interest—do they arise from the thymic rudiment itself or from blood-borne stem cells? E. P. Volpe (Tulane University) and N. Cohen (Basel) argued that experiments in which tissue primordia were transplanted between frog embryos of different ploidy states, proved that thymus lymphocytes are derived by differentiation of cells intrinsic to the thymic rudiment itself. Furthermore, Volpe suggested that a similar situation may exist in birds and mammals. But the elegant transplantation experiments of N. Le Douarin and her colleagues (Nogent-sur-Marne), using the structural differences between quail and chick nuclei as markers, demonstrate clearly that lymphocytes of the thymus and the bursa of Fabricius are derived from blood-borne stem cells. In addition, P. Deparis and A. Jaylet (Toulouse) and J. Charlemagne (Paris) presented evidence that thymus lymphocytes of newts and salamanders are of blood-borne origin. Hence, either there are fundamental differences in the pattern of lymphopoiesis among amphibia or, perhaps more likely, there is a common phylogenetic pattern involving migration of blood-borne stem cells to organs such as thymus. Volpe's results are compatible with the latter notion if stem cell migration occurs early in ontogeny and is restricted in time, as demonstrated by Le Douarin.

The source of blood-borne stem cells was also debated. It has been suggested that all haemopoietic stem cells are derived from yolk sac (Moore and Metcalfe, *Br. J. Haematol.* **18**, 279; 1970). F. Dieterlen-Lievre (Nogent-sur-Marne), however, demonstrated convincingly for the first time that definitive erythropoietic stem cells are derived from other sources. Yolk sac cells can populate the thymus, but they probably require a previous sojourn in the bone marrow (O. Stutman, New York).

The remarkable sequence of cellular and biochemical events which occurs during embryonic erythropoiesis—changing erythroid cell populations, changing haemoglobins and changing sites of erythropoiesis—was examined by several workers. J. Samarut *et al.* (Lyon) demonstrated the existence of separate erythroid stem cells specific for foetal and adult erythropoiesis respectively. Thus the situation contrasts with the synthesis of various immunoglobulin classes in B lymphocytes, which probably occurs in a single cell line (see Cooper below). J. Godet *et al.* (Lyon) identified membrane antigens specific for embryo and adult erythryocytes and A. Fantoni (Rome) showed that erythroid cells undergoing terminal differentiation in the 10–14-d mouse embryo synthesise haemoglobin by translating preformed long-lived messengers and that ageing leads to messengers which are unsuitable for terminating translation, thus resulting in reduced haemoglobin synthesis. The role of long-lived messengers in erythropoiesis leads one to wonder whether they may not operate in lymphopoiesis—perhaps explaining how a single lymphocyte can express two immunoglobulin classes at the same time. R. A. Rifkind (New York) discussed the regulation of foetal erythropoiesis. While erythropoietin serves as a cell-specific growth regulator (? at a proerythroblast stage), the rate of terminal differentiation is controlled at a more distal step along the erythroid pathway. In addition, changes in the composition of erythroid chromatin proteins probably have an important regulatory role (V. M. Ingram, Massachussetts Institute of Technology). R. Jacquot (Reims) and O. Gallien-Lartigue (Orsay) described new observations on the effects of glucocorticoids on foetal erythropoiesis.

The ontogeny of the immune response with its important implications for the generation of diversity of responsiveness was discussed next. L. Du Pasquier (Basel) pointed out that a broad range of antibody diversity appears early in amphibian development when the animals possess a small number of lymphocytes. This interesting observation is somewhat surprising in view of the restricted responsiveness of individual lymphocytes to antigen as envisaged by clonal selection and established by experiment. M. Cooper (University of Alabama, Birmingham) and P. Kincade (New York) showed that heterogeneity of responsiveness in terms of specificity and class of antibody is generated in the avian bursa of Fabricius from day 12 of incubation. Evidence that various immunoglobulin classes are generated within a single cell line by a preprogrammed switch mechanism in the bursa is convincing. On the basis of antigen binding studies, Cooper also suggested that specific clones of antigen-binding cells develop in a fixed sequential pattern which is not influenced by exogenous antigen. He interpreted this data as favouring a model in which individual stem cells give rise to multiple clones of B lymphocytes by a predetermined pattern of sequential expression of V-region genes. P. Toivanen (Turku, Finland) also pointed to the importance of the bursa which he showed was an important source of cells able to reconstitute immunodeficient chicks.

The importance of a circulating thymic factor (TF) in T-cell differentiation was discussed by J. F. Bach (Paris). This factor has been shown to possess several biological activities including restoration of suppressor and cytotoxic T-function in thymus-deprived mice. Its effect may be mediated by prostaglandins as well as cyclic AMP (M. A. Bach, Paris). TF seems to be one of the most functionally active factors of the various putative thymic hormones that have been described and so its further study is of considerable interest; however, the target cell for the action of these factors is as yet unclear and F. Loor (Basel) described studies with nude mice which suggested that T-cell differentiation begins at a prethymic level. Le Douarin *et al.*, however, presented evidence that stem cells which have already settled in the bursa can migrate to and differentiate in the thymus. Does this mean that stem cells which would have become B lymphocytes can instead become T cells if they are in the thymic microenvironment? Whatever the answer to these problems it is likely that various differentiation pathways are involved in the generation of T-cell subsets which were described in the thymus by M. Papiernik (Paris) and in the periphery by P. Häyry (Helsinki). Moreover, to obtain full functional maturation as described by R. Auerbach (University of Wisconsin, Madison), it seems likely that cell proliferation will be a crucial step as has been found in erythroid maturation by Rifkind.

In summary, the meeting was important in defining somewhat neglected areas for future study. In particular, most participants found the interdisciplinary approach of considerable value. □

A hundred years ago

MR. CROSS on Monday received a very numerous deputation from the British Medical Association, who laid before him their views with regard to the Vivisection Bill now before Parliament. These opinions were conveyed by Mr. Ernest Hart, Mr. John Simon, Dr Wilks, senior physician of Guy's Hospital, and Sir W. Jenner, who raised his voice against a measure which would place men of science under police supervision, and would lay a ban upon them for inflicting cruelties on the lower animals when ten thousand times greater cruelties were inflicted by those who were going to pass this Bill. Such conduct would make those who passed it objects of scorn to all the scientific men in Europe. The Home Secretary, in reply, pointed out that the Bill was framed practically in accordance with the views of the Royal Commission, and that whether the Bill passed now depended entirely upon the line of conduct pursued by the medical profession. from *Nature*, **14**, July 13, 241; 1876.