haploid genome) only between one and three copies of the gene are present in each DNA molecule. The accumulation of the product of the cell's activity must therefore be a consequence of exceptionally efficacious transcription of DNA and exploitation of the messenger. Notwithstanding that the gene makes up only 0.0022 per cent of the total DNA, at peak activity, 1 per cent of the total RNA in the cell is fibroin messenger, and this remains functional and undegraded while 10^5 copies of the protein are rolled off in the space of four days. With 10^4 such messengers transcribed from each gene, and 10^6 genes per cell when the total DNA content has reached its maximum, it can be seen that synthetic machinery, working at full pressure, generates a formidable output of its end-product. The specific gene amplification mechanism, however, is still on the cards only for genes whose end-product is RNA, especially ribosomal.

A brief description of such a delicate piece of research leaves the experimental difficulties to the reader's imagination. The complex problems that beset the hybridization approach are apparent in the work of Hough and Davidson (*ibid.*, **70**, 491). The RNA molecules that accumulate in the egg cell of *Xenopus* during its development have been found to be derived chiefly from the repeated sequences of the DNA, so that the overwhelming bulk of unique RNA sequences occurs in a very small part of the total. The authors have devised a method of isolating almost intact, by means of shearing, melting and self-hybridization, the repetitive part of the DNA (nearly half the total). When the RNA is hybridized with this material, something in the region of 2–5 per cent is taken up, which is one or two orders of magnitude more than the RNA transcribed from non-repeating DNA. The chief attribute of these repetitive hybrids, which the authors infer from their experiments, is that the sequence matching seems to be rather poor, for thermal dissociation profiles of the labelled hybrids adsorbed on hydroxyapatite showed, even after trimming with ribonuclease, a distinctly low melting temperature—an effect not observed in hybrids of non-repeating RNA—and there is also a hybridized fraction in which the pairing is so poor that it is not retained at all on hydroxyapatite columns. Just how bad the complementarity actually is, at what point a partial match may be regarded as significant, and what purposes this RNA serves anyway, remain in doubt.

An important technical advance comes from Wu, Davidson, Attardi and Aloni (*ibid.*, **71**, 81), who have devised a means of extending electron microscope mapping of repetitive genes to those for tRNA, which have hitherto been considered too short to be directly observable. The strategy is to derivatize the total 4S RNA, introducing a thiol at the periodate-oxidized terminus, by way of a Schiff base linkage with cystamine, which is then reduced. This provides a reactive group for coupling to an electron-dense marker, to whit a bromoacetate-treated ferritin molecule. When HeLa cell mitochondrial 4S RNA, labelled in this way, is hybridized with endogenous DNA heavy and light strands, nine tRNA genes show up on the heavy strand and three on the light. One of the former lies in the spacer region between the 12S and 16S RNA tracts. A similar number of 4S genes (fifteen) has been reported in *Xenopus* mitochondria on the basis of hybridization. How the system manages protein synthesis with a set of no more than twelve tRNAs (supposing that this is what the 4S RNA mostly is) is a fit subject for speculation.

NUTRITION

Fibre-depleted Diets

from a Correspondent

THE role of refined carbohydrate foods in many important diseases characteristic of Western civilization was discussed at a symposium organized by the McCarrison Society at the Royal Society of Medicine in London on October 20.

Dr H. Trowell, who had spent 30 years as a physician in Africa, mostly at Makerere College Medical School, described as "crude fibre" the fraction of carbohydrate foods which remains after boiling in dilute acid and then in alkali. "Dietary fibre" is the portion of food reaching the colon undigested by enzymes during its passage through the small intestine. It contains in addition to "crude fibre" pentosans which are mostly broken down by bacteria in the large bowel, the bacterial flora and chemistry of which they may largely dominate.

Dr Trowell traced the history of the gradually increasing availability and popularity of fibre-depleted foods both in the Western world and in developing countries. He emphasized the two complementary aspects of consuming refined foods—over-consumption of starch and sugar on the one hand and depletion of fibre on the other.

Mr D. Burkitt (Medical Research Council, London) outlined evidence convincing him that non-infective diseases of the bowel, diverticular disease, appendicitis, cancer, polyps and ulcerative colitis are all related to fibre-depleted diets. All are most prevalent in developed countries, and scarcest in communities deviating least from their traditional dietary customs. The fibre content of food is related to intestinal transit times and to stool bulk and consistency.

Mr N. Plainter (Manor House Hospital) showed from the geographical distribution and historical emergence of diverticular disease — the commonest disease of the large bowel in Western man—that it is the result of a fibre-depleted diet. In most patients symptoms can be alleviated or abolished by administering fibre.

Professor I. McColl (Guy's Hospital Medical School, London) opened the

Inducing C-type RNA Viruses

DURING the past several months groups of RNA tumour virologists in several laboratories have reported the induction of the replication of C-type RNA viruses in avian and murine cells exposed to iododeoxyuridine or bromodeoxyuridine and other mutagens and carcinogens. Furthermore, such C-type particles are released spontaneously by some clones of cells. These findings have strengthened the belief that all avian and murine cells carry the genetic information necessary to specify a C-type RNA virus, the chief tenet of the oncogene hypothesis, and that genetic and environmental factors determine whether or not this potential is expressed. The series of experiments which Todaro reports in next Wednesday's *Nature New Biology* (November 29) are certainly consonant with these ideas.

Todaro has detected the spontaneous release of C-type particles by clones of spontaneously transformed BALB/3T3 cells. Furthermore, random bred Swiss 3T6 and 3T12 and a line of SV40 transformed Swiss 3T3 cells but not untransformed Swiss 3T3 cells produce C-type virus particles after exposure for 3–5 days to 30 μg/ml. of iododeoxyuridine. All these observations suggest that the probability of the expression of endogenous genes which specify C-type particles is greater for cells that have a transformed cell phenotype and are oncogenic than it is for untransformed non-malignant cells. As Todaro says, "the control system that prevents expression of endogenous type C virus may have been altered permanently in transformed cells". Whether or not the partial expression of this genetic information is involved in spontaneous and chemically induced transformation remains to be seen.