symposium on mutation research held in Mainz in October 1969, supplemented by a number of additional papers and an appendix dealing with statistical methods used in mutation research. The discussions are centred on test methods employed in mutagenicity research with mammals and the contributions are parcelled up into three main sections: three chapters on 'Aspects of the problem'; 15 on 'Research methods'; 11 on 'Findings and applications'. There are some useful review chapters dealing with biochemical mechanisms of mutation, spontaneous mutation rates in man, and lists of chemical substances known to induce mutations in microorganisms and chromosome damage in human cells cultured *in vitro*. There are also useful papers on host-mediated assay systems in which bacterial cells, fungal spores, or mammalian cells are introduced into a mammalian host before the exposure of the host to a mutagen. The mutagenicity of compounds taken up and metabolized by the host is tested through assaying the mutation frequency in the introduced cells. Host-mediate assay systems of this sort are important tools since some compounds, eg, N-methyl-N-nitro-N-nitrosoguanidine (MNNG), may be powerful mutagens *in vitro* but appear to be only weakly mutagenic *in vivo*, whereas others, eg, cyclophosphamide, are much more potent *in vivo*.

A number of the contributions make very dull reading and like most published symposia, most of what is said has been published previously: the aficionado therefore will find little to whet his appetite. On the other hand the book should provide a useful guide to the interested bystander as to what is happening in this area of science. Unfortunately, the reading is not made any easier by the presence of an excessively large number of errors, many of which are a direct consequence of the fact that the bulk of the papers have been translated into English from the original German. Translational errors are, however, relatively easy to spot, eg, 'Professional exposition' (p. 50) in place of 'professional (occupational?) exposure', and, in general, do not present the reader with too much difficulty. Of far more importance are the numerous incorrect references; papers referred to in the text but not in the reference lists; and, in one instance, the presence of lengthy, and useful, tables (pp. 370-373) referring to 96 references by number without the corresponding numbers identifying the references listed at the end of the paper. These and other irksome editorial errors detract from the value of the book.

H. JOHN EVANS

reproduction) of papers published in a variety of places. So how does one comment? Presumably all the papers have been refereed and revised before their original appearance, and to criticize them on their reincarnation seems irrelevant in this context. This means that the only thing to review is the editor's choice of papers.

Loomis has collected 49 papers under five headings: endogenous control of enzyme synthesis in eukaryotic microorganisms; differential synthesis of proteins in developing organs; chromosomal differentiation; control of enzyme content in liver cells; haemopoiesis. He justifies his inclusion of the last two apparently specialized and limited groupings (comprising 24 papers) thus: 'since the products of intestinal absorption are carried directly to the liver via the portal vein, cells of this tissue are subject to frequent chemical changes. Thus it seemed logical to look for cases of substrate stimulation of enzyme stimulation in liver cells . . .' and ' . . . the fact that hemoglobin makes up more than 98 per cent of the total protein of a red blood cell makes these cells especially suitable for the study of the regulation of gene activity'. As will be apparent, Loomis is biased towards that stage of gene activity when the gene products have (presumably although not necessarily demonstrably) function but no obvious form. Twelve of his selected papers come from the *Proceedings of the National Academy of Sciences of the United States of America*, and a further 19 from assorted biochemical journals. Only one was published in a 'normal' embryological journal (*Developmental Biology*).

Can one assess the value of this selection? Some of the current accumulations of significant, classic, or well-written papers can be extremely useful as sources of concepts and references, or as background reading for students. No doubt the Loomis 49 will be valuable to some. I must confess that my emotion after leafing through the book was of disappointment that the problems of the relationship between gene and character expounded by Goodrich, and studied by Waddington, Dunn, Grüneberg, Landauer, Hadron, Gluecksohn-Waelsch, Deol, Forsthoefel, and their ilk were not included (the closest any of the 49 come to them is Mary Lyon's *Nature* paper that earned her a place in the dictionaries as the mother of Lyonization). Perhaps I expected too much from the title (to be fair, I cannot think of a more appropriate one). Or—dare I say it—possibly the pathways of gene activity studied by biochemists do not reach as far as the traits that occur in the obstetrician's and paediatrician's consulting room?

R. J. BERRY

Papers on Regulation of Gene Activity During Development. Edited by William F. Loomis. (Pp. ix + 442: figures + tables. £3.15.) New York: Harper and Row. 1970.

This book has been sitting on my desk for too long. My problem is that I have not known how to review it. It is one of those increasing number of books which consists of reprints (by typographically-unfortunate photo-

Birth Defects: Original Article Series, VII, 1. Second Conference of the Delineation of Birth Defects, Part VI, 'Nervous System'. (Pp. 255; illustrations. £8.00.) Baltimore: Williams and Wilkins (and Edinburgh: E. & S. Livingstone) for The National Foundation—March of Dimes, New York. 1971.

This volume in the Birth Defects series is a valuable review of neurological problems, providing also reports

of some new diseases, and a reminder of diseases already described in the Amish population. Much of the first half of the book is concerned with nosology, and an excellent chapter is that by P. E. Becker on the spastic paraplegias and spinocerebellar ataxias. He has brought interest and order to a difficult branch of neurology. Some of the other chapters on nosology are tedious and wordy. However there are some unusual topics covered in this book. For example, there are useful descriptions of some viral infections of the central nervous system, some of which give rise to malformations such as neural tube defects, cerebellar degeneration, and aqueduct stenosis; while others lead to the degenerative—occasionally familial—disorders of scrapie, kuru, and Creutzfeldt-Jacob disease. In another chapter, W. E. Nance discusses the aetiology of anencephaly spina bifida, mentioning the facts that only a small proportion of like-sexed twins are concordant for neural tube malformation, that maternal half-sibs have a recurrence risk as high as that of full sibs, and that the increased incidence in second and third-degree relatives is largely confined to matrilineal relatives. Dr Nance suggests that the explanation for these observations is that inheritance is through cytoplasmic factors.

Chapters which are more clinically oriented include good ones on Tay-Sach's disease, Refsum's disease with an account of dietary treatment in two patients, and descriptions of some of the childhood leucodystrophies. Of particular interest in the case reports in the later part of the volume are those autosomal recessive conditions associated with mental retardation, where diagnosis and subsequent genetic counselling are so important. Such disorders include an oculocerebrofacial syndrome where, in addition to retardation there is microcornea, optic atrophy, and small mandible; an example of the Dyggve-Melchoir-Clausen syndrome with mental deficiency; and familial megalencephaly. In all this is a helpful and interesting volume in the Birth Defects series.

SARAH BUNDEY

Genes, Dreams and Realities. By Sir Macfarlane Burnet. (Pp. 232; illustrations. £2.75.) Aylesbury: Medical and Technical Publishing Co. Ltd. 1971.

All that Sir Macfarlane Burnet writes must be treated with respect and in this book he discusses several of the most important biological issues of the day: the human applications of the new biology; the implications of the treatment of genetic disease; the immunological basis of carcinogenesis and of ageing; and the possibilities of population control. On most of these issues his conclusions are pessimistic and many readers will regard him as being unduly so; but will find it a valuable exercise to think out just where they feel he may be mistaken. On a more technical level the book is noteworthy in empha-

sizing the author's view of the importance of somatic mutation, as opposed to mutation in the germ cells, as a cause of disease.

He thinks that basic work on molecular biology is now largely completed except for the elucidation of the structure of ribosomes in relation to their function of translation and a complete specification of an RNA bacteriophage. He regards the chance of discovery of practical methods of direct gene replacement in man as infinitely small. He does however think that there is a reasonable chance of culturing and transforming some of the patient's own cells and returning them to the body so that they can compensate for genetically determined deficiencies.

He notes the difficulty that many doctors still have in accepting that a disease has a genetic cause and reminds us that this was once equally true for the concept that some diseases were due to invasion by microorganisms. He is doubtful of the ethics of treating children with disorders such as PKU and notes 'it will probably be many years before the logical solution can be accepted that infants with gross genetic defects of metabolism should be treated as those with no brains (anencephalic monsters) . . . and not allowed to survive'. Most medical practitioners perhaps would agree only if the detection and destruction of those affected could be readily achieved early in pregnancy, always provided of course that this is what the parents wanted. He makes a good case for the origin of cancers from somatic mutation and the reviewer was interested to learn that tumours in pure line strains of mice induced by carcinogenic chemicals are each antigenetically different. Burnet is sceptical of the view that viruses play much part in the aetiology of cancer on the grounds that he can see no selective advantage to a virus in inducing cancer in the host. He thinks that immune mechanisms control much potential cancer and offer the best hope for a cure. He believes however that 'little further advance can be expected from laboratory science in the handling of the 'intrinsic' type of disability and disease'.

On population problems he is equally pessimistic. He believes it necessary to get back to a global population of between one and two million until a greater proportion of solar energy can be harnessed by collectors in geo-stationary orbit which can beam energy onto the earth's surface. The control of population he regards as quite the most important priority. 'Family planning with its slogan of the children you want when you want them is absolutely inadequate; it is population control or chaos.' However he does not believe that any democratic country will ever initiate effective policies of population control so that 'current civilization will destroy itself and that a second civilization rebuilt in centuries or more millennia from pockets of survivors will probably again end in another catastrophe'.

C. O. CARTER