remained diploid. Numerous species have become weeds with a world-wide distribution, but their diploid races have only a local significance. Allopolyploids may inhabit wider areas than either parent. Polyploids may develop a perennial habit, apomixis, or seasonal dimorphism.

J. S. Huxley, in a general paper on "Systematics in Relation to Genetics", gave a valuable summary of the tendencies of modern taxonomy, illustrated by many examples. He showed that the progress of taxonomy itself, and its contacts with other branches of biology, are converting it into the basis of the study of evolution in action. In the first place, cytogenetic analysis is shedding light on particular taxonomic problems; secondly, taxonomic advance is suggesting important questions for experimental analysis; and thirdly, a combination of all lines of approach is increasing both the scope and the precision of the general principles underlying taxonomy and making it possible to forecast the course of differentiation and evolution in different kinds of taxonomic groups. It is not only cytology and classical genetics which are needed to co-operate with taxonomy, but also ecology and embryology are equally essential.

W. B. Turrill considered "Taxonomy and Cytogenetics in Plants" and pleaded for close co-operation between taxonomists and cytogeneticists. He illustrated the most desirable lines for such co-operation by examples of problems of mutual interest under the following headings: classifications of characters, degree of correlation of characters, constitution of taxonomic groups, the study of polymorphic groups, geographical and ecological problems, hybridization in Nature and experiment, problems of apomixis, problems of phylogeny, and general suggestions.

S. C. Harland read a paper under the title "Genetical Studies in the Genus *Gossypium* and their relation to Evolutionary and Taxonomic Problems". Within the widespread species of this genus in both the Old and New Worlds he traced the consequences of isolation for several millions of years. Species crossing and the study of their cytology in *Gossypium* has led to the accurate delimitation of the genus, has shown that species may be regarded as systems of modifiers, has revealed the taxonomic position of species in relation to other species, and has proved that species intercrossing results in the disintegration of the co-ordinated modifier systems possessed by each; it has shown that geographical isolation causes profound genic change, has indicated that genes may become mutable when transferred to the genetical background of other species, and has suggested that the number of alleles at a given locus differing only slightly in their reaction with the genetical background is probably large.

It is impossible in this article to deal with contributions to the ordinary meetings of the section except in a very brief and most generalized manner. The recognition of much more hybridization in the wild amongst animals than has usually been admitted by zoologists was stressed in several papers. The importance of population studies in throwing light upon the actual mechanism in evolution was also emphasized. The geographical distribution of 'races' in both animals and plants is obviously receiving increased attention and proving a connexion 'between genes and geography'. The wide occurrence of polyploidy and apomixis in plants is being shown to be one of the causes which make it difficult to accept the species as a clear-cut taxonomic unit.

GENETICAL ASPECTS OF GROWTH, NORMAL AND ABNORMAL

BY DR. A. HADDOW

THE fundamentals of this subject were outlined in a paper by E. B. Ford, who demonstrated how growth may be determined genetically by the most diverse means. Thus it may be under the control of a single factor-pair, or very numerous

genes, approximately equal in effect, may co-operate. Again, while the genetic situation can influence cell-size or cell-division directly, the effect on growth is frequently indirect. For example, genes controlling the endocrine glands

will modify total body size in mammals, as in recessive dwarfing in mice due to a factor-pair affecting the development of the anterior pituitary. Dr. Ford further discussed (1) the production by heterosis of increased size in the offspring of a wide cross, and (2) excess or reduction in hybrid size caused by mal-adjustment of the gene-complex. Similar considerations apply to differentiation, as in the case of a sex-linked factor producing dominant black-spotting in *Platyopceilus* and tumour formation in the hybrid between this and another form (*Xiphophorus*).

In a discussion of dominance in spontaneous cancer, P. A. Gorer dealt with the genetic basis of the inheritance of lung cancer in mice, mentioning evidence that the appearance of lung tumours is conditioned by three or four genes with additive effect, the degree of dominance thus depending upon the number introduced by the high-cancer parent. In those cases where the onset of tumours is delayed in the heterozygote, he regarded it as probably incorrect to speak of a change of dominance with age (Bernstein), since it is likely that the reactions preceding tumour emergence simply occur more slowly in the heterozygote.

Considerable interest centred round the interplay of genetic and environmental factors in the origin of different cancers. According to N. Dobrovolskaia-Zavadskaia, the failure of external carcinogenic agents to produce mammary cancer in mice, even in strains of high susceptibility, indicates that the onset of such tumours is almost entirely dependent on genetic constitution. On the contrary, sarcomata and squamous-cell epitheliomata appear to depend pre-eminently on environmental influences, a view confirmed by W. F. Dunning and M. R. Curtis when they reported that variation in the concentration of a chemical carcinogen is much more effective in influencing the probability of malignant change than is the genetic nature of the host. In another paper on the effect of genetic constitution in determining the response to carcinogenic agents,

G. M. Bonser described the gradation of tumour-response by male mice to oestrogens as reflecting the ability of the females to develop spontaneous mammary tumours, although when castrated females of high-cancer strains were tested with oestrogens, their ability to develop mammary cancer was reduced.

In a communication dealing with spontaneous and induced tumours in eight inbred strains of mice, H. B. Andervont stressed (1) the correlation between the susceptibilities to spontaneous and to induced pulmonary tumours, and (2) the absence of any correlation between susceptibility to the induction of subcutaneous tumours by carcinogenic hydrocarbons and susceptibility to spontaneous breast tumours.

Other contributors included G. W. Woolley on reduction in the incidence of mammary tumours in female mice in parabiosis with males, and H. J. Bagg on his method for early selection in mice and rats, by forced breeding coupled with the prevention of suckling, of those individuals constitutionally prone to the development of breast cancer. W. Cramer and E. S. Horning described the association in inbred strains of mice between brown degeneration of the adrenal and the incidence of mammary cancer, although L. Kreyberg found no difference in the occurrence of brown degeneration in two homozygous lines, one manifesting a high and the other a low yield of spontaneous mammary tumours.

R. J. Ludford discussed somatic mutation in relation to growth, while P. A. Gorer also examined the choice between this concept and "anomalous differentiation" in the origin of tumours. C. Auerbach reported work on various carcinogenic hydrocarbons in respect of their influence on mutation in *Drosophila melanogaster*. None of the compounds used produced any increase in mutation-rate, a result which could not be ascribed to insufficient substance, although it might conceivably be attributed to factors such as time allowed for action or penetration to the tissues.