very small[2]—and should, therefore, according to the chromosome theory, have six linkage groups, one of which might be expected to contain relatively few genes. From present evidence it seems probable that the five linkage groups, thus far detected, represent the five large pairs of chromosomes. Detection of the sixth group, representing the very small pair, would hardly be expected until a larger number of mutants had been obtained.

The data upon which these conclusions are based will be published in detail elsewhere, but may be summarized as follows:

Fourteen of the 27 characters are sex-linked, forming Group I. The remaining (non-sex-linked) characters fall into four groups—Group II. with three characters, Group III. with four characters, Group IV. with three characters and Group V. with three characters.

Maps of the five groups, based on crossover values, as determined thus far, are respectively about 90, 40, 60, 0 and 20 units long. These lengths are based, respectively, on data involving 12, 2, 4, 3, and 2 "loci," and hence will probably be extended considerably when more characters are studied. Although the values are only approximations, because of the small number of genes involved, they show that a relatively large amount of crossing over occurs in some of the groups. In the fourth group the three genes appear to be completely linked, but since there is no other evidence to indicate that they are allelomorphs they are assumed, tentatively, to represent three different loci.

Owing to the fact that in *D. virilis,* as in *D. melanogaster,* there is no indication of crossing over in the male, it has been possible to secure clear-cut evidence of the distinctness of the linkage groups, because back-crosses of heterozygous males always give complete linkage, if the genes belong to the same group, or free segregation if they do not. Thus representatives of each group (exclusive of the sex-linked group) have been tested with representatives of every other group and found to give free segregation, whereas with members of their own groups they gave complete linkage. The crossover values were, of course, obtained by back-crossing females instead of males.

It should be noted that in the case of the fourth group no crossing over has yet been detected in either sex, but only three characters have been studied in this group, and there can be little doubt that the sexual difference, as regards crossing over, will prove to be the same here as in the other groups.

Chas. W. Metz
Station for Experimental Evolution,
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[2] See Metz, C. W., *Amer. Nat.*, Vol. L., pp. 587–599, October, 1916.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SECTION H—ANTHROPOLOGY AND PSYCHOLOGY

At the St. Louis meeting of the American Association for the Advancement of Science, Section H presented a two-day program. The Monday morning program was given over to papers of especial anthropological interest. Unfortunately due to conflict in the announcements few were present and the session was postponed, resulting in only a few papers being given. On Tuesday morning the Section united with Section L—Education—in a joint program. The address of the retiring chairman of the Section, Dr. Aleš Hrdlička, was entitled "The relations of anthropology and psychology."

Due to action of the Council of the Association the old Section H—Anthropology and Psychology—has been divided up into new sections. The new Section H will be restricted to anthropology and the new Section I to psychology. Officers for both Sections were elected on Tuesday afternoon.

The officers for Section H—Anthropology—are: *Vice-president of the Association and chairman of the Section,* Dr. G. B. Gordon, University Museum, Philadelphia, Pa.; *Secretary,* Dr. E. Hooton, Peabody Museum, Cambridge, Mass.; *Members of Sectional Council,* Dr. F. W. Hodge, Museum of the American Indian, 1 year; Professor R. J. Terry, Washington University, 2 years; Dr. B. Laufer, Field Museum of Natural History, Chicago, 3 years; and Dr. Aleš Hrdlička, United States National Museum, 4 years.

The officers for Section I—Psychology—are: *Vice-president of the Association and chairman,* Professor Edward K. Strong, Jr., Carnegie Institute of Technology; *Secretary,* Professor F. N. Freeman, University of Chicago (for 4 years);

Members of Sectional Council, Professor W. D. Scott, Northwestern University, 1 year; Professor W. S. Hunter, University of Kansas, 2 years; Dr. J. E. W. Wallin, Psycho-Educational Clinic, St. Louis, 3 years; Dr. Helen T. Woolley, Vocational Bureau, Cincinnati Public Schools, 4 years.

A resolution was received from Felix Neumann, secretary of the Anthropological Society of Washington, in reference to an open letter, entitled, "Scientists as spies," written by Dr. Franz Boas, and which was published in *The Nation* of December 20, 1919.

After the article in question was read and discussed at some length, it was regularly moved and carried that "Section H indorses the resolution of the Anthropological Society of Washington." It was further voted that a committee composed of Dr. R. M. Yerkes, Dr. Aleš Hrdlička and Dr. J. E. W. Wallin, take such action concerning the resolution as they deem appropriate.

The following papers were presented:

Notes on the variation between the right and left limbs of man as observed in a small series in the dissecting laboratory: H. C. DANFORTH. (By title.)

Utilization of dissecting room material for the study of physical anthropology: R. T. FERRY. (By title.)

On certain variations in the form of the human scapula: W. W. GRAVES. A large collection of scapulas, both of man and of animals, were shown by specimens and on the screen. Variations of many sorts were pointed out.

The occipital (supra-inionic) forsa, and its true significance: A. HRDLIČKA. (By title.)

Theories of sternal origin: F. B. HANSON. By title.)

The St. Louis group of mounds: H. M. WHELPLEY. St. Louis became known as the "Mound City," early in the nineteenth century. This was due to a group of twenty-seven mounds on the Mississippi River bank, near what is now the business center of the city. As early as 1819, Major Stephen H. Long made what was probably the first map of the mound group. The twenty-six smaller mounds were destroyed before 1850. The remaining "Big Mound," which was one hundred and fifty feet long and about thirty feet high, was removed in March and April, 1869. Professor Spencer Smith had recently read a paper before the Academy of Science of St. Louis in which he gave seemingly convincing evidence that the mound was a natural formation. This prevented the local universities and scientific organizations from taking an interest in the demolition of the mound. A local artist, A. J. Conant, a photographer, Thomas M. Easterly, and the editor of the Missouri *Democrat,* seem to have been the only ones who followed the destruction of the mound with scientific interest. Conant was present daily. The Missouri *Democrat* describes the excitement caused when the workmen found at the base of the mound a sepulcher over seventy-four feet long, twelve feet wide and several feet high. It contained many human skeletons and a large quantity of shell beads. The editor said: "This stunned the zealous advocates of the natural formation theory." The paper was illustrated with a series of slides made from daguerreotypes, taken by Mr. Easterly, showing successive stages of the work of demolition of the mound.

Notched flint hoes of St. Louis and vicinity: H. M. WHELPLEY. The flint agricultural implements of the pre-Columbian Indians are designated as "spades and hoes." The spades are so called because they somewhat resemble in shape the blade of a modern iron spade. There is no evidence, whatever, that these blades of flint were ever hafted like our spades of to-day or employed as we use spades. The word "spade" is a misnomer. All flint agricultural implements should be termed "hoes." The hoes are divided into notched and unnotched. The notched hoes form but a small per cent. of the total number of flint hoes. They are distributed over a much more restricted area than the unnotched form of hoes. Flint hoes in general are found over a small section of the Mississippi Valley. The author proposes fourteen terms to designate the various parts of a notched hoe. Six points were considered under "Standard of Perfection." The term "flint" is used in the popular sense. Nearly all of the notched hoes are made from Union county, Illinois, chert. A few are of novaculite, quarried by the Indians in the same county. Occasionally, specimens were made from "Alton flint," from bluish flint balls, and perhaps from St. Louis county flint. The usual type of notched hoe is oval but some are triangular and a few rectangular. The influence of material on type was discussed and the evolution of the notched from the unnotched shown by a long series of successive stages of evolution. Attention was given the probable methods of manufacture. The author has for forty years studied the quarries and work-shops. The finest implements are found in St. Clair and Madison counties, Ill., far from the

quarries. Few hoes occur west of the Mississippi River. The gradation of notched hoes into axes, hammers and other artifacts was demonstrated. This paper was based on the study of several hundred specimens in the collection of the author.

Notes on the sitting height in man: R. B. Bean. (By title.)

Clinical study as a type of experimental education: F. N. Freeman. Psychological research in the field of learning has in recent years consisted largely of mass studies or studies of groups of individuals. For example, a common method is to compare the effectiveness of two methods of learning by comparing the average score made by a group which pursues one method with the average score obtained by the other method. These averages often conceal important variations from the rule in the case of individuals. It is necessary to make analysis of the factors involved in such cases if the laws of learning are to be completely understood. The clinical study of a child afflicted with congenital word-blindness illustrates such an analysis. The case was diagnosed as hopeless by a well-known oculist. Difficulty with reading was reported in the case of two near relatives. The Binet test and several specialized tests revealed no defect other than the inability to read. Photographs of the eye movements in reading showed serious lack of coordination. In spite of four years of schooling the child had less than median first-grade reading ability. Forty minutes training a day, in which phonics were abandoned and direct practise in comprehension together with the prevention of attention wandering and eye wandering were emphasized, resulted at the end of ten weeks in better than third-grade reading ability and in much better coordinated eye movements.

The concept of feeble-minded, especially the moron: J. E. W. Wallin. Feeble-mindedness is not primarily a medical or psychological concept, but a socio-legal concept, referring to a condition of social and industrial dependency due to intelligence defectiveness dating from birth or from early life, and should only be used in this sense. The practise has been very widely followed of considering that the highest grade of feeble-minded persons develops to an intelligence level of twelve years. The writer's conclusion, based on the individual examination of thousands of subjects, is in complete agreement with the finding of the division of psychology in the army that the highest grades of mental defectives, the so-called morons, do not develop beyond an intelligence level of nine years, and that some persons who stagnate at the ninth-year level can not be considered feeble-minded. On the basis of the 70 I.Q. standard of feeble-mindedness, and the average intelligence age of the selective service men, the highest intelligence level reached by the feeble-minded would be 9.2 years. These findings necessitate the complete rejection of the concept of the "middle" and "high-grade morons," and a considerable lowering of the borderland region. The borderland region probably must be placed between the upper limit of age seven and the upper limit of age nine or at most ten (by the Stanford scale), instead of between ages ten and twelve. In other words, persons who reach an intelligence level of ten years should be classified as borderland, backward or dull. The gradual appreciation of the above facts has recently led to the proposal that the concept of feeble-mindedness be extended beyond its traditional connotation of intelligence deficiency, so as to include individuals who are emotionally, temperamentally or volitionally defective or unstable, even though they may be normal in intelligence. This extension is unacceptable. Such individuals can not be considered feeble-minded unless they are sufficiently intellectually deficient to be so regarded, but must be classified otherwise. The term defective delinquents is suggested for emotionally or temperamentally unstable delinquents who are in need of restraint or special care and who are of borderline, backward or normal intelligence—and thus not feeble-minded—and who can not be placed in a definite, clear-cut classification, such as psychotic, psychopathic, neurotic, hysterical, choreic or epileptic.

(*To be concluded*)

Edward K. Strong,
Secretary

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