constraints. In the Harness case space is made available in multiples of 2,500 sq ft squares, of which 10 are required for a 25,000 sq ft laboratory to serve a notional catchment area of 250,000 population. (In some areas of the building smaller increments than 2,500 sq ft are possible.)

The initial reaction to a proposition to standardize laboratory design may well be that it cannot provide for the variations of practice which we know currently obtains in the NHS. In favour of standardization is that since all laboratories rapidly become obsolete, whoever designs them, there is little in principle to choose between alternative designs. It may even be that where funds are limited one good standard design could well be less quickly obsolete than many of the laboratory designs produced by 'one-only' laboratory planners who have limited opportunity to learn from their mistakes.

More important than the detail of laboratory layout is overall availability of usable space, provision for expansion, and an adaptable arrangement of benching systems. The Harness solution, for which four leading clinical pathologists—one from each major discipline—have been coopted, aims to meet all these requirements.

Designing by Function

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Hospital activities carried out in free space would be far more convenient but perhaps less comfortable.

Providing for people to do what they need to do, now and in the immediate future, with the freedom of free space but in a controlled, fully serviced environment and at a reasonable cost generates the conflicts out of which arise conferences such as this one.

The resolution of such conflicts involves two different kinds of people; those with a knowledge of the activities to be enclosed and those with a knowledge of the enclosing techniques, but unfortunately these different people also have different languages and objectives.

Traditional methods of briefing have done little or nothing to draw the two sides together mainly because such methods accept without question both hierarchies and spaces. As a result design discussion has centred on the 'how' rather than the 'what'.

Questioning traditional hierarchies, demarcation lines, and operational methods

very often throws up new ideas on 'how to do it'. But perhaps even more important it provides an educative process which encourages both sides of the team to understand their own problems and those of others more clearly.

In recent practice it has been found that because of a clearer understanding of the 'what' such things as overlapping activities can be identified and grouped together in a smaller but more appropriate space and hence at less cost.

For the future, the traditional briefing methods are not good enough. The shift must be from a 'spaced based' approach (where functions are fitted into spaces) to a 'function based' approach (determining the functions around which spaces are delineated). This is especially important if the growing acceptance of standardization is not going to make life intolerable.

Special Requirements for Automation and Mechanization

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'Automation', for design purposes, was taken to include mechanization and these two concepts were not separately considered, but the requirements for those departments intending to install a computer were discussed. It was assumed that these equipment features implied laboratories with large workloads, serving a group of hospitals or even several groups of hospitals.

The input of work to the laboratory and arrangements for the output of reports have to be taken into account when considering the external relationships and the optimum siting for the laboratory. The reception area, specimen handling, and storage areas must be capable of dealing with large workloads, especially at peak periods. As far as the laboratory itself is concerned, this is preferably subdivisible into (1) an automated area, (2) an area for manual and special techniques, (3) a computer (EDP) area, and (4) an office and administration area. The separate automated area is desirable so as to achieve in it a smooth factory-type operation, and the British Standards Institution (1970) has recommended that the EDP area should be kept separate.

When designing the automated area, account must be taken of the likely space requirements of the equipment, but if possible allowance should be made for the inevitable changes in instrumental design

so that, in due course, bench-top or free-standing equipment may be used, some of it requiring all-round access. Services need to be considered in relation to the equipment itself (ventilation, electricity supply, drainage of effluent, etcetera) and to the support of the automated equipment in daily operation, access to the laboratory for bulk supplies, space for bulk storage, an area for the preparation of reagents in bulk, and arrangements for bulk disposal. The particular dependence of automated equipment on an adequate and reliable electricity supply must be stressed, with the consequent need to consider heat output. Noise is a feature of the operation of much automated equipment that has also too often been overlooked.

Most of the special design considerations for automated equipment are relevant also to the computer (EDP) area. The British Standards Institution publication advocated that the EDP area should be separate, which raises the important problem of communication within the laboratory, the correct siting of internal windows, hatches, doorways, provision for closed circuit television, etcetera. Computer manufacturers specify the environmental requirements for their equipment and the other special needs include a reliable electricity supply, false flooring for cabling, protection of equipment and records from stray magnetic fields, a separate fireproof records store, and again the recognition that noise may be a major problem (which may be largely overcome by subdividing the EDP area).

Reference

British Standards Institution (1970). British Standard Code of Practice CP95: 1970. Fire Protection for Electronic Data Processing Installations.

Lung Tumours

L. KREYBERG (*Institute of General and Experimental Pathology, Oslo*)

The Centre for Lung Tumours was the first of the WHO international reference centres to be established, and the WHO monograph 'The histological typing of lung tumours' was consequently the prototype for the succeeding volumes. In the years that have passed since its publication, a number of controversial points have emerged, although the scheme of classification, as a whole, has been favourably received and can be applied

a reproducible way if the diagnostic criteria listed are strictly adhered to. While the WHO classification of lung tumours, like any other, is concerned with names, it is important to remember that the name given to a tumour is of less importance than its safe recognition and the understanding of the biological implications of that name.

'Epidermoid carcinomas' are defined as 'tumours with keratinization or intercellular bridges'. This is a precise, but narrow delimitation, and some authorities would like to see tumours with a more or less 'transitional cell epithelium' included. 'Spindle-cell carcinomas' and 'carcinosarcomas' pose similar problems.

The term 'small cell anaplastic carcinoma' is used to include a number of subtypes (fusiform cell type, polygonal cell type, lymphocyte-like type or oat-cell type, and others) whereas some pathologists are inclined to regard the first two of these as undifferentiated epidermoid carcinomas.

The group of 'large cell carcinomas', defined as 'tumours composed of large cells without evidence of epidermization or formation of gland-like structures', embraces a number of different entities, many of which have been referred to as 'carcinoma solidum' in the older literature. Many of these tumours are not without a certain differentiation, manifested by the production of mucin-like substances, and special staining procedures are essential for their identification.

The term 'combined epidermoid and adenocarcinoma' has been applied to the 'comparatively rare tumour which should in some parts have definite evidence of epidermization as well as features that would qualify other parts unequivocally as adenocarcinomas'. Some pathologists designate these tumours as 'muco-epidermoid carcinomas', but in the WHO classification this term has been reserved for tumours where origin from bronchial glands is definite, or where goblet cells can be distinguished. The term 'combined' has been reserved for tumours containing two different kinds of differentiation from one and the same cell, while the term 'mixed' has been used in connexion with tumours with differentiation showing resemblance to epithelium as well as to connective tissue.

Changes in Sulphonamide and Antibiotic Resistance of *E. coli* in Urinary Infections outside Hospital during a 12-Year Period

W. A. GILLESPIE AND K. B. LINTON (*University of Bristol*)

The drug resistance was recorded of lactose-fermenting coliform bacilli (nearly all of which were *E. coli*) from urinary infections in pregnant women during the past 12 years. Sulphonamide resistance increased slightly, from an average of 6% of all strains during the years 1959-64 to an average of 12% during 1966-70. Ampicillin resistance rose from 2% in 1964 to 11% in 1970. Resistance to nitrofurantoin and nalidixic acid remained below 5% and 7% respectively probably because these drugs were rarely used. No trimethoprim-resistant strains were found since testing began in 1969.

The resistance patterns in *E. coli* urinary infections in non-pregnant women in 1969 and 1970 were similar to those in pregnant women during the same years. The resistance of the predominant coliform bacilli of healthy adults' faeces in the same population was also similar. Approximately 60% of the resistant strains from faeces and urine were able to transfer their resistance to a sensitive *E. coli* recipient.

Sulphonamides will probably retain their value for primary treatment of acute urinary infection outside hospital for some years to come.

Influence of Employment with Livestock on Antibiotic-resistant *E. coli* in the Faeces of Healthy People

K. B. LINTON, M. H. RICHMOND, AND W. A. GILLESPIE (*University of Bristol*)

Faeces of healthy adults and of children under the age of 5, none of whom were attending hospital nor receiving antibiotics, were examined for the presence of antibiotic-resistant coliform bacilli.

A higher proportion of children (73%) than of adults (49%) carried resistant strains and this difference was observed in both the rural and urban groups.

Rural members of both age groups more often carried resistant organisms than urban members. Among rural adults, the incidence of drug-resistant strains was 63% in those whose occupation involved close contact with farm animals, compared with 29% in those with other occupations. The survey took place before the implementation of the Swann Report could have influenced the use of antibiotics in animal foodstuffs.

Transmissible R-factors were demonstrated in 61% of the resistant strains.

The incidence of transmissible resistance was similar among adults and children in town and country.

Haematological Findings and Fits during the Prevention and Treatment of Folate Deficiency in Long-term Anticonvulsant Therapy

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Folate deficiency has been frequently reported in epileptic patients treated with anticonvulsants and in psychiatric patients, and folate supplements have been reported as causing toxic symptoms in normal subjects, and as increasing fit frequency, whilst improving mental state in epileptic patients.

Yeast supplements, a natural source of folic acid, were given to both epileptic and non-epileptic, non-anaemic, mentally retarded patients. After three months of treatment with yeast, corresponding to the average normal red cell life, red cell and serum folate estimations were repeated in each clinical group. In the epileptic patients, on long-term treatment with anticonvulsants, both serum and red cell folate concentrations increased significantly, whereas in non-epileptics only the red cell folate concentration increased significantly in female patients. There was only a poor direct correlation between serum and red cell folate concentrations. The mean red cell volume was directly related to the daily dose of phenobarbitone, but red cell and serum folate concentrations were only poorly inversely correlated with phenobarbitone dosage, suggesting a different mechanism for the macrocytosis caused by phenobarbitone.

The number of fits recorded in epileptic patients during yeast therapy fell below the previous control period, and such yeast supplements have been effective in repairing folate deficiency without causing clinical trouble at very low financial cost, eliminating the need for costly and tedious laboratory estimations of serum and red cell folate concentrations in these patients. (The cost of yeast supplements per patient per three months of treatment is approximately 10p.)

Foetoprotein Estimation in the Diagnosis of Hepatoma

J. KOHN AND M. ADINOLFI (*Queen Mary's Hospital, Roehampton, and Guy's Hospital, London*)

Alpha₁ foetoprotein (α_1 FP) is a normal