ing the most features were grouped together—and also simultaneous. An unknown strain was compared on the forty-eight characters simultaneously with all the stored taxa to obtain identification in one step. A table (matrix), which gave the probability of a strain, in any given taxon, giving a positive result in each of the tests, was first constructed. When all strains in a taxon were positive for any particular character, a value of 0.99 was allotted and a corresponding value of 0.01 was allotted when all results were negative. This prevents a single aberrant test result from precluding all possibility of identification with otherwise suitable taxa. Unknown individual strains were then tested and identified on the basis of the results.

The likelihood that any unknown strain is a member of a particular taxon has been defined as the probability that a member of that taxon would give the same results as those for the unknown. For each strain in the study to be identified, a computer printout was produced; this included reference data on the strain, a list of the tests performed and the results obtained; if the strain was successfully identified, a list of the likely taxa to which it belonged, ranked according to their identification scores, was printed. If a strain failed to identify, then a list of further tests, necessary for successful identification, was compiled.

The computer department's results show that about 90% of all the identifications agree with conventional methods; this demonstrates the potential success of the system, because many of the reference strains are unusual and the Public Health Laboratory Service strains were those which had already caused some difficulty. Some misidentifications which did occur were almost always due to the absence of taxa for identifying the unknowns, because there had to be a finite limit to the choice of known taxa in the matrix. For routine series of strains, that is, not selected because they are atypical, the authors believe that approaching 100% would identify correctly.

This study has shown the value of a central service, which can deal with rare and unusual strains in a quick, standard and reproducible way and to save time, labour and money. There is evidence that fewer tests need be performed than in conventional work. It has also demonstrated that a computer can store large amounts of data for identification and test selection, which is readily available as printout for detailed, cumulative reports. The potential of the system, perhaps by linkage to other automated apparatus, has yet to be fully realised, but, by itself, it is an essential taxonomic application.

IMMUNOLOGY

Tumours and T Cells

from a Correspondent

VARIOUS devices are known for the production and maintenance of mice which are numerically deficient in lymphocytes of thymic origin (T cells). Neonatal thymectomy was the first to be recognised but it has the disadvantage that the few babies which survive are often sickly. Congenitally athymic mice are currently popular but they are expensive and difficult to maintain. Mice thymectomised as adults and subsequently irradiated have often been used, however, and their viability is usually satisfactory. Woodruff and his colleagues now describe (*Proc. R. Soc. Lond.*, **B184**, 97; 1973) the use of such deprived mice to explore the nature of antitumour immunity.

Three transplanted tumours were used. The first, a CBA-strain sarcoma, was grown in normal and deprived CBA mice. Its growth rate was slower in deprived than in normal mice. This implies that there was no effective resistance to tumour growth on the part of the host which involved 'T' cells. Furthermore, injection of heat-killed *Corynebacterium parvum* inhibited tumour growth in both groups of mice. The authors conclude that in this instance whatever resistance to tumour growth there was had been exerted by macrophages stimulated by the adjuvant. The second tumour was an A-strain mammary carcinoma grown in normal and deprived A-strain mice. Again growth in the deprived mice was if anything slower than in normal animals and again *C. parvum* had an inhibitory effect on tumour growth in both groups of animals.

The third tumour was an A-strain fibrosarcoma which was grown as an allogeneic transplant in normal and deprived CBA mice and as a syngeneic transplant in A-strain mice. (It would have been of interest to have a record of the growth of this tumour in deprived A-strain mice.) It grew slowly but progressively as an allotransplant in normal CBA mice but rapidly in deprived CBA animals. Its growth rate in deprived CBA mice was equivalent to its growth rate in normal A-strain mice. No record is made of any attempts to influence the growth rate

Actin and Myosin in Non-muscle Cells

IN spite of its undoubted importance, the tale of actin and myosin in non-muscle cells has been over-long in the telling. What was new and exciting in amoeba and platelets has become progressively commonplace, as the list of animal cells to yield myosin-like ATPase activities or decorated filaments has grown. Moreover, the proteins themselves, with one conspicuous exception, have turned out to be strikingly similar to their counterparts in muscle cells.

So it may be with some hope of variety that biochemists are now turning to the other components of muscle. Proteins such as tropomyosin, troponin and actinin, which are present in the myofibrils and which regulate or hold in place the contractile events, could all have in non-muscle cells a relative which helps to harness the same force-generating machinery to the particular requirements of the cell.

Not surprisingly, the first of these proteins to be looked for is tropomyosin; a distinctive protein whose ease of purification and remarkably high content of α helix made it an early favourite with X-ray crystallographers. In muscle, this protein is thought to provide rigidity to the actin filaments and to mediate the regulation by calcium of the actinomyosin interaction. Neither of these functions is obviously necessary to other systems, and so it was interesting to learn, a year ago, from Cohen and Cohen (*J. molec. Biol.*, **68**, 383; 1972) for blood platelets, and now from Fine *et al.* for embryonic brain and neurones (see *Nature New Biology* next Wednesday (October 10)), that these tissues also have a form of tropomyosin.

The new proteins resemble muscle tropomyosin in most of their properties —notably in their high content of α helix and consequent resistance to denaturation, and in their ability to function in the calcium regulation of muscle —but they differ in one important respect. The length of the rod-shaped muscle tropomyosin molecule as gauged from its periodicity in paracrystals is about 400 Å, which is long enough for it to lie in the groove of an actin filament alongside seven subunits. The new proteins have both lower molecular weights (30,000 as opposed to 35,000) and reduced periodicity in paracrystals (340 Å) so that, other things being equal, they are able to span only six actin monomers.

The finding of non-muscle tropomyosins, of course, raises more questions than it answers. What most cell biologists will hope not to see, after the experience with actin, is an extensive series of papers which show the presence of tropomyosin-like molecules in every conceivable cytological niche. It would be best to assume that a protein that is present in both blood platelets and nerve cells is likely to be of widespread distribution, and concentrate on the important question of what it does in the cell.

© 1973 Nature Publishing Group