fiers were described—acoustic masers (N. S. Shiren) and several forms of cadmium sulfide amplifiers using a high electronic drift velocity and parametric amplification of magnetoelastic waves (R. G. Damon). The effect of acoustic gain upon the electrical impedance and the resonant vibrational modes of CdS plates was described. A. R. Hutson predicted an active crystal resonator based upon these effects and D. L. White and Wen Chung Wang reported experimental observation of stable single mode oscillations in cadmium sulfide plates in the ultrahigh-frequency range.

The many applied uses of ultrasound were noted—ultrasonic inspection, scattering of sound by polycrystalline grains, techniques for measuring solids up to 2800°K, forming of materials under ultrasonic irradiation, transmission of sound in specially shaped solid horns, wave propagation in specially shaped torsional rods, ultrasonic image converters, electroluminescent displays panels, and tunable bandpass filters and ferroelectric devices for use in linear microcircuits.

In a session on the use of ultrasonic energy in basic biology and medicine, W. J. Fry, F. J. Fry, J. H. Holmes, and J. M. Reid discussed therapy at intermediate intensities and the use of high-frequency sound in surgery. The use of ultrasound in supplying pictures of various operations of the body was also described.

The symposium presented an impressive picture of the research uses, practical applications, and future possibilities of ultrasonic processes. This rapidly growing field can be regarded as one of the fundamental methods for physical investigations.

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Yeast Genetics

Sixty-two geneticists from 11 countries met at the University of Washington, 13–15 September 1965. Herschel L. Roman (chairman, Department of Genetics) was the coordinator and chairman of the meeting, which marked the opening of the new Biochemistry-Genetics Building. The conference was dedicated to Professor and Mrs. Carl C. Lindegren, pioneers in the field of yeast genetics, on the occasion of his retirement as director of the Biological Research Laboratory, Southern Illinois University. Eight general areas were discussed: mutation, suppressors, radiation effects, recombination, macro- and micromapping, cytoplasmic inheritance, gene-enzyme relations, and cytology. Except for clarification of the cytology, individuals discussed their work without slides. Discussion centered around unpublished results and emphasized research techniques and methodologies.

Magni (Parma) presented data on new experiments showing that mutations that have a higher reversion rate during meiosis compared to mitosis are associated with additions or deletions of bases, whereas those that revert at the same rate are associated with based-pair substitutions. To assay reversion rates in vegetative yeast Hurst (Brooklyn College) used a replica-plating version of the method of Ryan, in which the number of papillae indicates mutant number and the colony size indicates cell number. Von Borstel (Oak Ridge) discussed the use of the 10 × 10 multicompartmented boxes of de Serres for measuring mutation rates in liquid culture during mitosis and meiosis. Luzzati (Gif, now at Yale) described a technique for studying gene conversion in liquid medium. In principle the technique should also work for leaky mutants. To distinguish original prototrophic revertants from their progeny, the latter are changed to "petites" by growth in the presence of acriflavine, the mother prototrophic cells being unaffected by the acriflavine for a few generations.

A rapid-scanning microscopic method was used by Fogel (Brooklyn College) for detecting and isolating tetrads (originating from heteroallelic diploids) that contain a prototrophic spore. Wilkie (London) described a mutant-enrichment method based on destruction of prototrophs by actidione. He also noted a promising method of selective staining of auxotrophs with magdala red on synthetic complete medium. Pittman (Carbondale) independently has confirmed the usefulness of the actidione technique. Snow (Davis) has used Nystatin for 1000-fold mutant enrichment. De Serres (Oak Ridge) described chemical mutagens used on *Neurospora* which were of interest to yeast geneticists. Of particular interest is the acridine mustard, ICR-170, that seems to specifically induce addition-deletion mutations in *Neurospora*. Magni mentioned that 0.3 to 0.6*M* nitrous acid (*p*H 4.5) generally induces addition-deletion mutations, whereas 0.01 to 0.03*M* nitrous acid (*p*H 4.5) generally induces base-substitution mutations.

Hawthorne (University of Washington) introduced the topic of super-suppressors and their action with a summary of their known properties. He has found at least ten classes which act on overlapping hierarchies of super-suppressible mutants. Super-suppressible mutants generally are neither leaky nor osmotically alterable to wild-type. Super-suppression is essentially dominant, although a few cases of recessive (or semidominant) action of the super-suppressors have been observed. Some super-suppressed mutants grow better than wild-type on the minimal medium. One-third of the mutants induced by ultraviolet radiation are super-suppressible. Manney (Oak Ridge, now at Western Reserve) found that super-suppressible mutants rarely complement, and whenever they do, they exhibit a polarized complementation pattern. Mortimer (Berkeley) confirmed this for similar mutants at two other loci. Gilmore (Berkeley) presented evidence for a series of at least eleven super-suppressor loci, some of which may overlap those in Hawthorne's series. Some of the super-suppressors, when combined in one haploid strain, result in depressed growth. Mortimer reported a case of super-suppression of a non-complementing mutant to a nonfunctional, but complementing, condition. Magni, von Borstel, and Steinberg (Oak Ridge) showed that super-suppressible mutants revert at the same rate during mitosis and meiosis, whereas mutation of super-supressor loci occurs at a higher rate during meiosis. Cox (Oxford) told how cytoplasmic conditions seem to control the expression of some super-suppressors. Data from Leupold (Bern) on super-suppressibility in *Schizosaccharomyces pombe* parallel closely the data presented for *Saccharomyces*.

Manney presented evidence that super-suppressible mutants will make a fragment of the enzyme tryptophan synthetase. When the mutation lies between the A and B portion of the molecule, only the A fragment is made (as measured both by enzymatic activity and molecular weight). Fink (Yale, now at NIH) observed that the only super-suppressible alleles found in the hi_4 operon are noncomplementing or show polarized complementation in the B and C cistrons.

The session on radiation genetics began with a discussion by James (Chalk River) of sectoring of lethality in progeny of irradiated, diploid yeast cells. Beam (Brooklyn College) compared induced recombination in cells sensitive and resistant to potentially lethal radiation damage. During the course of this study he found that irradiated budding cells, in contrast to interdivisional ones, frequently give rise to inviable progeny at the first postirradiation division. Holliday (Hertford, now at Mill Hill) and Williamson (Hertford, now at University of Washington) found that cells are more sensitive to ultraviolet irradiation during the time of DNA synthesis. During pedigree studies, Haefner (Dallas) found that mitotic recombination is still enhanced in cells several generations after ultraviolet irradiation, and that lethal sectoring also appears in haploid *Saccharomyces* cells after ultraviolet and x-irradiation. It has long been known that yeast cells are more resistant to radiation during budding. Moustacchi (Paris, now at University of Washington) has shown that this resistance disappears if the cells are treated with 5-methyltryptophan or *p*-fluorophenylalanine. However, treatment with 5-fluorouracil has no effect. She also has collaborated with Hottinguer on studies of radiation-resistant mutants induced by ^{32}P decay. These mutants have the normal amount of DNA but have double the normal amount of RNA and most of the radiation-resistant mutants show irregular segregation patterns. Magni found that budding cells are not radioresistant when plated on a medium containing acridine.

During the session on recombination, Fogel and Hurst (Brooklyn College) presented an analysis of heteroallelic reversion based on the Whitehouse-Hastings hybrid, DNA polaron model. For pairs of alleles spaced roughly equally, they found a decline in the value of the site coefficient as the pairs were shifted from the proximal to the distal end of the cistron. They found that homoallelic reversion of complementing alleles was not associated with outside marker recombination. Also, for some mutants, homoallelic reversion resulted from mutation to a heteroallelic, complementing state. Nakai (Berkeley, now at Chiba-shi) described the induction of sectoring of seven markers on a chromosome arm of *Saccharomyces*. The frequency of mitotic exchange increased linearly with the meiotic distance (3 to 180 centimorgans) of the markers from the centromere, consistent with expectations of mitotic crossing-over. Gutz (Dallas) told how he had obtained haploidization of vegetative diploid *Schizosaccharomyces pombe* with 0.1 gram of *p*-fluorophenylalanine on a gradient plate. Heslot (Paris) believes that the haploidization effect is on the mitotic spindles and that the haploids arise by selection over the aneuploids. Luzzati (Gif, now at Yale) described a gene in *Saccharomyces* that suppresses heteroallelic reversion in the ad_3 gene.

The session on cytoplasmic inheritance began with a discussion by Wilkie (London) of actidione resistance in yeast. In certain strains the actidione resistance is transmitted to only about 5 percent of the spores. Slonimski (Gif), in collaboration with Yotsuyanagi and Mounolou, treated anaerobically grown cells with oxygen to make mitochondria appear. At this time the yeast cells were held in a nongrowing condition, and labeled thymine went into mitochondrial DNA only. Lindegren (Carbondale) discussed fixation methods for preparation of mitochondria for electron microscopy. Bevan (London) discussed the genetics of the killer factors. He stated that the molecular weight of these factors is so small that they are probably not viruses.

Ogur (Carbondale) introduced the topic of gene-enzyme relations with a discussion of how the auxotrophs requiring glutamic-acid affect aconitase synthesis in the citric acid cycle. Miller (University of Washington, now at Beirut) discussed the properties of a mutant which elaborates a surface-active agent. Since the complete amino acid sequence of cytochrome *c* is known, Slonimski (Gif) is conducting research on the two isocytochrome *c* molecules, one of which terminates in glutamic acid and the other in lysine. Five unlinked loci affect synthesis of isocytochrome *c-2*. Sherman (Rochester) has developed a staining method for recognizing mutants of the genes controlling synthesis of cytochrome *c*; mutants and reversions of these mutants have been found to have substituted amino acids in the cytochrome *c-1* molecule. Lacroute (Gif), who has worked out the pathway for uracil synthesis, discussed regulation of uracil and arginine biosynthesis by feedback inhibition and repression. De Robichon-Szulmajster (Gif) has shown that the strains resistant to canavanine allow arginine to enter into the cells. It had formerly been believed that such strains had an altered arginine permease system. Also, De Robichon-Szulmajster discussed the threonine and methionine pathways, the role of a gene that controls the uptake of amino acids, and some mechanisms of resistance to a number of amino acid analogues.

The cytological studies were given over entirely to Williamson, who has worked out in synchronized cultures the complete staging of DNA replication, nuclear migration, and nuclear fission. DNA synthesis begins in *Saccharomyces* just after appearance of the buds and is complete when a bud is one-fourth the size of the mother cell. Some of the stages of mitosis could be identified in electron microscope preparations. A "spindle-like" apparatus within the nucleus was seen in electron micrographs prepared by Robinow (London, Ontario).

The following additional pertinent information on yeast genetics was summarized from the discussion: 14 centromeres of *Saccharomyces* are marked, which is consistent with 18 chromosomes counted cytologically. More than half the known genes are in linkage groups, more than 50 gene-enzyme relations are categorized, and fine structure analysis is being done at eight loci. More than ten super-suppressor loci are known, and the evidence favors the interpretation that at least some of them are the genes that produce sRNA.

A grant, GB-3781, from the National Science Foundation enabled representatives from laboratories in Europe and Japan to attend.

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International Esperanto Congress

The 50th International Esperanto Congress was held in Tokyo between 1 and 8 August 1965 under the patronage of Yuji Shibata, president of the Japanese Academy. This was the first such congress to take place in Asia. About 1700 participants attended, from 40 countries; all proceedings, formal and informal, were in Esperanto. Scientific lecturers included F. Egami (molecular biology), M. Suzuki (electricity and life), S. Kawamura (soybean products), N. Oka (a film on orangutang intelligence), C. Støp-Bo-