Perspectives

Anecdotal, Historical and Critical Commentaries on Genetics

Edited by James F. Crow and William F. Dove

Sixty Years Ago: The 1932 International Congress of Genetics

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THE Sixth International Congress of Genetics, in Ithaca, New York in August, 1932 must have been an exciting experience in those dreary, depression, dust-bowl years. Five hundred and sixty-two people came to Cornell from 35 countries, often at considerable financial sacrifice, for in those days participants paid their own expenses (Figure 3 (foldout)).

The Congress (JONES 1932) featured demonstrations of living organisms, charts, photographs, and hundreds of microscopes for viewing specimens, especially cytological. Exhibits included 15 groups of invertebrates, including aphids, echinoderms, mollusks and tunicates, many with living specimens. There were 15 vertebrate species and 35 genera of plants. In addition there were an equal number of vegetable crops, flowers and fruits. The description of the exhibits took about 250 pages in the volume of abstracts available at the start of the Congress. The sheer magnitude and variety must have been overwhelming. The living plant exhibits, extending over about a hectare, attracted the most attention. These involved careful planning, with many of the types grown experimentally the year before to determine planting time so that demonstrations would peak in August. This was done under the supervision of MARCUS RHOADES, who did much of the field work himself, and that same year received his Ph.D. from Cornell. (RHOADES recently died and will be the subject of an obituary in a forthcoming issue.) The most popular exhibit was a "living chromosome map" in which mutant maize plants were arranged in positions corresponding to the locations of the mutations on the linkage map (Figure 1). The Congress set aside ample time for seeing the exhibits, including all day Sunday for those who didn't want to see Niagara Falls. Like the currently popular poster sessions, these offered the opportunity for individual discussions. According to the Congress description, "Even a most retiring person will easily find an opportunity to approach a person demonstrating his exhibits, in order to ask a question or to start a discussion."

My reason for featuring this particular Congress, however, is not the exhibits, but the number of outstanding addresses that have had a lasting influence. The year 1932 was near the end of the golden era of classical genetics, the period when the tools were breeding experiments and the microscope and when the riddles of genetic transmission were largely solved. The advances of the previous 32 years had created the new science of genetics.

Before discussing the Sixth Congress, I'll briefly mention some other early ones. The First antedated the rediscovery of MENDEL's laws. The "International Conference on Hybridisation and on the Cross-Breeding of Varieties" was held in London on July 11–12, 1899 at the instigation of the Royal Horticultural Society. The Congress featured a talk by WILLIAM BATESON, soon to become one of MENDEL's earliest and strongest supporters. The Second "International Conference on Plant Breeding and Hybridization" occurred in 1902, in New York City. Four years later the Royal Horticultural Society again convened an "International Conference on Hybridisation and Plant Breeding" in London in 1906, and again BATESON was featured, this time as President. In his talk he urged that his new verbal construct *genetics* be adopted. Accordingly, the printed volume was entitled *Report of the Third International Conference on Genetics*. For the first time, animal experiments were included. The Fourth Congress of Genetics took place in Paris in 1911. The Fifth was scheduled for 1916, five years later, but World War I intervened, and it was not held until 1927, in Berlin. By then genetics and geneticists had grown; 903 members from 35 countries attended, and the *Proceedings* include 148 papers.

The Sixth Congress, the subject of this essay, was held on schedule five years later. The Seventh was

FIGURE 1.—A living chromosome map, with maize mutations planted in positions corresponding to their map locations. From COOK (1932).

planned for 1937 in Moscow, but was postponed a year by the National Academy of the USSR and was eventually held in Edinburgh in 1939. One month before the opening the Russian delegation withdrew and 50 papers were cancelled. On the second day of the Congress, British citizens living in Germany were advised to return home and several non-British delegations left. The Congress continued, however, with most of the members remaining. On September 1, the day after adjournment, fighting began on the Polish-German border. The *SS Athenia* with several geneticists aboard was torpedoed in the Atlantic. B. PRICE, C. W. COTTERMAN, W. LAWRENCE and W. R. SINGLETON survived but the F. W. TINNEYs of the University of Wisconsin perished.

To return to the 1932 Congress: the President was T. H. MORGAN (Figure 2). His attendance was greeted with great relief, for he had recently been in a severe automobile wreck and his friends feared that he would not recover in time. MORGAN's address dealt mainly with history, but he listed what he regarded as the five most important problems. They were: (1) "growth and duplication" of genes; (2) physical interpretation of synapsis and crossing over; (3) relation of genes to characters; (4) nature of the mutation process; (5) application to plant and animal breeding. This reflected the state of genetics at the time. Transmission genetics was essentially solved, and it was time to understand the gene and development in a more basic way. MORGAN had no way of knowing that the study of tiny organisms and enormous molecules would converge in the decades ahead.

One of the most exciting and influential addresses was delivered by H. J. MULLER. This was not long after his discovery of X-ray mutagenesis, and he exploited this tool to the fullest. He reviewed the induction of mutations and chromosome breakage by radiation, and among other things emphasized how the use of deletions enabled him to discern the difference between gain and loss of gene function. He introduced the now-standard vocabulary of amorphic, hypomorphic, hypermorphic, neomorphic and antimorphic mutations. MULLER also introduced the idea of dosage compensation and its elucidation by hypomorphic mutations. Although his preferred mechanism turned out to be wrong, the observation was remarkably astute and the generalizations from it to the meticulousness of evolution remarkably far-reaching. I have long enjoyed MULLER's reasoning from dosage compensation of *mutant* alleles to the conclusion, later abundantly confirmed, that *normal* alleles are not completely dominant. What a wealth of ingenuity of both concept and experimental trickery he displayed! Those who claim MULLER as *the* idea man of early genetics can find ample supporting evidence here.

A. H. STURTEVANT, with typical conciseness, discussed the possibility of using mosaics for elucidating developmental patterns. The newly discovered *claret* mutation in *Drosophila simulans*, which produced a high rate of nondisjunction in early cleavage, greatly facilitated this analysis. It was to be many years before the corresponding mutation was found in *Drosophila melanogaster*. The system was then exploited for fate mapping and neurogenetics, and SEYMOUR BENZER coined the eponymous unit *sturt*.

CURT STERN presented his famous experiment using translocations to demonstrate the physical reality of crossing over. His diagram from this Congress has been reproduced in one textbook after another. Essentially the same experiment had been done in maize by HARRIET CREIGHTON and BARBARA MC-

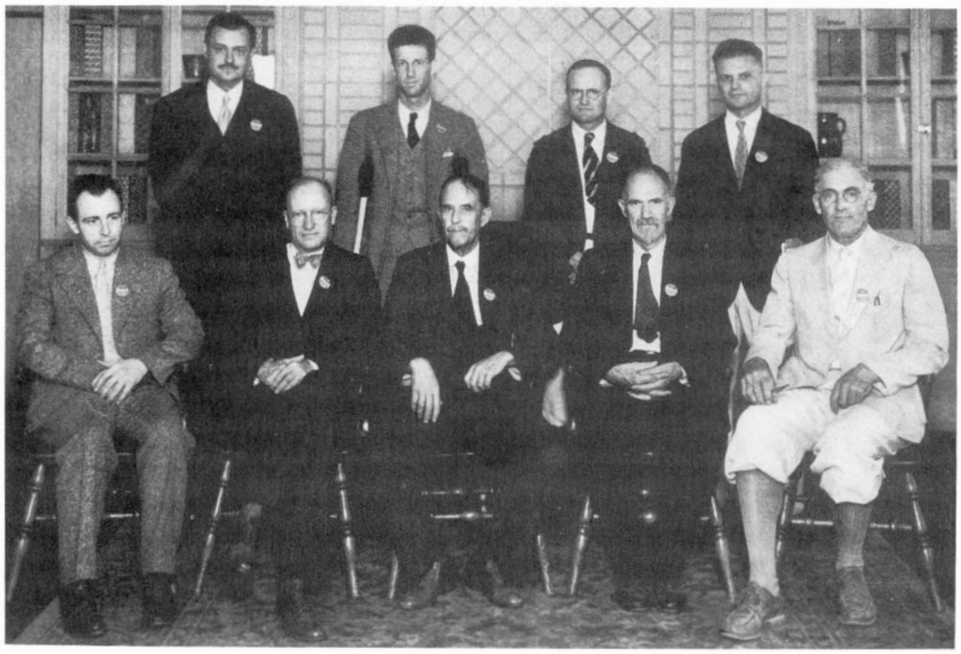

FIGURE 2.—The Executive Council. Front row: R. C. COOK, treasurer; E. M. EAST, program chairman; T. H. MORGAN, president; C. B. DAVENPORT, finances; R. A. EMERSON, local committee. Back row: C. C. LITTLE, secretary; L. C. DUNN, transportation; D. F. JONES, publications; M. DEMEREC, exhibits. From COOK (1932).

CLINTOCK, but was published elsewhere. At this Congress they went further and used doubly heteromorphic chromosomes to demonstrate four-strand crossing over. This was a subject of interest at the time because of BELLING's hypothesis of crossing over as a copying switch between newly replicated strands, which would not permit four-strand exchange. McCLINTOCK's name appears at many places in the proceedings. She gave a paper on nonhomologous chromosome associations. She also did the cytology for another important paper, that of L. J. STADLER. STADLER, deep and thoughtful as always, argued cogently that radiation produces mainly chromosome rearrangements and few, if any, "real" gene mutations.

In contrast, TIMOFÉEFF-RESSOVSKY discussed forward and backward mutations in great detail and believed that X-rays could indeed produce both. He ended his paper on a euphoric note: "We geneticists are in a very happy condition: our science is young, its 'development curve' is rising rapidly and the future will bring us the most interesting facts and views concerning the gene problem." Alas, this was one year before Hitler came to power and TIMOFÉEFF's life changed for the worse as he was caught up in both tragic dictatorships, Germany and USSR.

R. A. EMERSON gave a thorough review of maize genetics. All 10 linkage groups had by then been identified, some 100 mutations had been assigned to a group, and about 50 had been reasonably well mapped (Figure 1). The assignment of linkage groups to chromosomes was done mainly by McCLINTOCK, using trisomics. The trisomics, in turn, were obtained using GEORGE BEADLE's asynaptic gene, which produced abundant triploids from which all the primary trisomics were easily derived. EMERSON also described the variegated pericarp genes, now known to be the result of a transposable element. Later R. A. BRINK made this mutant the focus of his study, and variegated pericarp became a part of the McCLINTOCK legend.

BEADLE was just deserting corn for Drosophila and was engaged in showing, through the use of attached-*X* chromosomes, that crossing over was a four-strand phenomenon and that chromatid interference was negligible. The genetical and cytological analysis of crossing over was an important subject at the time and several other papers were also devoted to it.

A. F. BLAKESLEE described a mountain of work on the jimsonweed, Datura. Cleverly starting with a doubled haploid, he systematically found all the primary trisomics and most of the possible secondaries (extra isochromosomes) and tertiaries (fusions of arms from different chromosomes). Each had a characteristic phenotype which, because the strain was isogenic to begin with, was caused solely by gene dosage effects. (I recall the euphoric but short-lasting belief shared with my late colleague KLAUS PÄTAU, after the discovery of the first human trisomic, that by analogy with Datura he would soon identify 22 more.) BLAKESLEE also used the trisomics to assign mutant genes to specific chromosome arms. All the Datura species had the same chromosome morphology and number, yet

FIGURE 3.—Group photograph made on August 25, 1932. Of 562 members registered at Ithaca, 389 are shown.

1 F. A. E. Crew
2 F. B. Hutt
3 Katherine S. Brehme
4 R. G. Jaap
5 Edward J. Wenstrup
6 Sara F. Passmore
7 J. L. S. Simpson
8 Florence L. Barrows
9 Helen Besley
10 Helen Houghtaling
11 Solomon Horowitz
12 G. L. Slate
13 W. H. Alderman
14 John T. Bregger
15 David H. Thompson
16 A. P. French
17 Glen Salisbury
18 E. E. Heizer
19 Kenneth L. Turk
20 Stuart N. Smith
21 Jack Schultz
22 L. J. Stadler
23 A. C. Fraser
24 T. H. Morgan
25 R. A. Emerson
26 F. P. Bussell
27 C. C. Hurst
28 J. W. Gowen
29 E. H. Gay
30 E. W. Lindstrom
31 Anastasia J. Romanoff
32 N. Dobrovolskaia-Zavadskaia
33 Mrs. F. W. Herriott
34 George Haines
35 Th. Dobzhansky
36 L. C. Dunn
37 Lua A. Minns
38 Lillian Phelps
39 R. J. Kamenoff
40 Marcus M. Rhoades
41 Barbara McClintock
42 Virginia H. Rhoades
43 Harriet B. Creighton
44 Luther Smith
45 L. H. Newman
46 G. H. Cutler
47 W. W. Worzella
48 W. R. B. Robertson
49 F. A. Hays
50 Mrs. F. A. Hays
51 B. Rosiński
52 Zenas H. Ellis
53 Myron Gordon
54 J. B. S. Haldane
55 L. R. Waldron
56 E. F. Gaines
57 Margaret Gaines
58 Mrs. J. Rheinheimer
59 J. Rheinheimer
60 George H. Shull
61 G. P. Frets
62 N. R. Speiden
63 C. F. Feng
64 E. S. McFadden
65 Matthew Fowlds
66 Curt Stern
67 MildredHoge Richards
68 C. D. Darlington
69 O. L. Mohr
70 Mrs. O. L. Mohr
71 Mrs. Barbara Davis
72 Mary Crawford
73 H. Timoféeff-Ressovsky
74 Mrs. Gertrude Lindegren
75 Carl C. Lindegren
76 F. S. Howlett
77 W. P. Spencer
78 Noel L. Bennion
79 S. J. Holmes
80 C. L. Huskins
81 L. C. Glass
82 S. M. Saenko
83 Mrs. S. Belfield
84 Roy E. Gibson
85 A. Richards
86 H. H. Newman
87 C. R. Stockard
88 A. H. Estabrook
89 Lois Lampe
90 W. D. Merrell
91 E. B. Babcock
92 L. H. Snyder
93 Mrs. L. H. Snyder
94 Corrado Gini
95 A. Vandel
96 A. Ghigi
97 R. Goldschmidt
98 L. G. Kulkarni
99 C. Stuart Christian
100 L. Gordon Miles
101 E. Chrobooczek
102 P. C. Ma
103 John H. Schaffner
104 Mrs. John H. Schaffner
105 Yun-Kuei Yang
106 C. H. Chung
107 E. A. Lods
108 D. W. Robertson
109 W. J. Sando
110 W. H. Leonard
111 T. R. Stanton
112 G. F. Sprague
113 A. A. Byran
114 Florence Stuck
115 W. G. Einsele
116 Mrs. T. H. Morgan
117 F. M. Vicari
118 Catherine V. Beers
119 Mary B. Stark
120 G. O. Hall
121 W. A. Maw
122 Maurice Proulx
123 J. L. Lush
124 D. C. Warren
125 Charles W. Upp
126 H. B. Goodrich
127 J. W. Mavor
128 Raymond T. Moyer
129 C. C. Kwan
130 C. K. Parris
131 F. D. Richey
132 R. A. Fisher
133 Alexander Weinstein
134 Daniel Raffel
135 Mrs. A. Vandel
136 H. R. Hunt
137 Kurt Hubert
138 A. E. Brandt
139 P. W. Gregory
140 G. L. Stebbins, Jr.
141 A. P. Saunders
142 A. B. Stout
143 C. G. Bowers
144 J. T. Buchholz
145 G. W. Woolley
146 H. O. Hetzer
147 M. T. Macklin
148 N. I. Vavilov
149 E. F. Grossman
150 D. D. Whitney
151 S. I. Kornhauser
152 W. T. M. Forbes
153 J. H. Gerould
154 N. Timoféeff-Ressovsky
155 F. R. Immer
156 L. R. Powers
157 Jane Spier
158 Marie Hearne
159 J. S. Bangson
160 J. P. Kelly
161 C. D. Gordon
162 Arthur B. Chapman
163 John H. Quisenberry
164 Walker M. Dawson
165 William H. Eyster
166 W. T. Macoun
167 R. Summerby
168 H. Nachtsheim
169 Harry Federley
170 Kristine Bonnevie
171 Mrs. Hansen
172 C. H. Mahoney
173 Mrs. Helen D. Hill
174 J. Ben Hill
175 J. Sanders
176 E. J. Gumbel
177 René Vandendries
178 A. Zulueta
179 Jacques Rousseau
180 L. J. Cole
181 E. N. Wentworth
182 F. B. Morrison
183 C. J. Lynch
184 Wilhelmina F. Dunning
185 A. Schmid
186 E. W. Sinnott
187 A. F. Blakeslee
188 R. Ruggles Gates
189 H. H. Strandskov
190 Edward C. Colin
191 M. N. Weismann
192 Nathan Kaliss
193 A. C. Scott
194 Haig Dermen
195 G. B. Durham
196 Reginald H. Painter
197 B. Nebel
198 Lillian Hollingshead Hill
199 George S. Carter
200 R. J. Garber
201 Max M. Hoover
202 J. A. B. Nolla
203 V. W. Jackson
204 John T. Corfts
205 W. H. Longley
206 A. Franklin Shull
207 J. T. Patterson
208 D. E. Lancefield
209 F. A. Varrelman
210 Herbert S. Warren
211 Virgene Warbritton
212 G. Pincus
213 C. B. Davenport
214 R. S. McEwen
215 E. C. MacDowell
216 E. M. East
217 Fred N. Briggs
218 J. L. Collins
219 E. Eleanor Carothers
220 P. W. Whiting
221 Roger de Vilmorin
222 J. W. MacArthur
223 R. K. Nabours
224 John J. Bittner
225 Wm. H. Gates
226 Mrs. Wm. H. Gates
227 Ruth Marshall
228 Ö. Winge
229 A. M. Banta
230 S. C. Harland
231 O. E. White
232 R. A. Brink
233 D. N. Shoemaker
234 Paul A. Warren
235 A. F. Swanson
236 E. P. Hume
237 O. D. Smith
238 T. Hawryluk
239 G. A. Lebedeff
240 C. W. Metz
241 Ralph E. Cleland
242 Karl Sax
243 B. O. Dodge
244 B. L. Warwick
245 Mrs. Adeline Van Lone
246 E. E. Van Lone
247 J. E. Bowstead
248 D. G. Steele
249 H. R. Albrecht
250 D. C. Cooper
251 Ruth H. Lindsay
252 P. H. Senn
253 N. P. Neal
254 M. C. Parker
255 Henri Prat
256 L. C. Strong
257 J. W. Lesley
258 H. U. Good
259 E. H. Hart
60 H. D. King
61 L. F. Whitney
62 E. G. Ritzman
63 Paul Popenoe
64 Mrs. W. E. Castle
65 Mrs. F. S. Tulloss
66 Beatrice Johnson-Little
67 Robert Cook
68 Hugh C. McPhee
69 Elmer Roberts
70 B. P. Kaufmann
71 Burch H. Schneider
72 L. R. Watson
73 J. R. Livermore
74 R. B. Hinman
75 W. Neely
76 Arturo Roque
77 Carlos A. Krug
78 Tage Kemp
79 J. Clausen
80 L. C. Thomas
81 W. F. Hanna
82 L. E. Kirk
83 O. McConkey
84 G. P. McRostie
85 T. R. Wood
286 Mary J. Brown
287 Mary Eleanor Davis
288 Donald W. Davis
289 Martha H. Scott
290 Donald F. Jones
291 M. Demerec
292 R. G. Wiggans
293 A. M. Brunson
294 S. G. Smith
295 H. D. Goodale
296 H. E. Warfel
297 Mrs. B. P. Kaufmann
298 Ernest C. Diver
299 A. E. Clarke
300 Alan Deakin
301 A. H. Hersh
302 T. W. Whitaker
303 Ladley Husted
304 Wilbur M. Luce
305 Merle T. Jenkins
306 W. R. Singleton
307 T. L. Smith
308 H. M. Showalter
309 S. H. Yarnell
310 H. L. Ibsen
311 Albert Lorz
312 Alfred Marshak
313 S. O. Burhoe
314 P. C. Mangelsdorf
315 Edgar Anderson
316 Kenneth Kopf
317 W. J. Duchemin
318 W. E. Castle
319 C. C. Little
320 N. F. Waters
321 C. V. Green
322 Horace Feldman
323 J. M. Murray
324 J. B. Park
325 A. E. Waller
326 Alan Boyden
327 H. H. Plough
328 A. H. Sturtevant
329 C. R. Plunkett
330 E. W. Erlanson
331 H. A. Senn
332 Eva M. Tully
333 S. H. Emerson
334 Ruth E. Lenderking
335 Emerson G. Knowles
336 Philippe L'Heritier
337 Charles Zeleny
338 M. R. Irwin
339 J. I. Kendall
340 G. D. Snell
341 H. Bentley Glass
342 E. M. Perry
343 M. M. Perry
344 Mrs. B. O. Dodge
345 Hally J. Sax
346 Wm. H. Brittingham
347 S. K. Ru
348 Otto S. Margolis
349 A. L. Baron
350 George P. Child
351 L. H. Hamilton
352 M. H. Harnly
353 R. O. Earl
354 E. Grace White
355 M. A. Hayden
356 L. W. Taylor
357 N. A. MacRae
358 T. J. Arnason
359 W. H. McGibbon
360 Howard B. Frost
361 Floyd Ingersoll
362 W. V. Lambert
363 C. R. Burnham
364 F. A. Coffman
365 A. J. G. Maw
366 F. B. Meacham
367 J. B. Cotner
368 C. H. Bostian
369 R. A. Derick
370 A. G. Whiteside
371 J. R. G. Sutherland
372 Edward W. Shrigley
373 H. J. Fitzpatrick
374 W. G. McGregor
375 J. M. Armstrong
376 G. H. Stringfield
377 W. K. Smith
378 P. B. Sawin
379 F. H. Clark
380 S. C. Reed
381 Everett B. Clark
383 R. Cumming Robb
384 F. A. Krantz
385 Elliot
386 T. M. Currence
387 A. N. Wilcox
388 G. H. Rieman
389 Herbert P. Riley

the hybrid meioses produced chromosome rings, showing that the chromosome arms had been extensively shuffled by translocations–a most convincing demonstration that translocations were an important part of the evolutionary process.

A high point of the 1932 Congress was the paper by N. I. VAVILOV, in which he reported extensive geographical studies of the wild relatives of cultivated plants. He described a series of polyploid potatoes in South America, wheat varieties in Abyssinia, and many others. In those premolecular days, he realized that one could compare noncrossable species by looking for homologous chromosome changes and genetic variants. He emphasized that the future of plant breeding must rely on wild varieties as sources of useful genetic variability and established foundation stocks in widely different latitudes in the USSR. Alas, VAVILOV's methods promised only hard work, more geographical expeditions, and slow (but certain) improvement of cultivated crops. In contrast LYSENKO's expansive promises based on his eccentric Lamarckian views caught Stalin's eye. It is ironic that, in his Congress paper, VAVILOV called attention to the "remarkable discovery" by LYSENKO of "simple physiological methods of shortening the period of growth, of transforming winter varieties into spring ones and late varieties into early ones by inducing processes of fermentation in the seeds before sowing them," thereby building up the man who would later be his ruination.[1] VAVILOV was the first of four speakers in a session on evolution. The other three were R. A. FISHER, J. B. S. HALDANE and SEWALL WRIGHT. This was one of the few times, if not the only one, that this triumvirate who founded the genetical theory of evolution appeared on the same platform. The session was organized by E. M. EAST, who asked each of the speakers to give a nonmathematical presentation. HALDANE asked, "Can evolution be explained in terms of known genetical facts?" He concluded that a great many facts can be explained qualitatively and quantitatively, and "while we cannot yet explain all evolutionary phenomena in terms of known genetical facts, the number of phenomena so explicable increases every year, and there is no sign that the possibilities of explanation are reaching a limit." FISHER artfully noted that his title might well have been, in antiparallelism to HALDANE's, "Can genetical phenomena be explained in terms of known evolutionary causes?" and discussed the evolution of such genetic fundamentals as dominance and linkage. He accepted EAST's advice to suppress the mathematics and said, "As I am a mathematician by trade, perhaps I should explain that I shall use no mathematics, partly because I recognize that the first duty of a mathematician, rather like that of a lion tamer, is to keep his mathematics in their place." WRIGHT's paper has turned out to be the most influential of the three. This is partly because FISHER and HALDANE had both recently completed books that developed their ideas more completely, whereas WRIGHT had only written a paper that hardly anyone understood. His paper at the Congress was his first attempt to explain verbally the importance of population structure, random drift, and differential migration–what he later called the "shifting balance" theory of evolution, as controversial today as it was in 1932. WRIGHT spent much of the remainder of his long life restating the theory and arguing for it, but hardly changing it. My pleasure in writing this essay was enhanced by working with WRIGHT's well-worn copy of the *Proceedings* and inferring from his annotations on the abstracts which talks interested him most.

In addition to the plenary speakers, there were about 200 papers. T. S. PAINTER and MULLER reported a cytological map of Drosophila. This was made from metaphase chromosomes, salivary chromosomes having not yet been discovered, and showed a large variation in gene density in different chromosome regions. C. C. LITTLE, the founder of The Jackson Laboratory, argued against a highly publicized view that cancer in mice was a single recessive. DOBZHANSKY and STURTEVANT discussed variegated position effects produced by translocations. GEORGE SNELL, later to win a Nobel Prize for his work on histocompatibility, reported fertility reduction in irradiated mice, presumably the result of translocations. H. H. NEWMAN described 10 sets of identical twins who had been reared apart. D. F. JONES reported using two mutant genes to create a heterosexual strain of maize. (Some years later I explained the fundamentals of genetics to him, not knowing who he was. He was a quick study.) LILLIAN V. MORGAN described the properties of a ring chromosome, including the predicted absence of single exchanges. There were scores of papers using plants and animals other than Drosophila and maize. There was also a paper entitled "Genetical Engineering," meaning the application of genetic principles to animal and plant breeding. It is fascinating to see what kinds of problems were attracting attention in those days and what kinds of methods

[1] VAVILOV was named president of the 1939 Congress in Edinburgh. Shortly before the opening, he sent a letter noting that the Congress had been postponed for a year by the Academy of Sciences of the USSR so as to make better arrangements, and added, "The International Committee, however, postponed the Seventh International Congress of Genetics until 1939 and chose as its place of meeting not the USSR but another country. Under such circumstances Soviet geneticists and plant and animal breeders do not consider it possible to take part in the Congress." Nobody who knew VAVILOV thought this represented his true feelings. F. A. E. CREW was then chosen President and, with his usual grace, said, "I understand that in those places where films are made, every star has his shadow (technically known, I think, as a 'stand-in') who is required to look more or less like his principal and to take his place in the more arduous parts of his role. I would suggest to you that at the moment this is exactly what I am–a stand-in for a star. You invite me to play a part that VAVILOV would have so adorned. Around my unwilling shoulders you drape his robes, and if in them I seem to walk ungainly, you will not forget that this mantle was tailored for a bigger man" (PUNNETT 1939). Soon after, VAVILOV was arrested and died in prison.

were used. The variety of animal and plant species discussed was much greater than at a genetics meeting today.

What about the day-to-day aspects of this Congress? Remember that 1932 was the worst of the depression. Almost everybody was poor, and there were no grants to pay travel and living expenses. Nevertheless, 856 registered. The total expenses of the Congress were $17,583.58. For comparison, the 1988 Toronto Congress spent Can$1,396,701.16 (≈US$1,135,000) and 3702 attended.

The advance registration fee was $10 for full members and $6 for students. Those who couldn't afford the whole fee at one time could pay $5 down and the balance on arrival. Rooms in the residence halls at Cornell were $1.75 per day and rates in private rooming houses in the campus area ranged from $1.00 to $1.50. Those who traveled by car were told that "there are several very attractive camping places within thirty minutes' drive of Ithaca." Railroad fare from New York to Ithaca was $8.93 and attendees could get a round trip with various excursion privileges for 50% more. But the hard times took their toll; of 856 registered, only 562 were able to attend.

Despite great advances around the periphery, the central question of genetics–the nature of the gene, and how it replicates and mutates–was still elusive. In a review of the Congress, R. C. COOK (1932) said that "Oceans of words were spilled in formal and informal gatherings to discuss the vital question: 'What is the gene?' but that important entity is still elusive. Perhaps in 1937 the answer may be forthcoming." He was too optimistic; it would be two decades before WATSON and CRICK turned the trick.

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