mens, a match means the identity of a number of physical properties which can be measured under the microscope. Mr R. Cook (Metropolitan Police Laboratory) showed how this applied to the range of natural fibres. Fluorescence, refractive index, birefringence and melting point can all be measured and compared, followed by infrared spectroscopy and even chromatography of the dye if the samples are still indistinguishable. In the case of natural fibres such as jute, hemp, sisal and coir, such tests cannot be applied and straight microscopy is all-important. Mr C. G. Jarman (Tropical Products Institute) stressed the importance of sound knowledge and experience for the worker in this field if reliable identification is to be achieved. Another example of tests performed under the microscope is the series of microcrystal tests which are highly specific and sensitive for drugs. Although long established, these tests are somewhat neglected in Britain and Professor E. G. C. Clarke (Royal Veterinary College) urged forensic scientists to consider the advantages of the microcrystal tests particularly in distinguishing closely similar compounds.

The interpretation of pictures from the scanning electron microscope, and their relation to optical micrographs of the same object, sometimes proves difficult for those applying the scanning electron microscope to forensic problems. Mr M. E. Taylor (Home Office Forensic Science Laboratory, Birmingham) warned against expecting too much too quickly from the instrument: as experience is gained, the value will increase. The Birmingham laboratory and the Metropolitan Police Laboratory are the only forensic science laboratories so far in Britain to have their own scanning electron microscopes, but the availability of cheaper instruments could increase sales. The leader in this field is undoubtedly the Cambridge Scientific Instruments' 'Stereoscan 600', sister to the big 'Stereoscan S4', but the two British rivals were also on view at the trade exhibition. Both Vacuum Generators and the confusingly-named Cambridge Scanning Co. offer scanning electron microscopes at prices which one could pay for an optical microscope.

All these small scanning electron microscopes can be used as electron microprobes by the addition of energy-dispersive X-ray analysis equipment. This seems particularly useful for the forensic scientist because the analysis for elements can be performed on particles or regions down to a few microns across, and is rapid, non-destructive and often quantitative. Here the problem of interpretation does not arise because the results can be related directly to conventional chemical analyses.

CYTOCHALASIN

Points of View

from our Molecular Biology Correspondent

IT is seldom that two approaches to a problem come to such uncompromisingly opposed conclusions as those of Spudich and Lin (*Proc. US Nat. Acad. Sci.*, **69**, 442 ; 1972) and Forer, Emmersen and Behnke (*Science*, **175**, 774 ; 1972). The subject is important: it concerns the action of cytochalasin B, an alkaloid, which has the property of inhibiting a wide variety of contractile processes.

It seems to be generally agreed that the alkaloid operates by exerting some unwholesome influence on microfilaments. The drift of thinking in the field is that these microfilaments are often, and may turn out to be invariably, actin-like, for the composition and physical properties of the major protein constituent have been examined in a variety of cases and found to correspond closely to those of muscle actin. In many instances the capacity to bind heavy meromyosin (proteolytically truncated myosin) all along the filaments, in the characteristic arrowhead geometry found in muscle actin–heavy meromyosin complexes, has been demonstrated. It therefore seems by no means unreasonable that cytochalasin B should bind to F-actin filaments, with some detriment to their structure or function. This Spudich and Lin seem to have shown.

The evidence looks clear enough: actomyosin, in conditions of ionic strength at which it is soluble, has a high viscosity, which falls sharply on addition of ATP. Spudich and Lin show an almost equally dramatic drop in viscosity when cytochalasin B is introduced. Likewise the addition of cytochalasin to myosin before the actin leads to an actomyosin of low viscosity. There is no detectable effect on myosin (or rather heavy meromyosin) alone, the intrinsic ATPase activity being unchanged. By contrast, the ATPase activity of actin–heavy meromyosin is inhibited to a maximum of 60 per cent. The cytochalasin thus apparently interacts with the actin, and indeed Spudich and Lin find that the viscosity of polymerized actin (F-actin) drops in the presence of the alkaloid. The monomeric G-actin is still able to polymerize in solutions containing cytochalasin, but only attains a viscosity equal to the relatively low final value observed in F-actin after addition of cytochalasin. Spudich and Lin also infer from the very rapid effect of cytochalasin on the actomyosin viscosity, compared with

Fingerprints of Maturing Ribosomal RNA

THE series of cleavages and methylation steps which result in the maturation of ribosomal 28S and 18S RNAs in mammalian cells have been exhaustively investigated, in particular by Penman and his collaborators who have followed the flow of radioactive label through the various RNAs associated with the nucleolus in HeLa cells and have drawn up a maturation pathway. Penman's group envisage that a 45S RNA, the product of transcription, is converted by a series of stepwise cleavages and methylation reactions to a 41S RNA, a 32S RNA which matures into the ribosomal 28S RNA and a 20S RNA which matures to the smaller ribosomal RNA.

Direct proof of this putative maturation pathway derived from convincing but nevertheless circumstantial evidence depends, of course, on determining the nucleotide sequences of the ribosomal RNAs and their putative precursors. That is a mammoth task, but as Maden, Salim and Summers report in *Nature New Biology* next Wednesday (May 3), enough partial sequence data can be obtained from fingerprints of nuclease digests of these various RNAs to confirm the pathway.

To cut a long story short, Maden and his associates have shown that the fingerprint of a digest of 45S RNA from HeLa cell nucleoli is virtually identical to a fingerprint of a mixture of 28S and 18S ribosomal RNAs. There can be no doubt therefore that the 45S precursor not only includes the base sequences of both 28S and 18S ribosomal RNAs but also that all the methylated bases in the 45S precursor occur at sites which survive the maturation process and remain in the mature ribosomal RNAs. Similarly, 41S nucleolar RNA contains the sequences of both the mature ribosomal RNAs. By contrast 32S nucleolar RNA contains only the sequence of the 28S mature RNA and the fingerprint of nucleolar 18–20S RNA is almost identical to that of mature ribosomal 18S RNA.

One noticeable difference between the mature 18S RNA fingerprint and the 18–20S nucleolar RNA fingerprint is the presence of a methylated spot in the first but not the second. This indicates that the dimethylaminopurine in mature 18S RNA is formed after the RNA has left the nucleus. Zimmerman, who reported in 1968 a methylation step late in the maturation of 18S RNA, thought it occurred in the nucleolus, but these new data suggest it occurs in the cytoplasm. But, that aside, these fingerprint analyses fully confirm the proposed maturation pathway for HeLa ribosomal RNA.