changes in the external environment. Wherever DDT has been used, it is found stored in the adipose tissue of man and animals, yet there is little convincing evidence for detrimental effects. The fortuitous observation, that spraying animals with DDT shortens sleeping time induced by phenobarbital, initiated research that increased the understanding of how drug metabolizing enzymes of the liver influence beneficial as well as harmful substances entering the body, and pointed the way toward more effective use of therapeutic agents.

Several epidemiologists have used the results of field studies or autopsies in an attempt to link environmental factors to disease in man. Dr C. Heath, jun. (Center for Disease Control, Atlanta, Georgia), described forty-two cases of childhood leukaemia or lymphoma recorded during the past thirteen years in DeKalb County, Georgia, with some indication of clustering. Dr W. R. Cameron (Florida Department of Health) described the results of a study in elementary and high school students screened for hypertension in which hard water, particularly due to lithium, was associated with a beneficial effect. Dr A. W. Voors (University of North Carolina) suggested that increased ratios of cadmium to zinc in tissues from human autopsies could be related to the severity of cardiovascular disease. In most cases, however, epidemiology seemed to be on rather tenuous grounds and a need for caution in interpreting the results of studies was noted.

The current status of mercury and environmental pollution was discussed by Dr G. Lofroth (Stockholm, Sweden); he described the enormous variation in the half life of mercury in man and other species, including fish, and indicated that studies so far imply that man-made pollution of the ocean with mercury is very limited and that sewer sludge should be given considerably more attention.

Other presentations emphasized the potential for trace metal contamination from industrial facilities and mining operations and a need for continuing monitoring systems, but one was left with the impression that much of this is coming under control. The interaction of trace elements continues to receive high priority as being more significant than the concentration of single elements *per se*. Dr D. W. Klauder (University of Cincinnati) implicated lead in copper deficiency associated with swayback in sheep. The role of zinc in the healing process has been studied by many investigators; synthesis of collagen requires zinc, as Dr J. M. Hsu (Johns Hopkins University) reported, and this may be influenced by the pituitary-adrenal axis, according to Dr A. Flynn (Case Western Reserve University). A highly significant report from Drs C. E. Hunt and J. M. Narvia (University of Alabama) detailed prenatal effects of strontium, molybdenum, lithium and boron on the incidence of dental caries in post-natal rats, and suggested strongly that dental caries may be influenced markedly by the interaction of trace elements during intrauterine development.

On health effects of trace substances, Dr E. A. Doisy (St Louis University) described the influence of manganese on biosynthesis of prothrombin and cholesterol in the biological system. The beneficial effects of trace elements, acting through enzyme systems, and detrimental aspects of heavy metals, especially cadmium and zinc, were described. Lead in illegal alcohol was associated with severe derangements of the endocrine system, said Dr H. Sandstead (Grand Forks, North Dakota), particularly the pituitary, adrenal and juxtaglomerular apparatus. The protective effects of selenium against heavy metal toxicities and the role of selenium in host defence mechanisms were discussed, as well as the lack of significant amounts of selenium in the edible portions of poultry fed growth promoting concentrations of selenium in the diet.

Analytical methodology was discussed in relation to its shortcomings and attempts to standardize results regardless of methods were urged for all laboratories. Finally, a need for conceptual thinking in epidemiological research was suggested and participants were urged to consider differences in biological availability of trace substances and metals in the human environment.

MESSENGER RNA

The Missing Poly A Tail

from our Cell Biology Correspondent

THESE days, when the magic words polyadenylic acid are whispered to the trendy biochemist, he immediately starts thinking, and more often than not talking, about messenger RNAs. It seems that many, perhaps indeed virtually all, mRNAs in animal cells have at their 3′ termini a sequence of 150–200 adenylic acid residues which, it is believed, are added after transcription to the tails of heterogeneous nuclear RNA precursor molecules. And although nobody really knows why a poly A tail is required by a messenger, it is widely speculated that the poly A may play some part in the cleavage maturation and/or export of messenger molecules from the nucleus. Testing these plausible speculations will obviously not be an easy task, but as Adesnik and Darnell (*J. Mol. Biol.*, **67**, 397; 1972) point out a comparison of the metabolism of "9S" histone mRNA with that of other mRNAs ought to be particularly instructive.

Adesnik and Darnell isolated from HeLa cells so called "9S" histone messenger RNA, a collection of RNA molecules which, as others have shown, appears in small cytoplasmic polyribosomes during a cell's S-phase and which by virtue of its size, kinetics and other properties has been tentatively identified as the messenger for histones. This RNA comprises chains of about 400 nucleotides; if the molecules terminated in a tail of about 180

Oncolytic Viruses

THE idea that it may eventually be possible to kill certain tumour cells by infecting them with lytic viruses which for one reason or another more readily infect tumour cells than normal cells has often been raised over the past several years. And although little of therapeutic value has so far emerged the idea still has its champions, including Taylor and his colleagues at Indiana University who, in next Wednesday's edition of *Nature New Biology* (July 5) describe their latest investigations of the oncolytic action of bovine enterovirus on both human and murine tumour cells.

In 1970 and 1971 Taylor's group reported experiments which indicated that bovine enterovirus preferentially absorbs to murine tumour cells, Ehrlich carcinoma and sarcoma cells growing either as a solid tumour or an ascites tumour, and replicates in them and kills them. To see if this phenomenon is of more general significance they have now injected bovine enterovirus into inbred mice bearing various transplantable tumours and assayed subsequent tumour growth. They have also measured the response of primary cultures of various human and murine tumours and of cells of human and murine cell lines to infection with this virus.

Taylor and his colleagues find that although normal murine and human cells do not in general suffer any detectable cytopathic effect after exposure to bovine enterovirus, many human and murine tumour cells in culture are infected and lysed by the virus. Moreover, four bovine enterovirus caused the the lysis of cells of four transplantable tumours growing in mice.

Sedmak, Taylor, Mealey and Chen are sufficiently encouraged by these results to conclude guardedly that there is still a possibility "that eventually viral oncolysis will play some role in human cancer therapy". Whether such optimism is really justified remains, of course, to be seen.