
The monograph in Russian, 'Immunogenetics' by V. P. Efroimson, is issued by the Moscow publishing house, Medizina. However, the range of questions touched upon by the author exceeds the bounds of only medical interests. The monograph is dedicated to evolutionary genetics of congenital immunity.

There are 9 chapters logically interrelated. In chapter 1 the general principles of the evolutionary and genetic approach to the analysis of the interaction of macro-organisms and parasitic micro-organisms are expounded. The main emphasis is given to the fact that interrelations between macro- and micro-organism are characterized by a permanent process of mutual, genetically-conditioned adaptation. This process underlies the formation of balanced polymorphisms in populations of macro-organisms including human populations. The author maintains that a congenital immunity to infectious micro-organisms is conditioned by multiple allelism, resulting from the selection of macro-organisms for resistance to the pathogens of acute infectious diseases.

In chapter 2 the author sets forth the basic principles of the genetics of congenital immunity on the basis of an analysis of the resistance of plants to pathogens. This reference to data on plant immunity is not casual. The data demonstrate a certain community of mechanisms of congenital immunity formation both in plants and in animals.

Chapter 3 is dedicated to the genetics of virulence and pathogenicity of bacteria. Different species of bacteria—the cause of dangerous infections in man as well as in animals are considered as a dynamic system. The pathogens of some infections have to overcome a series of protective barriers of the macro-organism in order to be able to exist in the organism infected by them. On the basis of available facts the author describes the mechanism of how a pathogen overcomes a host's adaptation to it. This is brought about through mutation affecting the production of those chemical substances which are pathogenic for a macrosystem; microbial virulence of an organism of a specific species of an animal or a man being very often based on the activity of only one or two genes.

Chapters 4 and 5 are devoted to an analysis of genetic mechanisms of a congenital non-susceptibility to bacterial and virus infections in man as well as in animals. An intraspecific differentiation in humans and animals by their genetically conditioned immunity to a good deal of bacterial and virus pathogenesis is demonstrated.

Chapters 6 and 7 are the central ones of the monograph. They comprise nearly half of the book (pp. 161–279).

In chapter 6 the author discusses the mechanisms of human congenital immunity to the malarial parasite, Plasmodium. He has described in detail how selection by susceptibility to malaria picked up the mutation changes of substances in erythrocytes and primarily haemoglobin, a food source for the Plasmodium. These mutations determined a resistance to infection of native populations of malarial regions in the world. Among a great multitude of mutational changes of haemoglobin in man only a few have been fixed by selection. They are those haemoglobins which cannot be consumed by Plasmodium. On the example of the system, erythrocyte-Plasmodium, the author demonstrates one of the ways of analysis of the mechanisms of the congenital immunity in the system of macro- and micro-organism.

On the basis of the material given in the chapter and number of factual data in the preceding ones the author gives a hypothesis on mechanisms of congenital immunity formation.

In brief, the concept is as follows: during epidemics a selection of resistance to infection picks up only those gene mutations out of the hundreds in man and in animals which determine the formation of a structural analogue of a basic substance needed for the vital activity of a pathogen. The structural analogue reacts with enzymes which produce the main toxic factors of a microorganism. The result of this reaction will not be a destruction of the structural analogue of the basic substance, but a blockade of the microbe's enzymes. In other words the mutation of the basic substance in macro-organism annihilates the virulence and pathogenicity of the microbe. Mutation of this sort is picked up by selection and is fixed in the population determining its polymorphism by genes for particular substance.

Chapter 7 contains data on congenital balanced polymorphism of blood cells antigens and serum proteins in man. These data prove that the current distribution of allele genes for human blood group antigens cannot be a consequence of genetic drift but a result of selection by resistance to a range of infections in man primarily to smallpox and plague.

The final chapter is a summary of all the material of the monograph.

The basic approach is the consideration of the development of genetically determined immunity to infections by evolution. The author reveals the mechanisms of formation of polymorphous resistance which has developed in the natural human and animal population through natural selection. This selection
proceeds with an intensity such as was not even suspected in Darwin’s time.

The monograph by V. P. Efroimson will no doubt be of interest to British scientists.

V. G. GALAKTIONOV


Since C. C. Li wrote ‘Population Genetics’ in 1954, there has been no book in English to compare with its thorough yet elementary exposition of the theoretical principles of the study. Certainly there has been no book that set out the theory in the light of available data on the genetics of human populations. This volume by Cavalli-Sforza and Bodmer is therefore doubly welcome, first for presenting an up-to-date compendium of population genetics theory, and secondly for illustrating that theory by reference to ample example from human biological data.

After a preliminary explanation of basic concepts, the book proper starts with chapter II, dealing with Hardy–Weinberg equilibrium. Discussion of deleterious mutation, its increase with parental age, its balance by selection and the approach to equilibrium states, is followed by 2 chapters on polymorphism, the conditions for balance and its kinetics, illustrated in detail by the haemoglobin polymorphisms, while X-linked polymorphisms are illustrated by G6PD deficiency. Four human polymorphic systems, the ABO and Rh blood groups, the HLA tissue antigens, and the Gm groups are discussed in detail. In chapter VI appears a discussion of demography, showing how, for example, population size, structure, distribution, birth and death rates, and genetic evolution may be examined through quantities such as Crow’s index of opportunity for selection, for comparing the fertility and mortality components of selection in populations, and the intrinsic rate of increase applied in the measurement of selection.

Another unusual inclusion is the discussion of the fitness flow sheet, which provides the basis for computer predictions of evolution by natural selection and especially of the utilization of vital records through record linking. Discussion of inbreeding, its measurement and consequences, particularly in terms of the genetic load, heralds further departure from the ideal population of earlier chapters to the more real situations of limited population size, the resulting equilibrium situations that may result, movement of genes, and analysis of migration. The analysis of quantitative characters in chapter IX examines genetic models of quantitative variation, interaction with environment, partitioning the genetic variance, the analysis of threshold characters, and the use of twins in analysis. Sex determination and the evolution of sexual dimorphism is followed by a chapter on human evolution, racial differentiation, and methods of phylogenetic analysis. The final chapter is more philosophical, discussing eugenics, genetic engineering, and the effects of changing society.

The book is expansive, clearly and competently written, and well illustrated. Taking its origin in courses given by the authors, mainly at Stanford, its concentration on particular subjects reflects their own interests and enthusiasms. Perhaps that is why it is so consistently readable—an unusual quality in a volume of this size. Criticism can only be levelled at minor points, eg, are not all individuals of a species descended from an ancestral population, not a common ancestor (p. 341)? Work on the HLA system is progressing so rapidly that for example Table 5.18 where only 5 of the LA-series and 4 of the 4-series of alleles are listed is already out of date. But the many useful points outweigh the few disadvantages. A particularly useful feature of the book is the provision of worked examples at the end of each chapter and massive appendices, the first devoted to statistics and probability, the second to segregation and linkage analysis in human pedigrees and the estimation of gene frequencies, and the third to a list of sample problems. The book is to be strongly recommended for use as a student text for any course on population genetics, for general reference.

D. F. ROBERTS


The study of amniotic fluid cells as a means of preventing serious hereditary disorders dates from the mid-1950s when it was first reported that the sex of the fetus could be determined from sex chromatin studies on amniotic fluid cells. The importance of this in families at risk of having a son with a serious X-linked disorder was obvious. Some 10 years later the first successful culture of amniotic fluid cells was reported which opened up the possibility of determining the chromosome constitution of the fetus. Finally in 1968, Nadler showed that certain inborn errors of metabolism could be diagnosed antenatally by studying the biochemistry of cultured amniotic fluid cells. Since then the subject of antenatal diagnosis has developed rapidly, and gradually the potential value as well as possible limitations have become clearer.

In 1970, a symposium, sponsored by the John E. Fogarty International Center for Advanced Study in the Health Sciences, was held in Bethesda and devoted to the problems of antenatal diagnosis with contributors mainly from the United States. The proceedings reflect well the atmosphere of the meeting which was highlighted by the discussions which have been reported in full and often contain interesting information. The areas covered include the technique and complications of, and indications for amniocentesis, and the cytogenetic and biochemical problems associated with antenatal diagnosis.