

REVIEWS

TREASURY OF HUMAN INHERITANCE, Vol. V, Part II. On syndactyly and its association with polydactyly. By Julia Bell. Cambridge University Press. 1953. 10s. 6d.

This is the latest addition to the valuable collection of human pedigrees featuring pathological and abnormal conditions which during some forty years have been brought together in the *Treasury of Human Inheritance* under the sponsorship of the Galton Laboratory. From an exhaustive study of the genetical and medical literature, Dr Bell has assembled 63 pedigrees which include some 700 predominantly syndactylous digital anomalies. The varied manifestation of syndactyly, the association with polydactyly, differences in its sex incidence and the difficult problem of its inheritance, these are questions considered in a preliminary note. The genetical analysis of this material would certainly be of great interest. Dr Bell has classified the pedigrees on the basis of the varied manifestation and whilst this may be convenient, it can be only tentative for it is not demonstrated that these correspond with different genetical types. However, it does focus attention on interesting sex differences in the incidence of the various forms of this defect. Noteworthy amongst the collection is Schofield's unique pedigree (fig. 125) in which webbed toes are limited to males, being transmitted only from father to son, completely in accordance with the inheritance of a single gene on the Y-chromosome. One normal sister has been lost from this pedigree in transcription. J. H. BENNETT.

NUCLEO-CYTOPLASMIC RELATIONS IN MICRO-ORGANISMS. Their bearing on cell heredity and differentiation. By Boris Ephrussi. Oxford: Geoffrey Cumberlege, Clarendon Press. 1953. Pp. 127. 18s.

For forty years or so people have been studying the relations of nucleus and cytoplasm in animal and plant cells. The work has fallen into five main sections. First, there are the connections of nuclear and cytoplasmic heredity, chiefly in the higher plants. Secondly, there are the observations of bodies in the cytoplasm, primarily the chloroplasts of the higher plants, whose action in heredity could be traced. Thirdly, there are the relations of nucleus and cytoplasm under a variety of developmental and experimental conditions: they concern competition and co-operation of nuclei following abnormal chromosome and cell division induced by treatment, by cancer, by hybridity or by genotypic control. Fourthly, there are the chemical relations of nucleus and cytoplasm as determined both microscopically and also macroscopically in genetical experiments in a variety of organisms. Finally, it has become clear that the viruses of higher plants and animals—some multiplying in the cytoplasm, some in the nucleus, some spontaneous, some induced, and some natural, and all influenced by the character of the nucleus—all of them provide evidence on this problem.

During the last ten years most of these kinds of study have been transferred with prodigious success to micro-organisms. The more rapid and

sometimes more precise experiments and the different range of tests possible in this new field have vastly strengthened the conclusions reached earlier and have in some respects broken new ground. Moreover the future possibilities, as soon as microbiologists in general grasp the argument, are obviously enormous.

Professor Ephrussi, who has himself played an important part in this new development, here publishes three lectures which explain recent experiments with yeast, *Paramecium* and *Podospora*, all of them throwing light on these problems. He expresses his argument with the utmost lucidity so as to be intelligible to the general reader. Only in one sentence a phrase needs inserting (p. 81) "if crossing over occurs, there is post-reduction of mating type genes" would be better if it specified "crossing over between gene and centromere".

As a model of scientific exposition the three lectures reveal only one serious fault to the reviewer and that is one which most critics would take to be no fault at all. Ephrussi distinguishes (on p. 35) between what is "proved" or "demonstrated" and what is a "tempting assumption". The same distinction arises later between what differentiation "is due to" and what it "may be due to" (p. 95). In the reviewer's opinion, however, scientific statements cannot be proved right. They can only be proved wrong; and even that is more difficult than the world imagines. Is there not every gradation between what "is" and what "may be", between the tempting assumption and the unquestioned truth? At what point in the scale a particular statement stands we surely ought to judge only after the whole of the evidence has been considered. This is the rub. Do the higher plants and animals come in? The multifarious evidence of the relations of nucleus and cytoplasm in them is not considered here. A paragraph explaining that it exists would strengthen the book. And if it were added that this evidence conforms in every imaginable way with that derived from micro-organisms nothing would have been lost. Indeed the analogy between *Paramecium* and *Pisum* or between "petite" yeast and the rogue tomato is the most far-reaching analogy to be found in genetics since it was discovered that crossing over explained linkage both in flies and in peas. Such analogies convert the tempting but gratuitous assumption into the well-founded hypothesis.

In a *Discussion*, Professor Ephrussi offers a model of the organisation of the egg necessary to account for differentiation. This provides a useful basis for enquiry. But perhaps of more immediate interest is his somewhat condensed *Addendum*. Here he goes deeper into the question of the relative function or importance of nucleus and cytoplasm. He advances the genetic evidence for the view that the "basic structure of cytoplasmic proteins is a function of cytoplasmic [as opposed to nuclear] elements". Some contrast of this kind obviously exists. Probably it is not unconnected with the contrast within the nucleus between the properties of heterochromatin and euchromatin. It also poses the question as to whether we can admit that the direction of the cell is in the hands of a body that can merely adjust or titivate the imposing molecules which carry on outside it from generation to generation in substantial chemical continuity. But have we not here one of those paradoxes which constantly astonish us as we pass from the chemical to the cellular and from the cellular to the organismal level? In many species a mere deficiency is all that distinguishes the two sexes

at the chromosome level. The most trivial difference in the nucleus determines the most profound difference in the organism. But we cannot on this ground regard the nucleus as trivial.

Following the same theme Professor Ephrussi points out that the nucleus offers more opportunities to the experimenter to be tested and examined. This has given the nucleus, as it were, an unfair advantage over the cytoplasm. But to nature also does not the nucleus offer more opportunities to test its capacity? Surely it is to these opportunities for selection and adaptation that the long-term predominance of the nucleus, *i.e.* in heredity and evolution, is due. In development, however, the nucleus interferes, as Ephrussi has explained, in sequences of reciprocal reactions which are bound to be small and delayed if they are not to be disastrous. Importance therefore depends on the time scale. The village priest or policeman may be more important from day to day. But over a period of years the Pope or the President makes his weight felt—and simply by saying yes or no.

Such are a few of the problems raised by this book. It is a most timely and effective little volume. Later we may hope that it will appear in an expanded form.

C. D. D.

CLINICAL GENETICS. By Arnold Sorsby. Butterworth & Co. 1953. Pp. 577. 90s.

Genetical studies of man are now rapidly increasing in importance both for genetics and for medicine. The reactions of the two are reciprocal. This situation is recognised in the present work by its division into two parts. There is an introduction on the theoretical side by twelve authorities, European and American, on the genetic interpretation of man. This is followed by a systematic clinical classification of diseases in over thirty sections.

With so many authors, and of so many nations, co-ordination is difficult and synthesis perhaps impossible. The fundamental account of chemical genetics, largely in fungi, cannot be brought into relation with all its bearings in the other articles without an explanation which it indeed deserves. The account of cancer cytology is not mentioned in the later account of cancer genetics although the connection between the two likewise deserves explanation, being more fundamental than either.

These gaps between different branches of medical genetics are of long standing and have led to a theoretical backwardness which becomes more noticeable as the subject becomes more important. The universal assumption that one-egg twins are genetically identical is adopted as a matter of course in this book. But if twin studies are to be taken seriously the error is a serious one. The assumption made here (on p. 36) that twins derived from the separate fertilisation of the opposite products of the second meiotic division in the egg would be more alike genetically than average sibs, has no serious consequences: it is merely of interest as showing another hiatus between medical genetics and genetics proper.

The deepest impression that one gets from this book is of the great importance that has been attached by both geneticists and clinicians to rare and striking abnormalities and the very slight interest they have taken in the genetics of susceptibility to infectious disease in general, and to the most widespread diseases, such as the common cold and dental decay, in particular.