I Importance of maize in U.S. 1, 2, 3 1960

II Where products come from - kernels. Parts - slides 1+2
Plant structure - tassel, ear, nodes - branches.

III Importance of maize in the Americas.
where grown - when.
Propagation - selection - from what
Recent - Cases. Mexico - origin - Transport
Origin - projection Teocinte (Teo-cintle)
Why - plant, chromosomes, synopsis. c.o.
give order. knob locations.

IV. To other countries -- Tribes
Guatemala, Central Am., northern So. Am.
Andes -
Origin of Races -- Tribes. selection (So Brazil)
Polymorphism - ears. slide 3. Plant Breeding
Extent of polymorphism -
Ears use in tracing origin + migration - Mt Maiden.
Knob -- monograph. Dec 1981 From Dec 1938

V. Mendel 1865 to 1900 changes Results early.
1. By 1900 - what known - projections.
2. Maize plant breeders -- so much material
3. Biologist in general - skeptical. + H Morgan 1910 to 1915 -- Students, Wilson, Drosophila

VI My association 1921. 1923 1927. Pl. Breeding
2. 1927-1929 - grad. students. Plant Breeding Botany-Ec.
3. Their accomplishments - 1927-1935.
" golden days of genetics at Cornell. "
4. Drosophila salivaries -- 1935 Bridges

C.S.H. Inbreed symposium. Significance of maize— 6

I Maize + U.S. Economy = most important plant - why

1. Food - animals - hay - cattle - poultry -
2. " - Humans - constituents = Popcorn; corn-on-cob - canned corn, cornbread, hominy grits, corn flakes, cornstarch, cornoil, cornsyrup, corn-liquor, corn-nuts.
3. Commercial - processed -- not corn = glues; Treasured place on candies, sweeteners - ceramics, paints, paper products, pharmaceuticals, etc. Corncob pipes.

II Where products come from - mainly kernel -

1. Kernel parts: Pericarp; embryo scutellum, endosperm, aleurone layer. Cut kernel; Seeds 1, 2 ears - width, Varl.
2. Structure of plant. Tassel ear
   ① grass - parts - Reed. nodes. maize or wg
   ② early grass - nodes - potential handles, Terminal branch
   ③ Tillers vs commercial maize - why different.

III Importance of maize in Americas.

1. Where grown -- Indian tribes -- only grain in Americas - (no wheat, barley, rye, rice, sorghum, millet).
2. Inca to America - Basic foods - corn - beans - squash So. Am. = maize, more restricted - Canava.
3. Maize - can't propagate itself - man propagated - why
4. Where did maize originate? So. W. Mexico city. From what source?
5. native plant - Mexico & Guatemala - Like maize except ears -- . why self propagating - Pop
   Teo & maize native name Teo-cintli god - maize mazorca
   Competitors.
6. Caves - Mexico - 5000 yrs ago - longer - smaller ears.
7. To Guatemala - Central Am. N. Indian S. Am. introduced into Andes (2000 yrs ago). Spread -

8. Plant Breeding - Indian tribes -- selectors, purposes - pop, flour, tear, pigmented - food etc, ceremonial
9. Consequences -- Highly polymorphic - ears - Slide 3. Ancestral pop. miniaturization.

10. Polymorphism - all parts - isozymes, mapping, insertions, deletions - compared at DNA level. Recent steps
mitochondria -- knob sites 4, 5

11. Tracing origin + migrations of maize races -
knobs, isozymes, DNA polymorphism, mitochondria
cytoplasmic & plasmids. Knobs + Teosinte - start 1959,
monograph - Dec 1981.

IV Contributions of maize to genetic knowledge.

A. Early -- 1865 - Mendel - Dom. rec. No pea crossed
1865 - 1900 ± 1865 aniline dyes vs. carmine, hematoxylin
Royal purple -- shell
staining - preferences - parts of cells -
Fixing for microscopic examination
sectioning - embedding - slicing.
theory of microscopic image - 1883 Abbe Zeiss
By 1900: diffraction rule from object
chromosomes, - ① mitosis - meiosis, gametes
[modern] fertilization
② Development.
③ Rediscovery of Mendelism in heritance
Publication - quah - plants -

Projections: onto to chromosomes; replication
Meiosis - synapsis + co-(chiasmata)
development - gamete formation -
fertilization -

B. Skepticism - Biologists - Geneticists into 1920.
1. T.H. Morgan - ecology Drosophila; grad students
1910 - 1915 -7 Book on mendelism in heredity
* maize early why. 2. 1921 - Cornell - genetics course - Plant Breeding - maize
graduate courses - Cytology course - Botany, Univ. of
Ph.D. - maize. 1927
3. 1927 - 1935. Cornell - "Golden days of Genetics - Cornell"
4. Graduate students -- Rhoades etc. + univ. hereditist
Activities -
1927 - 1935 - Cornell -
Cytogenetics -- advanced rapidly. Dr. 1935 Sullivan

3) Maize 1927-1935 Early. no DNA interpretation

1. 10 linkage groups - one group - chr to linkage grp.
2. where interchanges occurred between 2 chrs.
3. Physical proof of genetic crossing over.
4. First instance of recognition of cytoplasmic or sterility.
5. mutants affecting spindle-pole orientation + poly mitosis at meiosis - micronuclei
6. chromosome breaks -- fusions -- "sticky chromosomes"
7. x-ray modification of chrs. inversions, translocations, deficiencies. Ring chromosomes behavior
   Replication -- semi-conservation - sister strand exchange - Double-sized dup. anaphase-
   mechanical rupture - Telophase: fusion of broken
8. Chromosomal component responsible for formation a nucleolus.
9. Repeted components in parts of chrs: knobs - (chromocenters), Centromeres. Nucleolus organizer.
10. Peculiar aspect of meiotic synapsis = non homologous association. synaptinemal complex - zipper.

1935 - Drosophila salivaries

Shortly later - 1937 - 1942.

1. single broken ends [double strand break] or ruptured chrs.
   Healing: new telomere = Retention DNA - analogs
   B-F-B cycle: no healing - endoreplication.
2. fusion of broken ends - basic - $\sigma \times \varphi$ = fusion. 1941
   Generalized behavior
3. Genome shock - Transposable elements 1944-45
   Regulation of gene action - 1944-45 [no DNA necessary]