

Table of contents

1 INTRODUCTION.....	6
1.1 HISTORY OF GENETICS AND ITS PHASES	6
1.2 CLASSIFICATION OF GENETICS	8
1.3 STUDY OF GENETICS AND ITS METHODS	9
1.4 GENETIC OBJECTS	10
2 MOLECULAR PRINCIPLES OF HEREDITY	13
2.1 CLASSIFICATION AND CHARACTERISTICS OF NUCLEIC ACIDS	13
2.1.1 Structure of nucleic acids.....	13
2.1.2 Key enzymes for nucleic acids	16
2.2 TRANSMISSION AND EXPRESSION OF GENETIC INFORMATION.....	18
2.2.1 DNA replication	19
2.2.2 Transcription	21
2.2.3 Translation.....	24
2.2.4 Genetic code.....	26
2.2.5 Regulation of gene activity	27
2.3 GENE MUTATIONS	31
3 CYTOLOGIC PRINCIPLES OF HEREDITY	35
3.1 ULTRASTRUCTURE OF CHROMOSOMES	35
3.2 CHROMOSOME MORPHOLOGY.....	37
3.3 NUMBER AND SIZE OF CHROMOSOMES.....	39
3.4 DETECTING CHROMOSOMES	40
3.5 CELL CYCLE.....	42
3.5.1 Mitosis and its role in genetics.....	43
3.5.2 Meiosis and its role in genetics.....	45
3.6 GAMETOGENESIS AND FERTILISATION IN PLANTS	47
3.7 GAMETOGENESIS AND FERTILISATION IN ANIMALS.....	48
4 MENDEL'S CONCEPT OF HEREDITY	49
4.1 MENDEL'S IDEA OF MONOHYBRID CROSSING	49
4.2 MENDEL'S IDEA OF DIHYBRID AND POLYHYBRID CROSSING	52
4.3 VALIDITY OF "MENDEL'S LAWS".....	57
5 GENE INTERACTIONS	59
5.1 INTERACTION OF NON-ALLELIC GENES	59
5.2 PLEIOTROPY	65
5.3 PHYSIOLOGICAL AND BIOCHEMICAL PRINCIPLE OF GENE INTERACTIONS	66
6 GENE LINKAGE	68
6.1 LINKAGE PHASES, STRENGTH OF LINKAGE	69
6.2 CROSSING OVER.....	71

6.3 INTERFERENCE AND COINCIDENCE	76
6.4 GENOME MAPPING	77
7 HEREDITY OF SEX	79
7.1 SEX CHROMOSOMES	79
7.2 TYPES OF SEX CHROMOSOMES.....	80
7.3 DETERMINATION AND DIFFERENTIATION OF SEX.....	81
7.4 GENETIC AND NON-GENETIC OPTIONS FOR INFLUENCING THE RATIO OF SEX IN BORN OFFSPRING	82
7.4.1 Methods for separating X and Y spermatids.....	83
7.4.2 Determining the presence of X and Y heterochromosomes in preimplantation embryo cells.....	83
7.5 SEX AND TRANSFER OF GENETIC INFORMATION	84
7.5.1 Transfer of sex-linked genetic information.....	84
7.5.2 Transfer of genetic information influenced and controlled by sex	86
8 MUTATIONS	87
8.1 CLASSIFICATION OF MUTATIONS.....	87
8.2 INDUCTION OF MUTATIONS	88
8.3 CHROMOSOMAL MUTATIONS	89
8.4 GENOMIC MUTATIONS - POLYPLOIDY	91
8.4.1 Classification of polyploidy	92
8.4.2. Genesis of polyploidy	93
8.4.3 Euploidy.....	94
8.4.4 Aneuploidy.....	95
8.4.5 Haploidy.....	97
8.5 NONCHROMOSOMAL MUTATIONS.....	97
9 GENETICS OF QUALITATIVE TRAIT POPULATIONS	99
9.1 GENES AND GENOTYPES IN POPULATIONS.....	99
9.2 FREQUENCY OF GENOTYPES AND AUTOSOMAL LOCI ALLELES	100
9.3 GENETIC EQUILIBRIUM	103
9.4 DYNAMICS OF GENE AND GENOTYPE FREQUENCIES IN POPULATIONS.....	105
10 GENETICS OF QUANTITATIVE TRAIT POPULATIONS	110
10.1 CHARACTERISTICS OF QUANTITATIVE TRAITS	110
10.2 BREAKDOWN OF TOTAL PHENOTYPE VARIABILITY.....	111
10.3 HERITABILITY COEFFICIENT.....	115
10.4 IMPORTANCE OF HERITABILITY COEFFICIENT AND HOW TO CALCULATE IT	118
REFERENCE.....	119