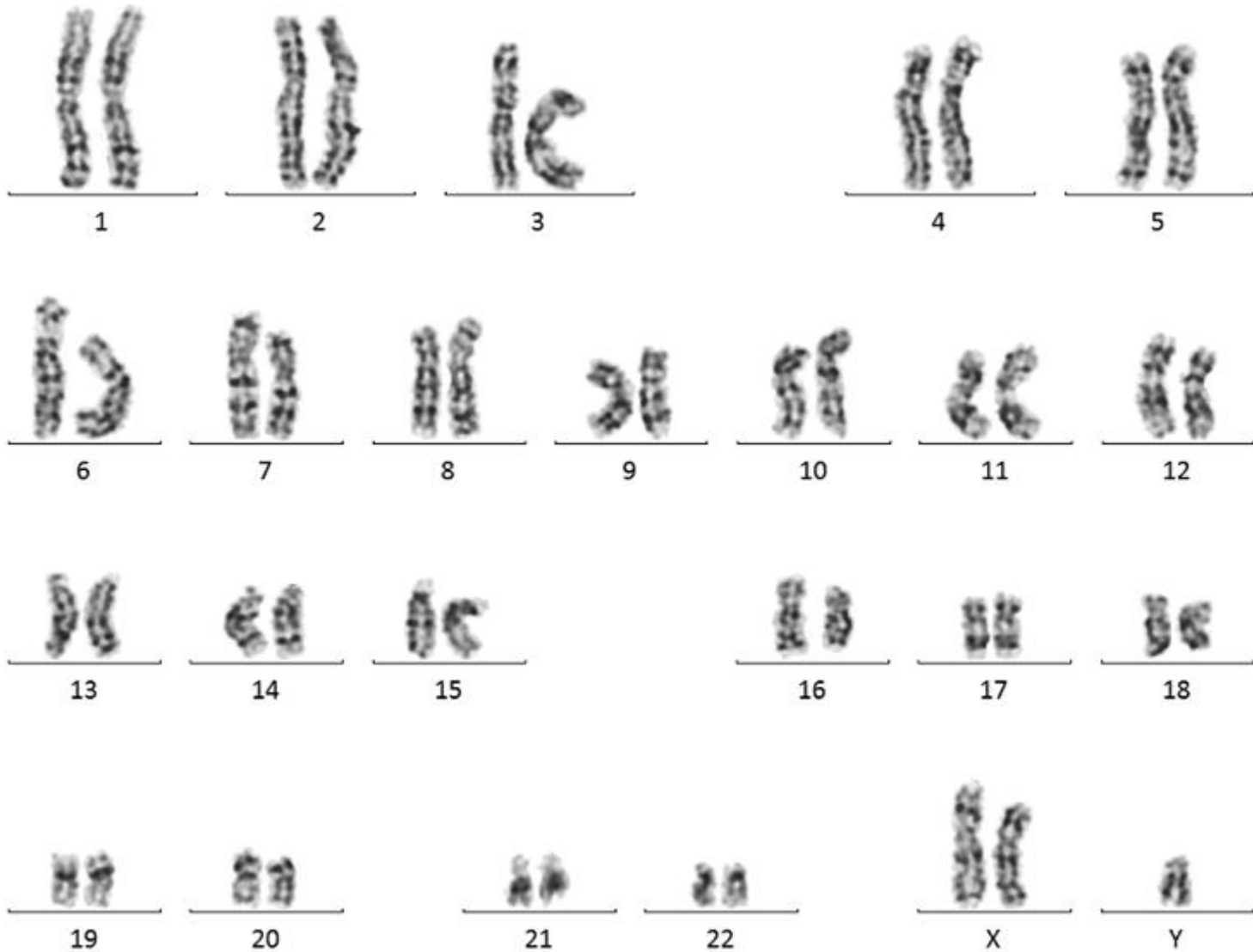
# Кариотип человека при дифференциальном окрашивании хромосом



Нормальный кариотип мужчины  
(46, XY)

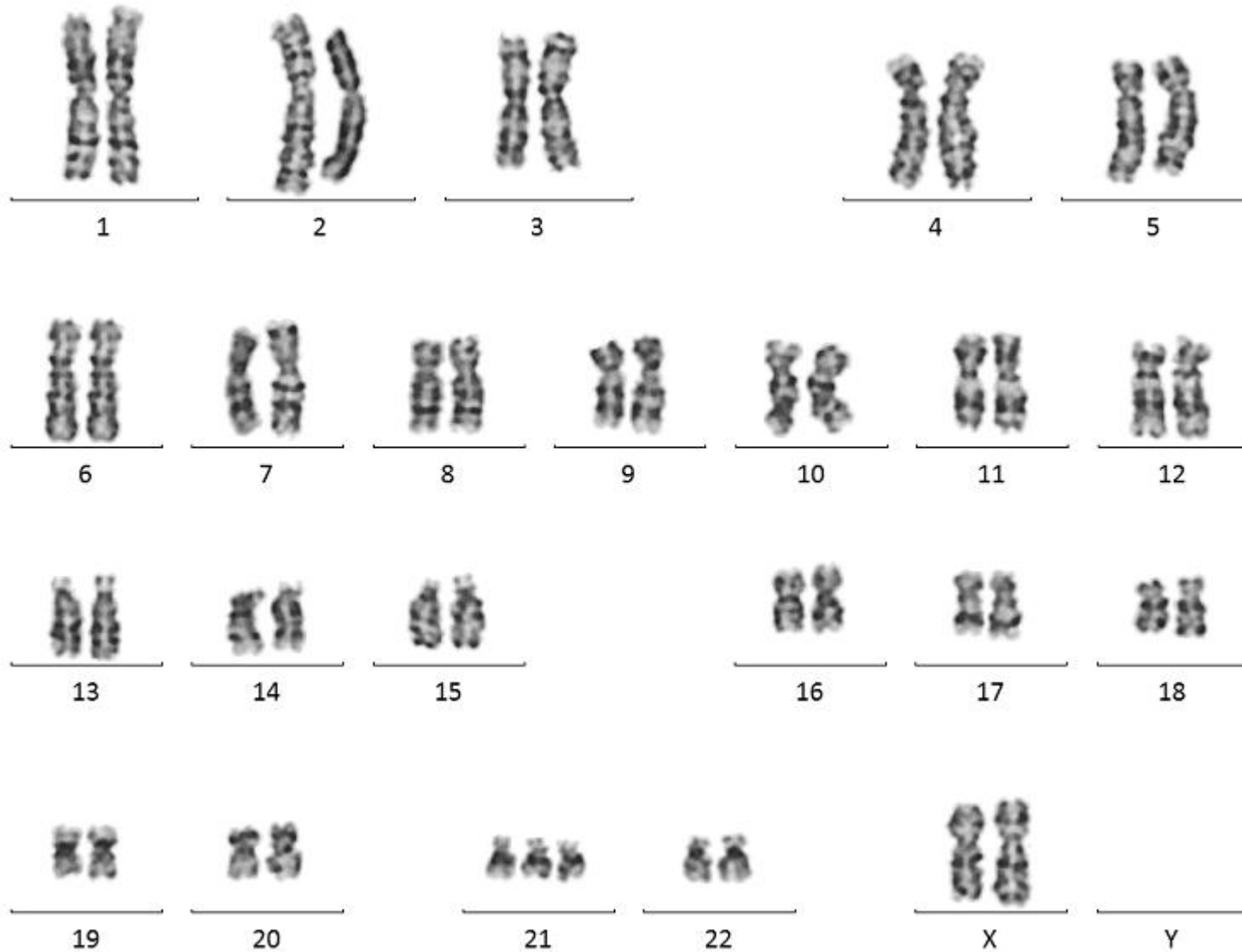
Нормальный кариотип женщины  
(46, XX)

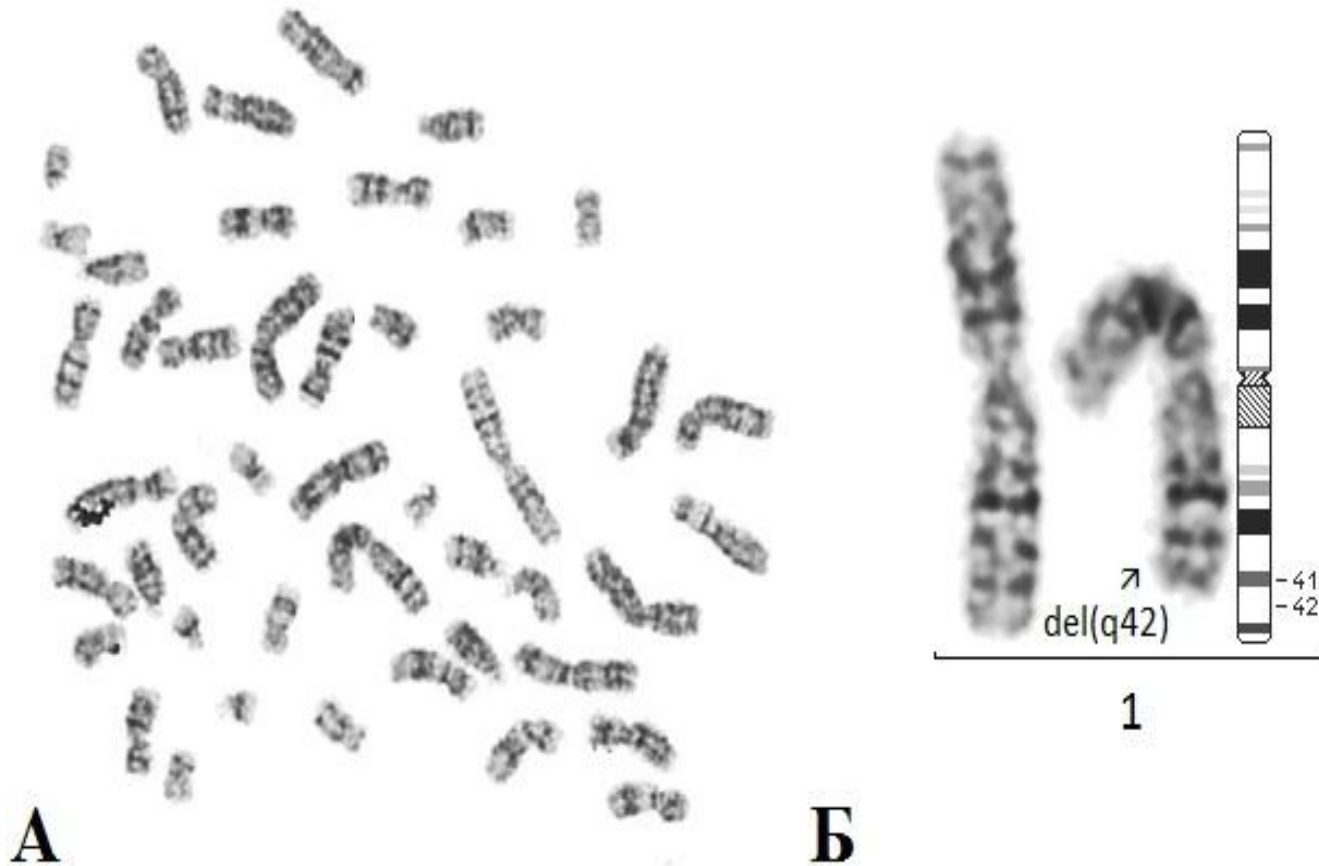
# Кариотип мужчины с синдромом Клайнфельтера (47,XXY)





# Кариотип женщины с синдромом Дауна (47,XX,+21)





Метафазная пластинка (А) и фрагмент кариограммы (Б)  
хромосом человека при делеции  
части длинного плеча хромосомы 1  
(кариотип 46,XX,del(1)(q42))