

#### 6. Computerized karyotype analysis.

A meaningful analysis of the variation in arm lengths and arm ratios of chromosomes requires a large number of measurements and repetitious calculations. Preceding such an analysis a survey was initiated to investigate the possibilities of computerized analysis.

Computerized analysis of human chromosomes is being attempted in several laboratories. The Chloe film scanner, F.I.D.A.C., and the Cydac system are three devices being used. The first two systems provide as computer output the image of the chromosome spread, analyzed as to arm ratio and total length of each chromosome. Negatives of the cells to be analyzed must be fed into the Chloe scanner and F.I.D.A.C. whereas the Cydac system takes the image directly from the prepared slide. Cydac appears to be the most efficient system for an analysis of the proposed type since it would both collect and analyze the data.

Manual measurements of chromosome lengths and arm ratios can be done with good precision. A computerized project would also permit the determination of mean arm lengths and ratios with a small standard error. Whether any greater precision can be obtained using the computer, has not been established. Thus, the merit of computer use appears to lie in its relative speed and precision and removal of the limitation of small sample size.

Computerized chromosome analysis could be useful in any area where somatic chromosomes are to be examined. For instance, development of an aneuploid series could be accelerated. As well, trisomic and nullisomic analysis could be computerized. Since the computer can be programmed to identify, record and recall, normal and abnormal chromosome complements can be determined. Computerization, then, could increase quantity without a sacrifice on quality.

Computerized analysis of corn root tip preparations have been attempted using the Chloe film scanner. Many technical problems unique to the corn material, have yet to be overcome. Whereas the human leucocyte cultures are in a monolayer due to the air drying process used in slide preparation, corn root tip smears are thicker and therefore result in a more dense background. As well, the corn chromosome arms are not spread as widely as the human material. The net result of these technical differences is the inability to locate accurately the centromere and define the limits of the arms. Attempts are being made to correct the technical problems and hopefully a satisfactory solution can be found.

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#### 7. Nuclear cycle in maize root tips.

An investigation of the nuclear cycle, and its components, in corn was undertaken in preparation for evaluation in specific chromosomes of the pattern of incorporation of  $H^3$  - thymidine during DNA synthesis.