constituent of foetal serum, but it virtually disappears from the circulation very soon after birth and is not detectable in normal adults. The only conditions where α_1 FP has been found in the sera of adult humans in significant quantities are primary hepatocellular cancer of the liver and teratocarcinomas. It has been shown that the demonstration of α_1 FP in the serum of adult patients can be regarded as a reliable indicator of the presence of primary carcinoma of the liver. Synthesis of α_1 FP by liver cancer cells is believed to result from derepression of genes which had been, in turn, activated and then repressed during ontogenesis. Techniques most commonly used for the detection of α_1 FP are bidimensional immunodiffusion (Ouchterlony), counter-current electrophoresis, followed by complement-fixation tests, haemagglutinin inhibition and more recently radioimmunoassay and latex agglutination. The relative merits of these techniques, as well as the problems of quantitation, standards, and availability of suitable antisera, will be discussed. The importance of good quality specific high titre antisera is emphasized. The interpretation of results and main sources of error will be considered, including the occurrence of α_1 FP in conditions other than hepatoma. Statistical and epidemiological data available to date regarding results obtained in various centres will be presented, as well as our own findings.

Antibody Protein Levels in Maternal Sera in Rh Haemolytic Disease

I. D. FRASER AND G. H. TOVEY

(Regional Blood Transfusion Centre, Bristol)

An automated haemagglutination technique was used to estimate antibody protein levels, in the maternal sera, in 600 pregnancies complicated by Rh incompatibility. Good correlation was found between the maternal antibody protein level and the subsequent severity of haemolytic disease in the baby. The method was found to be very reliable for selecting cases for amniocentesis. In 325 pregnancies (group I) where the mother developed Rh antibodies for the first time, amniocentesis was indicated if the antibody protein value reached or exceeded 1.5 μ g/ml before the end of 34 weeks' gestation. In 275 pregnancies (group II) where the mother had had a previously affected baby, amniocentesis was indicated if the antibody protein level reached 1.0

μ g/ml or more before the end of 34 weeks' gestation. If the automated technique was employed instead of manual antibody titrations, the proportions of mothers requiring amniocentesis in group I fell from 45% to 35% and the proportion in group II fell from 56% to 50%.

The maternal serum of two of the 600 mothers contained a bromelain inhibitor; pre enzyme treatment of the test cells in the automated procedure overcame this problem.

A Mortality Study of Sickle Cell Anaemia in Central Africa 1968-1971

G. P. T. BARCLAY (Kitwe, Zambia)

In our community of Zambian mine workers and their families, the total population of some 60,000 has a sickle cell carrier rate of 18%. In three years, 246 cases of sickle cell anaemia have been found and a closely supervised screening programme has revealed 49 of them to have died in childhood. In only seven of these cases was the diagnosis of sickle cell anaemia offered clinically. Most were discovered by typing everyone born in and admitted to the community hospital, some direct to the necropsy room.

The age range of these fatalities is of particular relevance clinically and offers a clue to the reason for the paucity of adult homozygote sicklers in this country.

The now traditional classification of crises into occlusive, haemolytic, and aplastic is meaningless in the form of the illness seen in Zambia. The clinical course of many of these fatal cases of sickle cell anaemia has been dramatic. Death occurred most commonly after a relatively short period of oligaemic shock and central cardiac failure following a rapid worsening of the anaemia, the result of acute hepatosplenic sequestration, in turn, associated with the metabolic acidosis of an infection. The key to the successful management of sickle cell anaemia is the prevention of infection.

Necropsies were performed on 21 of this series. The results further elucidate the nature of the sequestration syndrome and indicate the urgent necessity for a rational treatment regime which is simple and is proving increasingly successful.

The Spread of Cholera to and within Nigeria 1970-71

A. M. M. WILSON (University of Edinburgh)

The seventh pandemic of cholera started

from an endemic focus in the East Indies in 1961. Its westward spread came to halt in the Middle East in 1966. In August 1970, the disease was reported from south Russia, previously uninfected parts of the Middle East, Libya, and Guinea. From Guinea it spread east along the coast to Nigeria in December and Cameroun in February and inland more slowly to reach Mali in November and Chad in May. No northward spread occurred along the coast, but eventually inland spread from Mali to Mauritania was reported in June, and subsequently to Morocco, Spain, Senegal and Algeria.

Within Nigeria the spread was general, all but one of the 12 states reported the disease within three months. Explosive outbreaks were few and small, except for that in Ibadan at the end of Ramadan.

Total figures are unknown. Most cases were in adults. The case mortality in Lagos fell from over 50% in the first week to under 5% two and a half months later.

The passage of *V. cholerae* in the stool of a demographically randomized sample of the population of the Lagos area was carried out between February and April. No clinical cholera or contact with a case was found but five persons per thousand were asymptomatic excretors. They lived mainly in the areas where the concentration of population had outstripped the public services.

The spread and retreat of cholera are unpredictable; some of the factors will be discussed.

The Effects of Centralization in Haematology

A. A. SHARP (Radcliffe Infirmary, Oxford)

Expansion of laboratory haematology has necessitated the introduction of mechanical and automated equipment to contain the ever increasing workload. This revolution has shown the value of these machines both in terms of speed of working, numbers of tests handled, and accuracy. Further expansion is possible today and greater use of automated equipment is inevitable.

In terms of economics and availability of staff, centralization of this equipment in large, centralized laboratory areas appears inevitable. Considering the capital investment, machine potential, and the need for duplication of certain equipment, it would appear that the central laboratory should serve a population of 500,000 and receive between 500 and 1,000 tests per

day. Data processing by a computer-based reporting and record store is essential if such a system is to work. The possible effects of such centralization are disturbing; impersonal service, complex administration, rethinking on technician and graduate training, effect on staff morale, and the role of satellite laboratories are all problems to be faced. Patient care will require concentration of those requiring special investigation in the hospital containing the central laboratory and the laboratory itself should be sited centrally in the parent hospital. Clinical fashions and administrative barriers will have to be broken.

The effect of such centralization and automation will tend to cause a profound revolution in our pattern of working, but should release the medically qualified personnel from much that is mundane and routine and allow them to carry out the task they are best qualified to do, namely, research and development, and to play a greater role either directly or indirectly in patient care.

The Effect of Centralization on Laboratory Procedure in Histopathology

H. K. WEINBREN (*University of Nottingham*)

With the development of newer techniques, reorganization of hospital groupings and the possibly reduced numbers of histopathology technicians qualifying from training schools, new methods have to be devised for increasing the service load and at the same time relieving technicians of the chore of routine cutting and staining.

Of the possible modifications to existing systems, the main changes envisaged in some new developments involve automatic linkage stations between existing mechanical procedures. Selection of blocks is to be made after macroscopical details are recorded with the help of a suitably programmed two-way computer, the data are stored, and individual print-out notes accompany each specimen.

Tissue processing and vacuum embedding is effected by means of a linear system involving features found in commercially available apparatus and an electronically controlled linkage is being developed between paraffin block production and orientation in a mechanical microtome, in which some knife renewal system is incorporated.

The linkage between section cutting and mounting is provided by temperature-

controlled water flow for floating sections and a vertical belt carrying slides to which the sections adhere. Mounted slides are delivered to a staining machine and cover slips may be replaced by a mechanized transparent spray.

Effects of Centralization on Laboratory Services

M. T. PARKER (*Central Public Health Laboratory, Colindale*)

The main activity in clinical microbiology is identifying medically important micro-organisms in specimens from patients. Centralization would create problems if it removed this work from the point at which clinical and epidemiological decisions have to be taken. Fortunately, present techniques in diagnostic bacteriology are so primitive and so dependent on personal judgment that there is little to be gained from centralizing them further than to the area served by a group laboratory.

The other activities in clinical bacteriology are secondary identification processes, eg, typing and the identification of rare or 'difficult' organisms, and the detection of antibodies in patients' sera. Here, centralization is sometimes inevitable, but must be justified in each case and usually by one of the following considerations. (a) In a few specialized fields it may be necessary to centralize 'on a person', ie, the national expert. (b) When a technique is difficult to perform a special laboratory may have to be set up to carry it out. But most examples of centralization 'on a technique' are in fact examples of centralization 'on a reagent'. Here, the main obstruction to decentralization is the reluctance of the special laboratory to become merely a producer of reagents. This can usually be overcome by cautious devolution to selected regional centres. (c) Centralization to achieve an optimal workload often leads to increased efficiency and may often give a quicker service. Virology is a special case, because a credible virological service can seldom be provided except in a relatively large laboratory unit.

The Effect of Centralization on Laboratory Services in Chemical Pathology

I. J. L. GOLDBERG (*St. Mary's Hospital, London*)

It is not realistic to think in terms of geographical centralization until new district general hospitals are built.

Administrative centralization, however, is possible at an earlier stage and this could take the form of cooperation in the provision of biochemical services for about three adjacent groups or areas serving a population of between a half and threequarters of a million. This development is made possible by the recognition of eight or more subspecialties of clinical biochemistry. These could be distributed among the contributing hospitals thereby retaining a significant biochemical 'presence' on the spot at each acute hospital. The effects will be beneficial in providing an improved analytical and consultative service and the problems created in staff training, data communication, patient identification, and specimen transport are not impossible to solve.

The Grouping of Staphylococci and Micrococci

A. C. BAIRD-PARKER (*Unilever Research Laboratory Colworth/Welwyn, Colworth House, Sharnbrook, Bedford, England*)

The Gram- and catalase-positive, cluster-forming cocci belonging to the genera *Staphylococcus* and *Micrococcus* can be separated by the ability of numbers of the former genus to grow in the absence of glucose. *Staphylococci* can be grouped into two quite distinct species, *Staphylococcus aureus* (the type species) and *S. epidermidis*: the latter organism is frequently, although incorrectly, referred to as *S. albus* in the medical literature. They are distinguished in the laboratory by such characters as cell wall structure, growth requirements, and metabolic activities such as the production of enzymes, clotting animal plasmas (coagulases) by *S. aureus*. *Staphylococcus aureus* can be subdivided into several ecotypes based on differences in biochemical properties, serology and phage sensitivity of strains isolated from human and animal sources. *Staphylococcus epidermidis* can be divided into a number of biotypes corresponding to Baird-Parker's *Staphylococcus* subgroups II, III, IV, and VI,¹ (subgroup V was subsequently shown to be indistinguishable from II) and into a number of phage types. There is some correlation between phage type and biotype, but this is far from clear cut. Five species are at present recognized in the genus *Micrococcus*. These are: *Micrococcus luteus* (the type species), *M. lactis*, *M. morrhuae*, *M. saprophyticus* and *M. roseus*. It